JOURNAL OF THE MALAYSIAN INSTITUTE OF PLANNERS

PLANNING MALAYSIA

MALAYSIA INSTITUTE OF PLANNERS
PLANNING MALAYSIA VOLUME 20 ISSUE 5 (2022)
[ISSN 1675-6215] e-ISSN 0128-0945]
www.planningmalaysia.org

PLANNING MALAYSIA

Journal of the Malaysian Institute of Planners

Editorial & Business Correspondence
PLANNING MALAYSIA
Journal of the Malaysian Institute of Planners
B-01-02, Jalan SS7/13B, Aman Seri, Kelana Jaya
47301, Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: +603 78770637 Fax: +603 78779636 Email: mip@mip.org.my
www.planningmalaysia.org

This journal is a refereed journal.
All articles were reviewed by two or three unanimous referees identified by the Institute (MIP).

Published By
Malaysian Institute of Planners

ISSN Number
1675-6215
e-ISSN
0128-0945

Date Published: 12th December 2022

CONTENTS

MIP Council Members
2019 - 2021 Session

President
Datin TPr. Hjh Noraida Saludin (468/02)

Immediate Past President
TPr. Hj Ihsan Zainal Mokhtar (305/94)

Vice President
TPr. Lee Lih Shyan (267/92)
Datin TPr. Hjh Mazrina Dato' Abdul Khalid (559/09)

Honorary Secretary
TPr. Hj. Abdul Hamid Akub (450/01)

Honorary Treasury
TPr. Wan Andery Wan Mahmood (572/10)

Council Members
TPr. Mohamad Fauzi Ahmad (418/99)
TPr. Saiful Azman Abdul Rashid (474/03)
TPr. Afzal Azhari (735/20)
Prof. TPr. Dr. Mariana Mohamed Osman (581/11)
TPr. Juwairiyah Ho Abdullah (453/02)
TPr. Hj Nik Mohd Ruiz Ahmad Fakhrul Razy (570/10)
TPr. Fu Swee Yun (553/99)
TPr. Abdul Halim Ali Hassan (407/98)
TPr. Dr. Marlyana Azyyati Marzukhi (582/11)
TPr. Annie Syazrin Ismail (670/17)

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 1 – 13

COMPARISON OF MALAYSIAN URBAN GREEN SPACES USE PRIOR AND DURING THE COVID-19 PANDEMIC AND PREFERENCES FOR POST-PANDEMIC DESIGN IMPROVEMENTS

Iskandar Al Khalifah Mohd Razali[1], Shureen Faris Abd. Shukor[2]

[1,2]*Department of Landscape Architecture,*
Faculty of Design and Architecture,
UNIVERSITI PUTRA MALAYSIA

Abstract

A survey on the comparison between Malaysians' usage of green spaces prior and during COVID-19 pandemic was conducted using an online self-administered questionnaire. Frequency and descriptive analysis were applied and a total of 415 responses from the whole Malaysia was recorded. Results showed that there was a huge increase in the number of respondents who did not visit the urban green spaces during COVID-19 pandemic. In addition, there was an increase in the use of home garden and neighbourhood park during the pandemic as compared to before the COVID-19 pandemic. The majority of the respondents involved in the survey mentioned that they diverted their visitation to the nearest green spaces available during the pandemic. The findings managed to highlight the changes in usage pattern of green spaces among Malaysians and provide proposals to relevant authorities on the future design of parks and green spaces in post-COVID-19 settings.

Keywords: During pandemic, Prior pandemic, Park usage, post-COVID-19 design

[1] Master Science Student at Universiti Putra Malaysia. Email: irhafezkhalid@gmail.com

INTRODUCTION

The society today is faced with increasing occurrences of various forms of poor health-related issues due to modern lifestyles. Contributing factors include the increase of sedentary population, levels of psychological stress related to urban living and contemporary work practices. Efforts to promote public health and well-being have become an important agenda in Malaysia (Ministry of Health Malaysia, 2021). Green settings have been identified as places accessible to everyone in the community without any formal, financial or symbolic restrictions. There are numerous studies on green and nature settings in relation to the enhancement of positive effects of green and nature on human emotions.

Ever since the first detection of COVID-19 virus in December 2019, there has been more than 6.18 million deaths caused by COVID-19 worldwide. In total, about 493 million infected cases were reported with 428 million patients recovered (World Health Organization, 2022). As of April 5th 2022, Malaysia has reported a total of 4.22 million total confirmed cases of COVID-19 and 35,127 deaths (Ministry of Health Malaysia, 2022). Given the worldwide health emergency caused by the COVID-19 pandemic, it is of great interest to explore whether citizens' behaviour and perceptions of green spaces in Malaysia have changed and if any, how.

LITERATURE REVIEW

The Use of Urban Green Space During COVID-19 Pandemic

Over the past two years, urban green space around the world has undergone dramatic changes in usage and realization. On one hand, the public are now becoming more aware and appreciative of the provided urban green space (Kim et al., 2021). While on the other hand, this realization has put a new challenge among users and green space practitioners due to the surge of urban green space that had occurred in many parts of the world following the event of COVID-19 (e.g., studies by Berdejo-Espinola et al., 2021).

The closure of workplace, indoor recreational centre, restaurants and cancellation of public event has left the public with no choice rather than to shift their social routine towards the urban green space as it is the only place that had remained open and accessible during the pandemic (Geng et al., 2021). On the bright side, those who has never stepped into urban green space before are now starting to gradually utilise it. However, this had resulted the urban green space to be overcrowded, while becoming less comfortable and are open to higher risk of COVID-19 infection. The phenomenon has then induced significant concern for withdrawal behaviour and attitude related to the visitation of urban green spaces during the COVID-19 term.

In Italy and Spain – two countries with highest rate of COVID-19 cases in 2020, studies found that nearly two-third of those who had regularly visited

urban green spaces before the pandemic simply stopped going during the pandemic (Ugolini et al., 2020). Similarly, Larson et al. (2021) also reported that 56% of urban residents, particularly those in the socially vulnerable population of North Carolina, United States of America, have stopped or reduced going to the park. Meanwhile, in order to replenish the need for outdoor greenery and open air, the Europeans are willing to go within or beyond the city in search for better urban green space (Ugolini et al., 2020). This travelling behaviour however is banned in many other nations. Thus, the public are left with little choice in utilizing any green space within their proximity. An increase in neighbourhood park and available greenery areas within 10-minute distance has been widely pronounced in many related research (e.g., Berdejo-Espinola et al., 2021; Xie et al., 2020).

Recommendations of Design Improvements for the Current and Post-pandemic Urban Green Space

Mitigating the impact of COVID-19 on park and urban green spaces has become a raising concern among scholars and practitioners. To ensure the resilience and benefit continuity of urban green space, several modification and improvement on the current and post-pandemic urban green space design is henceforth paramount. In this study, six peer-reviewed articles by Eltarabily & Elghezanwy (2020), Honey-Roses et al., (2020), Shaori et al., (2020), Slater et al., (2020), Ugolini et al., (2020) and Yang et al., (2021) that provides some pragmatic recommendations and ideas for the betterment of urban green space experiences during the pandemic and onwards were carefully collected by the researcher. **Table 1** summarizes the key findings of design-related recommendation of improvisation on the current and post-pandemic urban green space which also served as a basis for the Section 3 of the survey questionnaire.

Table 1: Design recommendations for the improvisation of the current and post-pandemic urban green space.

Design recommendation	Authors
Connected and wider pedestrian walkway	Honey-Rosés et al. (2020), Eltarabily & Elghezanwy (2020)
Improve the condition of bicycle lane	Slater et al. (2020)
Provide longer bike route and running track	Eltarabily & Elghezanwy (2020)
Provide sanitization facilities	Eltarabily & Elghezanwy (2020)
Provide larger green space	Honey-Rosés et al. (2020), Ugolini et al. (2020), Eltarabily & Elghezanwy (2020), Yang et al. (2021)
Provide more pocket park or smaller green space	Honey-Rosés et al. (2020), Eltarabily & Elghezanwy (2020), Yang et al. (2021)

Provide facilities for different types of users	Shoari et al. (2020), Eltarabily & Elghezanwy (2020)
Enhance monitoring activity and facility	Slater et al. (2020), Shoari et al. (2020)
Create multipurpose space	Honey-Rosés et al. (2020)
Create flexible space	Honey-Rosés et al. (2020), Shoari et al. (2020)

Source: Author (2022)

RESEARCH AIM

Exposure to outdoor green spaces has been lauded as one of the approaches to improve the mental and physical health of the public. For many Malaysians, visiting parks and green spaces has been proven to support their physical and mental health especially among urban residents (Nath et al., 2018). Prior to the COVID-19 pandemic, the use of urban green space in Malaysia was driven by the need for restoration, social, fitness, and education (Aziz et al., 2018; Malek & Nashar, 2018). The use of green spaces becomes more frequent when it is accessible within the household's proximity and has short travelling distance (Aziz et al., 2018).

Meanwhile, the utilization of green spaces such as urban parks and recreational area are expected to increase following the relaxation of the Standard Operating Procedure (SOP) in the coming months. However, restrictions on the use of public space and strict social distancing guidelines have provided obstacles for people to enjoy the green spaces. The purpose of this study is therefore, to explore the impact of COVID-19 on the use of urban green spaces which may have changed due to the restrictions imposed during the pandemic as compared to the utilization of green spaces before the pandemic. Additionally, the study also attempts to gauge the respondents' preferences and attain several recommendations on the improvements of urban green space that can be made during and post-pandemic.

RESEARCH METHODOLOGY

The Instrument

A self-administered online questionnaire was developed via Google Form and distributed to the general public. The survey was designed using a combination of open-ended and closed-ended questions. In the link provided, information on the researchers, the type of data that would be collected, how the data would be stored, analysed, reported, as well as respondents' rights on the data provided was included. Participation was voluntary. The questions consisted of dichotomous scale, categorical scale, and a positive 10-point Likert scale format (response from 1- strongly disagree, 5- neutral and 10- strongly agree). The survey consists of three parts; (1) the demographic profile, (2) the use of green spaces prior and

during the pandemic and (3) the respondents' preferences in the improvements of the designs of green spaces post Covid-19. The questions were all derived to cover the parameters of this study.

Sampling Size and Method

Based on the convenient sampling method utilized in this research, the sample size of this study is 415 respondents. The sample size is considered sufficient for a very large population size (> 2, 500, 000), assuming the 95% confidence level, 0.5 standard deviation, and a margin of error (confidence interval) of +/- 5% (Gill et al., 2010). The data collection began in May 2021 and ended in July 2021. Distribution of the online questionnaire started through the authors' network of professional and personal contacts, as well as through social media. Participants were asked to fill in the questionnaire and further distribute to their personal contacts. The distribution proceeded according to a snowball effect, and did not allow for personal information of individual respondents to be identified.

Analysis

The datasets were analysed using frequency and descriptive analysis. Both analyses employed IBM SPSS Statistic V26 to extrapolate the demographic result, public usage patterns and public preferences for post-pandemic green spaces' design improvement using percentage and mean tabulation.

RESULTS AND FINDINGS

A total of 415 respondents participated in the study. The majority of the respondents were between the age of 20-29 (50.1%), woman (62.4%), resides in Central Malaysia (48.0%), and Malay (61.9%). Other demographic profile is as shown in **Table 2**.

Table 2: Demographic characteristic of respondents (N = 415)

Characteristic		**Frequency (n)**	**Percentage (%)**
Gender	Male	156	37.6
	Female	259	62.4
Age	Below 19	45	10.8
	20-29	208	50.1
	30-39	54	13.0
	40-49	62	14.9
	50-59	32	7.7
	Above 60	14	3.4
Ethnicity	Malay	257	61.9
	Chinese	103	24.8
	Indian	27	6.5

	Other	28	6.7
Region	Central	199	48.0
	Northern	84	20.2
	Southern	79	19.0
	Eastern	20	4.8
	Sabah/Sarawak	33	8.0

Source: Author (2022)

Comparative Analysis for the Respondents' Usage on Urban Green Space Prior and During COVID-19 Pandemic

The respondents' frequency of weekly visits has dropped drastically during COVID-19 pandemic and approximately 59.3% of the respondents stated they had stopped visiting urban green spaces in that period (**Figure 1**). Nevertheless, 40.7% of the respondents did continue using the urban green space amidst the COVID-19 breakout in Malaysia.

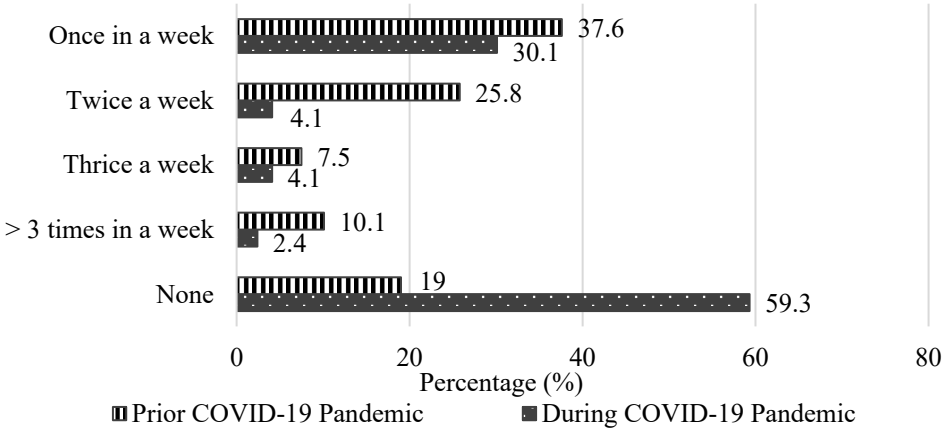


Figure 1: Frequency of weekly visits to green spaces prior and during the COVID-19 pandemic
Source: Author (2022)

Figure 2 illustrates a comparison between the distance of visited urban green space by our respondents prior and during COVID-19 pandemic. The results indicate that approximately 30.8% respondents have diverted their visitation of urban green spaces to the nearest green space available. Additionally, there is also significant increase of 23.0% in the number of respondents who did not travel or visit the urban green spaces during pandemic. This may imply that the travel restriction enforced by Malaysia during pandemic period has limited

the accessibility of respondents who lives far away from urban green spaces from accessing the urban green space during pandemic.

Meanwhile, **Figure 3** presents the frequency analysis of multiple response questions on respondents' types of visited green space prior and during COVID-19 pandemic. As shown in **Figure 3**, the most prominent changes occurred during pandemic were the increase in the use of home garden by 14.1% and neighbourhood park by 2.4%. While the remaining types of green space, including urban park showed major drop in usage. In addition, the figure also showed that 15.9% of the respondents did not visit any green space during pandemic.

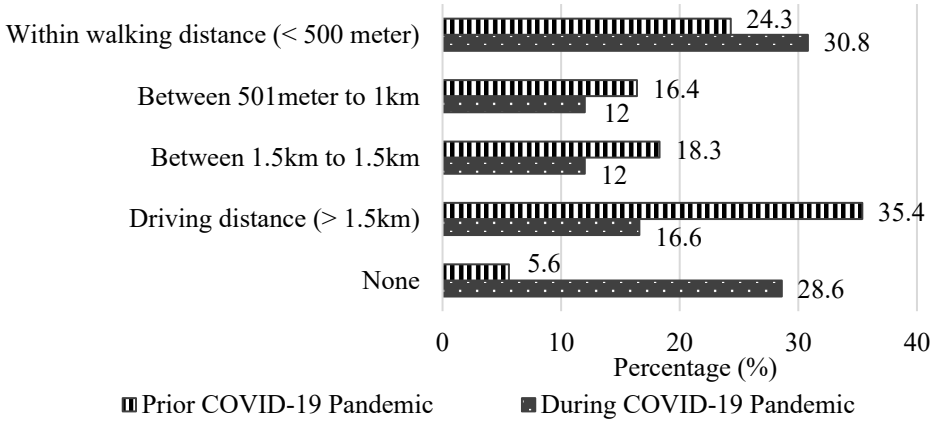


Figure 2: The distance of visited urban green spaces prior and during COVID-19 pandemic
Source: Author (2022)

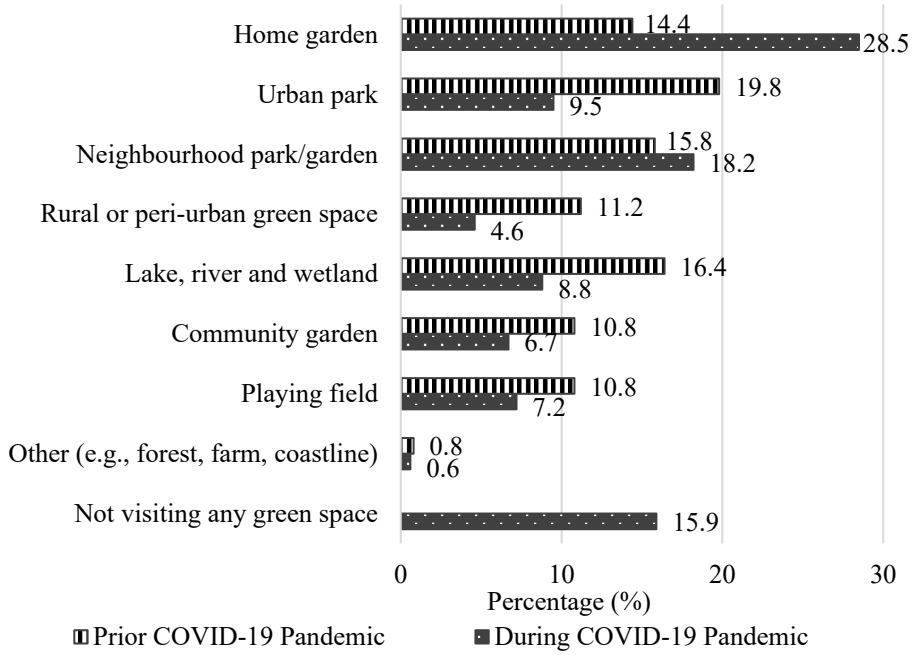


Figure 3: The type of green spaces visited prior and during the COVID-19 pandemic
Source: Author (2022)

Respondents' Preferences in the Design Improvements for Urban Green Spaces Post-COVID-19

Table 2 presents the mean of 10 items (α = .96) related to the design preferences on the improvisations to be made to the current and post-COVID-19 urban green space using a 10-point Likert scale format (1= strongly disagree; 10 = strongly agree). Out of the 10 items presented, the mean score of nine items were greater than 5 (neutral), which indicate positive responses. The five most preferred design improvements were: sanitization facilities (M = 6.83), larger green spaces (M = 6.63), multipurpose and flexible spaces (M = 6.53-6.56) as well as facilities for different types of users (M = 6.53). Meanwhile, the least preferred item was more pocket park or smaller green space (M = 3.70). This highlighted the need for a bigger, flexible and multipurpose spaces that comes along with sanitizing and universal-designed facilities that are more fitting to the current situation of COVID-19.

Table 2: Respondents' preferences for improvements in urban green spaces post COVID-19

Item	*N*	*Minimum*	*Maximum*	*Mean*	*SD*
Make connected and wider pedestrian walkway	415	1	10	6.30	2.79
Improve bicycle lane condition	415	1	10	5.68	2.75
Provide longer bike route and running track	415	1	10	5.60	2.76
Provide sanitization facilities	415	1	10	6.83	2.89
Provide larger green space	415	1	10	6.63	2.84
Create more pocket park or smaller green space	415	1	10	3.70	2.70
Provide facilities for different types of users	415	1	10	6.53	2.81
Enhance monitoring activity and facility	415	1	10	6.47	2.83
Create multipurpose space	415	1	10	6.56	2.83
Create flexible space	415	1	10	6.53	2.83
Valid N (likewise)	415				

Source: Author (2022)

DISCUSSION AND CONCLUSION

This study was inspired by similar researches conducted in other countries on the use of urban green spaces and the social isolation that was imposed during the COVID-19. To date, studies on the comparison between the use of urban green spaces in Malaysia before and during the COVID-19 pandemic as well as studies on improvisations that is preferred by the public during and post-pandemic are both found to be scarce.

As shown in the results of this study, the use of urban green space has dropped significantly where 59.3% of the respondents stated they simply stopped using urban green space during the pandemic. From a global perspectives, the result mirrors the patterns reported in Chengdu, China (Xie et al., 2020), North Carolina, United States of America (Larson et al., 2021), as well as Spain and Italy (Ugolini et al., 2020). While this can easily be attributed to the government stringency on COVID-19 containment regulations, several other factors may also render the changes itself. It is believed that the reduction in the use of green space in Malaysia was attributed by number of vaccinated populations during the year 2020 and 2021. As of July 4th 2021, only eight percent of the Malaysian population (roughly 2,618,316 people) has completed two doses of the COVID-19 vaccine shots (*Dr Adham: 8pc of Malaysian Population Fully Vaccinated against Covid-19*, 2021). Although there was a major reopening of public and recreational space from early January of 2021 (Conditional Movement Control

Order, 2021), the low level of vaccinated population may hinder the Malaysian to visit and use the green space during pandemic.

Moreover, the level of knowledge, attitude and reduce risk-taking or risk avoidance behaviour among population toward the COVID-19 may also influence the reduction in the use of green space among Malaysians. According to Azlan et al. (2020), Malaysians have strong knowledge and attitude towards the COVID-19 virus, hence the majority of the population has been persistent in avoiding crowded places since the beginning of the pandemic. Here, it can be deduced that the increase in one's knowledge, attitude and practices on the COVID-19 may result in their withdrawal from the use of urban green space during the pandemic. The rising fear of the COVID-19 virus along with the increment of positive cases and death caused by the virus since April 2021 (Ministry of Health Malaysia, 2022) can be said to be one of the contributing factors for positive response towards movement control order. Consequently, persistent advice from the government to avoid outdoor activities and travelling also contributed greatly to the decreasing utilization of green spaces.

As a result, significant increase in the use of home garden and neighbourhood park during the pandemic was observed. The same pattern were also recorded in Brisbane, Australia where Berdejo-Espinola et al. (2021) signified an increase in the use of backyard garden and available green space within residence proximity which was appropriate to the active discouragement by Australian government on social interaction and travelling behaviour. While the findings proved that the need for outdoor greenery during the pandemic did not change, it is also imperative for us to note that not everyone was privileged with the access of a personal home garden, balcony, backyard, or lives in a well-planned neighbourhood. Therefore, sufficient provision of green space in local neighbourhoods and within households proximity, especially in densely populated area is necessary for maintaining the wellbeing of the population (Berdejo-Espinola et al., 2021).

Subsequently, the SOP applied during the COVID-19 pandemic has definitely influenced how future parks and urban green spaces are to be designed in order to curb the spread of the disease. Given the transformation we are witnessing in the ensuing months, it is critical to highlight the current public preferences and demand in urban green space to inform future urban planning and design. For the next upcoming years, the inclusion of new elements in the green space environment is expected, for example; temporary hand washing stations and sanitization facilities are the foremost desired improvement awaited by the public. A study by Eltarabily and Elghezanwy (2020) suggested similar facilities to be made available in green spaces in order to increase comfort and usage among green space users.

The high rate of preferences toward larger green space with abundant greenery in the findings of this study also confirmed the suggestions made by Honey-Rosés et al. (2020), Yang et al. (2021) and Ugolini et al. (2020) that highlights the need for new park and urban green space expansion to cater to the utilization and demands of future population. The restriction imposed for small space occupancy during pandemic also left many of the respondents to become less interested in having more small green space. However, small green space, like pocket park and neighbourhood garden has a value in providing public easy access, quick enjoyment and rapid healing process (Balai Kerishnan & Maruthaveeran, 2021). This is on par with findings of this study where an increment in the use of such places were observed. In this context, urban planning and design should consider a diverse mix including large parks, together with smaller pocket parks, neighbourhood gardens as part of urban fabric enhancement (Fatiah et al., 2021; Ugolini et al., 2020).

Last but not least, as highlighted in the findings of this study, having multipurpose, flexible spaces and area to cater to different type of users are among other improvements preferred by the respondents. The idea is that such spaces can alleviate social isolation and positively impact physical and mental wellbeing (Geng et al., 2021) without neglecting the socially vulnerable population. This is expected to help in accommodating the needs of populations, providing equal resources to public during future pandemics as well as in generating green spaces to meet the outdoor activity demanded by the populations (Honey-Rosés et al., 2020).

ACKNOWLEDGEMENTS

This research has been made possible with funding from the Institute of Landscape Architects Malaysia (ILAM) grant ID- ILAMGRANT-2021-02.

REFERENCES

Aziz, N. A. A., van den Bosch, K., & Nillson, K. (2018). Recreational use of urban green space in Malaysian cities. *International Journal of Business and Society*, *19*(S1), 1–16.

Azlan, A. A., Hamzah, M. R., Sern, T. J., Ayub, S. H., & Mohamad, E. (2020). Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. In *PLoS ONE* (Vol. 15, Issue 5).

Balai Kerishnan, P., & Maruthaveeran, S. (2021). Factors contributing to the usage of pocket parks—A review of the evidence. *Urban Forestry and Urban Greening*, *58*(January), 126985.

Berdejo-Espinola, V., Suárez-Castro, A. F., Amano, T., Fielding, K. S., Oh, R. R. Y., & Fuller, R. A. (2021). Urban green space use during a time of stress: A case study during the COVID-19 pandemic in Brisbane, Australia. *People and Nature*, *3*(3), 597–609.

Dr Adham: 8pc of Malaysian population fully vaccinated against Covid-19. (2021, July 5). Malay Mail. https://www.malaymail.com/news/malaysia/2021/07/05/dr-adham-8pc-of-malaysian-population-fully-vaccinated-against-covid-19/1987303

Eltarabily, S., & Elghezanwy, D. (2020). Post-Pandemic Cities - The Impact of COVID-19 on Cities and Urban Design. *Architecture Research*, *10*(3), 75–84.

Fatiah, A. A., Ponrahono, Z., & Zakariya, K. (2021). QUALITY OF DESIGNS AND FEATURES OF SMALL URBAN GREEN SPACES IN PETALING JAYA TOWN, MALAYSIA. *Journal of the Malaysian Institute of Planners*, *19*(1), 138–149.

Geng, D. (Christina), Innes, J., Wu, W., & Wang, G. (2021). Impacts of COVID-19 pandemic on urban park visitation: a global analysis. *Journal of Forestry Research*, *32*(2), 553–567.

Gill, J., Johnson, P., & Clark, M. (2010). *Research Methods for Managers* (4th ed.). SAGE Publications, Ltd.

Honey-Rosés, J., Anguelovski, I., Chireh, V. K., Daher, C., Konijnendijk van den Bosch, C., Litt, J. S., Mawani, V., McCall, M. K., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. J. (2020). The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities. *Cities & Health*, 1–17.

Kim, J., Kim, W., Ko, Y., Kim, G., Lee, J., Eyman, O. T. G., Chowdury, S., Adiwal, J., Won, H., Son, Y., & Lee, W. (2021). *Using Urban Green Spaces in the Pandemic: Example from the Republic of Korea*.

Larson, L. R., Zhang, Z., Oh, J. I., Beam, W., Ogletree, S. S., Bocarro, J. N., Lee, K. J. J., Casper, J., Stevenson, K. T., Hipp, J. A., Mullenbach, L. E., Carusona, M., & Wells, M. (2021). Urban Park Use During the COVID-19 Pandemic: Are Socially Vulnerable Communities Disproportionately Impacted? *Frontiers in Sustainable Cities*, *3*(September), 1–15.

Lu, Y., Zhao, J., Wu, X., & Lo, S. M. (2021). Escaping to nature during a pandemic: A natural experiment in Asian cities during the COVID-19 pandemic with big social media data. *Science of the Total Environment*, *777*.

Conditional Movement Control Order, Majlis Keselamatan Negara 1 (2021). https://www.mkn.gov.my/

Malek, N. A., & Nashar, A. (2018). USE PATTERN AND ACTIVITIES: THE EVALUATIONS OF MALAYSIAN GREEN OPEN SPACE DESIGN. *Journal of the Malaysian Institute of Planners*, *16*(3), 121–131.

Ministry of Health Malaysia. (2021, November 23). *Agenda Nasional Malaysia Sihat*. https://www.moh.gov.my/index.php/pages/view/2933

Ministry of Health Malaysia. (2022, April 5). *COVIDNOW in Malaysia - COVIDNOW*. https://covidnow.moh.gov.my/

Nath, T. K., Zhe Han, S. S., & Lechner, A. M. (2018). Urban green space and well-being in Kuala Lumpur, Malaysia. *Urban Forestry and Urban Greening*, *36*(February), 34–41.

Shoari, N., Ezzati, M., Baumgartner, J., Malacarne, D., & Fecht, D. (2020). Accessibility and allocation of public parks and gardens in England and Wales: A COVID-19 social distancing perspective. *PLoS ONE*, *15*(10 October 2020), 1–10.

Slater, S. J., Christiana, R. W., & Gustat, J. (2020). Recommendations for keeping parks

and green space accessible for mental and physical health during COVID-19 and other pandemics. *Preventing Chronic Disease*, *17*(17).

Ugolini, F., Massetti, L., Calaza-Martínez, P., Cariñanos, P., Dobbs, C., Ostoic, S. K., Marin, A. M., Pearlmutter, D., Saaroni, H., Šaulienė, I., Simoneti, M., Verlič, A., Vuletić, D., & Sanesi, G. (2020). Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban Forestry and Urban Greening*, *56*(June).

World Health Organization. (2022, April 5). *WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data*. https://covid19.who.int/

Xie, J., Luo, S., Furuya, K., & Sun, D. (2020). Urban parks as green buffers during the COVID-19 pandemic. In *Sustainability (Switzerland)* (Vol. 12, Issue 17).

Yang, Y., Lu, Y., Yang, L., Gou, Z., & Liu, Y. (2021). Urban greenery cushions the decrease in leisure-time physical activity during the COVID-19 pandemic: A natural experimental study. *Urban Forestry and Urban Greening*, *62*(November 2020).

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 14 – 28

A COMPARATIVE STUDY OF SMART CITY INITIATIVES IN MALAYSIA: PUTRAJAYA AND ISKANDAR PUTERI

Noor Aimran Samsudin[1], Muhamad Solehin Fitry Rosley[2], Lee Yoke Lai[3], Siti Rahmah Omar[4], Mohamad Fadhli Rashid[5], Nur Syamimi Najihah Mohd Hanifi[6], Ida Shaheera Bakhtiar[7]

[1, 3, 4 ,5, 6 & 7] Urban Design and Environmental Research Group (UDE),
[2] Centre for the Study of Built Environment in the Malay World (KALAM),
Faculty of Built Environment and Surveying,
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

The Smart City concept has grown exponentially and is rapidly accepted by wider international communities and developed countries. Smart City implementation may lead to a high-quality, more resilient, liveable and sustainable development for a nation. Malaysia's urban population will increase from 74.3% in 2015 to 79.6% in 2025. By 2040, Malaysia is expected to reach 84% of the urbanisation rate. In managing and solving daily urban issues (e.g., congestion, energy, crime, pollution, waste management, etc.), urban planners are searching for implementing Smart Cities as a primary solution. This study aims to investigate two (2) cities' experiences in implementing these initiatives, namely, Putrajaya and Iskandar Puteri. Both cities act as administrative centres at the national and state levels. Since established in 1995, Putrajaya promoted as the 'Garden City' and 'Intelligent City'. This is followed by the new administrative city of Johor State, Iskandar Puteri (previously known as Nusajaya), officiated in 2009 in the Southern part of Peninsular Malaysia. Both cities introduced their own Smart City blueprint, with 93 strategies in the Putrajaya Smart City Blueprint (2018), and 28 in Smart City Iskandar Malaysia (2012). By comparing the Smart City strategies or initiatives in both areas, this study concludes that Putrajaya's strategies are more focused on micro-city-level implementation. Iskandar Puteri (in Iskandar Malaysia Development Region) has a brief and wider context at the regional level (macro). In both cities, there are still no clear measurement methods or indicators that can assess the achievement of Smart City initiatives implemented at the local level.

Keywords: Smart City, Smart Governance, Smart Mobility, Putrajaya, Iskandar Puteri

[1] Lecturer at Universiti Teknologi Malaysia. Email: nooraimran@utm.my

INTRODUCTION

The study conducted a content analysis of Smart City initiatives to evaluate the status and progress development within Malaysian Cities, namely Putrajaya and Iskandar Puteri. Adapting the Smart City incentive is a vital development approach that incorporates various leading industrial sectors. It touches on several critical urban policy issues and the usage of technology in urban management (e.g., 5G network coverage, cybersecurity, renewable energy, big data, sustainable development, optimisation of land management, traffic management, etc.). It influences how urban areas are managed and governed around the world. The Smart City conceptually depends on the availability of technology growth, technological infrastructure, and the Internet of Things (IoT) within countries, regions or cities. It combines IoT devices, software solutions, user interfaces (UI), data gathering and communication networks in urban settings. Therefore, this study compares the smart city initiatives in Malaysia between Putrajaya and Iskandar Puteri.

These concepts offered urban managers (local authorities known as Putrajaya Holdings and Iskandar Puteri City Council) an advanced urban management ecosystem. As a result, a modern living environment, high quality, cost-effective, efficient and proactive action creates better living conditions. It is not only about creating a better living environment, it may be up to the established nation-state for *'Bangsa Pintar',* the term used to refer to smart Malaysian citizenship as discussed by Lim et al. (2021). The Smart City concept in Malaysia has been embedded in several policies and development plans such as the 11th Malaysian Plan, National Physical Plan 3 (NPP3), National Urbanization Policy 2 (NUP2), Malaysia Smart City Framework, Putrajaya Smart City Blueprints, Smart City Iskandar Malaysia, Green Technology Master Plan 2017 – 2030 and Low Carbon Cities Framework (LCCF). The development of Smart Cities also uplifts Malaysian Cities' competitiveness and supports Malaysia's commitment to reaching the global agenda such as Sustainable Development Goals (SDGs) and New Urban Agenda (NUA).

The Fourth Industrial Revolution (4IR) had been introduced and promoted globally. It can upgrade city life, improve decision-making efficiency and process (urban planner, governance, urban manager etc.), and enable a determined sufficient budget allocation to provide better infrastructure and significant design approaches. The Smart City concept has grown and is rapidly accepted by wider international communities and developed countries. Under the US-ASEAN Smart Cities Partnership, Malaysia has identified at least four (4) major cities with the potential to implement the Smart Cities Framework, namely Kuala Lumpur, Kota Kinabalu (Sabah), Kuching (Sarawak), and Johor Bahru (Johor). Several cities and states have implemented smart cities, such as Iskandar Malaysia, Putrajaya, Cyberjaya, Selangor, Melaka and Penang. The Malaysian

government had launched its first national–Malaysia Smart City Framework (MSCF) (Loo, 2019).

In general, this concept is expected to lead a high-quality, sustainable development in city development and future nation-building. Despite the 'Smart City' term being widely used, several other terms are commonly used: 'Digital City', 'Intelligent City' and 'Knowledge-based City'. However, assessment methods to measure the effectiveness of Smart City initiatives implementation are still unclear locally. This study explores the Smart City initiative implementation locally by comparing well-plan administrative centres in Malaysia, namely Putrajaya and Iskandar Puteri city.

WHAT ARE SMART CITY INITIATIVES?

Generally, the Smart City promotes the use of technology in the development and improvement of the quality of life in society. Smart cities are designed to encourage smarter choices and provide a better quality of life using technology and data. Aside from the advantages of safety, resources, health, connections, employment, and cost of living, significant changes in the environmental sector are possible. Cities are almost universally confronted with rapidly growing demographics, significant demographic trends, climate changes, economic shifts, and rapid technological transition. Smart City Initiatives in Malaysia could be the new idea and mode of promoting better urban planning in a more efficient and smart manner.

Applying technology in daily life can optimise available resources and sustainable energy management. This would also promote investment in green infrastructure, reduce urban traffic and road congestion, and improve quality of life. Technology and the integration of spatial geographical information can develop futuristic cities and provide adequate urban infrastructure to meet the increasing pace of urbanisation. Performance benchmarks also accompany these initiatives compared to globally recognised Smart City indicators for Malaysian Urban development. The Smart City development in Malaysia is in line with the existing global and national plan, which will form a Smart City framework in Malaysia.

The 'Smart City' concept has not been too clear in its definition and is still debatable. There are several definitions from various sources and scholars globally. There may not have yet been a globally accepted definition for the Smart City. According to Georgiadis, A. (2021), it can be understood as *"Any city that uses advanced technologies to achieve the goals has set either financial development, education, eradication of poverty, social equality, enhanced citizens' security, tourism, cultural education, intercultural physique, environment, and fast citizen service in public services can be presumed as Smart City".*

Malaysian Industry-Government Group for High Technology, MIGHT (2021) refers to 'Smart City' as the *"One which uses digital technology to empower the economy and creates a harmonious living environment for its citizens"*. In Malaysia Smart City Outlook 2021-2022 (MSCF), the term smart city was defined as *"Cities that use ICT and technological advancement to address urban issues, including improving quality of life, promoting economic growth, developing sustainable and safe environment."*.

The goals can vary depending on the city's geographical location, socio-economic conditions, allocation of city resources, and the perceptions of the respective local authorities. Smart Cities projects are often related to many applications, such as communication, culture, energy, environment, climate, health, tourism, and transport. The existence of 'smart buildings', 'smart devices', and 'smart applications' used by people daily in the city strengthens such ideas and concepts. The idea relies on the city administration's smartness, politicians, and citizens to utilise technology in 'smart' ways (Berntzen, L. and Johannessen, M.R., 2016). The use of technology in urban management is very important because neither city is smart by itself.

'Smart City' is also defined as *"a concept for managing resources effectively and efficiently to improve the quality of life in urban areas. The initial step is through infrastructure development as part of overall development"* (Al-Hader M, RA, 2009). According to Athey, G. (2008), it is very important to obtain support from the public since Smart City initiatives were one of the innovation policies promoted by the government. Smart cities have seen much coverage around the global economy because they have the potential to offer value and approaches to challenges and opportunities presented by urbanisation.

Malaysia Smart City Outlook 2021-2022 reported that the economy, government and people are the main beneficiaries of Smart City, primed to benefit from its development and implementation. As cities grapple with ever-increasing costs of delivering efficient services to their citizens, the effective deployment of digital technologies would significantly improve performance, reduce costs and minimise environmental impact. This would result in enhanced liveability and workability standards for communities. The combination of efficient mobility, effective resources management, reliable digital infrastructure and the positive attitude of communities and the society at large would further enhance city living (MIGHT, 2021).

COMPONENTS OF SMART CITY

According to Ong and Ong (2018), developing a Smart City vision requires many phases, including defining relevant Smart City principles, creating the development phase, collaborating and drafting approaches with shareholders, prioritising projects, and crafting the roadmap. Smart City initiatives are divided

into seven (7) main components contributing to implementing strategies and initiatives and a concrete framework for resolving urban problems and core challenges in Malaysia (Table 1). Smart City prioritises infrastructure growth and improves economic, social, cultural, and urban development. This is why it works to expand connectivity networks so that facilities such as housing, culture, telecommunications, and industry, among others, can be linked using emerging technology to help a community grow and prosper.

According to the Malaysia Smart City Framework, these seven components of smart cities are commonly used to solve urban problems due to rapid urbanisation. Smart City is a global innovation in the use of technology for sustainability, communal growth, and the improvement of the quality of community life. This would result in improved liveability and workability standards for communities. The combination of efficient mobility, effective resources management, reliable digital infrastructure and the positive attitude of communities and the society at large would further enhance city living (MIGHT, 2021).

Table 1: Seven main components of Smart City

Dimensions	Functions	Aspect/Focus
Smart Governance	To improve citizen access to government services	● Public participation ● Efficient public and social services ● Private-public partnership ● Transparent governance
Smart Mobility	Increase the quality of public transit, accessibility, people mobility, and road traffic in the city by adopting intelligent traffic management.	● Efficient road accessibility ● Efficient public transportation ● Non-motorised accessibility Availability of ICT infrastructure
Smart People	To improve the quality of life of urban areas by high human capital (knowledge workers), a high Human Development Index, and highly adaptable and resilient people to changing circumstances.	● Caring community ● High Human Development Index ● Skilled and talented human capital ● Racial harmony
Smart Environment	To reduce greenhouse gas emissions and live a low-carbon lifestyle, emphasising energy conservation, clean	● Clean environment ● Environmental protection ● Green economy development ● Green infrastructure

	energy, and green technologies to build a better climate.	● Smart growth
Smart Economy	To create competitiveness, innovation and diverse economic opportunities to prepare for the challenges and opportunities of economic globalisation.	● Economic growth and value creation ● Innovative economic growth ● Equitable wealth distribution ● Entrepreneurship
Smart Living	To create a sustainable, vibrant and ideal place of living, especially for women, children, and senior citizens in the city	● Safety and security ● Low carbon lifestyle ● Housing quality ● Cultural facilities ● Tourist/recreational attractiveness
Smart Digital Infrastructure	To improve the efficiency, productivity and security of the organisation	● Network coverage ● High-speed internet ● Personal data protection ● Data security ● Crowdsourcing and data sharing

Source: Adapted from Malaysia Smart City Framework (2019)

Previously, 'Smart Cities' traditionally focused too much on developing new technology, provisional technology that are infrastructure-related, big data and computing, and less on whether any of these developments would improve problems faced by urban dwellers daily. Shawn Tan (2000) proposed good public transport networking, efficient waste management, safe and clean public spaces, more affordable housing, energy-efficient building initiatives and environmental sustainability in Malaysia's Smart City implementation. At any level of implementation, every city planning to adopt Smart City initiatives should improve its service governance first. A clear, strong vision and comprehensive strategies or action could help provide a better ecosystem to implement the Smart City. 'Smart Governance' involves political engagement, citizen welfare, and administration operations (Giffinger, *et al.*, 2007).

There is a wide agreement that government policies have a critical role in fostering Smart Cities (Yigitcanlar, *et al.*, 2008). This situation fits well within the public management perspective, highlighting that solving societal problems is not merely a question of developing good policies but much more of a managerial question of organising a strong collaboration between government and other stakeholders (Torfing, *et al.*, 2012).

Currently, PLANMalaysia initiated the Malaysia Urban Observatory (MUO), which collects urban data across agencies nationwide to ease access to governance-related knowledge and solutions. MUO expected it would play an important role in providing more comprehensive solutions through urban analytics. IRDA also established their own Urban Observatory Center, known as Iskandar Malaysia Urban Observatory (IMUO), to manage, monitor and disseminate data or information on Iskandar Malaysia Development Region. Such initiatives help decisions and policymakers to make better decisions in development planning.

Secondly, 'Smart Mobility initiatives have also been seen as important as governance. It focuses on increasing the efficiency and service quality of urban transportation to enhance the use and adoption of new mobility solutions and increase people's mobility through efficient mobility management and targeted infrastructure investments. Achieving cheaper, faster, and environmentally-friendly mobility and integrated multi-modal transportation is an important challenge for cities and communities. Supporting the combination of multiple public and private transport modes and adopting new forms of transportation (e.g., electric vehicles, hydrogen-powered vehicles, autonomous vehicles, bike-sharing, carpooling/ car-sharing) is an important aspect of a future-oriented strategic approach to fostering 'Smart Mobility'. A customer-centric and inclusive approach for all citizens, businesses, and visitors is needed to achieve a high-quality mobility service and ultimately improve the flow of people and goods within a city or community while at the same time reducing the environmental impact. Increasing the mobility level of dwellers smartly will enhance other dimensions of Smart City.

PUTRAJAYA & ISKANDAR PUTERI

This paper explores two (2) blueprints or frameworks of Smart City initiatives in Putrajaya Smart City Blueprint (Putrajaya) and Smart City Iskandar Malaysia Framework (Iskandar Puteri) (Figure 1). Firstly, Putrajaya was developed in 1995 as the new administration centre of Malaysia. Managed and governed by the Perbadanan Putrajaya (PPj) or Putrajaya Holdings under the Perbadanan Putrajaya 1995 (Act 536), the Federal Territory of Putrajaya now has become a well-planned, modern township and matured city as well as a national symbol. Under Act 536, the PJj plays an important role as the local and planning authority for Putrajaya.

Norhisham et al. (2013) reported that Putrajaya Holdings, a government-listed company, was established to be the master developer of the city, translating philosophy between building form and landscape under the man-God-nature relationship. This green city is home to elegant and unique architecture, located in West-Central of Peninsular Malaysia, 25km South of

Kuala Lumpur City Center. Nowadays, this city houses various government offices that were relocated from Kuala Lumpur previously. 37% of Putrajaya is dedicated to parks and open spaces. There are 200 hectares of man-made wetland and a 400-hectare man-made lake, allowing for the creation of 38 kilometres of waterfront within 5,000 hectares of total land area (Figure 2).

Figure 1: Putrajaya Smart City Blueprint (Left) and Smart City Iskandar Malaysia Framework (Right)
Source Author (2022)

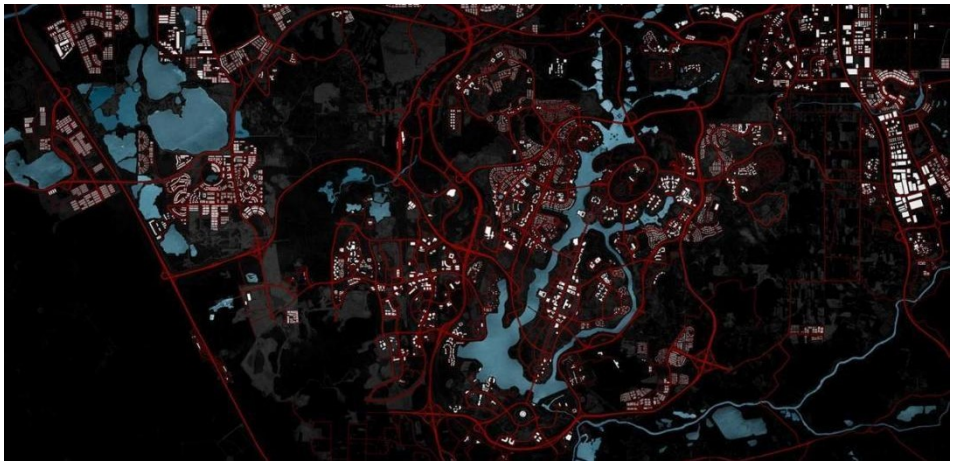


Figure 2: Road networking, water body and building distribution map of Putrajaya
Source: www.fmetropoli.org

The city was named after the first Malaysian first Prime Minister, Tunku Abdul Rahman Putra, who gradually expanded and sprawled into nearby areas such as Cyberjaya, Sepang, Serdang, and Kajang, and were declared Putrajaya Federal Territory in 2001. It consists of several national iconic

buildings, a significant man-made lake, parks, botanical gardens, wetland, government complexes, infrastructure, remarkable monuments, and well-connected public transportation within 17 Precincts. Putrajaya is also known as a 'Garden City' since it dedicated and reserved more than 38% of its total size for green spaces.

Since its establishment, Putrajaya is also promoted as an 'Intelligent City', and it has progressed remarkably with the latest communication technologies and progressive infrastructure provision within the city. To propel the city into becoming a Global City, the PJj implemented several initiatives related to the Internet of Things (IoT) and Information and Communication Technology (ICT). To transform Putrajaya into a Smart City, PPj emphasises at least three elements in this blueprint, namely (1) Smart Building, (2) Safety, and (3) Security. For example, 70 buildings in Putrajaya are now being monitored for their carbon emissions, while future developed buildings are required to incorporate energy-saving elements or green concepts (The Sun Daily, 2020).

Business Today (2021) reported that to be the first municipal-operated IoT infrastructure in this country, PJj collaborated with higher institutions and IoT-based companies to initiate several physical projects, including installing the Smart Street Lighting system within Presint 15 in Putrajaya. As one of the main aspects of making this city attractive for people, investments and the ecosystem of businesses, efficient transport connectivity, mobility, and a sustainable green environment becomes essential. By 2025, this city will be expected to house a population of 350,000. Saibal Chowdhury (2021) believed that the future green, smart and connected development model for Putrajaya would be achieved locally by implementing Smart City initiatives.For example, the Putrajaya City Blueprint highlights the need for Putrajaya City to achieve a smart urban living environment and a more sustainable and higher quality of life as their vision statement. The Sun Daily (2020) reported that PJj claimed thirty-two per cent of the guidelines in this blueprint had been successfully achieved, and the balance is expected to be completed by 2025. There are seven (7) Smart City Domains in these blueprints, consisting the several main strategies that have been divided into 32 Applications and 93 Initiatives, such as below:

- Smart Transportation and Mobility (7 Applications & 25 Initiatives)
- Smart Home and Environment (5 Applications & 12 Initiatives)
- Smart Government Services (4 Applications & 11 Initiatives)
- Smart Infrastructure and Utilities (4 Applications & 13 Initiatives)
- Smart Safety and Security (4 Applications & 10 Initiatives)
- Smart Economy (Competitive Economy) (4 Applications & 9 Initiatives)
- Smart Community (4 Applications & 13 Initiatives)

While Iskandar Puteri city is located in Iskandar Malaysia Regions, a centre for investment, financial and business opportunities, it is supported by a comprehensive masterplan and state-of-the-art infrastructure, comprising 525,000 in population residing in the area of 24,000 acres situated along the Straits of Johor. Located next to the Johor Bahru Metropolitan area and adjacent to Singapore, the Iskandar Puteri area covers several townships such as Skudai, Lima Kedai, Gelang Patah, Kangkar Pulai, Ulu Choh and Nusajaya (later known as Kota Iskandar), the new administration centre of the Johor State government. Since its launch, it has become one of the country's foremost emerging economic zone within the Five Flagship Zones of Iskandar Malaysia.

The total size of Iskandar Puteri is only 4% of Iskandar Malaysia's regional development area, but now it is one of the nation's most-recognised developments. Since Smart City Iskandar Malaysia Framework was introduced in 2012, it has become an added-value-enabler initiative to provide ease of doing business and improve the quality of community living in Iskandar Malaysia. There are six (6) Dimensions listed under three (3) focus areas (Economy, Environment and Social) with 28 Characteristics introduced (Figure 3):

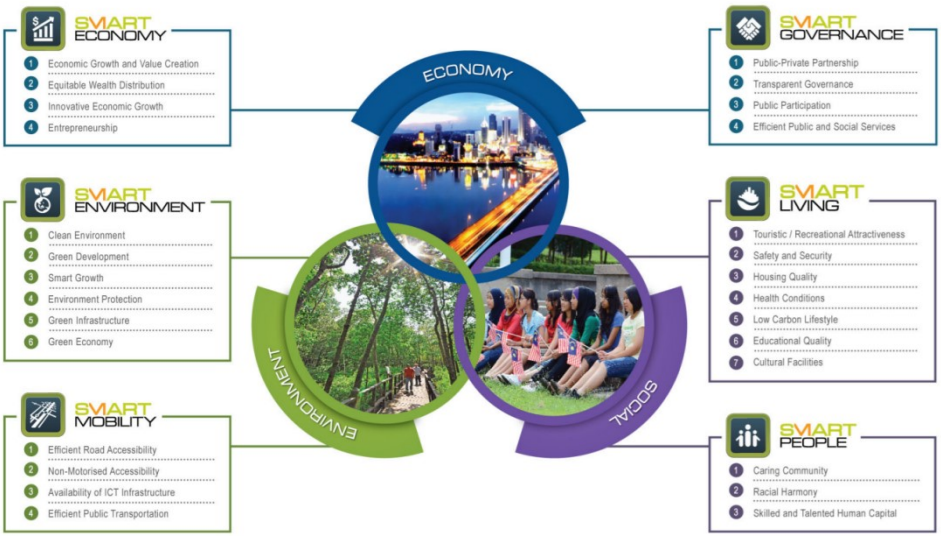


Figure 3: Smart City Iskandar Malaysia Framework
Source: iskandarmalaysia.com.my (2016)

Smart mobility relates to the accessibility of advanced, sustainable, and safe transportation systems, community and supralocal accessibility, and the provision of ICT. To create a prosperous and integrated city, a Smart City should

properly use existing information and communication technology (ICT) installations (Tahir et al., 2016).

The Comprehensive Development Plan (CDP) by Iskandar Development Region Authority (IRDA) envisions Iskandar Malaysia as becoming a resilient and successful megacity with international prominence by focusing on three main pillars: wealth generation, resource and low carbon optimisation, and wealth sharing and inclusiveness. For example, under the Smart Mobility initiative, Iskandar Puteri promoted several strategies and programmes, including a Non-Motorised Transport (NMT) and Bus Rapid Transit (BRT). NMT in Iskandar Malaysia aims to set targets, objectives and standards for enhancing safety, broadening mobility alternatives and increasing the number of journeys taken by walking and cycling in Iskandar Malaysia.

According to the study conducted in Iskandar, Malaysia, a community's infrastructure and policies must be developed to make walking and cycling feasible transit options for residents. An in-depth inventory and analysis of current bicycle and pedestrian facilities in Iskandar Malaysia were completed with a prioritised list that included the master plan, guidelines, and a pilot project as part of the Iskandar Malaysia NMT research. The Cohesive Mobility Solution (COMOS) is a smart, practical, and environmentally friendly urban mobility alternative. A Public-Private Partnership (PPP) including a handful of various stakeholders, including the Ministry of Energy, Green Technology, and Water, is driving this effort (KeTTHa). Electric Vehicle (EV) Car Sharing, EV EcoRide, and EV Corporate Branding and Leasing are the three main commercial activities of COMOS.

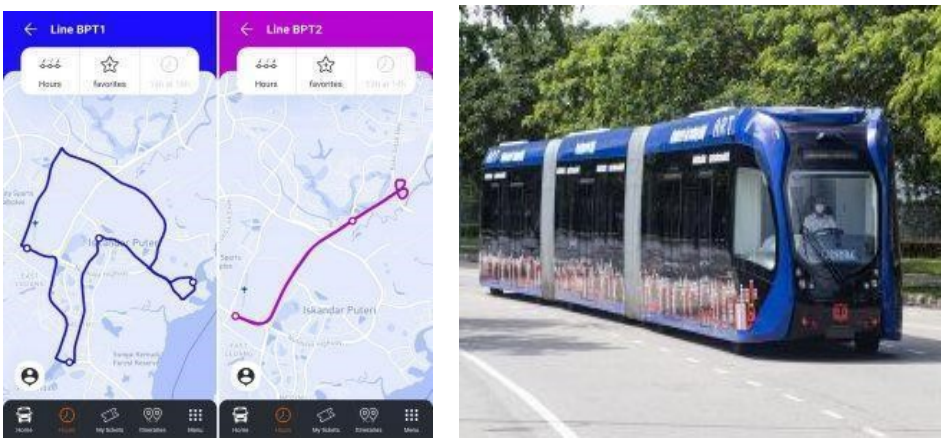


Figure 4: Smart Mobility initiatives in Iskandar Puteri. Over 750 buses servicing IMBRT routes will be monitored by the control centre
Source: Iskandar Malaysia Urban Observatory

This endeavour is not only pollutant-free but also user-friendly. Electric charging stations have been installed in Iskandar Malaysia as part of the region's efforts to promote sustainable mobility. GreenTech Malaysia has created the 'ChargEV' network, a unified corporate image for electric vehicle charging stations in Malaysia. GreenTech Malaysia met its goal of installing 300 electric vehicle charging stations in Malaysia in 2016. As of December 2016, charging points had been built in at least 12 locations in Iskandar, Malaysia.

Next, three (3) dedicated BRT corridors from JB Sentral-Skudai, Tebrau and Iskandar Puteri will be introduced in 2023. According to landtransportguru.net (2021), Iskandar Malaysia Bus Rapid Transit (IMBRT) is complemented by 55 feeders and 44 direct services, bringing the total network coverage to 2,051km, approximately 90% of the populated area of Iskandar Malaysia. Although the more environmentally-friendly buses will be used in Iskandar Puteri. A new app known as the MyBus app will also be used. So far, two routes and seven stations in Iskandar Puteri are visible on the MyBus app for the road testing of these buses (Figure 4).

COMPARATIVE STUDY

This qualitative research used a comparative study. The comparative study analysed and compared more than two objects, ideas, situations, or phenomena to demonstrate similarities or differences. The comparative study is on simple designs. Objects (policy/ strategy/ initiatives) are similar cases in some respects but differ in some contexts. These differences become the focus (Syed Aftab Hassan, B., 2011). Based on both case studies discussed above, this paper concluded the similarity and differences dimensions of Smart City initiatives from respective blueprints and frameworks in Table 2.

CONCLUSION

The term "Smart Cities" has become so overused that it risks losing its significance and distinguishing itself from other city development concepts. In every Smart City, the three components of technology, connectivity, and engagement must all be present. Interconnectedness, i.e. user-provider and user-user connections and infrastructure integration, are required by technology, preferably in conjunction with a shared platform to streamline all accessible services.

Finally, the smart projects' viability is determined by stakeholder participation. Based on Putrajaya and Iskandar Puteri's City experience, one of the biggest challenges is tailoring Smart City programmes for existing cities to the local environment rather than randomly investing in and deploying accessible technologies

Building a Smart City from the ground up is expensive. Still, it had also been considered cosmetic and limited in utility compared to enhancing existing cities with Smart City technology. When considering future Smart Cities for Malaysian cities, the approach should begin with determining the city's primary goal, followed by the population's actual cognizant and technical capabilities. Simultaneously, rigorous considerations of linked infrastructure development should be conducted to avoid repeating historical mistakes of indiscriminate technological infrastructure expenditure. To put it another way, Smart City isn't about sensors and real-time data but rather a more intelligent, well-thought-out use of data that may already be available. After the policies of a Smart City have been introduced for almost five years, such blueprint and framework should be revisited. An assessment of achievement for each programme or activity should be evaluated meticulously. Malaysia Smart City initiatives at any level of implementation in the future should be a national agenda to enhance urban dwellers' quality of life and community in rural areas.

Table 2: Comparison of Smart City initiatives in Putrajaya and Iskandar Puteri

Details	Putrajaya	Iskandar Puteri
Name of policy	Putrajaya Smart City Blueprint	Smart City Iskandar Malaysia Framework
Level	Local Authority/ City	Local Authority/ Regional
Local authority	Putrajaya Holding/ Perbadanan Putrajaya	Iskandar Puteri City Council/ Majlis Bandaraya Iskandar Puteri (MBIP)
Start	2018	2012
End	2025	-
Dimensions	1. Smart Transportation and Mobility 2. Smart Home and Environment 3. Smart Government Services 4. Smart Infrastructure and Utilities 5. Smart Safety and Security 6. Smart Economy 7. Smart Community	1. Smart Economy 2. Smart Governance 3. Smart Environment 4. Smart Mobility 5. Smart People 6. Smart Living
Applications/ Focus Areas	32	3
Initiatives/ Strategy/ Programmes	93	28
Description	Strategies designed more focus on city-level implementation (micro).	The very brief and wider context of regional level (macro).

Source: Author (2022)

Today, there are still no clear measurement methods or indicators that can assess the achievement of the Smart City initiative's implementation nationwide. In conclusion, for a Smart City to work requires combined effort and support from the public, private and government. Currently, both Putrajaya and Iskandar Puteri have targeted to deliver seven (7) Dimensions of Smart City, namely (1) Smart Governance, (2) Smart Mobility, (3) Smart People, (4) Smart Environment, (5) Smart Economy, (6) Smart Living and (7) Smart Digital Infrastructure to implement their own Smart City initiatives within the city.

ACKNOWLEDGEMENTS

This paper was sponsored by the "Smart City Initiatives: A Comparative Study of Malaysian Cities" grant (Reference No.: Q.J1300003652.02M85). Credit is also be given to all research assistants from Urban Design and Environmental Research Group UTM including Maheran Hamzah, Faiqah Nabilah Razman, Siti Hajar Abdul Razak, Norshahira Normi, Nur Syamimi Najihah Mohd Hanifi and Ida Shaheera Bakhtiar.

REFERENCES

Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. *Theoretical and Empirical Researches in Urban Management*, *4*(2 (11), 87-94.

Athey, G., Nathan, M., Webber, C., & Mahroum, S. (2008). Innovation and the city. *Innovation*, *10*(2-3), 156-169.

Berntzen, L., & Johannessen, M. R. (2016, June). The role of citizens in "smart cities.". In *Management International Conference*, Pula, Croatia, 1-4.

Business Today (2021). Putrajaya Smart City Takes Shape with First Municipal Operated IoT Infrastructure Powered by Vectolabs https://www.businesstoday.com.my/2021/05/06/perbadanan-putrajaya-and-vectolabs-technologies-to-set-up-1st-municipal-operated-iot-infrastructure/

Georgiadis, A., Christodoulou, P., & Zinonos, Z. (2021). Citizens' perception of smart cities: A case study. *Applied Sciences*, *11*(6), 2517.

Iskandarmalaysia.com.my (2016). https://iskandarmalaysia.com.my/SCIM/about.html

Land Transport Guru (2021). IMBRT Pilot Testing Programme. https://landtransportguru.net/imbrt-pilot-testing-programme/

Malaysia Industry-Government Group for High Technology (MIGHT) (2021). *Malaysia Smart City Outlook 2021-2022 Embracing Technology Toward Enhancing Smart Cities & Communities*.

Norhisham, Q., Rahman, Y., & Zubir, S. S. (2013). Unveiling the potentialities of urban space in Putrajaya. *The Sustainable City VIII (2 Volume Set): Urban Regeneration and Sustainability*, *179*, 157.

Ong & Ong, E. S. I. and. (2018). Smart City Governments 1. 1–106.

Saibal Chowdhury (2021). *The Smart City Journal.Com.* https://www.thesmartcityjournal.com/en/cities/green-smart-and-connected-putrajaya

Shawn Tan. (2000). *Iskandar shows Malaysia's smart cities' promise but only if they keep citizens in mind.* https://www.smartcitiesworld.net/opinions/opinions/iskandar-shows-malaysias-smart-cities-promise-but-only-if-they-keep-citizens-in-mind

Tahir, Z., & Malek, J. A. (2016). Main criteria in the development of smart cities determined using analytical method. *Planning Malaysia*, 14, pp.1-14.

The Sun Daily. (2020). *Three concepts to drive Putrajaya's vision for development.* https://www.thesundaily.my/local/three-concepts-to-drive-putrajaya-s-vision-for-development-XD3731231

Loo, C. (2019). *Ministry Launches Malaysia Smart City Framework.* https://www.thesundaily.my/local/ministry-launches-malaysia-smart-city-framework-BN1395377

Lim, Seng Boon & Abdul Malek, Jalaluddin & Hussain, Mohd & Tahir, Zurinah. (2021). Malaysia Smart City Framework: A Trusted Framework for Shaping Smart Malaysian Citizenship?. In book: *Handbook of Smart Cities* (pp.515-538), Chapter: 19 Publisher: Springer, Cham, Switzerland 10.1007/978-3-030-69698-6_34.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 29 – 39

THE ROLES OF GOVERNANCE IN PROVIDING STRATA HOUSING FOR AGING IN PLACE

Amalina Azmi[1], Peter Aning Tedong[2], Zafirah Al Sadat Zyed[3], Wan Nor Azriyati Wan Abd Aziz[4]

[1,3.4]*Department of Real Estate, Faculty of Built Environment,*
UNIVERSITI MALAYA
[1]*Department of Building and Property Management,*
Faculty of Accountancy and Management,
UNIVERSITI TUNKU ABDUL RAHMAN
[2] *Department of Urban & Regional Planning, Faculty of Built Environment,*
UNIVERSITI MALAYA

Abstract

Ageing in place in strata housing is becoming an aspiration among the elderly in Malaysia, especially in Klang Valley. Accordingly, multiple stakeholders have different roles in providing strata housing for the elderly to age in place. By using thematic analysis, the qualitative analysis analyses their roles in providing strata housing for the elderly to age in place, from different points of view. Fifteen stakeholders from multiple disciplines took part in the interview. Analysis of the interview identified 3 major themes. These themes were Planning, Approvals and Passion. These themes evidenced the importance of stakeholders' roles in strata housing attributes for the elderly to age in place. Explicitly, they demonstrated greater awareness of the importance of strata housing attributes for ageing in place. This research paper demonstrated that states and local governments, as well as private sectors, are preparing for the rapid ageing of the Malaysian population. With this shared understanding, states and local governments, as well as private sectors, can better support those who aim to age in place in strata housing.

Keywords: Ageing in place, Elderly, Strata Housing Attributes, Governance

[2] Lecturer at Universiti Malaya. Email: peteraning@um.edu.my

INTRODUCTION

The ageing population in most countries and regions has shown a tremendous increment. According to the United Nations Department of Economic and Social Affairs Population Division (2019), the global elderly population as of 2019 is 703 million and is projected to increase to 1.5 billion in 2050. The issue has been the main focus in roundtables by many global organisations, policymakers as well other stakeholders. Previous research has consistently demonstrated that most elderly prefer to age in place (Ainoriza et al., 2015; Amalina et al., 2021; Park et al., 2017; Støre-valen & Smistad, 2019). Ageing in place (AIP) is defined as 'the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level' (Nan et al., 2016, p. 1). Moreover, Xiang et al. (2019) contended that ageing and rapid urbanisation had become one of the most significant challenges globally, as Widiyastuti and Ermawati (2019) argued most of the elderly population would live in the urban area. Thus, the trend has changed for the elderly to age in a strata housing in an urban area rather than in landed property (Guillory and Moschis, 2008; Judd et al., 2012; Vasara, 2015).

RESEARCH BACKGROUND

In the Malaysian context, Jariah et al.(2012) defined the elderly as those above 60 years of age. This definition aligns with the definition introduced by United Nations World Assembly on Ageing 1982 in Vienna. Research by Ainoriza et al. (2015) also suggested that Malaysia has selected 60 years old and above as a benchmark for the elderly. There are signs that the population in Malaysia is moving toward an ageing population (Wan-Ibrahim and Zainab, 2014). Based on the Department of Statistics (2019), there are 32.6 million in total population. The elderly population in 2019 is 10.3% of the total population which is approximately 3.35 million in total. By 2020, Malaysia will be a mature society with approximately 9.5% of its population aged 60 and above (Table 1). Interestingly, as shown in Table 1.2, the total number of elderly people aged above 60 years old in Selangor in 2010 is 334,889, with the District of Petaling having the highest elderly population. Due to having the highest elderly population, this research will focus on the District of Petaling.

Table 1: Population projection by age group, Malaysia 2010-2040

Year	0-14 ('000)	%	15-59 ('000)	%	60+ ('000)	%
2010	7822.1	27.4	18518.1	64.8	1425.1	7.9
2020	7911.8	23.4	22121.4	65.5	3749.0	11.1
2030	8082.3	21.2	24161.4	63.5	5818.4	15.3
2040	7726.2	18.6	25546.3	61.6	8230.7	19.8

Source: Department of Statistics, Malaysia (2012)

Table 2: Elderly Population Based on Districts in Selangor, 2010

Age/ District	60-64	65-69	70-74	>75	Total
Sabak Bernam	4,438	3,009	2,531	2,557	12,535
Kuala Selangor	5,693	3,366	2,740	3,128	14,927
Hulu Selangor	4,607	3,062	2,370	2,553	12,592
Gombak	18,747	9,657	6,990	7,749	43,143
Hulu Langat	27,324	14,065	10,480	12,138	64,007
Petaling	46,032	25,334	17,457	22,532	111,355
Klang	21,345	12,119	8,634	9,689	51,787
Kuala Langat	5,851	3,761	2,938	3,279	15,829
Sepang	3,330	1,903	1,472	2,009	8,714
Total	137,367	76,276	55,612	65,634	334,889

Source: Population Distribution by Local Authority Areas and Mukims 2000, Population and Housing Census, Department of Statistics, Malaysia (2010)

The elderly population in Malaysia is rapidly increasing due to several factors. The number of the elderly population has increased primarily because of the increase in longevity (Nurul Aini et al., 2018). In addition, the decline in mortality and fertility rates are also the factors that contribute to the increment in the elderly population in Malaysia (Samsudin et al., 2019). The overall trends reveal that the ageing population will continue to increase over the years. In this light, Ainoriza et al. (2015) discovered that the elderly show high persistence to age in place. At the same time, factors such as urbanisation, land scarcity, and higher price for landed properties have seen the trend shift to living in strata housing such as condominiums and apartments (Haszlila et al., 2018). Klang Valley is one of the most developed regions in Malaysia. This region consists of five areas: the Federal Territory of Kuala Lumpur, Gombak, Petaling, Klang and Hulu Langat (Mohd Fadzli, 2017). This research paper will focus on the elderly who lives in condominiums and apartments within the District of Petaling, Selangor. As mentioned earlier, the District of Petaling has the highest elderly population (also as shown in Table 2) and has the most significant number of existing strata housing supply.

The rising number of elderly populations in Malaysia has been considered an important agenda to the Government Development Plan. This is because there is a need to improve the general elderly well-being through the physical environment. Besides, according to Ainoriza et al. (2015), there are only limited options of institutional and care residents available for the elderly in Malaysia, which is unlikely to meet the need of the burgeoning numbers of the elderly population. It is also not likely to allow the elderly to age in place, particularly in strata housing. However, on another note, Warner et al. (2017) explained that the community needs to be equipped with good housing attributes

for the elderly to age in place. Hence, specific housing attributes that enable the elderly to age in place must be produced to improve their well-being (Beard et al., 2016). Nevertheless, it is nothing new that the government worldwide, including Malaysia, are struggling to establish a good mechanism to provide care for the elderly to age in place. For instance, although Singapore is a developed country and synonym with vertical living, the country is still facing the challenge of providing a suitable strata housing environment for the elderly to age in place (Cho et al., 2018).

Although strata building has currently become a lifestyle in the urban population in Malaysia, there are no specific guidelines in relation to strata living for the elderly in Malaysia. Nevertheless, most of the previous studies only focused on the housing attributes for the elderly to age in place in landed properties (as previous research by (Siti Uzairah et al., 2018; Zainab Ismail et al., 2012). Therefore, one of the objectives of this study is to evaluate the role of stakeholders in providing strata housing for the elderly to age in place in Malaysia. Thus, this study evaluates the role of stakeholders in providing the strata housing for the elderly to age in place. Additionally, the World Health Organisation (WHO) has stressed the importance of including qualitative evidence in the guideline development process, considering it 'useful to assess the needs, values, perceptions and experiences of stakeholders (Farrugia, 2019). Furthermore, strong human governance through inter-sectoral and multi-disciplinary approaches involving various government ministries and agencies, non-governmental organisations, private sectors and the community" provides a supportive living environment for the elderly.

RESEARCH METHODOLOGY

This research paper adopted a qualitative method through an in-depth semi-structured interview with 15 stakeholders from multiple backgrounds. Therefore, there are ethical protocols and interview processes conducted and participants' sampling as explained below.

Ethical Protocol

All participants were clearly informed regarding their participation in an active study as well as the purpose of the study. Prior to the interview process, consent from all the respondents was obtained. The respondents were also informed that they were allowed to withdraw at any time if they felt uncomfortable during the process and wished not to proceed. Participants consented to the interviews being recorded, which were subsequently anonymised and transcribed. All participants were treated equally during the data collection, and very minimal disruption was made. The interviews were stored on a password-protected computer, which kept all the data.

Interview Process
Once the participants agreed to be interviewed, an appointment was made with each participant at a time convenient to both them and the interviewer. Appointments made were based on participants' convenience and did not affect their other commitments. Furthermore, there no harmful information was shared in this study. Interviews were in-depth and semi-structured; a guide was provided to further explore the main topic. Five open-ended interview questions were asked to the stakeholders. The opening question was, "What is your role in providing the strata housing with suitable attributes for the elderly to age in place?".

Participants
Purposive sampling is widely used in richly textured information with limited resources (Palinkas et al., 2016). In this research paper, a group of stakeholders comprised of 15 participants were purposely selected to explain their roles in providing the strata housing for the elderly to age in place. They were selected based on their experiences, knowledge of the subject and willingness to participate. Particularly, a total of 15 interviews were conducted with the stakeholders within the Klang Valley. The stakeholders consisted of representatives of government agencies, local authorities, non-government organisations and developers; 5 participants were from government agencies (GA1 – GA5), 5 from local authorities (LA1-LA5), 2 each from non-government organisations (NGO1 and NGO2) and 2 developers (DV1 and DV2) as well as a representative from REHDA Retirement Village Community (RVC).

RESULT AND FINDINGS
This study adopted a thematic analysis (Braun and Clarke, 2006) where the interview recordings were transcribed, coded, and the potential themes were reviewed. The themes were then identified, defined and named. The research questioned their roles in providing strata housing attributes for the elderly to age in place. Finally, once the themes were finalised, a report was prepared. Through the thematic analysis, three main themes were identified.

Planning
Most of the participants in this study were involved in planning at various stages and angles. Illustrative examples appear below.

> *Our role is to observe specific people in a specific area in an urban area. Through the observations, we will make sure to do the urban planning as the urban area is the new "kampung" for the elderly.*
>
> Code: GA5

At the same time, one of the local authorities had taken the initiative to be involved in the planning for the elderly community activities. One local authority converted some vacant land to farming activities to occupy the elderly's time. She mentioned.

> *We were also involved in the planning of the social activity for the elderly within their territory. In fact, the elderly have managed to transform some vacant lands into farming activity, and some have generated income from it.*
>
> Code: LA3

Approval

Most of the participants in this study agreed that their role is to provide approval. Illustrative examples appear below.

> *Before we approve the drawing, we will make sure that the developers really comply with the Universal Design (MS1184: 2014) in the common areas, especially the ramp and handrails.*
>
> Code: LA1, LA2, LA3, LA4 AND LA5

The government agencies also provide approval for social and community activities. They explained:

> *We also provide approval for states' social activities within the area (gardening, aerobic, recycling programs) that involve the elderly as well as the community*
>
> Code: GA3 AND GA4

Passion

In this study, passion comes from the private sector. One of the developers mentioned:

> *It is actually our vision to provide a house to enable the elderly to live independently, safely and healthily. Thus, we took the initiative to do all we could, including hiring local and international consultants, complying with the Universal Design (MS1184: 2014) in the common areas as well as in the unit itself, and importing custom made equipment for our development. Even though we do not know the demand, at the same time, no one is forcing us to do so.*
>
> Code: DV1

At the same time, one of the private sectors made similar claims, as the previous developer, who felt obligated to support the elderly issue. He says:

> *Not all developers are interested in building this type of house. However, due to Malaysia becoming an ageing nation by 2030, some developers have developed some passion inside themselves. Moreover, they also feel the obligation to take care of themselves when they are old. Hence, they are planning to do this type of house. It is considered a niche market, so they will start with only 1 or 2 developments, and we will consider further expanding if the demand is good.*
>
> Code: RVC

DISCUSSION

Planning is an important element prior to, during and after development. There are a few liveability policies and practices that local governments can adopt from developed countries in planning in order to support the desire of the elderly to "age in place in strata housing. Multiple stakeholders' involvements at the planning stage will provide a strong framework to guide, support and evaluate elderly-friendly initiatives, including strata housing attributes for the elderly to age in place. This research paper found that the government agencies, as well as the local authorities, were involved in the planning stage. They had shown strong governance support for ageing in place in relation to strata housing. Guidelines and policies were taken seriously during the planning stage by the government agencies and local authorities. As seconded by Zhou et al. (2019), with the engagement of multiple stakeholders, efficient and effective ageing in place will be achieved. Furthermore, Malaysia's government programmes continue to prioritise housing and community facilities, which indirectly improve the quality of life and contribute to the formation of civilisation development (Nur Shaffiqa Muhammad et al., 2018).

On top of that, the local authority had prepared a comprehensive community plan for future land use and development to help smooth a demographic transition to an ageing city. This plan included filling up the elderly's spare time with some activities. This comprehensive planning initiative will consider other types of social or community activities needed to address the future needs of the elderly who age in place in strata housing. As Alias et al. (2006), highlighted, meeting just the housing needs alone is insufficient to produce an integrated and effective housing development.

In Malaysia, the Federal government, and the State Government work together to produce and allocate affordable housing to eligible buyers. The Federal Government will provide the funding for the project, while the State Governments are responsible for identifying the available state land for affordable housing construction and choosing the eligible buyers. These efforts show that they have full control only of the developers involved in the project. Otherwise, developers are not obliged to follow the Universal Design guidelines. This is despite the fact that the local government should be involved in approving

the planning permission and building plans for both public and private developers' housing construction (Noraziah et al., 2018). For instance, the development of an affordable housing scheme under the State of Selangor has allocated specific units for the vulnerable group, requiring developers to incorporate the Universal Design Guidelines.

This research paper found that the local authorities and government agencies had enforced the developers to comply with the Universal Design MS1184:2014, for the internal and external environment and the allocated units. Thus, prior to the development approval, they will ensure that the developers comply with the Universal Design MS1184:2014. The local authorities in Selangor will only approve the drawing only if the developers comply with the Universal Design, MS1184:2014. This is supported by Phang (2009, p. 3), where "the State may choose to provide subsidies to build housing intended for the targeted group consistent with price affordability". This argument was supported by Alias et al. (2006), where housing requirements are driven by population trends, affordability, and effective household demands.

Noralfishah Sulaiman et al. (2005) mentioned that the State is responsible for providing adequate housing to fulfil human rights. For instance, Kuala Lumpur City Hall (DBKL) provides facilities for disabled people with a lower rental house, while Syarikat Perumahan Nasional Berhad (SPNB) give priority to the disabled people with a low-income background in obtaining housing at low costs and medium-low income background with lower prices (Syakir Amir et al., n.d.). In this case, the elderly is also categorised in the disabled group as they are vulnerable. Nevertheless, in Selangor, even though it is compulsory for the private sectors, especially the developers, to comply with the Universal Design, MS1184:2014 for the external environment in development but they do not have to comply with the internal environment. Thus, most development projects that comply with the Universal Design, MS1184:2014 for both internal and external environment are based on their passion and own initiatives. Furthermore, developers are aware that they should take the risk by being more flexible and more adaptable to the changes in homebuyers' wants and needs. Likewise, there will be greater emphasis on ageing in place as the numbers of elderly is burgeoning and their preferences are to age in place especially in strata housing.

Passion is defined as a strong inclination toward an activity that one likes, finds important, and invests time and energy (Rousseau & Vallerand, 2008, p. 201). This research paper revealed that the developers are passionate about providing strata housing with suitable attributes for the elderly to age in place by taking into consideration the internal housing environment even though it is not part of the approval requirement by the government agencies and local authorities. To remain competitive in the industry, developers need to adopt strategies such as being more socially responsible and projecting a good image to

the public because most of the house buyers are not only looking at the price factor but also consider the housing environment, infrastructure and developer's reputation (Sharon et al., 2008). Besides, they need to identify the market preference to deliver superior products to them and anticipate the likelihood in the property market. Therefore, fulfilling the housing needs and demands should be the primary objective to ensure the local housing requirements are adequately and successfully met (Alias et al., 2006).

CONCLUSION

In summary, the focus of ageing in place is to enable the elderly to live independently regardless of their age, finances and ability. The goal of the elderly wanting to age in place is to maintain their autonomy and/or improve their well-being. Thus, good planning that focuses on their well-being, which comprises themselves, home (internal and external housing attributes, technology), and other items, should be drafted as early as possible. This plan should be maintained over time as the time evolves and engages all stakeholders, the government, the private sectors and NGOs. Nevertheless, this research paper revealed that governments, private sectors, and NGOs work within a complex governance system to produce a strata housing that enables the elderly to age in place in Malaysia. Thus, it is hoped that the stakeholders, including the government and private sectors, will step up and continue to provide strata housing with suitable attributes for the elderly to age in place. New guidelines specifically for the elderly need to be created, existing relevant guidelines and policies are to be reviewed and improved, and numerous laws should be revised and amended to update the latest market needs and conditions. By engaging with relevant stakeholders, policies, laws and regulations, existing guidelines can be better shaped to enable the elderly who wants to age in place in strata housing.

Passion can be seen in a good initiative shown by the stakeholders to provide strata housing with suitable attributes for the elderly to age in place. It will ensure the elderly's needs are met and their wishes respected when they age in place in strata housing. Providing the right place for the elderly to age in place will improve their well-being. In conclusion, housing demands are shifting, and a house today is not just a roof over their heads, but it should be part of their lifestyles.

However, this research predominantly focused on the urban point of view, considering the fact that Selangor is one of the urbanised states in Malaysia. The majority of the respondents are well-educated, which correlates to the actual phenomenon in Selangor. Thus, it is believed that the research disregards the rural perspective on strata housing's attributes for ageing in place. Nonetheless, the limitations of the research did not undermine the value of the research, which is solely discussed in order to provide suggestions for further study. Future research could pay attention to strata housing attributes for ageing in place from a different

perspective by considering the rural aspect. As referred to by Aini et al. (2016), respondents from rural areas tend to have a stronger preference for ageing in place. In this scenario, the elderly in rural areas may have different demands for ageing in place due to their environment and lifestyle compared to urban areas. For instance, there will be differences in terms of housing types, accessibility, limited space and resources, financial background, and other factors.

However, most notably, the findings on the roles of stakeholders in providing strata housing for the elderly to age in place are unique to each other. There is a need for the stakeholders and policymakers to tailor interventions, provision of resources, amendments in the related policy, and strengthening the enforcement which will be appropriate to enable the elderly to age in place and at once improve their well-being.

ACKNOWLEDGEMENTS

We would like to express our gratitude and appreciation to all participants who have participated in the interview for the research paper. Furthermore, we would like to express our gratitude to NAPREC, the University of Malaya (UM), Kuala Lumpur and Universiti Tunku Abdul Rahman (UTAR) Sg Long Campus for the support in producing this research paper. Finally, we appreciate all the relevant stakeholders, departments, and those who were, directly and indirectly, involved in this research paper and the cooperation received during the research process.

REFERENCES

Ainoriza, M. A., Wan Azriyati, W. A. A., & Noor Rosly, H. (2015). To move or not to move?: exploring future housing plan of ageing communities in Kuala Lumpur. *The Asia Pacific Network for Housing Research (APNHR) Conference, Gwanju, Korea*, 573–579. http://www.researchgate.net/profile/Ainoriza_Aini/publication/276926117_To_Move_or_Not_to_Move_Exploring_future_housing_plan_of_ageing_communities_in_Kuala_Lumpur/links/555c29d608aec5ac2232ac3c.pdf

Amalina, A., Peter, A., Wan Nor Azriyati, W. A. A., Nur Hafizah, J., Nurhayati, K., Puteri Ameera, M. K., & Sheelah, S. (2021). Assessing the Strata Housing Attributes for. *PLANNING MALAYSIA: Journal of the Malaysian Institute of Planners*, *19*(3), 95–110.

Department of Statistics Malaysia. (2012). *Population projections, Malaysia, 2010–2040.* Putrajaya, Malaysia: Author.

Department of Statistic. (2019). Press Release Current Population Estimates, Malaysia, 2018-2019. In *Department of Statistics Malaysia* (Issue July). https://doi.org/10.1017/CBO9781107415324.004

Guillory, M. D., & Moschis, G. (2008). Marketing Apartments , Townhouses , and Condominiums to Seniors. *Seniors Housing & Care Journal*, *16*(1), 39–52.

Haszlila, J., Norngainy, M. T., Md Nasir, D., & Aina Edayu, A. (2018). House price movement for primary and secondary markets: Evidence from Selangor, Malaysia. *Journal of the Malaysian Institute of Planners*, *16*(1), 334–347.

https://doi.org/10.21837/pmjournal.v16.i5.436

Jariah, M., Husna, S., Aizan, T., & Ibrahim, R. (2012). Social Sciences & Humanities Financial Practices and Problems amongst Elderly in Malaysia. *Pertanika J. Soc. Sci. & Hum*, *20*(4), 1065–1084. http://www.myjurnal.my/filebank/published_article/26015/09_Page_1065_1084.pdf

Judd, B., Bridge, C., Davy, L., Adams, T., & Liu, E. (2012). Downsizing amongst older Australians. In *AHURI Positioning Paper* (Issue 150). http://staging.beweb.fbe.unsw.edu.au/sites/default/files/upload/research/centres/cf/publications/ahuriprojectreports/AHURI_Positioning_Paper_No150.pdf

Mohd Fadzli, A. R. (2017). Urban Migration In Malaysia : A Case Study Of The Klang. *Journal of Urban Planning, Landscape & Environmental Design*, *2*(August), 107–127. https://doi.org/10.6092/2531-9906/5261

Nan, J., Vivian, W. Q. Lou, & Nan, L. (2016). *Does social capital influence preferences for aging in place ? Evidence from urban China*. *September 2017*. https://doi.org/10.1080/13607863.2016.1249455

Nurul Aini, B., Mohamad Zaki, H., Hazilah, M. K., Nor Fazilah, M. H., Rudzidatul Akmam, Dziyauddin, Rafizah, M., Mohamed Azlan, S., Sahnius, U., Firdaus, Muhammad-Sukki, Abu-Bakar, S. H., & Mas'ud, A. A. (2018). Assessment of Health Status of the Elderly and Pre-elderly at a Malaysia Elderly Care Centre. *International Journal of Integrated Engineering*, *10*(7), 10–22. https://doi.org/10.30880/ijie.2018.10.07.002

Park, S., Han, Y., Kim, B., & Dunkle, R. E. (2017). Aging in Place of Vulnerable Older Adults : Person – Environment Fit Perspective. *Journal of Applied*, *36*(11), 1327–1350. https://doi.org/10.1177/0733464815617286

Samsudin, S., Abdullah, N., Ismail, N. S. A., Hassan, K., & Ahmad, U. A. (2019). Growing old at own home: A study among pre-elderly adults in Peninsular Malaysia. *Economics and Sociology*, *12*(1), 115–124. https://doi.org/10.14254/2071-789X.2019/12-1/6

Støre-valen, M., & Smistad, I. (2019). Senior Residence Concepts in Norway : Challenges and Actions for a Sustainable Development. *10th Nordic Conference on Construction Economics and Organization*, 337–347. https://doi.org/10.1108/S2516-285320190000002010

United Nations Department of Economic and Social Affairs Population Division. (2019). World Population Ageing 2019. In *World Population Ageing 2019*. http://link.springer.com/chapter/10.1007/978-94-007-5204-7_6

Vasara, P. (2015). Not ageing in place: Negotiating meanings of residency in age-related housing. *Journal of Aging Studies*, *35*, 55–64. https://doi.org/10.1016/j.jaging.2015.07.004

Widiyastuti, D., & Ermawati, H. (2019). Travel Motivation Factors of Elderly in Yogyakarta City: Push and Pull Factors. *IOP Conference Series: Earth and Environmental Science*, *256*(1). https://doi.org/10.1088/1755-1315/256/1/012037

Xiang, L., Yu, A., Tan, Y., Shan, X., & Shen, Q. (2019). Senior citizens' requirements of services provided by community-based care facilities: a China study. *Facilities*, *ahead-of-p*. https://doi.org/10.1108/F-02-2019-0023

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 40 – 50

INADEQUATE EXPOSURE TO GREENSPACE AND ITS EFFECTS ON MENTAL HEALTH DURING THE PANDEMIC

Xiao Cai[1], Peter Aning Tedong[2], Rosilawati Zainol[3]

[1, 2, 3] *Department of Urban & Regional Planning, Centre for Sustainable Urban Planning and Real Estate (SUPRE), Faculty of Built Environment,*
[3] *Centre for Civilisational Dialogue,*
[3] *Centre for Transport Research (CTR),*
UNIVERSITI MALAYA

Abstract

Visiting greenspace plays an important role in maintaining public mental well-being. This study aims to explore what results from people's limited access to greenspace and the consequent effects on people's mental health. To achieve this goal, this study takes the district of Nanshan in Shenzhen, China as a case study to empirically examine whether residents are adequately exposed to greenspace. Findings revealed that there was an unbalanced spatial distribution of population and greenspace in Nanshan, which was one of the main factors deterring some residents from being served by greenspace. This study also found that the pandemic has caused a deterioration of mental health. Consequently, three nature-based approaches to reducing public psychological diseases under the condition of inadequate access to greenspace were proposed. These findings can provide policymakers with significant insights for local greenspace design and planning in Nanshan. It also offers some effective suggestions to handle public mental issues due to limited access to greenspace.

***Keyword**:* COVID-19; Greenspace; Park accessibility, Mental health; Nanshan

[3] Associate Professor at Universiti Malaya. Email: rosilawatizai@um.edu.my

INTRODUCTION

In December 2019, the first case of infection by the coronavirus COVID-19 was reported in China. This virus quickly spread around the world, culminating in a pandemic. To limit the spread of this highly infectious coronavirus, various lockdown policies had been issued in countries across the world to restrict their citizens' movement, which in turn reduced people's access to greenspace. The uneven spatial distribution of greenspace in cities also limit residents from adequate access to the natural environment. These two aspects have adversely affected people's mental health.

In this regard, the goal of this study is to explore complex relationships among inadequate access to greenspace, mental health and the COVID-19 pandemic. To be specific, three research questions are expected to be addressed: (1) Are the residents of Nanshan able to easily visit *greenspace*? (2) How does the pandemic affect people's access to greenspace and further influence their mental health? (3) What potential nature-based solutions can improve psychological problems among the public during times of crisis?

LITERATURE REVIEW

Greenspace accessibility refers to the extent of difficulty to which people are able to visit greenspace. This indicator is often measured in previous studies for promoting urban parks visitation, which can be understood from emotional and physical aspects. First, emotional accessibility to greenspace is related to residents' perception of the greenspace, e.g., perceived safety. Improved park safety can bring about large improvements for accessibility and environmental justice (Williams et al., 2020). Second, physical accessibility to greenspace is related to the spatial availability of greenspace for people. It refers to either the distance between greenspace and places of residence, or the quantity of greenspace shared by its surrounding residents. The greenspace-residence distance is measured by real travel costs along the road network or the Euclidean distance in existing studies. For instance, Yu et al. (2020) suggested that a 15-minute walking time or 1000-meter distance (i.e., the real travel cost) is an appropriate threshold for residents to access a greenspace from their residence for daily recreational purposes. Natural England (2010) applied the Euclidean distance as requirements for park accessibility - everyone, wherever they live, should have an accessible natural greenspace of at least, (1) a two-hectare greenspace within 300 meters from home; (2) one 20-hectare greenspace within two kilometers from home; (3) one 100-hectare greenspace within five kilometers from home; and (4) one 500-hectare greenspace within ten kilometers from home. Greenspace accessibility measured in this study is physical accessibility.

Improving residents' accessibility to greenspace is significant because people with higher greenspace accessibility are more likely to visit greenspace (Hartabela et al., 2022). It is noted that exposure to natural environments can help

people at different age scopes deal with mental issues. For instance, Engemann et al. (2019) found that high levels of green space presence during childhood were associated with a lower risk of a wide spectrum of psychiatric disorders later in life. It is also found that long-term exposure to greenspace plays an important role in mental health (depression and anxiety) in adults (Gascon et al., 2018). A protective effect of greenness on depression was consistently observed for older adults (Sarkar et al., 2018), while having more greenspace near the residence supported mental health through several indirect pathways with serial components in young adults (Dzhambov et al., 2018). Street view green and blue spaces are protective against depression for the elderly (Helbich et al., 2019). Therefore, people at different ages can receive mental health benefits from exposure to greenspace. Given the importance of greenspace, a series of nature-based approaches are thus expected to be proposed to promote public health. This study defines the nature-based approach as the method of helping people increase their exposure to greenspace for promoting their mental health.

RESEARCH METHODOLOGY

This study takes Nanshan (located in Shenzhen, China) as the study area to empirically examine whether residents can be adequately exposed to greenspace. This study collected census data in Nanshan from the local statistical bureau. The locations (i.e., the longitude and latitude of each community's geographic centroid) of communities were acquired from the Shenzhen Municipal Government Data Open Platform (https://opendata.sz.gov.cn). A total of 98 communities are applied for the following spatial analysis. Notably, to ensure the precision of spatial population distribution, this study examined the spatial distribution of population at the community level because the community is the least administrative zone in China.

A series of spatial analyses were conducted in ArcMap 10.2 to empirically examine residents' accessibility to greenspace in Nanshan. First, the spatial population distribution in Nanshan was achieved based on the method of Kriging interpolation. A buffer analysis was then applied for each piece of greenspace. According to the National Garden City Series Standards in China, 300-meter and 500-meter buffer radiuses are applied to greenspace with areas between 2000 and 5000 square meters and more than 5,000 square meters respectively. Third, whether people can access easily greenspace was examined by overlapping spatial distributions of population and greenspace service areas.

RESULTS AND DISCUSSION

Limited access to greenspace in Nanshan

Figure 1 presents the spatial population distribution in Nanshan using population density data at the community level. An evident spatial disparity in the population was discovered. Two high clusters were identified, located in the South and the

middle of Nanshan (see Zones A and B, Figure 1). A comparatively less dense cluster, Zone C, was identified (Figure 1). By contrast, the areas to the West and to the North are sparsely populated.

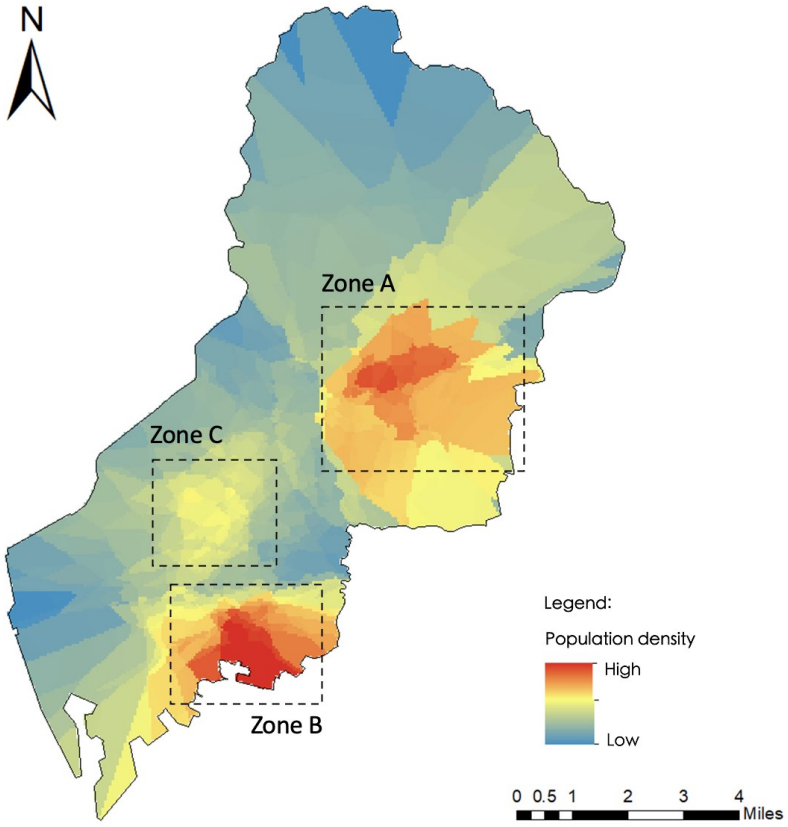


Figure 1: Spatial distribution of population in Nanshan
Source: Authors (2022)

Figure 2 presents the spatial distribution of greenspace and its buffer zones in Nanshan. It was found that there are quite a number of areas underserved by greenspace. This indicates that it requires people residing in these areas to travel a longer distance to access a greenspace. On the other hand, there were also apparent differences in buffer zones. The saturation level of buffer zones depends on the number of overlaps, thus representing how well an area is served by greenspace. As shown in Figure 2, a greater number of buffer zones overlap in the southern and central regions of Nanshan. This suggests that people living in these areas can be well served by greenspace compared to other areas.

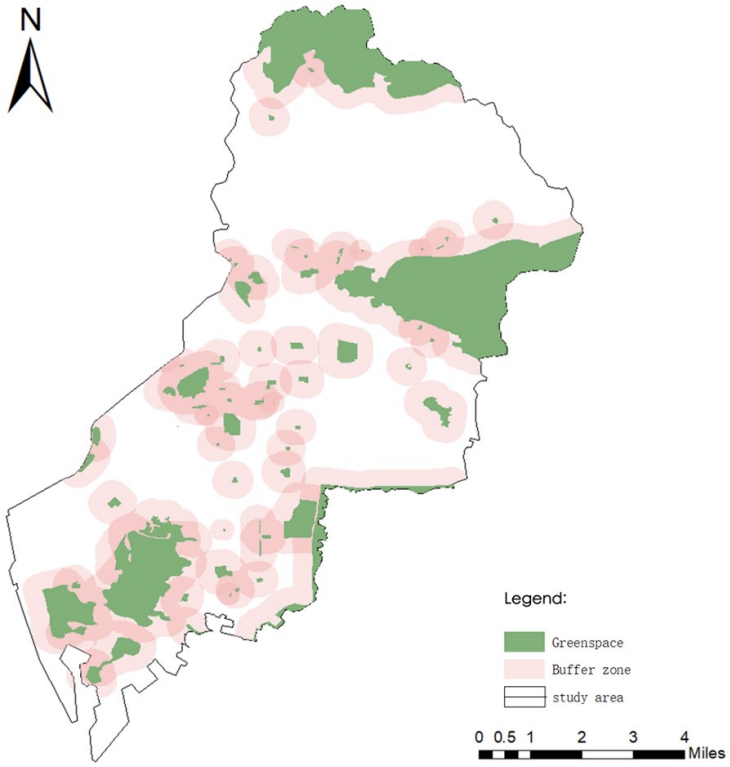


Figure 2: Spatial distribution of greenspace and its buffer zones in Nanshan
Source: Authors (2022)

Figure 3 presents overlap relationships between population and greenspace-served areas. It was found that two high population clusters in Zone A and Zone B were not entirely served by greenspace. Worse, the comparatively high population cluster in Zone C was almost completely underserved by greenspace. These two findings indicate that it is difficult for people to access greenspace in Nanshan, even though the greenspace coverage has met local greenspace proportion standards. People are required to travel long distances to visit a park.

Based on the above analysis, this study concludes that people living in Nanshan have unequal access to greenspace, which is the same as the previous study conducted by Lv et al. (2017). Actually, a significant disparity in greenspace distribution exists among Chinese cities (Huang et al., 2020), and the level of disparities vary according to population scales and geographic locations (Xu et al., 2019). It was reported that only 57.62 percent of residents in Shenzhen can access the nearest community park within a 500-meter walking distance Li et al. (2017). In fact, Nanshan possesses exceptional advantages in greenspace

resources because four mountains with a series of urban parks provide the public with adequate greenspace amount. The main problem, this study holds, is that the spatial distribution of greenspace in Nanshan is not reasonable. As supported in Figure 3, three population clusters cannot be served entirely by greenspace, which leads to less adequate accessibility to greenspace in a whole.

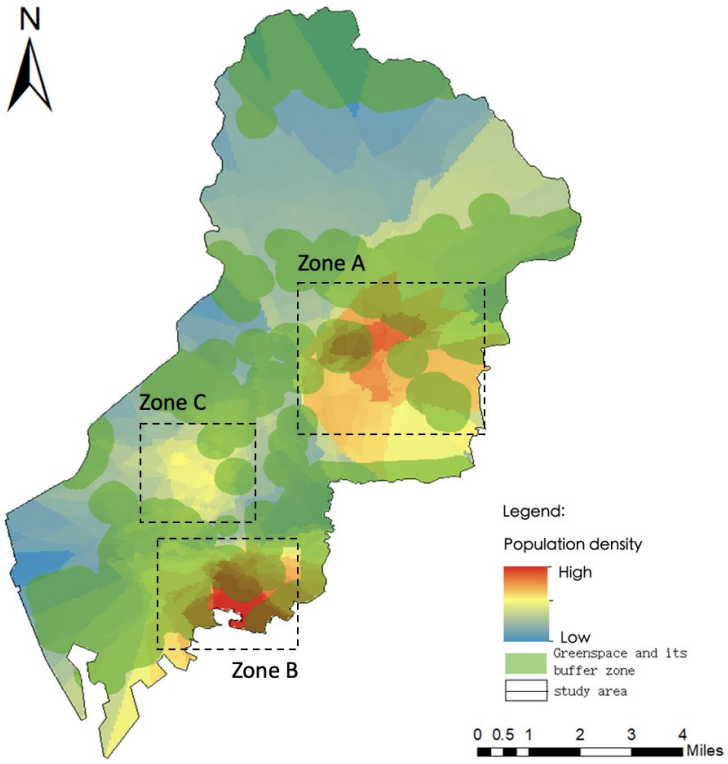


Figure 3: Residents' accessibility to greenspace in Nanshan
Source: Authors (2022)

Mental well-being, exposure to greenspace, and the COVID-19 pandemic

Exposure to greenspace on a frequent basis is significant for improving people's mental well-being (Salleh et al., 2022). However, lockdown deprives people of visiting greenspace freely, causing potentially an eruption of mental distress (Heo et al., 2021). Pouso et al. (2020) reported that people were experiencing worse mental conditions under lockdown conditions. This consequence is partially attributed to reduced physical activities and increased screen time (Olszewska-Guizzo et al., 2021). People who are habitual users of greenspace suffer more adversely due to the dramatic change in greenspace visitation frequency,

compared to those who visited greenspace less frequently before the pandemic (Ugolini et al., 2021).

On the other hand, a recent study also stated that most people self-reported no differences in mental health before and during the COVID-19 pandemic (Xie et al., 2020). This contrary finding can be explained by different quarantine conditions among countries, which can lead to differential mental health outcomes (Ribeiro et al., 2021). Some countries did not impose strict restrictions, especially during the early time of the pandemic. For instance, a study conducted by Robinson et al. (2021) found that people's greenspace use and duration of visiting nature were more frequent and longer during the pandemic. As a result, people's mental health is only slightly affected because there is not an evident decrease in people's exposure to greenspace after the breakout of the pandemic.

The pandemic is also affecting people's greenspace visitation patterns. For instance, it was found that people had a preference to visit urban parks with a higher greenery coverage rate during the pandemic (Cheng et al., 2021). It might be because that these urban parks have adequately spacious spaces for social distancing. It was also reported that people's visits to various capacious greenspace (e.g., woodlands and natural parks) were more frequent than before the pandemic (Grima et al., 2020; Logan et al., 2021). Two reasons can account for this phenomenon. First, a shift of working and life patterns enables people to spend time in exposure to nature when the quarantine policy is less strict (Fagerholm et al., 2021). Second, people start to realize the importance of greenspace for public well-being and attempt to find opportunities to be exposed to nature. These public greenspaces enable residents to contact directly with nature and provide them with safe spaces for necessary social interaction.

Ways of exposure to greenspace during the COVID-19 pandemic

As mentioned above, Nanshan has poor greenspace accessibility. However, solving these problems is quite challenging because Nanshan is located in the center of Shenzhen's built-up areas with limited land for building greenspace. Meanwhile, the pandemic has decreased people's exposure to greenspace. In this regard, the following ways can help alleviate the adverse effect on people's mental health.

First, visiting private gardens can make great contributions towards reducing psychological diseases when access to public greenspace is not available (Marques et al., 2021). As reported by Lehberger et al. (2021), the residents with private gardens expressed greater life satisfaction and self-reported a higher sense of mental well-being substantially than those without gardens. Second, indirect exposure to greenspace (i.e., having green views from windows at home and watching nature-based videos) can help people have a more positive mood. It was surprisingly found that green views had a greater effect on people's psychological

health than the effect brought by physical use of greenspace (Soga et al., 2021). A recent controlled experiment conducted by Olszewska-Guizzo et al. (2021) reported that greenspace scenes (in comparison with busy urban center scenes) could not induce a stress and anxiety related hemodynamic pattern, so as to offset negative neuropsychological effects during the pandemic. Third, having some plants in the house can also be an easily achievable alternative for mitigating people's psychological issues (Spano et al., 2021).

CONCLUSION

The goal of this study is to explore the effect of limited access to greenspace on people's mental health. According to the above analyses, limited exposure to greenspace does exist, which could cause some mental issues for the public. To solve this problem, this study summarizes three approaches to enhance public mental well-being.

There are a few limitations preventing this study from receiving more convincing results, but the authors believe this can only produce insignificant detrimental effects. First, buffer analysis was employed to examine residents' access to greenspace. This method is easy to use but does not take real travel difficulties into consideration, which could result in less realistic measurement results. Future studies can employ more effective methods to measure accessibility to greenspace, such as the 2-step floating catchment area method. Second, fine-grained population data (i.e., at the community level) make measurement results more precise, which is an advantage for this study. However, there are missing population data for five communities of a total of 107 communities, which might somewhat affect the accuracy of results. Besides, the population data in Nanshan were censused in 2019, and there might be some slight changes in population distribution from then until 2021. It is highly suggested to measure spatial population distribution using big data rather than census data in future studies, such as mobile phone data. This kind of data allows researchers to acquire real-time spatial population distribution.

This study can provide relevant policymakers some insights into greenspace design and planning in Nanshan. Besides, the findings also offer some effective suggestions to handle limited access to greenspace. This is of significance for the public to mitigate mental distress due to limited access to greenspace given the pandemic.

REFERENCES

Cheng, Y., Zhang, J., Wei, W., & Zhao, B. (2021). Effects of urban parks on residents' expressed happiness before and during the COVID-19 pandemic. *Landscape and Urban Planning, 212*. doi:10.1016/j.landurbplan.2021.104118

Dzhambov, A. M., Markevych, I., Hartig, T., Tilov, B., Arabadzhiev, Z., Stoyanov, D., . . . Dimitrova, D. D. (2018). Multiple pathways link urban green- and bluespace to

mental health in young adults. *Environmental Research, 166*, 223-233. doi:10.1016/j.envres.2018.06.004

Engemann, K., Pedersen, C. B., Arge, L., Tsirogiannis, C., Mortensen, P. B., & Svenning, J. C. (2019). Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. *Proceedings of the National Academy of Sciences of the United States of America, 116*(11), 5188-5193. doi:10.1073/pnas.1807504116

Fagerholm, N., Eilola, S., & Arki, V. (2021). Outdoor recreation and nature's contribution to well-being in a pandemic situation - Case Turku, Finland. *Urban Forestry and Urban Greening, 64*. doi: 10.1016/j.ufug.2021.127257

Gascon, M., Sanchez-Benavides, G., Dadvand, P., Martinez, D., Gramunt, N., Gotsens, X., . . . Nieuwenhuijsen, M. (2018). Long-term exposure to residential green and blue spaces and anxiety and depression in adults: A cross-sectional study. *Environmental Research, 162*, 231-239. doi: 10.1016/j.envres.2018.01.012

Grima, N., Corcoran, W., Hill-James, C., Langton, B., Sommer, H., & Fisher, B. (2020). The importance of urban natural areas and urban ecosystem services during the COVID- 19 pandemic. *PLoS ONE, 15*(12 December). doi: 10.1371/journal.pone.0243344

Hartabela, D., Dewancker, B., Vidyana, C., & Mori, Y. (2022). Tourist preferences and expectations of urban park: A case study in Kitakyushu, Japan. *Planning Malaysia, 20*, 89-100. doi:10.21837/PM. V20I20.1081

Helbich, M., Yao, Y., Liu, Y., Zhang, J., Liu, P., & Wang, R. (2019). Using deep learning to examine street view green and blue spaces and their associations with geriatric depression in Beijing, China. *Environment International, 126*, 107-117. doi:10.1016/j.envint.2019.02.013

Heo, S., Desai, M. U., Lowe, S. R., & Bell, M. L. (2021). Impact of changed use of greenspace during covid-19 pandemic on depression and anxiety. *International Journal of Environmental Research and Public Health, 18*(11). doi:10.3390/ijerph18115842

Huang, B. X., Chiou, S. C., & Li, W. Y. (2020). Accessibility and street network characteristics of urban public facility spaces: Equity research on parks in Fuzhou city based on GIS and space syntax model. *Sustainability, 12*(9), 19. doi:10.3390/su12093618

Lehberger, M., Kleih, A. K., & Sparke, K. (2021). Self-reported well-being and the importance of green spaces – A comparison of garden owners and non-garden owners in times of COVID-19. *Landscape and Urban Planning, 212*. doi:10.1016/j.landurbplan.2021.104108

Li, L., Liu, J., & Ren, F. (2017). Using house level data to evaluating accessibility for public parks in Shenzhen. *Geomatics & Spatial Information Technology, 40*(9), 38-43.

Logan, M. J., Metzger, M. J., & Hollingdale, J. (2021). Contributions of Scottish community woodlands to local wellbeing before and during the COVID-19 pandemic. *Scottish Geographical Journal*. doi:10.1080/14702541.2021.1945670

Lv, Q., Gao, W., & Fan, X. (2017). Study on spatial distribution equilibrium of community parks based on valid service areas: A case study of Nanshan district in Shenzhen. *Architecture & Culture*(06), 185-187.

Marques, P., Silva, A. S., Quaresma, Y., Manna, L. R., de Magalhães Neto, N., & Mazzoni, R. (2021). Home gardens can be more important than other urban green infrastructure for mental well-being during COVID-19 pandemics. *Urban Forestry and Urban Greening, 64*. doi:10.1016/j.ufug.2021.127268

Natural England. (2010). *Nature nearby: accessible natural greenspace guidance*. Peterborough: Natural England Retrieved from http://www.naturalengland.org.uk/

Olszewska-Guizzo, A., Mukoyama, A., Naganawa, S., Dan, I., Husain, S. F., Ho, C. S., & Ho, R. (2021). Hemodynamic response to three types of urban spaces before and after lockdown during the covid-19 pandemic. *International Journal of Environmental Research and Public Health, 18*(11). doi:10.3390/ijerph18116118

Pouso, S., Borja, Á., Fleming, L. E., Gómez-Baggethun, E., White, M. P., & Uyarra, M. C. (2020). Contact with blue-green spaces during the COVID-19 pandemic lockdown beneficial for mental health. *Science of the Total Environment*. doi:10.1016/j.scitotenv.2020.143984

Ribeiro, A. I., Triguero-Mas, M., Jardim Santos, C., Gómez-Nieto, A., Cole, H., Anguelovski, I., . . . Baró, F. (2021). Exposure to nature and mental health outcomes during COVID-19 lockdown. A comparison between Portugal and Spain. *Environment International, 154*. doi:10.1016/j.envint.2021.106664

Robinson, J. M., Brindley, P., Cameron, R., Maccarthy, D., & Jorgensen, A. (2021). Nature's role in supporting health during the covid-19 pandemic: A geospatial and socioecological study. *International Journal of Environmental Research and Public Health, 18*(5), 1-21. doi:10.3390/ijerph18052227

Salleh, M. Z. M., Othman, N., Malek, N. A., & Suddin, L. S. (2022). A paradoxical proposition of connectedness to nature, recycling behaviour and psychological restoration relationship in urban park context: A path analysis evidence. *Planning Malaysia, 20*, 101-111. doi:10.21837/PM.V20I20.1082

Sarkar, C., Webster, C., & Gallacher, J. (2018). Residential greenness and prevalence of major depressive disorders: a cross-sectional, observational, associational study of 94 879 adult UK Biobank participants. *The Lancet Planetary Health, 2*(4), e162-e173. doi:10.1016/S2542-5196(18)30051-2

Soga, M., Evans, M. J., Tsuchiya, K., & Fukano, Y. (2021). A room with a green view: the importance of nearby nature for mental health during the COVID-19 pandemic. *Ecological Applications, 31*(2). doi:10.1002/eap.2248

Spano, G., D'Este, M., Giannico, V., Elia, M., Cassibba, R., Lafortezza, R., & Sanesi, G. (2021). Association between indoor-outdoor green features and psychological health during the COVID-19 lockdown in Italy: A cross-sectional nationwide study. *Urban Forestry and Urban Greening, 62*. doi:10.1016/j.ufug.2021.127156

Ugolini, F., Massetti, L., Pearlmutter, D., & Sanesi, G. (2021). Usage of urban green space and related feelings of deprivation during the COVID-19 lockdown: Lessons learned from an Italian case study. *Land Use Policy, 105*. doi:10.1016/j.landusepol.2021.105437

Williams, T. G., Logan, T. M., Zuo, C. T., Liberman, K. D., & Guikema, S. D. (2020). Parks and safety: a comparative study of green space access and inequity in five US cities. *Landscape and Urban Planning, 201*. doi:10.1016/j.landurbplan.2020.103841

Xie, J., Luo, S., Furuya, K., & Sun, D. (2020). Urban parks as green buffers during the COVID-19 pandemic. *Sustainability (Switzerland), 12*(17). doi:10.3390/SU12176751

Xu, Z. N., Gao, X. L., Wang, Z. Q., & Fan, J. (2019). Big data-based evaluation of urban parks: A Chinese case study. *Sustainability, 11*(7), 16. doi:10.3390/su11072125

Yu, S. Q., Zhu, X. G., & He, Q. (2020). An assessment of urban park access using house-level data in urban China: Through the lens of social equity. *International Journal of Environmental Research and Public Health, 17*(7), 19. doi:10.3390/ijerph17072349

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 51 – 65

PERCEIVING THE TRANSITION OF URBAN CAMPUS OPEN SPACES UNDER THE INFLUENCE OF COVID-19

Fan Mengjia[1], Hazreena Hussein[2], Adi Ainurzaman Jamaludin[3]

[1]*Department of Architecture, Faculty of Built Environment,*
UNIVERSITI MALAYA
[2]*Centre of Sustainable Urban Planning & Real Estate,*
Faculty of Built Environment,
UNIVERSITI MALAYA
[3]*Institute of Biological Sciences, Faculty of Science,*
UNIVERSITI MALAYA

Abstract

The open spaces on campus provide great opportunities to engage in beneficial outdoor activities. However, due to the COVID-19 outbreak, campus users have experienced several periods of isolation, which has affected perceptions of the environment and practical use of these public spaces. To investigate how campus users, connect with adjacent open spaces under the influence of pandemic restrictions, the authors conducted a case study at six selected sites on the Universiti Malaya (UM) campus. The results show that the current lockdown has reduced frequency and differences in daily use at the selected sites. Some landscape furniture and vegetation were removed or replaced as regular maintenance, while the primary users changed from students to staff. Nevertheless, the perceived aesthetic appeal and previous outdoor experiences in the selected open spaces stimulated emotional attachments to the physical campus and a widespread appreciation of the green spaces on campus. The results can serve as a practical basis for interventions for campus users' psychological restoration during this transition and provide theoretical support for investigating higher quotient stimulation of spatial senses to enhance landscape design strategies.

Keywords: Campus open space, Perception, Users, Utilisation

[1] Student at Universiti Malaya. E-mail: bva180004@siswa.um.edu.my

INTRODUCTION

Malek and Nashar (2018) consider green open space as part of the sustainable component that promotes liveability and active community. The outbreak of COVID-19 has led to the need to reappraise the value of urban green spaces (Pouso et al., 2021). According to Brooks et al. (2020), open spaces with vegetation motivate recovery from mental health problems associated with the lockdown. As a prominent part of the urban green space system, campus open spaces are essential to student mental health (Ghaus et al., 2017). There have been restrictions on the use of open spaces on urban university campuses. Access to most open spaces has been currently prohibited (Stockwell et al., 2021). It is critical to balance campus users' expectations for physical spaces with the need to break the chain of COVID-19 transmission on campus (Deshmukh, 2021). As Conrad et al. (2021) mentioned, many presidents of higher education institutions have suggested that student mental health should be one of their primary concerns because the lockdown has exacerbated student anxiety, depression, and loneliness. This concern has raised further calls for how to enter the physical campus safely and what changes to normal operations might be necessary to protect students and staff (Gressman & Peck, 2020).

Several studies have shown the expectations students have about the characteristics of different educational environments (Ali et al., 2020). A better understanding of how open spaces are used under the influence of the ongoing "physical distancing" may facilitate management strategies within university campuses (Conrad et al., 2021). However, very few evaluations have linked students' mental restoration to the lockdown precautions of open space on campus (Gressman & Peck, 2020). An investigation of campus open space use and perceptions of these open spaces could improve pandemic prevention strategies on campus with consideration of student psychological wellbeing. Thus, this study was conducted with the following two objectives: (i) to investigate differences in the occupancy patterns of selected open spaces in an urban university, and (ii) to explore the users' perceptions while considering the psychological impact of the pandemic. The relevant background, methodology, findings, discussion, and conclusions of this study are outlined below.

RESEARCH BACKGROUND

Participants' perceptions of design factors promote opportunities for optimal use of the outdoor environment (Bakar et al., 2020). The interactivity of a landscaped space depends on the activities perceived from the supportiveness of its environmental settings, as the landscape's character shapes a place's environment and ambience (Wahab et al., 2018). It has been proven that the design attributes of open space on campus determine its functional use and users' perceptions. In an urban university, soft landscapes provide greenery with aesthetic values and

optimise the microclimate (Jamaludin et al., 2014). In contrast, campus users regard hard landscapes as more interactive and participatory (Fan et al., 2020; Malek & Nashar, 2018). Since the appearance of landscape elements dominates the qualities of open spaces, the corresponding changes are expected to influence users' perceptions and participation (Akhir et al., 2021).

In response to the COVID-19, the Malaysia government has taken national quarantine measures, known as The Movement Control Order (MCO). An extended phase followed this, referred to as Conditional Movement Control Order (CMCO), in which regulations were relaxed and outdoor exercises were allowed with social distancing (Conrad et al., 2021). Lim et al. (2021) have found that the pandemic occurrence in urban areas with higher population densities had a more significant impact on environmental sustainability and quality of life for people. It suggests that managing green spaces on urban universities may encounter greater challenges than rural or suburban areas. Working from home during CMCO has reduced urban activities (Pouso et al., 2021). Restrictions on access to the physical campus and "social distancing" measures have expanded online learning approaches and reduced the use of adjacent open spaces (Ali et al., 2020). Compared to the various evaluations of student academic performance, there is less information on how open spaces affect students' mental health (Yaman et al., 2018). Chen et al. (2016) have suggested that user satisfaction with design features and the use of facilities are the factors for assessing the salutogenic aspects of green spaces. It indicates that feedback from users may reflect the psychological impact of green spaces on campus during the pandemic.

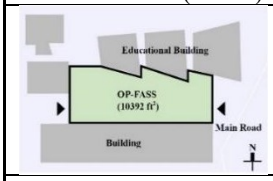
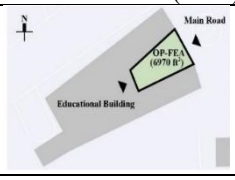
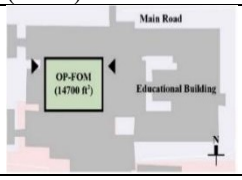
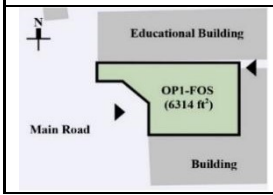
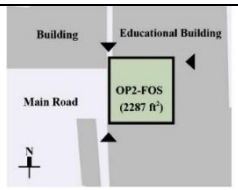
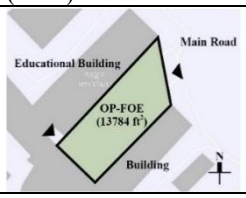
A case study is a practical approach to investigating the use of open spaces (Harun et al., 2017). Universiti Malaya (UM), the oldest public university in Malaysia, has a campus in the middle of Kuala Lumpur (Keat et al., 2016). Unlike other public universities in the suburbs, the urban environment affects the outdoor environment of UM due to the conjunction with the city traffic system (Fan et al., 2020). At the same time, this campus has preserved sufficient green space compared to the newer urban campuses, which are compact and have many restrictions on the arrangement of open spaces (Fan et al., 2020). The campus must represent the social health context of urban universities with climatic-adaptive open space design (Jamaludin et al., 2016). Several studies on sustainable environments and biological design have used the UM campus as a case study and provide reliable data for a future study of its green spaces (Keat et al., 2016; Jamaludin et al., 2014). In addition, human interactions in open spaces are in various dimensions (Ibrahim et al., 2018). The criteria used to evaluate the quality of open spaces are accessibility, attractiveness, functionality, and safety (Fatiah et al., 2021). Ibrahim et al. (2013) have classified urban green spaces in size, function, use, quality, area, accessibility, and facilities to explore their positive influence on maintaining wellbeing. These design factors dominate the

available services of green space (Akhir et al., 2021). The sites selected should be accessible, frequently used, and activity supportive.

RESEARCH METHODOLOGY

The authors conducted a comparative case study to investigate how CMCO affects the perception and use of selected open spaces on campus. Students and staff spend most of their day in the educational buildings and frequently use the adjacent open spaces (Fan et al., 2020). Based on the criteria mentioned above, six open spaces surrounding educational buildings in five faculties on the UM campus were selected as case study sites, as shown in Table 1.

Table 1: Selected open spaces as case studies

The codes, locations, and layouts of the selected open spaces as case studies		
Case study 1: OP-FASS, Faculty of Arts and Social Science (FASS)	Case study 2: OP-FEA, Faculty of Economics and Administration (FEA)	Case study 3: OP2-FOM, Faculty of Medicine (FOM)
		
Case study 4: OP1-FOS, Faculty of Science (FOS)	Case study 5: OP2-FOS, FOS	Case study 6: OP-FOE, Faculty of Engineering (FOE)
		

Source: Author (2022)

An on-site observation was conducted in two separate periods before and during the CMCO to capture changes in the landscape and the type and frequency of users. It is because the observation method is often used at the beginning of observing and analysing the associations of users' activities with a particular environment (Hussein, 2012). The landscape features, number and type of users are the assessment criteria for the occupancy pattern. The authors observed from 8:30 a.m. to 5:30 p.m. on weekdays to record the frequency of users. The CMCO observation conducted before CMCO was from June to October 2019 and was initially used to evaluate the landscaping of the campus green spaces. After the pandemic outbreak, the corresponding observation data were collected during CMCO from November to December 2020.

The psychological impact of the pandemic is evaluated based on the aroused emotions and experiences of the users while using the space. An online interview was conducted with students from the selected faculties to obtain their perceptions of the case study sites, as the conduction of interviews can effectively and efficiently reflect the satisfaction, preferences and psychological interactions of the respondents (Harun et al., 2017). A purposive sampling method was used to identify interviewees who frequently visited the sites. This interview section was processed during CMCO from November 2020 to February 2021.

FINDINGS

Case study 1: OP-FASS

The researcher noted that some marginal plants, such as shrubs and ground cover, were replaced. Accordingly, the lockdown also affected the adjacent external environment of OP-FASS. As shown in Figure 1a, the parking area adjacent to the entrance lobby was always crowded during rush hours, but on weekdays during the lockdown, the same area was relatively empty. Students and staff sat in the lobby and walked beside the garden. The corridor connected to the faculty building was frequently used for educational activities, walking between buildings, sitting, and resting. However, these same areas mainly served non-academic staff during the lockdown. For example, several female janitors were observed sitting together, talking, and getting water from the water dispenser in the lobby (see Figure 1b). The interviewees expressed fear of going outside and touching the surfaces of the furniture. The green views and quietness created a relaxing atmosphere that positively relieved stress and created a desire for more greenery outdoors.

> *"I miss the greenness of this garden and the smell of grass a lot… I have not been outside for long since I attended online classes. It is heightening my anxiety. I want to breathe the fresh air outdoors, but the cases are soaring all the time." (Postgraduate from FASS, 23rd December 2020)*

> *"I feel like I can memorise more lines when I am reading there… but who knows what I touched?" (Undergraduate from FASS, 19th January 2021)*


(a)

(b)

Figure 1: The appearance of OP-FASS, (a) A comparison of the type of users and activity (b) The adjacent car park before (left) and during (right) the CMCO
Source: Author (2020)

Case study 2: OP-FEA

The configuration of the vegetation remained the same. Only the potted plants were removed from the corner of the lawn, while the other plants were in good condition. The place was closed for months after the outbreak of the COVID-19 pandemic. It was no longer allowed to be entered or used, as shown in Figure 2a. Many students lingered on the shaded lawn between 12:00 pm and 1:00 pm, talking and resting. But during CMCO, the café on the ground floor was temporarily closed due to the cancellation of physical classes (see Figure 2b). Besides, the recreational facilities around this area were removed and cleaned up. The interview results show that interviewees generally feared the conditions of the environment more than they desired. The closure of the surrounding cafés and shops reduced the desire to stay. However, there was still a provision for open-air recreational activities on this site.

> *"I used to exercise a bit with my friends here…but should I miss this place? I don't have a reason to come here. The whole campus is empty, nothing to eat and nothing to do…" (Undergraduate from FEA, 10th February 2021)*

> *"It is ok for me to lock this area; I agree with it… even though I often had my breaks and got some food under the tree shade when I got physical classes." (Undergraduate from FEA, 3rd February 2021)*


(a)

(b)

Figure 2: The appearance of OP-FEA, (a) The corridor with vegetative landscapes (b) The use of the adjacent cafe before (left) and during the lockdown (right)
Source: Author (2020)

Case study 3: OP2-FOM

The construction works on the building façade next to the path with the stone pergola affected the use of this site, which was the most significant transformation of this place. The path was closed for the repair of the building surface. Workers used the other walkway under the sloping lawn more frequently to maintain machinery and walk through (see Figure 3a). As shown in Figure 3b, users still had access to the rest of the garden, but with certain restrictions, which resulted in it being used less during working hours. For example, a warning sign was posted to remind people to keep social distance. The landscape furniture was hardly used, in contrast to the previous record. The closure of the adjacent café reduced the number of users dramatically. Several interviewees mentioned that they still preferred to enjoy the view of the garden when walking along the adjacent open corridor. However, the most simply walked by without entering inside because the adjoining café was closed.

> *"Before I lived in the dorm in our residential hall, and here is a social place where I often sit… But since the COVID-19 situation started, I already lived off the campus…." (Postgraduate from FOM, 7th January 2021)*

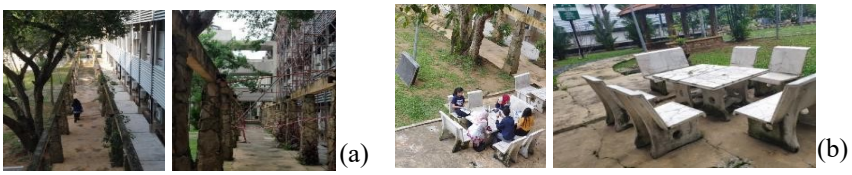
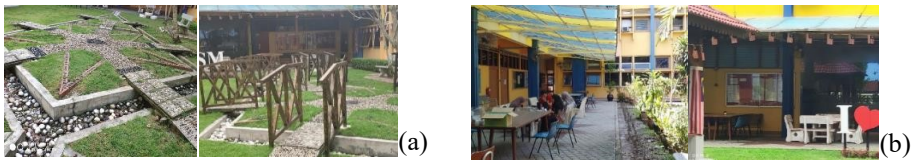


Figure 3: The appearance of OP-FOM, (a) The path with the stone pergola used for walking, (b) Landscape furniture before (left) and during the CMCO (right)
Source: Author (2020)

Case study 4: OP1-FOS

The main activities observed during CMCO were staff walking through the pathways to get into the building or water the plants. Access to recreational areas, such as platforms and lawns, was not permitted. Many landscape furniture items, such as seats and tables, were no longer allowed to be used. Both hard and soft landscapes changed during the lockdown. One noticeable change occurred at the landmark in the middle of the lawn patch, with the addition of several wooden bridges over the cobbled pavement (see Figure 4a). Ground-covering plants were replaced with several species of herbs and shrubs. Even the covered lobby remained almost unchanged, as the absence of students made the green yard quiet and empty (as shown in Figure 4b). Other interviewees pointed out the place was used for open-air recreation and social activities. They expressed that social life and academic performance depended on the physical campus.

"I miss the nice view of the green area… As for my study, I cannot focus on the internet as I did in the classroom. I used to talk to my friends after class. We have lunch together and play together. If I have questions about our lesson, I just ask them. But now I am in this isolated box, and I feel my good grades are slipping away somehow…" (Undergraduate from FOS, 17th December 2021)



(a) (b)

Figure 4: The appearance of OP1-FOS, (a) The landmark before (left) and the modification made (right), (b) The use of the covered lobby
Source: Author (2020)

Case study 5: OP2-FOS

The staff remained the primary users of the space. The original ornamental plants were removed or replaced, especially the potted plants. The reduction of vegetative landscapes made the yard's overall appearance different from its earlier appearance. The potted flowers and herbs replaced the decorative landscape of colourful plants with the faculty logo on the steps (see Figure 5a). The covered corridor and benches were still frequently used to walk between building blocks, with a warning sign posted for social distancing. A desk was placed beside the walkway to register visitors as a COVID-19 safety measure (see Figure 5b). Interviewees included students and staff who visited or walked through this area daily. Most expressed concerns about online learning and a desire to enjoy the peaceful green view, cool breeze, and shade in this courtyard. However, a few students mentioned that they prefer online classes due to the time it takes to travel.

"I just passed through this area a few days ago because I needed to pick up some files. Online classes are comfortable because I don't have to take the train to reach the campus. I used to come to sit on the benches.… I like the plants, and the green is so eye-relaxing." (Postgraduate from FOS, 20th January 2021)

(a) (b)

Figure 5: The appearance of OP2-FOS, (a) The steps and the faculty logo before (left) and after ornamental plant removal (right), (b) Use of the covered corridor
Source: Author (2020)

Case study 6: OP-FOE

Since the entrance area connects several faculty buildings, its accessibility and appearance were not significantly affected by the lockdown. On the contrary, there were noticeable variations in the occurrence of activities, with a relatively significant decrease in user frequency and length of stay. Walking and parking were the main activities that occurred during the observation period, while sedentary activities did not happen. The original plant species remained unchanged and grew in good condition. Although the pavilion seats were kept clean, users used these seats only a few times to put things while standing. Groups gathering in the entrance lobby and on the pathways were no longer recorded (see Figure 6a). Nevertheless, this area was regularly used for parking throughout the lockdown period, with only a slight decrease in occupancy frequency (see Figure 6b). An interviewed researcher mentioned parking and driving became more manageable during the lockdown. Most interviewees expressed that staying in this open space was less necessary after the pandemic.

> *"If I can still come to the campus and use the faculty library, at least I can walk around the yard for some minutes after my writing… the mountain view, and the leaves of trees and flowers can rest my eyes and mind… Staying inside the room gave me more pressure and weight. I am just eating and reading, but not moving at all…." (Undergraduate from FOE, 10th February 2021)*

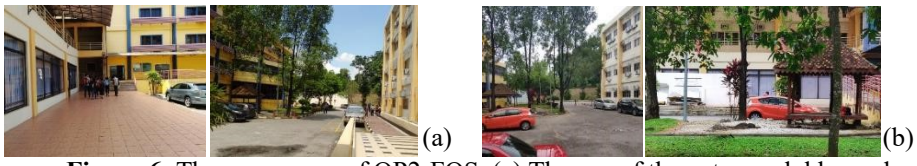

(a) (b)

Figure 6: The occupancy of OP2-FOS, (a) The use of the entrance lobby and pathways before the Covid19 lockdown, (b) The use of adjacent car parks
Source: Author (2020)

To summarise, observation of the six sites indicated several changes in landscape elements. Most students stopped coming to the campus because the curriculum temporarily changed to online classes and discussions. Therefore, the primary user type switched from students to staff. Remarkably, janitors and maintenance workers became regular users. Activities observed during CMCO included walking through, resting, talking, machinery maintenance, and cleaning. Table 2 illustrates the relevant comparisons.

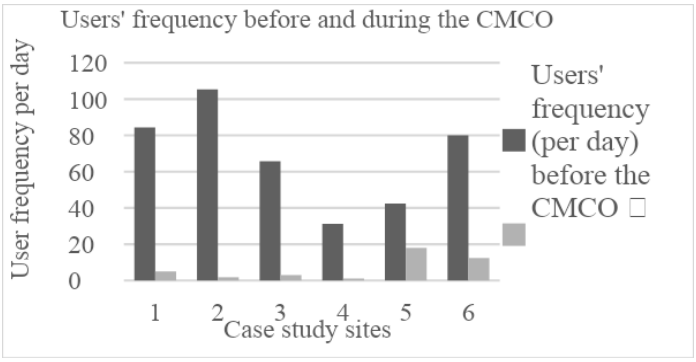
Table 2: Summary of data collection

Case study sites	Daily users before the CMCO	Daily users during the CMCO	No. of interviewees	Differences in landscape elements
1	84.4	5	7	Slight changes in vegetation
2	105.4	1.8	10	No obvious differences recorded
3	65.8	3	8	Refurnishing of building facades
4	31.3	1.1	7	Landmarks and vegetation
5	42.4	18	5	Changes in vegetation
6	80	12.4	9	No obvious differences recorded

Source: Author (2022)

DISCUSSION

Figure 7 shows that all sites experienced drops in user frequency in CMCO. The access ban kept users from visiting OP-FEA and OP1-FOS. OP-FASS and OP2-FOM were used by staff for walking, resting, and maintenance. In comparison, the users' frequency of OP2-FOS and OP-FOE dropped less. Although the COVID-19 outbreak promoted online distance learning, the online interview revealed that researchers in faculties specialising in science subjects still needed to use physical equipment (Hussain et al., 2018). Dependence on the physical environment is valuable in architectural psychology (Bakar et al., 2020). For example, the interviewees from OP-FOE needed the laboratories to conduct their experiments. Besides, most staff needed to use the office building. It explains the relatively higher frequencies at OP-FOE and OP2-FOS. The interviewees frequently used words to express negative emotions during the interview, such as "stressful" and "anxious" (see Figure 8).



1 Depression/disappointment
2 Stress/anxiety
3 Loneliness/ isolation/need of socialising
4 Fear of touching any surface
5 Need of open-air activities
6 Need of greenness

Figure 7: Users' frequency at the case study sites
Source: Author (2022)

Figure 8: Frequency of words
Source: Author (2022)

The results of the interviews showed that the perceived landscape elements are in multi-sensory dimensions. Insight into the different dimensions explains the human interaction experienced in open spaces (Ibrahim et al., 2018). Green spaces benefit urban residents by providing opportunities for contact with nature (Fatiah et al., 2021). Exposure to natural landscapes during activities has improved psychological health (Yaman et al., 2018). After the campus was closed due to the lockdown, students were no longer the primary users of the open spaces, resulting in a greater or lesser decrease in daily frequency. Instead, passing by staff was the most common activity that occurred. The COVID-19 virus attacks physical health and exacerbates psychological suffering among urban residents (Stockwell et al., 2021). Conrad et al. (2021) found that lockdown exacerbated anxiety, depression, and loneliness among students, which is consistent with the findings of this study.

In addition, the feedback showed different attitudes towards the closure of physical spaces due to the lockdown. Some interviewees emphasised that it is difficult to be productive while studying. They felt that the quality of our education diminished due to eliminating some extracurricular activities on campus. This finding highlights the positive psychological influence of the outdoor environment on learning performance (Yaman et al., 2018). On the other hand, the others thought it was more convenient to stay at home because it saved them time and money to travel to their faculties. It indicates the importance of campus walkability as a measure of sustainable development at UM (Keat et al., 2016). Figure 9 shows how interviewees' perceived open spaces during the pandemic. The authors noted the widespread paranoid "avoidance behaviour" described by Stockwell et al. (2021) as avoidance of public spaces. Many interviewees mentioned fear of touching facilities in the open spaces, implying that the sense of touch stimulated environmental fear during the pandemic (Mohd Hussain et al., 2018). Conrad et al. (2021) mentioned that the pandemic negatively affected the students' lives emotionally and academically. However, the interview results also showed that the lockdown experience improved social interaction, togetherness, and the importance of green spaces. On the other hand, this finding is consistent with Pouso et al. (2021) 's statement about the stimulating effect of the campus environment. However, more evidence and systematic evaluations are needed to prove the positive psychology of green spaces in urban universities.

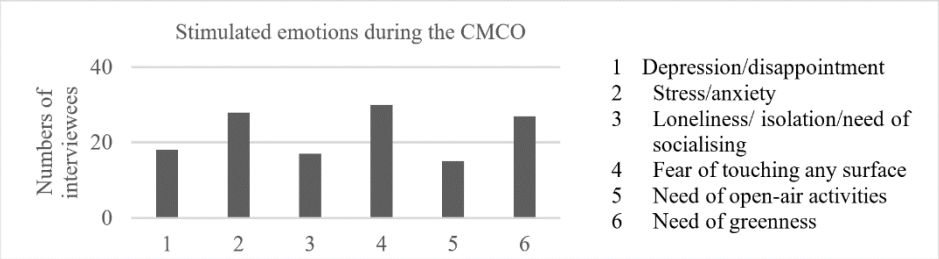


Figure 9: Interviewees' perceptions of case study sites
Source: Author (2022)

CONCLUSION AND RECOMMENDATIONS

The CMCO lockdown has resulted in differences in occupancy of selected open spaces, including reduced user frequency and changes in primary users. The interviewees expressed their dependence on physical spaces. The aesthetic appeal and previous outdoor experiences in the selected open spaces stimulated a positive emotional attachment. However, the insufficient number of respondents did not explain in detail how changes in landscape elements affect users' experiences. Increasing the sample size could provide more evidence of this interaction. However, this study provided evidence for adapting open space design and management strategies. Future studies could focus on interventions to psychologically restore campus users during this transition to improve the university environment.

ACKNOWLEDGEMENTS

The authors would like to thank the financial support offered by Universiti Malaya under Satu Joint Research Grant (ST010-2019).

REFERENCES

Akhir, N. M., Sakip, S. R. M., Abbas, M. Y., & Othman, N. (2021). Analysing the criteria of planting design for visual landscape quality in campus. *Planning Malaysia*, 19(2), 39-47. doi:https://doi.org/10.21837/pm.v19i16.950

Ali, S. M., Othman, N., Latif, F. A. A., Awang, A. H., & Rostam, K. (2020). The functions of landscape in school learning process. *Planning Malaysia*, 18(4), 191-202. doi:https://doi.org/10.21837/pm.v18i14.826

Bakar, A. A., Osman, M. M., & Hitam, M. (2020). Attitudes and pro-environmental behaviours: Determining factor of personality and lifestyle. *Planning Malaysia*, 18(1), 1-10. doi:https://doi.org/10.21837/pm.v18i11.704

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. The Lancet, 395(10227), 912-920.

Chen, W., Zaid, S. M., & Nazarali, N. J. P. M. (2016). Environmental psychology: The urban built environment impact on human mental health. (5).

Conrad, R. C., Koire, A., Pinder-Amaker, S., & Liu, C. H. (2021). College student mental health risks during the COVID-19 pandemic: Implications of campus relocation. Journal of Psychiatric Research, 136, 117-126.

Deshmukh, J. (2021). Speculations on the post-pandemic university campus–a global inquiry. Archnet-IJAR: International Journal of Architectural Research.

Fan, M., Jamaludin, A. A., & Hussein, H. (2020). Wellbeing in an Urban University: Sensory perception for salutogenic landscape design. Journal of ASIAN Behavioural Studies, 5(16), 65-80.

Fatiah, A., Ponrahono, Z., & Zakariya, K. (2021). Quality of designs and features of small urban green spaces in Petaling Jaya town, Malaysia. *Planning Malaysia*, 19(1), 138-149. doi:https://doi.org/10.21837/pm.v19i15.931

Ghaus, R. M., Harun, R., Hock, L. K., & Ponrahono, Z. (2017). Are green universities producing greener future leaders? *Planning Malaysia*, 15(4), 1-12. doi:https://doi.org/10.21837/pm.v15i4.312

Gressman, P. T., & Peck, J. R. (2020). Simulating COVID-19 in a university environment. Mathematical biosciences, 328, 108436.

Harun, N. Z., Mansor, M., & Noh, S. A. (2017). The benefits of river indicators to assess the ecological status of IIUM campus. *Planning Malaysia*, 15(1), 221-228. doi:https://doi.org/10.21837/pm.v15i1.237

Hussein, H. (2012). The Influence of Sensory Gardens on the Behaviour of Children with Special Educational Needs. Procedia - Social and Behavioral Sciences, 38, 343-354. doi:10.1016/j.sbspro.2012.03.356

Ibrahim, F. I., Omar, D., & Mohamad, N. H. N. (2018). Multi-dimensional human interaction in open spaces. *Planning Malaysia*, 16(7), 297-307. doi:https://doi.org/10.21837/pm.v16i7.519

Ibrahim, W. Y. W., Long, A., & Permana, A. S. (2013). Green space audits on its accessibility in Pasir Gudang. *Planning Malaysia*, 11(2), 39-56. doi:https://doi.org/10.21837/pm.v11i2.115

Jamaludin, A. A., Hussein, H., Ariffin, A. R. M., & Keumala, N. (2014). A study on different natural ventilation approaches at a residential college building with the internal courtyard arrangement. Energy Buildings, 72, 340-352.

Jamaludin, A. A., Hussein, H., Keumala, N., & Ariffin, A. R. M. (2016). Preferences of student residents towards sustainability with the concept of bioclimatic design. *Planning Malaysia*, 14(5), 145-156. doi:https://doi.org/10.21837/pm.v14i5.199

Keat, L. K., Yaacob, N. M., & Hashim, N. R. (2016). Campus walkability in Malaysian public universities: A case-study of Universiti Malaya. *Planning Malaysia*, 10(5), 101-114. doi:https://doi.org/10.21837/pm.v14i5.196

Lim, S. B., Malek, J. A., Rashid, M. F. A., & Kong, Y. C. (2021). Rethinking density in urban planning: policy directions in the post-covid-19 era in Malaysia. *Planning Malaysia*, 19(2), 1-13. doi:https://doi.org/10.21837/pm.v19i16.947

Malek, N. A., & Nashar, A. (2018). Use pattern and activities: The evaluation of Malaysian green open space design. *Planning Malaysia*, 16(3), 121-131. doi:https://doi.org/10.21837/pm.v16i7.505

Hussain, N. H. M, Md Sakip, S. R., Mansor, A., Bahaluddin, A., & Ilias, N. H. (2018). The Shift in Teaching Pedagogy for Independent Landscape Design During The

Pandemic: An Analysis Of Student Performance In ODL. *Planning Malaysia*, 19(2), 131-140. doi:https://doi.org/10.21837/pm.v19i16.958s

Pouso, S., Borja, Á., Fleming, L. E., Gómez-Baggethun, E., White, M. P., & Uyarra, M. C. (2021). Contact with blue-green spaces during the COVID-19 pandemic lockdown beneficial for mental health. Science of The Total Environment, 756, 143984.

Stockwell, S., Trott, M., Tully, M., Shin, J., Barnett, Y., Butler, L., . . . Smith, L. (2021). Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review. BMJ Open Sport Exercise Medicine, 7(1), e000960.

Wahab, N. A. A., Zakariya, K., Ibrahim, P. H., & Ibrahim, I. (2018). Mapping the landscape characters along a rural route for tourism. *Planning Malaysia*, 16(1), 131-140. doi:https://doi.org/10.21837/pm.v16i6.468

Yaman, M., Abdullah, F., Rozali, N. F., & Salim, F. (2018). The relevancy of outdoor classroom for PBL approach in selected university in Kuala Lumpur. *Planning Malaysia*, 16(6), 186-196. doi:https://doi.org/10.21837/pm.v16i6.473sss

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 66 – 78

A REVIEW OF THE ESSENCE OF CITY BRANDING IN ENHANCING IMAGE AND IDENTITY OF A CITY

Norafida Abd Ghafar[1], Nur Mazidah Che Ghani[2], Mastura Adam[3]

[1,2,3] *Faculty of Built Environment*
UNIVERSITI MALAYA

Abstract

The future of cities is at the juncture of a new reality. This poses a domestic opportunity to relook and rediscover the image and identity of the city. Cities are often viewed in the international arena, hence the authentic local essence of city image and identity is often flattened, hidden, or ignored. Therefore, this paper aims to review existing literature on city branding in order to identify characteristics that will enhance city strategies. This research is conducted using content and thematic analysis based on the Scopus and Web of Science (WoS) databases. Findings have identified criteria such as integrated- design, landmarks, signature architecture, city vision statement, culture and symbolic assets to be among the contributing factors. Based on the review, the domain of city branding consists of intangible and tangible city assets that must be further researched in the field. These findings shall contribute to the research in the context of cities in Malaysia.

***Keywords**:* Place Branding, City Characteristics, Imageability, Integrated Design, Interpretive Phenomenological Analysis

[3] Senior Lecturer at Universiti Malaya. Email: mastura@um.edu.my

INTRODUCTION

This study is a review of articles by leading researchers in the multidisciplinary field of city branding. It reviews city branding literature from established research databases to analyze the essence of city branding components that contribute to the enhancement of a city's image and identity. The city branding research domain is cross-disciplinary, encompassing robust academic discussions from multiple viewpoints since the 1980s (Muratovski, 2012; Oguztimur & Akturan, 2015; Ma, Schraven, Bruijne, Jong, & Lu, 2019). The body of knowledge of city branding is both conceptual and empirical, and also at the practice level (Oguztimur & Akturan, 2015).

Why is city branding important for cities? City branding is emerging as an internationally recognized research domain and design strategy characterized by a high degree of multidisciplinary, with rapid proliferation in and between disciplines (Lucarelli & Berg, 2011). The city branding phenomenon is similar to corporate branding, in the sense of addressing numerous stakeholder groups, having multidisciplinary roots, being complex and intangible, dealing with multiple identities, and its need for social responsibility (Oguztimur & Akturan, 2015; Kavaratzis & Hatch, 2013). City branding has been defined as the 'purposeful symbolic embodiment of all information connected to a city to create associations around it' (Lucarelli & Berg, 2011). The city as a brand is defined by a sustained public presence and characterized by an enduring existence (Muratovski, 2012). This image of the past is intertwined with modern and technological advancements within the city fabric. What differentiates the visual characteristics of one city from another is its local content in the form of a city identity. In this review, the essence of city branding is investigated to identify key characteristics that influence a city brand from the perspective of the image and identity of a city.

RESEARCH BACKGROUND

The aim of this study is to review key themes on the essence of city branding components that enhances a city's image and identity. The image of the city, described as 'imageability' by Lynch (1960), is a concept introduced to city planners and urban designers to help create cities that are memorable, attractive, and navigable. The term 'imageability' is a way to describe the quality of a city to be re-created in the mind. Lynch (1960) emphasizes the need for cities to be efficient as well as interesting, aesthetically pleasing, and able to offer delight. The cross-reference and purpose for cities to have a strong image and identity has been on the table for many city managers and city dwellers alike. City branding is a developing research domain that covers major viewpoints from marketing and business, tourism development, and urban governance, as well as viewpoints from the built environment of architecture design and urban planning. As there is a lack of cohesive discussion between the various disciplines in existing

literature, this study aims to perform a preliminary identification of components that bridge city brand essence to the elements of city image and identity.

Scholars are reviewing the literature on city branding in order to find common ground. Content analysis is commonly used by scholars to extract place brand terms and geographical entities within various articles published in various disciplines (Oguztimur & Akturan, 2015). As concluded by Kavaratzis and Hatch (2013), there is a need for further theoretical development and practical clarification. Muratovski (2012) observes that a brand's identity cannot be observed in a vacuum and that the outcomes of branding activities need to be observed in relation to one another. Cities cannot be treated in the same way as short-lived products or corporations without taking into consideration essential policy changes that will determine how people participate in the ongoing restructuring of economic and cultural practices (Muratovski, 2012). Some approach the field on the basis of place branding research, which is a more comprehensive concept.

RESEARCH METHODOLOGY

The iterative search and article retrieval technique employed in this study begins with an awareness of the concepts and language used in city branding, which connects to diverse ways of thinking about a city. Lucarelli and Berg (2011) conducted a systematic review of city branding literature and analyzed articles published between 1988 and 2009 via content analysis. Oguztimur & Akturan (2015) continued the review of city branding literature as a research domain on articles published between 1988 and 2014. The three common perspectives are Place, City and City Region as described by Lucarelli and Berg (2011). These terms are used interchangeably within various contexts in city branding literature. Concepts and terminologies commonly used by researchers include town, destination, region, place, metropolis, municipality, urban, city, etc. Urban branding has a different context from city branding (Oguztimur & Akturan, 2015). Urban branding is seen from a larger perspective of city branding, that is the city region. The city region includes approaches from urban branding, regional branding, urban regeneration branding, and branding the metropolis. This article emphasizes city branding perspectives and definition from the context of a city perspective and approaches city branding in building a visual identity, city image, and distinct profile for the built environment.

The scope of this research investigates articles across relevant academic journals explicitly from the Web of Science (WoS) and Scopus databases. Thomson Reuters' Web of Science and Elsevier's Scopus are leading research databases that have wide journal coverage of bibliometric evaluations (Mongeon & Paul Hus, 2015). A comparative analysis was also conducted between active scholarly articles in WoS and Scopus (Mongeon & Paul Hus, 2015) with results showing that the two databases have substantially different coverage of specific

fields. WoS provides a common search language, navigation environment, and data structure, allowing researchers to search broadly across disparate resources and use the citation connections inherent to the index to navigate relevant research results and impact. WoS has a research indexing that is preferred by premier government and non-government agencies with regards to research database. WoS is searchable with complete bibliographic data, cited reference data, navigation, and links to the full text articles. In this study, only open access journal articles, predominantly published in the past ten (10) years, were reviewed. The objective is to seek contemporary discussions, identify gaps in the research, and discuss the matter in the field of city branding.

The methodological procedures for search, selection, and exclusion include:

(1) Defining the Field of Study

i. Open access journal articles only.
ii. Directly integrating the keywords *city branding*, *city rebranding*, and *cities* in relation to discussions on characteristics of *city image* and *identity* from the viewpoint of built environment.

(2) Search Method and Scope

i. Iterative search of articles across relevant academic journals.
ii. Using the open access database and search engine of Web of Science (WoS) and Scopus journals only.
iii. Journal articles predominantly relevant components of key discussions among researchers in the field.
iv. Qualitative research method of interpretive analysis.

(3) Interpretive Phenomenological Analysis

i. The articles are analyzed to identify key themes and context in the meaning of city branding phenomena.
ii. The article themes are analyzed into two (2) thematic domains:

(1) Essence of city branding component.
(2) Related elements of city image and identity.

(4) Exclusion Criteria

Studies focused on geographic entities other than cities and the urban context (such as destination, town, country, and nation).

DISCUSSION

In understanding the city brand image, a brand is a ‘consistent group of characters, images, or emotions that consumers recall or experience when they think of a specific symbol, product, service, organization or location. The attachment of the definition of the city branding phenomenon to a product is due to its similarities to corporate branding, in the sense that it addresses numerous stakeholder groups, has multidisciplinary roots, is complex and intangible, deals

with multiple identities, and has a need for social responsibility (Oguztimur & Akturan, 2015; Kavaratzis & Hatch, 2013).

City Branding

Some of the early concepts of branding are rooted in the philosophy of the brand personality scale that identifies five (5) dimensions of a product brand. Aaker Brand Dimensions is a framework that describes the profile and traits of a brand in five core dimensions, each divided into a set of facets. It is a model that describes the profile of a brand using the analogy of a human's personality: excitement, sincerity, ruggedness, competence, and sophistication. In adopting the concept of brand personality to cities, originality, and value, are added to the dimensions of the city brand personality research domain. City branding is more complex than a product as it identifies with complexities beyond those of products and services. City branding arises from the diversity of stakeholders, the number of organizations steering the brand, and the limited control brand developers have over their product with the diverse target groups within a city context (Kavaratzis & Hatch, 2013).

According to Muratovski (2012) every city already has a form of 'corporate identity' that includes a name, a visual identity in the form of a coat of arms or a similar sign, logo or symbols in the form of landmarks and monuments, as well as a brand perception in people's minds about a particular place or city. This is also supported by the description of Kavaratzis and Hatch (2013) that every city already possesses the basic elements of a brand, and that people would already have a basic perception of it, albeit unconsciously. The city brand is a valuable asset that improves the competitive advantage of the city, although residents and their priorities have an insufficient concentration in many city branding practices (Dastgerdi & De Luca, 2019). Therefore, city branding should not be focused on 'selling' the city and the lives of its inhabitants, which means considering social, cultural, political, and economic environments and practices (Muratovski, 2012).

The built environment possesses components of city branding in the form of infrastructure, cityscape, and gateways (Kavaratzis & Hatch, 2013). These city branding components are the tangible city assets that enhance the image and identity of the city and, importantly, becomes the habitat and catalyst for intangible city assets to flourish. According to Kirby and Kent (2010), the 'sense of permanence' contributes to the communicative power of architecture to a great extent. Buildings have become brands in their own right, while at the same time being landmarks that can communicate the vision of their cities (Muratovski, 2012). The role of architecture and integrated design in city branding is one that is design-led and based on social innovation policy combined with architectural theory and practice. Cities with distinct cultures and recognizable architectural features are more popular than those without them (Muratovski, 2011).

In reviewing and identifying the essence of city branding from prominent researchers in the field, it is agreed that this essence consists of common themes of tangible and intangible city assets in the form of (1) vision and strategy, (2) internal culture, (3) local communities, (4) synergies, (5) infrastructure, (6) cityscape and gateways, (7) opportunities and potential of place, and (8) communication (Kavaratzis M., 2009). These eight (8) components are a suggested framework of an integrated approach to managing city brands that further describes the essence behind each city branding component. This informs the structure of this review, whereby journal articles are analyzed against the descriptions of the framework. Relevant concepts of image and identity of the city has an important role in city branding strategies.

City Image and Identity

Influential discussions on urbanism by sociologists and scholars defines and debates urbanism from a sociological and critical urbanism perspective. Critical urbanism theory opens new modes of multi-scalar and multidisciplinary research geared to urban design and planning practices, therefore unleashing the potential for urban transformation (Dovey, 2011). We understand the city image as defined by prominent urbanist and theorist in the field, Kevin Lynch (1960), who identified paths, edges, districts, nodes, and landmarks as five (5) interrelated characteristics to create navigable and interesting cities. Lynch describes these characteristics as the qualities of 'imageability' of the city. This projected image varies, as cities are built over generations where social identity, structure, and relation to time and historical context give different experiences to the city. Cities are known to be a constantly growing entity that is organic, never static, and seeks to improve both its externalization and internalization (Kapferer, 1994; Florek & Janiszewska, 2013).

In understanding the unique layers and perspectives of city image and identity, the authors identified the gap of discussion between the disciplines describing the city as an entity. Kavaratzis and Hatch (2013) states that city branding serves as a conduit for city residents to identify with their city. Signals of identity within pluralistic societies take on critical importance. Muratovski (2012) agrees that city branding should involve changes to the 'physical fabric of place'. With residents in search of place attachment and an aspiration to belong, the city's image and identity plays a role as a symbol of territorial identity. Hence, from the literature, the discussion about the essence of city branding does impact the understanding of the components of city image and identity.

In this crucial time, it is also important to acknowledge that this global crisis is not only a time of recovery for cities and their inhabitants. Perhaps we are at a juncture and rite of passage for cities to rethink strategies in city branding as a way forward to rebrand themselves, equipped with the knowledge and frameworks from researchers and practitioners. An understanding of the essence

of city branding is important to enhance the respective components for a sustainable and resilient city to move forward in the 21st century. Enhancing the image and identity of a city is important in a post-recovery period, where cities formed a densely populated epicenter, a conversation often brushed aside in city developments. The opportunity presents itself for cities to rebrand, reconstruct, revitalize, and reclaim their image and identity to mediate not only an increasingly complex consumer space (Muratovski, 2012) but the future of city dwellers who continue to drive and uplift the city and nation.

The image of the city is often viewed in the international arena, hence the authentic local essence of city identity is often flattened, ignored, or hidden in the quest for cities to project an image that is metropolitan and modern. Authenticity of place, historic landscape, cultural tradition, and built heritage are contributing criterion (Abdul Aziz, 2021). It is the right time to include and engage local communities, especially local citizens, in the city branding narrative and strategy. It is the role of researchers in the field to review broader perspectives, make suggestions, and be part of the process to rebuild and rebrand the city image in co-creation with city administrators and managers. A cohesive brand identity through communication and co-creation are revealed to be prerequisites for efficient collaboration.

Essence of City Branding Component

The articles reviewed arrived at common themes and the essence of city branding components from the findings discussed by Kavaratzis (2009) and Oguztimur and Akturan (2015). The data collected from the selected key journal articles are summarized in Table 1.

Table 1: Essence of City Branding Components related to City Image and Identity

WoS & SCOPUS Journal	**Year, Author**	**Article Theme**	**Essence of City Branding Components**	**Related City Image and Identity Elements**
Place Branding and Public Diplomacy	2009, Kavaratzis	City Brand Management	Eight components of an integrated city brand. Vision and clear strategy are the top components for realization of the	Built environment components include infrastructure, cityscape, and gateways

		city's future. The built environment's representation.	
2012, Muratovski	Cityscape and Gateways, Built Environment	Ability of built environment to represent itself and reinforce the city brand. Role of architecture, social innovation policy, and integrated design-led strategy.	Integrated design. Building as a marketing object and brand. Iconic architecture and expressive landmarks to communicate vision of their cities.
2019, Mankowska, Grochowski.	Local Communities, Opportunities	Prioritizing local needs and residents. Empowerment of local entrepreneurs and creative industries. City's attractive feature used in branding.	Visual image of local creative community. Creation of city image from local characters, heritage, and culture-based activities.
2021, Lemmetyi	Internal Culture, Synergies.	Culture and image of an individual	Distinction and authenticity of

	ne n, Nieminen , Aalto.		site contribute to a cohesive brand identity. Cultural heritage and sites develop a recognizable brand name. Co-creation among stakeholders; the process of joint values and goal.	site. Architecture and prolific individual architect's portfolio enhance city visibility. Culture as a symbol of territorial identity.
Journal of Place Management and Development	2011, Berg & Lucarelli.	City Brand Management, Communication	City planning, city regeneration, city as a destination, city promotion and marketing, city image managem ent.	Visual identity of cities, image and profile building of cities. New semiotic spaces that re-organize the urban experience.
Journal of Brand Management	2009, Freire.	Local Communities	*Local people* factor is important in the geo-brand building process. A manageable variable; well-managed and motivated .	A form of stereotypical image of local people. Favorable images of local people create a positive city image; success in the marketplace.
	2016,	City Brand	Co-creation in city	Uniqueness in city

	Green, Grace & Perkins.	Management, Communication	branding. Collaboration between researchers and practitioners. Co-ownership and co-management of cities. Representation of city's natural distinctiveness.	brand. Organic origin of cities, such as history. Multiple elements of place identity include physical landscape, people, media, and the arts.
Journal of Marketing Theory	2013, Kavaratzis & Hatch	Internal Culture, Cityscape and Gateways, Infrastructure, Communication.	Spreading brand orientation through city management. Dynamics of place branding relating to place culture, place identity, and place image between stakeholders.	Implanting new meanings and symbols into culture. Brands are built out of the 'raw material' of identity.

Source: Author (2022)

CONCLUSION

Researchers in the field agree on the importance of city branding as a multidisciplinary and complex research domain with high relevance and significance in mapping the future of cities. Analytical and bibliometric studies reviewing city branding and, in the broader scope, place branding literature that also includes cities have been conducted by several scholars (Lucarelli & Berg, 2011; Oguztimur & Akturan, 2015; Green, Grace & Perkins, 2016; Ma, Schraven, Bruijne, Jong, & Lu, 2019), although the existing literature on the city branding component is predominantly discussed from the academic viewpoint of city brand management and communication aspects. In recent developments, the research area of city branding has attracted field researchers and perspectives from the built environment field that includes architecture, urban planning, and design.

Integrated design is the key theme and component in the theory and perspectives put forth by Lynch (1960) and, more specifically, in the research domain of city branding by Muratovski (2012). It is important to co-relate these perspectives as they highlight the inter-related components in city building (T.F. Poon, 2018). These city qualities are interrelated characteristics as they are spatially distinct to the pattern of the city. Muratovski (2012) highlights that integrated design strategy combined with architectural theory and practice in the built environment can contribute to the city branding of emerging cities (Figure 1).

This study has several limitations. The main limitation is that it explores only open access scholarly articles published in WoS and SCOPUS journals in relation to the keywords 'city branding' and 'city rebranding'. It excludes articles focused on geographical entities other than cities, such as destination branding, country branding, nation branding, and town. The study focuses on reviewing the essence of city branding from existing literature that includes the elements of and discussions on the image and identity of a city. For further research, including other geographically distinct entities can contribute to the broader discussion.

Figure 1: Diagram derived from Lynch (1960) & Muratovski (2012)

The other limitation is that the study analyzed only journal articles in the English language. Analyzing national articles in native languages can help extend the contextual city branding perspectives reviewed.

ACKNOWLEDGEMENTS

This study was conducted under the research fellowship scheme awarded by the Faculty of Built Environment, University of Malaya. We would like to thank the Dean, Professor Sr. Dr. Anuar Alias and the Head of Department of Architecture, Ar. Dr. Helena Aman Hashim.

REFERENCES

Abdul Aziz, M.F. (2021). Post-Conservation Evaluation (PCE) on Historic Buildings: Authenticity of Adaptive Reuse Museums in George Town, UNESCO World Heritage Site. *Journal of Planning Malaysia, 19*(19).

Carr, S., Rodwin, L. & Hack, G. (1984). Kevin Lynch – Designing the Image of the City. *Journal of the American Planning Association, Volume 50*, 1984 – Issue 4.

Dastgerdi, A.S. & De Luca, G. (2019). Strengthening the city's reputation in the age of cities: an insight in the city branding theory. *Journal of City, Territory and Architecture, 6*(2).

Dovey, K. (2011). Uprooting Critical Urbanism. *Cities: Analysis of Urban Change, Theory, Action, Volume 15*, Issue 3-4.

Dudek-Mankowska, S. & Grochowski, M. (2019). From creative industries to the creative place brand: some reflections on city branding in Poland. *Place Branding and Public Diplomacy, 15*, 274-287.

Florek, M. & Janiszewska, K. (2013). Defining Place Brand Identity: Methods and Determinants of Application. *Actual Problems of Economics*, *150*(12), 543-553.

Freire, J.R. (2009). 'Local People' a Critical Dimension for Place Brands.

Journal of Brand Management, 16(7), 420-438.

Green, Grace & Perkins (2016). City Branding Research and Practice: An Integrative Review. The Journal of Brand Management, 23(3).

Kalandides, A. & Kavaratzis, M. (2011). Branding Cities: The Search for Place Identity. *Journal of Place Management and Development, 4*(1), 5-8.

Kapferer, J.N. (1994). *Strategic Brand Management: New Approaches to Creating and Evaluating Brand Equity*. Simon and Schuster.

Kasapi, I. & Cela, A. (2017) Destination Branding: A review of the City Branding Literature. *Mediterranean Journal of Social Sciences, 8*(4).

Kavaratzis, M. (2009). Cities and their brands: Lessons from Corporate Branding. *Place Branding and Public Diplomacy*, 5(1).

Kavaratzis, M. & Hatch, M.J. (2013). The dynamics of place brands: An identity-based approach to place branding theory. *Journal of Marketing Theory, 13*(1), 69-86.

Lemmetyinen, A., Nieminen, L., & Aalto, J. (2021). A gentler structure to life: co-creation in branding a cultural route. *Place Branding and Public Diplomacy, 17*, 268 – 277.

Lucarelli, A., & Olof Berg, P., (2011). City Branding: A State-of-the-Art Review of the Research Domain. *Journal of Place Management and Development, 4*(1), 9-27.

Lynch, K. (1960). The Image of the City. *The MIT Press*. ISBN 0-262-62001-4.

Ma, W., Schraven, D., de Bruijne, M., de Jong, M., & Lu, H. (2019). Tracing the Origins of Place Branding Research: A Bibliometric Study of Concepts in Use (1980-2018*). Journal of Sustainability. MDPI, 11*(11), 2999.

Mohd Rohaizad, N.F.H., Hamzah, E., Abdullah Hashim, H., & Ismail, A. (2021). Tangible and Intangible Factors Incorporated for Infrastructure Asset Valuation. *Journal of Planning Malaysia, 19*(17).

Mongeon & Paul Hus (2015). The Journal Coverage of Web of Science and Scopus: A Comparative Analysis. *Scientometrics,* 106(1).

Muratovski, G., (2012). The Role of Architecture and Integrated Design in City Branding. *The Journal of Place Branding and Public Diplomacy, 8*, 195-207.

Oguztimur, S. & Akturan, U. (2015). Synthesis of City Branding Literature (1988-2014) as a Research Domain. *International Journal of Tourism Research, 18* (4), 357-372. Wiley Online Library.

Rehan, R.M. (2013). Urban Branding as an Effective Sustainability Tool in Urban Development. *HBRC Journal, 10*(2), 222-230.

Riza, M., Doratli, N., & Fasli, M. (2012). City Branding and Identity. *Procedia–Social and Behavioural Sciences, 35*, 293-300.

Smith, M.E. & Lobo, J. (2019). Cities Through the Ages: One Thing or Many? *Frontiers in Digital Humanities*. Frontiersin.org.

Poon, S.T.F. (2018). The Viability of An Integrative Framework for Urban Design and Regional Environmental Justice. *Journal of Planning Malaysia, 16*(5).

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 79 – 94

PRELIMINARY HOUSING CONTINUUM MODEL FRAMEWORK FOR YOUNG HOUSEHOLDS IN GREATER KUALA LUMPUR

Izma Syazana Badrudin[1], Zafirah Al Sadat Zyed[2], Peter Aning Tedong[3]

[1, 2] *Department of Real Estate,*
Faculty of Built Environment,
UNIVERSITI MALAYA
[3]*Department of Urban and Regional Planning,*
Faculty of Built Environment,
UNIVERSITI MALAYA

Abstract

Owning a house had been the standard for adults until property prices increased, particularly in urban regions. The price increase led to homeownership becoming a pipe dream for most people. Young households (YH) that intend to purchase a house are subject to social and economic challenges, including a housing policy gap such as devoting attention solely to low-income earners and overlooking the middle-income demographic. The study objectives were to examine housing affordability issues among YH in Greater Kuala Lumpur (GKL) and to review the housing continuum model (HCM) globally. The study data were collected through questionnaire surveys of 323 randomly sampled respondents aged 20–39 years living in GKL. Resultantly, rising housing prices, lower household income, and limited housing choices contributed to YH affordability issues. Furthermore, homeless shelters, social or public housing, affordable housing, rental housing, and private housing were critical HCM components. Based on the findings, the researchers proposed a preliminary HCM framework that can be used to inform YH of available options in the housing market. Moreover, the framework can be used to aid the mitigation of housing affordability problems faced by GKL YH by addressing these issues holistically via framing the components of available houses.

Keywords*:* Young Households, Housing Affordability, Housing Continuum Model, Housing Policy

[2] Corresponding Author. Email: zafirahzyed@um.edu.my

INTRODUCTION

Housing has been significant in social change since the 20th century and is important to economic growth. Most people have dreamed of homeownership for generations. Moreover, most advanced economies aspired to achieve higher homeownership rates (Mckee, 2012). Due to a significant increase in the number of young people moving from rural to urban areas during the 20th century to seek employment, city centres were transformed into economic, cultural, and social activity hubs (Van Doorn et al., 2019). Urban regions have increased from 30% of the global population in 1950 to 55% currently with a projected rise to 60% by 2030 (United Nations, 2018). For urban residents, the increased popularity of metropolitan areas is accompanied by poverty, urban sprawl, and housing affordability (UNHABITAT, 2018). Bilal et al. (2019) reported that GKL populations increased significantly due to unprecedented urbanisation in the era of industrial revolution, which resulted in high demand for adequate and affordable housing. Consequently, housing prices increased significantly and subsequently created the housing affordability crisis (Daud et al., 2017; Yap & Ng, 2018). McKee et al. (2020) stated that young households (YH) demonstrated the highest inability to afford houses and failed to realise the privilege of homeownership as an asset unlike older generations due to lower wages and high living costs. This group includes YH in GKL, Malaysia (Hamzah & Zyed, 2020; Ismail et al, 2021).

Malaysia has been termed a 'homeownership nation' due to its high homeownership rate (76.9% in 2019) (Department of Statistics Malaysia, 2020), which highlights the importance of the Malaysian government continuing to increase the homeownership rate which at par with the government objectives to ensure that everyone in the country can afford to have their own house called home (Kam et al., 2018). Malaysian government policies substantially emphasised housing since independence in 1957 and included housing in the Five-Year Malaysia Plan began in 1956 until the current 12th Malaysia Plan. The government also introduced policy specifically to address the issue in the housing market through National Housing Policy (NHP) and sub-policy, National Affordable Hosuing Policy (NAHP). Through the policy, the federal government has established various housing programmes, such as the 1Malaysia Housing Programme or Perumahan Rakyat 1Malaysia (PR1MA), Civil Servants Housing Programme (PPAIM), Residensi Wilayah (RUMAWIP) and many more to enhance housing access to low- and middle-income households. Moreover, each state government has launched affordable-housing initiatives, such as Rumah Selangorku (Osman et al., 2020) in Selangor, as have Melaka, Johor, Perak (Shatar et al., 2017).

Despite the availability of various homeownership programmes and schemes, the housing affordability crisis among Malaysian YH persists (Anacker, 2019). The decline in housing affordability among YH demonstrates the presence

of housing policy gaps and loopholes that should be addressed. As Malaysian housing policies exclude many groups, including middle-income earners (Mohamed et al., 2020), and there is a lack of housing options (Zairul, 2019), YH have been forced to rent or live in their parental homes. Thus, this study proposed a preliminary housing continuum model (HCM) framework that can be used in housing policy to aid mitigation of the housing affordability problems faced by YH in GKL. The study objectives were to: 1) investigate GKL YH housing affordability problems, and 2) review the HCM in the international context. The literature review addresses the housing affordability issue concerning YH and reviews the need for HCM in the GKL housing policy.

LITERATURE REVIEW

Housing Affordability among Young Households (YH)

Homeownership has become a normalised tenure of choice for adults until housing market Malaysian homeownership had become a normalised tenure of choice for adults until the housing market experienced spiralling house prices, especially in GKL, and a scarcity of affordable housing limited YH options after they had transitioned to adulthood. As Malaysia is known as a 'homeownership nation', the government has implemented incentives and schemes to assist house purchasing. Nevertheless, various factors have led to YH encountering an increasingly unstable housing trajectory. Consequently, the current YH housing scenarios have shifted from homeownership culture towards renting or living with their parents (Holleran, 2020). Overall, there are three factors for the YH housing affordability problems: housing price, household income, and housing options (Zyed et al., 2016).

Housing affordability is inextricably linked to housing market prices, which have become a significant barrier for low- and middle-income YH intending to purchase a house (Tawil et al., 2019). The National Property Information Centre (NAPIC) statistics demonstrate that the average house price in Kuala Lumpur and Selangor in 2020 was RM778,143 and RM486,659, respectively. The overall average house price in Malaysia for the year 2020 was RM429,877. Although housing prices have decreased slightly since 2019, the average GKL housing price continues to exceed the national average. The National Bank of Malaysia (Bank Negara Malaysia, BNM) estimated in 2018, the estimated maximum price for affordable housing should be at price of RM282,000 by using the international standards of Housing Cost Burden approach (Faraziera et al, 2019). Nonetheless, the 2020 housing price exceeded this. Consequently, this demonstrated that Malaysians YH who have just begun their careers and are transitioning to adulthood continue to encounter difficulty in purchasing a house.

Hassan et al. (2017) identified household income as a prominent factor influencing the Malaysian housing crisis, particularly in GKL where the housing

price increase overtook the household income increase. Hassan et al. (2019) and Zairul (2019) reported that the younger starters (25-29 years old), the majority of which earned incomes below the national median income which was RM2,594 in 2017, felt the most pressure from the current situation.

The BNM estimated that the monthly wages that would enable a comfortable life in an urban area were RM2700 for single people and RM6500 for married couples with two children (Chong & Khong, 2018). Nonetheless, the Ministry of Education Graduate Tracer Study survey (Kementerian Pendidikan Malaysia, 2019) revealed that the vast majority of fresh graduates earned starting salaries between RM1000 and RM3000 per month. Although the basic minimum wage increased to RM1200 in major cities and RM1100 in rural areas on 1 February 2020 (Christopher & Ong, 2020), the majority of young starters remain underpaid. According to BNM, such wages are insufficient for living comfortably in the GKL. Based on their current wages and living costs, the possibility of YH purchasing a house in the present and future appears unlikely.

Thanaraju et al. (2019) and Hamzah and Zyed (2020) hypothesised that limited affordable housing options have weakened YH purchasing power. Kim (2020) reported that most YH with incomes below RM1000 wished to live in high-end apartments despite the unaffordability. Zairul (2019) noted that the majority of homebuyers prioritised proximity to work as a primary criterion but Olanrewaju and Woon (2017) reported that most inexpensive housing is far from the city centre, which forces people to commute by motor vehicle, which is time- and fuel-consuming. The issue of housing affordability has become a research focus worldwide (Zainon et al., 2017; Kam et al., 2018; Yaacob et al., 2018; Sohaimi et al., 2018; Zairul, 2019; Hamzah & Zyed, 2020; Osman et al., 2020); nevertheless, there is a dearth of discussion of the relationship between housing affordability and the development of an HCM, which was the primary focus of this research.

The Housing Continuum Model (HCM)

Salman et al. (2018) noted that the influence of urbanisation and a range of challenges that aggravated the housing sector condition prompted the authorities to establish guidelines commonly referred to as ‘housing policy’ to address the issue. Malaysia has implemented a housing strategy since its independence: the objectives were described in the Five-Year Malaysia Plan and its purpose is to construct low-cost housing for people in need. Government efforts to meet citizens’ housing needs have continued until the most recent Malaysia Plan (Shatar et al., 2017). Nonetheless, despite commendable efforts to aid homeownership, persisting loopholes in the current housing policy contribute to the housing affordability crisis, particularly in urban areas. Zairul (2019) and Mohamed et al. (2020) reported that the housing policy has several loopholes. These loopholes include a lack of focus on middle-income groups and a lack of

housing options, which have both contributed to other housing crises, such as overhang properties and homeownership affordability.

Therefore, to support the idea of homeownership and to bridge this housing policy gap in Malayia and GKL specifically, HCM was introduced. As described by Haylen (2015), there is a housing system in the housing market, and each house is related to the next, which is referred to as the "housing continuum." A well-functioning housing continuum ensures that there are sufficient houses to meet the housing needs of people in the society. Additionally, the disparity between demand and supply for each property along the continuum may have a significant impact on the flow of housing across the entire continuum. Furthermore, the housing continuum has been introduced in a linear form since it suggests that all families should aim to advance along the continuum, and each level of the housing continuum symbolises an improvement in the housing status of the households (Flanagan et al, 2020). Through the housing continuum, policymakers can identify housing market issues more holistically and used it to identify key housing accessibility issues. Housing continuums have been described previously in the literature and in the housing policies of other nations, including Canada (City of Vancouver, 2012; City of Richmond, 2018), Australia (Australian Housing and Urban Research Institute [AHURI], 2017; Greater Sydney Commission, 2018), New Zealand (Auckland Council, 2020; Treasury Government NZ, 2020). Generally, the housing continuum describes the range of available housing options based on the house types available in a country, which can range from emergency shelter to private homeownership (City of New Westminster, 2010), and which are described below.

Emergency or Homeless Shelter

Emergency housing typically houses people with mental health issues, health problems, or family problems; domestic violence survivors; or people with financial disparities that led to homelessness by choice and force (Houard, 2011). The Australian Bureau of Statistics (ABS) defined the homeless as people without suitable accommodation alternatives and they are considered homeless if their current living arrangement is in an inadequate dwelling (ABS, 2012). Nevertheless, emergency or homeless shelters vary between countries. Some countries consider emergency shelter a municipality obligation and responsibility while other countries do not recognise this duty, particularly in the lower income countries. To assist the homeless, the majority of lower income countries rely solely on non-governmental organisations (NGOs) (Busch-Geertsema & Sahlin, 2007).

Social or Public Housing

According to the Community Housing Industry Association Victoria, Australia, the state government owns and manages state housing, whereas community

housing is managed and possibly owned by any NGO. Together, such housing is known as social or public housing, which shares a similar vision and mission: assisting in the accommodation of people facing housing stress and problems. Social or public housing mainly targets specific groups, such as low-income families, domestic violence survivors, the elderly, children, and other disadvantaged groups (Jones, Phillips & Milligan, 2007). Granath Hansson & Lundgren (2019) defined social or public housing as a house supplied for a non-profit purpose by the state, non-profit NGOs, or both.

Private or Public Rental Housing

The role of the rental sector is to accommodate low- or middle-income households that are unable to access social housing or any available affordable houses (Kemp, 2011). In the 20th century, the rental market became popular among the low- and middle-income groups. Although there is a social housing, which enabled property ownership among low- and middle-income earners, some social housing focused on the poorest households and not other low-income groups. Furthermore, some countries do not have sufficient social housing to accommodate middle-income earners (Hulse, 2003).

Affordable Housing

The Australian Housing, Local Government, and Planning Ministers (2006) defined affordable housing as a dwelling constructed at a lower cost than private housing to fulfil the needs of low- and middle-income households (Abelson, 2009). The US Department of Housing and Urban Development proposed the term 'affordable housing' as an alternative to 'below-market' or 'low-income' houses (Nguyen, 2005). In the United Kingdom, 'affordable housing' refers to 'social rental and intermediate housing' supplied to households whose requirements are not met by the market (Pittini, 2011). Affordable housing was created as a result of the inability of certain income groups to own private housing property.

Private Housing

The growth of city dwellers has outstripped the capacity of the government to provide adequate housing. Due to the massive numbers of low-income earners and the homeless, government efforts at providing accommodation for all citizens remain inadequate. As the public sector alone cannot construct sufficient houses, government efforts were compelled to include the private sector to provide houses for the middle- and higher-income groups (Agbola & Olatubara, 2007).

RESEARCH METHODOLOGY

In this study, the primary data were collected using a questionnaire survey and case study approach involving different countries. The questionnaire survey was

used to obtain information on the housing affordability problems among GKL YH. The case study approach was used to review the HCM globally before a preliminary HCM framework was constructed to be used in the Malaysian and GKL housing policies. Secondary data were collected through a literature review, where the data were obtained from online articles, journals, seminar reports, an online newspaper, and government reports such as that by NAPIC.

Questionnaire Survey

Participants were selected by random sampling, which is one of the simplest forms of collecting data from a population. Before calculating the sample size, the researcher should consider the target population and sample needs, such as population size, margin of error, confidence level, and standard deviation. Population size refers to the entire number of individuals in the population: "In a reliability analysis, sample size is perhaps the most important element" (Bonett, 2002, p. 335). If the population surveyed is divided into sub-groups, then each sub-group must contain at least 100 people. In this study, the sample was calculated as depicted in Figure 1. Overall, the sample size can be between 30 and 500 (Delice, 2010) but must reflect the eventual research quality.

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Figure 1: Formula for calculating sample size
Source: Delice (2010)

Due to the current coronavirus disease 2019 (COVID-19) pandemic, all the survey was done using the Google Form and distribution was made online in 2021. The targeted area was GKL, which comprises seven districts. The total sample size successfully obtained was 323 and the participants were aged between 20 and 39 years because in Malaysia people age 15 to 40 years old are classified as "young people" in accordance with the Malaysian Youth Council (Dahalan et al., 2012). However, people ages 20 to 39 constitute the majority of first-time home buyers in Malaysia (Zyed et al, 2016) (see Table 1).

The data were analysed with descriptive statistics using SPSS software. Descriptive statistics facilitate, which enables easier data interpretation. For this study, the significance of the selected variable was depicted using a table. Subsequently, the results were evaluated and used to answer the first study objective.

Case Study Approach

To review the HCM in the international context, the researchers used the case study approach involving the HCM in the housing policies of Canada, Australia, and New Zealand because these are the countries that integrate HCM in their housing policy. HCM has been widely adopted in the majority of Canadian states. Meanwhile, in Australia and New Zealand, the federal government has devised a housing continuum to address both the issue of homelessness and housing affordability, as well as the affordability of owning a home among the country's indigenous population.

These policies were examined to gain a clear understanding of how the HCM can be implemented in Malaysian housing policy, specifically in GKL. Following data collection via the questionnaire survey and HCM review, the preliminary GKL HCM was developed as a framework to achieve the main research aim.

FINDINGS AND DISCUSSIONS

The questionnaire survey involved a total of 323 respondents. Table 1 summarises the respondents' profiles.

Table 1: Respondents' Profile

Categories		Percentage (%)
Age (years)	20-24	31.3
	25-29	26.9
	30-34	23.5
	35-39	18
Marital Status	Single	67.5
	Married	31
	Divorced	1.2
	Widowed	0.3
Current Living Area	Kuala Lumpur	20.7
	Hulu Langat	14.6
	Petaling Jaya	12.7
	Gombak	10.8
	Klang or Shah Alam	10.2
	Subang Jaya	10.2
	Ampang Jaya	10.2
Highest Education Qualification	Secondary school	49.5
	Diploma	22.6
	Bachelor's degree	10.5
	Master's degree	6.8
Houshold Monthly Income (RM)	1001-2000	18
	2001-3000	20.7
	3001-4000	13.3
	5001-6000	8.4
	Not applicable	12.7
Current Tenure	Owning	22.6

Renting	34.1
Living with family	43.3

Source: Author (2022)

To achieve the first research objective, the respondents were requested to rank their perceptions of housing affordability in GKL using the Likert scale as a proxy for their satisfaction level (refer to Table 2).

Table 2: Frequencies and percentages of the housing affordability

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Housing Price					
In my opinion, housing prices in GKL are reasonable and affordable.	110 (25.5%)	175 (40.6%)	80 (18.6%)	44 (10.2%)	22 (5.1%)
The cost of a house influences the buyer's decision to buy one.	6 (1.4%)	33 (7.7%)	47 (10.9%)	172 (39.9%)	173 (40.1%)
It is more difficult for young people to purchase a house than it is for older people.	28 (6.5%)	69 (16%)	97 (22.5%)	148 (34.3%)	89 (20.6%)
The supply of affordable housing, especially in urban areas, does not meet the demand.	13 (3%)	35 (8.1%)	138 (32%)	177 (41.1%)	68 (15.8%)
Household Income					
Household income affects a buyer's ability to afford a house.	8 (1.9%)	10 (2.3%)	54 (12.5%)	176 (40.8%)	183 (42.5%)
The high cost of living and debt burden affect family finances and the ability of individuals to save money for a house purchase.	6 (1.4%)	20 (4.6%)	54 (12.5%)	189 (43.9%)	162 (37.6%)
Increases in the minimum wage could boost people's chances of becoming homeowners.	8 (1.9%)	20 (4.6%)	76 (17.6%)	158 (36.7%)	169 (39.2%)
Housing Choice					
Homeownership rates are declining due to a lack of affordable housing options.	11 (2.6%)	33 (7.7%)	157 (36.4%)	175 (40.6%)	55 (12.8%)
Houses should be designed based on people's preferences.	8 (1.9%)	29 (6.7%)	101 (23.4%)	202 (46.9%)	91 (21.1%)
Different housing choices can help improve homeownership rates.	11 (2.6%)	32 (7.4%)	123 (28.5%)	201 (46.6%)	64 (14.8%)
If it is not my housing preference, I will not buy a house even if I can afford it.	20 (4.6%)	72 (16.7%)	184 (42.7%)	122 (28.3%)	33 (7.7%)

Source: Author (2022)

Housing affordability is affected by price. Daud et al. (2017) noted that rising housing costs in GKL rendered homeownership unattainable for many lower- and middle-income earners. In this study, 40.1% of the respondents strongly agreed that housing costs are an important consideration when buying a home while 40.6% disagreed that the stated GKL housing prices are affordable and reasonable, which represented the majority opinion. Tawil et al. (2019) stated that the extremely high cost of GKL housing caused many YH to abandon their dream of homeownership in favour of renting or living with their families.

Out of the 323 respondents, 148 (34.3%) agreed that it is more difficult for young people to own a home than older people. New entrants to the housing market, particularly young people who have just finished school and are just starting their careers, are often affected by their ability to afford a house. McKee et al. (2020) asserted that the 21st-century YH have been unable to afford current housing market prices and are unable to enjoy the privilege of homeownership as an asset as older generations have, which supported the findings by Forrest and Xian (2018). Finally, 41.1% of respondents believed that the demand for affordable housing in GKL exceeded the supply. These findings are consistent with those of Zainon et al. (2017), who stated that an imbalance in the supply and demand of affordable housing in urban areas contributed to housing affordability.

The primary point of consideration when determining housing affordability is income. Income was the most important factor influencing housing affordability (Rameli et al., 2016), with which 42.5% of the respondents in this study agreed. Overall, 43.9% of the respondents reported that they were unable to save money for a house down payment due to their debt obligations, such as student loans. These findings corroborate the assertion of Raviv (2021) that many young people struggled to save for a down payment and obtain a mortgage due to various debts, including educational debt, which forced them to remain in the private rental market longer than previous generations. Next, 158 (36.7%) and 169 (39.2%) respondents agreed and strongly agreed, respectively, that increasing the minimum wage would help them afford a house. Nonetheless, although the US minimum wage had increased, many Americans continued to encounter difficulties even renting, let alone purchasing a house, particularly in cities (Anacker, 2019). That author concluded that raising wages would not solve the affordability problem as other factors, such as high living costs, were present.

The final factor influencing housing affordability is the availability of affordable housing options. Abdul Kadir et al. (2020) stated that affordability is measured not only by cost and income, but also by choices. Specifically, first-time homebuyers prefer houses that suit their preferences and needs before deciding to purchase a house (Sohaimi et al, 2017). In this study, 40.6% of the respondents agreed that a lack of housing options reduced homeownership rates. In contrast, 36.4% expressed no opinion on the statement and 202 respondents (46.9%) agreed that affordable housing should be designed according to the

buyer's preferences while 201 respondents (46.6%) agreed that having a choice might increase homeownership rates. Lastly, 184 respondents (42.7%) stated that they would be neutral when asked if they would buy an affordable house even if it was not based on their preferences. Therefore, it can be concluded that, despite the fact that housing policies and numerous schemes have been implemented, housing affordability among YH in the GKL remains a problem. As Rowley et al (2017) noted, housing continuum is the first step in conceptualising housing need, hence, it is significant to include housing continuum in GKL's housing policy to help fulfil YH housing needs while minimising the housing affordability problems among them.

Before developing the preliminary GKL YH HCM, it was crucial to review and reference the HCM used in the housing policies of Canada, New Zealand, and Australia. The Auckland Council (2020) defined the housing continuum as the range of housing types available in the community and which usually began with emergency shelters and ended with the private housing market. The council also described the HCM as a framework for viewing the types of houses available to assist policymakers in addressing housing issues, such as housing affordability, schemes, and initiatives. Specifically, the HCM contains helpful guidelines for government and policymakers to better understand the housing needs of various households and aids householders in meeting their requirements for acquiring a house and achieving homeownership status.

Canada

The Canadian government decided to unveil their first National Housing Strategy (NHS) in 2017 to address the country's housing affordability and affordable housing throughout the country. In order to address all affordability issues in each segment of housing, the housing continuum was created. Housing continuums have long been incorporated into national housing policy and have been implemented in other Canadian provinces, but in 2018, CMHC established a new housing continuum (Julia, 2018), as shown in Figure 2.

Figure 2: The Housing Continuum in Canada
Source: Canada Mortgage and Housing Corporation (Julia, 2018)

New Zealand

For overall housing plan, New Zealand's government introduced affordable housing continuum in their Auckland Plan 2050. The Auckland Plan 2050 has a

strong focus on ensuring that Aucklanders have security of tenure, as renting is becoming a long-term, possibly permanent, reality for many households. The continuum will foster both security of tenure and pathways to greater independence by offering housing choice and social mobility (Auckland Council, 2020).

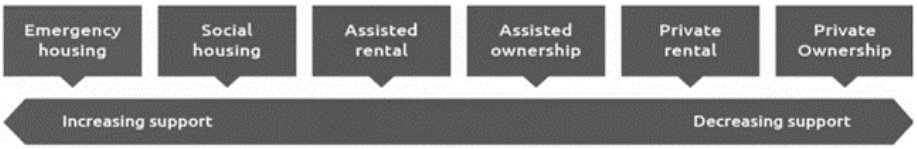


Figure 3: The Housing Continuum in New Zealand
Source: Auckland Council (2020)

Australia

To address the housing crisis in Australia, the Australian Housing and Urban Research Institute (AHURI) has formed a collaboration with various housing stakeholders to conduct research and hold discussions on issues relating to housing issues in the country's cities (AHURI, 2014). According to Rowley *et al* (2017) in one of the AHURI research paper (see Figure 4), understanding the housing needs using the housing continuum is the first step because different tenures are required for households in varied conditions, including household income. Calculating the prospective household income for each segment in the middle of the continuum and the supply required across the continuum to meet the housing requirement can be used to estimate need. More affordable housing options can help people transition out of social and public housing, allowing them to move along the continuum without having to rely on government assistance.

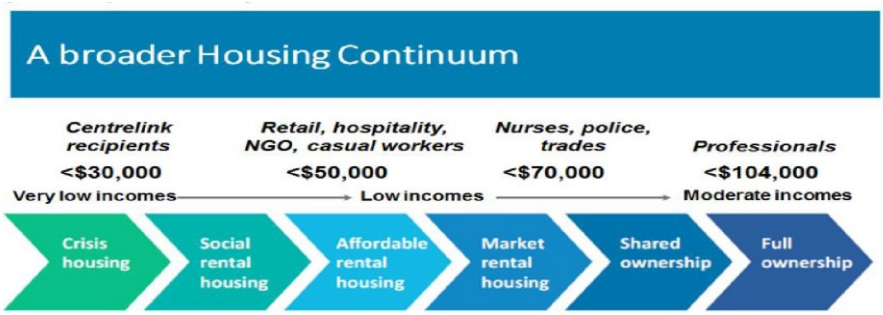


Figure 4: The Housing Continuum in Australia
Source: Rowley et al (2017)

To summarize, the housing continuum is a diagram that depicts the range of housing options available in the market, ranging from emergency shelter

on one end to private housing homeownership on the other. The purpose of the housing continuum is to ensure that everyone has a place to live and owns a home at the end. This is because, according to Rossi & Weber (1996), homeownership creates more stable and secure living environment, which leads to higher levels of happiness among household members. As a result, it is critical for a person to own a house, particularly to provide a comfortable and pleasant life especially after coming of retirement age.

The Malaysian Context

The shape and the spectrum of housing available in the continuum is varies according to respective countries and cities. It can be easily integrated in the country that yet to have a housing continuum on their own like Malaysia and GKL By having the housing continuum in the housing policy, Malaysia government and policy makers can used it to visually depict different segments of housing that exist in the housing market so that they can identify key housing accessibility issues and cater to the housing needs of different groups in the society from lower income to middle income (Rowley *et al*., 2017).

Since the Malaysian government has been employing and invested heavily in numerous schemes and programmes to help the people to attain the home-owner status since the country gained independence in 1957 (Soffian *et al.,* 2018) and given the goal of HCM is towards homeownership, it is appropriate to implement the model as a housing framework in Malaysia to support the government's efforts to promote homeownership in the county.

Therefore, this research proposes the HCM (please see Figure 5), which outlines a preliminary housing continuum framework for GKL. The proposed HCM begins with basic shelter for the homeless and ends with private housing built by private developers. Private housing is typically pricier than the government-developed public housing targeted at lower- to middle-income buyers.

Figure 5: Preliminary HCM of GKL
Source: Author (2022)

CONCLUSION

To bridge the current housing policy gaps, this research proposes that the HCM (Figure 5) be integrated with government policy and that policymakers consider housing problems more holistically by addressing all types of housing available

in GKL and automatically covering all income levels. The housing continuum is significant as it depicts diverse housing options ranging from emergency shelter to private housing. The findings are important as they proposed a preliminary HCM framework for Malaysians to clearly understand each housing segment and how the framework could identify solutions to the perpetual issue of housing affordability problems. Therefore, implementing the HCM in the housing policy would facilitate assistance from private developers and NGOs to aid the government in supporting homeownership among different income groups.

ACKNOWLEDGEMENT

The authors appreciatively acknowledge the grant provided by the Ministry of Higher Education Malaysia via Fundamental Research Grant Scheme (FRGS/1/2019/SS06/UM/02/8) (FP070-2019A) and also sincere appreciation to Prof. Dr. Wan Nor Azriyati Wan Abd Aziz, Prof. Dr. Noor Rosly Hanif, Dr. Ainoriza Mohd Aini, Dr. Zairul Nisham Musa and Sr Abdul Ghani Sarip for their guidance and valuable input.

REFERENCES

Abdul Kadir, J. M., Subramaniam, G., & Ghazali, I. (2020). Housing affordability among middle-income earnersin Selangor, Malaysia. *Environment-Behaviour Proceedings Journal, 5*(15), 289–293.

Anacker, K. B. (2019). Introduction: housing affordability and affordable housing. *International Journal ofHousing Policy*, *19*(1), 1–16.

Auckland Council. (2020). *Auckland plan 2050 (Issue June).* The Auckland Council Planning Committee.https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plansstrategies/auckland-plan/Pages/default.aspx

Bilal, M., Meera, A. K. M., & Abdul Razak, D. (2019). Issues and challenges in contemporary affordable publichousing schemes in Malaysia: Developing an alternative model. I*nternational Journal of HousingMarkets and Analysis, 12*(6), 1004–1027.

Busch-Geertsema, V., & Sahlin, I. (2007). The role of hostels and temporary accommodation. *European Journalof Homelessness, 1*(1), 67-93.

Daud, N. M., Nor, N. M., Ali, U. N. N., Yusuf, M. A., & Munikanan, V. (2017). Affordable housing system: Areview on issue of housing affordability. *The Social Science, 12*(7), 1281–1287.

Faraziera, M. R. (2019). Perceptions of young professional in Malaysia: Homeownership or renting? *ICRP 2019- 4th International Conference on Rebuilding Place*, 511–519.

Granath Hansson, A., & Lundgren, B. (2019). Defining social housing: A discussion on the suitable criteria.*Housing, Theory and Society, 36*(2), 149-166.

Hamzah, H., & Zyed, Z. A. (2021). Housing pathways of young starters in urban Malaysia. *Journal of Housingand the Built Environment, 36*(2), 705-72

Hegedus, J., Lux, M., & Teller, N. (Eds.). (2013). *Social housing in transition countries* (Vol. 10). Routledge.

Holleran, M. (2021). Millennial 'YIMBYs' and boomer 'NIMBYs': Generational views on housing affordabilityin the United States. *The Sociological Review, 69*(4), 846-861.

Houard, N. (2011). The French homelessness strategy: reforming temporary accommodation, and access tohousing to deliver 'Housing First': continuum or clean break. *European Journal of Homelessness, 5*(2),83-98.

Ismail, S., Manaf, A. A., Hussain, M. Y., Basrah, N., & Azian, F. U. M. (2021). Housing preferences: An analysis of Malaysian youth. *Planning Malaysia, 19*(3), 134-145.

Julia, M. (2018). National housing conference. Canada Mortgage and Housing Corporation. https://assets.cmhc-schl.gc.ca/files/pdf/national%20housing%20conference/nhc_wwh_en_w_acc.pdf?rev=6b25c5b4-57ba-4113-8486-1266673a5fa1

Kam, K. J., Sheng, A., Lim, H., Al-Obaidi, K. M., Tze, &, Lim, S., Shwan, T., & Lim, T. S. (2018). Evaluating housing needs and preferences of generation Y in Malaysia. *Planning Practice & Research, 33*(2), 172185.

Mohd-Rahim, F. A., Zainon, N., Sulaiman, S., Lou, E., & Zulkifli, N. H. (2019). Factors affecting the ownershipof low-cost housing for socio-economic development in Malaysia. *Journal of Building Performance,10*(1), 1–16.

McKee, K. (2012). Young people, homeownership and future welfare. *Housing studies, 27*(6), 853-862.

McKee, K., Soaita, A. M., & Hoolachan, J. (2020). 'Generation rent' and the emotions of private renting: Self worth, status and insecurity amongst low-income renters. *Housing Studies, 35*(8), 1468–1487.

Osman, M. M., Zainudin, F. E., Rabe, N. S., Hitam, M., & Ponrahono, Z. (2020). Challenges and ownership issuesfacing by low (B40) and Medium Income Group (M40) in Selangor. *Planning Malaysia, 18*(3), 218228.

Rowley, S., Leishman, C., Baker, E., Bentley, R., & Lester, L. (2017). Modelling housing need in Australia to2025 (Report No. 287). Australian Housing and Urban Research Institute, Melbourne. https://www.ahuri.edu.au/research/finalreports/287

Rossi, P.H. & Webber, E. (1996) The social benefits of homeownership: empirical evidence from nationalsurveys. *Housing Policy Debate, 7*(1), 1–35

Salman, M., Malik, S., Tariq, F., & Gul, A. (2018). Appraisal of national housing policy-A case of Pakistan.*Technical Journal*, University of Engineering and Technology (UET), 23(3), 1–8.

Shatar, S. A., Othman, N., Ashikin, N., Yusof, M., & Mohamed, Z. (2017). Preliminary review on housing policyand its implementation in Malaysia. *Journal of Science, Technology and Innovation Policy, 3*(1), 30–33.

Sohaimi, N. S., Abdullah, A., Shuid, S., & Sarkawi, A. A. (2017). Young professionals housing affordabilitythrough housing preferences in Kuala Lumpur and a review on the means-end chain model. *Planning Malaysia, 15*(1), 369-376.

UNHABITAT. (2018). Adequate Housing and Slum Adequate Housing and Slum. 1–31.

Van Doorn, L., Arnold, A., & Rapoport, E. (2019). In the age of cities: The impact of urbanisation on house pricesand affordability. *Hot Property*, 3-13.

Yap, J. B. H., & Ng, X. H. (2018). Housing affordability in Malaysia: perception, price range, influencing factorsand policies. *International Journal of Housing Markets*

and Analysis, 11(3), 476–497.
Zairul, M. (2019). House Buyers Preferences among Young Urbanites in Malaysia. *Malaysia Architectural Journal, 1*(1), 33–40.
Zyed, Z. A. S., Abd Aziz, W. N. A. W., & Hanif, N. R. (2016). Housing Affordability Problems among Young Households. *Journal of Surveying, Construction & Property, 7*(1), 1–18

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 95 – 107

A SPATIAL ANALYSIS OF SUBSIDISED BUS ROUTE CATCHMENT FEASIBILITY IN AN URBAN AREA IN MALAYSIA

Khor Jia Min[1], A. A. Fatiah[2], & Zakiah Ponrahono[3]

[1,2,3] *Department of Environment, Faculty of Forestry and Environment,*
UNIVERSITI PUTRA MALAYSIA

Abstract

This paper focuses on subsidized bus services provided by a local authority in Malaysia to determine the route's feasibility. This case study explores the catchment area of the designated bus stops in its route, the distance between the bus stops, the passengers' boarding, and alighting points, and the level of service. A Global Positioning System (GPS) device was used for an onboard survey to identify the boarding and alighting points, and the service catchment area was explored with the Geospatial Information System (GIS) tool. Findings indicate that the service level lacks sufficient facilities, proper accessibility, comprehensive information, and signage at bus stops. Furthermore, relatively poor performing bus service in passengers loading and timely arrival during peak periods. Next, an analysis of forty-one (41) catchment areas revealed that only 37% of the bus stops are within a catchment area. Recommendations for bus services include timely and accurate information to ease users to plan their journey and providing comfortable bus stops.

Keywords: Public Bus Service; On-board Survey; Service Catchment; Level of Service (LOS)

[1] Student at Universiti Putra Malaysia. E-mail addresses: khorjia95@gmail.com

INTRODUCTION

Rapid urbanization in Malaysia has caused heavy traffic congestion (Norhisham et al., 2018). In cities without an effective transportation plan, demand and supply are out of balance (Givoni & Banister, 2010). Due to the importance of transportation to economic growth, a comprehensive and sustainable transportation system is essential (Brand et al., 2017). Globally, buses are the most prevalent, affordable, and accessible mode of transportation. When a broad geographic area is served, bus service planning is optimal (Taplin & Sun, 2020). Malaysia's capital, Kuala Lumpur, reorganized bus corridors according to primary routes in the city center through the implementation of the Bus Network Revamp (BNR) in 2015 (Norhisham et al., 2018). The BNR directs public transportation planning in all Malaysian states with the goal of enhancing the free public bus service to increase public transportation use, reduce private vehicle use, and reduce environmental pollution (Setiausaha Kerajaan Negeri Selangor, 2019).

Selangor, the most sustainable state in the country, intends to become a "Smart State" by 2025. (Smart Selangor, 2016) The Smart Selangor Initiative implements Internet of Things (IoT) solutions to enhance the quality of life of its citizens. This domain offers an IoT-based transportation solution and integrates big data and smart infrastructure in order to enhance the user experience (Smart Selangor Delivery Unit, 2016). Selangor Smart Bus provides free navigation for city buses (Setiausaha Kerajaan Negeri Selangor, 2019). Using the SITS application, passengers of Selangor Smart Bus can view bus routes and arrival times in order to avoid traffic (Fong et al., 2019).

Improving the catchment area and level of service are important factors to consider for enhancing the quality of bus services (LOS). The catchment area of a bus stop is the range of walkable passengers (Roy & Basu, 2019). A pedestrian shed analysis (ped-shed) depicts the areas covered by a 5-minute walk to a bus stop or a 10-minute walk to a train station (Salvo & Sabatini, 2005), or, a 400-800-metre buffer space between a bus stop and a train station that is accessible to pedestrians (El-Geneidy et al., 2014). The analysis determines the accessibility of an urban area by drawing a perfect circle around a designated point. Ped-sheds are asymmetrical in practice to accommodate actual walking distances (Daniel & Burns, 2018; Salvo & Sabatini, 2005). In the meantime, LOS has emerged as a useful metric for evaluating the quality of services (Das and Pandit, 2013).

RESEARCH BACKGROUND

Selangor Smart Bus's aims to provide efficient services and convenience. The Selangor Smart Bus SA02 Route (Hentian Pusat Bandar - Stesen Komuter Batu Tiga) in Shah Alam was chosen as a case study because of its service catchment area and route network feasibility for passengers have not been thoroughly

determined. This study evaluates a route's efficiency and convenience. Spatial analysis was used to determine the distance between the designated bus route and bus stop (SA02 Route) based on passenger count, service level, boarding, and alighting locations, current planning, and service catchment.

METHODOLOGY

The case study examines Selangor Smart Bus SA02 in Shah Alam, Malaysia (Figure 1). It covered Shah Alam's economic activities. The route connects neighborhoods, commercial districts, a train station, and an educational hub. he SA02 route was deemed a good reference for urban bus service providers.

Onboard Survey

Onboard the bus, a survey was conducted to observe the route and manually count passengers at each stop. Two pilot tests verified the data collection's reliability. Data were collected on three weekdays and one weekend day. Data collection was based on the bus's daily operating hours, as follows:

Morning Peak: 7.00 a.m. - 8.00 a.m.
Morning Off-Peak :10.00 a.m. - 11.00 a.m.
Afternoon :12.00 p.m. - 2.00 p.m.
Evening Peak :4.30 p.m. - 5.30 p.m.
Evening Off-Peak :7.30 p.m. - 8.30 p.m.

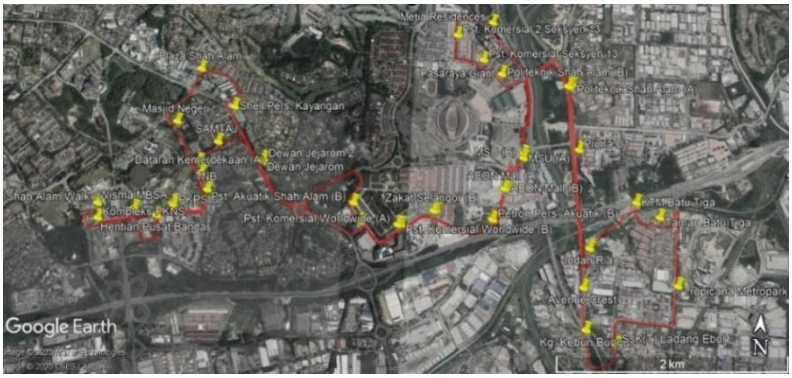


Figure 1. Selangor Smart Bus SA02 Route

The monthly number of passengers for the Selangor Smart Bus service SA02 Route in 2019 was obtained from Shah Alam City Council Urban Transportation Division. A further comparison was made between the peak and off-peak hours to observe the difference between the weekdays and weekends loadings.

GPS Points Recording

A mobile GPS device (Garmin GPSMAP® 64sx | Handheld GPS with Navigation Sensors) was used to record each passenger's boarding and alighting locations during the onboard survey. In addition to a pilot onboard survey, two pilot studies were conducted to calibrate the GPS device. Using the Google Maps service, the recorded GPS coordinates were validated by comparing them to the actual bus stop coordinates. A spatial analysis was utilized to determine the optimal boarding and alighting point coordinates for each stop.

Pedestrian Shed Analysis and GIS Spatial Analysis

A pedestrian shed analysis was conducted to evaluate passengers' walkability to the nearest bus stops and main stations at a buffer distance of 400 m and 800 m, respectively. A Geospatial Information System (GIS) spatial analysis was conducted using ArcGIS software to determine the service catchment area's type of land use surrounding the bus stops and study the pattern of pedestrians who can access the nearest bus stops or station.

Level of Service

Level of service (LOS) analysis validated the load factor, service frequency, service hour, and reliability. The collected data were rated from grade A to F according to the standards for LOS of bus services established from the Highway Capacity Manual (National Research Council, 2000)

Interview with Bus Service Planner

Three individuals from the Shah Alam City Council Urban Transportation Division bus service planners were interviewed about the bus service schedule, daily operation, passenger statistics, type of bus stop or station, and challenges they face providing a free bus service. Next, the Selangor Town and Country Planning Department an officer was also interviewed on the route's urban planning and GIS land use data was interviewed separately. All the interviews were conducted through an informal approach.

RESULTS AND DISCUSSION

Bus Stop and Interchange within SA02 Route

There are 41 distinct bus stops or stations along the SA02 Smart Bus Route. Twenty-one (21) pole bus stops, seventeen (17) bus stops, two (2) major stations, and one (1) ghost bus stop are all present on the route (Figure 2). The Shah Alam City Council defines a phantom bus stop as a designated stop that has no facilities or signage. Shelter and bus route information are available at the main station and standard bus stops. The remaining 21 pole bus stops are signposts without shelter. S Standard and main bus stops are lit and powered by electricity. A bus driver might pass by people at a bus stop that isn't well lit at night because the pole and

phantom bus stops rely on nearby street lighting. Passengers frequently need to cross the street to stop a bus when waiting at a pole or makeshift bus stop, which is dangerous. Pole stops are located at stops 1, 2, 13, 29, and 33, while stop 16 is unprotected and unlit. The SA02 route also makes it possible to travel quickly within and outside of Shah Alam, where 18 interchange routes are run by various bus companies, and 34% of the SA02's 41 bus stops are interchanges. Kuala Lumpur, Petaling Jaya, Klang, Subang Jaya, Cyberjaya, and Kuala Langat are all accessible from Shah Alam via its six routes. The number of passengers at stops O, 13, 17, 24, and 33 increases as a result of this integration with the SA02 interchange routes.

Figure 2. Example of Bus Stop. (a) Main Bus Station; (b) Bus Stop; (c) Pole Bus Stop.

The Selangor Intelligent Transport System (SITS) application was developed by the Smart Selangor Delivery Unit (SSDU) to aid in trip planning. It displays the anticipated arrival time at each bus stop. SITS do not fully integrate bus stops because bus operators and application developers are from separate organizations (Appendix, Table 8). For instance, the application does not display Shah Alam Walk, Dewan Jejarom 2, MSU (A), MSU (B), Dewan Jejarom, or Dataran Kemerdekaan. Without these bus stops in SITS, passengers are unable to determine if a bus stops at a specific stop, as the driver may not see the route signage. In the application, some of the bus stops have different names. The ambiguity, inconsistency, or deficiency of information regarding bus routes can discourage individuals from using public transportation. For the SITS application to be able to provide information, both bus operators and application developers should improve bus route planning, including frequent updates on GPS location in the database (Fong et al., 2019), which would enhance the user experience. Some of the existing features, such as displaying the license plate number of the approaching bus and its current location on the map, are effectively integrated.

Bus Stop Coordinate Comparison Analysis

This study discusses GPS coordinates from an onboard survey that validated passengers' boarding and alighting points. Validating GPS points helped

researchers study the SA02 Bus Route's catchment area. SA02 covers 27.7 km and 4.33 km^2. Geospatial data validation used GPS-based comparison analysis. Each test's most precise GPS coordinates were compared to a geospatial resource. Optimal coordinates were chosen based on the trip variation. If the sampling site is at the equator, a second of longitude equals 30.87 m of latitude. Longitude and latitude range differences are 0 to 0.5 seconds and 0 to 0.6 seconds, respectively. This result represents a distance difference of fewer than 20 m caused by actual road traffic. Because there was no stopping at these bus stops, the GPS coordinates for stops 12, 15, and 17 were automatically selected from their geospatial resources. Bus stops O and 23 were not chosen from the onboard survey because they arrive and depart from different locations in the main station. This discovery validates the bus stop's location, easing future transportation planning and upgrading.

Pedestrian Shed Analysis and GIS Spatial Analysis

Based on bus service providers' ridership statistics for the SA02 route, more than 610,000 passengers were recorded in 2019, or 50,000 per month (Figure 3). The bus company confirmed this number in all their records. This route's constant ridership requires a study of bus stop catchment areas to ensure efficiency. Figure 4 shows each bus stop's catchment area, which is 400-m except for stops O and 23, which are 800 m as main stations. When the 400-m circles overlapped, they were combined. These combinations show that passengers at the intersection of two catchment but-stop walk between bus stops within the circled walkability range. When a passenger's destination is just one bus stop away, the circle shows whether they can walk there instead of waiting 20 minutes for the next bus. Red circles represent the catchment area for Hentian Pusat Bandar (bus stop O) to KTM Batu Tiga (bus stop 23), while blue circles represent the return direction. Red lines go from bus stop O to 23 and blue from 23 to O. Following are some key findings from Pedestrian Shed Analysis, GIS Spatial Analysis and observation during the on-board survey:

- Bus stop O has one of the most prominent locations in Shah Alam's city center. The stop spans bus stops 1 to 6, which overlaps a second catchment area from bus stop 36 to the origin bus station (bus stop O). Because it was a parking lot, bus stop 1 was hard to reach. Shah Alam's origin station is the main bus hub.
- The area around bus stops 1, 2, 3, 4, 38, 39, and 40 is dominated by commercial and government offices. The same street has ten bus stops, from 11 to 15 and 30 to 34. All of these bus stops are within the next stop's catchment area, so a passenger must walk about five minutes.

- Bus stops 11, 12, 33, and 34 serve the commercial area along the street, while stops 13 and 32 are interchange stops. Bus stops 14 and 31 are near a shopping center.
- At bus stop 31, food stalls cause evening rush-hour traffic congestion. Bus stops should have a 3-meter buffer zone to avoid traffic conflicts (Salvo & Sabatini, 2005). University students use stops 15 and 30. No passengers were seen boarding the SA02 Smart Bus from phantom stop 15.
- Bus stops 10 to 12 and 33 to 35 serve residential areas, but residents cannot access them. When designing a bus stop, the catchment area radius should be based on the walking distance route, not a straight-line radius, as this reduces the neighborhood catchment area (Azmi et al., 2012)
- Bus stop 16 is strategically located because it serves low-income neighborhoods with residents who walk to amenities. In this dense, low-income community, bus stop 16 is served twice per round trip (Azmi et al., 2012).
- A highway separates bus stops 22 through 28. The origin station route of KTM Batu Tiga terminates at bus stop 22, between a condominium and an industrial area (bus stop 23). The rail station is a five-minute walk from bus stop 23, so passengers can walk. The last catchment area comprises stops 26 through 28. The 26th bus stop faces a primary school. Despite their proximity, bus stops 27 and 26 are not accessible on foot due to a major road. Bus stop 28 is located in a condo-and-business district and the SA02 serves numerous commuters daily.

The gap between bus stops ranges from 220 to 700 meters to 800 to 1,800 meters. To simulate the actual scenario, actual bus distance was used instead of displacement. 74% of the gap distance between bus stops on the SA02 route fell between 220 m and 700 m, with half of it falling within the catchment area of 400 m; this indicates that 37% of bus stops on the SA02 route are designated as being within walking distance. Eleven non-designated bus stops were surveyed during the onboard survey (Table 2). The points are known as intermediate drop-off points (IT), with the exception of IT1 and IT10, the majority of which are insignificant due to their proximity to a designated bus stop or the low number of passengers alighting from the point. IT1 is a safer bus stop for the SA02 route because it is located on a side road before exiting the main road and is closer to commercial and residential areas. In contrast, IT10 was a dangerous place for a bus to stop because it was located immediately after a traffic light, which posed a high potential for an accident. Mostly residential. Both the previous and subsequent bus stops from IT10 are appropriately labeled to serve the entire residential area. Therefore, there should be an instruction prohibiting

bus drivers from stopping at locations where it is unsafe for passengers to exit the bus, such as IT10. Thus, to encourage the use of public transport, safer and more convenient pedestrian access to interchanges and main hubs must be provided (Aziz and Mohamad, 2020).

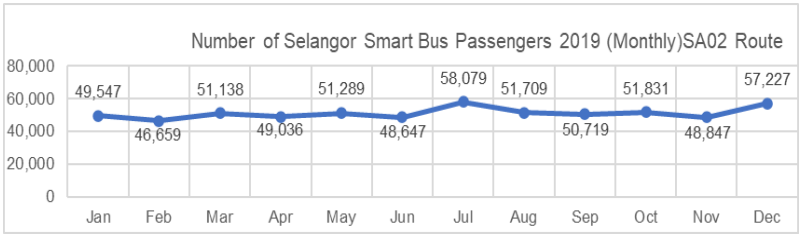


Figure 3. The number of Selangor Smart Bus SA02 Route Passengers in 2019 (Monthly)

Table 2. Gap Distance of Each Bus Stop to the Subsequent Bus Stop (Based on Distance Travelled by Bus).

Bus Stop	Gap Distance (m)	Bus Stop	Gap Distance (m)	Bus Stop	Gap Distance (m)
O to 1	650	14 to 15	400	28 to 29	1,800
1 to 2	300	15 to 16	1,000	29 to 16	900
2 to 3	400	16 to 17	220	16 to 30	1,600
3 to 4	350	17 to 18	450	30 to 31	400
4 to 5	550	18 to 19	600	31 to 32	290
5 to 6	550	19 to 20	1,200	32 to 33	550
6 to 7	650	20 to 21	650	33 to 34	350
7 to 8	800	21 to 22	1,100	34 to 35	600
8 to 9	550	22 to 23	650	35 to 36	1,700
9 to 10	1,200	23 to 24	350	36 to 37	600
10 to 11	450	24 to 25	1,000	37 to 38	300
11 to 12	350	25 to 26	1,100	38 to 39	300
12 to 13	550	26 to 27	550	39 to 40	400
13 to 14	300	27 to 28	350	40 to O	700

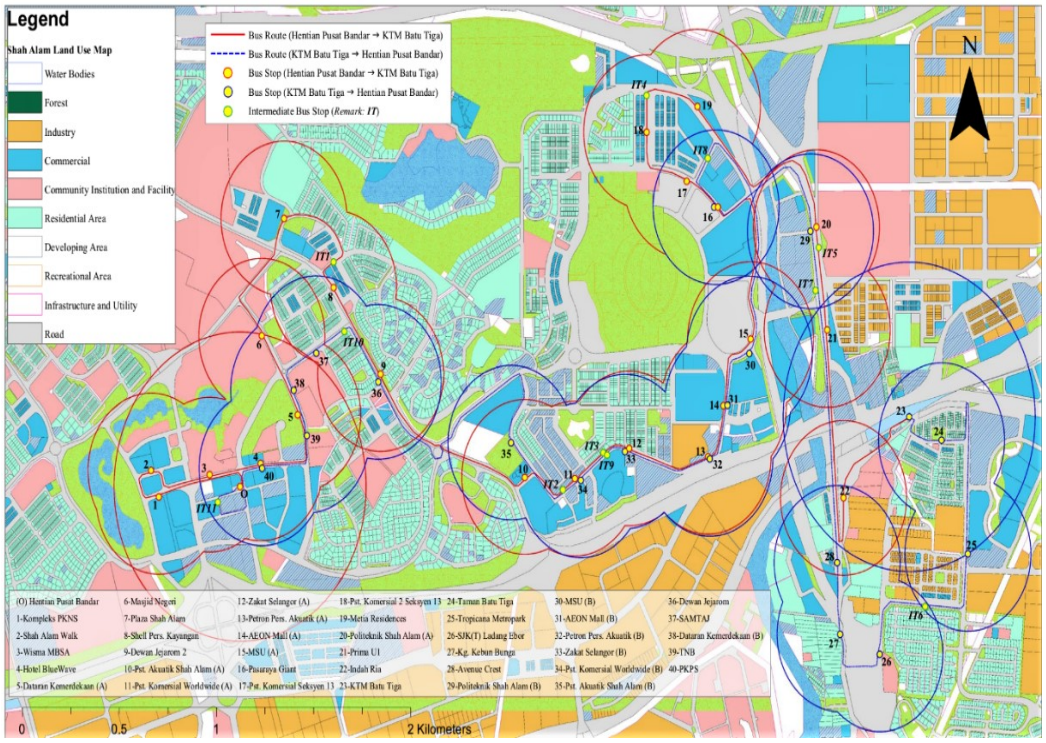


Figure 4. Catchment Area of SA02 Bus Route from Each Bus Stop

Table 3. Passengers Loading LOS Thresholds Grade for SA02 Route

Time Period	Level of Service (LOS)			
	Test 1 (Monday)	Test 2 (Friday)	Test 3 (Wednesday)	Test 4 (Saturday)
Morning Peak	D	C	E	B
Morning Off-Peak	B	C	C	A
Afternoon	B	C	B	B
Evening Peak	F	F	F	C
Evening Off-Peak	A	A	C	C

Table 4. Hour of Service LOS for SA02 Route

	Scheduled First Trip	Scheduled Last Trip	LOS
Weekdays	6.00 am	10.00 pm	B
Weekends	6.00 am	10.00 pm	B

Table 5. Duration of each Trip in SA02 Route at Different Period of Time

Time Period	Duration (minutes)				
	Weekdays				Weekend
	Test 1 Monday	Test 2 Friday	Test 3 Wednesday	*Average*	Test 4 Saturday
Morning Peak	97	79	109	*95.0*	93
Morning Off-Peak	80	73	76	*76.3*	76
Afternoon	92	75	77	*81.3*	102
Evening Peak	98	151	127	*125.3*	84
Evening Off-Peak	84	67	71	*74.0*	70

Table 6. On-Time Performance (OTP) LOS for Weekdays and Weekend for SA02 Route

Time Period	Weekdays			Weekend		
	On-Time Percentage (%)		LOS	On-Time Percentage (%)		LOS
	OTP	100 - |OTP|		OTP	100 - |OTP|	
Morning Peak	18.75	81.25	E	16.25	83.75	E
Morning Off-Peak	-4.63	95.37	B	-5.00	95.00	B
Afternoon	1.63	98.37	A	27.50	72.50	F
Evening Peak	56.63	43.37	F	5.00	95.00	B
Evening Off-Peak	-7.50	92.50	C	-12.50	87.50	D

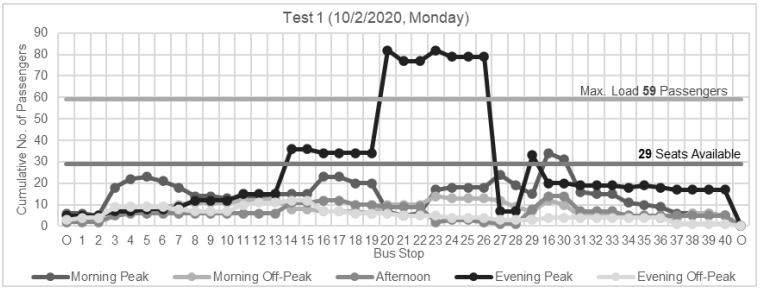


Figure 5. Cumulative Number of Passengers Loading for Test 1 (10/2/2020, Monday)

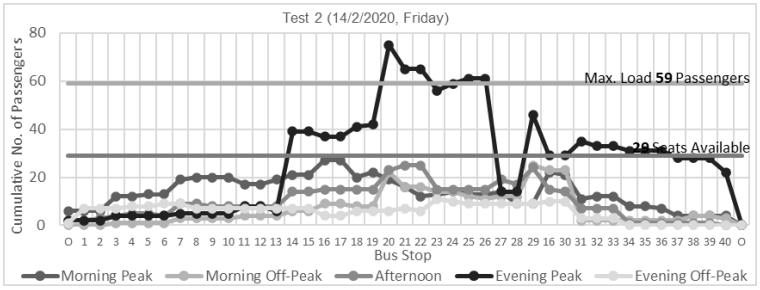


Figure 6. Cumulative Number of Passengers Loading for Test 2 (14/2/2020, Friday)

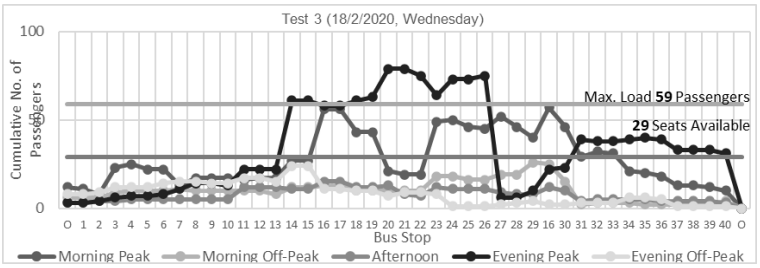


Figure 7. Cumulative Number of Passengers Loading for Test 3 (18/2/2020, Wednesday)

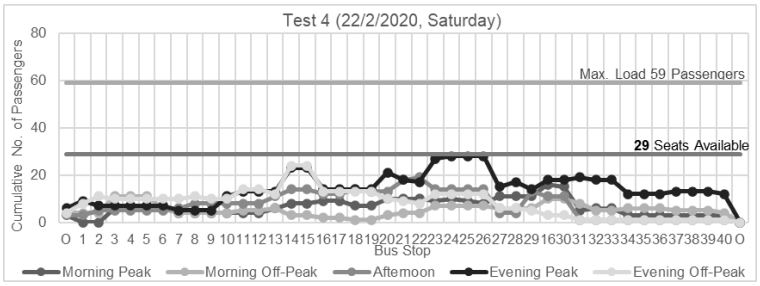


Figure 8. Cumulative Number of Passengers Loading for Test 4 (22/2/2020, Saturday).

Level of Service (LOS)

Daily, six buses travel this route. In the United Kingdom, the Alexander Dennis Enviro200 is one of five low-emission bus models (LowCVP). Each bus has 29 seats for a total of 30 passengers. The onboard survey collected information from numerous passengers at various times (Figures 5, 6, 7, and 8). The bus's 59-passenger capacity was exceeded by more than 1.5 times during evening rush hour (LOS F) (Figure 5-7 and Table 3). The maximum passenger capacity was 82. During morning rush hour, passengers boarded a fully seated bus (LOS C) or stood comfortably (LOS D and LOS E) without reaching the maximum passenger load. During the week, levels above the threshold were recorded (LOS D). Every weekend, passengers are able to find seats, so LOS is sufficient. Despite a service frequency of every 20 minutes, bus frequency varied between LOS B and LOS

C. However, in practice, passenger wait times varied between 20 and 40 minutes. During data collection, this held true both weekdays and weekends. This route has LOS B throughout the entire week because it operates more than 17 hours per day (Table 4). Table 5 displays the duration of each trip based on the dependability of the service. Comparing weekday and weekend trip durations (Table 6), weekday and weekend round-trips differed significantly, particularly during afternoon and evening peak periods. The evening rush hour (LOS F) on weekdays was the busiest, while the weekend afternoon was the busiest (LOS F). Other time periods vary slightly. Only off-peak trips were completed in 80 minutes; all others exceeded the acceptable range by between 4 and 71 minutes. Service providers and local governments should therefore increase the frequency of bus departures and arrivals in order to improve the LOS (Shukri et al., 2020).

CONCLUSION

The catchment area of the SA02 bus route was analyzed to determine the optimal GPS coordinate for each bus stop. This study used the 400-800 m catchment area as a guideline, but it is not fixed because distances vary from location to location and over time. Upon analyzing the SA02 bus route's catchment area, numerous demand-supply gaps were uncovered. Some bus stops exceeded their passenger capacity, while others were poorly integrated. The SA02 bus route's LOS is inconsistent in terms of passenger load and punctuality. Therefore, recommendations include adopting an application that provides timely and accurate information to help users plan their journey, providing a comfortable bus stop to improve user comfort and safety, and planning the location of bus stops by considering the surrounding land use are all practical actions. The findings of the study will determine the future of public transportation in this region.

ACKNOWLEDGEMENTS

This research was fully supported by the UPM Putra Grant - IPM/2018/9592500 (UPM RMC).

REFERENCES

Advani, M., & Tiwari, G. (2006). Review of capacity improvement strategies for bus transit service. *Indian Journal of Transport Management, 30*(4), 363-391.

Azmi, D. I., & analyzingKarim, H. A. (2012). A comparative study of walking behaviour to community facilities in low-cost and medium-cost housing. *Procedia-Social and Behavioral Sciences, 35*, 619-628.

Aziz, A., & Mohamad, J. (2020). Public transport planning: Local bus service integration and improvements in Penang, Malaysia. *Planning Malaysia, 18*.

Brand, J., Hoogendoorn, S., Van Oort, N., & Schalkwijk, B. (2017, June). Modelling multimodal transit networks integration of bus networks with walking and cycling. In 2017 5th *IEEE international conference on models and Technologies for Intelligent Transportation Systems* (MT-ITS) (pp. 750-755). IEEE.

Daniel, P., & Burns, L. (2018). How steep is that street?: Mapping 'real'pedestrian catchments by adding elevation to street networks. *Radical Statistics*, (121), 26-48.

Das, S., & Pandit, D. (2015). Determination of level-of-service scale values for quantitative bus transit service attributes based on user perception. *Transportmetrica A: Transport Science, 11*(1), 1-21.

El-Geneidy, A., Grimsrud, M., Wasfi, R., Tétreault, P., & Surprenant-Legault, J. (2014). New evidence on walking distances to transit stops: Identifying redundancies and gaps using variable service areas. *Transportation, 41*(1), 193–210.

Fong, S. L., Chin, D. W. Y., Abbas, R. A., Jamal, A., & Ahmed, F. Y. (2019, June). Smart city bus application with QR code: a review. In 2019 *IEEE International Conference on Automatic Control and Intelligent Systems* (I2CACIS) (pp. 34-39). IEEE.

Givoni, M., & Banister, D. (2010). The need for integration in transport policy and practice. In Integrated transport (pp. 17-28). Routledge.

Norhisham, S., Ismail, A., Sidek, L. M., Borhan, M. N., Zaini, N., & Yen, A. T. G. (2018, April). Assessing Bus Performance Rating in Kajang, Selangor. In *IOP Conference Series: Earth and Environmental Science* (Vol. 140, No. 1, p. 012076). IOP Publishing.

Roy, S., & Basu, D. (2019). Ranking Urban Catchment Areas according to Service Condition of Walk Environment. *Journal of Transportation Engineering*, Part A: Systems, 145(4), 04019005. https://doi.org/10.1061/jtepbs.0000225

Salvo, G., & Sabatini, S. (2005). A GIS approach to evaluate bus stop accessibility. In Proceedings.

Setiausaha Kerajaan Negeri Selangor. (2019). Setiausaha Kerajaan Negeri Selangor. (2019), Perkhidmatan Bas Selangor Percuma. https://www.selangor.gov.my/index.php/pages/view/1181

Shukri, N. S. M., Ponrahono, Z., Sunoto, Y. N., & Ghazali, W. N. W. W. (2020). Evaluation of Level of Service (LOS) on routes of smart bus in Kajang, Selangor. *PLANNING MALAYSIA, 18.*

Smart Selangor Delivery Unit. (2016). Smart Selangor Delivery Unit. (2016). Smart Selangor Executive.

Taplin, J. H. E., & Sun, Y. (2020). Optimising bus stop locations for walking access: Stops-first design of a feeder route to enhance a residential plan. *Environment and Planning B: Urban Analytics and City Science, 47*(7), 1237–1259.

National Research Council. (2000). Transportation Research Board., 2000 Highway Capacity Manual. Washington, DC.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 108 – 121

ISSUES AND WAY FORWARD FOR THE SMART SUSTAINABLE CITIES AND COMMUNITIES STANDARDS: THE MALAYSIAN CASE IN THE POST-COVID-19 ERA

Seng Boon Lim[1]

[1] *Programme of Urban and Regional Planning,*
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA PERAK BRANCH, MALAYSIA

Abstract

Governing a city's development with the use of standards started relatively recently, in the mid-2010s. However, the issues of such city standards in systematically governing future smart cities remains largely unknown under the digital infrastructural stress of the post-COVID-19 era. Therefore, this paper aims to examine the issues and directions in developing the Malaysian smart sustainable cities and communities standards that suit the post-COVID-19 era. This study applied the multiple case study method to compare the international literatures and the local smart city webinars. The results showed that smart city standards were welcomed by policymakers and practitioners, although issues such as learning, connectivity, and citizenship rationale need to be addressed. More focus should be put on how humans relearn and responsibly participate in the post-COVID-19 cyber-physical ecosystem in order to create a healthy and sustainable digital-based society. This paper has contributed as one of the first researches examining the role of smart city standards in Malaysia.

***Keywords**:* Malaysia; post-pandemic planning; smart cities; standardization; urban management

[1] Senior Lecturer at UiTM Perak Branch Seri Iskandar Campus, Malaysia. lim@uitm.edu.my

INTRODUCTION

Never before could one imagine that a city space full of wicked problems could be measured quantitatively and qualitatively using performance indicators and standards such as those applied earlier on the smaller spaces or scales, namely a mechanical engineering process, a factory production process, or a management flow of a working organisation. The wicked problems, such as poverty, displacement of original settlers, access to education, reduction of gender violence, virus infection, environmental degradation and climate change, caused by rapid urbanisation of human race into city spaces are arguably difficult to be solved, and they need new innovations (Goodspeed, 2015; Rittel & Webber, 1973). Furthermore, Mertens (2015) also pointed out that 'business as usual' and traditional urban solution will not effectively address those complex urban wicked problems; a mixed method methodology is needed. Under such framing, the author thinks that the idea of applying a mixture of quantitative and qualitative standards into the scale of city planning is justifiably and innovatively filling such gap, and it has emerged since the early 21st century from the initial efforts of the British Standard Institutions (BSI) and the International Organization for Standardization (ISO) (Joss et al., 2017; Kitchin et al., 2015).

The global development of city standards is still in its nascent stage (Huovila et al., 2019; Lai et al., 2020). The global trend is initiated from the sustainable city-related standards (i.e., ISO 37120 measuring the economic, social and environmental sustainability) to the smart city standards (i.e., ISO 37122 or ITU 4901 measuring the technological innovations for urban management) and to other city concept standards that are still in development. Under the current fourth industrial revolution (4IR), the innovation under the urban cyber-physical ecosystem (physical, digital and biology) is full of unknown factors and challenges (Economic Planning Unit, 2021). For example, the way to measure the healthy level of a city (physical) and citizen (biology) using the available (digital) infrastructure to help overcome the COVID-19 pandemic threat is a pressing issue. Nonetheless, it is still largely uncertain that by complying to the city standards, humans can lead a prosperous and healthy city lifestyle that also benefits the next generations.

In Malaysia, two pioneer city standards are in development: one is the smart city indicator by the Federal Department of Town and Country Planning for the Peninsula Malaysia (PLANMalaysia), and the other is the smart city ICT infrastructure by the Malaysian Communications and Multimedia Commission (MCMC). To the best knowledge of the author, there is no academic study on smart city standardization in the Malaysian context to date. Largely unknown areas require more clarifications and improvements from time to time. Thus, it is the right time to fill such research gap by examining the issues and directions in specific and critical areas. This paper aims to examine the issues faced by the city

standards development in Malaysia, and thus providing some valuable directions to create holistic city standards that suit the post-COVID-19 era.

The next section will provide an overview of city standards development, organizations involved, and examples of issues faced by city indicators. Then, the methodology section explains the multiple case study method, and the findings and discussions sections include the issues and directions of city standards. Finally, this article ends with remarks on the contribution and limitation under the section of conclusion.

LITERATURE REVIEW

Since 2014, BSI has initiated the publication of smart city standards such as the BSI-RoS:2014 The Role of Standards in Smart Cities; and BSI-PAS180, 181 and 182 on smart cities vocabulary, framework and conceptual model. To date, BSI has published nineteen smart cities and communities standards, and the BSI team has also acted as one of the initial committees in setting up the ISO city standards (BSI, 2021; Lim et al., 2021). The technical committees started their work in 2012, producing a report on the ISO/TC 268 that later was translated into the first edition of ISO 37120:2014 Sustainable Development of Communities. To effectively develop the city standards, the World Council on City Data (WCCD) was founded in Canada in 2014, thus accelerating the ISO city standard development. To date, the ISO 37120 (indicators for sustainable cities) series has been expanded to include indicators for smart cities (ISO 37122) and for resilient cities (ISO 37123). The ISO 37120 and 37122 are available online while the ISO 37123 is still in development (WCCD, 2021a). Altogether, there are estimated more than 30 available related ISO city standards and the list keeps on increasing.

It is important to highlight that the global trend currently is on smart sustainable city development. Recent literature has reported that the smart element of ICT technologies is a means for city management; and ultimately, the management is directed back towards the triple bottom sustainability direction (economic, social and environmental sustainability) propagated since the early 1990s, and is progressing through the realisation of the 17 sustainable development goals (SDGs) for humankind (Liu et al., 2021). This article has adopted the International Telecommunication Union (ITU, 2016)'s definition of a smart sustainable city as "an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects". As this definition indicates, forthcoming city developments must involve a combination of conventional urban sustainability, ICT requirements and novel participatory strategies.

Besides the aforementioned organisations of BSI and ISO, there are many other international, regional and national organisations which collaborate

to develop the smart sustainable city standards. The notable international ones include the ITU, International Electrotechnical Commission (IEC), and the United Nations' (UN) Sustainable Development Goal 11+. From a regional perspective, various principal actors are involved in the standardisation of European cities: the European Telecommunications Standards Institute (ETSI), the European Committee for Electrotechnical Standardisation (CENELEC), and the European Committee for Standardisation (CEN) (EU, n.d.). Meanwhile, the are 167 national standards bodies that are the country's members of the ISO, such as the North America's American National Standard Institute (ANSI), Standards Council of Canada (SCC) and National Institute of Standards (NIST) (Kubina et al., 2021), and Malaysia's Standards Malaysia.

As for the Asian region, WCCD has collaborated with the Dubai city, and launched the Dubai-WCCD Local Data Hub in 2019. This Dubai-WCCD Local Data Hub is a platform for cities across the Middle East, North Africa, and South Asia (MENASA) region to connect and share data-driven innovations and policies, hence getting certification for the ISO 37120 series.

There are many benefits of city standards, and these benefits are stated in the WCCD website (WCCD, 2021b). In summary, standards create a common language of worldwide data communication, facilitate inter or intra urban management, streamline activities towards realising the SDGs, and identify potential areas of city investment.

In the study by Huovila et al. (2019), a taxonomy of city standards has been formulated, especially on dividing the indicators into input, process, output, outcome, and impact indicators. The author found that this division was important and useful for further explaining the nature of the formed indicators. The description of the types of indicators is summarised in Table 1.

Table 1: Descriptions on the types of indicators

Types of Indicator	Explanation	In Other Term	Assessment Level	Example
Input	What resources are required?	Resource	Planning-Identify resources and constraints	Policies, human resources, materials, and financial resources
Process	What your project does	Activity	Implementation-Quality assessment on means of implementation	Holding of meetings, training courses, and distribution of smart meters
Output	What your project produces	Product, service	Monitoring-Short-term monitoring	How many smart meters have been issued, the total extent of the isolated roof

				area and how many electric buses are registered.
Outcome	What your project achieves	Result, intervention	Evaluation Mid-term evaluation	The target population the project aimed to reach, such as the proportion of car owners who use an app for parking.
Impact	How your project contributes to higher-level strategic goals	Benefit, Contribution	Evaluation Long-term evaluation	The effects of policies such as the energy consumption of a city. It is possible to use this measure to conduct evaluations of, for instance, how a smart solution may have a sustainability impact.

Source: Adapted from Huovila et al. (2019) and Parsons et al. (2013)

Aside from the various indicators, a study by Yigitcanlar et al. (2022) revealed that within regional or metropolitan contexts, a city's location was excluded from every global smart city indicator and standard. The measurement of this factor occurred by means of a smart city readiness for transformation indicator that was unrelated to ICT, the remoteness value. This outlines the value of accessing various services that may be found in small settlements or only in more populous areas. Another interesting finding from Vianello (2021) is that the issue of displacement of people is frequently highlighted by scholars in new or smart cities development (Moser, 2020), and is suggested to be incorporated into the city standards. This suggestion is viable through the incorporation of the Core Humanitarian Standard published by CHS Alliance (2014). While in the case of shaping smart Malaysian citizenship, Lim et al. (2021) has proposed to learn from ISO standards to bring in more responsible roles for the direct participation of citizens.

METHODOLOGY

This study applied multiple case study method. An example of application can be referred to Mora et al. (2019) in investigating four European smart cities, namely Amsterdam, Barcelona, Helsinki and Vienna. Mora et al. (2019) adopted the literal replication logic (Yin, 2018) to ensure that the selected cases are subject to the same analytical process. Similarly, this study divided the cases into international and local cases to examine the study context – the issues with city standards formation in Malaysia. The selected international cases included the standards by ISO, ITU, ETSI, and UN SDG 11+ (Table 2). These cases are important international references for city standards as studied by scholars such as Guo et al. (2018), Huovila et al. (2019), Lai et al. (2020), Santana et al. (2018)

and Zhang et al. (2021). The author decided not to include the BSI standards in this analysis since the contents were mostly covered by the ISO standards as explained by an informant from BSI during the webinar covered in this study (also refer to BSI (2021)).

Table 2: Selected Cases

Case	Detail	
International Cases	ISO	ISO 37120; ISO 37122
	ITU	ITU 4901; ITU 4902; ITU 4903
	ETSI	ETSI 103
	UN	UN SDG 11+
Local Malaysian Cases	1st Webinar discussion	On 6 Sep 2021, "The roles of standard in Malaysia smart city development: How standard can assist the development of smart cities in the road to recovery from COVID-19", a network event in the Malaysia Urban Forum, organized by Urbanice Malaysia.
	2nd Webinar discussion	On 21 Sep 2021, "The role of standards in smart city development", a sharing session in the Cities 4.0 webinar: Reimagining city transformation, organized by MiGHT.

Note: ISO 37120: 2018 – Sustainable cities and communities – Indicators of urban services and living standards (worldwide non-mandatory standard; the abbreviation used is "ISO 37120"); ISO 37122:2019 – Sustainable cities and communities – Indicators for smart cities (worldwide non-mandatory standard; the abbreviation used is "ISO 37122"); ITU-T Y.4901/L.1601 – Key performance indicators concerning how information and communication technology are used in smart sustainable cities (recommendation; the abbreviation used is "ITU 4901"); ITU-T Y.4902/L.1602 – Key performance indicators concerning how information and communication technology have sustainability impacts on smart sustainable cities (recommendation; the abbreviation used is "ITU 4902"); ITU-T Y.4903/L.1603 – Key performance indicators for smart sustainable cities; these form an assessment of the extent to which sustainable development goals have been achieved (recommendation; the abbreviation used is "ITU 4903"); ETSI TS 103 – 463 key performance indicators for sustainable digital multi-service urban areas (TS = technical specification; the abbreviation used is "ETSI 103"); monitoring framework for United Nations Sustainable Development Goal 11+ (definition by the UN Inter-Agency Expert Group; the abbreviation used is "UN SDG 11+").

As for the local case, the Malaysian city standards were still under development, and the author analysed the issues through webinar discussions by the stakeholders on the 6 and 21 Sep 2021. The informant's details are shown in Table 3. The length of the first webinar was 1 hour 29 minutes, and it could be accessed at https://www.airmeet.com/event/21fd28b0-041b-11ec-a196-873037e98dd7 while the length of the second webinar was 26 minutes, and it could be accessed at https://youtu.be/FB3zlLHRtvo. As for the analysis, the data from the webinars were transcribed and together with data from the international cases, were tabulated through thematic analysis. Its purpose was to derive the themes related to issues with city standards. This analysis process was conducted using Atlas.ti, Mendeley, and Microsoft Excel.

Table 3: Informants in the local webinar discussions

Webinar	Sector	Detail
1st Webinar	Government	G1, Head of Smart City Division, PLANMalaysia
		G2, Principal assistant director, Standards Malaysia
		G3, Head of Department Technology Development, MCMC
	Private	P1, Representative of British Standards Institution
	NGOs	N1, Representative of Malaysian Smart Cities Alliance Association (MSCA)
2nd Webinar	Government	G4, Director general of PLANMalaysia

Note: G1 represents informant number one from the government sector. For the first webinar, the presentation slides can be downloaded at https://drive.google.com/drive/folders/1ql6azVGUCJ3nCyPr7fQqvlgd_jVl30iH.

FINDINGS

THE INTERNATIONAL CASES

In general, the selected international cases had different contents of indicators (Table 4). The issues were discussed based on the main focus, and types of indicators as follows.

Table 4: Content of the international cases

Standard	Main Focus	Category	Indicator
ISO 37120:2018	For sustainable city services and quality of life	19 categories	104
ISO 37122:2019	For smart (ICT) cities	19 categories (same as above)	80
ITU 4901	For the use of ICT in SSC	6 categories: ICT, environmental sustainability, productivity, quality of life, equity and social inclusion, physical infrastructure	48
ITU 4902	For the sustainability impacts of ICT in SSC	5 categories: same as above except ICT	30
ITU 4903	For SSC to assess the achievement of SDGs	3 categories: Economy, environment, society and culture	52
ETSI 103	For sustainable digital multiservice cities	4 categories: People, planet, prosperity, governance	76
UN SDG 11+	For SDG11 "Make cities inclusive, safe, resilient and sustainable", SDG1.4 on poverty, and SDG6.3 on water and wastewater	12 targets	18

Note: ICT stands for information and communication technology, SSC stands for smart and sustainable cities, SDGs stands for sustainable development goals.

The issue of main focus: Sustainability Vs. Smartness

From the observation on the seven international cases, there were two different focuses. First, the majority of the five standards were focused on sustainability, namely the UN SDG 11+, ISO 37120, ITU 4902, ITU 4903 and ETSI. Second, two standards were focused on smartness or ICT, namely the ISO 37122 and ITU 4901.

The issue of indicator: Different quantities and types

Among the cases, one standard has exceeded 100 indicators, with the ISO 37120 having the most indicators of 104. On the other hand, two standards had 30 and less indicators, with the UN SDG 11+ having the least indicators of 18, followed by ITU 4902 with 30 indicators. Overall, there were an average of 59 indicators for each standard. The types of indicators could be divided into five types: indicators for measuring input, process, outcome, output, and impact. From the findings of Huovila et al. (2019), the most popular type of indicator was the impact indicator (32%), followed by output indicator (30%), and outcome indicator (24%). Meanwhile, the least popular type of indicators was the process indicator (6%) and the input indicator (8%).

THE MALAYSIAN CASES

The sixth of the 16 policies under the Malaysia Smart City Framework stated clearly that "Accreditation of smart city standards shall be introduced to set a standard for smart city qualification and recognition" (Ministry of Housing and Local Government, 2019, p. 35). The major issue faced by the Malaysian context was that there was no current standard to measure a city's qualification to be recognized as a smart city in the nation. The related issues of the Malaysian cases are elaborated below.

The issue of adoption

Table 5 shows the draft of the Malaysian standards, MS ISO 37122 Sustainable cities and communities – Indicators for smart cities. In general, this draft was adopted and adapted from ISO 37122. As mentioned by an informant of Standard Malaysia, G3, "We are not going to reinvent another wheel. We should jump start whatever available standards at the international level." There were 80 indicators, with the majority of indicators (55%) being totally adopted for the Malaysian context, 37.5% being modified and another small amount of 7.5% being reserved for future considerations.

Table 5: The draft of MS ISO 37122

	Theme	Indicator with Total Adoption	Indicator that Require Modification	Indicator for Future Consideration	Total
1.	Economy	-	4	-	4
2.	Education	2	1	-	3
3.	Energy	3	5	2	10
4.	Environment and climate change	-	3	-	3
5.	Finance	2	-	-	2
6.	Governance	2	2	-	4
7.	Health	1	2	-	4
8.	Housing	-	2	-	2
9.	Population and social conditions	4	-	-	4
10.	Recreation	1	-	-	1
11.	Safety	1	-	-	1
12.	Solid Waste	2	2	2	6
13.	Sport and culture	3	1	-	4
14.	Telecommunication	3	-	-	3
15.	Transportation	9	5	-	14
16.	Urban/ local agriculture and food security	3	-	-	3
17.	Urban planning	3	1	-	4
18.	Wastewater	2	1	2	5
19.	Water	3	1	-	4
	Total	44 (55%)	30 (37.5%)	6 (7.5%)	80 (100%)

Source: Author

As for the main themes' analysis, the majority (ten categories or 52.6%) required both hybrid action of total adoption and modification. Another six categories or 31.6% that adopted the entire original ISO global measurement included Finance, Population and Social Conditions, Recreation, Safety, Telecommunication, Urban or Local Agriculture, and Food Security. Meanwhile, another three categories or 15.8% needed total modifications to suit the Malaysian context, namely the Economy, Environment and Climate Change, and Housing. The above practice is considered as a type of identical adoption of ISO 37122 rather than the direct use of it. This identical adoption is also practised by many countries such as the UK, Indonesia, Philippines, and others. Meanwhile, as mentioned by the informant of PLANMalaysia, G4, only a few countries practise the direct use, namely the USA, Singapore, Japan and Germany.

The above proposal of MS ISO 37122 – smart city indicators – is being developed under the working group, WG/D/29-1, led by PLANMalaysia. The progress updates of the current status of MS ISO 37122 as shared by the informant from MCMC, G3, showed that the technical committee, TC/D/29, has submitted this proposal to the final stages of review by the NSC-D before being sent to the minister for the final approval in 2021. As for the second proposal of smart city ICT infrastructure standard (the name of the MS has not been confirmed yet), it was still under the public deliberation process prior to the submission to the NSC. The second proposal was led by MCMC under the working group, WG/D/29-2, and the contents were adapted from ITU standards. The technical committee, TC/D/29, targeted to complete this second proposal by 2022.

The issue of COVID-19 and readiness of digital infrastructure

Given the existing threat of COVID-19, Malaysia, along with the majority of countries, introduced strategies to monitor the movements of citizens (in Malaysia, this was termed the MCO). The regulation and prevention of direct human contact aimed to stop the potentially fatal disease from spreading. In terms of maintaining the means of communication in everyday life, the interaction through virtual spaces has become significantly more important than before. This online communication is central for the government, businesses and service-based industries, education for students through home-based learning, and communities and societies to constantly stay in touch with families and friends. This unprecedented high volume of online communication under the period of COVID-19 has been a stress test to the nation's digital infrastructure. For example, the informant from MCMC, G3, has pointed out four scenarios in Malaysia: a) the internet traffic has increased by 30 to 70%, b) internet speed has reduced by 30 to 40%, c) internet use has moved to residential areas by 50 to 70%, and d) complaints on internet speed, new and indoor coverage have increased from 40 to 70%.

The issue of data, connectivity, and information security

Data exchange and sharing on smart cities applications are crucial. But, what makes those local, stand-alone or proprietary smart cities applications, such as electric/water metering, lightings, home equipment, and autonomous vehicles, share the data to the level considered smart? Informant from MCMC, G3 explained that, for the "smart insertion" to happen, the local smart cities application should connect seamlessly to the communication and multimedia applications, such as remote monitoring, remote controlling, data management, smart billing and big data.

From the above explanation, the MCMC informant G3 highlighted that in the post-COVID-19 era, the focus area of standardisation would be

connectivity. In detail, connectivity should also look at the devices, with incorporation of the IoT or monitoring sensors into devices and then, through the internet such as the 5G networks in order to make them communicate with each other, and to or from the controlling system. Including the readiness of the physical interface such as Coax, RJ11/25 and Fibre, if the standardisation of ICT infrastructure connectivity is not achieved, then it will be an empty promise or wasted investment in the smart city planning. On top of connectivity on supporting the built environment of digital transformation, another important issue emerged: information security. This was highlighted by BSI informant, P1, "Often we will see how wonderful the smart is; but with being more digital, you are being more vulnerable."

DISCUSSION

From the findings, the issues varied among the international and local cases. For the seven international standards, each has their focuses; however, in general, the main focus areas are sustainability (economic, social and environmental aspects) and smart ICT infrastructure. This means that for the future direction of Malaysia city standards formation, the policymakers should put higher emphasis on the broader aspect of sustainability instead of the narrow aspects of the "smart city standards" naming. For the technical committee, TC/D/29, the priority seems to have skipped the formation of the standards for sustainable city. If the current working group, WG/D/29, only focuses on the smart city indicators (led by PLANMalaysia) and the other one on smart ICT infrastructure (led by MCMC), then the society will tend to prioritise the ICT elements than balancing the sustainability measurements.

The five types of indicators proposed by Huovila et al. (2019) are something new for the Malaysian policymakers to learn as no evidence has shown that the technical committee is adopting this aspect. The reason for this is that a clear measurement of the various forms of indicators (for instance, those signifying input, procedures, output, results, and contributions) will enable the deficiencies of many designated indicators to be identified. For example, the impact indicators are found to be the most popular, and the type of process and input indicators are frequently being ignored. The author argues that setting up more input and process indicators are as important as the impact indicators because if the resources invested and processes used are quantified clearly in the early value chain of decision making and planning, then mistakes will be minimised and investment direction will be much clearer for the city stakeholders.

Besides that, the common practice of totally adopting standards of areas such as the population and social conditions, recreation, and safety in the MS ISO 37122 from the ISO standards is to be cautioned as the global landscape has been disrupted by COVID-19. The socio-cultural background of citizens in Malaysia

is also unique such as the need to advocate for ageing communities (Elsawahli et al. 2016) and dense city planning (Lim, Malek, et al., 2021). In the author's opinion, modifying and differentiating the types of indicators are better moves to review the draft MS ISO 37122. Moreover, Indicators unrelated to ICT measure how remote the value of the city's location is, in terms of regional or metropolitan circumstances (Yigitcanlar et al., 2022), and incorporating the Core Humanitarian Standard to measure the issue of the displaced community (Vianello, 2021) are new indicators proposed for future working group in forming more inclusive Malaysian city standards in the post-COVID-19 era.

From the qualitative analysis of the local webinar cases, the author found that most of the concerns for the local players were on the ICT infrastructure, connectivity and data security. These three technicalities played important role as highlighted under the JENDELA, MyDigital blueprint, and the cyber-physical system imagined under the national 4IR policy. However, these issues should be handled in a cautious manner because all these needs high investment and potentially causes a city to bankrupt or go in debts to giant techno-companies, thus in long-term, subjugating the citizen's interest to the private profit interest (Cardullo et al., 2019; Kummitha & Crutzen, 2017). In other words, in building better connectivity and data security, the city administrators should think creatively (i.e., practical-critical-imaginative mindset as proposed by Perry-Kessaris (2020)) to encourage grassroots-invented IoTs, together with viewing 5G connection as a public utility provided freely to the public. On the social side, smart-society type of non-governmental organisations (NGOs) could be set up, such as the formation of MSCA. However, in this grassroot case, the vision of the NGO should be promoting PPPP (public private people partnership) and public values.

CONCLUSION

Issues of city standards could be solved through the consensus of all, and turned into benefits for the people. The future direction for the Malaysian city standards development, not limited to the findings of this article, should be on considering the main focuses of smart and sustainable cities; clarifying and differentiating the different types of indicators; critically modifying the international standards to uphold public values; and handling the ICT infrastructure, connectivity and data security with great grassroot innovation rather than private-driven interest. With regards to the directions in the post-COVID-19 era, the author summarizes that the future cities and standards need more responsible citizenship to achieve the greatest consensus for all, be it from the governance that allows more participatory approaches to the ground innovations with more proactive and aware citizens (Lim et al., 2021; Malek et al., 2021). This study was limited by the method of data collection in Malaysia which was webinar inputs. Future studies could drive more detailed indicators, such as understanding the total

adoption from international standards, proposing working groups on drafting the basic foundation for sustainable city indicators, detailing the existing indicators into five different types as proposed by Huovila et al. (2019), and critically adding new indicators, such as measuring the grassroot-invented IoTs that suit the local contexts.

ACKNOWLEDGEMENTS

The previous version of this article was presented at the International Conference on Integrated Urban Planning (ICIUP2021), Universiti Malaya, Malaysia, on 12 Oct 2021. This article has received no funding sources from any organisation.

REFERENCES

British Standards Institute (BSI). (2021). Smart city standards and publications. Retrieved September 18, 2021, from https://www.bsigroup.com/en-GB/smart-cities/Smart-Cities-Standards-and-Publication/

Cardullo, P., Feliciantonio, C. Di, & Kitchin, R. (Eds.). (2019). *The Right to the Smart City*. Bingley, UK: Emerald.

CHS Alliance. (2014). *Core Humanitarian Standard on Quality and Accountability*. Geneva, Switzerland.

Economic Planning Unit. (2021). *National Fourth Industrial Revolution (4IR) Policy*. Putrajaya: Economic Planning Unit, Prime Minister's Department.

Elsawahli, H., Ahmad, F., & Ali, A. S. (2016). Demographic transition and sustainable communities in Malaysia. *Planning Malaysia*, *V*(Special Issue), 39–48.

European Union (EU). (n.d.). Key players in European Standardisation. Retrieved September 19, 2021, from https://ec.europa.eu/growth/single-market/european-standards/key-players_en

Goodspeed, R. (2015). Smart cities: Moving beyond urban cybernetics to tackle wicked problems. *Cambridge Journal of Regions, Economy and Society*, *8*(1), 79–92.

Guo, H., Gao, S., Li, J., & Xue, H. (2018). A conceptual framework for smart city international standards. *Proceedings of the 18th International Conference on Electronic Business (Pp. 1-8). ICEB, Guilin, China, December 2-6.*, 1–8.

Huovila, A., Bosch, P., & Airaksinen, M. (2019). Comparative analysis of standardized indicators for Smart sustainable cities: What indicators and standards to use and when? *Cities*, *89*, 141–153. https://doi.org/10.1016/j.cities.2019.01.029

International Telecommunication Union (ITU). (2016). *Recommendation ITU-T Y.4900/L.1600: Overview of key performance indicators in smart sustainable cities*.

Joss, S., Cook, M., & Dayot, Y. (2017). Smart cities: Towards a new citizenship regime? A discourse analysis of the British Smart City Standard. *Journal of Urban Technology*, *24*(4), 29–49.

Kitchin, R., Lauriault, T. P., & McArdle, G. (2015). Knowing and governing cities through urban indicators, city benchmarking and real-time dashboards. *Regional Studies, Regional Science*, *2*(1), 6–28.

Kubina, M., Šulyová, D., & Vodák, J. (2021). Comparison of smart city standards, implementation and cluster models of cities in North America and Europe. *Sustainability*, *13*(6), 1–15.

Kummitha, R. K. R., & Crutzen, N. (2017). How do we understand smart cities? An evolutionary perspective. *Cities*, *67*, 43–52.

Lai, C. S., Jia, Y., Dong, Z., Wang, D., Tao, Y., Lai, Q. H., … Lai, L. L. (2020). A review of technical standards for smart cities. *Clean Technologies*, *2*(3), 290–310.

Lim, S. B., Jalaluddin, A. M., Mohd Yusof, H., & Zurinah, T. (2021). Malaysia Smart City

Framework: A trusted framework for shaping smart Malaysian citizenship? In J. C. Augusto (Ed.), *Handbook of Smart Cities* (pp. 515–538). Cham: Springer.

Lim, S. B., Malek, J. A., Rashid, M. F. A., & Kong, Y. C. (2021). Rethinking density in urban planning: Policy directions in the post-covid-19 era in Malaysia. *Planning Malaysia*, *19*(2), 1–13.

Liu, Z., Ye, C., Chen, R., & Zhao, S. X. (2021). Where are the frontiers of sustainability research? An overview based on Web of Science Database in 2013–2019. *Habitat International*, *116*(October), 102419.

Malek, J. A., Lim, S. B., & Yigitcanlar, T. (2021). Social inclusion indicators for building citizen-centric smart cities: A systematic literature review. *Sustainability*, *13*(1), 376.

Mertens, D. M. (2015). Mixed methods and wicked problems. *Journal of Mixed Methods Research*, *9*(1), 3–6.

Ministry of Housing and Local Government. (2019). *Malaysia Smart City Framework*. Putrajaya: Ministry of Housing and Local Government.

Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change*, *142*, 70–97.

Moser, S. (2020). New cities: Engineering social exclusions. *One Earth*, *2*(2), 125–127.

Parsons, J., Gokey, C., & Thornton, M. (2013). Indicators of Inputs, Activities, Outcomes and Impacts in Security and Justice Programming. In *Conflict, Crime, and Violence Results Initiative (CCVRI)*. London: Department for International Development, UK.

Perry-Kessaris, A. (2020). Making socio-legal research more social by design: Anglo-German roots, rewards, and risks. *German Law Journal*, *21*(7), 1427–1445.

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*, 155–169.

Santana, E. da S. de, Nunes, É. de O., & Santos, L. B. (2018). The use of ISO 37122 as standard for assessing the maturity level of a smart city. *International Journal of Advanced Engineering Research and Science*, *5*(12), 309–315.

Vianello, M. (2021). *Urbanisation, displacement and urban planning: Themes and issues for the humanitarian-development-peacebuilding nexus* (No. RTPI research paper September 2021). London, UK.

World Council on City Data (WCCD). (2021a). About ISO 37120 - Indicators for Sustainable Cities. Retrieved September 16, 2021, from https://www.dataforcities.org/iso-37120

World Council on City Data (WCCD). (2021b). The value of municipal data as generated by the WCCD and the ISO 37120 series. Retrieved September 20, 2021, from https://www.dataforcities.org/why-become-wccd-iso-37120-series-certified

Yigitcanlar, T., Degirmenci, K., Butler, L., & Desouza, K. C. (2022). What are the key factors affecting smart city transformation readiness? Evidence from Australian cities. *Cities*, *120*, 103434.

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods (Sixth Edition)*. Thousand Oaks, California: Sage.

Zhang, D., Wang, X., Rong, W., & Yang, Y. (2021). China's practice of smart city standardisation and assessment. *IET Smart Cities*, (November 2020), 1–8.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 122 – 137

A FRAMEWORK FOR THE ANALYSIS OF URBAN INNOVATION IN SMART CITIES: LITERATURE REVIEW FINDINGS

Jun Lyu[1], Hasniyati Hamzah[2], Peter Aning Tedong[3]

[1,2,3]*Faculty of Built Environment*
UNIVERSITI MALAYA
[1]*School of Management Science*
GUIZHOU UNIVERSITY OF FINANCE AND ECONOMICS

Abstract

The development of a smart city (SC) has always been accompanied by urban innovation (UI). UI mainly refers to the use of smart technology to promote urban development and also as a product of SC development. Smart technology can be used and developed by SC citizens. However, some research on UI in SC is conducted mainly from top-down technocratic perspectives or citizen participation. Therefore, this study proposes that the level of citizen-centric UI can be measured by using the Unified Smart City Model (USCM). With the use of the systematic literature review method, a search was conducted using keywords on three literature databases. Fifty-six indicators of UI were compiled as preliminary findings, with eight of them categorised as USCM indicators—smart architecture, smart governance, smart planning and management, smart data and knowledge, smart facilities, smart services, smart people and smart environment—to develop a citizen-centric framework. This framework will facilitate the analysis of the UI level of SC to enable city comparison and identify areas of weakness to assist in city managers' decision-making.

***Keywords**:* Smart City, urban innovation, citizen-centric, assessment framework, USCM

[1] Ph.D. candidate at University of Malaya, Lecturer at GuiZhou University of Finance and Economics.
Email: 17220987@siswa.um.edu.my

INTRODUCTION

According to the 2018 Revision of World Urbanization Prospects, the world's urbanisation level can reach 68.4%, and the world's urban areas will have a population of 6.68 billion in 2050 (UN, 2018). The rapid development of urbanisation has brought urban diseases which may affect city sustainability. Scholars have documented that cities need efficient and advanced smart technology to facilitate the development of urban innovation (UI) (Anthopoulos et al., 2016; Giffinger et al., 2007). With the rise of new technologies such as big data and artificial intelligence, the direction of UI in smart cities (SCs) is increasingly deviating from citizen-centric development.

Humanistic urban researchers have called for attention to the importance of citizen participation in the innovative development of SC (Finger & Portmann, 2016; UNCTAD, 2021). However, the existing UI capacity analysis framework for SC that normally accompanies technology-oriented cognition is not sufficient to analyse the UI capabilities of citizen-centric SC. Previous literature showed the following characteristics: Firstly, scholars generally focus on building a framework from the perspective of technology innovation with the enterprise and on regional innovation (Meijer & Thaens, 2018; Sfez et al., 2017). Secondly, citizens' participation in SC normally focuses on the framework of participation, ignoring that citizens can be included in UI as a large-scale innovation force (Lim et al., 2019; Seng Boon et al., 2020). Thirdly, Nilssen (2019) thought that UI referred to technological, organisational, collaborative and experimental innovation in SC.Putra and van der Knaap (2018) revealed a UI model of mutual innovation between SC participants and organizers. In terms of UI, the synthesis of articles on the development of UI in SC highlights relevant indicators to measure their development direction. However, these indicators are mainly from the macro or technical level and hardly reflect the indicators of citizens as users that prompt UI.

Therefore, the study introduce the Unified Smart City Model (USCM) model[1] to facilitate analysis and understand citizen-centric UI with a more comprehensive perspective. Thus, the guiding research question is, *How do we develop an analytical framework for citizen-centric UI in SC so that the levels of UI may be determined and used for city development strategies?* The research aim is to develop a framework for analysing the citizen-centric UI level in SC. This paper will contribute to our understanding of the areas that have been not well documented in literature, especially in mid-size cities, of UI in SC that have been built for more than 10 years into the maturity phase. The article is structured in two parts. Firstly, the definition of UI in SC and the applicability of the USCM model will be discussed. Secondly, results from a systematic literature review

[1] USCM model is a benchmark SC model that synthetically summarises smart concept models, including SCs' innovation elements.

conducted to outline UI development and the indicators for measuring UI development will be presented according to USCM to construct the framework.

DEFINITION AND ANALYSIS MODEL OF URBAN INNOVATION

Definition of urban innovation

To eliminate the barriers to citizens' participation in UI, citizens are established as the driving force to promote UI (Eskelinen et al., 2015; Wolff et al., 2018). Based on the literature review, a conceptual framework that shows citizen-centric UI in SC was constructed (Figure 1). Figure 1 shows the interactions that exist within the elements of SC, UI and citizens as a two-way relationship between each element. The authors define UI as citizen-centric UI, which is an approach that can facilitate large-scale promotion of citizens' multi-role and multi-dimensional participation, understanding and feedback to the decision-making layer using the SC technology layer. On the basis of iCity (2016), the citizens' willingness to engage in the innovative development of SC is explained by the theory of three-dimensional space coordination in SC, i.e. physical, social and digital space. Citizens' participation may be represented at the personal layer, digital intermediary layer and decision-making layer.

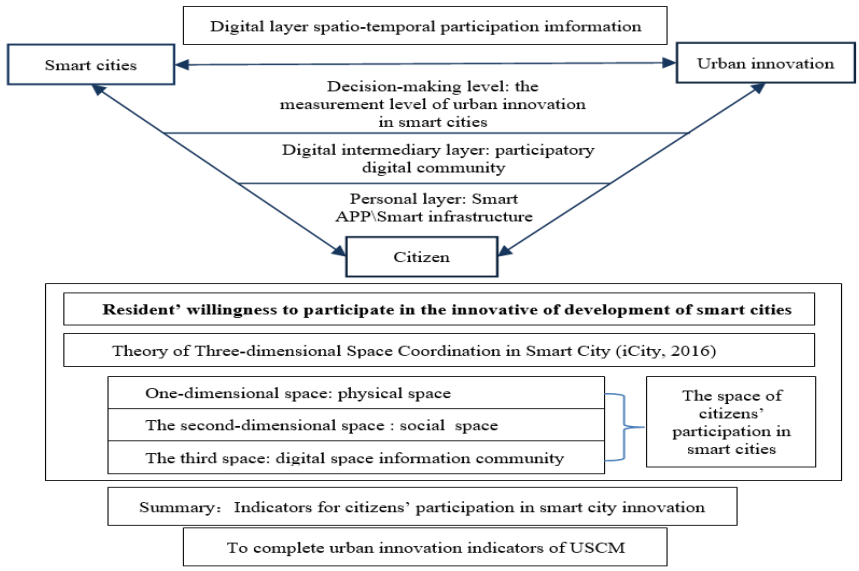


Figure 1: Conceptual framework for citizen-centric UI in the context of SCs
Source: This study

Description of USCM

UI is also the product of smart urban development (Sierpinski & Staniek, 2018). Therefore, this study borrows from the SC analysis framework to help conduct

an analysis of UI in SC (Table 1).

Table 1: **Description of USCM**

Description of USCM	
What is USCM?	USCM is a benchmarking model used to analyse smart cities. It involves smart city architecture, governance, planning and management, data and knowledge, facilities, services, people and environment of SC (Anthopoulos et al., 2016).
Who developed it?	USCM was developed by Anthopoulos et al. (2016) by reviewing many theoretical overviews of various conceptualisations and evaluations of SC from 2009 to 2015.
Who has used it and how has it been used?	USCM has been adopted by many scholars and applied to sustainable urban innovation analysis of smart cities, such as sustainable development capabilities, sustainable development of society, smart governance, urban space innovation, understanding of smart cities and urban innovation (Dalton et al., 2020; Simonofski et al., 2019).

Source: USCM's literature and the use of his literature

For the interpretation of the USCM, smart architecture believes that SC are built with all parts of SC likes an umbrella shape. Smart governance is considered a governance capability that combines urban historical context, resource characteristics, facility layout, city sustainability and service innovation (Baron, 2012). Smart planning and management primarily refer to the published technology roadmap for smart urban development, focusing on SC technology evolution, and models the interconnectedness of services and equipment and technology (Lee et al., 2013). Smart data and knowledge mean that the analysis of new knowledge can be derived from the quantity in SC, such as the access to data sources and the point of interest collection. Smart facilities refer to the use of smart technology to transform into an energy system infrastructure. Smart services requires a vibrant business environment, a stable social environment, urban facilities that bond talent, job growth, a well-educated workforce and a flexible system. Smart people mainly refer to the attractiveness of talents from the city. Smart environment is more specifically the new model of eco-city life and the corresponding sociopolitical relationship.

SYSTEMATIC LITERATURE REVIEW METHODOLOGY

According to Page et al. (2021), a systematic literature review may guide the diagnosis of an accurate systematic review, scope reviews, limitations, context and quality of current research; and search for systematic integration of results (Harari et al., 2020; Siddaway et al., 2019). Some research on SC and UI has adopted the systematic review method, such as social inclusion indicators for building a citizen-centric SC (Malek et al., 2021), sustainability-oriented

innovation in SC (Tura & Ojanen, 2022). Therefore, the review needs to synthesise the existing literature with the conceptual framework (Figure 1). Three steps of the review are as follows:

Firstly, literature collection is limited to three databases, namely, Web of Science, Scopus and Google Scholar, which are the most authoritative, popular and comprehensive databases. The search was mainly restricted to the selected keywords 'smart cities', 'urban innovation' and 'citizen-centric', and alternative keywords. Secondly, a search of the Web of Science database obtained only 1 article by entering the search formula ALL= ('urban innovat*' and 'citizen-centric*'), and 62 articles were obtained by entering the search formula ALL= ('smart cit*' and 'citizen-centric*'). The search formula ALL= ('smart citi*' or 'urban innovat*' and 'citizen-centric*') was used to obtain 680 articles in the Scopus database. A total of 3,250 articles were obtained by entering the search formula smart cit* or urban innovat* and citizen-centric* into the Google Scholar database. In essence, the search formula smart cit* or urban innovat* and citizen-centric* can help obtain more relevant articles. The search period was from 2013 to 2021, and the collection time was in June 2021. This research uses the literature screening flowchart shown in Figure 2.

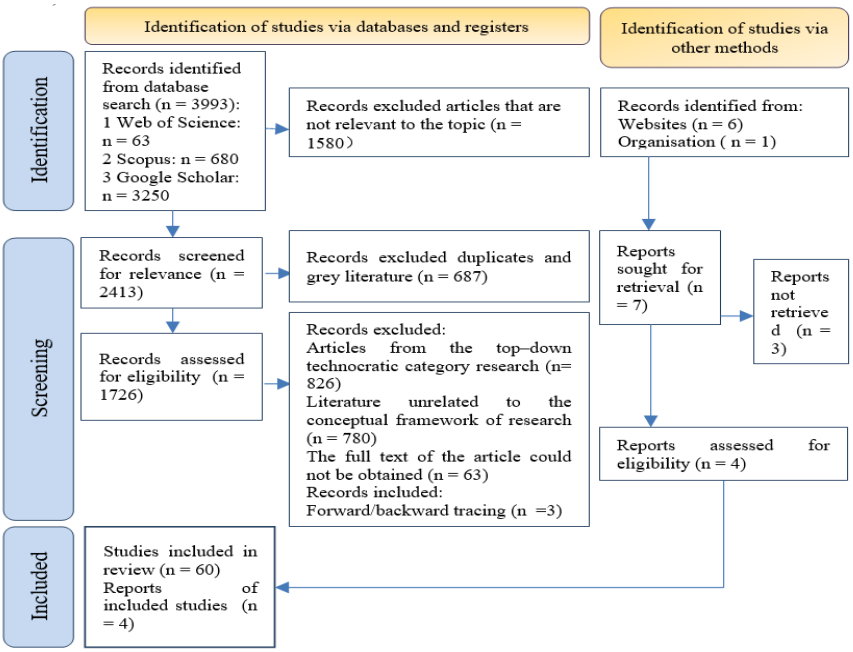


Figure 2. Document screening flowcharts
Source: The author draws according to the requirements of literature screening

Thirdly, the articles were screened to exclude duplicates, grey literature and literature that did not fit the conceptual framework. The review removed topics that are not closely related to the definition of UI, such as SC community governance and SC national mentality. The literature review mainly extracted the quantitative indicators from the selected literature. The other literature without quantitative indicators is summarised to have the same meaning basis of the conceptual framework. The review adds potential indicators' considering from the innovation organisation such as European Commission and Cornell University. A total of 64 data sources of information related to the study were derived.

RESULTS AND FINDINGS

Existing indicators of urban innovation

This research is based on the conceptual framework model constructed in this study, which is divided into the three-dimensional space environment of citizens' participation in SC, citizens' willingness to participate in SC, the participation digital layer and the communication decision layer. The three-dimensional space environment layer of citizens' participation in SC refers to the spatial and temporal and digital environment of citizens' participation in SC. Citizens' willingness to participate in SC mainly refers to their understanding of and role in the innovation of SC. The digital layer indicators have the characteristics with receiving and processing of information using IoT, such as apps, webpage and smart virtual community. The decision layer includes the level of government and macro-level measurement of SC innovation. Table 2 is a collection of 56 indicators and bibliography from the 64 collected studies.

Table 2: Fifty-six urban innovation indicators

Author	Indicator	Number
2.1 Three-dimensional space (physical, social, digital)		1
(Kim et al., 2021; Przeybilovicz et al., 2020)	Role and identity of residents participating in a smart city	
2.2 Citizens' willingness to participate layer		1
(Peng et al., 2017; Vakali et al., 2013)	Awareness	
2.3 Digital layer		7
(Reddick et al., 2020)	Virtual community platform	
(Grigg, 2020; Reddick et al., 2020)	Affordability	
(Khan et al., 2017; White et al., 2021)	Virtual feedback platform	
(Lee et al., 2013; Lytras & Visvizi, 2018; Yu et al., 2019)	Ability to use effectively	

(de Oliveira Neto & Kofuji, 2016; Panta et al., 2019; Prandi et al., 2017)	Accessibility	
(Parusheva & Hadzhikolev, 2020; Van Audenhove et al., 2007)	Electronic participation	
(Lee et al., 2013; Lytras & Visvizi, 2018; Simonofski et al., 2019; Yu et al., 2019)	Availability of basic and standard skills	
2.4 Decision-making level (Urban innovation indicators available at the government level)		4 7
(Commission, 2019)	Average carbon oxide (CO_2) emissions per km by new passenger cars in a given year	
(Cornell University, 2019)	Policymakers actively pay attention to the use of local wealth, crafts and skills to promote local, frugal and inclusive innovation	
(Liu, 2015)	Urban innovation activities and measures in smart cities	
(Karvonen et al., 2018)	Innovative talents (innovators) and the proportion of innovative talents in the population	
(Commission, 2019)	Corporate R&D intensity as a percentage of GDP	
(Achmad et al., 2018; Dewalska–Opitek, 2014)	Cultural base, earthly facilities for integrating talents and promoting employment growth and quality of life	
(Commission, 2019; Kwon et al., 2012)	Local financial investment in science and technology and the proportion of GDP	
(Cornell University, 2019)	Promote the shift of science and R&D expenditure to efforts to create and maintain a sound and dynamic innovation ecosystem	
(Khan et al., 2017; Sierpinski & Staniek, 2018)	Efficient for collecting community information	
(Nam & Pardo, 2011)	Convenience of ICT E-government affairs and residents' cognition	
(Commission, 2019)	Proportion of population aged 25–34 who have completed higher education	
(Commission, 2019)	Emission intensity of particular matter (PM2.5) from the manufacturing sector	
(Caragliu & Del Bo, 2019; Commission, 2019)	At the national level, employment in technologically advanced and knowledge-intensive sectors	
(Commission, 2019)	Total domestic R&D expenditure as a percentage of GDP	
(Sinaeepourfard et al., 2020)	Information and communications technology	
(Lu et al., 2015)	Local education investment and GDP proportion	
(Ricciardi & Za, 2015)	Published volume of papers	
(Yu et al., 2019)	Virtual network platform	
(Commission, 2019)	Number of Internet users per 10,000 people	

(Park et al., 2020; Yu et al., 2019)	Accessibility and convenience of information education
(Kwon et al., 2012)	A well-educated workforce and flexible system
(Commission, 2019)	Broadband Internet users per 100 inhabitants
(Mboup, 2017)	Prosperity of the urban business environment
(Ingrams, 2019)	Use of public data by residents
(Lombardi et al., 2012)	University rankings
(iCity, 2016)	Support the experience of citizens' space
(Grupp & Schubert, 2010); Li et al. (2015)	Annual number of patents granted per million residents
(Heitlinger et al., 2019)	Smart property rights
(Li et al., 2015)	Science and technology progress award at or above the provincial level
(Rodríguez-Pose et al., 2014)	R&D investment
(Anttiroiko, 2015; Komninos, 2009)	Internationalisation of inventions
(Wesseling et al., 2019)	Smart data and implementation of the platform
(Commission, 2019)	Number of elite science and technology human resources
(Lee et al., 2013)	Citizen -centric elements of the data roadmap
(Nugent & Suhail, 2021)	Stability of the urban social environment
(Gössling & Rutten, 2007; Matuzeviciute et al., 2017)	Researchers per million inhabitants
(Clohessy et al., 2014)	Online services
(Farmanbar & Rong, 2020)	Interactive use of smart cities
(Liu, 2015)	Indicator mobile app creation
(Caragliu & Del Bo, 2019)	Published volume of patent
(Cornell University, 2019)	Research input
(Picatoste et al., 2018)	Employment growth
(Commission, 2019)	Elite number
(Commission, 2019)	Global R&D company
(Karima & Peter, 2012)	Knowledge-intensive employment
(Caragliu & Del Bo, 2019; Richter et al., 2015)	Availability
(Caragliu & Del Bo, 2019)	High-tech situation
Total	5 6

Source: various sources

Table 2 shows that the indicators that measure the innovation capacity of cities from the macro or government level are relatively mature. The literature also shows that the indicators in terms of patents and technologies may be quantified according to the inhabitants as unit subjects. However, these indicators are relatively single, scattered and fragmented. Citizens' participation in the environment, citizens' understanding of SCs and citizens' awareness of the digital dimension are currently mainly qualitative indicators and underdeveloped. This study explains and illustrates the eight categories of the USCM model,

which can help the compilation of citizen-centric UI indicators and their integration with existing indicators.

Urban innovation indicators under the 8 USCM indicators

The above indicators are not listed in particular order (Table 2). Therefore, this study uses the eight categories of the USCM to sort the citizen-centric UI indicators. The resultant 56 UI indicators under the 8 USCM indicators are shown in Table 3.

Table 3: UI indicators under the 8 USCM indicators

Dimension	Category	Urban innovation indicator (56)
Smart architecture	Citizens' understanding of smart architecture	
sa2	Citizens' participation in smart cities	Are you involved in the architecture of smart cities? (role or identity)
		Is there a suitable virtual platform to provide the government with feedback on opinions on smart city architecture?
		Interactive use of smart cities
		Support the experience of citizens' space
sa3	Citizens' acquisition of technological innovation	Availability
		Accessibility
		Affordability
		Awareness
		Ability to use effectively
sa4	Citizens' acquisition of open innovation in cities	Start data and implementation of the platform
		Use of public data by residents
sa5	Citizens' acquisition of urban sustainable innovation	Is there a better and more efficient platform for collecting feedback from the residential community?
		At the national level, employment in technologically advanced and knowledge-intensive sectors
		Promote the shift of science and R&D expenditure to efforts to create and maintain a sound and dynamic innovation ecosystem
		High-tech situation
Smart governance	Citizens' understanding of smart governance	
sg1	Efficiency of public policy governance	Convenience of ICT E-government affairs and citizens' cognition
		Government online services
		Electronic participation
sg2	Local investment in education and technology	Local education investment and GDP proportion
		Local financial investment in science and technology and the proportion of GDP

Smart planning and management	Citizen-centric technology roadmap	
spm1	Technology roadmap for smart city development	Citizen-centric elements of the data roadmap
Smart data and knowledge	Citizens' understanding of smart data and knowledge	
sdk1	Data and knowledge innovation	Published volume of papers
		Researchers per million inhabitants
		Elite number
		Total domestic R&D expenditure as a percentage of GDP
		Research and Development (R&D) investment
		Annual number of patents granted per million residents
		Internationalisation of inventions
		Science and technology progress award at or above the provincial level
		Information and communications technology
		Corporate R&D intensity as a percentage of GDP
		Global R&D company
sdk2	Knowledge innovation	Smart property rights
		University rankings
		Published volume of papers
		Number of elite science and technology human resources
		Research input
		Proportion of the population aged 25–34 who have completed higher education
		Availability of basic and standard skills
Smart facilities	Citizens' understanding of smart facilities	
sf1	Smart facilities	Number of Internet users per 10,000 people
		Broadband Internet users per 100 inhabitants
		Virtual community platform
		Virtual network platform
		Indicator mobile app creation
Smart services		
ss1	Smart services	Prosperity of the urban business environment
		Stability of urban social environment
		Cultural base, earthly facilities for integrating talents and promoting employment growth, quality of life
		A well-educated workforce and flexible system
Smart people	Citizens' understanding of smart people	
sp1	Human capital	Employment growth
		Innovative talents (innovators) and the proportion of innovative talents in the population
sp2	Employment environment	Knowledge-intensive employment

Smart environment	Citizens' understanding of smart environment	
se1 Inclusiveness of urban innovation environment	Social inclusion	Policymakers actively pay attention to the use of local wealth, crafts and skills to promote local, frugal and inclusive innovation
	Information education	Accessibility and convenience of information education
	Innovation ability	Urban innovation activities and measures in smart cities
se2 The dynamic model of the eco-city system		Average carbon oxide (CO_2) emissions per km by new passenger cars in a given year
		Emission intensity of particular matter (PM2.5) from the manufacturing sector

Source: various sources indicators list based on USCM

DISCUSSION

This review focuses on the extraction of citizen-centric indicators involved at the level of the four segments of UI. Only a few articles focus on citizen-centric UI in SC, such as ones on removing barriers to innovation (Wolff et al., 2018). Limited articles are available on citizen-centric UI in terms of willingness, engagement, feedback and the multiple elements that influence SC as a whole to assess the elements. More articles delve into the independent component (Kim et al., 2021; Przeybilovicz et al., 2020; Simonofski et al., 2017). One possible explanation is that the evaluation of these combined dimensions makes the study complex and neglects integration in the analysis of citizen-centric UI in SC.

According to the review results, these diverse indicators can be comprehensively evaluated in urban areas by using representative indicators of many SCs in eight dimensions of the USCM model. Future studies can conduct empirical research by using the framework, which can help better identify the innovation capabilities of SC integrated with citizens or the macro achievements and the differences between citizens and SC innovation. The framework can also be used to help identify the innovation ability in various dimensions of SC, such as smart environment and smart people. The dimensions or single indicators in the framework can be used to assess the potential of the development of SC, and for single comparison of dimensions and indicators of different SC, such as those that aim to understand citizens' interaction link to SC through technological innovation at the citizen participation level, digital level and decision-making level.

CONCLUSION

With the recent surge in research on citizen-centric SC, the authors acknowledge the limitations of this literature review. The three selected databases may not be comprehensive, especially because of the possible interdisciplinarity involving

management and economics, among other issues. The method of searching the literature may have resulted in missing literature.. However, the preliminary results of a citizen-centric framework for assessing UI in SC are complete. It facilitate to cogitate UI development driection in smart cities and identify the factors that are conducive to effective communication of innovative ideas.

ACKNOWLEDGMENTS

Thanks to my PhD supervisors for guiding my academic research and the conference organisation for providing this opportunity for academic communication.

REFERENCES

Achmad, K. A., Nugroho, L. E., Djunaedi, A., & Widyawan. (2018). *Smart City for Development: Towards a Conceptual Framework* 2018 4th International Conference on Science and Technology (ICST), Yogyakarta, Indonesia.

Anthopoulos, L., Janssen, M., & Weerakkody, V. (2016). A Unified Smart City Model (USCM) for Smart City Conceptualization and Benchmarking. *International Journal of Electronic Government Research*, *12*(2), 77-93.

Anttiroiko, A.-V. (2015). Smart cities: Building platforms for innovative local economic restructuring. In *Transforming city governments for successful smart cities* (pp. 23-41). Springer. https://doi.org/10.1007/978-3-319-03167-5_3

Baron, M. (2012). Do we need smart cities for resilience. *Journal of Economics & Management*, *10*, 32-46.

Caragliu, A., & Del Bo, C. F. (2019). Smart innovative cities: The impact of Smart City policies on urban innovation. *Technological Forecasting & Social Change*, *142*, 373-383.

Clohessy, T., Acton, T., & Morgan, L. (2014). Smart city as a service (SCaaS): A future roadmap for e-government smart city cloud computing initiatives. 2014 IEEE/ACM 7th International Conference on Utility and Cloud Computing, London, UK.

Commission, E. (2019). *sustainable development indicators*. E. Commission. https://ec.europa.eu/eurostat/web/sdi/industry-innovation-and-infrastructure

Cornell University, I., WIPO. (2019). *Global Innovation Index 2019 Creating Healthy Lives — The Future of Medical Innovation*.

Dalton, C., Wilmott, C., Fraser, E., & Thatcher, J. (2020). "Smart" Discourses, the Limits of Representation, and New Regimes of Spatial Data. *Annals of the American Association of Geographers*, *110*(2), 485-496.

de Oliveira Neto, J. S., & Kofuji, S. T. (2016). *Inclusive smart city: an exploratory study* International Conference on Universal Access in Human-Computer Interaction, Toronto, Canada.

Dewalska–Opitek, A. (2014). Smart city concept–the citizens' perspective. International Conference on Transport Systems Telematics, Berlin, Heidelberg.

Eskelinen, J., Robles, A. G., Lindy, I., Marsh, J., & Muente-Kunigami, A. (2015). *Citizen-driven innovation*. World Bank Publications.

Farmanbar, M., & Rong, C. (2020). Triangulum city dashboard: an interactive data analytic platform for visualizing smart city performance. *Processes*, *8*(2), 250.

Finger, M., & Portmann, E. (2016). What Are Cognitive Cities? In E. Portmann & M. Finger (Eds.), *Towards Cognitive Cities: Advances in Cognitive Computing and Its Application To the Governance of Large Urban Systems* (pp. 1-11). Springer International Publishing Ag.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). *Smart cities Ranking of European medium-sized cities*. V. U. o. Technology, U. o. Ljubljana, & D. U. o. Technology.

Gössling, T., & Rutten, R. (2007). Innovation in regions. *European Planning Studies*, *15*(2), 253-270. https://doi.org/10.1080/09654310601078788

Grigg, N. (2020). Smart water management: can it improve accessibility and affordability of water for everyone? *Water International*, *45*(6), 608-620.

Grupp, H., & Schubert, T. (2010). Review and new evidence on composite innovation indicators for evaluating national performance. *Research Policy*, *39*(1), 67-78.

Harari, M. B., Parola, H. R., Hartwell, C. J., & Riegelman, A. (2020). Literature searches in systematic reviews and meta-analyses: A review, evaluation, and recommendations. *Journal of Vocational Behavior*, *118*.

Heitlinger, S., Bryan-Kinns, N., & Comber, R. (2019). The right to the sustainable smart city. Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, Glasgow, Scotland UK.

iCity. (2016). *Research on Evaluation Indicators System of Smart City*. Zhejiang University Press.

Ingrams, A. (2019). Public values in the age of big data: A public information perspective. *Policy & Internet*, *11*(2), 128-148.

Karima, K., & Peter, N. (2012). Smart cities in the innovation age. *Innovation: The European Journal of Social Science Research*, *25*(2), 93-95.

Karvonen, A., Cugurullo, F., & Caprotti, F. (2018). *Inside smart cities: Place, politics and urban innovation*. Routledge. https://doi.org/10.4324/9781351166201

Khan, Z., Dambruch, J., Peters-Anders, J., Sackl, A., Strasser, A., Fröhlich, P., . . . Soomro, K. (2017). Developing knowledge-based citizen participation platform to support Smart City decision making: The Smarticipate case study. *Information & Management*, *8*(2), 47. https://doi.org/10.3390/info8020047

Kim, B., Yoo, M., Park, K. C., Lee, K. R., & Kim, J. H. (2021). A value of civic voices for smart city: A big data analysis of civic queries posed by Seoul citizens. *Cities*, *108*, 102941. https://doi.org/https://doi.org/10.1016/j.cities.2020.102941

Komninos, N. (2009). Intelligent cities: towards interactive and global innovation environments. *International Journal of Innovation regional development*, *1*(4), 337-355. https://doi.org/10.1504/IJIRD.2009.022726

Kwon, S., Kim, J., & Oh, D.-S. (2012). Measurement of Urban Competitiveness Based on Innovation Indicators in Six Metropolitan Cities in Korea. *World Technopolis Review*, *1*(3), 177-185. https://doi.org/10.7165/WTR2012.1.3.177

Lee, J. H., Phaal, R., & Lee, S.-H. (2013). An integrated service-device-technology roadmap for smart city development. *Technological Forecasting and Social Change*, *80*(2), 286-306. https://doi.org/10.1016/J.TECHFORE.2012.09.020

Li, D. D., Wei, Y. D., & Wang, T. (2015). Spatial and temporal evolution of urban innovation network in China. *Habitat International*, *49*, 484-496.

Lim, S., Abdul Malek, J., Hussain, M. Y., & Tahir, Z. (2019). The behaviours and job positions of citizen in smart cities' development. *PLANNING MALAYSIA*, *17*(2), 133-145. https://doi.org/10.21837/pm.v17i10.635

Liu, L. j. (2015). *Innovative city and smart life*. Shanghai People's Press.

Lombardi, P., Giordano, S., Farouh, H., & Yousef, W. (2012). Modelling the smart city performance. *Innovation: The European Journal of Social Science Research*, *25*(2), 137-149.

Lu, D., Tian, Y., Liu, V. Y., & Zhang, Y. (2015). The performance of the smart cities in China—A comparative study by means of self-organizing maps and social networks analysis. *Sustainability*, *7*(6), 7604-7621.

Lytras, M. D., & Visvizi, A. (2018). Who uses smart city services and what to make of it: Toward interdisciplinary smart cities research. *Sustainability*, *10*(6), 1998.

Malek, J. A., Lim, S. B., & Yigitcanlar, T. (2021). Social inclusion indicators for building citizen-centric smart cities: a systematic literature review. *Sustainability*, *13*(1), 376. https://doi.org/10.3390/su13010376

Matuzeviciute, K., Butkus, M., & Karaliute, A. (2017). Do technological innovations affect unemployment? Some empirical evidence from European countries. *Economies*, *5*(4), 48. https://doi.org/10.3390/economies5040048

Mboup, G. (2017). Smart infrastructure development makes smart cities—Promoting smart transport and ICT in dakar. In *Smart Economy in Smart Cities* (pp. 871-904). Springer.

Meijer, A., & Thaens, M. (2018). Urban Technological Innovation: Developing and Testing a Sociotechnical Framework for Studying Smart City Projects. *Urban Affairs Review*, *54*(2), 363-387. https://doi.org/10.1177/1078087416670274

Nam, T., & Pardo, T. A. (2011). *Smart city as urban innovation: Focusing on management, policy, and context* the 5th International Conference on Theory and Practice of Electronic Governance, https://doi.org/10.1145/2072069.2072100

Nilssen, M. (2019). To the smart city and beyond? Developing a typology of smart urban innovation. *Technological Forecasting and Social Change*, *142*, 98-104.

Nugent, D., & Suhail, A. (2021). Crisis, Disorder and Management: Smart Cities and Contemporary Urban Inequality. In *Urban Inequalities* (pp. 145-169). Springer.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews*, *10*(1). https://doi.org/10.1186/s13643-021-01626-4

Park, G.-w., Park, H.-J., Bae, S.-H., Kim, M.-K., & Hwang, S.-J. (2020). A Study on the Smart City Core Value and Indicator Design. *Journal of the Society of Korea Industrial Systems Engineering*, *43*(4), 198-207.

Parusheva, S., & Hadzhikolev, A. (2020). Social Media as a People Sensing for the City Government in Smart Cities Context. *Tem Journal-Technology Education Management Informatics*, *9*(1), 55-66. https://doi.org/10.18421/tem91-09

Peng, G. C. A., Nunes, M. B., & Zheng, L. (2017). Impacts of low citizen awareness and usage in smart city services: the case of London's smart parking system. *Information Systems and e-Business Management*, *15*(4), 845-876.

Picatoste, J., Pérez-Ortiz, L., Ruesga-Benito, S. M., & Novo-Corti, I. (2018). Smart cities for wellbeing: youth employment and their skills on computers. *Journal of Science and Technology Policy Management*, *9*(2), 227-241.

Prandi, C., Mirri, S., Ferretti, S., & Salomoni, P. (2017). On the need of trustworthy sensing and crowdsourcing for urban accessibility in smart city. *ACM Transactions on Internet Technology*, *18*(1), 1-21.

Przeybilovicz, E., Cunha, M. A., Geertman, S., Leleux, C., Michels, A., Tomor, Z., . . . Meijer, A. (2020). Citizen participation in the smart city: findings from an international comparative study. *Local Government Studies*, 1-25.

Putra, Z. D. W., & van der Knaap, W. G. M. (2018). Urban Innovation System and the Role of an Open Web-based Platform: The Case of Amsterdam Smart City. *Journal of Regional and City Planning*, *29*(3), 234-249.

Reddick, C. G., Enriquez, R., Harris, R. J., & Sharma, B. (2020). Determinants of broadband access and affordability: An analysis of a community survey on the digital divide. *Cities*, *106*, 102904. https://doi.org/10.1016/j.cities.2020.102904

Ricciardi, F., & Za, S. (2015). Smart city research as an interdisciplinary crossroads: a challenge for management and organization studies. In *From information to smart society* (pp. 163-171). Springer.

Richter, C., Kraus, S., & Syrjä, P. (2015). The Smart City as an opportunity for entrepreneurship. *International Journal of Entrepreneurial Venturing*, *7*(3), 211-226. https://doi.org/10.1504/IJEV.2015.071481

Rodríguez-Pose, A., Di Cataldo, M., & Rainoldi, A. J. S. P. B. S. (2014). The role of government institutions for smart specialisation and regional development. *4*.

Seng Boon, L., Abdul Malek, J., Hussain, M. Y., & Tahir, Z. (2020). Participation in E-government Services and Smart City Programs: A case Study of Malaysian Local Authority. *PLANNING MALAYSIA*, *18*(13).

Sfez, S., Dewulf, J., De Soete, W., Schaubroeck, T., Mathieux, F., Kralisch, D., & De Meester, S. (2017). Toward a Framework for Resource Efficiency Evaluation in Industry: Recommendations for Research and Innovation Projects. *RESOURCES-BASEL*, *6*(1). https://doi.org/10.3390/resources6010005

Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to Do a Systematic Review: A Best Practice Guide for Conducting and Reporting Narrative Reviews, Meta-Analyses, and Meta-Syntheses. *Annual Review of Psychology*, *70*, 747-770. https://doi.org/10.1146/annurev-psych-010418-102803

Sierpinski, G., & Staniek, M. (2018). Platform to support the implementation of electromobility in smart cities based on ICT applications - concept for an electric travelling project. *Scientific Journal of Silesian University of Technology.Series Transport*, *100*, 181-189.

Simonofski, A., Asensio, E. S., De Smedt, J., & Snoeck, M. (2017). *Citizen Participation in Smart Cities: Evaluation Framework Proposal* 2017 IEEE 19th Conference on Business Informatics (CBI), Thessaloniki.

Simonofski, A., Asensio, E. S., De Smedt, J., & Snoeck, M. (2019). Hearing the Voice of Citizens in Smart City Design: The CitiVoice Framework. *Business and Information Systems Engineering*, *61*(6), 665-678.

Sinaeepourfard, A., Krogstie, J., Soltvedt, T. K., & Skuggevik, T. (2020). Large-Scale Information and Communications Technology (ICT) Management in Smart Cities

based on Edge to Cloud Orchestration. 2020 International Conference on Omni-layer Intelligent Systems (COINS), Barcelona, Spain.

Tura, N., & Ojanen, V. (2022). Sustainability-oriented innovations in smart cities: A systematic review and emerging themes. *Cities*, *126*, 1-16.

UN. (2018). *World Population Prospects 2018*. The Population Division of the Department of Economic and Social Affairs of the United Nations Retrieved from https://population.un.org/wup/

UNCTAD. (2021). *Technology and Innovation Report 2021*. UN. https://unctad.org/webflyer/technology-and-innovation-report-2021

Vakali, A., Angelis, L., & Giatsoglou, M. (2013). Sensors talk and humans sense towards a reciprocal collective awareness smart city framework. 2013 IEEE International Conference on Communications Workshops (ICC), Budapest, Hungary.

Van Audenhove, L., Jans, G., Staelens, T., Van Attenhove, J., Jacobs, A., Verdegem, P., & Hautekeete, L. (2007). *Multichannel e-government. A reality check by way of in-depth user and usability research in Flanders*. Acad Conferences Ltd.

Wesseling, J., de Ruiter, H., Blokhuis, C., Drukker, D., Weijers, E., Volten, H., . . . Zandveld, P. (2019). Development and implementation of a platform for public information on air quality, sensor measurements, and citizen science. *ATMOSPHERE*, *10*(8), 445. https://10.3390/atmos10080445

White, G., Zink, A., Codecá, L., & Clarke, S. (2021). A digital twin smart city for citizen feedback. *Cities*, *110*, 1-11. https://doi.org/10.1016/j.cities.2020.103064

Wolff, A., Gooch, D., Cavero, J., Rashid, U., & Kortuem, G. (2018). Removing Barriers for Citizen Participation to Urban Innovation. In *The Hackable City* (pp. 153-168). Springer Singapore. https://doi.org/10.1007/978-981-13-2694-3_8

Yu, J., Wen, Y., Jin, J., & Zhang, Y. (2019). Towards a service-dominant platform for public value co-creation in a smart city: Evidence from two metropolitan cities in China. *Technological Forecasting Social Change*, *142*, 168-182.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 138 – 148

THE IMPLICATION OF MOVEMENT CONTROL ORDER (MCO) TOWARD THE SMALL-SCALE FOOD AND BEVERAGE ACTIVITIES IN JOHOR, MALAYSIA

Mohamad Fadhli Rashid[1], Nurul Suliana Yusoff[2], Noor Aimran Samsudin[3], Muhamad Solehin Fitry Rosley[4], Lee Yoke Lai[5], Siti Rahmah Omar[6]

[1,2,3,5,6] *Urban Design and Environmental Research Group*
[4] *Centre for the Study of Built Environment in the Malay World (KALAM)*
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

The implementation of a movement control order (MCO) in Malaysia due to the COVID-19 pandemic has widely affected the majority of small-scale economic activities, including the food and beverage (F&B) sector. This paper aims to analyse the impact of MCO implementation on small-scale F&B activities in Majlis Bandaraya Iskandar Puteri (MBIP), Johor, Malaysia. Descriptive and inferential analyses were employed to analyse the impact of MCO implementation via a questionnaire sampling of 60 small-scale F&B operators across the case study. The research found that the movement restrictions had a massive influence on the economy of most of the businesses, particularly on their income generations. The MCO also obstructed a smooth economic recovery of any business, including the small-scale F&B activities, despite the various initiatives being addressed to minimise the economic impact of pandemic and sustain the business activities and income generations. Hence, a planning approach should be taken to manage the chain impact of a health crisis, such as movement restrictions, in reducing the economic impacts of small-scale F&B activities.

Keywords: Food and Beverage Sector; Small-Scale Business; COVID-19; Movement Control Order

[1] Senior Lecturer at Universiti Teknologi Malaysia. Email: m.fadhli@utm.my

INTRODUCTION

The COVID-19 pandemic has had a significant influence on the entire world. The Malaysian government made an emergency attempt to enforce the Movement Control Order (MCO) in response to the COVID-19 outbreak. The country's first MCO beginning on March 18, 2020, was viewed as a harsh measure against COVID-19 cases (Shah et al., 2020; Hamid et al., 2021). The role of MCO in preventing the spread of COVID-19 was crucial in protecting the health and safety of the community. While the MCO was expected to reduce the spread of the COVID-19 virus significantly, it has impacted the entire social and economic population (Aziz et al., 2020). Malaysia's complete implementation of COVID-19 to combat the new wave undoubtedly affected the country's economic recovery. At the same time, the government had to invest money to assist businesses and citizens in restoring the economy through eight economic assistance and stimulus packages worth RM662.5 billion (MEDC, 2021). Inflation in the national economy also impeded overall economic growth, indicating a difficult situation for the government in maintaining desirable economic growth (Abdul Latip et al., 2021).

The MCO's implementation was ultimately impacted by the short notice announcement, mainly affecting commercial industries such as small and medium businesses (SMEs). Several SMEs, including food and beverage (F&B), encountered financial difficulties and were forced to lay off workers (Omar et al., 2020; Rashid & Hassan, 2020). Such unprecedented circumstances led to the SMEs beginning to lose their primary source of income. According to DOSM (2020), during the MCO period, sales from the retail sector, particularly SMEs in Johor, decreased by around 50% in 2020. During the MCO period, the F&B activities saw a nearly 90 per cent drop in sales value (DOSM, 2020). Given such predicament, the current research examines the impact of MCO implementation on small-scale F&B activities in Majlis Bandaraya Iskandar Puteri (MBIP), Johor, as this local authority is one of the most significant numbers of registered small-scale F&B activities in Johor and its proximity location advantages to Singapore.

BACKGROUND OF COVID-19 AND MOVEMENT CONTROL ORDER (MCO)

COVID-19 was labelled a worldwide health issue by the World Health Organization (WHO) on March 11, 2020, after spreading rapidly to other countries (Cucinotta & Vanellli, 2020). After first being spotted in Wuhan, China, at the end of 2019, the COVID-19 epidemic shocked the entire world. According to a data released by the Ministry of Health Malaysia (2021), there were 1.73

million positive cases and 16,382 deaths between January 25, 2020 to August 30, 2021.

The impact of the epidemic on the rest of the world was unanticipated. In addressing this issue, Fabiel et al. (2020) noted that international economists had offered numerous warnings about the worsening global economic and financial structure. Most Southeast Asian countries, including Indonesia, Malaysia, Thailand, the Philippines, and Singapore, issued emergency and quarantine orders to prevent the spread of COVID-19 (Fauzi & Paiman, 2021; Chong et al., 2021). Most countries made difficult decisions to shut down vast portions of their economies in all areas, whether urban or rural, thus significantly influencing society (Khor et al., 2020). Malaysia's political, economic, social, health, and educational systems were also impacted by the pandemic (Aziz, 2020; Shakeel et al., 2020). Many countries imposed travel restrictions and movement limitations due to the outbreak.

The COVID-19 pandemic, which was spreading and infecting Malaysians, prompted the government to declare MCO as a precautionary measure to prevent the virus from spreading further (Aziz, 2020). The MCO, which went into effect on March 18, 2020, was phased in until the end of the Rehabilitation Movement Control Order (RMCO) on December 31, 2020. The COVID-19 pandemic's polemics have had huge ramifications on every level, including political, economic, social, and adverse societal reactions. Due to the MCO order, Malaysians were ordered to stay home and not undertake any daily duties outside. As a result, some issues caused poverty-related problems such as increased homelessness, increased crime rate, and disorders in mental health (Thinagar et al., 2021).

IMPACT OF COVID19 AND MOVEMENT CONTROL ORDER (MCO) ON SMALL-SCALE ECONOMIC ACTIVITIES

Due to the effect and employees' health concerns, nearly half of the businesses had temporarily closed worldwide. Small businesses in the United States showed a heavy decline during February 2020. There were 15 million active businesses, which dropped to 11 million during the initial period of the pandemic (Kalogiannidis, 2020). China's SMEs also faced a crisis of having little to no cash flow to cover salaries, rent, and loans (Lu *et al*., 2020). In Malaysia, the impact of the MCO was on the economic sector and the social aspects of the population as many economic industries had to close for the government to prevent COVID-19 from spreading further. Most businesses, corporate organisations, and government institutions shut down their activities and services immediately.

Many businesses, notably small-medium enterprises (SME), were unable to cover expenses, including employee salaries, due to the MCO, forcing

them to lay off their personnel. People's daily lifestyles have altered compared to prior lives; they faced insecure employment/work, which affected income and expenditure, education, health, security, welfare, religious activities, and social relations (Rashid et al., 2019a; 2019b). The MCO implementation affected approximately 33.8 million individuals in Malaysia, with 76.6 per cent of the population living in urban areas and 23.4 per cent in rural areas. This MCO was a contagion prevention method to break the COVID-19 chain, which was crucial for infected patients with unknown connections (Norashikin et al., 2021).

Despite specific economic sectors being exempted from MCO implementation, nothing changed. The industry must comply with Majlis Keselamatan Negara's (MKN) SOP rigidly and in agreement. The most significant issue they encountered in closing their business was the lack of consumer presence owing to SOP and MCO compliance. Additionally, travel restrictions and border closures also significantly impacted the tourism industry and other economic sectors such as hospitality, food production, and transportation (Foo et al., 2020; Karim et al., 2020; Fabei et al., 2020). About 3,000 enterprises in the food and beverage services sector, including SMEs, in Johor Bahru (with 21,879 people), were in a precarious situation in terms of maintaining their employment and revenues (DOSM, 2020).

The preference for a new norm, such as social distancing, has affected the interaction between seller and customer and disrupted the prior product distribution chain (Aziz et al., 2020). Approximately 80% of Johor'' workforce was decreased during the MCO as most part-time employees were forced to resign and full-time staff faced compensation reductions or unpaid leave (DOSM, 2020). This crisis diminished the workforce in all economic sectors, resulting in the loss of most jobs (Karabarg, 2020). Small and medium enterprises (SMEs) were among the most affected sectors in Malaysia due to MCO implementation when most of them could not continue their operations due to the pandemic (Hasanat et al., 2020; Hasbullah & Ab Rahman, 2020). Sales declines increasingly led them to financial difficulties, and their business costs continued to rise during the MCO implementation. The situation was even worse for hawkers and small shopkeepers who were relying on the tourism industry which depends entirely on visitor arrivals (Karim et al., 2020; Rashid & Hassan, 2020). The food and beverage industry was significantly affected, especially the small-scale activities. Most of them ran their conventional businesses and complained about the plummeted sales revenue due to fierce competition from online businesses. This situation was much worse when the small-scale F&B activities faced a capital shortfall to restart their business after not being allowed to operate since the MCO. Nevertheless, the businesses moved slowly with competition from online businesses, which grew in number during the MCO. The precaution

of the COVID-19 pandemic among the customers also significantly reduced the number of customers to their premises.

SMEs, particularly small-scale F&B activities, must adapt to the new digital business norm. Significant improvements have occurred in digital adaptation among SMEs after the COVID-19 pandemic and the MCO. Approximately 10 to 20 per cent of SMEs have used digital technology entirely in their business; however, this figure is expected to rise to 40 per cent after MCO ends (Abdul Aziz, 2020; Lundin, 2020). Nevertheless, consumer habits will likely change after the end of MCO implementation. It is expected that they will favour businesses as a new way of business interactions. With this new norm, the only way for SMEs to sustain themselves is by venturing into the online platform, thus reducing operating costs to increase company productivity.

PLANNING POLICIES AND DECISIONS ON SMALL-SCALE ECONOMIC ACTIVITIES

Planning policies and decisions also play an important role in helping SMEs' growth. Determining the location of SMEs can determine higher profits (Brown et al., 2019). During the MCO, the travel radius was limited, so it was imperative to place SMEs within every 10 km travel radius to facilitate buyers in an emergency such as COVID-19 and restriction of movement, particularly in rural areas with limited access to purchase essential goods. The local authority should also assist the dealer in managing the rent, business lots, hawker licenses, and stalls, which must be paid even if the shop had to be closed (Farique & Fauzi, 2021). The digitization policy in business dealings is also a technology that can help hawkers continue to do business even during a pandemic (Kumar & Ayedee, 2021). Town planners can highlight the digitization of businesses, such as using digital wallets for payments and online business, in the national planning policy to help the community's economy and significantly improve small businesses.

METHODOLOGY

MBIP is one of the most significant numbers of registered small-scale F&B activities in Johor, which has proximity location advantages to Singapore. The primary data were obtained from a field study using a questionnaire survey. The survey aimed to understand the current scenario of small-scale F&B activities and obtain necessary information regarding the impact of the MCO on their economic activities. The study area selection was Majlis Bandaraya Iskandar Puteri (MBIP).

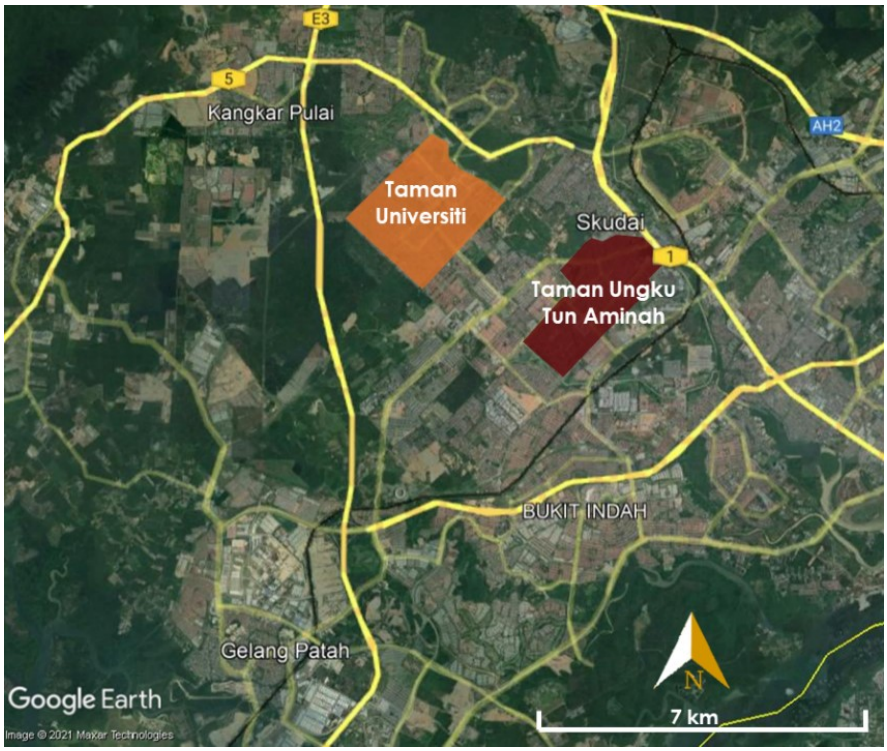


Figure 1: Selection of study area in Majlis Bandaraya Iskandar Puteri (MBIP)
Source: Google Earth Pro

The respondents were selected among small-scale F&B activities that conduct business activities around the MBIP administration area, such as Taman Universiti and Taman Ungku Tun Aminah. Both areas were the largest registered small-scale F&B activities under the MBIP's business licensing (Figure 1). The total number of respondents was 60 small-scale F&B operators who registered their operating licenses under MBIP, comprising 32 operators (53 per cent) in Taman Ungku Tun Aminah and 28 operators (47 per cent) in Taman Universiti. The respondents were selected via clustered sampling.

The data analysis method employed was a combination of descriptive and inferential analyses. A descriptive analysis, such as a cross-tabulation analysis through percentage and mean, was used for the analysis of small-scale F&B activities and the level of impact due to MCO implementation. The inferential analysis used in this study was analysis of variance (ANOVA) using the F-test, which was employed to evaluate the significance of the MCO's impacts on the vulnerability of the small-scale F&B activities.

DISCUSSION OF ANALYSIS AND FINDINGS

Table 1 explains several conclusions related to the vulnerability of small-scale F&B activities due to the MCO implementation. Overall, most of the respondents (91.7 per cent) agreed that their businesses were affected by the implementation of the MCO. The majority of small-scale F&B activities were involved in food and beverage activities (46.7%), where 85.7 per cent of them were affected by the MCO implementation. This is because most of their current businesses (such as catering and restaurants) were run on a small-scale approach to reduce operating costs. Most have been in the business for 5 to 10 years. However, the implementation of MCO impeded their business from fully operating on a large scale hence their experiencing a drastic decline in business revenue.

Table 1: Small-Scale F&B Activities' Vulnerability due to MCO Implementation

F&B Activities	Food	Beverage	Food and Beverage	Total (%)
Strongly Not Affected	0.0	0.0	1.7	**1.7**
Not Affected	1.7	0.0	5.0	**6.7**
Less Affected	8.3	1.7	0.0	**10.0**
Affected	16.7	5.0	5.0	**26.7**
Strongly Affected	10.0	10.0	35.0	**55.0**
Total (%)	**36.7**	**16.7**	**46.7**	**100.0**
Mean	0.79	0.90	0.89	0.85
ANOVA (F-test)	**0.018***	**0.002***	**0.010***	**0.013***

*Significant value at 0.05

In terms of the impact of MCO implementation, the small-scale F&B activities suffered severe losses, and their businesses were forced to shut down. They had to pay rent for business lots, hawker licenses, and stalls from local authorities despite not operating. They also suffered huge losses where the existing stock supply of raw materials was not utilised due to the business closure. Table 2 highlights the impact of MCO implementation on the activities of small-scale F&B activities, particularly on the effects on their businesses. Most of the respondents negatively perceived the aspect of raw material stock supply due to restrictions of movement. Most of the respondents agreed that the MCO implementation has negatively impacted raw material supply, indicating that the businesses expected the price to increase and the shortages of raw material supply.

Table 2: Level of Impact on Small-Scale F&B Activities Vulnerability

Impact	Strongly Not Agree	Not Agree	Uncertain	Agree	Strongly Agree	Mean	ANOVA (F-test)
Business Aspect							
Losses Suffered by Hawkers	3.3	5.0	20.0	60.0	11.7	0.74	0.008*
Business is Forced to Shut Down	1.7	6.7	33.3	50.0	8.3	0.71	0.019*
The burden of Business Rental	1.7	6.7	21.7	60.0	10.0	0.74	0.008*
Raw Material Supply Aspect							
Increasing Raw Material Prices	3.3	1.7	26.7	36.7	31.7	0.78	0.001*
Lack of Raw Material Stocks in the Market	3.3	8.3	23.3	38.3	23.3	0.72	0.015*
Waste of Raw Materials Due to Business Closure	1.7	20.0	10.0	36.7	31.7	0.75	0.005*
Income Aspect							
Loss of Source of Income	3.3	5.0	11.7	40.0	40.0	0.82	0.000*
Reduction in Sales Revenue	3.3	3.3	21.7	46.7	25.0	0.77	0.001*
Retrenchment	1.7	1.7	50.0	20.0	25.0	0.72	0.015*

*Significant value at 0.05

The findings (Table 2) highlight that small-scale F&B activities experience a drastic loss of sources of income, demand for products/services, and sales revenue. Also, MCO's SOP was strict yet kept changing throughout the time. At one time, only selected businesses were allowed to operate. To some extent, food and beverage industries, such as restaurants, could not survive due to limited time of operation and restrictions on people's movement within a radius of 10 km within the district itself. Such restraint had greatly affected the income generations of small-scale F&B activities.

Moreover, most small-scale F&B activities are uncertain about laying off their employees during the MCO. Most of them had a misconception of the SOP of MCO implementation, which constantly changed over time and in different

phases of the MCO. The majority of small-scale F&B activities are self-sustained and run by family members who support the business operations.

CONCLUSION

This study concludes that the majority of small-scale F&B activities agreed with the implementation of MCO to address COVID-19 in the interest of all parties. However, the restrictions have adversely affected their activities, particularly their income generation and business operation aspects. Despite most of them initially not agreeing with the MCO, they must adapt for their business's survival. Given such a predicament, this study focused on the small-scale F&B activities to provide insights into the various challenges they faced during the MCO implementation. As the findings suggest, most were significantly affected in sustaining their businesses and securing raw materials and income.

The way forward for small-scale F&B activities to recover the fastest from the economic impact is their agility and resilience to adopt different strategies to survive in business, such as digital adaptation, minimising business operation, and new marketing strategies. They realized the importance of digital adaptation in their business activities. The government can also implement the digital adaptation and location of SMEs on resilient strategies in policies of economics to help SMEs progress during the pandemic. During the MCO implementation period, most business activities can still be conducted online, even though some obtained huge demand beyond expectations due to the impact of digital adaptation in their businesses. With the initiative and role of all levels of government, particularly the local authority, the reopening of more sectors and phase changes for the National Recovery Plan (PPN), as well as the relaxation of travel restrictions, are expected to support the country's economic growth trajectory. Such measures will boost business activities and production, especially in the small-scale F&B activities that have begun operating. This, in turn, will positively impact small-scale F&B activities by increasing their income and creating new employment opportunities.

REFERENCES

Abdul Aziz, M. (2020). *PUNB Bantu Usahawan Tangani Impak COVID-19*. Berita Harian Online: Bisnes, (1), 1-1.

Aziz, A. R. A. (2020). Pengangguran Dalam Kalangan Tenaga Kerja Semasa Wabak COVID-19. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(11), 1-9.

Aziz, A. R. A., Sukor, N. M., & Ab Razak, N. H. (2020). Wabak Covid-19: Pengurusan Aspek Kesihatan Mental Semasa Norma Baharu. *International Journal of Social Science Research*, 2(4), 156-174.

Abdul Latip, N., Karim, R., Marzuki, A., Muhammad, F., Shah, A., Yilret Nanle, V., & Umar, M. U. (2021). Covid-19 Outbreak and Role of Tourism Development on Economic Growth in Pakistan. *Journal of the Malaysian Institute of Planners*, 19(5), 88–95.

Brown, R., Liñares-Zegarra, J., & Wilson, J. O. S. (2019). The (Potential) Impact of Brexit on UK SMEs: Regional Evidence and Public Policy Implications. *Regional Studies*, 53(5), 761–770.

Chong, T. T. L., Li, X., & Yip, C. (2021). The Impact of COVID-19 on ASEAN. *Economic and Political Studies*, 9(2), 166-185.

Cucinotta, D., & Vanelli, M. (2020). WHO Declares COVID-19 a Pandemic. *Acta Bio Medica: Atenei Parmensis*, 91(1), 157.

Department of Statistic Malaysia (DOSM) (2020). *Buletin Khas DOSM: Menangani Covid-19 di Malaysia, Siri 1*8. Putrajaya, Malaysia.

Fabeil, N. F., Pazim, K. H., & Langgat, J. (2020). The Impact of COVID-19 Pandemic Crisis on Micro-Enterprises: Entrepreneurs' Perspective on Business Continuity and Recovery Strategy. *Journal of Economics and Business*, 3(2), 837-844.

Farique, M. A. M., & Fauzi, M. A. M. (2021). Implikasi Pandemik COVID-19 terhadap Ekonomi Global dan Ekonomi Malaysia. *International Journal of Interdisciplinary and Strategic Studie*s, 2(1), 122-129.

Foo, L. P., Chan, M. Y., Tan, K. L., & Phuah, K. T. (2020). The Impact of COVID-19 on Tourism Industry in Malaysia. *Current Issues in Tourism*, 1-5.

Fauzi, M. A., & Paiman, N. (2021). COVID-19 Pandemic in Southeast Asia: Intervention and Mitigation Efforts. *Asian Education and Development Studies*, 10(2), 176-184.

Hamid, M. N. S., Ali, R. M., & Ramli, M. W. (2021). Impak Perintah Kawalan Pergerakan terhadap Golongan Miskin: Satu Analisis Cerpen "Kuncitara". *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 6(2), 1-8.

Hasanat, M. W., Hoque, A., Shikha, F. A., Anwar, M., Hamid, A. B. A., & Tat, H. H. (2020). The Impact of Coronavirus (COVID-19) on e-business in Malaysia. *Asian Journal of Multidisciplinary Studies*, 3(1), 85-90.

Hasbullah, N. A., & Ab Rahman, A. (2020). Peranan Pemegang Taruh dalam Menjaga Kebajikan Ekonomi Rakyat Semasa Pandemik COVID-19 dari Perspektif Ekonomi Islam: The Role of Stakeholders in Safeguarding People's Economic Welfare During the COVID-19 Pandemic from the Perspective of Islamic Economy. *The Journal of Muamalat and Islamic Finance Research*, 71-89.

Karabarg, S. F. (2020). An Unprecedented Global Crisis! The Global, Regional, National, Political, Economic, and Commercial Impact of the Coronavirus Pandemic. *Journal of Applied Economics and Business Research*,10 (1), 1-6.

Karim, W., Haque, A., Anis, Z., & Ulfy, M. A. (2020). The Movement Control Order (MCO) for the Covid-19 Crisis and its Impact on Tourism and Hospitality Sector in Malaysia. *International Tourism and Hospitality Journal*, 3(2), 1-7.

Kalogiannidis, S. (2020). Covid impact on small business. *International Journal of Social Science and Economics Invention*, 6(12), 387

Khor, V., Arunasalam, A., Azli, S., Khairul-Asri, M. G., & Fahmy, O. (2020). Experience from Malaysia during the COVID-19 Movement Control Order. *Urology*, 141, 179-180.

Kumar, M., & Ayedee, D. (2021). Technology Adoption: A Solution for SMEs to overcome problems during COVID-19. *Forthcoming, Academy of Marketing Studies Journal*, 25(1), 1-16.

Lundin, N. (2020). *COVID-19 and Digital Transformation-What do We See Now and What Will We See Soon?*. Offices of Science and Innovation.

Lu, Y., Wu, J., Peng, J., & Lu, L. (2020). The perceived impact of the Covid-19 epidemic: evidence from a sample of 4807 SMEs in Sichuan Province, China. *Journal Environmental Hazards*, 19(4), 323-340.

Ministry of Health Malaysia (2021). *Report of Daily Active Cases of COVID-19 in Malaysia until August 30, 2021*. Putrajaya.

Norashikin, N. A. A., Sidek, N. I. J., Johari, N. A., & Ishar, M. I. M. (2021). Kesan Norma Baharu terhadap Pengguna dari Aspek Aktiviti Sosial. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 6(3), 159-170.

Omar, A. R. C., Ishak, S., & Jusoh, M. A. (2020). The Impact of COVID-19 Movement Control Order on SMEs' Businesses and Survival Strategies. *Geografia-Malaysian Journal of Society and Space*, 16(2), 139-150.

Ministry of Entrepreneur Development and Cooperatives (MECD). (2021). Penemuan Kaji Selidik MEDAC Mengenai Impak COVID-19 dan Penguatkuasaan PKP kepada Usahawan. Putrajaya, Malaysia.

Rashid, M. F., Ngah, I., & Misnan, S. H. (2019a). Revitalising Rural Areas in Malaysia: A Framework for Economic Revitalization. *IOP Conference Series: Earth and Environmental Science*, 385(1). IOP Publishing.

Rashid, M. F., Ngah, I., & Misnan, S. H. (2019b). Framework for Economic Performance of Rural Areas in Malaysia: A Territorial Approach. *International Journal of Built Environment and Sustainabilit*y, 6(1-2), 1-6.

Rashid, S. M. R. A., & Hassan, F. (2020). Amalan dan Penglibatan Peniaga Kecil melalui Perniagaan Digital semasa Pandemik COVID-19 di Malaysia. *GEOGRAFI*, 8(2), 1-20.

Shah, A. U. M., Safri, S. N. A., Thevadas, R., Noordin, N. K., Abd Rahman, A., Sekawi, Z., Ideris, A., & Sultan, M. T. H. (2020). COVID-19 Outbreak in Malaysia: Actions Taken by the Malaysian Government. *International Journal of Infectious Diseases*, 97, 108-116.

Shakeel, S., Hassali, M. A. A., & Naqvi, A. A. (2020). Health and Economic Impact of COVID-19: Mapping the Consequences of a Pandemic in Malaysia. *The Malaysian Journal of Medical Sciences: MJMS*, 27(2), 159-164.

Thinagar, S., Roslan, S. N. M., Ismail, M. K., & Chamhuri, N. (2021). Covid-19: B40 Household's Financial and Consumption During the Implementation of Movement Control Order (MCO). *Journal of the Malaysian Institute of Planners*, 19(1), 65–76.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 149 – 159

GIG WORKERS AMONG WOMEN, A BETTER CHOICE OF WORK? A CASE STUDY OF MAKCIK TRAVELS

Nurfatin Fauzi[1], Yong Adilah Shamsul Harumain[2], Melasutra Md Dali[3]

Centre of Sustainable Planning and Real Estate,
Faculty of Built Environment,
UNIVERSITI MALAYA

Abstract

The evolution of information technology has formed an information society whereby all activities can be reached by surfing through an online platform. Business organisations have also transformed virtually through which the physical absence of employees is less necessary. There are two types of gig works introduced, which are known as physical gig works (workers need to carry out tasks physically) or digital gig works (tasks will be conducted entirely through online platforms from beginning to end). These so-called gig works offer flexible work arrangements and a more family-friendly work environment that benefits married working women notably in achieving work-life balance. The present study would like to understand the motivational factors influencing women's participation in physical gig works towards achieving work-life balance. A qualitative method was used whereby nine respondents for interviews were recruited through convenience sampling from the case study. The findings derived from the thematic analysis revealed that flexibility in time management and autonomy in managing the work schedule were recorded as the second highest factors after generating income. As a majority of the participants were single mothers, these factors (income and flexibility) should be the major concerns for future research on the enhancement of policies for an effective gig work system so that these women can have freedom in managing their work-life balance.

***Keywords**:* Gig works; women; flexibility; work-life balance; qualitative

[2] Lecturer at Universiti Malaya. Email: adilah_shamsul@um.edu.my

INTRODUCTION

In this era of modern technology, the usage of Internet communications has been widespread around the world and has recorded a gradual increment in the percentage of freelancers as gig workers. According to the World Bank Data (2021), the percentage of self-employment in Malaysia was recorded at approximately 27.4% in 2019 with the share of self-employed women increasing from 11.6% in 2010 to 19.5% in 2018 (Schaper, 2020). Previous research has reported that the percentage of women's labour force participation is still low in the world context and some of them are overqualified with the current positions as they have higher educational qualifications where some of them accepting bottom-level positions as a trade-off for higher flexibility in time management and autonomy in arranging their work schedule (Craig et al., 2018; Risse, 2018). Furthermore, the 'gender division of labour' among couples assigns women the primary role in domestic responsibilities and secondary earner in the household. Consequently, women become intentionally selective over gig works as they are able to juggle the work-family life in which it can reduce their work pressure and they can focus more on parenting activities (Bianchi & Milkie, 2010; Solomon, 2010). Having freedom in commuting is crucial for an individual to have a better quality of life (Othman & Ali, 2020). It has been proven from the study conducted in France, men spend about 27 minutes per day for commuting to the workplace and 22 minutes per day for domestic travel, while women spend about 15 minutes per day for commuting to the workplace and 27 minutes per day for domestic travel (Motte-Baumvol et al., 2017). Hence, it is questionable on the motivational factors influencing women in entering gig works and how this physical gig works such as e-hailing help women in achieving work-life balance. It is true that e-hailing services have become part of the famous gig works in Malaysia other than alternative modes of transport that partly contribute to the domestic economy (Jais & Marzuki, 2020). However, it is not yet proven how this gig works shapes travel patterns. Thus, the research objectives have been identified as follows:

1. To examine the motivational factors influencing women's participation in gig works.
2. To rationalise the women's travel patterns in balancing work-life demands.

LITERATURE REVIEW

Dilemma of Work-Family Conflicts and Family-Work Conflicts

Over the past decades, the dilemma faced by working parents due to work-family conflicts and family-work conflicts has been highly debated among researchers in behavioural studies (Ismail & Gali, 2017). Regardless of the clear difference between both conflicts, the outcome is inter-related, leading to the concept of work-life balance. According to Netemeyer et al. (1996), work-family conflicts

refer to work demands including time constraints and workload stress that restrict working individuals in satisfying their family responsibilities, while family-work conflicts refer to the restraints in performing work duties due to family demands and stress. Therefore, the phenomenon occurred due to the conflicts result in imbalance of both roles, whereby work performance and productivity are affected. Hyperwallet (2017) conducted a study among 2,000 United States-based female gig workers on their behaviour and career motivations in joining the gig economy. One-quarter of women gig workers left their full-time jobs due to full-time jobs are more stressful, thus making them opt for flexibility, extra time required in taking care of children, parents, or other relatives, opting for other careers, laid-off from previous job, and difficulties in entering full-time jobs after having children. Extensive research was conducted on the experiences of work-family dilemma faced by dual-earner and single-earner families including couples with and without children. It was found that most of the couples with children were affected by work-family demands instead of childless couples or single persons (Allen & Finkelstein, 2014; Winslow, 2016).

Transition to Flexible Work Arrangements

The growth of flexible work arrangements particularly among parents has become significant as more individuals choose the work-life balance concept to achieve a maximum level of work-life productivity with minimum conflicts. This concept was first introduced by the United Kingdom's Work-Life Balance Campaign on March 2000 by promoting work-life balance policies and practices, which enhance the employee-employer welfare (Department of Business Innovation and Skills (BIS), 2011). It reported a diversity of flexible work arrangements availability, whereby 56% were part-timers, 34% with flexi-time, 30% homeworking, 19% job-sharing, 19% with compressed hours, and 16% with term-time (Wheatley, 2012; van Wanrooy et al., 2013). There are four types of flexible work arrangements, namely part-time (regular type of flexible work arrangement that symbolises work-life balance), flexi-time or compressed hours (flexible work focusing on work arrangement with greater flexibility without reducing monthly income, favourable for working mothers who often combine domestic responsibilities with their work schedule), homeworking (offers greater flexibility and autonomy as most of the tasks are basically conducted at home, reducing commuting trips), and job-share (less popular among flexible work arrangements due to other flexible work choices). However, according to Russell et al. (2009), mothers mostly choose job-sharing to reduce work responsibilities by dividing the work scope equally between employees, and thus, increasing their 'family time' and securing the paid employment jobs.

Opting for Work-Life Balance Concept

The evolution of the work-life balance concept from the role theory indicated that individuals who undertake several distinctive roles in life are often confronted with difficulties in balancing the work-life demands, notably women (Freeney & Stritch, 2017; Matos, 2015). In fact, it was reported that the percentage of women's participation in the labour force has been increasing in the past centuries leading to a majority of married women experiencing a higher level of work-family conflicts and opting for greater flexibility and family-friendly environments (Cortes, 2018). In addition, the cultural elements and religion in some societies, such as Africa, Arab, and Palestine, demand certain obligations on women due to marriage sustainability, restricting them in achieving balance between both lives (Adisa et al., 2019). Comprehensive research on work-life balance has been conducted in alleviating the burden by concentrating on different aspects such as flexibility, autonomy, gender division of labour, and family-friendly policies (Smithson & Stokoe, 2005; MacInnes, 2008). Since most individuals choose flexible work arrangements for the greater autonomy in managing work schedule activities, it has been revealed that both genders acquire different rationales, whereby men opt for a greater degree of work choices with associated benefits while women opt for a greater degree of time management due to several constraints (Sullivan & Smithson, 2007; Atkinson & Hall, 2009).

RESEARCH METHODOLOGY

Scope of Study

The study focused on three components: (1) women, (2) motivational factor in participating gig works, and (3) daily travel patterns. The researcher adopted a case study to be included as part of the research process due to several reasons such as: (1) the percentage of individuals especially women entering gig works is still lacking in terms of official statistical records capturing gig works and gig economy issues at large and (2) the limitation on research timeline, followed by unintended causes due to the COVID-19 pandemic.

Overview of MakCik Travels as Case Study

MakCik Travels is a transportation company in Malaysia and has been operating since November 2018. Similar to other e-hailing companies, this company also provides transportation service. The uniqueness of MakCik Travels services is that it was created for a social entrepreneurial project with the concept of 'by women for women', focusing on helping others, especially elderly or disabled people and school children. It offers four types of services: MakCik Chaperone (helper), MakCik Drive (driver), MakCik Runner (personal shopper), and MakCik Explorer (travel guide). The clients mostly consist of women, children, college students, elderly, and disabled persons. MakCik Travels was selected as a case study as the research intention is to understand the motivational factors

influencing women's participation in gig works and how the factors reflected their daily travel patterns and activities in balancing and managing the work-life demands, notably among married working women with dependent children. As these women are required to travel almost every single day to meet job demands, MakCik Travels services would be a suitable option in recruiting the sample as it meets the criteria given: (1) women, (2) participating in gig works, and (3) given job requires daily commute.

Data Collection and Sampling Technique

The sampling technique used in this study was a qualitative method whereby the targeted respondents were selected using the convenience sampling technique. The recruitment process was handled by both parties in which the management team of MakCik Travels would list out the respondents' details while the researcher would reach out to the respondents in receiving their consent. The respondents were the travel companions of MakCik Travels (women who provided the services) and a total of nine respondents agreed to participate in the interview session. The one-to-one interview sessions were carried out through phone calls and were guided with a semi-structured interview. The session took about 40 to 50 minutes and before conducting the interview, the researcher must obtain written consent from all respondents as an ethical consideration. For validity purposes, audio recording and notetaking were performed during the process.

Data Analysis

This study referred to several previous research studies in designing the sampling and conducting the analysis method such as Dousin et al. (2020), Bhattacharjee (2020), and Dobbs (2007). All these prior works have conducted a similar study but with different research scopes. Due to the limitation in time frame and unexpected events of the COVID-19 pandemic faced by the researcher that eventually slowed down the research progress, the researcher decided to only conduct the qualitative method. In fact, there were several limitations in terms of gig works data, academic publication on women's mobility in gig works, and data from the management. This research method has been reported to offer various opportunities in addressing the research process, which has been designated to take into account the participants' background and experience in detail or else, it remains invisible apart from ensuring the accuracy of data (Dobbs, 2007; Caelli et al., 2003). Thematic analysis was conducted using a six-phase approach that included data familiarisation, coding, searching for themes, reviewing themes, defining themes, and producing a write-up based on the linkages created (Corbin & Strauss, 2008).

FINDINGS AND DISCUSSIONS

From the findings, a majority of the respondents were single mothers with dependent children aged below 12 years old. Apart from that, most of them were previously working women with greater experiences in their field of expertise coming from either the government sector or private sector before they entered gig works. The reason for resignation varied among the respondents, but the most highlighted reasons were because of company downsizing, workload pressure, and desire to focus more on their children. Undeniably, the pandemic issues of COVID-19 recently have affected these women because several companies were greatly affected, resulting to downsizing the number of staff or even closing down. In addition, some of them acquired multiple gigs work in order to support them financially as they were the sole breadwinner for the family, and because of the unstable income and limited number of jobs offered. As most of the respondents were dependent on the gig jobs to generate income, it can be seen that women with a larger household size or greater commitment would search for more gig works in supporting them financially. A large number of the respondents were at the age of 30 to 50 years old in which logically, most of them were still young, able to work, and probably still had a dependent school child. In fact, it was found that women who acquired a strong support system were able to conduct multiple gig works even though they had a higher number of dependent children. In Asian countries, it has been reported that joint families with grandparents or other nonworking family members will help the working mother in taking care of the children while they are at work. It is because in joint families, the working mother plays a crucial role in supporting the household; thus, it is important for other members to support the working mother and enable her to perform the dual role efficiently (Poduval & Poduval 2009). Therefore, it can be concluded that the motivational factors for women who acquire a strong support system in taking care of their children would be focusing more on generating income for their families and having freedom in work arrangements. Nevertheless, single mothers with a lack of a support system tend to have a dilemma in balancing the work-life demands as they need to focus on both children and financial stability. Apparently, it can be seen that the crucial reason influencing the women's participation in joining gig works was because they wanted to focus solely on their children, especially for single mothers. According to the Department of Labour of the United States on the Family and Medical Leave Act (1993), there is a lack of employment policies in addressing the needs of working couples, leading them to choose either job security or parenting responsibilities.

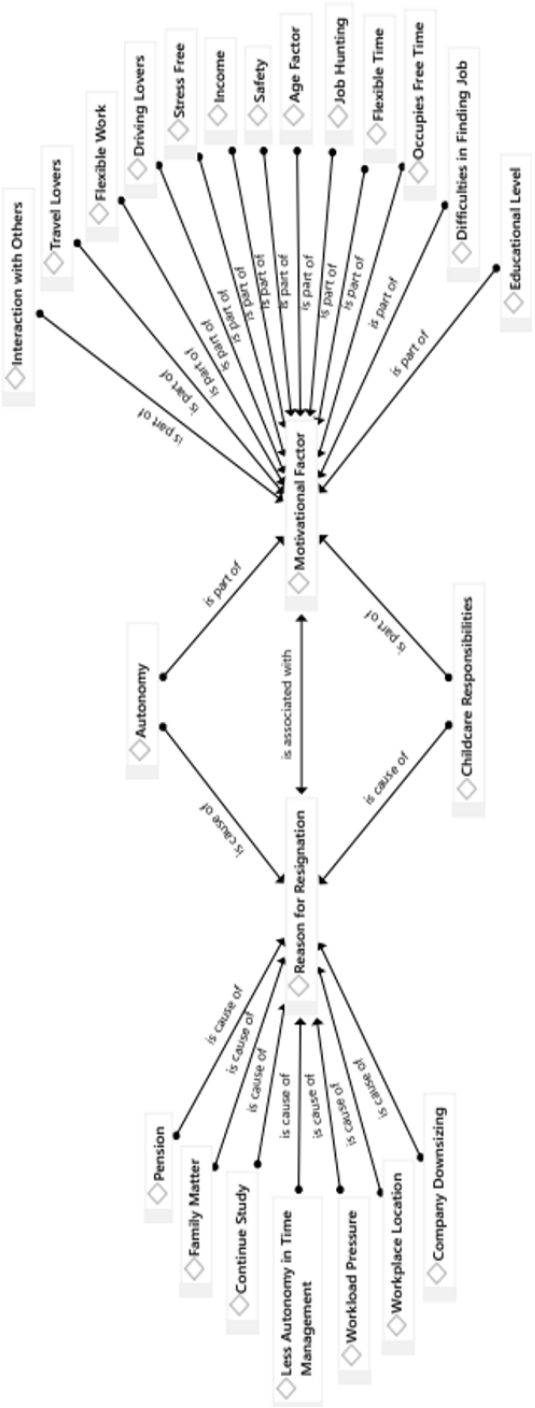


Figure 1: Motivational factors influencing the women's participation in gig works
Source: Data from fieldwork generated using Atlas.ti Software

Due to the nature of the men's and women's roles in the society, the primary obligation in caretaking often falls on women, which eventually affects the work lives of women more than men.

> "*If there is no support system from my mother and grandmother, I think I would just consider MakCik Travels jobs as my permanent job rather than sales promoter due to the fixed working hours, which is difficult for me to handle my children (Interviewee 2)*.

> "*The reason why I choose freelance and flexible working hours [is] because of the responsibility in taking care of the children as I am the sole guardian, [so it] is part of my duties (Interviewee 3)*."

The motivational reasons are differed for women who had a strong support system than the ones who did not. This indicated that they put more focus on their children's welfare, aside from achieving financial stability. Maldonado and Nieuwenhius (2015) reported that single parents, especially mothers, would suffer a higher risk of poverty due to household demands, as they usually bear the full responsibilities in taking care the children after separation, apart from issues with gender pay gap and lack of job opportunities.

> "*As for now, I am living with my mother and grandmother. So, I am not too worried about my children's welfare because both of them are my strong support system in taking care of the children when I am not around or when I am at the office. So, my focus is on generating more additional income for the family (Interviewee 2)*."

> "*After divorce, my prominent focus is generating income for my family as I am [a] single mother and do not [have] to worry about my children's welfare because I have [hired a] maid. So, she will be taking care of my mother and my children, making it easier for me to handle the household duties (Interviewee 6)*."

Meanwhile, it was discovered that a majority of the respondents shared one thing in common apart from their differences in the background profile and field of expertise, namely they enjoyed driving and travelling.

> "*It is stress-free and I do enjoy driving till late night while listening to my favourite songs (Interviewee 2)*."

"*Driving is one of my hobbies and the e-hailing services [are in] demand nowadays. So, I have decided in joining MakCik Travels because I love driving and my safety is more secured (Interviewee 9)*."

The highest factors reported were flexibility and autonomy, which refer to two situations, either they are resigning from the previous job because they are seeking for flexibility and autonomy in life, or they are entering gig works because they are choosing flexibility and autonomy in achieving work-life balance due to circumstances. In fact, Van Gasse and Mortelmans (2017) also stated that flexibility can be classified into acquire flexi-time, acquire flexi-place, or work arrangements.

"*My previous job is too demanding and stressing. In fact, at that time, I do have family issues where my husband was paralysed due to [a] stroke attack and I need to take care of him and generate income for the family at the same time (Interviewee 4)*."

"*As my priority is basically my daughter, so I do prefer jobs that are more flexible and have autonomy in managing [my] routine schedule because I need to juggle the jobs in between my daughter's activities as well (Interviewee 7)*."

It can be said that some of the respondents were looking forward to participating in gig works because they lacked job options or opportunities due to circumstances such as educational or age factors.

"*Before this, I have applied [for a] few other office jobs with stable monthly income, but the rate of success is low due to age factors and lacking in terms of educational qualifications in which all I have is only my previous work experiences. Therefore, I have decided to join MakCik Travels because that is the only option and I do have a driving licence (Interviewee 4)*."

Based on the respondents' daily travel patterns and routine, it can be seen that a majority of them had dependent children and juggled both work-life demands by producing a "convenient" work schedule beforehand. Indeed, they are the sole breadwinner for their families, notably single mothers; thus, reducing other expenditure costs including transportation is highly recommended.

"*Since the school distance is near to my house and my workplace about 500m (2–3 minutes), normally I will send my children either by motorcycle or just walking and will fetch them after school hours (Interviewee 2)*".

"*My daily routine is that I will send my children to school every day. At 6.30 a.m., I will send them and during lunch break, which is at 12.00 p.m. till 2.00 p.m., I will fetch them from school because after that, they need to attend other classes in the afternoon. Then at 6.00 p.m., I will fetch them after classes (Interviewee 4)*".

CONCLUSION

In conclusion, gig works have the potential to offer women flexibility in time management and freedom in work arrangement based on the job opportunities in improving work-life balance. In Malaysia, most women start working at the age of 24 to 26 years old after graduating from universities; however, the conflict starts when they get married and starting families while they just recently entered the workforce. The concept of work-life balance emerges, yet the struggle is different for every individuals. Commonly, women and single parents are reported to have the worst work-life balance among all (Van den Eynde et al., 2019). Findings have indicated that motivational factors of women's participation in gig works are because of flexibility in time and financial stability. It is also believed that without having a greater passion in driving for instance, these women would choose another career path. Although gig works offer financial freedom in relation to higher demands and engagement received from clients, the income is still unstable and very competitive. Despite these situations, several women have considered gig works as their primary source of income to support their families, supplement their income with another part-time job or full-time job, or even to support their spouse's income. Last but not least, women could be an important growing gender in leading the gig workforce in future. Therefore, the government and stakeholders need to address several key drawbacks including ambiguity of employment laws and regulation, inconsistency of the gigs' income, and lack of employee benefits in establishing and achieving sustainable development for gender equality and equity. A study conducted by Jais and Marzuki (2020) reported that the success of gig works such as e-hailing services in Malaysia is highly based on the method used in encountering the issues of consumer's safety and driver's income by the regulatory bodies.

ACKNOWLEDGEMENTS

The author would like to thank the Ministry of Higher Education Malaysia for the research funding under the Fundamental Research Grant Scheme (FP045-2019A). The author would also like to express gratitude to MakCik Travels and all participants due to their contribution for the rich information gathered for this paper.

REFERENCES

Atkinson, C., & Hall, L. (2009). The role of gender in varying forms of flexible working. *Gender, Work and Organisation*, 16(6), 66–650.

Bianchi, S. & Milkie, M. (2010). Work and family research in the first decade of the 21st century. *Journal of Marriage and Family*, 72(3), 705-725.

Charlesworth, S., Strazdins, L., O'Brien, L., & Sims, S. (2011). Parents' jobs in Australia: Work hours polarisation and the consequences for job quality and gender equality. *Australian Journal of Labour Economics*, 14(1), 35–57.

Cortes, G. M. (2018). The end of men and the rise of women in the high-skilled labour market. *National Bureau of Economic Research*, Working Paper 24274.

Dobbs, L. (2007). Stuck in the slow lane: Reconceptualising the links between gender, transport and employment. *Gender, Work and Organisation*, 14(2), 85–108.

Dousin, O., Collins, N., Bartram, T., & Stanton, P. (2020). The relationship between work-life balance, the need for achievement and intention to leave: Mixed-method study. *Journal of Advanced Nursing,* 77(7), 1478-1489.

Jais, A. S., & Marzuki, A. (2020). E-hailing services in Malaysia: Current practices and future outlook. *Journal of the Malaysian Institute of Planners*, 18(3), 128–141.

MacInnes, J. (2008). Work-life balance: Three terms in search of a definition. In C. Warhust, D. R. Eikhof, & A. Haunschild (Eds.), *Work Less Live More? Critical Analysis of the Work-Life Boundary* (44-61). Palgrave Macmillan, Basingstoke.

Matos, K. (2015). Modern families: Same and different sex couples negotiating at home. *Families and Work Institute*, New York.

Motte-Baumvol, B., Bonin, O., & Belton-Chevallier, L. (2017). Who escort children: Mum or Dad? Exploring gender differences in escorting mobility amongParisian dual-earner couples. *Journal of Transportation*, 44(1), 117–138.

Othman, A. G., & Ali, K. H. (2020). Transportation and quality of life. *Journal of the Malaysian Institute of Planners*, 18(3), 35–50.

Risse, L. (2018). The gender qualification gap: Women 'over-invest' in workplace capabilities. *The Conversation*.

Russell, H., O'Connell, P., & McGinnity, F. (2009). The impact of flexible working arrangements on work-life conflict and work pressure in Ireland. *Gender, Work and Organisation*. 16(1), 73–97.

Sullivan, C., & Smithson, J. (2007). Perspectives of homeworkers and their partners on working flexibility and gender equity. *International Journal of Human Resource Management,* 18(3), 448-461.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 160 – 171

INTENTIONS AND INTERVENTION OF PUBLIC SPACE DESIGN DURING PANDEMIC

Maheran Hamzah[1], Gobi Krishna Sinniah[2]

[1,2]*Department of Urban and Regional Planning,*
Faculty of Built Environment and Surveying
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

This study examines the spatial effects of public places during the pandemic, as well as individual perceptions of public spaces. In Malaysia, incidences of COVID-19 had a significant impact on people's movement. During the epidemic, the level of public safety and the ability to interact with individuals on the pedestrian walkway has been a serious worry. The concept of conducting research to determine tendencies and public perceptions regarding public usage during the Movement Control Order was sparked by the increased number of Covid-19 cases in Malaysia. The government sequentially limited social interaction in public settings. The scope of the study is the design of the public space components in pedestrian walkway zones in commercial areas. The researchers used both qualitative and quantitative methodologies, including observation and questionnaire surveys. The data was gathered using probability and random sampling, with a sample size of 104 respondents. Limited distance and safety efficacy were found in studies. According to the findings, distance and safety have a considerable impact on the preferences and demands of public users. The respondents in this survey were also dissatisfied with the quality and width of the pedestrian walkway. Full transit space, semi-transit space, and limited transit space have all been presented as options for the conceptual design. Many agencies concerned with the design of public areas will find the study informative.

***Keywords**:* Public space, Pandemic

[2] Senior Lecturer at Universiti Teknologi Malaysia. Email: sgobi@utm.my

INTRODUCTION

The Covid-19 epidemic has been affecting the entire globe for the past two years. Covid-19 has an impact on the city and its residents (Sharifi et al., 2020). Urban planning oversees the creation of public areas to ensure that new norms can be maintained safely. According to A Megahad & M Ghoneim (2020), global breakouts have faced issues on the city planning level in reducing the Covid-19 pandemic's contagious impacts. Wilkie et al., (2018) agreed that public space serves as a feeling of place that is also linked to well-being and health. Covid-19 raises concerns about alterations in social relations ins public areas (Honey-Rosés et al., 2020).

It is difficult to meet social distancing because it has a drastic impact, especially on people living in dense urban areas with limited public space (Samuelsson et al., 2020). The COVID-19 pandemic affects urban residential streets, living spaces, playgrounds, and social integration, especially for children, families, and communities. The government's action is aimed at reducing the social interactions that take place in the narrow and crowded public areas that have led to the widespread outbreak of a pandemic. According to Mehta (2020), measures taken by the government through social distancing during the pandemic of COVID-19 has altered public space usage.

According to the Malaysian Ministry of Health, between February and April 2021, the percentage of COVID-19 cases contributed by several clusters involved in public spaces is 12.55% and commercial areas 4.78%. Therefore, this study emphasises the public space area since it is the second-highest in Malaysia after factory clusters that have most people infected with COVID-19. Table 1 shows a comparison between local and international pedestrian walkways with the minimum width of pedestrian walkways in the city centre and commercial areas. The international standard requires 2.4 meters, while the local level is 1.5 meters. Therefore, it is time for some review in urban planning to see and review the level of effectiveness of the width of pedestrian walkways in Malaysia. The COVID-19 pandemic has an impact on spatial space that affects well-being and exposes weaknesses. Besides that, it creates opportunities to come up with solutions as well as generate creativity for future challenges (Grigoriadou, 2020). Long-term planning is essential to develop and grow the built-environment infrastructure (Wazani et al., 2021).

Table 1: Comparison of walkway widths

Comparison	Widths of walkway	
	Minimum	**Maximum**
Local (Malaysia) (Road 15 meter/ Commercial Area)	1.5 Meter (5 feet)	3.00 Meter (10 feet)
International (Town Center / Commercial)	2.4 Meter (8 feet)	3.6 Meter (12 feet)

International (Housing Area)	1.8 Meter (6 feet)	2.1 Meter (7 ft)

Sources: (Jabatan Perancang Bandar dan Desa, 2013) & (National Association of City Transportation Officials, 2020)

AIM AND OBJECTIVE

The study aims to design a concept of public space during pandemics and the spread of infectious diseases. The following are the objectives of the study:

(a) To identify the components of public space;
(b) To identify the level of inclination of public use of public space during COVID-19;
(c) To examine the design characteristics of the appropriate space during the spread of a pandemic;
(d) To formulate an appropriate concept to the public space as the pedestrian walkway zone during COVID-19.

PUBLIC SPACES

Parks, squares, and plazas are all examples of public areas. Public space is a living space between buildings (Gehl, 2011). The building is frequently situated at the crossroads of two popular routes, at the end of the main road, or near outstanding natural attractions such as beaches and rivers (Martoni, 2010). There are numerous new types of venues available (Cho et al., 2016). It challenges perceptions in terms of physical, social, and public space management. Neighbourhood parks, sports venues, public squares, beaches, streets and yards, urban farms, urban nature, and areas dedicated to space are all included in the category of public space (Garry, 2017).

Neighbourhood parks, sports venues, public squares, beaches, streets and yards, urban farms, urban nature, and areas dedicated to space are all included in the category of public space (Garry, 2017). A gathering spot in a neighbourhood, city centre, special district, waterfront, or other areas inside a public domain that promotes social interaction and community ties is known as public space. Other public spaces are also known as plazas, town squares, parks, markets, public places shopping malls, and so on (American Planning Association, 2014). Rubenstein (1992) mentioned, that there are three types of pedestrian zones, namely full mall, semi mall and transit mall.

Despite limitations imposed by the pandemic (Hamidi et al., 2020), it is recommended that urban planners continue to provide and recommend cohesive development as there is a range of factors and infectious diseases such as Covid-19. The quality of space at present does not play a significant role in such use (Gehl et al., 2007). Nowadays, public space is declared as unhealthy area and undesirable place, heavily criticized for not being widely beneficial (Gehl et al., 2007). Urban space has served as a meeting place, place of business, and connection space since 1900. The hallmark of a good public space is by

encouraging human contact and social activity. Public space features are designed with safe, user-friendly features and able to accommodate all users (American Planning Association, 2014). The types of walkways are divided into residential walkways, walkways in neighbourhood, and walkways in commercial areas (National Association of City Transportation Officials, 2020). Harun et al., (2021) stated the importance of a well-designed public for bringing people into contact with their surroundings, encouraging, providing area for daily exercise, as well as enhancing social and well-being relations.

METHODOLOGY

Data collection for this study based on qualitative and quantitative methods. Researchers also used secondary data methods, namely online platforms that are used as academic reference material throughout the research to obtain the first objective. This study was conducted on the public in the study area of the commercial area, Pekan Lama, Ipoh to obtain the second and third objectives. This study uses non-probability sampling, which is defined as simple sampling, that is, convenience sampling, to determine the sample size of respondents. This sampling is done based on secondary data consisting of the total population of Ipoh in 2020. The researcher uses the Raosoft.com website to set up the sample size. This sampling method is done randomly by subjects and without bias selection of samples found in the study population. According to the sampling count made, the total number of samples that need to be made is 97 sampling. However, the sampling for this study has taken 104 samples of respondents. The analysis used by the researcher is Statistical Package for Social Science Version 20.0 (SPSS 20.0). The analyses used were descriptive analysis, content analysis, comparative analysis, and Pearson correlation coefficient analysis.

Correlation Analysis

To ensure the validity of objective 3, the correlation analysis of these criteria determines the strength of the relationship between the variables. The results of the study found that most of the correlations showed a highly positive relationship. Table 2 shows the interpretation for each value generated using the Pearson Correlation Coefficient (r). While Table 3 shows the coefficient interval.

Table 2: Correlation of public space design characteristics criteria

Variables	Variables	Distance Width & Safety	Comfort Features	Design Features
Distance Width & Safety	**r**	-	.621	.693
	Interpretation		Strong positive relationships	Strong positive relationships

Comfort Features	**r**	.621	-	.730**
	Interpretation	Strong positive relationships		Strong positive relationships
Design Features	**r**	.693	.730	-
	Interpretation	Strong positive relationships	Strong positive relationships	

Table 3: Coefficient interval

Coefficient Interval	Correlation
0.00-0.199	Very Weak
0.20-0.399	Weak
0.40-0.599	Moderate
0.60-0.799	High
0.80-1.000	Very high

Descriptive Analysis between Questionnaire and Observation

To ensure the validity of Objective 2, the researcher did a descriptive analysis to compare the results of the questionnaire and observation based on the elements of distance, width, safety, design features, and comfort features.

Distance Width & Safety Features

Based on the minimum mean for comfort characteristics by questionnaires and observations, the results found that the average mean for the questionnaire was 2.5481 while the average mean for observations was 3.0000. While the total average mean for distance width and safety is moderate which is 2.7740. (Refer to Table 4 and Table 7).

Table 4: Descriptive analysis between distance width and safety

	Minimum	Maximum	Total	Min	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Std. Error**
Questionnaire	1.00	5.00	265.00	**2.5481**	.08520
Observation	2.00	5.00	18.00	**3.0000**	.51640
Total Average				**2.7740**	

Design Features

Based on the average mean of the design features obtained by the questionnaire and observations. The results of the study found that the average mean for the questionnaire was 2.5288 while the average mean for observations was 2.3333. While the total average mean for the distance, width, and safety is low at 2.4310, (Refer to Table 5 and Table 7).

Table 5: Descriptive analysis between design features

	Minimum	Maximum	Total	Min	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Std. Error**
Questionnaire	1.00	4.00	263.00	**2.5288**	.07724
Observation	2.00	3.00	14.00	**2.3333**	.21082
Total Average				**2.4310**	

Comfort features

Based on the minimum mean for comfort characteristics obtained by questionnaires and observations. The results of the study found that the average mean for the questionnaire was 2.4231 while the average mean for observations was 2.3333. While the total average mean for distance width and safety is low at 2.3782. (Refer to Table 6 and Table 7).

Table 6: Descriptive analysis between comfort characteristics

	Minimum	Maximum	Total	Min	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Std. Error**
Questionnaire	1.00	5.00	252.00	**2.4231**	.07570
Observation	2.00	3.00	14.00	**2.3333**	.21082
Total Average				**2.3782**	

Table 7: Mean score

Score	Level of Influence
4.21-5.00	Very Good
3.41-4.20	Good
2.61-3.40	Moderate
1.81-2.60	Low
1.0-1.80	Very Low

DISCUSSION AND CONCLUSION

Objective 1: To identify the components of public space

The components of public space are divided into several elements, such as neighbourhood parks, sports venues, public squares, beaches, streets and yards, urban farms, urban nature, and places dedicated to space (Garry, 2017). A public space is a gathering place in a neighbourhood, city centre, whether it's a particular district, a waterfront, or other public territory that encourages social interaction. Plazas, town squares, shopping malls, parks, markets, public areas, and so on are examples of other public spaces (American Planning Association, 2014). The researchers found that there are a few types of pedestrian walkways: residential walkways and neighbourhood walkways in commercial areas. While there are three types of pedestrian zones available in the United States, such as traditional

pedestrian zones designed for the exclusive use of pedestrians, there is a full mall. The second type is shopping malls that allow limited vehicles and allow one-way traffic lanes, such as semi-malls. The third type is transit pedestrian walkways that are intended to accommodate both pedestrian and transit use.

Objective 2: The level of inclination of public use of public space during covid-19

The tendency of the level of public use consists of the level of respondents' satisfaction with the walkway; public perception of the safety; the comfort of the walkway; and design features.

Respondents' Level of Satisfaction with the Pedestrian Walkway

The analysis shows the respondents' satisfaction with the pedestrian walkway is 65.45% not satisfied with the provision of pedestrian walkways provided and 34.6% satisfied with the provision pedestrian walkways provided. Consumers are dissatisfied because there are obstacles on the sidewalk such as low-quality level, used by hawkers; the sidewalk can only be used one way because the width of 1.5 only fits one way for pedestrians; pole obstacles; garbage; sidewalk structure problems; not user-friendly towards the disabled; and discontinuous. Table 8 shows the highest percentage of respondents (62.2%) were uncomfortable with pedestrian walkway design.

Public perception of safety, comfort, and features of pedestrian walkway design

Table 8: Public perception

Perception	Questionnaire
Distance width & safety	Respondents showed that **53.8%** of respondents disagreed with the level of quality and width of sidewalks.
Comfort	Respondents indicated that **62.5%** of walkways were uncomfortable.
Design features	Respondents indicated that **56.7%** were dissatisfied with the design features of the walkway.

Objective 3: The appropriate design characteristic space during the spread of the pandemic

Figure 1 shows the results of design features that were suitable during the pandemic. The results related to the design features are the priority of users and cause concern among them. The results showed that 54.9% preferred the type of semi-mall pedestrian walkway and some preferred the full mall pedestrian walkway type, which is 41.2%. While the appropriate design features during a

pandemic, according to the respondents The respondent priority is based on all the design features mentioned, which is 56.7% of the respondents. Distance and safety are the priorities of users during the spread of infectious epidemics, which is 55.8%, followed by the layout design at 30.8%, and comfort is 22.1%. The study shows the width of the distance is a major factor that is emphasised during the spread of infectious epidemics. To conclude from this survey, distance and safety are the appropriate design characteristics for space during the spread of a pandemic.

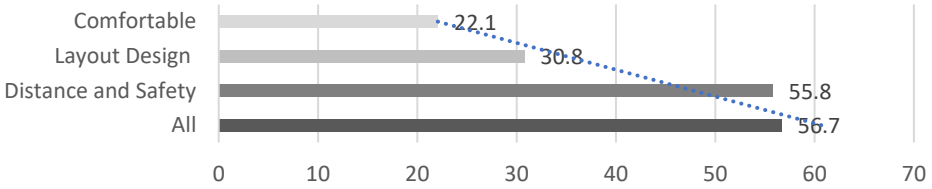


Figure 1: Priority of users and cause concern among them

Objective 4: Formulating appropriate concepts for current public spaces covid-19

Full, semi-, and transit concepts are three alternatives to the proposed public space concept that are framed in designing a suitable public space. Figures 2, 3, and 4 show a proposed pedestrian walkway consisting of full, semi-, and limited transit space.

Full Transit Space

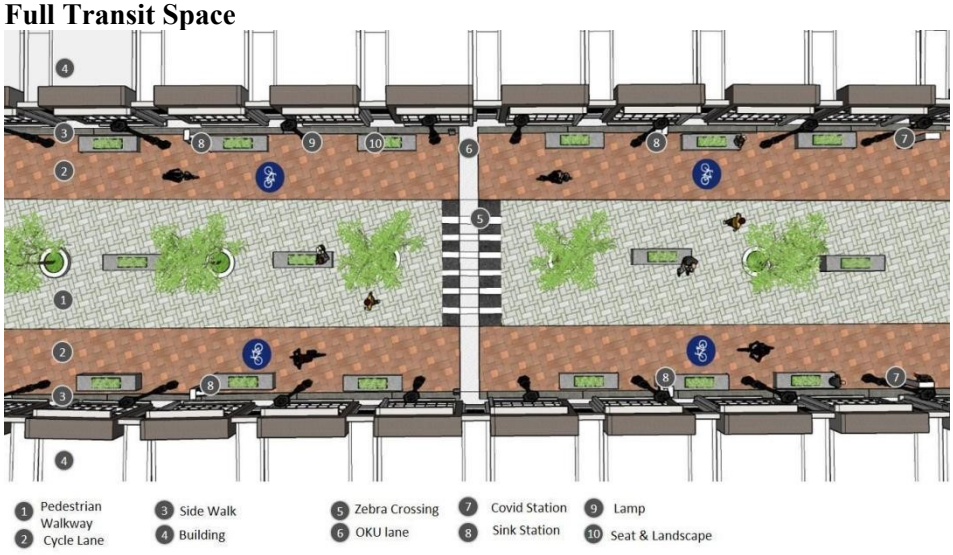


Figure 2: Proposed pedestrian walkway (Full Transit Space)

Semi Transit Space

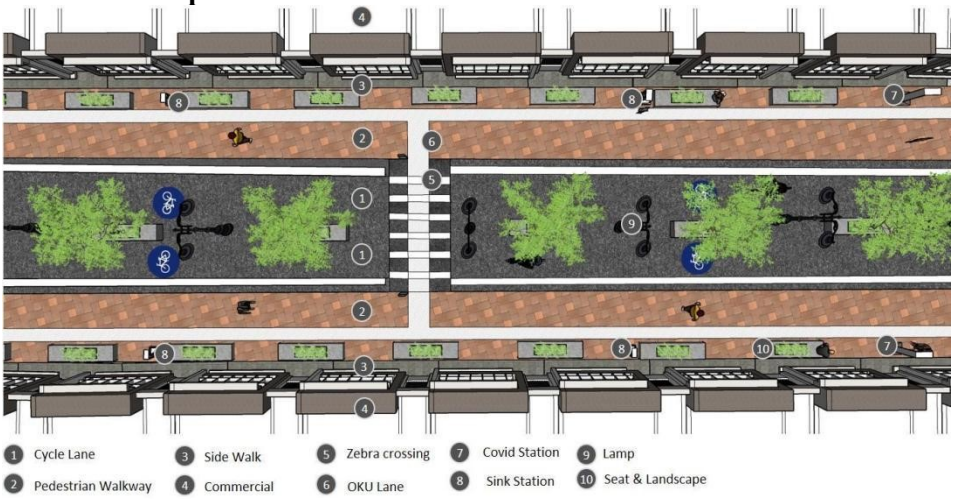


Figure 3: Proposed pedestrian walkway (Semi Transit Space)

Limited Transit Space

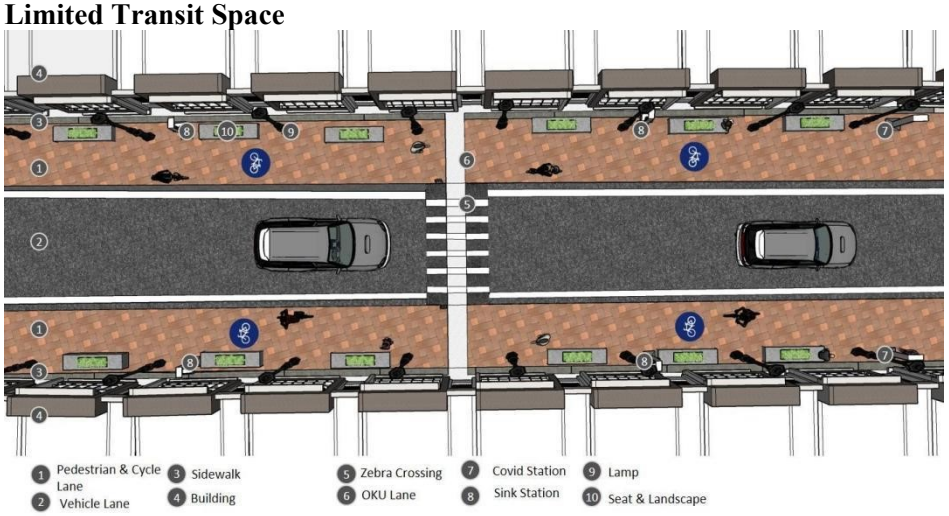


Figure 4: Proposed pedestrian walkway (Limited Transit Space)

CONCLUSION

Most urban areas are experiencing rapid urbanisation, necessitating knowledge-based urban development to help implement strategic goals and policies (Yin et al., 2022). Public spaces are also areas where people can access them at any time. The first objective is to gain knowledge about public space. The general category of public space is divided into several elements, such as neighbourhood parks,

sports venues, public squares, beaches, streets, yards, and places dedicated to public space. The types of public space are also divided into blue space, ghost space, living space, play street, superblock, void deck, clean air zone, linear park, car-free street, urban forest, and woonerf. There are three types of pedestrian zones for public space components for pedestrian walkways, which are full malls, semi-malls, and limited transit space. While the second objective, based on the results of the analysis conducted, showed 65.45% of people are dissatisfied with the provision of pedestrian walkways. The public's perception of safety, respondents showed 53.8% of respondents felt unsafe using the walkway; 62.5% of respondents showed discomfort with the walkway provided, and 56.7% of respondents showed dissatisfaction with the design features of the walkway. Based on the study, the width of the distance is a major factor during the spread of epidemics, which means 55.8% is higher than the other elements. The third objective shows that full and semi are the priority of 54.9% and 41.2% of pedestrian walkways, respectively.

To complete the fourth objective's question, there are several alternatives such as full, semi, and limited transit space design. In addition, there are also suggested walkways, bike paths, COVID stations, station sinks, and some street furniture that can be adapted in public spaces. It is necessary to look at and review the problems that exist in accordance with the current planning situation. This study investigates the scope of public spaces that consist of areas of streets, pedestrian lanes, and bike lanes, as well as an emphasis on several alternatives that can reduce the rate of infection in public space areas. Thus, we can see the gradual process shown in obtaining some research results that are consistent with the objectives of the study. Urban planning oversees developing public areas so that new norms may be maintained in a safe manner. A conceptual design with many options for complete transit space, semi-transit space, and limited transit space has been presented. Entities interested in designing public places, particularly in commercial areas, could find this study and apply it. Further research can establish further ideas and notions of public space in various components, as well as investigate the role of the government in ensuring pedestrian access for all communities during a crisis and study the role of public space in human well-being.

REFERENCES

A Megahad, N., & M Ghoneim, E. (2020). Antivirus-built environment: Lessons learned from Covid-19 pandemic. *Elsevier*, *61*(102350), 1–9. https://doi.org/https://doi.org/10.1016/j.scs.2020.102350

American Planning Association. (2014). *Great Places in America*. American Planning Association. https://www.planning.org/greatplaces/

Cho, I. S., Heng, C. K., & Trivic, Z. (2016). *Re-Framing Urban Space*. Routledge.

Garry, M. (2017). *Categories of Public Places*. http://www.garrymiddle.net/public-open-space-blog/2017/7/31/categories-of-public-places

Gehl, J. (2011). Life Between Buildings: Using Public Space. In *Island Press* (Vol. 8, Issue 1, pp. 54–55). Island Press.

Gehl, J., Thompson, C. W., & Travlou, P. (2007). Open space: People space. In *Open Space: People Space*. Taylor & Francis. https://doi.org/10.4324/9780203961827

Grigoriadou, E. T. (2020). The urban balcony as the new public space for well-being in times of social distancing. *Cities & Health*, 1–4. https://doi.org/10.1080/23748834.2020.1795405

Hamidi, S., Sabouri, S., & Ewing, R. (2020). Does Density Aggravate the COVID-19 Pandemic?: Early Findings and Lessons for Planners. *Journal of the American Planning Association*, *86*(4), 495–509. https://doi.org/https://doi.org/10.1080/01944363.2020.1777891

Harun, N. Z., Jaffar, N., & Mansor, M. (2021). The contribution of public space to the social sustainability of traditional settlements. *Journal of the Malaysian Institute of Planners*, *19*(5), 192–205. https://doi.org/https://doi.org/10.21837/pm.v19i19.1071

Honey-Rosés, J., Anguelovski, I., Chireh, V. K., Daher, C., Konijnendijk van den Bosch, C., Litt, J. S., Mawani, V., McCall, M. K., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. J. (2020). The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities. *Cities & Health*, 1–17. https://doi.org/10.1080/23748834.2020.1780074

Jabatan Perancang Bandar dan Desa. (2013). *Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia Kementerian Perumahan dan Kerajaan Tempatan*.

Martoni, J. (2010). *Metropolis: A Green City of Your Own!*

Mehta, V. (2020). The new proxemics: COVID-19, social distancing, and sociable space. *Journal of Urban Design*, *25*(6), 669–674. https://doi.org/10.1080/13574809.2020.1785283

Ministry of Health Malaysia. (2021). *Covid-19 Malaysia*. https://covid-19.moh.gov.my/

National Association of City Transportation Officials. (2020). *Urban Street Design Guide*. National Association of City Transportation Officials. https://nacto.org/publication/urban-street-design-guide/street-design-elements/sidewalks/

Rubenstein, H. M. (1992). *Pedestrian malls, sreetscapes, and urban spaces*. New York: Wiley.

Samuelsson, K., Barthel, S., Colding, J., Macassa, G., & Giusti, M. (2020). *Urban nature as a source of resilience during social distancing amidst the coronavirus pandemic*. https://doi.org/10.31219/osf.io/3wx5a

Sharifi, A., Khavarian-Garmsir, & Reza, A. (2020). The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. *Science of the Total Environment*, *749*, 1–14. https://doi.org/10.1016/j.scitotenv.2020.142391

Wazani, I. A., Mohamad, D., & Jaafar, M. (2021). Accessibility for persons with disabilities in built environment of urban area: Case study of George Town, Penang. *Journal of the Malaysian Institute of Planners*, *19*(5), 53–65. https://doi.org/https://doi.org/10.21837/pm.v19i19.1059

Wilkie, S., Townshend, T., Thompson, E., & Ling, J. (2018). Restructuring the built

environment to change adult health behaviors: a scoping review integrated with behavior change frameworks. *Cities & Health*, *2*(2), 198–211. https://doi.org/https://doi.org/10.1080/23748834.2019.1574954

Yin, I., Tan, M. L., Mahmud, D. S. A., Mutuveeran, A. A. S., Hassan, M. A., & Tew, Y. L. (2022). Monitoring major city urban expansion in Kuala Lumpur and Penang city centre. *Journal of the Malaysian Institute of Planners*, *20*(1), 64–76. https://doi.org/https://doi.org/10.21837/pm.v20i20.1079

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 172 – 183

WEB-BASED APPLICATION FOR ENHANCING ON-SITE AND REMOTE DATA COLLECTION PROCESS DURING PANDEMIC: AN EXPLORATORY STUDY

Illyani Ibrahim[1], Khalilah Zakariya[2], Norhanis Diyana Nizaruddin[3], Norzailawati Mohd Noor[4], Alias Abdullah[5], Fatin Farhana N Murtaza[6]

[1,2,3,4,5,6] *Department of Urban and Regional Planning, Kulliyyah of Architecture and Environmental Design*
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

The COVID-19 pandemic has changed the way data collection for research takes place around the world. Such adaptation has forced a turn of research methodologies in conducting research. This study focuses on on-site and remote digital data collection methods that can be adopted during the pandemic. The method of research and data collection often requires a group of researchers to travel to a specific site to meet communities for data collection, which is not permissible during the pandemic. This paper explores the use of web-based application for documentation of the existing natural and built features, and land management system for identification of the rural community's land information. In this paper, the use of a web-based application, namely i-LULACAST, is highlighted. The application was designed and used for data entry and management of the rural community with fewer human resources on-site while still maximizing the number of datasets needed for analysis. The system was built using Codelgniter Application 4.0.4 to develop libraries to link databases and perform operations such as data entry, location, and uploading pictures for particular data. This system has also shown prospects for other purposes, such as census, landscape data entry, and contact tracing for medical purposes.

***Keywords**:* data collection, Covid-19, digital, rural, pandemic

[1] Lecturer at International Islamic University Malaysia. Email: illyani_i@iium.edu.my

INTRODUCTION

In response to the COVID-19 pandemic, the Malaysian government enacted a Movement Control Order (MCO) on March 18, 2020 (Prime Minister's Office of Malaysia, 2020). The decree imposes restrictions on all inbound and outward travels, a nationwide prohibition of mass meetings, as well as the closure of all public and private educational institutions and government offices (Tiong & Sim, 2020). During MCO, the government also announced a lockdown, and policy requiring citizen to stay home if sick, practice good hygiene, maintain a social distance of 1 meter from others, and wear a mask. The influence of lockdown has changed the nature of the research, in this case, from site visit, the researcher needs to conduct hybrid or online data collection. Many researchers need to suspend data collection or re-design their projects considering social-distancing measures (Norzailawati, 2021).

On-site questionnaires and interviews are among the traditional data collection techniques that can address the datasets needed from a particular community. These methodologies, however, became infeasible due to the pandemic as many data collection initiatives and routine surveillance must be postponed indefinitely. The MCO restrictions have consequently imposed an enormous challenge to researchers in terms of cost and time. To ensure a research's timeline is fulfilled and the project can continue, alternative methods need to be proposed to facilitate the coordination among researchers and the community. Such shortcomings have imposed big challenges in rural areas for many countries, including Malaysia, as the Internet suddenly become a necessity.

Various technologies such as big data, Internet of Thing (IoT), mobile internet, and cloud computing can be used for data collection. Mobile-phone surveys allow the users to collect real-time data on behavior, exposure, knowledge, and perception, as well as care and treatment, to help the researcher make better decisions (Phadnis et al., 2021). Other technologies that were developed include the virtual data collection for COVID-19 purposes, including pandemic planning, surveillance, testing, contact tracing, and quarantine monitoring (Sosa et al., 2021; Whitelaw et al., 2020). Other studies included data on lifestyle, activities, habits, and environment (Canino et al., 2016), health monitoring (Nugroho Joshua et al., 2017), daily trips and activities information (Piras et al., 2018), and medical delivery in Sri Lanka (Phadnis et al., 2021). Phadnis et al.'s (2021) study particularly found the ability of a mobile-phone survey to facilitate rapid data collection. The mobile-phone survey can be conducted without face-to-face contact with the respondents, hence its suitability to be used during the pandemic. According to Minaar and Heystek (2016), using online surveys for academic research should be acknowledged internationally as practical and affordable. An open-source suite for data collection, KOBO toolbox researcher to collect the data by using 'one click method' and can compile the

data based on the predefined criteria of the research (Lakshminarasimhappa, 2021). However, this web-based application is different as the other technologies as it was answered by the rural residents and its ability to take photos and locate places.

This web-based application was designed to cope with the restriction of movement in the study area. This application allows the data to be collected through minimal direct contacts and interactions with the targeted users or respondents. The study aims to explore the use of a web-based application via mobile phones for land management and a landscape character survey that was to be conducted in a rural area during the pandemic. The objectives of this paper are i) to use the web-based application to collect datasets for land management and a landscape character survey, and ii) to transfer and mapping both datasets using GIS. This study explores the application of the web-based system by selecting six villages under Sultanate Land that is in Pekan town in the state of Pahang. The innovation of the web-based mobile application was crucial because the research team was based in Kuala Lumpur, about 280 kilometres away from the case-study area.

DATA COLLECTION

The case study of this research is the Sultanate land in Pekan town. For the land-use survey, the respondents selected are all villagers who live in this land. The villagers need to fill in the survey form to update information regarding the owner or renter of the land. Due to the restrictions of traveling during the fieldwork phase of the research, only a limited number of researchers could travel to the site. The robust nature of i-LULACAST made it easy for the research team to obtain the data, whether by sourcing it from the locals' and research assistants' smartphones or by having a local representative to assist the locals to fill in the data from a computer.

To monitor the research remotely, the team appointed the liaisons officers from the Sultanate Office and the representative from each village to explain the purpose of the study. They also distributed the questionnaires to all homes in the study areas by providing the link and Quick Responds (QR) codes media, and social media platforms, such as Facebook and Whatsapp. Another action taken was to distribute flyers and booklets to each home in the study area. For those residents who has no smartphone, they will respond to the system and the representative will visit to the respective home or fill in the questionnaire using laptop or a computer. As a result, this approach will increase the outreach to the rural residents who lack technology.

WEB-BASED APPLICATION FOR DATA COLLECTION

The web-based application had to be user friendly and developed with specific parameters that could facilitate the data collection and analysis. Thus, this study developed the web-based application survey, namely IIUM Land Use and Landscape Character Survey Tool (i-LULACAST), for the data collection and analysis. The detailed information focused in this application particularly covered of two main aspects: (i) the owner of each lot in the rural area for land management, and (ii) the landscape character of the rural area for site analysis. This application was developed as an alternative to on-site fieldwork data collection. The key components of the database have been identified and will be developed and transferred to a Geographical Information System (GIS) application for land management purposes and landscape character analysis and will be coordinated through the application according to ArcGIS and MapInfo formats. The data are also transferrable to Google Earth.

The system was built using Codelgniter Application 4.0.4 as a PHP MVC framework to develop libraries to link databases and perform operations such as data entry and location and uploading of pictures for particular data. The optimisation of web-based application for data collection was high among the researchers due to the movement limitation caused by the pandemic. The application, called i-LULACAST, was intended to be used in two ways. Data entry can be done using any smartphone with access to the Internet. The land-use survey data were to be filled in by the local residents, while the landscape character survey questionnaire was to be filled in by trained local research assistants. The collected data then can be accessed and retrieved by the researchers from their laptops. Since the data entries were updated automatically in the database, the researchers could monitor the data progress in real-time.

The framework of the system focuses on the functions and steps for adding users and selecting the data needed to be filled by users or experts regarding the analysis for the rural area (Fig. 1). The user and expert need to register and log in. The user, the occupant of the house, in this case, needs to input the data in the form. For land management, the details of data input include the name, identification number, address, rental or ownership status, phone number, duration of residency, number of households, tax number, year built, and house type. Since the house addresses are geotagged, all of the data can be automatically transferred to the GIS platform. For the landscape character survey, the expert and trained local research assistants will identify the landscape elements on the site, such as vegetation, structure, building, culture, visual and public space. These datasets will be transferred to Google Earth and the GIS platform for mapping.

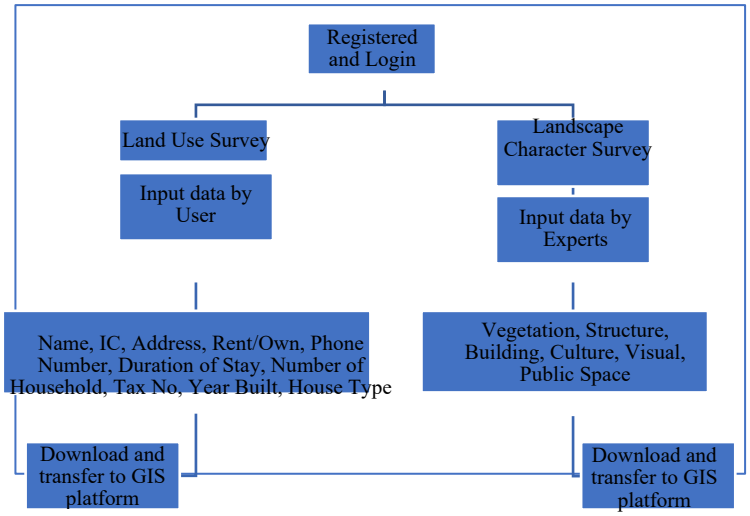


Figure 1: Flowchart of i-LULACAST web-based system

i) Land Use Dataset

The data collection was conducted from March to May 2021 using the i-LULACAST application. This web-based application was developed to facilitate the data collection process by considering the pandemic situation. A link to the web application was given via social media groups, which included the village head and other JKKK members. The link was then distributed to all members of the particular village for them to fill in the data from their homes. For security purposes, the user needed to register him/herself and the village name. The password was prepared by the administrator and distributed to the occupants. With regard to land-use information, some of the datasets required were the house's location, occupant's name, occupant's identification card, phone number, and lot number. Other information needed were the year of the house built, type of house, year occupied, duration stay in that particular house, total household, photos, and land tax number.

ii) Landscape Character

The landscape character survey is another important component of the research. While the land management survey documented the occupancy of the study area, the landscape character survey documented the existing natural and built features of the site. Based on a preliminary study of the significant components that need to be mapped on-site, the research team delineated five primary components: (i) location details, (ii) vegetation, (iii) buildings, structures, and public spaces, (iv) culture, and (v) visual. Other relevant data—such as topography, hydrology, land

use, and others commonly mapped during the site inventory process—were omitted from the application because these kinds of data can be obtained from secondary sources and are not necessary to be mapped on-site. For each component, the experts or trained research assistants can fill in the descriptions and evaluations of their observations (similar to writing down field notes), upload multiple photos, and geotag the locations. The application can map the data directly according to the coordinates of the location and attach the information and photos that were keyed in from the smartphones. Then, this data can be accessed and downloaded in the form of a spreadsheet and transferred to Google Earth or GIS for mapping and analysis.

DATA ANALYSIS

The levels of login to i-LULACAST are divided into two parts: the administrator and the user. 'Admin' is the administrator who manages the system, which is part of the research team. 'User' is the occupant of the houses in the study area and the trained research assistants. The application was developed to support data collection via survey with security features (https, cloud server, admin roles and password controls). The interface of the login page is shown in Fig 2.

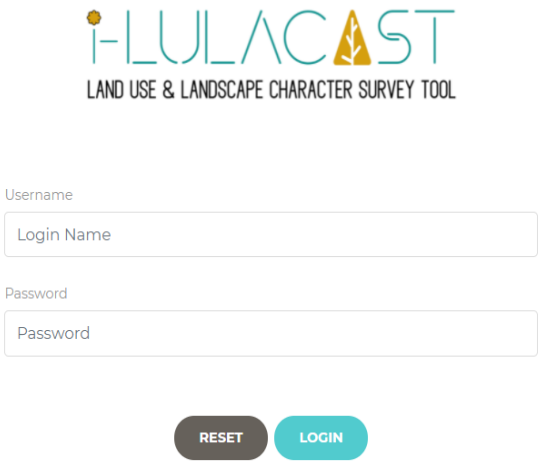


Figure 2: The login page of 'i-LULACAST' for both Admin and User

The Dashboard application (Fig. 3) was used to view the registered users. In this interface, the total users, as well as the number of entries for both land use and landscape survey, can be seen. This dashboard can be seen by the administrator only. The summary of users who key in the particular information can be seen under 'land survey' records by villages, while the number of data

collected for landscape character survey can be seen under 'landscape survey' records.

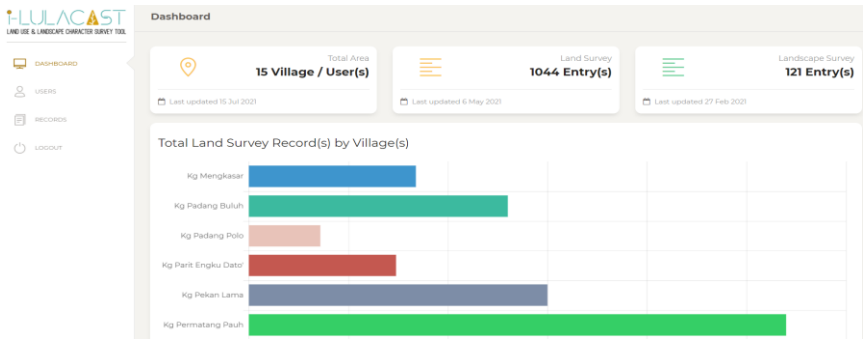


Figure 3: The dashboard application 'i-LULACAST'

i) Land Use Survey

This interface is the view seen by the users (Fig. 4). The users were required to fill in all of the datasets and also take photo of their house. All the datasets were kept in the servers and will be exported to the GIS platform for the development of database for data management. The users need to be in their home and click on Locate button to capture the coordinate.

Using a centralized platform, web-based information portal improved the number of users required to fill in the data. At least 75 percent successfully filled in the form. The data indicate that 937 users out of 1152 total ownerships (including houses, agricultural land, commercial and institutional areas) filled in the form. Some of the areas could have an unstable internet connection; these locations therefore, were pin-pointed by the users not on the exact location.

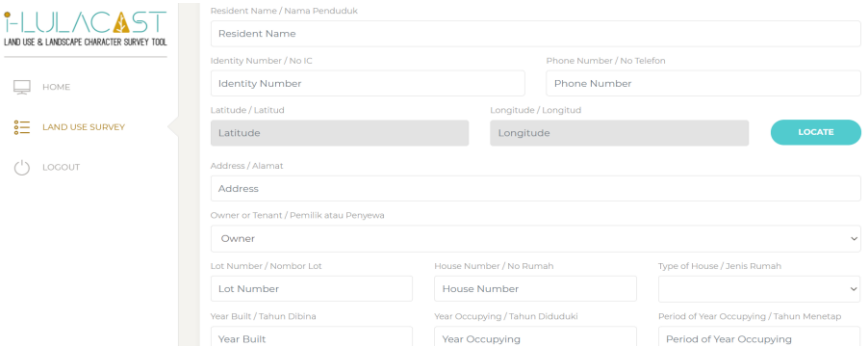


Figure 4: Types of datasets needed in the study

The key components of the database were identified and were developed and coordinated through the application and according to ArcGIS and MapInfo formats. All of the occupants' information were matched with their particular houses on the GIS map so the occupants' updated information can be kept and used by the authority for land management purposes. The data collected were then extracted from the spreadsheet and transferred to GIS for further analysis. The xy coordinate of each particular house are extracted as below (Fig. 5).

However, several limitations of the web-based application were found. The limitation of the internet network precluded the data from being submitted at the occupants' homes. The occupants also had to fill in the overlapped data for similar information, hence the need for data screening. Another limitation was the users' unfamiliarity with how to key in the datasets, as they come from rural areas. Susceptible groups, including the elderly, are less likely to have a mobile phone and may not be able to use such an application. Some of the elderly also stay in their house without their children, who work in different area or state; this group of occupants (the elderly) would need further assistance from the research team. In this case, the chief village distributed his team members to visit those particular houses to ensure that every information of the occupants was successfully included in the system.

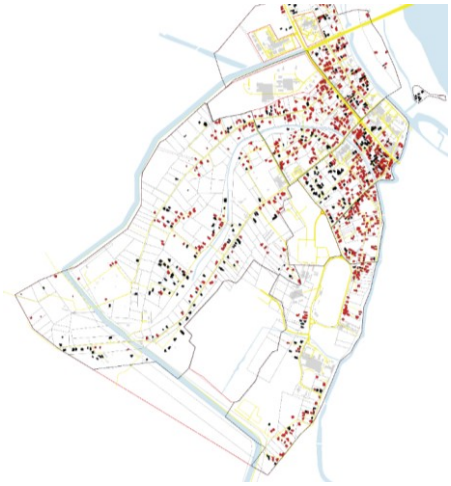


Figure 5: Point data for individual house

ii) Landscape Character Survey

For the landscape character survey, the admin set an account for each of the experts and trained research assistants. Each person was given a guide for the

landscape character survey and briefed on how to use the application (Fig. 6). They were then assigned to collect the data at the site. The technique is the researcher could document all or any of the relevant components for a particular spot. For example, for Site A, Researcher No. 1 could document the location details, vegetational characters, buildings, structures, public spaces, visible cultural activities, and visual qualities. This could be done by a trained person with a smartphone and Internet access. All entries are required to have location details so that all the data can be mapped to their locations.

The data collected were then extracted from the spreadsheet and transferred to Google Earth via the plotted coordinates (Fig. 7). The research team then categorized the data into two major aspects: accessibility and zones. Accessibility comprises critical entry points, primary and secondary access routes, and transition points between the zones. Zones comprises the palace and administrative zone, and the village zones. Based on the documented photographs, descriptions, evaluations, and locations, the researchers then analyzed the collected data based on the research aims and objectives.

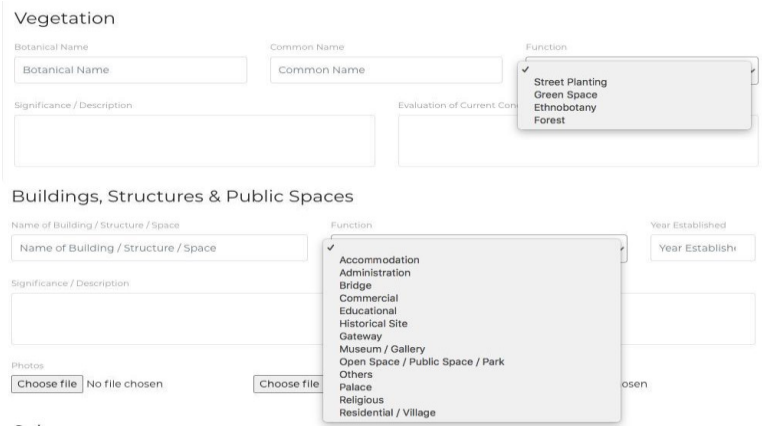


Figure 6: Example of datasets for landscape character survey

Figure 7: Example of data mapping from i-LULACAST to Google Earth

By using i-LULACAST for the landscape character survey, the researchers found three advantages and two limitations. The advantages of i-LULACAST are that it is collaborative, easy to use, and able to map data digitally. First, the collaborative nature of the application allows multiple users to key in data simultaneously or at different times, and at the same or different locations. Fieldwork can be done by as little as one or two researchers or by as many numbers of researchers needed. Second, since i-LULACAST can be accessed using most smartphones with an Internet connection, the application can be used easily by researchers and trained research assistants. The application's components are user friendly in that users only need to type in their observation notes and upload photos from their smartphone cameras. Locations can be plotted both from the address keyed in the application or from the location detected in the GPS. Third, i-LULACAST documents the data entries can be mapped digitally with the coordinates and retrieved for analysis. Conventional manual mapping would require site data to be plotted physically on a map or documented through field notes and aided by a hand-held GPS for coordinates. The use of i-LULACAST enabled the researchers to obtain all these data by using a single application.

Nevertheless, as a newly developed web-based application for landscape character survey, i-LULACAST still has some limitations. First, due to the weak signals in certain parts of the rural area, some of the coordinates were not accurate. This was solved during the data cleaning stage where the researchers replotted the coordinates based on the address keyed in the database. Second, the quality of the photos highly depends on the quality of the smartphone used during the data collection. For inventory and analysis purposes, most of the photos documented in the study were sufficient for analysis. However, for presentation purposes, only high-quality photos could be used.

DISCUSSION

The restrictions of the pandemic have provided an opportunity for researchers to propose new methods for on-site and hybrid data collection. In the pre-pandemic time, a research team would typically be the main actors that collect data on-site and the locals would be the respondents, with little or no interaction with the research instruments. i-LULACAST serves as a digital platform for a wider crowdsourcing of research data where the locals can directly engage with the research instrument. The use of this web-based application also provides an opportunity for a research team to empower the local community as representatives to guide other local respondents on how to use the application. In this study, the chief of villages, the JKKK, and the local research assistants were briefed and trained on how to use i-LULACAST. Some of the residents never had the chance to key in their information online, as this project marked their first

experience. The knowledge-transfer process was a trajectory of the research that was not initially planned as part of the methodology. However, this application has become a significant part of the contributions of the research to the locals of the study area.

The potential of this web-based application is this application can be used as a long-distance survey that can reduce the cost of the data collection. However, the limitation of this application is that some areas was limited internet connection, thus the location provided is not accurate. Low internet connection will provide a not accurate Global Positioning System (GPS) location when transferred to GIS software. This issue can be improved by providing a fast internet connection in any places around Pekan town area.

The strength of this application is it is paperless work. It only requires android phone and minimal understanding in filling in the data, so the researcher able to do long distance data collection. It is also time consuming as all the data will be collected in the server as cloud data. The application also able to locate the location of the houses with the availability of GPS. With the use of application, this research also able to reduce the cost for data collection, including for remunerators dan mobility.

CONCLUSION

The effectiveness of the web-based application has been demonstrated in this study since its operation is simple and easy to understand by persons of different ages and levels of education. This technology does have the potential to be used for other applications, such as census, landscape data entry, and medical contact tracing. This i-LULUCAST web-based application can be optimised in a flexible manner by the researchers particularly in the challenging times that limit the possibilities of on-site groundwork and direct community engagement.

ACKNOWLEDGEMENT

Thank you for an extensive discussion for our sponsored research groups regarding the subject of this paper. Thanks for the funding from grant (C21-156-0474). Thank you to the International Islamic University of Malaysia and IIUM Planning & Design Services Sdn. Bhd. (IPDSS) for the full cooperation in completing this research. Many thanks also to the Orenbytes Sdn Bhd for assisting our team in developing i-LULACAST. Authors also would like to sincerely thank all referees for their suggestions to improve the manuscript.

REFERENCES

Canino, G., Scarpino, M., Cristiano, F., Mirarchi, D., Tradigo, G., Guzzi, P. H., Cuda, G., & Veltri, P. (2016). Geoblood: A Web Based Tool for Geo-analysis of Biological Data. *Procedia Computer Science*, *58*, 473–478.

Lai and Widmar, 2021, Revisiting the Digital Divide in the COVID-19 Era, *Appl Econ Perspect Policy, Vol. 43*(1), pp. 458 – 464.

Lakshminarasimhappa (2021). Web-based and smart mobile app for data collection: KOBO Toolbox/KOBO Collect, *Journal of Indian Library Association, Vol. 57* (2), pp. 72-79.

Norzailawati, M. N., Alias, A., Illyani, I., Fatin Farhana, M., Khalilah, Z., Norhanis Diyana, N. (2021). Experiencing i-LULACAST urban planning virtual survey approach during pandemic covid-19. *Malaysian Journal of Industrial Technology, Vol. 6*(1).

Nugroho Joshua, J. W., Agus Swastika, I. P., & Daniaty, T. O. W. (2017). E-Government Integration through Implementation of web-based GIS on Community Health monitoring in Jembrana Regency, Bali. *Procedia Computer Science*, *124*, pp. 552–559.

Minnaar, L., & Heystek, J. (2016). Online Surveys as Data Collection Instruments in Education Research: A Feasible Option? South African Journal of Higher Education, 27(1), pp. 162–183.

Phadnis, R., Zevallos, J. C., Wickramasinghe, C., Davlin, S., Kumarapeli, V., Lea, V., Lee, J., Perera, U., Solórzano, F. X., & Vásconez, J. F. (2021). Leveraging mobile phone surveys during the COVID-19 pandemic in Ecuador and Sri Lanka: Methods, timeline and findings. *PLoS ONE*, *16*(4 April), pp. 1–15.

Prime Minister's Office of Malaysia. Restriction of Movement Order (2020, March 16). Retrieved from https://www.Pmo.Gov.My/2020/03/Movement-Control-Order/.

Piras, F., Sottile, E., Calli, D., & Meloni, I. (2018). Automatic data collection for detecting travel behavior: The IPET platform. *Procedia Computer Science*, *134*, pp. 421–426.

Sosa, J. P., Ferreira Caceres, M. M., Ross-Comptis, J., Hathaway III, D., Mehta, J., Pandav, K., Pakala, R., Butt, M., Dogar, Z. G., Belizaire, M.-P., El Mazboudi, N., Pormento, M. K. L., Zaidi, M., Devender, H. M., Loh, H., Garimella, R., & Brahmbhatt, N. (2021). Web-Based Apps in the fight against COVID-19. *Journal of Medical Artificial Intelligence*, *4*, pp. 1–1.

Tiong, W. N., & Sim, A. F. S. F. (2020). Web-based Seminar - New Source of Qualitative Study: Data Collection during the Pandemic of COVID-19. *SEISENSE Journal of Management*, *3*(6), pp. 50 – 64.

Whitelaw, S., Mamas, M. A., Topol, E., & Van Spall, H. G. C. (2020). Applications of digital technology in COVID-19 pandemic planning and response. *The Lancet Digital Health*, *2*(8), pp. 435 – 440.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 184 – 196

DETERMINING THE FACTORS AFFECTING THE EXTENT OF COMPLIANCE WITH RESIDENTIAL PLANNING STANDARDS: CASE STUDY OF BENGHAZI, AL-FATAH DISTRICT, LIBYA

Saaed Awad Abrabba[1], Nurwati Badarulzaman[2], Diana Binti Mohamad[3]

School of Housing, Building and Planning
UNIVERSITI SAINS MALAYSIA

Abstract

This study aims to determine the factors that influence the extent of compliance with residential planning standards and regulations in an authorised urban area of Benghazi, in Al-Fatah district, Libya. Combined quantitative and qualitative methods are used in this study. Based on survey results of 359 heads of households, the statistical software PLS-SEM via Warp PLS 6.0 is used to determine the significant factors affecting compliance level, supported by semi-structured interviews with five officials from planning authorities. Compliance level with residential planning standards is relatively low in Benghazi. Nine factors include the monitoring system, staff training, corruption, bureaucracy, financial facilities, housing provision, and social and physical infrastructure all have significant effects on the extent of compliance with residential planning standards. However, only the enforcement system has no noticeable effect on the compliance level. The study found that the primary driver for low compliance is economic in nature, followed by administrative considerations. With the continued availability of authorised housing and housing schemes, even without infrastructure, it is possible to achieve a high level of compliance in the future.

Keywords: planning standards, compliance, urban area, planning violation, Libya: Benghazi

INTRODUCTION

Non-compliance with planning standards is a widespread issue in most developing countries. (Arku, Mensah, Allotey, & Addo Frempong, 2016; Fuladlu, 2019; Ochieng Omollo, 2020). Non-compliance with planning standards or planning violations occur when a building, layout, or project violate the planning standards, the zoning regulations, or the master plan land-use standards (Sundaresan, 2017). Planning standards and regulations specify the appearance of the settlements in terms of quality. In other words, planning standards are rules that regulate what activities are allowed or disallowed on a plot or in a given area (Adamolekun, M. O., A. J. Isiwele, 2017; Lusugga Kironde, 2006). A high level of compliance with planning standards is critical to the success of the planning system. The welfare concept of planning and its standards is to direct urban development and land use requirements in a way that is beneficial to society (Baffour Awuah & Hammond, 2014). Many studies have investigated and continue to determine the factors affecting the extent of compliance with planning standards. These factors are often classified as economic, social, administrative, and demographic factors, in addition to those directly related to the planning standards themselves (Abrabba, Badarulzaman, Mohamad, & Kadi, 2021; Abubakar, Lizam, & Yassin, 2013; Alnsour & Meaton, 2009; Atamewan, 2019). Non-compliance with planning standards is a serious dilemma, as it affects not only those who breach the standards but also complying individuals who live in the same area, as violations have a negative economic impact on housing and land values (Addai, John, Bediako, & Gyimah, 2012). As a result of the above insights, this study aims to identify the factors that affecting the level of compliance with residential planning standards through a case study of Benghazi's Al Fatah district. To achieve this goal, the study developed nine hypotheses limited only to the administrative and economic factors based on a careful review of the relevant literature:

H1. Monitoring of the construction process has a positive impact on the extent of compliance with residential standards.
H2. Enforcement of planning standards has a positive impact on the extent of compliance with residential standards.
H3. The level of trained staff has a positive impact on the extent of compliance with residential standards.
H4. Corruption has a negative impact on the extent of compliance with residential standards.
H5. Bureaucracy has a negative impact on the extent of compliance with residential standards.
Economic Factors
H6. Residential financial facilities have a positive impact on the extent of compliance with residential standards.

H7. Housing provision has a positive impact on the extent of compliance with residential standards.
H8. The social infrastructure provision has a positive impact on the extent of compliance with residential standards.
H9. The physical infrastructure provision has a positive impact on the extent of compliance with residential standards.

RESEARCH BACKGROUND

The review of the literature demonstrated that non-compliance with planning standards has an adverse impact. This impact extends from individuals to neighbourhoods, towns, cities, nations, and even the world as a whole. Non-compliance also affects zone typology, which shifts from rural to urban zones without consideration for regional and spatial objectives (Wunarlan, Soetomo, & Rudiarto, 2020). Numerous researches have been conducted to determine the factors that influence the extent of compliance with planning standards (Abrabba et al., 2021; Abubakar et al., 2013; Alnsour & Meaton, 2009; Atamewan, 2019).

Administrative factors

The administrative effect as a main factor consists of several sub-factors including the monitoring system, enforcement, and staff training level, corruption and bureaucracy. Firstly, a weak monitoring system has shown to have adverse effects on the compliance level with planning standards (Arimah & Adeagbo, 2000; Ochieng Omollo, 2020; Offiong, 2017). The monitoring system's function is to detect any act of planning violation at an early stage (Ioannidis, Psaltis, & Potsiou, 2009). Secondly, the enforcement task is to remove any development that violates the planning requirements or bring the work into line with the residential standards (Alnsour & Meaton, 2009). Financial constraints, a lack of staff and social ties all contribute to the enforcement system's incapacity (Omollo, Hayombe, & Owino, 2018). Thirdly, the level of staff training has been indicated as one of the factors affecting the compliance level. The lack of skilled planning staff has a detrimental effect on the entire planning system in terms of poor decisions that result in increased density and the destruction of green spaces (Hajialirezalou, 2018). When reviewing the reasons for non-compliance with planning standards in previous studies, it is clear that corruption plays a role in the fall in compliance levels (Adamolekun, M. O., A. J. Isiwele, 2017; Jones & Vasvani, 2017). Bureaucracy and complex procedures have made it difficult to maintain a high compliance level (Dambeebo & Jalloh, 2018).

Economic factors

According to the literature, the economy plays a significant role in the compliance level, which is reflected by the income level(Alnsour & Meaton, 2009; Monkkonen & Ronconi, 2013), difficulties related to financial resources and

funding, and financial facilities (Aliyu, Kasim, & Martin, 2011) that affect housing and infrastructure provision. The term "housing provision" here does not apply exclusively to housing; rather, it refers to any legal access to housing units or plots. Housing shortage has been identified as one of causes that increase the planning violations (Ochieng Omollo, 2020; Srkheylai, Sharifi, Rafieian, Bemanian, & Murayama, 2012). Usually, the subsequence of urbanisation is the shortage of housing (Arimah & Adeagbo, 2000; Mohd Ariff Mohd Daud, Saiful Azhar Rosly, 2022). Only a small number of plots provided for development compared to the quantity of plots applications, which refers to the land shortage that encouraged the planning violations (Kombe, 2005).In most developing countries, the absence of physical infrastructure and services has been a critical concern, as governments are unable to handle the high cost of infrastructure provision (Djafri Riadh, 2021; Sundaresan, 2017).Regarding the social infrastructure, scholars indicated that there is a relationship between the social infrastructure and the extent of compliance with planning standards (Mohammad, 2006).

Study location

Benghazi is Libya's second-largest city and economic capital. Benghazi is located on Libya's eastern coast. The case study Al-Fatah district is located in the centre of Benghazi, consisting of two types of housing that are allocated in two distinct ways: firstly, through the cooperative housing system; and secondly, by providing a plot of land with loans and allowing owners to construct their dwellings under their supervision. Additionally, it contains two distinct types of residential housing, low and middle density.

Theoretical context

This study's theoretical framework was constructed using a variety of theories and multivariate behavioural models. Numerous attempts have been made to characterise both regulatory compliance and pro-environmental activities using a variety of major behavioural drivers. While non-compliance is traditionally viewed as a deliberate act motivated by risk assessment (Becker, 1968; Thomas, Milfont, & Gavin, 2016). By providing an instrumental perspective on compliance, Becker's model considers non-compliance as a result of the expected net benefit of law violations, the risk of detection, the possibility of conviction, and the severity of the penalty (King & Sutinen, 2010; Thomas et al., 2016).

RESEARCH METHODOLOGY

This study employed a mixed-methods approach to determine the factors affecting the level of compliance with planning standards. The questionnaire was distributed to household heads, while the semi-structured interviews were conducted with officials from the planning authorities of Benghazi. Using

quantitative methods to gather accurate answers to the research questions, responses on the questionnaire survey were obtained from the heads of households who were living in residential areas that violated the planning standards. The selected area has a total of 1115 residential units. Each housing unit represented one questionnaire as the target population are the household heads. The minimum sample size for this study was 298, which was determined on the basis of the Morgan schedule (Krejcie & Morgan, 1970) . A total of 400 questionnaires were received from the household heads. After eliminating biassed responses, the remaining 359 questionnaires were analysed. Convenience sampling was used as a sampling technique. The questionnaire data were analysed using the statistical software PLS-SEM via Warp PLS 6.0.

RESULTS AND FINDINGS

The model constructs' reliability has been assessed, and loading factors less than 0.7 have been removed (Hair et al., 2011; Oliver G¨otz, Kerstin Liehr-Gobbers, 2010). Results showed that factors (exogenous variables) of Monitoring, Enforcement, Staff training level, corruption, Bureaucracy, Finance, Housing provision, social infrastructure, Physical infrastructure all have composite reliability (CR) greater than 0.7. As a result, the findings indicated that the measurement model is internally consistent and reliable. The R-square (R2) measure of endogenous constructs and the path coefficients should be examined to get a preliminary assessment of the structural model (inner model) and hypothetical framework (Chin, 2010; Hair et al., 2011). The endogenous construct (Compliance level) in this study has an (R2) value of 0.31 (Figure 1), which is regarded to be a moderate value. As demonstrated in Table 1, eight of the nine path coefficients are also highly significant. A common interpretation is to refer to effect sizes as small (0.2), medium (0.5), and large (0.8) based on Cohen benchmarks (Cohen, 1988). Cohen's d is best interpreted by comparing it to other effects in the literature and explaining its practical implications. No clear recommendations are given (Fidler, 2002). The results indicate that the effect size of all factors is small, yet, the majority have significant P values. Positive connections indicate that both variables either increase or decrease together. Consequently, the factors (IVs) affect the compliance level (DV), indicating that the compliance level may improve once these factors are addressed.

Table 1: Results of path coefficients and hypotheses testing.

	Hypotheses			Path coefficient	p value	Effect size	Supports
1	Monitor	=>	Compliance Level	0.08	0.05	0.02	Yes
2	Enforce	=>	Compliance Level	Factor was deleted			No
3	Training	=>	Compliance Level	0.07	0.08	0.01	Yes
4	Corrupt	=>	Compliance Level	-0.13	<.01	0.03	Yes

5	Bureau	=>	Compliance Level	0.09	0.03	0.02	Yes
6	Finance	=>	Compliance Level	0.07	0.07	0.01	Yes
7	Housing	=>	Compliance Level	-0.08	0.05	0.01	Yes
8	S-Infra	=>	Compliance Level	-0.29	<.01	0.12	Yes
9	Ph-Infra	=>	Compliance Level	-0.22	<.01	0.08	Yes

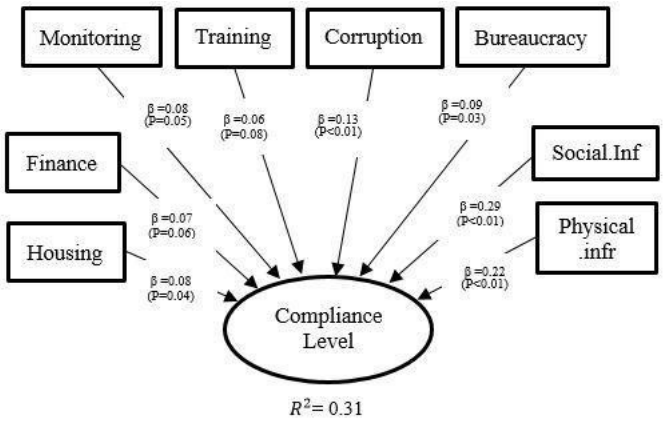


Figure 1: Results of the structural model

The Administrative Aspects

Monitoring

The survey indicated that an ineffective monitoring system contributes to non-compliance with residential planning standards. Participants stated that the lack of modern techniques is one of the main reasons for the system's inefficiency even for existing and new buildings. Based on the interviewees, social barriers that hinder people from reporting any form of planning contraventions also thwart the traditional monitoring system, which relies on neighbours' complaints to detect planning violations. Moreover, the difficulty of visiting existing buildings due to social considerations obstructs the field patrols. As a result, the traditional method is ineffective. Aside from that, there are no new modern techniques. As a result, the monitoring system in Benghazi's planning system does not exist. A further issue of debate is the complete absence of databases and information. The information available is only aerial images, satellite images, and blueprints of planning schemes. This finding is consistent with empirical findings from (Kombe, 2005) and (Rakodi, 2001), which demonstrate that planning violations are a result of an insufficient monitoring system. The more skilled the monitoring staff were, the more compliant the buildings were (Offiong, 2017).

Enforcement

According to the survey, enforcement has no discernible influence on compliance. Participants cited obstacles to planning authorities enforcing

planning standards, including a lack of government financial support, the large scale of violations, and foreknowledge of the lack of options except for illegal buildings. The lack of a significant effect of the enforcement system is surprising given Alnsour (2009) and Olufemi (2018)'s findings that enforcement has a considerable impact on the compliance levels. Additionally, these findings contradict those of Dambeebo and Jalloh (2018) and Wahab and Ojolowo (2018), who found that insufficient enforcement enabled non-compliance, resulting in disorganised spatial growth. Interpretations of this contradiction can be suggested that enforcement had no substantial influence in the research region because household heads believe that the planning violation was only related to flagrant infractions, such as breaches of public places such as public parks. The majority of inhabitants in the study region believe they have the right to expand their dwellings within the bounds of their plots as long as they do not go beyond the plot boundaries.

Staff's training level

According to the findings, the level of training of planning department staff has a substantial impact on compliance. P Value is a certain trend toward significance (0.08). A proportion of interviewees indicated that the planning department staff is unskilled. Technical skills, well-advised decisions, and monitoring by using new modern devices and technologies are the most significant characteristics related to the training and skills of the planning staff that scholars identified as affecting compliance levels. Offing (2017), Arku (2016), and Hajialirezalou (2018) findings corroborated the analysis of this hypothesis. The skills and training level of the planning staff got evaluated on a variety of criteria, including their expertise in managing the city, their ability to update standards, their communication skills with agents and citizens. Thus, based on these perspectives, the findings suggested that the levels of training and skills of planning authority staff affect the extent of compliance. Additionally, these findings were supported by interviews with planning authority officials.

Corruption

Corruption is one of the elements affecting the extent of compliance in the study area. Corruption in this context typically pertains to favouritism, nepotism and social pressure from relatives and friends that influenced staff' ability to treat applicants fairly. Other corruption forms such as the bribes is not common as bribery is characterized by shame in the Libyans' society. This finding confirms Alnsour's (2009) assertion that corruption encourages planning deviation. Similarly, related research indicated that one of the reasons that facilitated non-compliance was corruption (Makato, 2016; Omollo et al., 2018).

Bureaucracy

The bureaucracy is evaluated in terms of time, fees, and the procedures for acquiring building approval and title. According to the interviewers, bureaucracy may not be one of the primary factors, as apathy toward obtaining a building permit may result from a lack of monitoring and enforcement. As long as the monitoring and enforcement mechanism is weak, people tend to disregard getting permission. As a result, bureaucracy may contribute significantly to planning breaches through the delaying and issue of new layouts, rather than through the delaying and issuance of building permits and permits for housing extensions. These results agree with the finding of Arku et al. (2016), who found that bureaucracy in terms of rigorous and series of procedures and filed documents to earn a title encourages people to build illegally. In a similar context, Dambeebo (2018) determined that bureaucracy has hampered efforts to achieve a high level of compliance.

Economic Factors

Residential financial facilities

The hypothesis predicting a relationship between the financial facilities and compliance level is fully supported. P-Value approached the borderline of significance (0.07). The interviewees identified the following issues with these facilities: (i) Lack of approved residential plots. (ii)The difference between the loan amount and the actual construction costs. (iii)Housing loan complications in terms of requirements. These data confirmed Alnsour's (2009) assertion that a lack of financial resources often results in substandard design and construction.

Housing provision

As expected, housing provision has a sizable impact on compliance levels. All participants agreed that a lack of housing and authorized residential schemes was the main reason for planning violations and informal settlements. The literature on housing shortages and illegal housing supports these findings. For example, Arimah and Adeagbo (2000) found that housing shortages led to informal settlements. According to Jawaid, Pipralia, & Kumar (2018), housing shortages together with shrinking buildable land, are serious issues to urban planning and the environment.

Social and physical infrastructure

The study indicated that both social and physical infrastructure had an impact on residential planning standards compliance. These results agree with the findings of Mohammad (2006), who found a moderately positive association between social infrastructure and compliance level in Old Salt, Jordan. Physical infrastructures were discussed with the planning officials, surprisingly the majority of interviewees asserted that there is no relationship between

infrastructure provision and noncompliance with planning standards. One of the managers made an intriguing argument regarding infrastructure and the planning violation, adding that the only relationship was that the planning encroachment damaged existing infrastructure. Libyan infrastructure projects face challenges such as a lack of coordination and hierarchy among different types of infrastructure, whether during installation or maintenance. Additionally, it was expected that infrastructure might contribute to planning violations by attracting citizens to build illegally to benefit from the infrastructure. This assumption was incorrect, as over 80% of Benghazi's urban area lacks infrastructure, either partially or totally, and planning violations occurred in both serviced and unserviced areas. According to the survey findings, physical infrastructure has an effect on compliance levels. These findings contradict the findings of the planning authorities' staff. This discrepancy may be explained by the notion that planning officials evaluate the issue in a broader context for the entire country, rather than simply for a specific area. The survey results reflect Zegarac's (1999) conclusion that one of the causes for illegal construction is a scarcity of available sites and parcels for individual housing with basic utility provision. According to Omollo's (2020) recent study, there is a link between disregarding planning standards and infrastructure, with the planning violation affecting a variety of factors, including pressure on infrastructure facilities.

DISCUSSION

Since non-compliance with planning standards was investigated from two distinct perspectives, namely household's heads and planning officials, the findings were sometimes consistent from both sides and at other times inconsistent. Most findings of the administrative factors were in line with the households' heads and planning officials, such as monitoring, bureaucracy, and corruption. The probability of the justification for the consistency between residents and staff in urban planning is that these factors are clear from both sides and there are no hidden aspects for either residents or officials and even that the issues stem from these factors occur by direct contact between residents and staff. Interpretations of the contradiction in the enforcement effect can be provided by observing that household heads believe that the planning violation is only associated with flagrant violations such as breaches of public areas such as public parks. Economics issues were the most significant compared to other groups of factors. Both household heads and planning staff agreed on the effects of these factors except for physical infrastructure, where planning staff explained that infrastructure doesn't encourage planning violations. This discrepancy may be due to officials' viewpoint built on infrastructure for the whole country, while residents' viewpoint built on their neighbourhood infrastructure.

CONCLUSION

In the study area, the inefficiency of the monitoring system impacted the compliance level. Corruption in terms of favouritism has a detrimental influence on compliance and the planning system in general. There is a lack of skills and training among the planning authority employees, especially in technical skills on monitoring by new modern technologies. The bureaucracy also bears some of the blame for planning violations due to their rigid rules and processes. Besides other economic factors such as residential financing facilities and infrastructure provision, the primary reason for non-compliance with residential planning regulations is a housing shortage. The problem of planning violation has not addressed by planning authorities at the beginning of the 1990s. Even if the issue was purely economic, planning authorities were supposed to issue new subdivisions, even if there were difficulties with infrastructure provision or housing loan availability, in order to encourage everyone to build a home legally rather than illegally. This is because informal settlements take place in the absence of infrastructure and housing loans. Accordingly, it was supposed that these settlements occurred under the supervision of planning authorities and in line with planning standards. Moreover, if this had been done, some would not have resorted to violating the standards in the approved schemes.

REFERENCES

Abrabba, S. A., Badarulzaman, N., Mohamad, D., & Kadi, A. J. (2021). A Biblio-Systematic Analysis of Factors Affecting the Compliance of Residential Planning Standards and Regulations : A Conceptual Framework. *Civil Engineering and Architecture*, *9*(3), 646–655. https://doi.org/10.13189/cea.2021.090308

Abubakar, M., Lizam, M., & Yassin, A. M. B. (2013). A Review on the Models of Compliance with Residential Development Standards in Nigeria. *2nd International Conference on Technology Management , Business and Entrepreneurship*, (12), 522–531.

Adamolekun, M. O., A. J. Isiwele, N. G. A. (2017). An assessment of the level of compliance with development controlstandards and housing policy in Nigeria : A case study of Esan West local government area of Edo State. *Journal of Environmental Studies*, *2*(2), 27–35.

Addai, N., John, B., Bediako, K., & Gyimah, C. (2012). The impact of land use regulations on residential land values in the Wa municipality , Ghana. *J Hous and the Built Environ*, *27*(2), 349–358. https://doi.org/10.1007/s10901-012-9268-7

Aliyu, A. A., Kasim, R., & Martin, D. (2011). Problems of Finance for Home Acquisition By Private Residential Property Developers in Bauchi Metropolis , Nigeria, (Icm).

Alnsour, J., & Meaton, J. (2009). Factors affecting compliance with residential standards in the city of Old Salt, Jordan. *Habitat International*, *33*(4), 301–309. https://doi.org/10.1016/j.habitatint.2008.08.003

Arimah, B. C., & Adeagbo, D. (2000). Compliance with urban development and planning regulations in Ibadan, Nigeria. *Habitat International*, *24*(3), 279–294. https://doi.org/10.1016/S0197-3975(99)00043-0

Arku, G., Mensah, K. O., Allotey, N. K., & Addo Frempong, E. (2016). Non-compliance with building permit regulations in Accra-Tema city-region, Ghana: exploring the reasons from the perspective of multiple stakeholders. *Planning Theory and Practice*, *17*(3), 361–384. https://doi.org/10.1080/14649357.2016.1192216

Atamewan, E. E. (2019). Factors Affecting Implementation and Compliance with Housing Standards for Sustainable Housing Delivery in Bayelsa State, Nigeria. *European Scientific Journal ESJ*, *15*(3), 210–222. https://doi.org/10.19044/esj.2019.v15n3p210

Baffour Awuah, K. G., & Hammond, F. N. (2014). Determinants of low land use planning regulation compliance rate in Ghana. *Habitat International*, *41*, 17–23. https://doi.org/10.1016/j.habitatint.2013.06.002

Becker, G. S. (1968). Crime and Punishment : An Economic Approach. *J Polit Econ*, *76*(2), 169–217. https://doi.org/10.1086/259394

Chin, W. W. (2010). How to Write Up and Report PLS Analyses.Concepts,Methods and Applications. In V. E. V. W. W. C. J. H. H. Wang (Ed.), *Handbook of partial least squares* (pp. 655–690). Springer International Publishing. https://doi.org/10.1007/978-3-540-32827-8

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York: Routledge Academic.

Dambeebo, D., & Jalloh, C. A. (2018). Sustainable Urban Development and Land Use Management: Wa Municipality in Perspective, Ghana. *Journal of Sustainable Development*, *11*(5), 235. https://doi.org/10.5539/jsd.v11n5p235

Djafri Riadh, M. M. O. (2021). Housing crisis in Algeria:challenges and prespectives. *PLANNING MALAYSIA*, *19*(5), 220–232.

Fidler, F. (2002). The fifth edition of the APA Publication Manual: Why its statistics recommendations are so controversial. *Educational and Psychological Measurement*, *62*(5), 749–770. https://doi.org/10.1177/001316402236876

Fuladlu, K. (2019). Urban Sprawl Negative Impact: Enkomi Return Phase. *Journal of Contemporary Urban Affairs*, *3*(1), 44–51. https://doi.org/https://doi.org/10.25034/ijcua.2018.4709

Hair, J. F., Ringle, C. M., Sarstedt, M., Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM : Indeed a Silver Bullet PLS-SEM : Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hajialirezalou, M. H. (2018). Building Contraventions in Tehran and Its Control by the Municipality. *Landscape Architecture and Art*, *12*(12), 95–104. https://doi.org/10.22616/j.landarchart.2018.12.10

Ioannidis, C., Psaltis, C., & Potsiou, C. (2009). Towards a strategy for control of suburban informal buildings through automatic change detection. *Computers, Environment and Urban Systems*, *33*(1), 64–74. https://doi.org/10.1016/j.compenvurbsys.2008.09.010

Jawaid, M. F., Pipralia, S., & Kumar, A. (2018). Review of environment responsiveness of building regulations in Jaipur. *Journal of Urban Management*, (February), 0–1. https://doi.org/10.1016/j.jum.2018.06.001

Jones, S., & Vasvani, V. (2017). Compliance with the building byelaws and earthquake safety in urban areas of Bihar: progress, constraints and challenges. *Environmental*

Hazards, *16*(4), 345–362. https://doi.org/10.1080/17477891.2017.1314246

King, D. M., & Sutinen, J. G. (2010). Rational noncompliance and the liquidation of Northeast groundfish resources. *Marine Policy*, *34*(1), 7–21. https://doi.org/10.1016/j.marpol.2009.04.023

Kombe, W. (2005). Land use dynamics in peri-urban areas and their implications on the urban growth and form: the case of Dar es Salaam, Tanzania. *Habitat International*, *29*(1), 113–135. https://doi.org/10.1016/S0197-3975(03)00076-6

Krejcie, R. V, & Morgan, D. (1970). Small-Samlpe Techniques. *The NEA Research Bulletin*, *39*, 99.

Lusugga Kironde, J. M. (2006). The regulatory framework, unplanned development and urban poverty: Findings from Dar es Salaam, Tanzania. *Land Use Policy*, *23*(4), 460–472. https://doi.org/10.1016/j.landusepol.2005.07.004

Makato, W. E. (2016). *Analysis of Development Control Regulations' Compliance in Kitengela Town, Kajiado County*.

Mohammad, J. A. (2006). *Planning and Managing the Built Environment in the Context of Compliance with Residential Standards in Jordan*.

Mohd Ariff Mohd Daud, Saiful Azhar Rosly, Z. M. S. (2022). Understanding issues of affordable housing in Malaysis to attract investment : An exploroatory investigation. *PLANNING MALAYSIA*, *20*(1), 1–12.

Monkkonen, P., & Ronconi, L. (2013). Land Use Regulations, Compliance and Land Markets in Argentina. *Urban Studies*, *50*(10), 1951–1969. https://doi.org/10.1177/0042098012471982

Ochieng Omollo, W. (2020). Compliance with Planning Standards Related to the Setbacks around Domestic Buildings: Empirical Evidence from Kenya. *Journal of Contemporary Urban Affairs*, *4*(2), 95–108. https://doi.org/10.25034/ijcua.2020.v4n2-9

Offiong, V. E. (2017). Physico-Legal Characteristics of Buildings And compliance With Building Law In Urban Area . Calabar , Cross River State. *Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, *11*(12), 30–35. https://doi.org/10.9790/2402-1112023035

Oliver G¨otz, Kerstin Liehr-Gobbers, and M. K. (2010). Evaluation of Structural Equation Models Using the Partial Least Squares (PLS) Approach. In V. E. Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares Concepts, Methods and Applications* (pp. 691–711). Springer International Publishing. https://doi.org/10.1007/978-3-540-32827-8

Omollo, W. O., Hayombe, P. O., & Owino, F. O. (2018). Compliance with Physical Planning Standards by Residential Developments in Kisii Town , Kenya. *Architecture Research*, *8*(2), 62–73. https://doi.org/10.5923/j.arch.20180802.03

Rakodi, C. (2001). Forget planning , put politics first ? Priorities for urban management in developing countries Carole. *City*, *3*(3), 209–223. https://doi.org/10.1016/S0303-2434(01)85029-7

Srkheylai, E., Sharifi, A., Rafieian, M., Bemanian, M. reza, & Murayama, A. (2012). An investigation of the reasons for non-compliance with FAR regulations in Tehran. *Cities*, *29*(4), 223–233. https://doi.org/10.1016/j.cities.2011.09.004

Sundaresan, J. (2017). Urban planning in vernacular governance: Land use planning and violations in Bangalore, India. *Progress in Planning*, (November 2016), 0–1.

https://doi.org/10.1016/j.progress.2017.10.001

Thomas, A. S., Milfont, T. L., & Gavin, M. C. (2016). RESEARCH ARTICLE A New Approach to Identifying the Drivers of Regulation Compliance Using Multivariate Behavioural Models. *PLOS ONE*, 1–12. https://doi.org/10.1371/journal.pone.0163868

Wunarlan, I., Soetomo, S., & Rudiarto, I. (2020). Typology of peri-urban area based on physical and social aspects in Marisa, Indonesia. *Civil Engineering and Architecture*, *8*(5), 984–992. https://doi.org/10.13189/cea.2020.080525

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 197 – 208

PUBLIC RENTAL HOUSING (PRH) OPERATIONAL POLICIES AND HOUSING PATHWAYS IN KUALA LUMPUR

Nurhayati Khair[1], Ainoriza Mohd Aini[2], Zafirah Al Sadat Zyed[3]

[1,2,3] *Centre for Sustainable Urban Planning and Real Estate (SUPRE), Faculty of Built Environment*
UNIVERSITI MALAYA

Abstract

The Malaysian Government's vision is to provide Malaysians of all income levels accessibility to adequate, affordable, and quality housing, particularly those from the low-income group (B40). For several decades, the Malaysian Government has played an important role in the provision of low-cost public housing by building houses either for sale or rent. In Kuala Lumpur, the administration of low-cost public housing is managed by Dewan Bandaraya Kuala Lumpur (DBKL). Recently, there has been a pressing need for more public rental houses in Kuala Lumpur, evident from the vast number of B40 applicants awaiting settlement. However, the number of vacant units for housing is very limited. The paper discusses the role of DBKL in shaping the public housing pathways by reviewing the current DBKL's PPR Operational Policies. The paper is constructed based on policy review, as well as data from interviews with DBKL officials. The DBKL's operational policies from the point of view of tenant "Enter" until "Exit" was mapped with the housing pathways. The study found a variety of operational policies that DBKL has implemented to ensure tenants' successful transition in and out and are strongly influenced by the need to manage the waiting list and political pressure. The paper, which looks from the perspective of DBKL as a landlord, concludes with a preliminary recommendation on some ways DBKL can improve their tenancy management.

***Keywords**:* public rental housing, housing policies, housing pathways, operating policies

[2] Senior Lecturer at University Malaya. E-mail: ainoriza@um.edu.my

INTRODUCTION

Public rental housing refers to housing that is constructed and funded by the Government, inclusive of rental and owner-occupier housing. Public housing was developed with government subsidies and rented to low-income families or vulnerable groups who cannot afford to purchase houses in private housing markets or pay market rents (Baker et al, 2020). Public housing always has a social purpose, including better-housed workers as part of the economic strategy, better housing conditions as better public health, and housing as a visible price (Forrest, 2013). Despite the preference for home ownership, the low-income group is often excluded from the housing ladder because of the difficulty in obtaining mortgage finances. Hence, the government plays a vital role in addressing the housing market failure and providing adequate housing for vulnerable groups. For several decades, the Malaysian Government has played an important role in the provision of low-cost public housing by building houses either for sale or rent. In the capital city of Kuala Lumpur, the administration of low-cost public housing is managed by Dewan Bandaraya Kuala Lumpur (DBKL). Of the total number of low-cost public housing offered, 60% are for rent which constitutes 37,415 units from 61,559 units. Recently, there has been a critical need for more public rental houses in Kuala Lumpur, evidenced by the massive number of B40 applicants expecting settlement. However, the number of vacant public rental housing (PRH) units is very limited. Moreover, land in urban areas is becoming scarcer and more expensive. Combined with rapid social and demographic changes, the government faces more challenges in ensuring adequate stock of Public Rental Housing.

The question arises as to what causes the low turnover of tenants. As such, the paper aims to analyse the role of DBKL in shaping the public housing pathways by reviewing the current DBKL's PPR Operational Policies. The paper is constructed based on policy review, as well as data from interviews with DBKL officials. The paper will focus on PRH in Dewan Bandaraya Kuala Lumpur's administration, the largest provider of public rental housing in Malaysia. The rest of the article is structured as follows; after this introduction, the paper will discuss the general overview of public housing operational policies. Next, the paper will present the DBKL's operational policies from the point of tenant "Enter" until "Exit" and map with a linear approach to social housing pathways as applied by Powell et al. (2019). The paper ends with a brief discussion of the way forward for Public Housing in Kuala Lumpur.

PUBLIC HOUSING OPERATIONAL POLICIES

Public housing or social housing aims to house households predominantly in a weak negotiating position in the private housing market, such as low-income households, physically and, or mentally handicapped individuals, ethnic minorities, immigrants, and asylum seekers. (Lang & Roessl, 2013). The changes

in the tenure of public rental housing can be summarised in the concept of housing pathways. The concept of housing pathways is strongly reflecting and links residential mobility to many housing and non-housing factors (Clapham et al., 2014). The housing Pathway concept is a comprehensive approach, it does not merely analyse the individual experience but also the housing market (Clapham et al., 2014). Additionally, the analysis should take into account housing market behaviour and agency aspects such as individual experiences and decisions (Sohaimi et al., 2017). The social housing pathway is influenced by a few factors such as the economic background, individual behaviour and aspiration to experience a new movement amongst the residents. Figure 1 shows the social housing pathway, which starts from entry to social housing, followed by living in, moving within and moving out of social housing, which will be explained in the following subsections.

Getting in (Entry)

Entry into public rental housing is considered a successful pathway output. Entering social housing is considered as a successful milestone for people leaving homelessness (Li, Stehlík, & Wang, 2019). According to Wiesel and Pawson (2015), in countries where the government provides subsidised housing for low-income families, the entrance mechanism plays an important role in vacation for new applications, especially for people in need.

Powell et al. (2019) argued that households' pathways into social housing depend on highly detailed and prescriptive policies for eligibility. First, a prospective tenant will have to go through an application process and eligibility criteria, including a priority and needs assessment. The application process is usually managed by a centralised system where the prospective tenants will apply, and their details are disseminated through a system. This is followed by eligibility criteria, which will be determined by the applicant's income, age, assets, and priority needs. Next is a priority needs assessment. The applicants are categorised under waiting lists based on the priority assessment if there is a shortage of social housing. However, the applicants' place on the waiting list is frequently assessed. If they are found to be unqualified, they may be removed.

Public Rental Housing is normally applied as temporary accommodation or emergency with highly detailed and prescriptive eligibility. Pathways into PRH depend on a prescriptive eligibility criterion as well as the availability of housing stock. According to housing authorities in Australia, Hong Kong, China, South Korea, Singapore and Malaysia, the basic eligibility requirements are citizenship and residence status, no prior ownership of any kind of property, income and age. Priority given to the applicants is based on the score point for each eligibility requirement which is the applicants with more dependents as well as the health condition or disabilities (Zhang, 2017). The applicants with higher points have the priority for PRH (Li, 2016). Fair

distribution is one of the crucial matters in the operation of public housing programmes (Baker et al., 2020). Therefore, the entry system is one of the critical aspects of ensuring that only people who are eligible to enter the PRH.

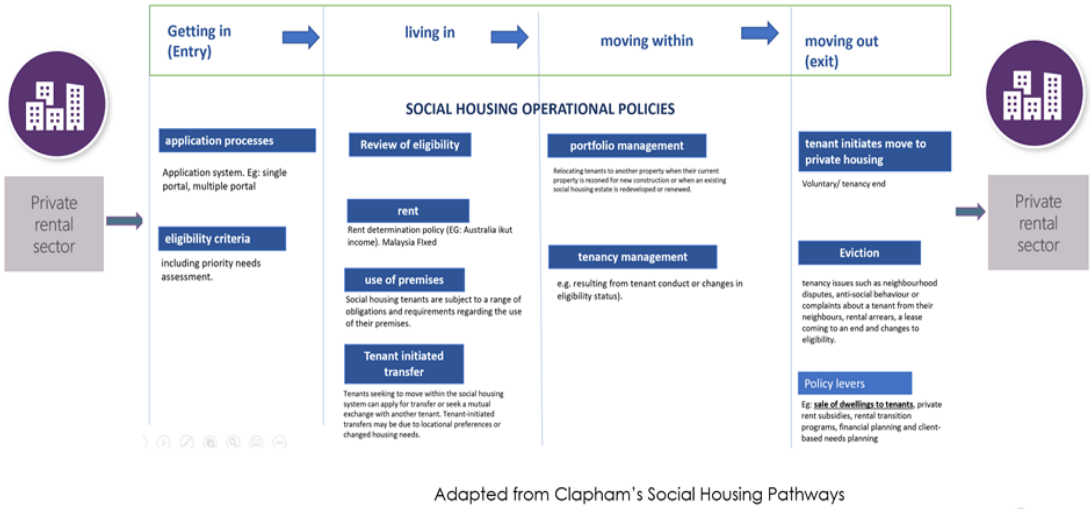


Figure 1: Social Housing Pathways adapted from Powell (2021) and Clapham (2002)

Living In

The policies for reviewing social housing tenants' continuing eligibility can extensively affect the social housing pathway. Social housing is a scheme of income-related rents operated by the social housing provider. Paying rent is essential for living in social housing. This is followed by the use of the premises. Tenants are subject to a range of obligations and requirements regarding the use of social housing. The obligations for residential tenancy agreements such as in Australia are prescribed by residential tenancy agreements, including criminal offending and relations with neighbours, (Powell et al., 2019). Any offence contributed by the tenant will result in tenancy agreement termination.

Moving within

Moving within social housing is the next pathway for renters and households while living in social housing. It consists of tenant-initiated transfer, portfolio management and tenancy management. Tenant-initiated transfers are for tenants who seek to move within the social housing. A tenant can also move between properties with the landlord-initiated transfer, which can be a result of portfolio management. This involves the government relocating tenants to another property when current social housing is redeveloped. This is followed by tenancy management as an additional category of landlord-initiated transfer. The landlord-initiated transfer must take into account the tenant's current needs when

the tenant moves to another property. Tenancy management may be the outcome of tenant conduct. The transfer may also occur because of changes to the tenant's eligibility status for their existing social housing. However, it will make the property no longer suitable due to the eligibility policies (Powell et al., 2019).

Moving out

The final pathway is moving out or exiting from social housing when the tenant is making a transition to private housing or is expelled by the social housing provider. In most cases, the tenant voluntarily initiates a transition to private housing. On the other hand, eviction is considered a pathway to social housing. Tenants may be evicted because their current income is no longer eligible for social housing, rental arrears, or criminal offences. The exit system is responsible for ensuring the service users leave the statutory sector as soon as they are ineligible to live in PRH (Wiesel & Pawson, 2015). The extensive studies show that some demographic factors, including age, gender, income and human capital, are clearly associated with public housing exits (Li, Stehlík, & Wang, 2019).

Previous studies have examined the policy and service contexts of public rental housing exits. For example, Australia has introduced Western Australia's Rental Pathways Scheme, which supports tenants moving from social to private rental housing (Wiesel et al., 2014). Their findings revealed that income-related rent rates may act as a disincentive for some tenants to depart from their public housing tenure (Wiesel et al.. (2014). Another author recommended that regularly raising rents to market level may 'force' some tenants to exit (Li et al., 2017). Moreover, frequent income eligibility reviews and strictest fixed-term tenancies are forcing tenants to search for alternative housing arrangements (Baker et al., 2020).

However, the problem of access to public housing remains unresolved without a clear policy on the length of tenancy in low-cost public housing. (Baker et al., 2020). Powell et al. (2019) concluded that the lack of affordable options represented the most serious obstacle to delaying moves out of social rented housing. In the Australian context, Wiesel and Pawson (2015) suggested two critical policy responses that may ease exits, including reinventing the National Rental Affordability Scheme and consideration of home ownership schemes, including shared equity models.

THE PUBLIC RENTAL HOUSING IN MALAYSIA

Prior to the country's independence, the Housing Trust was entrusted with providing low-cost housing for rental and sale in Malaysia. The housing was targeted at dwellers with a monthly income of less than RM300 and the ordinary working-class such as general labourers and lower rank government staff (Shuid, 2016). The Housing Trust built the rental housing, and the monthly rent paid by the tenants was recorded as a hire purchase instalment. Public housing in the form

of Site and Services has been introduced to relocate the squatters since the First Malaya Plan and continued until the Third Malaysian Plan. In addition, the longhouse is another initiative introduced by the Dewan Bandaraya Kuala Lumpur (DBKL) as a temporary shelter from 1978 to 1988. The longhouse consisted of one bathroom, a living room, a kitchen and one or two tiny rooms (Khazanah, 2016). Longhouses were initially designed to temporarily shelter squatters for one to two years.

In the 6th to the 8th Malaysian Plan, various housing programmes were created under the public and private sectors. Public housing programme were launched known as Perumahan Awam Kos Rendah (PAKR), Program Perumahan Rakyat Bersepadu (PPRB), Program Perumahan Rakyat Disewa were implemented for the resettlement of squatters. The programme was focused only on rental to solve the squatter's issue and not initially on homeownership (Shuid, 2016). On the back of rising difficulty for qualified PPR applicants to secure bank loans to purchase a PPR unit, the Government introduced the PPR-Rent to own (RTO) scheme in 2007. This provides a chance for the owners to own a home by first renting it from the government. With a clean record of monthly rental payments, house ownership will be transferred to the tenants (Khazanah, 2016). The latest PRH programme is Transit Housing, introduced in the 11th Malaysian Plan to provide shelter to newly married B40 couples.

RESEARCH METHODOLOGY

The study was a part of a larger study on PRH tenants' mobility. The article reported the findings from an in-depth interview conducted with 2 DBKL officers: the Assistant Officer of Information Technology and the Assistant Director of Community Development & Urban Wellbeing Department DBKL. The respondents were selected based on their extensive experience in DBKL PRH allocation and management.

FINDINGS: DBKL'S PUBLIC HOUSING OPERATIONAL POLICIES

Based on the interview, from 1998 to 2019, a total of 133,669 applicants registered with DBKL. However, 128,550 were entitled inclusive applicants who successfully obtained rental housing units and those who were placed on the waiting list, as shown in Figure 2. There has been an average of 313 new tenancy per year, depending on vacant units. Furthermore, DBKL had identified 27,940 tenants who failed to continue whilst 2,840 tenants successfully extended their tenancy. The statistics in March 2021 showed a total of 38,760 public rental housing units under DBKL's management.

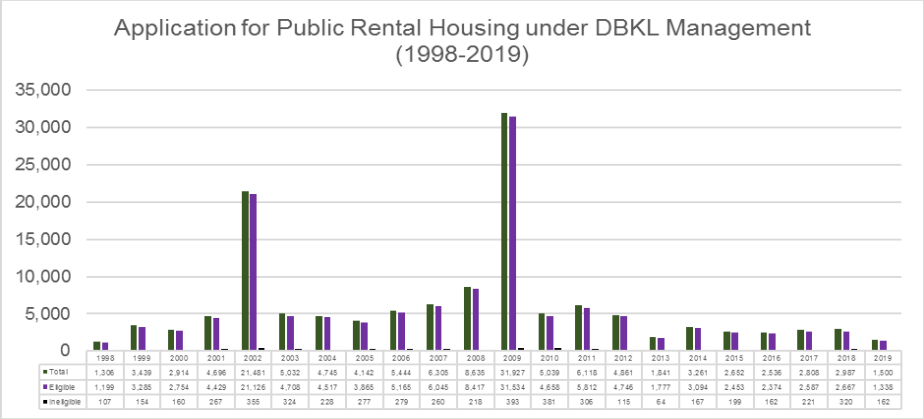


Figure 2: Application for Public Rental Housing under DBKL's Management (1998-2019)

The massive application for PRH is obviously due to the rents offered being below the market rent despite their strategic locations. The following subsection discusses DBKL's operational policies from the point of tenant's "Entering" to "Exiting" and mapped in the housing pathways based on the interviews conducted.

GETTING IN

The common application process for most public housing is a centralised online system which allows the processing applications to be more efficient and transparent. The system database ensures PRH is distributed and accessible to the public. In Malaysia, the systems' data is accessible by the Ministry's Open Registration System (ORS). The system's primary purpose is to avoid any misconduct in selecting eligible applicants. Applicants must provide accurate information regarding their family background, property and current residence (Shuid, 2016). The entrance mechanism to PRH is online or by filling in a form at the Housing Management and Community Development Department (HMCDD). According to DBKL's eligibility requirements, applicants and their spouses must be Malaysian citizens with combined incomes not exceeding RM3,000 per month. Priority is also given to applicants who live or work in Kuala Lumpur. The priority will be given based on the calculation for each eligibility criteria as below:

Table 2: Eligibility Criteria

No	Criterion	Maximum points
1	Number of dependents	20
2	Marital status	15
3	Health condition	15

4	Per capita income	15
5	Status of current house	10
6	Length of registration	10
7	Household income	5
8	Occupation sector	5
9	Age of applicant	5

Source: Shuid (2013)

A new rental housing scheme under DBKL, which is Council Home (Pangsapuri Bandaraya), caters to married city dwellers working in Klang Valley with income between RM3,000 to RM10,000 per month. The dwelling unit is rented out at RM 800 per month, in which the net rental is RM500, and the remaining RM300 per month will be treated as savings to be returned after the rent period. The maximum tenure for this apartment is five years. Public rental housing needs to provide shelter for the low and middle-income household before they can enter the homeownership. Nevertheless, numerous problems related to PRH allocation have been reported, such as giving false information for PRH applications, subletting the unit, and tenants refusing to leave their PRH units when the lease expires. Some of the tenants who are no longer eligible for the PRH still benefited from the unit's rental subsidies.

LIVING IN AND MOVING WITHIN

The operational policies about living in and moving within were not further discussed during the interview with DBKL. However, the tenants were required to extend the tenancy every three years to ensure their eligibility to rent the PRH. The rent offered by DBKL is fixed to RM124 per month, which is not reflecting similar properties in the private market. In addition, DBKL had given 50 percent discounts during Movement Restriction Order (MCO) to reduce the tenants' burden. Whilst moving within occurs whenever DBKL has to conduct a refurbishment for the existing PRH, tenants will need to move to any vacant PRH unit. As a result, DBKL will need to secure alternative PRH units.

MOVING OUT (EXIT)

There is several research conducted on public rental housing exits (Baker et al., 2020). However, few studies have examined the reasoning, motivations, and barriers to exiting public housing. The lower rental rates in PRH and the continued rise of property prices in the private market resulted in some tenants remaining in their units for an extended period of tenancy. In addition, the lack of a clearly defined permissible tenancy period will be an advantage for the tenant to extend the tenancy (Shuid, 2013). Furthermore, Shuid and Zamin (2018) highlighted that the current physical environment and highly satisfied housing conditions influence the prolonged tenancy. Previous studies have shown a

significant relationship between dwelling features, utility, environment, attachment and social interaction contributed to the renter's satisfaction which leads to the reluctance to exit the tenancy. (Fattah, Badarulzaman, & Ali 2020)

The study also found that many tenants remain in their units for extended tenancy. This will increase the waiting list period for new applicants before units become available. The number of PRH applicants in Kuala Lumpur keeps on increasing, but from 2014 to 2018, it was reported that less than 20 percent of the tenants were able to exit public housing. In 2019 only 1,338 applicants were eligible for renting the public housing unit and were placed on the waiting list. DBKL has enforced several measures to ensure the exit of tenants from PRH, including flushing, audit and data bleaching and increasing the turnover rates of tenants.

One measure is "flushing" to filter expired tenancy agreements. Upon issuing the offer letter for renting, the tenant has agreed to rent the housing unit for 3 years according to the tenancy agreement. The frequency of the flushing mechanism is twice a year, whereby the management actively flushes tenants who failed to extend the tenancy agreement. However, without a clear policy on the period of tenancy and renewal conditions through the online selection process, which could have shortened the application process, it will result in inadequate access to public housing remains unresolved. An audit is carried out by DBKL once a year, and it successfully terminated 616 tenancy agreements in 2018. An audit will identify which tenancy has not been renewed after the expiry of the tenancy agreement. The third approach is the data bleaching process, which is conducted gradually over a period of two years. This exit approach was only introduced recently in 2020. This exit mechanism aims to identify the tenants who still fit the admission criteria at the time of their entrance to public rental housing.

Based on these approaches, DBKL has evicted a total of 2,554 from 2015 until 2020 due to the different offences committed by the tenants. In 2020, there were a few categories of the enforcement action by DBKL, including the tenants staying in the housing unit whereas he or she has another house or property. An illegal tenant does not fit with the condition to rent public rental housing. Next is if the tenant is non-Malaysian. They are not eligible to be a tenant in this housing scheme, or the accommodation has been sublet by the owner or tenant. Eviction occurs after several initiatives to overcome the problems, such as issuing warning notices, blocking water supplies, and implementing enforcement action on the unit, which violates the terms of the tenancy agreement.

In addition to these 3 mechanisms, DBKL has also initiated several supports, including providing skills to residents and free tuition to the tenants. They believe that improving the socio-economic state of the tenants is the only way for them to successfully exit the PRH. No other support provided by DBKL

was identified to assist the tenants in moving out into the private rental market. The exit mechanisms/ approaches are depicted in Figure 3

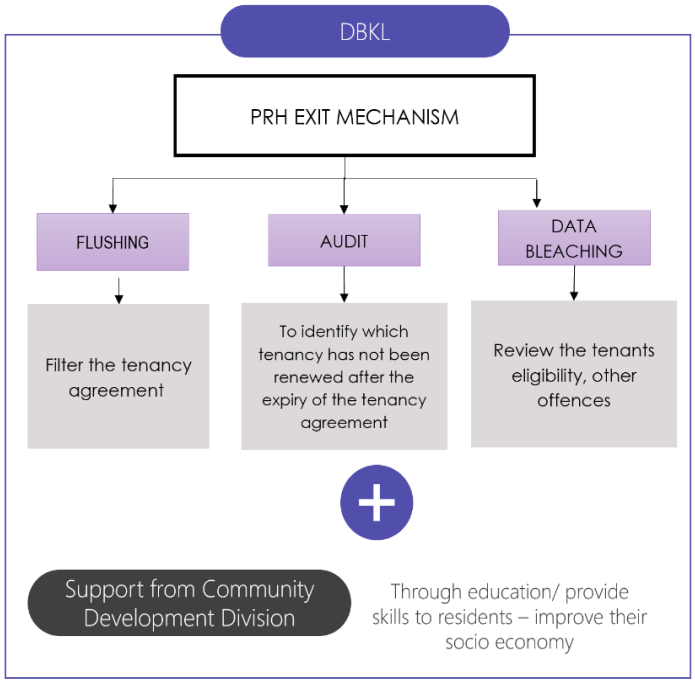


Figure 3: Exit Mechanism
Illustrated from the interview

According to Figure 3, the number of vacant units leads the DBKL to enforce an exit mechanism to ensure the tenant successfully exits public rental housing, partly caused by DBKL's not enforcing its policy. Operational policy levers have been introduced in Australia to facilitate the moves of social housing, including financial assistance such as the provision of private rent subsidies, rental transition programmes and financial planning. The aims of policy levers will not only reduce the waiting list but also enhance housing affordability.

CONCLUSION

The housing pathway is based on the changing experience of tenants in public rental housing. Powel et al. (2019) revealed that operational policies shape the social housing pathway in various ways. In the current operating process of DBKL, the housing pathway begins with tenant experience of getting into PRH, living in, moving within or between PRH and leaving or exiting the social housing. PRH has a long history of providing housing for those in need. The

scarcity of existing public housing will depend on DBKL's ability to meet the increasing demand for PRH. The study found various operational policies implemented by DBKL to ensure tenants' successful transition in and out and are strongly influenced by the need to manage the waiting list and political pressure. The current exit approach is more inclined toward force measure that is still insufficient in freeing up scarce public housing opportunities for those on a waiting list and ensuring faster turnover rates of tenants. Innovative solutions are needed to encourage tenants' independence and early transition out of public housing to allow more eligible applicants to enter PRH. DBKL will need to consider other mechanisms or approaches to encourage early exits from public housing to renting private houses or homeownership. The paper only looks from the perspective of DBKL as a landlord. It is crucial to continue building evidence studies based on motivations for tenants to stay in or exit the public housing sector.

ACKNOWLEDGEMENTS

The authors appreciatively acknowledge the grant provided by the Ministry of Higher Education Malaysia via the Fundamental Research Grant Scheme (FRGS/1/2020/SS0/UM/02/12) (FRGS 2020-1) and also appreciation to Prof. Dr. Wan Nor Azriyati Wan Abd Aziz, Dr. Nikmatul Adha Nordin, and Dr. Norngainy Mohd Tawil for their guidance and valuable input.

REFERENCES

Baker, E., Leishman, C., Bentley, R., Pham, N. T. A., & Daniel, L. (2020). Social housing exit points, outcomes and future pathways: an administrative data analysis.

Bermingham, S. & Park, Y. (2013) 'NSW public housing and AHO – Tenancy exits and subsequent assistance', paper presented at the National Housing Conference, Adelaide, 30 October–3 November.

Clapham, D., Mackie, P., Orford, S., Thomas, I., & Buckley, K. (2014). The housing pathways of young people in the UK. Environment and Planning A, 46, 2016–2031. http://doi.org/10.1068/a46273

DBKL, Slide Pembentangan, Program Kawalan dan Penguatkuasaan, Jabatan Pembangunan Komuniti dan Kesejahteraan Bandar (2020)

Fattah, H. A., Badarulzaman, N., & Ali, K. (2020). Neighbourhood Quality Assessment: A View of Tenure Ownership and Mobility Decisions in Penang, Malaysia. Planning Malaysia, 18.

Forrest R. (2013) Reflections. In: Chen J., Stephens M., Man Y. (eds) The Future of Public Housing. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41622-4_17

Hwang, S., Lee, J., Yi, J. S., & Kim, M. (2019). Korean public rental housing for residential stability of the younger population: analysis of policy impacts using system dynamics. Journal of Asian Architecture and Building Engineering, 18(3), 180-189.

Iommi, S. (2011). The target efficiency problem in Italy's housing Policy: The case of Tuscany. Housing Studies, 26(1), 41-67.

Jamaluddin, Z. (2005). Privatisation of squatters' resettlement. UUM Press

Khazana Research Institute, 2016. Making Housing Affordable. Kuala Lumpur.

Lang, R., & Roessl, D. (2013). The governance of co-operative housing: Current challenges and future perspectives. International Journal of Co-operative Management, 6(2), 8-12

Li, J. (2016). Housing Policies in Hong Kong, China and the People's Republic of China. Baker, E., Leishman, C., Bentley, R., Pham, N. T. A., & Daniel, L. (2020). Social housing exit points, outcomes and future pathways: an administrative data analysis.

Li, J., Stehlík, M., & Wang, Y. (2019). Assessment of barriers to public rental housing exits: Evidence from tenants in Beijing, China. Cities, 87, 153-165.

Li, J., Wang, C. C. and Sun, J. (2017) 'Empirical analysis of tenants' intention to exit public rental housing units based on the Theory of Planned Behavior – The case of Wuhan, China', *Habitat International*, vol. 69: 27–36.

Malaysia. 2016. Eleventh Malaysia Plan (2016-2020). Putrajaya: Prime Minister's Department

Powell, A., Meltzer, A., Martin, C., Stone, W., Liu, E., Flanagan, K., Muir, K. and Tually, S. (2019) The construction of social housing pathways across Australia, AHURI Final Report 316, Australian Housing and Urban Research Institute Limited, Melbourne, http://www.ahuri.edu.au/research/final-reports/316, doi: 10.18408/ahuri-7118101.

Rehda Institute, 2018, Affordable Housing The Game Plan Transformation

Shuid, S. (2016). The housing provision system in Malaysia. *Habitat International*, *54*, 210-223.

Shuid, S., & Zamin, M. F. M. (2018). Maqasid Al-Syariah & Human Well-Being: A Study on Melaka's Public Housing. PLANNING MALAYSIA, 16.

Sohaimi, N. S., Abdullah, A., & Shuid, S. (2017). A review on housing pathways approach for young professionals housing affordability. *International Journal of Academic Research in Business and Social Sciences*, *7*(6), 2222-6990.

Wei, L. (2012). A research on access and withdrawal mechanism for fair distribution of affordable housing. Southeast Academic Research, 3, 40–48.

Wiesel, I., & Pawson, H. (2015). Why do tenants leave social housing? Exploring residential and social mobility at the lowest rungs of Australia's socio-economic

Wiesel, I., Pawson, H., Stone, W., Herath, S. and McNelis, S. (2014) *Social Housing Exits: Incidence, Motivations and Consequences*, AHURI Final Report No. 229, Australian Housing and Urban Research Institute Limited, Melbourne, https://www.ahuri.edu.au/research/final-reports/229.

Zhang, R. J. (2017). A Tale of Two Cities: Comparative Study of Public Housing Policies of Hong Kong and Singapore.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 209 – 222

ADAPTING TO A NEW NORMAL DURING COVID-19: LEVERAGING THE SMART BUILDING SYSTEM WITH BIM INTEGRATION FOR LIFECYCLE SUSTAINABILITY

Lim Chuin Yong[1], Nur Mardhiyah Aziz[2], Faizul Azli Mohd-Rahim[3]

[1,2,3]*Centre for Building, Construction & Tropical Architecture (BuCTA)*
UNIVERSITI MALAYA

Abstract

The COVID-19 outbreak brought challenges to the education sector in Malaysia as schools were shut down and later on, operate under strict standard operating procedures (SOP) and guidelines. This situation caused inconvenience to school authorities as the education process was significantly affected. Smart building systems that integrate various technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), mechanisms and robotics and building management systems allow school authorities to operate the schools under the new norm. Therefore, this research was conducted to propose a safe operation of the physical teaching and learning process in schools by leveraging smart building systems. A qualitative method was adopted which involved the participation of five schools in Kedah. Findings revealed that smart building systems are suitable to be implemented in schools to create a safe environment and operation for the physical teaching and learning process under the new norm.

***Keywords**:* Smart buildings system; built environment; COVID-19; schools; teaching and learning process

[2] Lecturer at Universiti Malaya. Email: nurmardhiah@um.edu.my

INTRODUCTION

In 2019, the outbreak of Coronavirus disease 2019 (COVID-19) has caused the global health crisis which directly affects human health and social functions. Some statistics and studies also proved that the built environment is one of the main factors that triggered COVID-19 transmission among the occupants in a building as the virus can spread easily and rapidly in confined and crowded spaces (Azuma et al., 2020). The Malaysian government introduced the Movement Control Order (MCO) nationwide starting on 18 March 2020 to curb the spread of COVID-19 infection in Malaysia (New Straits Times, 2020). All education institutions were closed due to the implementation of MCO. Thus, all physical classes were replaced with online classes. However, the closure of the schools caused some inconveniences to the teachers and students as online classes come with a plethora of challenges and problems.

The implementation of MCO has succeeded in reducing the number of reported COVID-19 cases in Malaysia. The Ministry of Education announced the reopening of schools in phases after the COVID-19 situation is manageable (Hana and Tharanya, 2020). However, the re-opening of the schools requires school authorities to follow all the standard operating procedures (SOPs) and guidelines released by the Malaysian authorities. This situation created additional workload and stress for school authorities as they had to put extra effort and time into operating the school to ensure that schools are safe for conducting physical teaching and learning processes under the new norm (Nuradzimmah, 2021).

The COVID-19 outbreak not only had negative consequences to all sectors but also created a state of uncertainty in the world (Abdul Latip et. al., 2021). This is evidenced in November 2020; all schools were forced to close again as the COVID-19 cases increased in Malaysia. The flip-flopping decision made by the government raised concerns and caused inconveniences to various parties, which also affected students' academic progress and caused long-term disruptions to their education. Thus, the closure and re-opening of the schools is not the best solution, as people need to learn to live with COVID-19.

RESEARCH BACKGROUND

In ensuring the safety of the students and teachers, the Ministry of Education prepared a guideline for school operation and management that is in line with guidelines prepared by the Ministry of Health and National Security Council. Among the guidelines are the requirement of temperature and symptom screening of the students at the school entrance, sanitising and cleaning the classrooms before and after every school session and practising physical distancing of 1 metre apart between students. On top of that, schools must also establish suitable movement routes to control the students' movement within the school compound. Furthermore, to minimise crowds at the school canteen, students are encouraged

to pack food from home or buy packed food from the school canteen operator and have their meals at their respective desks during recess.

All these measures and regulations are necessary to minimise the risks of spreading the virus. However, this has created an additional workload for the school administrators and teachers. All teachers and school administrators had to take additional measures to ensure the school was clean and safe. For this, teachers and school administrators must reach the school early to record students' temperature, ensure all the classrooms are clean and sanitised, and also monitor students during recess to make sure all students practise physical distancing. These additional tasks burdened the teachers and school administrators and consumed lots of time and energy. This has created additional stress on school authorities as they need to ensure that the schools are safe for conducting physical teaching and learning (Nuradzimmah, 2021).

In creating a healthy and safe environment for the students and teachers, schools need to transform by leveraging technology in surviving this health crisis. The integration of digital technologies in the construction industry has created the existence of smart buildings (Tung et al., 2021). Smart buildings which were previously used to improve building efficiency can now be used to create a safe and healthy environment. The concept of smart buildings which are sometimes referred to as 'intelligent buildings' or 'automated buildings', arose a few decades ago. There is no fixed definition of smart buildings and Wigginton found that there are more than 30 different definitions that are related to smart buildings (Wigginton, M & Harris, J., 2002). The first definition of the smart building only focuses on the technical aspects without considering occupants' interaction with the buildings (Powell, J.A., 1990). However, the definition of smart buildings kept changing based on the requirements of the occupants. Nowadays, smart buildings have learning capabilities, gather information and can carry out regulated performance regarding the building occupancy and its relations with the surrounding environment (Yang, J. & Peng, H., 2001). The smart building today is a pro-active entity, not only just responding and reacting to performance requirements but also learning and adjusting to meet optimum performance based on the surrounding environment and occupants' requirements.

The application of smart building technologies can create more efficient building management through proper environmental management and ventilation, occupancy monitoring, maintaining the cleanliness of the building, and touch-free technology to avoid contact with surfaces and others. According to Kaklauskas et al. (2010), the intelligent sensors that are installed at shared facilities such as lifts, elevators and automatic doors enable building occupants to interact and utilise them touch-free. Hence, these features can minimise the chance of cross-infection happening among the occupants. Furthermore, the thermal cameras and temperature sensors installed at the buildings can measure

building occupants' temperature automatically and detect any occupants with high body temperature or fever (Degha et al., 2019). Smieszek et al. (2019) stated that indoor air quality and the heating, ventilation, and air conditioning (HVAC) system play a vital role in decreasing the chance of airborne transmission of the viruses. The Internet of Things (IoT) and Artificial Intelligence (AI) were being implemented in some HVAC systems to enhance their efficiency to purify the indoor air. The sensors can detect any contaminants or viruses in the air and let the system take the corresponding action to eliminate those contaminants in the air to enhance the air quality (Arup, n.d.).

Social distancing and contract tracing are very important during the re-opening of various sectors and social functioning under the new norm. Therefore, some IoT applications were adopted during the COVID-19 pandemic including the IoT-based wearable devices and crowd monitoring devices. (Mohammad Nasajpour et al., 2020). EasyBand is one of the examples of wearable IoT devices that will alert users to practise social distancing. Spot, a dog-like AI-based four-legged robot equipped with cameras and intelligence sensors is an example of a crowd monitoring device which was deployed in public areas in Singapore to encourage people to practise social distancing (Wray, 2020). In Malaysia, the Royal Malaysia Police (PDRM) uses drones to monitor SOP compliance at bazaars around the Klang Valley and reprimand anyone who does not comply with the SOPs through the drone's loudspeaker (Bernama, 2021). Furthermore, UVD Robots, developed by a Danish company, were adopted in China hospitals to disinfect rooms (Ackerman, 2020) because it is more efficient and saves time. The usage of these technologies helps to minimise the manpower involved in making sure that all the guidelines imposed by the government are adhered to.

However, the study on the implementation of the smart building concept in existing schools is very limited, creating the need to further investigate its application to create a safe and healthy environment for schools' operation. Thus, this research aims to propose a safe operation of the physical teaching and learning process in schools. This is achieved by identifying the suitable smart building system that is suitable as a prevention and control measure of COVID-19; prioritising the suitable smart building system that is suitable to be installed at schools and formulating a guideline for the existing school to adopt with the new norm based on the smart technologies.

RESEARCH METHODOLOGY

To determine the study area and grasp the current information on the topic, a literature review was conducted. The review included English and Malay language articles from databases such as Emerald, Scopus, and ScienceDirect, as well as conference papers, dissertations, and official government web pages. Articles were studied from the year 2018 to 2022 using specific keywords such

as smart building systems, built environment, COVID 19, Internet of Things (IoT), Artificial Intelligence (AI), schools, as well as Boolean search commands such as "and" and "or." Articles which are published in 2018 to 2022 only were chosen as references to ensure the accuracy of the data and information. The exclusion criteria were investigated using a sample that was not representative of industry participants and was unrelated to the building sector. For data extraction and analysis, Endnote and Microsoft Excel were utilised. The findings of the literature research were also used to develop semi-structured interview questions. A qualitative research design has been chosen, which involved 5 case studies. The five case studies were selected based on several criteria which include the school size and the location of the school. A total of 2 public schools and 3 vernacular schools were chosen for this research. Each selected school has an average of 1205 students and 61 academic staff. Besides, all the selected schools were in the town area. A semi-structured interview method and observations were used in collecting the data. This method provides both researchers and participants opportunities to discuss the topic in more detail to determine the relative emphasis on the topic. The data analysis was framed using findings identified in the literature to incorporate the study into the existing body of knowledge.

Three sections were created for the semi-structured interview questions. It begins with Section A which focuses on the respondents' backgrounds, Section B identifies the approaches that are adopted by the respondents to overcome all the challenges when operating schools under the new norm, and Section C identifies the agreement of the respondents toward the necessity of the statement. A total of 12 respondents which were school administrators, school principals and teachers agreed to participate in the interview sessions. They were chosen as respondents for this research because they have an in depth understanding of the conditions and strategies adopted when operating the schools under the new norm. On top of that, observations were conducted at these five schools to collect additional and supplementary information to strengthen the reliability of the interviews. Thematic analysis was used in analysing the collected data which included familiarisation, coding, generating themes, reviewing themes, defining, and naming themes and writing up is adopted to analyse the data collected to formulate a conclusion on the issues concerned. Furthermore, gap analysis is conducted to allow researchers to make comparisons between the current conditions of the schools and the expected conditions of the schools after implementing the proposed smart building system in schools.

RESULT AND FINDINGS

Case Study Analysis

All data obtained from the case studies were analysed. The data collected from the interviewees through interview sessions were analysed using thematic analysis. Table 1 shows the finding of the 5 case studies involved. Findings revealed that a lot of manpower was needed in implementing the SOPs outlined by the government, which caused some degree of inconvenience to the school authorities.

Table 1: Findings of the 5 case studies.

Activity	Methods Applied	Case Study				
		1	2	3	4	5
Temperature Screening & Symptom Checking	Teachers record students' body temperature manually using a digital thermometer.	✓	✓	✓	✓	✓
	Develop and implement a special QR code system to record students' body temperature and attendance.					✓
	Digital thermometers with stands were prepared at school entrances for temperature screening.		✓			
Physical Distancing	Teachers on duty monitor students during school dismissal time.	✓	✓	✓	✓	✓
	Using CCTV to monitor students and make an announcement to warn students.	✓				
	Staggered school dismissal time.	✓	✓	✓	✓	✓
	Prepare floor markings to encourage social distancing practice.	✓	✓	✓	✓	✓
	Demerits will be imposed on those students who failed to practise physical distance.		✓			
	Introduce a one-way pedestrian plan.		✓			
Disinfection	School workers disinfect the school premises.	✓	✓	✓	✓	✓
	Students disinfected their respective tables and chairs.	✓	✓		✓	
	Automatic hand sanitiser dispensers were installed in several locations of schools to allow occupants to sanitise their hands.	✓		✓		✓
	Disinfection tunnels were installed at school entrances to allow students to sanitise themselves once they enter the school compound.			✓		

Appoint disinfection and sterilisation contractors to disinfect school premises regularly.	✓

Source: Author

Participants involved in the interview were also asked about the suitable smart building applications to be implemented in school to ease their burden. Nine smart building applications were obtained from the literature review and for the interviewees to rank based on their personal opinions regarding the need and expectations of these applications. From the interview findings, it shows that the majority of the respondents (93%) choose IoT wearable devices to alert people to keep maintaining social distance all the time as the most necessary smart technologies that should be implemented. On the other hand, the smartphone application to record people who were in close contact with each other is the least preferred application which is chosen by 33% of the respondents. Table 2 shows the agreement on the necessity of each application by respondents.

Table 2: The agreement on the necessity of each application by respondents.

Applications	Category	Frequency (%)
IoT wearable devices to alert people keep maintaining social distancing all the time	Internet of Things (IoT)	92
AI disinfection robot that utilises UVC light to disinfect common areas	Artificial Intelligence (AI)	83
Thermal cameras and temperature sensors to measure occupants' body temperature	Smart Building System	75
An AI-based robot to encourage people to practise physical distancing in public areas	Artificial Intelligence (AI)	67
An AI system equipped with AI and infrared sensor to detect people's body temperature	Artificial Intelligence (AI)	58
Automatic doors	Smart Building System	50
Smart sensors that identify the areas that are visited by many people or frequently used surfaces (handles, handrails)	Smart Building System	50
Smart Heating, Ventilation & Air Conditioning (HVAC) system that can improve indoor air quality automatically	Smart Building System	42
Smartphone applications record people who were in close contact with each other	Internet of Things (IoT)	33

Source: Author

Current State and the Future State of Schools

The gap analysis was conducted to compare between the current conditions and the ideal conditions of the schools after implementing the proposed smart building system in schools with the aim to improve the current conditions through several actions to achieve the ideal conditions.

Figure 1, Figure 2 and Figure 3 show the summary of the gap analysis. The current state of the schools conducting temperature screening and symptom check manually and the tools that were used by the school authorities were very limited such as the handheld electronic thermometers.

Besides, it was found that all the disinfecting works were conducted manually. The schools' cleaners are required to disinfect or clean the classrooms before and after the school sessions. However, this consumes a lot of time and causes some inconvenience for those schools that have both morning and afternoon sessions as they need to share the same classroom. The disinfection works might not be effective as school cleaners could miss cleaning certain areas. For physical distancing, several strategies were adopted including staggered dismissal school time and a one-way pedestrian plan and markings to ensure everyone practises physical distancing. However, it is difficult to make everyone follow the physical distancing guideline because the strategies applied were not effective enough.

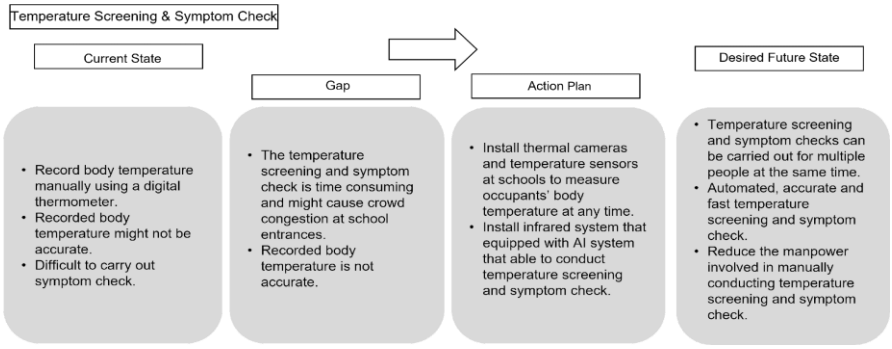


Figure 1: Summary of gap analysis for temperature screening and symptom check.
Source: Author

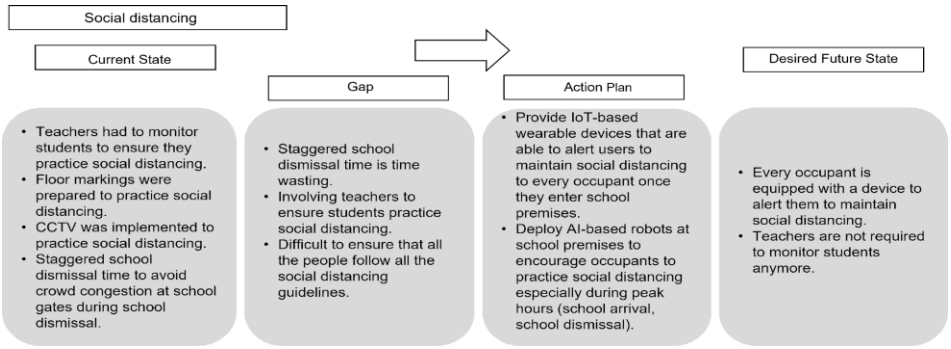


Figure 2: Summary of gap analysis for social distancing.
Source: Author

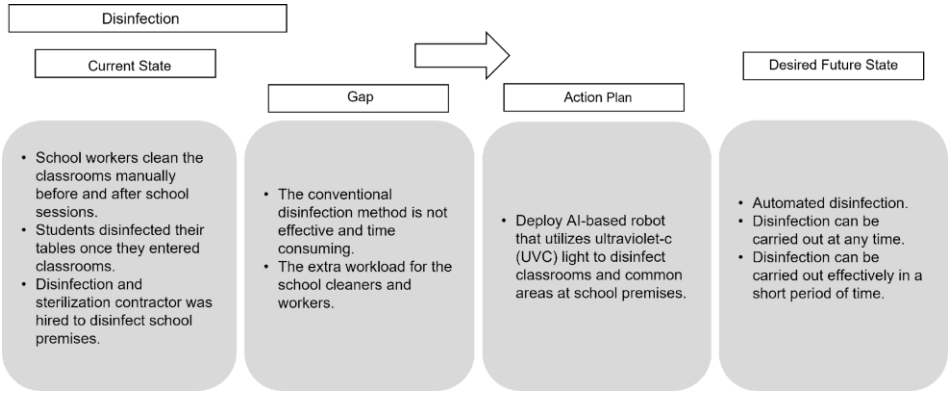


Figure 3: Summary of gap analysis for disinfection.
Source: Author

DISCUSSION

Proposed Guideline

Researchers can identify the challenges and problems faced by the school authorities to operate the schools under the new norm from the research findings. The main challenges including the guidelines outlined by the government have increased school administrators and teachers' workload and students' academic performance were greatly affected due to the closing and reopening of the schools. Hence, a proposed guideline is formulated based on the research findings to help the school authorities overcome these challenges.

The proposed guideline is required to ensure that the schools can achieve the ideal future state. It also plays an important role to act as a recommendation to formulate a guideline for the schools to create a safe physical teaching and learning environment under the new norm. Figure 4 shows the proposed guideline.

The proposed guideline includes the top five applications as over 50% of the respondents choose them as the applications that are suitable to be implemented in schools. The five applications are:

1. IoT-based wearable devices to alert people to keep maintaining physical distance all the time.
2. An AI-based robot that utilises ultraviolet-c (UVC) light to disinfect common areas.
3. Thermal cameras and temperature sensors to measure occupants' body temperature.
4. An AI-based robot to encourage people to practice physical distancing in public areas.
5. An AI system equipped with an AI and infrared sensor to detect people's body temperature.

Under the proposed guideline, temperature screening and symptom checks can be conducted by implementing AI infrared sensors, thermal cameras and temperature sensors at schools. This can reduce the manpower involved in conducting one-to-one temperature screening manually and can also detect any occupants with high body temperature and suspicious symptoms accurately and rapidly. Thus, temperature screening and symptom checking will not be time and energy-consuming anymore with the implementation of these applications. For physical distancing, IoT-based wearable devices and AI-based physical distancing robots were proposed. Both applications aim to alert students, teachers, and school administrators to practise physical distancing within the school compound. Implementing these applications can reduce the teachers' burden as they do not need to monitor and supervise students, especially during school dismissal time. Furthermore, the AI-based disinfection robot was proposed. The current method that the schools adopted to disinfect and clean the school compound is very time consuming and not effective. Implementing a smart building system that consists of an AI-based disinfection robot able to conduct disinfection and cleaning works according to optimal cleaning routines which are formulated based on current or historical building occupancy information. Therefore, disinfecting works can be conducted effectively and effortlessly.

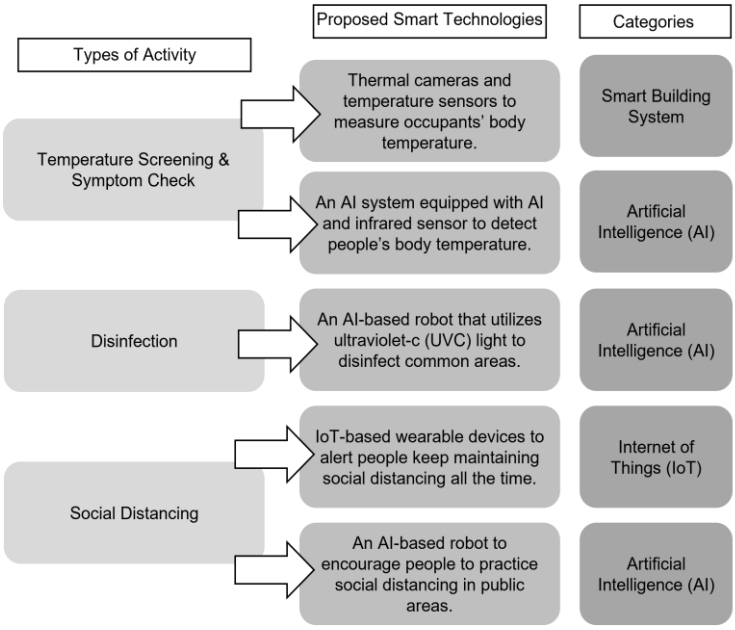


Figure 4: The proposed guideline.
Source: Author

School authorities can create or achieve the ideal future state which is to create a safe physical teaching and learning environment under the new norm with this proposed guideline. Once the smart building system is implemented in the existing schools, it can reduce the manpower involved such as teachers, school staff and school administrators in conducting certain tasks in the guidelines outlined by the government. Thus, the workload of the teacher will be minimised, and they can fully concentrate on teaching the students in school. Besides, schools were built to create the space for students to learn. The closure and reopening of the schools will affect some students' academic performance as they do not have a suitable alternative environment to learn when schools were closed. Thus, it clearly shows that schools are the perfect places for students to learn. A safe physical teaching and learning environment can be created by leveraging the smart building system. According to Cleveland (2021), some schools in the United States and some countries in Europe already implemented smart technologies to ensure that the buildings can provide a healthy and safe learning space during the post-COVID-19 pandemic. However, implementation of smart building systems in existing schools in Malaysia is very limited. It is a huge challenge for the school authorities to create a safe and healthy learning environment without the aid of these smart technologies, especially in a post-COVID pandemic world. Furthermore, infectious diseases and pandemics are cyclical and unpredictable and will strike again in future. Hence, the

implementation of a smart building system with various smart technologies discussed earlier would be a key contributor to creating a safe and healthy environment for occupants in a post-pandemic world.

CONCLUSION

This research identified and highlighted the challenges and problems faced by the schools' authorities during the closure, re-opening and operating of the schools under the new norm. It also revealed that the current state of the school operating under the new norm is time and energy-consuming due to the guidelines and SOP outlined by the Malaysian government. Thus, the implementation of a smart building system in schools can reduce additional work and inconvenience when operating the school under the new norm. The teaching and learning process can be conducted physically and safely under the new norm by leveraging the smart building system. For instance, physical education and learning will not become a challenge anymore for the teachers and students under the new norm. Thus, the students' education will not be affected by the pandemic.

ACKNOWLEDGEMENTS

This study was supported by grants from the Ministry of Higher Education under the Fundamental Research Grant Scheme (FRGS/1/2020/SS102/UM/02/1).

REFERENCES

14-day Movement Control Order begins nationwide on Wednesday. (2020, March 16). *NewStraits Times*. Retrieved from https://www.nst.com.my/news/nation/2020/03/575180/14-day-movement-control-order-begins-nationwide-wednesday

Abdul Latip, N., Karim, R., Marzuki, A., Muhammad, F., Shah, A., Yilret Nanle, V., & Umar, M. U. (2021). Covid-19 Outbreak and Role of TourismDevelopment On Economic Growth In Pakistan. *Planning Malaysia*,*19*(19). https://doi.org/10.21837/pm.v19i19.1062

Ackerman, E. (2020, March 11). *Autonomous Robots Are Helping Kill Coronavirus in Hospitals*. Retrieved from https://spectrum.ieee.org/automaton/robotics/medical-robots/autonomous-robots-are-helping-kill-coronavirus-in-hospitals

Akadiri, O. P. (2011). *Development of a Multi-Criteria Approach for the Selection of Sustainable Materials for Building Projects,* PhD Thesis, University of Wolverhampton, Wolverhampton, UK.

Arup. (n.d.). Smart buildings: How a virus might lead to healthier buildings. Retrieved from https://www.arup.com/perspectives/smart-buildings-how-a-virus-might-lead-to-healthier-buildings

Azuma, K., Yanagi, U., Kagi, N., Kim, H., Ogata, M., & Hayashi, M. (2020). Environmental factors involved in SARS-Cov-2 transmission: Effect and role of indoor environmental quality in the strategy for COVID-19 infection control.

Environmental Health and Preventive Medicine, *25*(1). doi:10.1186/s12199-020-00904-2

Bernama. (2021, May 1). Cops use drones to monitor SOPs at Klang Valley bazaars. *The Star.* Retrieved from https://www.thestar.com.my/news/nation/2021/05/01/cops-use-drones-to-monitor-sops-at-klang-valley-bazaars

Cleveland, M. (2021, September 24). Using Smart Building Technology to Create Healthier Learning Environments. Education Technology. Retrieved from https://edtechnology.co.uk/comments/smart-building-technology-create-healthier-learning-environments

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications

Degha, H. E., Laallam, F. Z., & Said, B. (2019). Intelligent context-awareness system for energy efficiency in smart building based on ontology. *Sustainable Computing: Informatics and Systems*, *21*, 212-233. doi:10.1016/j.suscom.2019.01.013

Hana Naz Harun, & Tharanya Arumugam. (2020, July 1). Back to school: Full re-opening by July 22. *New Straits Times*. Retrieved from https://www.nst.com.my/news/nation/2020/07/605063/back-school-full-reopening-july-22

Johnson, K. (2020, March 4). *How people are using AI to detect and fight the coronavirus*. Retrieved from https://venturebeat.com/2020/03/03/how- people-are-using-ai-to-detect-and-fight-the-coronavirus/

Kaklauskas, A., Zavadskas, E. K., Naimavicienė, J., Krutinis, M., Plakys, V., & Venskus, D. (2010). Model for a complex analysis of intelligent built environment. *Automation in Construction*, *19*(3), 326-340. doi:10.1016/j.autcon.2009.12.006

Nasajpour, M., Pouriyeh, S., Parizi, R., Dorodchi, M., Valero, M., & Arabnia, H. (2020). Internet of Things for Current COVID-19 and Future Pandemics: an Exploratory Study. *Journal of Healthcare Informatics Research*, *2020*(4), 325–364. doi:10.1007/s41666-020-00080-6

NCS. (2020). AI-powered solutions in tackling COVID-19 and beyond. Healthcare IT News. Retrieved from https://www.healthcareitnews.com/news/asia/ai-powered-solutions-tackling-covid-19-and-beyond

Nora, M. (2021, June 19). Students losing interest in online lessons, attendance dropping, says expert. *Free Malaysia Today*. Retrieved from https://www.freemalaysiatoday.com/category/nation/2021/06/19/students-losing-interest-in-online-lessons-attendance-dropping-says-expert/

Nuradzimmah Daim. (2021, February 21). Schools reopen: Staggered roster will prevent overcrowding. *New Straits Time*. Retrieved from https://www.nst.com.my/news/nation/2021/02/667569/schools-reopen-staggered-roster-will-prevent-overcrowding

Raja Rafidah Raja Muhammad Rooshd, Muhd Zaimi Abd Majid, Shaza Rina Sahamir, & Noor Akmal Adillah Ismail. (2018). Relative Importance Index of Sustainable Design and Construction Activities Criteria for Green Highway. Chemical Engineering Transactions, 63(1), 151-156.

Smieszek, T., Lazzari, G., & Salathé, M. (2019). Assessing the dynamics and control of droplet- and aerosol-transmitted influenza using an indoor positioning system. Scientific Reports, 9(1). doi:10.1038/s41598-019-38825-y

Tan, V. (2021, January 9). IN FOCUS: Prolonged school closure in Malaysia due to COVID-19 shakes up learning experience. *Channel New Asia*. Retrieved from https://www.channelnewsasia.com/news/asia/in-focus-malaysia-covid-19-school-closure-2020-parents-students-13740364

Tung, Y.-H., Chia, F.-C., & Yong, F. Y.-Y. (2021). Exploring The Usage Of Digital Technologies For Construction Project Management. *Planning Malaysia*, *19*(17). https://doi.org/10.21837/pm.v19i17.983

Wray, S. (2020, May 12). Robot 'dog' roams Singapore park to encourage social distancing. *CitiesToday*. Retrieved from https://cities-today.com/robot-dog-roams-singapore-park-to-encourage-social-distancing/

Yeoh, A. (2020, April 27). MCO: As lessons move online, local teachers and students struggle with uneven Internet access. *The Star*. Retrieved from https://www.thestar.com.my/tech/tech-news/2020/04/27/mco-as-lessons-move-online-local-teachers-and-students-struggle-with-uneven-internet-access

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 223 – 234

DELAY MITIGATION STRATEGIES AND THE IMPLICATION ON THE CONSTRUCTION INDUSTRY: A SYSTEMATIC LITERATURE REVIEW

Norazlin Abd Aziz[1], Faizul Azli Mohd Rahim[2], Nur Mardhiyah Aziz[3]

[1,2,3]*Faculty of Built Environment*
UNIVERSITI MALAYA

Abstract

Every project's goal has always been to be successful. Failure to complete projects on time has become a major problem in the last few decades. Construction delays are a common and serious problem that needs to be investigated further. This issue has implications for the construction industry and the economy's growth, as well as the long-term development of countries. Many studies have not highlighted the strategies implemented by organisations to lessen the impact of project delays. As such, a systematic literature analysis (SLR) was performed in this study by selecting publications of articles from indexed journals on the Web of Science and Scopus to identify the efficacy of strategies utilised when mitigating problems that postpone the overall construction. The method applied for this SLR is using the Reporting Standards for Systematic Evidence Syntheses (ROSES) analysis protocol. Through this protocol, several steps need to be followed accordingly to acquire an accurate number of articles that have to be reviewed. The findings identified five leading aspects of strategies that should be adopted to reduce construction project delays, namely: communication; management; information systems and technology; enforcement of law and order; and financials. The implications of these strategies are also discussed in this research.

Keywords: Project, strategy, project delay, systematic literature review

[2] Associate Professor at University Malaya. Email: azli@um.edu.my

INTRODUCTION

Project management entails applying prior knowledge, expert capacity, wherewithal, and approaches to ensure that a project meets its requirements; thus, for the project to succeed, the project manager must directly regulate the project's scope, deadlines, and costs (Shakeri & Khalilzadeh, 2020). A good project manager and project participants must be excellent at practising the details suggested in project management to avoid any issues. Postponement of tasks in a project is among the commonplace complications encountered by the construction business (Bajjou & Chafi, 2020; Banobi & Jung, 2019; Durdyev et al., 2017; Mpofu et al., 2017).

Countless studies were carried out in various nations to assess the reasons for delaying construction projects. For example, studies conducted in Iran (Fallahnejad, 2013; Khoshgoftar et al., 2010; Rafieizonooz et al., 2015) listed the reasons for project delays as project management; technology; materials; financial, improper planning; ineffective site supervision; commitment; and lack of communication. In Malaysia, Hamzah et al. (2012) listed 22 factors of project delay for the year 2012. The top five factors are workers' output, on-site material deliveries, the greater cost of materials, malfunctioning equipment, and monetary constraints.

Existing Studies Related to Mitigation Strategies Taken by the Project Participants in the Construction Industry - The Research Gap

Researchers have studied the reasons that can cause project delays in the construction industry. Studies were also conducted to explore the project parties' strategies for reducing the project delay. In their studies, Rahman et al. (2013), Yap et al. (2018), and Yap and Shavarebi (2019) suggested several strategies to mitigate project delays in Malaysia. These strategies include improvement in contractors' site management; focusing on project communications and project learning; and focusing on human and managerial issues related to construction industry problems. Durdyev et al. (2017) also proposed a number of beneficial strategies for the Cambodian construction industry, such as ensuring adequate material delivery times on construction sites, providing accurate and comprehensive schedules for site supervisors, and enhancing workforce resources.

Even though some of the strategies were highlighted by the researchers in their studies, few studies stressed the impact and implications of the strategies in mitigating project delay. Thus, this study was conducted using a systematic literature review (SLR) to identify the effects of the strategies in mitigating project delay.

RESEARCH METHODOLOGY

Reporting Standards for Systematic Evidence Syntheses (ROSES) - The Review Procedure

This study employed the Reporting Standards for Systematic Evidence Syntheses (ROSES) analysis protocol to present its analysis. The processes of searching, selecting, data retrieval, and critical assessment are all covered in great detail in ROSES throughout the early and middle phases of the analysis process, but with little information on the synthesis (Haddaway et al., 2018).

Formulation of the Research Question

The PICo approach was used to formulate the research topic for this study. It is a tool that can help researchers come up with an appropriate research topic with three primary elements: population or challenge, interest, and context. These aspects guide the authors in formulating their central research issue. Two research questions for this paper are; 1) What are the strategies to mitigate the project delays? 2) What are the implications of delay mitigation strategies in the construction sector?

Identification

A set of keywords was chosen as search strings to conduct a literature search in databases such as Web of Science and Scopus. The identification method relies on an online thesaurus, keywords from previous research, keywords from Scopus, and keywords suggested by experts. The entire search string is shown in Table 1. A total of 444 papers were found after searching both databases.

Table 1: The search string

Database	Search string
Scopus	TITLE-ABS-KEY ((“mitigation strategy” OR “approach” OR “plan”) AND (“project delay” OR “postpone”) AND (“construction”))
Web of Science	TS= ((mitigation strategy* OR approach* OR action*) AND (project delay* OR “postpone*) AND (building construction*))

Screening

This study used the database’s sorting mechanism to automatically screen all 444 selected articles after specifying the article selection criteria. Since researchers cannot possibly review all currently published papers, Okoli (2015) proposed that researchers choose a time frame to review. The criteria used to choose the articles were based on the timeline (2017–2021), document type (article only), and language (English only).

Eligibility

The titles and abstracts of the papers were read as part of the screening process. Only 22 articles were analysed thoroughly after rejecting papers that were irrelevant to the study's scope.

Quality Appraisal

According to Mohamed Shaffril et al. (2019), a small number of journals are needed to conclude a particular investigation area using systematic reviews. In their study, Mohamed Shaffril et al. (2019) reviewed a total of 18 articles. Haris et al. (2020) reviewed 19 journals for their survey, and Mohamed Shaffril et al. (2020) reviewed 25 articles in their studies. After going through the screening process, 22 papers were chosen for this review.

Data Abstraction and Analysis

The current analysis took a qualitative approach, with the researcher reading all 22 articles in-depth, including the abstracts, conclusions, and discussion parts. A qualitative thematic analysis was used to perform a systematic review for this study. Figure 1 shows the diagram for journal searching strategies for this SLR paper.

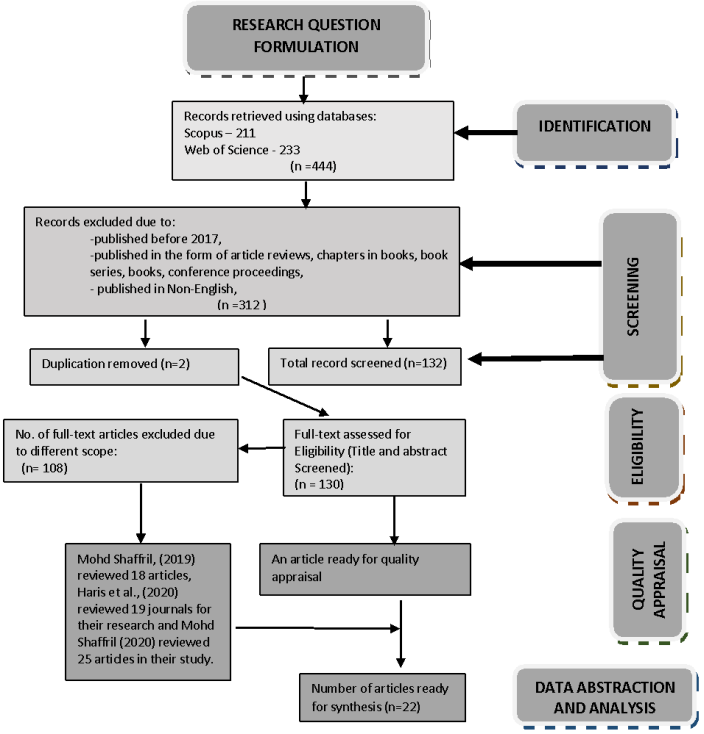


Figure 1: Flow diagram
Source: adapted from Mohamed Shaffril et al. (2020)

RESULTS OF THE STUDY

Background of the Studies

For this SLR, a total of twenty-two articles were selected after going through the whole article searching process previously. From this total, six articles were published in 2017. In 2018, only three articles were published on this subject. However, for the year 2019, the number of articles published increased to four. This increasing trend continued into the following year, 2020. Eight articles were published. This total number of articles is also the highest contribution to the published articles for five years from 2017 until 2021. For the current year 2021, one article managed to be published in Scopus. The details of the selected papers are recorded in Table 2.

Table 2: Summary of Background of Studies

No.	Author (s)	Year	Country	Research Method		
				Quantitative	Qualitative	Mixed-method
1.	Babaeian et al.	2021	New Zealand		✓	
2.	Elabd et al.	2020	N.A		✓	
3.	Ali Shaikh et al.	2020	Pakistan	✓		
4.	Singla et al.	2020	India	✓		
5.	Yap et al.	2020	Malaysia			✓
6.	Yap et al.	2020	Malaysia	✓		
7.	Yap and Skitmore	2020	Malaysia		✓	
8.	Yap and Toh	2020	Malaysia	✓		
9.	Riazi et al.	2020	Malaysia		✓	
10.	Banobi et al.	2019	Tanzania	✓		
11.	Prasad et al	2019	India			✓
12.	Gurmu	2019	Australia			✓
13.	Soomro et al.	2019	Pakistan	✓		
14.	Riazi and Nawi	2018	Malaysia		✓	
15.	Ranawaka and Mallawaarachchi	2018	Sri Lanka	✓		
16.	Böhme et al.	2018	Australia		✓	
17.	Amoatey et al.	2017	Ghana	✓		
18.	Oyegoke and Al Kiyumi	2017	Oman	✓		
19.	Chokor et al.	2017	US	✓		
20.	Yap et al.	2017	Malaysia	✓		
21.	Al-Fadhali et al.	2017	Yemen	✓		

22.	Yap et al.	2017	Malaysia		✓	

MAIN FINDINGS

This study analysed twenty-two articles in the inclusion stage by categorising the empirical studies' findings into several themes and sub-themes. The first identified theme and subthemes are strategies to mitigate construction delays; communication; management; enforcement of law and order; information systems and technology; and finances. The summary is shown in Table 3. The other theme highlighted in this SLR is the implication of these strategies on project delay; in the construction sector. The details of the implications of these strategies on project delay are indicated in Table 5.

Table 3: Summary of Delay Mitigation Strategies

No.	Author (s)	Strategies to Mitigate Project Delay				
		Communication	Management	Enforcement Law & Order	Info. System &Technology	Financial
1.	Babaeiaet al. (2021)	✓	✓			
2.	Elabd et al. (2020)				✓	
3.	Ali Shaikh et al. (2020)		✓	✓		
4.	Yap et al. (2017)	✓	✓			
5.	Yap et al. (2017)	✓	✓			
6.	Yap and Skitmore (2020)	✓	✓			
7.	Yap and Toh (2020)	✓	✓			
8.	Singla et al. (2020)	✓	✓			
9.	Riazi et al. (2020)				✓	
10.	Banobi and Jung (2019)	✓	✓			
11.	Prasad et al. (2019)	✓	✓		✓	
12.	Gurmu		✓			
13.	Soomro et al. (2019)		✓			✓
14.	Riazi and Nawi (2018)				✓	
15.	Ranawaka and Mallawaarachchi (2018)				✓	
16.	Böhme et al. (2018)				✓	
17.	Amoatey et al. (2017)				✓	

18.	Oyegoke and Al Kiyumi (2017)	✓	✓			
19.	Chokor et al. (2017)					✓
20.	Al-Fadhali et al. (2019)				✓	
21.	Yap et al. (2020)	✓	✓			
22.	Yap et al. (2020)	✓	✓			

IMPLICATION OF MITIGATION STRATEGIES ON PROJECT DELAY

Communication and management

Babaeian et al. (2021) discovered that proactive and reactive measures were introduced to mitigate project delays, especially on the contractor's side. The experts interviewed agreed that responding faster will save time and resources and reduce the risk to the project and the contractor's credibility for reasons that cannot be avoided entirely (Muthuveeran et al., 2022). Banobi and Jung (2019) suggested that project participants' close project supervision can help identify problems in the early stages. Incompetent firms hired can lead to many other problems, such as low quality and slow response (Zulkifli et al., 2021). Any method that can improve interaction and administration must be executed by the construction firm to lessen the detrimental effect of project delays (Banobi & Jung, 2019; Prasad et al., 2019; Babaeian et al., 2021; Yap et al., 2020; Yap & Skitmore, 2020; Yap & Toh, 2020; Yap et al., 2017).

Information Systems and Technology

In favour of a remote management system, Elabd et al. (2020) suggested that integrating new technology may be the best way to enable remote supervision of worksites. Technology advancement is vital in all organisations, although much can be improved through efficient information technology governance (Henriques et al. 2020). One of the systems similar to technology is information technology (IT). Information Systems (IS), which are characterised as functional systems, are another crucial concept. IS processes and activities mainly involve information processing, which includes capturing and transmitting, storing, retrieving, manipulating, and displaying data. Riazi and Nawi (2018) and Riazi et al. (2020) suggested these strategies based on the results of the interviews and focus group sessions with the industry experts in Malaysia. They concluded that most construction problems stem from a weak system of supply chain management in the organisation.

Enforcement of Law and Order and Financial

According to Ali Shaikh et al. (2020), project delays can also be avoided by enforcing law and order in the organisation as a control measure for the organisational behaviour and attitudes of the project participants. Regarding financial expenditure, Soomro et al. (2019) specified that any complications which lead to a delayed construction project are usually associated with monetary constraints. Financial assistance provided by the government can also improve the project's performance (Akhmadi & Himawan, 2021). Table 4 summarises the details of the implications of the strategies implemented.

Table 4: Summary of strategies and implications

Author (s)	Strategies	Implications
Babaeian et al. (2021), Ali Shaikh et al. (2020), Yap et al. (2020), Yap et al. (2020), Yap and Skitmore, (2020), Yap and Toh, (2020), Yap et al. (2017), Singla et al. (2020), Banobi and Jung, (2019), Prasad et al. (2019), Gurmu, (2019), Soomro et al. (2019), Oyegoke and Al Kiyumi, (2017)	Communication and management	● Project participants will take action immediately once problems are identified to reduce time, resources, and risk. ● Strong contact networks are established. ● Organisational, preventive, preventive-corrective, and corrective approaches reduce project delays. ● Effective collaboration between project parties might reduce problems in the future.
Elabd et al., (2020), Riazi & Nawi (2018), Riazi et al. (2020), Prasad et al. (2019), Ranawaka and Mallawaarachchi (2018), Böhme et al. (2018), Amoatey and Ankrah (2017), Al-Fadhali et al. (2019)	Information systems and technology	● New technology is introduced to improve site monitoring. ● Technological advancements ensure that information flow is managed efficiently. ● IIF helps remove delay problems. ● Causes of delay can be avoided in the early stages through a risk-responsive framework.
Ali Shaikh et al. (2020), Soomro et al. (2019), Chokor et al. (2017)	Enforcement of Law and Order and financial	● Project participants' behaviour at the workplace can be controlled through punishment and compounds. ● Financial problems might cause project delays. Therefore, the organisation must ensure that the fund is always sufficient, and experienced contractors must be hired to reduce financial problems. ● Cost-based incentives improve the motivation of the project team.

CONCLUSION

Numerous factors frequently cause construction projects to be delayed, all of which can have a significant financial impact. While a number of studies have been conducted to ascertain the root of delays in project completion, only a few have concentrated on the methods of mitigating project delays within

organisations. Focusing on an organisation's strategies might help in identifying the underlying cause of project delays and the corresponding solutions. Among the strategies identified are communication, management, enforcement of law and order, information systems and technology, and finance. These strategies also have a positive effect on the organisation, as the delays in actual progress can be diminished. However, the scope of this SLR is limited to primarily developing countries. Thus, it is recommended that other researchers focus on the strategies of developed countries because results may vary. It is also recommended that future research use a variety of databases to broaden and diversify the search.

REFERENCES

Akhmadi, M. H., & Himawan, A. R. (2021). Determination of financial feasibility of Indonesia's new capital road construction project using scenario analysis. *Planning Malaysia*, *19*(3), 190–201. https://doi.org/10.21837/PM.V19I17.998

Al-Fadhali, N., Zainal, R., Kasim, N., Dodo, M., Kim Soon, N., & Hasaballah, A. H. A. (2019). The desirability of Integrated Influential Factors (IIFs) Model of internal stakeholder as a panacea to project completion delay in Yemen. *International Journal of Construction Management*, *19*(2), 128–136. https://doi.org/10.1080/15623599.2017.1390720

Ali Shaikh, F., Nasurullah, O., & Kaliannan, S. (2020). Civil Engineering Journal. *Civil Engineering Journal*, *6*.

Amoatey, C. T., & Ankrah, A. N. O. (2017). Exploring critical road project delay factors in Ghana. *Journal of Facilities Management*, *15*(2), 110–127. https://doi.org/10.1108/JFM-09-2016-0036

Babaeian Jelodar, M., Hemant Raut, P., & Saghatforoush, E. (2021). Contractor-Delay Control in Building Projects: Escalation of Strategy from Primary Proactive to Secondary Reactive. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *13*(2), 04521002. https://doi.org/10.1061/(asce)la.1943-4170.0000449

Bajjou, M. S., & Chafi, A. (2020). Empirical study of schedule delay in Moroccan construction projects. *International Journal of Construction Management*. https://doi.org/10.1080/15623599.2018.1484859

Banobi, E. T., & Jung, W. (2019). Causes and mitigation strategies of delay in power construction projects: Gaps between owners and contractors in successful and unsuccessful projects. *Sustainability (Switzerland)*, *11*(21). https://doi.org/10.3390/su11215973

Böhme, T., Escribano, A., Heffernan, E. E., & Beazley, S. (2018). Causes and mitigation for declining productivity in the Australian mid-rise residential construction sector. *Built Environment Project and Asset Management*, *8*(3), 253–266. https://doi.org/10.1108/BEPAM-10-2017-0097

Chokor, A., El Asmar, M., & Sai Paladugu, B. (2017). Quantifying the Impact of Cost-Based Incentives on the Performance of Building Projects in the United States. *Practice Periodical on Structural Design and Construction*, *22*(2), 04016024. https://doi.org/10.1061/(asce)sc.1943-5576.0000312

Durdyev, S., Omarov, M., & Ismail, S. (2017). Causes of delay in residential construction projects in Cambodia. *Cogent Engineering*. https://doi.org/10.1080/23311916.2017.1291117

Elabd, N. M., Mansour, Y. M., & Khodier, L. M. (2020). Social distancing in construction: Investigating the role of technologies in supporting remote management. *Journal of Engineering and Applied Science*, *67*(8), 2073–2091.

Fallahnejad, M. H. (2013). Delay causes in Iran gas pipeline projects. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2012.06.003

Gurmu, A. T. (2019). Identifying and prioritizing safety practices affecting construction labour productivity: An empirical study. *International Journal of Productivity and Performance Management*, *68*(8), 1457–1474. https://doi.org/10.1108/IJPPM-10-2018-0349

Haddaway, N. R., Macura, B., Whaley, P., & Pullin, A. S. (2018). ROSES Reporting standards for Systematic Evidence Syntheses: Pro forma, flow-diagram and descriptive summary of the plan and conduct of environmental systematic reviews and systematic maps. *Environmental Evidence*. https://doi.org/10.1186/s13750-018-0121-7

Hamzah, N., Khoiry, M. A., Arshad, I., Badaruzzaman, W. H. W., & Tawil, N. M. (2012). Identification of the causes of construction delay in Malaysia. *World Academy of Science, Engineering and Technology*, *72*, 312–317.

Haris, S. M., Mustafa, F. B., & Raja Ariffin, R. N. (2020). Systematic Literature Review of Climate Change Governance Activities of Environmental Nongovernmental Organizations in Southeast Asia. *Environmental Management*. https://doi.org/10.1007/s00267-020-01355-9

Henriques, D., Almeida, R., Pereira, R., da Silva, M. M., & Bianchi, I. S. (2020). How IT governance can assist iot project implementation. *International Journal of Information Systems and Project Management*, *8*(3), 25–45. https://doi.org/10.12821/ijispm080302

K.V, P., Vasugi, V., R, V., & Bhat, N. (2019). Analysis of causes of delay in Indian construction projects and mitigation measures. *Journal of Financial Management of Property and Construction*, *24*(1), 58–78. https://doi.org/10.1108/JFMPC-04-2018-0020

Khoshgoftar, M., Bakar, A. H. A., & Osman, O. (2010). Causes of delays in Iranian construction projects. *International Journal of Construction Management*. https://doi.org/10.1080/15623599.2010.10773144

Mohamed Shaffril, H. A., Ahmad, N., Samsuddin, S. F., Samah, A. A., & Hamdan, M. E. (2020). Systematic literature review on adaptation towards climate change impacts among indigenous people in the Asia Pacific regions. In *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2020.120595

Mohamed Shaffril, H. A., Samah, A. A., Samsuddin, S. F., & Ali, Z. (2019). Mirror-mirror on the wall, what climate change adaptation strategies are practiced by the Asian's fishermen of all? In *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2019.05.262

Mpofu, B., Ochieng, E. G., Moobela, C., & Pretorius, A. (2017). Profiling causative factors leading to construction project delays in the United Arab Emirates. *Engineering, Construction and Architectural Management*.

https://doi.org/10.1108/ECAM-05-2015-0072

Muthuveeran, A. A. S., Tahir, O. M., Hassan, M. A., & Yin, I. (2022). Investigating the Current Risk Management Process Practice in Malaysian Landscape Planning Projects. *Planning Malaysia*, *20*(1), 48–63. https://doi.org/10.21837/PM.V20I20.1078

Oyegoke, A. S., & Al Kiyumi, N. (2017). The causes, impacts and mitigations of delay in megaprojects in the Sultanate of Oman. *Journal of Financial Management of Property and Construction*. https://doi.org/10.1108/JFMPC-11-2016-0052

Rafieizonooz, M., Salim, M. R., Khankhaje, E., Warid Hussin, M., Zarebidaki, A., & Salmiati. (2015). Determining the Causes of Delay by Using Factor Analysis in Tehran's Construction Projects. *Applied Mechanics and Materials*, *735*(February), 109–116. https://doi.org/10.4028/www.scientific.net/amm.735.109

Rahman, I. A., Memon, A. H., Azis, A. A. A., & Abdullah, N. H. (2013). Modeling causes of cost overrun in large construction projects with partial least square-sem approach: Contractor's perspective. *Research Journal of Applied Sciences, Engineering and Technology*, *5*(6), 1963–1972. https://doi.org/10.19026/rjaset.5.4736

Ranawaka, I., & Mallawaarachchi, H. (2018). A risk-responsive framework for green retrofit projects in Sri Lanka. *Built Environment Project and Asset Management*, *8*(5), 477–490. https://doi.org/10.1108/BEPAM-10-2017-0088

Rathod, G. G., Yadav, K., & Darshan, A. (2020). *Causes of delays in construction industry 1*. *5*(1), 43–45.

Riazi, S. R. M., & Nawi, M. N. M. (2018a). Project delays in the Malaysian public sector: Causes, pathogens and the supply chain management approach. *International Journal of Technology*, *9*(8), 1668–1680. https://doi.org/10.14716/ijtech.v9i8.2752

Riazi, S. R. M., & Nawi, M. N. M. (2018b). Project Delays in the Malaysian Public Sector: Causes, Pathogens and the Supply Chain Management Approach. *International Journal of Technology*. https://doi.org/10.14716/ijtech.v9i8.2758

Riazi, S. R. M., Nawi, M. N. M., & Yaziz, M. F. A. (2020). Developing a holistic project time management framework utilizing fundamental supply chain management (Scm) tools to overcome delay in Malaysian public sector building projects. *International Journal of Sustainable Construction Engineering and Technology*, *11*(1), 31–41. https://doi.org/10.30880/ijscet.2020.11.01.004

Shakeri, H., & Khalilzadeh, M. (2020). Analysis of factors affecting project communications with a hybrid DEMATEL-ISM approach (A case study in Iran). *Heliyon*. https://doi.org/10.1016/j.heliyon.2020.e04430

Singla, H. K., Shrivas, A., & Sharma, A. (2020). Identification of knowledge assets in construction projects and their impact on project performance. *Journal of Intellectual Capital*. https://doi.org/10.1108/JIC-04-2020-0135

Soomro, F. A., Memon, M. J., Chandio, A. F., Sohu, S., & Soomro, R. (2019). Causes of Time Overrun in Construction of Building Projects in Pakistan. *Engineering, Technology & Applied Science Research*, *9*(1), 3762–3764. https://doi.org/10.48084/etasr.2449

Yap, J. B. H., Abdul-Rahman, H., & Chen, W. (2017). Collaborative model: Managing

design changes with reusable project experiences through project learning and effective communication. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2017.04.010

Yap, J. B. H., Abdul-Rahman, H., & Wang, C. (2018). Preventive Mitigation of Overruns with Project Communication Management and Continuous Learning: PLS-SEM Approach. *Journal of Construction Engineering and Management*. https://doi.org/10.1061/(asce)co.1943-7862.0001456

Yap, J. B. H., Leong, W. J., & Skitmore, M. (2020). Capitalising teamwork for enhancing project delivery and management in construction: empirical study in Malaysia. *Engineering, Construction and Architectural Management*. https://doi.org/10.1108/ECAM-10-2019-0581

Yap, J. B. H., Low, P. L., & Wang, C. (2017). Rework in Malaysian building construction: impacts, causes and potential solutions. *Journal of Engineering, Design and Technology*, *15*(5), 591–618. https://doi.org/10.1108/JEDT-01-2017-0002

Yap, J. B. H., & Shavarebi, K. (2019). Enhancing project delivery performances in construction through experiential learning and personal constructs: competency development. *International Journal of Construction Management*. https://doi.org/10.1080/15623599.2019.1629864

Yap, J. B. H., Shavarebi, K., & Skitmore, M. (2020). Capturing and reusing knowledge: analysing the what, how and why for construction planning and control. *Production Planning and Control*, *0*(0), 1–14. https://doi.org/10.1080/09537287.2020.1774676

Yap, J. B. H., & Skitmore, M. (2020). Ameliorating time and cost control with project learning and communication management: Leveraging on reusable knowledge assets. *International Journal of Managing Projects in Business*, *13*(4), 767–792. https://doi.org/10.1108/IJMPB-02-2019-0034

Yap, J. B. H., & Toh, H. M. (2020). Investigating the principal factors impacting knowledge management implementation in construction organisations. *Journal of Engineering, Design and Technology*, *18*(1), 55–69. https://doi.org/10.1108/JEDT-03-2019-0069

Zidane, Y. J. T., & Andersen, B. (2018). The top 10 universal delay factors in construction projects. *International Journal of Managing Projects in Business*. https://doi.org/10.1108/IJMPB-05-2017-0052

Zulkifli, N. A. A., Azis, S. S. A., Saliman, N. S. S., & Maimun, N. H. A. (2021). Factors causing failure in completing reassessment work among appointed valuation firms. *Planning Malaysia*, *19*(3), 123–133. https://doi.org/10.21837/PM.V19I17.992

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 235 – 247

CRITERIA AND ATTRIBUTES FOR THE 20-MINUTE CITY CONCEPT (KP20M) IN BALIK PULAU, PULAU PINANG

Ruhizal Roosli[1], Mohd Ismail Isa[2], Diana Mohamad[3] & Abdul Ghapar Othman[4]

[1, 2, 3 & 4] *School of Housing, Building & Planning*
UNIVERSITI SAINS MALAYSIA

Abstract

This article reports on the progress of a community project that involves Universiti Sains Malaysia, PLANMalaysia, Penang Disaster Management Committee and local community organisations. The purpose of this project is to measure the suitability of this neighbourhood in Balik Pulau that qualifies to be considered as a pilot project that is able to achieve a level comparable to the pilot project in Melbourne, Australia. This 20-Minute City project aims to assess the attributes and criteria, examine the study area's preparedness to address disaster based on the assessed attributes and criteria, and strengthen the resilience of the study area via practising locally mould 20-Minute City attributes and criteria. This is done by looking at the use of space (spatial) and capacity (public facilities, infrastructure, buildings & other land use categories) based on the needs of existing communities. 20-Minute City Concept was initially brought forward to promote the idea of living locally – people can meet most of their needs within a 20-minute walk from home. COVID-19 has abruptly tweaked living locally into living sustainably, where the profound COVID-19 destructive effect has accelerated the necessity of developing a community that is resilient to risk. The study area technically has 20-Minute City's attributes and criteria; however, they are yet to be fully assessed on its readiness aspect. This study is appropriately done now to see this concept potentially incorporated in some Malaysia development policies, especially after the COVID-19 outbreak as a pandemic since this new city concept has become a new trend of new neighbourhood norm. Understanding the feasibility of these attributes and criteria will help in planning an effective disaster management plan which then creates a resilient and competitive community towards understanding distances and features as being practised in the 20-minute neighbourhoods in Australia.

***Keywords**:* Community Project; COVID-19 Pandemic; Resilient; New City Concept; New Neighbourhood Norm

[1] Associate Professor at Universiti Sains Malaysia Email: ruhizal@usm.my

INTRODUCTION

20-Minute City Concept was initially brought forward to promote the idea of living locally – people can meet most of their needs within a 20-minute walk from home. COVID-19 has abruptly twisted living locally into living sustainably, where the profound COVID-19 destructive effect has accelerated the need to develop a community that is resilient to risk (UN-Habitat, 2020). The study area technically has 20-Minute City's attributes and criteria; however, they are yet to be fully assessed on its readiness aspect (Wang et al., 2016). Understanding the feasibility of these attributes and criteria will help in an effective disaster management plan, creating a resilient and competitive community (Song, 2015). This will increase the opportunity to be socially and economically viable on its own (Amann & Jurasszovich, 2017). This 20-Minute City project aims to assess the attributes and criteria, examine the study area's preparedness to address disaster based on the assessed attributes and criteria, and strengthen the resilience of the study area via practising locally mould 20-Minute City attributes and criteria. This is done by looking at the use of space (spatial) and capacity (public facilities, infrastructure, buildings & other land use categories) based on the needs of existing communities (Egila & Agbola, 2012). Therefore, the identification of criteria and attributes in the study area are the step towards understanding distances and features as being practised in the 20-minute neighbourhoods in Australia.

Once the 20-Minute City Concept can be identified in this study location in Malaysia, a proposal will be made by Universiti Sains Malaysia, PLANMalaysia, the State Disaster Management Committee and the local community organisation of Balik Pulau (Figure 1) to the Victoria State Government Department of Environment, Land, Water & Planning, Australia on the potential of becoming a partner in their existing 20-Minute Neighborhood Pilot Program. In Australia, this concept has already been incorporated into the long-term physical planning of Plan Melbourne 2017-2050; Direction 5 — Create a city of 20-minute neighbourhoods. Malaysia still does not have the planning to see this concept in its major physical development policies (Roosli et al., 2019). After the COVID-19 outbreak as a pandemic, this new city concept needs to be studied and has become a new trend of new norms neighbourhood as recommended by the PLANMalaysia. Planning has dramatically changed post-pandemic life; most residents in affected areas must remain at home and follow the Ministry of Health (MOH) and KKM SOPs to obtain daily necessities. This scenario corresponds with the implementation of KP20M, which promotes easy access to daily necessities by walking, cycling, or safely using public transportation. The implementation of KP20M necessitates the cooperation and participation of numerous parties, beginning with local governments, developers, public transportation operators, non-governmental organizations (NGOs), and public awareness (PLANMalaysia).

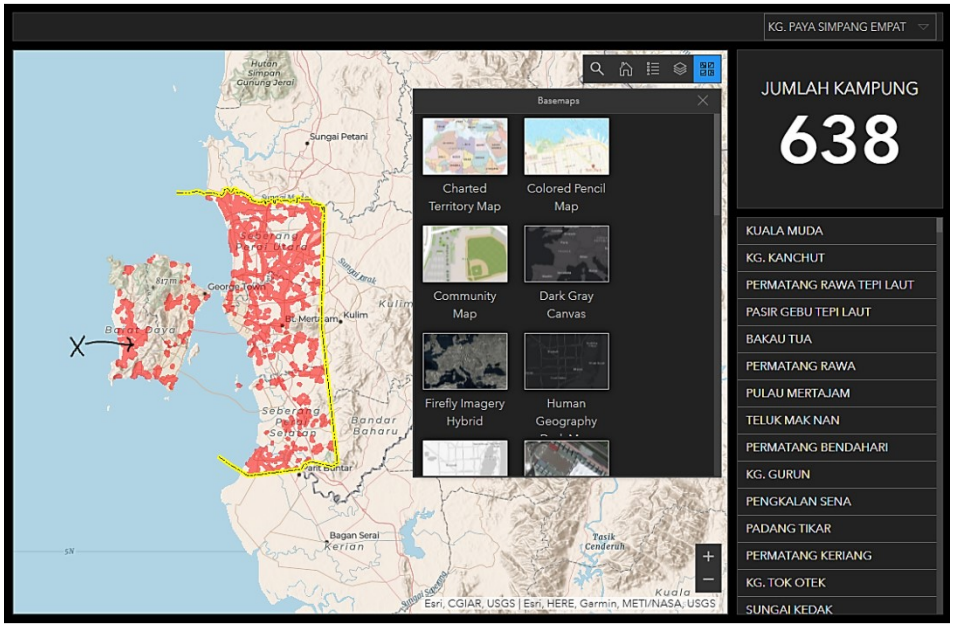


Figure 1: Keyplan of Balik Pulau (PLANMalaysia, 2021)

METHODS & MATERIALS

This community project is divided into two (2) phases (Figure 2). Phase one (1) has started (since 20th August 2021) with sponsorship received from four (4) sponsors, namely Universiti Sains Malaysia (research team), PLANMalaysia (federal town planning authority), State Disaster Management Committee (local authority) and local community organisation. The ongoing Phase one (1) will cover the 1st objective out of 3. Phase two (2) needs to be done to get results that qualify to be considered as a pilot project that is able to achieve a level comparable to the pilot project in Australia. This study will only focus on phase one (1), which will answer the first objective.

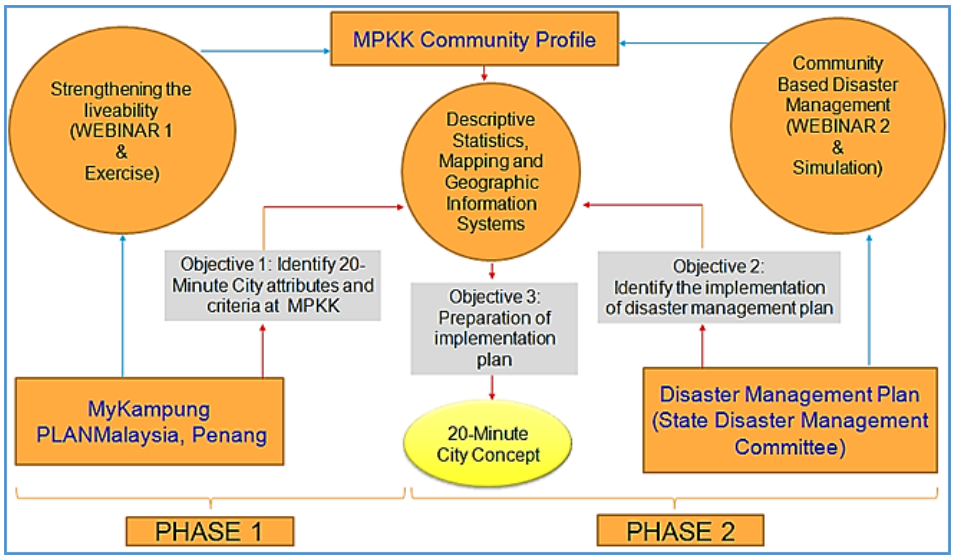


Figure 2: Implementation Framework

The current study is based on academic reports of original investigations and policy guidelines focusing on major urban themes necessary for effective criteria and attributes of future townships, as shown in Table 1. The researcher will extract the relevant attributes from these reports and use those criteria in this study. The attributes and criteria for this study will be chosen by considering the use of space (spatial) and capacity (public facilities, infrastructure, buildings, and other land use categories) concerning the needs of existing communities.

Table 1: Authors with Coherent Title/Theme

Author	Title/Theme
Amann & Jurasszovich (2017)	Urban Agenda
Roosli et al. (2019)	New Urbanism
Greenfield (2013)	Smart Cities
Deakin & Allwinkle (2007)	Sustainable Urban Regeneration
Egila & Agbola (2012)	ICT & Physical Planning Practice
Gaughan et al. (2013)	Population Distribution
Ong, K & Fong, J. (2016)	Transportation
Song, K. B. (2015)	Sustainable Cities
Ujang, (2012)	Urban Place Identity
Wang et al. (2016)	Quality Assessment & Physical Planning
Ministry of Health (2017)	Typhoid Case/Outbreak Management Guidelines FWBD/TYP/GP/003 Typhoid Case/Outbreak Management Guidelines

UN-Habitat (2020)	UN-Habitat Covid-19 Policy and Programme Framework
Ministry of Housing and Local Governance (2019)	National Community Policy
	National Housing Policy
PLANMalaysia (varies)	GPP Green Neighborhood
	GPP Healthy Walkable City
	GPP Community Facilities
	GPP Commercial Area
	GPP Transit-Oriented Development
	GPP Vertical Mixed-Use
	GPP Housing Planning
	GPP Disaster Resilient Cities In Malaysia
	National Physical Plan, Structure Plan & Local Plan
	Geo-disasters In Land Use Planning
	DPF National Village (*Desa Negara*) 2030
	National Urbanization Policy

A detailed review of the above mentioned research is being done through content analysis to develop a policy agenda to follow the livable townships in the future, aiming at the well-being and economic stability of its residents (Greenfield, 2013). The objective is to propose a strategic framework aimed at sustainable urban development and better current and future townships as follows:

Objective 1: To identify matching criteria and attributes of 20-Minute City in the study area (Balik Pulau, Pulau Pinang, Malaysia)

On top of the policy statement from the disaster management blueprint, identification of the criteria and attributes for the 20-minute city, mapping potential demand for walking also can be provided along each route to the centre, using census data on where people lived in the local area (Gaughan et al., 2013). The mapping then will work with the councils' local plan to identify the most important walking routes to each centre as shown in Figure 3. This work is based on the desk study already available by the Department of Transport.

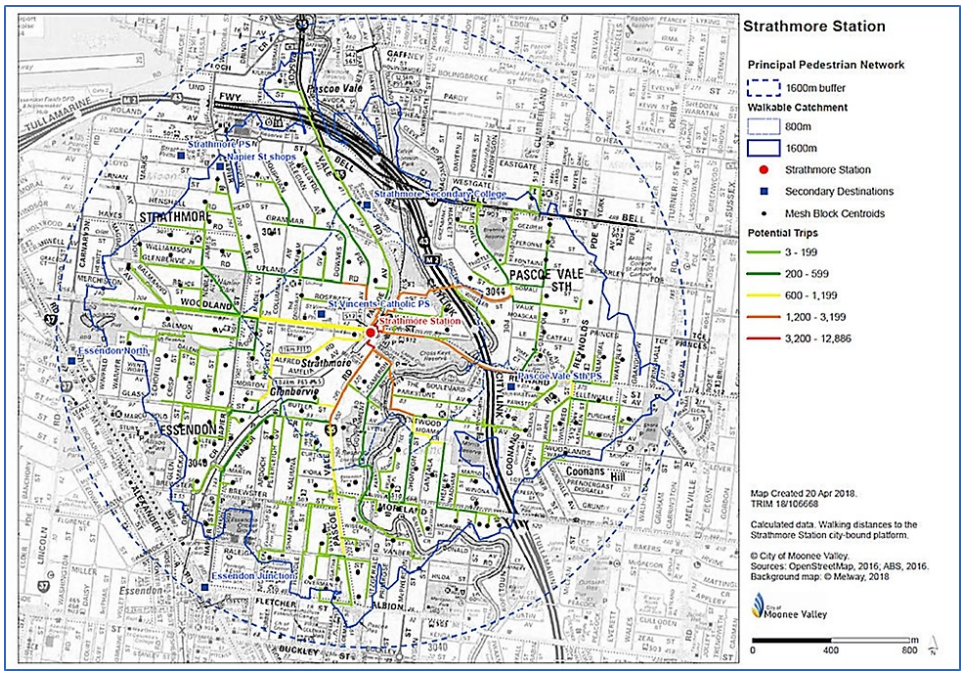


Figure 3: Identifying Distance and Features within the Specific Radius (Victoria State Government, 2021)

ANALYSIS & DISCUSSIONS

For the analysis, on top of local community baseline data, formal indicators will be used to measure the formal components of a neighbourhood and street in promoting sustainability to support walkability, biking or other public transport (Porla & Renne, 2005). This study utilised two indicators: urban fabric and street indicators. For the first indicator (urban fabric), eight indicators were used, including accessibility (pedsheds), land use diversity, public/private realm, natural surveillance (fronts and backs), permeability/street connectivity, employment density, number of buildings, and number of lots. For example, the mapping of a 'pedshed' or walkable catchment enables an assessment to be made about the interconnectedness and accessibility of the street network for pedestrians. To map the pedshed, a 400- and/or 800-m circle is drawn around a transit stop which assumes a 5- and 10-min walk, respectively, as in Figure 4.

Figure 4: Urban Fabric Indicators: Pedshed Maps (Porla & Renne, 2005)

Meanwhile, second indicators (street indicators) will be used to dissect the individual components of an area to understand the building blocks of a successful (or unsuccessful) as compared to street design. Whether the street is planned or built, these indicators can be used to improve the vitality of a street (Porla & Renne, 2005). Measurements were taken using AutoCAD and GIS along the centre of the street, 25m apart. Once the measurements have been developed, each image will be analysed to gather the measurements for the indicators, including sky exposure, facade continuity, softness, social width, visual complexity, number of buildings, and detractors. Although this project will utilise AutoCad and GIS, photos will also be used from existing streets to supplement measurements from 'virtual' streets to be built in a 3D program. Samples of the Layout are shown in Figure 5.

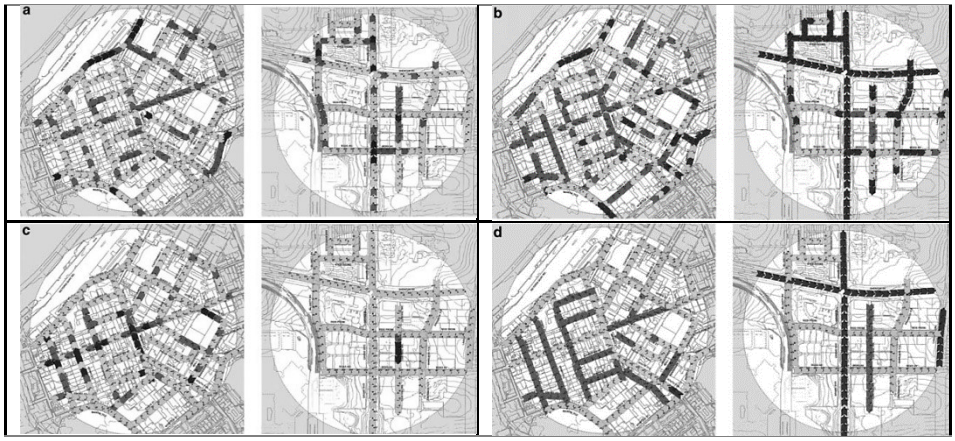


Figure 5: Street Indicators, Samples of Layout. (a) Sky Exposure. (b) Facade Continuity. (c) Softness. (d) Social width (Porla & Renne, 2005)

Criteria for the 20 Minute City Concept (KP20M)

The two major considerations in achieving a 20-minute neighbourhood are the distance and features. Research shows that 20-minutes is the maximum time people are willing to walk to meet their daily needs locally (Badland et al., 2014) (Figure 6). People can walk 2 km in 20 minutes, or cycle 5 km in 20 minutes and still get access to other public transport. A 20-minute neighbourhood must consist of:

- be safe, accessible, and well connected for pedestrians and cyclists to optimise active transport,
- offer high-quality public realm and open space,
- provide services and destinations that support local living,
- facilitate access to quality public transport that connects people to jobs and higher-order services,
- deliver housing/population at densities that make local services and transport viable, and
- facilitate thriving local economies.

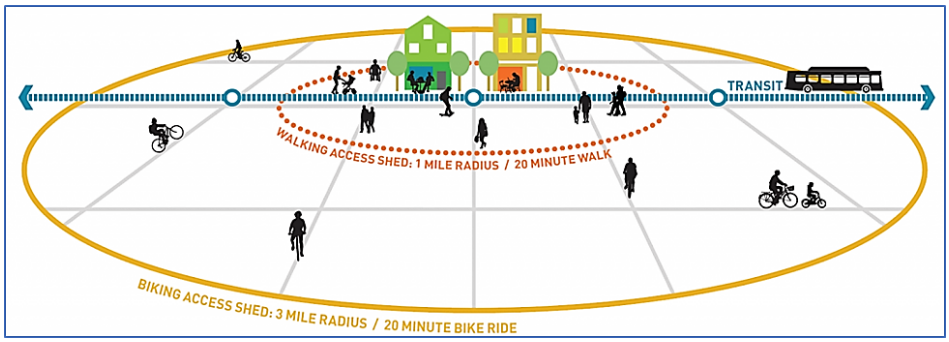


Figure 6: Distances According to 20-Minute Neighbourhoods' Concept (Badland et al., 2014)

The data based on the identification of these proposed criteria from the literature (Gunn et al., 2017) will be processed and matched with local criteria based on GIS information. There are four characteristics of such places and detailed in Figure 7 as follow:

- Ecology, for a green and sustainable city
- Proximity, to live at a reduced distance from one's work activities
- Solidarity, forging connections between people
- Participation, to actively involve citizens in transforming the spaces in which they live.

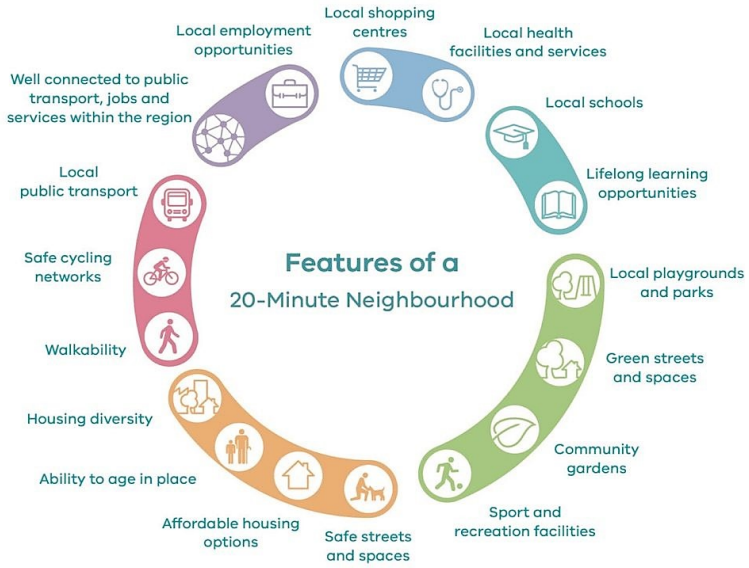


Figure 7: Features of 20-Minute Neighbourhoods' Concept (Gunn et al., 2017)

Attributes for the 20 Minute City Concept (KP20M)

The core of a 20-minute neighbourhood is its walkability and priority given to pedestrians. 800 metres (about half a mile) is the distance of a 20-minute neighbourhood or 20 minutes in time (based on average walking times of healthy adults). Whilst, public transport is to be supported, these distances within a neighbourhood are not usually covered by public transport; it is more helpful to think of public transport as linking neighbourhoods (Ong & Fong, 2016). Cycling might do if there were good cycling infrastructure, but the idea of the 20-minute neighbourhood is to give priority consideration to pedestrians and walkability.

Based on Isa (2020), city design is an ongoing process in shaping the image and identity of the city, its surroundings and the community environment. Some researchers distinguish between place identity and place attachment (Qazimi, 2014), and many works have attempted to explain and determine the relationship between people and their backgrounds in various ways. Place identity and place attachment are some of those concepts that relate humans to their surroundings. However, place identity is more than just an attachment; it also includes one's perception and understanding of their surroundings. (Isa, 2022). Research on urban place identity and place attachment features significant attributes and elements of local places depending on locality, as shown in Table 2.

Table 2: Attributes and elements relevant to urban place identity

Component	Attributes	Elements
Physical Element	Accessibility	Location; access & layout
	Legibility	Signage; greenery/trees; view; landscape features; building & facade; landmark/nodes; & shopping complexes
Activity	Vitality	Liveliness; street activity; people watching; entertainment
	Diversity/ Choice	Product/services; sport & eating spots; day & night activities; mixture of people; price;
	Transaction	Banking & communication centres; & street vendors
Image	Legibility	Image; & popularity
	Distinctiveness	Public open spaces; distinction; uniqueness; traditional
	Comfort	Resting space; convenience; facilities; environmental quality; maintenance;
	Safety/Security	Surveillance; & pedestrian

Source: Ujang (2012)

This study refers to the spatial and non-spatial database of villages in the state of Penang, which contains the boundaries of each village and a clearer, practical and comprehensive attribute profile based on the village category as contained in the National Rural Physical Planning Policy 2030 (Figure 8). This village profile database will be used to match the criteria identified earlier.

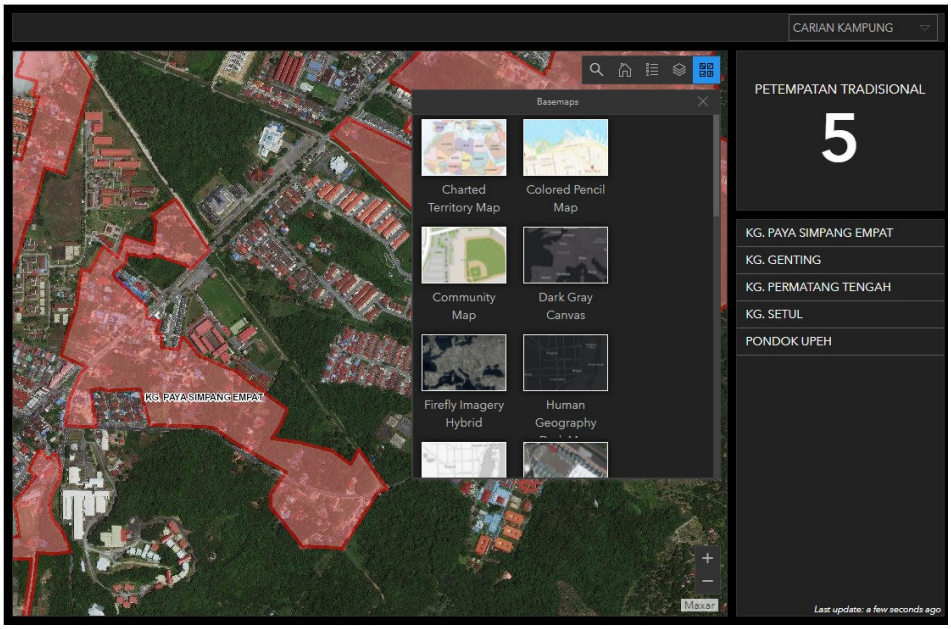


Figure 8: The Boundary of the Study Area (PLANMalaysia, 2021)

CONCLUSIONS

There is greater awareness of risk because of the pandemics, the increasing frequency of disasters and the challenges of climate change. This means that society is once again looking at models of '30- and 20-minute cities or neighbourhoods', notably initiated in Australia, and the 15-Minute City concept in Paris, especially since the Paris Climate Agreement came into force. Such models build on New Urbanism and Transit-Oriented Development (TOD) principles and find their roots in the 'neighbourhood unit' idea. This is a new urban design. It aims to improve the quality of life by creating cities where a resident's needs (jobs, food, recreation, green space, housing, medical facilities, small businesses and more) can be reached within 15 minutes by foot, bike, or public transit. This is as recommended by PLANMalaysia for better connectivity. Town planners and decision-makers need to skilfully optimise every inch of the town and rural area in the following:

1. Understand the current spatial and land use condition and utilise the understanding to improve community socio-economic planning in a targeted/strategic manner.
2. Gain a clear picture of the role and contribution that the community can make in physical development and utilise it to plan an effective development based on existing and future land use allocations.

3. Awareness and capacity building are fundamental in successfully operating locally mould 20-Minute City's attributes and criteria.
4. Potential collaboration between Southeast Asia country (Malaysia) and the Victoria State Government Department of Environment, Land, Water & Planning, Australia, towards creating 20-minute neighbourhoods in Malaysia's major planning policies.

Understanding the feasibility of these attributes and criteria will help in planning an effective disaster management plan which then create a resilient and competitive community towards understanding distances and features as practised in the 20-minute neighbourhoods in Australia, which needs to be adapted to the local context in Malaysia. Finally, with the results of other similar studies in the future, it is hoped to inspire the improvement of current physical planning policies at various development planning levels.

ACKNOWLEDGEMENTS

This community research project was funded by PLANMalaysia Penang, State Disaster Management Committee, Penang; and Simpang Empat Community Management Council (MPKK) through the support from Industry and Community Networking Division (BJIM, USM Account No. 1001.PPBGN.AUPSE00161) programme. The research team gratefully acknowledge the use of facilities and additional funding from the School of Housing, Building & Planning, Universiti Sains Malaysia.

REFERENCES

Amann, W. & Jurasszovich, S. (2017). Habitat III — A Critical Review of the New Urban Agenda, *Housing Finance International*, Spring 2017.

Badland, H., Whitzman, C., Lowe, M., Davern, M, Aye, L., Butterworth, I., Hes, D. and Giles-Corti, B. (2014). Urban Liveability: Emerging Lessons From Australia for Exploring the Potential for Indicators to Measure the Social Determinants of Health, *Social Science and Medicine*, 111: 64–73.

Deakin, M. & Allwinkle, S. (2007). Urban Regeneration and Sustainable Communities: The Role of Networks, Innovation and Creativity in Building Successful Partnerships, *Journal of Urban Technology*, 14 (1): 77–91.

Egila, M., & Agbola, B. (2018). *The Relevance and Application of Information and Communication Technology on Physical Planning Practice*, 2018 Rounds of Mandatory Continuing Professional Development Programme (MCPDP) for Town Planners, 18-19 April 2018, Owerri: Nigeria.

Gaughan, A. E., Stevens, F. R., Linard, C., Jia, P. and Tatem, A. J. (2013). High-Resolution Population Distribution Maps for Southeast Asia in 2010 and 2015, *PLoS ONE*, 8(2): 383–397.

Greenfield, A. (2013). *Against the Smart City*, London: Verso.

Gunn, L.D., King, T.L., Mavoa, S., Lamb, K., Giles-Corti, B., Kavanagh, A. (2017). Identifying Destination Distances that Support Walking Trips in Local Neighbourhoods, *Journal of Trans Health*, 5:133–141

Isa, M.I., Hedayati Marzbali, M. and Saad, S.N. (2022). Mediating role of place identity in the relationship between place quality and user satisfaction in waterfronts: a case study of Penang, Malaysia. Journal of Place Management and Development, Vol. 15 No. 2, pp. 130-148. https://doi.org/10.1108/JPMD-08-2020-0083

Isa, M. I. (2020). Evolution of Waterfront Development in Lumut City, Perak, Malaysia. Page 104-117. Journal of the Malaysian Institute of Planners. Planning Malaysia. Vol. 18 Issues 3. http://dx.doi.org/10.21837/pm.v18i13.778

Ong, K. & Fong, J. (2016). *The SUNWAY Bus Rapid transit (BRT) Line: Lessons for the Future, Penang*, Penang: Penang Institute.

PLANMalaysia (2021). *SMARTPLAN GEOPORTAL*, https://smartplan.penang.gov.my/

Porta, S. and Renne, J. (2005). Linking Urban Design to Sustainability: Formal Indicators of Social Urban Sustainability Field Research in Perth, Western Australia, *Urban Design International*, 10, 51–64.

Qazimi, Shukran. (2014). Sense of Place and Place Identity. European Journal of Social Science Education and Research, (S.l.), v. 1, n. 1, p. 306-310. ISSN 2312-8429.

Song, K. B. (2015). *Liveable and Sustainable Cities: Common Challenges, Shared Solutions*, World Cities Summit June 2014, 1-4 June 2014, Singapore: Centre for Liveable Cities and Urban Redevelopment Authority.

Ujang, N. (2012). Place Attachment and Continuity of Urban Place Identity. *Procedia-Social and Behavioral Sciences*, 49, 156-167.

Wang, L., Li, F., Gong, Y., Jiang, P., Huang, Q., Hong, W., & Chen, D. (2016). A Quality Assessment of National Territory Use at The City Level: A Planning Review Perspective*, Sustainability*, 8(2), 145.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 248 – 259

RESILIENCY OF URBAN INFORMAL ECONOMIC ACTIVITIES IN KUCHING CITY

Nor Amaleena Mazlan[1], Rosilawati Zainol[2], Yong Adilah Shamsul Harumain[3]

[1,2,3]Centre for Sustainable Urban Planning and Real Estate (SUPRE),
[2,3]Department of Urban and Regional Planning, Faculty of Built Environment
[2,3] Centre of Transportation Research
UNIVERSITI MALAYA

Abstract

The unprecedented outbreak of the Covid-19 pandemic since the year 2020 has witnessed an economic downturn which has caused negative impacts towards the global economy. The impacts of this crisis have greatly affected the informal economy, in which this vulnerable sector is not safeguarded by any regulations or policies during this difficult time. Informal sectors are no exception to restrictions of business operations imposed by the Malaysian Government during the Covid-19 pandemic. This study aims to explore the approaches and challenges faced by the operators of informal economic activities in Kuching city, Sarawak, towards sustaining their businesses. The findings have shown that the informal business operators in Kuching city have a moderate resilience index based on the data collected on both threats and resilience strategies. The study found that three major threats are highly associated with these informal businesses, namely disruption of access to goods and products, Covid-19 pandemic and disruption of internet and telecommunication services. Additionally, the business operators have adopted few strategies towards ensuring the resiliency of their businesses, namely the use of E-commerce and conducting their businesses in flexible and accessible locations. Immediate responses, strategies and policy interventions are necessary towards rectifying the current challenges faced by these operators as well as providing future opportunities for the informal sector.

***Keywords**:* Informal Economy, Resilience, Sustainable Development, Covid-19 Pandemic

[2] Associate Professor at Universiti Malaya. Email address: rosilawatizai@um.edu.my

INTRODUCTION

The distinctive income discrepancy between the rich and the poor despite the same cost of living has urged the poor to penetrate the informal sector in order to survive (Naik, 2009). A large portion of the population in developing countries are dependent on the informal economy for their livelihood (Blades, Ferreira, & Lugo, 2011). As of today, in developing countries with emerging economies, the informal economy constitutes between one third to half of the total economy (World Bank, 2014). Informal economy exists in three categories, namely (1) fixed activity, (2) semi-fixed activity; and (3) mobile activity (Khan & Idid, 2016).

The term urban economic resilience was introduced; in which it is seen as the capacity to solve local economic problems in a way that generates long term success. Local economic problems include recession, competitors' unexpected closure and technological change (Simmie & Martin, 2010). Additionally, Drobniak (2012) stated that urban economic resilience recognises the idea that a city is able to accept whether it is vulnerable or facing positive change. As cities are known to be complex adaptive systems, the ability to be flexible is important towards achieving economic resilience in developing cities.

In this pandemic era of Covid-19, the concept of informal economy is currently being witnessed in which the people have opted for informality due to loss of jobs and income security. Despite the growth of informal economic activities in cities, particularly Kuching city, the idea of economic resilience has not been properly defined. In addition, the resiliency of economic activities due to informal economy is rarely discussed in literature or policies, with hardly any information available on the economic sustainability of the economy towards the development of the country (Spangenberg, 2005).

RESEARCH BACKGROUND

As the higher levels of government concentrate on the economy as a measure of progress, successful cities place more attention towards the quality of life of the people. The aftermath of over urbanisation in cities has witnessed deteriorating socio-economic conditions among the society, which includes unsustainable adverse impacts such as income inequalities, social disparities and increasing unemployment rates. These crucial issues due to rapid urbanisation faced in major cities require policy makers, scholars and field professionals to acknowledge and deliberate the emerging trends of entrepreneurial activities among the locals (Muñoz & Cohen, 2016). Informal economy has come into sight, in which it acts as an alternative for one to participate in business by avoiding unnecessary requirements for licensing and regulations (Vuletin, 2008; Igudia et al., 2016).

The recent global Covid-19 outbreak has led to sudden closure of businesses, which in turn has caused an economic downturn on a global scale, ranging from large to small businesses. Loss of employment and income have

affected the livelihood of the community, where 86% of workers in South Asia are workers from the informal sector. Considering the recent pandemic, this study aims to develop a resilience index and resilience scores of current informal economic activities in Kuching and analyse the relationship between the ERI components. This study is vital for policy makers, as well as informal economic operators in enabling them to intervene and rectify the current challenges and provide opportunities for the informal sector.

RESEARCH METHODOLOGY

This study adopts a mixed methodology, in which it incorporates both quantitative and qualitative methods. According to Briguglio (2014), there are two significant characteristics of economic resilience, namely the ability to withstand shocks and the ability to recover from the effects of adverse shocks. In this study, both planned and spontaneous resilience variables are constructed and analysed by considering threats that may affect business operations and strategies undertaken by the operators to sustain their businesses. The quantitative approach involves measuring the current resilience scores of the informal economy in Kuching city, by factoring in ten threats that may affect business operations, namely electricity disruption, water disruption, telecommunication and internet disruption, weather disruption, infrastructure disruption, safety disruption, the Covid-19 pandemic, disrupted access to goods and services and disrupted access to financial services. Additionally, the qualitative approach involves observations and interviews with operators with regards to strategies towards making their businesses resilient.

The population of this study was sampled among the informal business operators; operators operating in Kuching city, namely Kuching City North and Kuching City South, in which the respondents were selected via the purposive sampling method. A total of 112 respondents were selected for the interviews, i.e. 56 operators for Kuching City North and 56 operators for Kuching City South. Based on a study conducted by Bruglio (2006), a very high economic resilience (VHER) has a score of above 3, while high economic resilience has a score between 2 to 3, moderate economic resilience has a score between 1 to 2; while weak economic resilience has a score of below 1.

In this study, the variables of the resilience components are constructed based on the four major components of the Economic Resilience Index (ERI) done by Briguglio et al. (2006); namely (i) macroeconomic stability, (ii) microeconomic market efficiency, (iii) good political governance and (iv) human development. Similarly, the ERI has been adopted in other study frameworks on city and economic planning (Hidayat et al., 2021; Ghazemi & Arabmazar, 2020; Bakhtiari, 2018; Marinescu, 2016). The dimensions and indicators of ERI are described in the table below.

Table 1: Economic Resilience Index (ERI) Components

Components	Details
Macroeconomic Stability	Fiscal deficit to GDP ratio The sum of unemployment and inflation rates The external debt to GDP ratio
Microeconomic Market Efficiency	Financial freedom Business freedom Labour freedom
Good Governance	Legal structure Security of property rights
Social Development	Education Health

Source: Adapted by Bakhtiari & Sajjadieh (2018) & Briguglio et al. (2006)

As the study aims to analyse the resilience index of the current informal economy in Kuching city, the component of Macroeconomic Stability such as the contribution of informal employment rate towards GDP progress was excluded from the study. Therefore, the variables are redesigned based on the other three components, namely Macroeconomic Stability, Microeconomic Market Efficiency, Good Governance and Social Development, which are tabulated as follows.

Table 2: Items on the Survey Instrument

Element	Description	Items	ERI Component
Urban Economic Resilience	Threats that may affect business operations	1. Electricity disruption	Good governance
		2. Water disruption	Good governance
		3. Telecommunication and internet disruption	Good governance
		4. Weather disruption	Good governance
		5. Infrastructure disruption	Good governance
		6. Safety disruption	Good governance
		7. Fire disruption	Good governance
		8. Covid-19 pandemic	Social development
		9. Disrupted access to goods and services	Good governance
		10. Disrupted access to financial services	Microeconomic market efficiency
Resilience Strategies	Infrastructure	1. Flexible location	Microeconomic market efficiency
		2. Accessible location	Microeconomic market efficiency

		3. Accessible to evacuation route	Microeconomic market efficiency
		4. Use of E-commerce	Microeconomic market efficiency
		5. Energy saving	Microeconomic market efficiency
		6. Renewable energy	Microeconomic market efficiency
	Security	1. Located at natural surveillance area	Microeconomic market efficiency
		2. Surveillance camera is installed	Microeconomic market efficiency
	Financial	1. Financial stability	Microeconomic market efficiency
		2. Personal insurance	Microeconomic market efficiency
	Management	1. Risk management plan	Microeconomic market efficiency
		2. Emergency response plan	Microeconomic market efficiency

Source: Author (2022)

The variables for measuring the resilience index of both planned and spontaneous resilience are constructed using the Max-Min formula, which was also adopted in the framework of the Human Development Index (UNDP, 2010). The formula is rescaled as follows:

$$X^R = (Xj - Xjmin) / Xjmax - Xjmin), j = 1,2,3,4,5,6,7,8,9,10.$$

- X^R is the resilience index,
- Xj is the total resilience score
- Xjmax is the highest resilience score,
- Xjmin is the lowest resilience score,
- i is the number of informal business operators,
- j is the scale

To determine the scores of each component of the study, the weighting scheme is employed, as adapted by Bruglio (2016). The details of the resilience components are indicated in the table below.

Table 3: Resilience Scores Indicators

Indicator	Details
α	total score for each component (ranked from 1-10)
s	maximum score of each component (ranked from 1-10) = 1120

Hence, the resilience scores are determined as: Resilience Score = (α / s) * 100

Furthermore, in analysing the association between operating sectors and urban resilience threats and the strategies employed to sustain these businesses, a Multiple Correspondence Analysis (MCA) was conducted. MCA is denoted as a technique that allows visualisations on relations and associations between the variables (Natarajan, Sivasankaran, & Balasubramanian, 2020) and has been adopted in other resilience studies (Kijowski, 2021; Shadbolt, 2016).

RESULTS AND FINDINGS

Towards determining the urban economic resilience of informal business in Kuching city, the maximum and minimum resilience scores are calculated. The index is calculated by (Xj - Xjmin) / (Xjmax - Xjmin), in which Xj represents the highest score for each component, which is 1120. The urban economic resilience is determined as follows:

$$X^R = (Xj - Xjmin) / (Xjmax - Xjmin), j = 1,2,3,4,5,6,7,8,9,10.$$

$$X^R = 1.66$$

Based on the results, the urban economic resilience index for Kuching city is indicated as 1.66; in which it is denoted as moderate economic resilience. A similar study was conducted by Zaman and Vasile (2014), where based on the results, Malaysia was among few of the emergent and developing countries with an economic resilience index of 0.94, which is denoted as a weak resilience index. To comprehensively capture the components of each of the urban economic resilience, the resilience scores are calculated. These scores are determined based on the strategies that have been adopted by the operators. The results are as follows.

Table 6: Kuching City Resilience Scores

Element	Description	Items	Resilience Scores (%)
Resilience Strategies	Infrastructure	1. Flexible location	79.7
		2. Accessible location	81.1
		3. Accessible to evacuation route	67.2
		4. Use of E-commerce	79.8
		5. Energy saving	78.0
		6. Water saving	78.3
		7. Renewable energy	52.3

Security	1. Located at natural surveillance area	69.2
	2. Surveillance camera is installed	59.2
Financial	1. Financial stability	65.8
	2. Personal insurance	55.1
Management	1. Risk management plan	71.8
	2. Emergency response plan	68.1
	Mean (μ)	**69.7**

Source: Author (2022)

Based on the score above, most of the operators agreed that their location is accessible and flexible in which these strategies carried a score of 81.1 and 79.7 respectively. Moreover, the use of E-commerce in business operations helps the operators strategise their businesses during the pandemic. Based on the data collected and analysed, this strategy carried a resilience score of 79.8, the second highest overall. However, a few other resilience strategies need to be adopted and strengthened within the community of informal businesses, namely in terms of infrastructure, security and finance. The use of renewable energy, installation of surveillance cameras and personal insurance are the three strategies with the lowest scores.

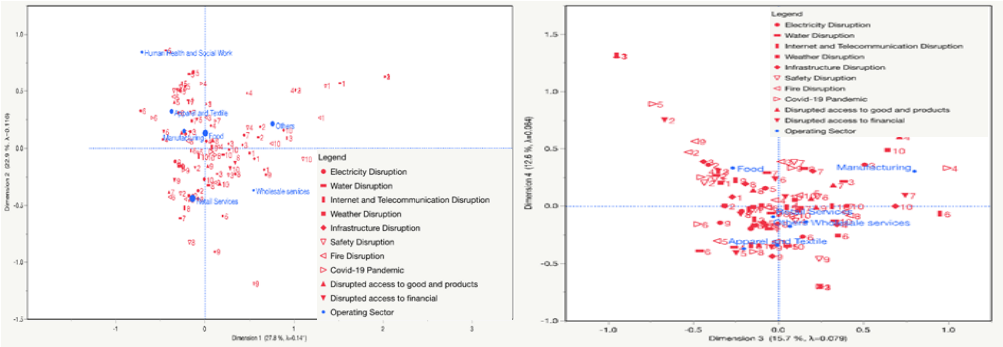
MCA was then conducted based on the two major resilience elements, namely urban economic resilience and resilience strategies. Towards analysing these variables, plots are designed and generated in order to present an overall visual representation of the association between the variables. The dimensions of the dataset were 112 x 10 for urban resilience and 112 x 12 for resilience strategies. The inertia (variance) values of these dimensions are tabulated as below.

Table 7: Inertia Decomposition on Threats that May Affect Business Operations

Dimension	Inertia	ChiSquare	Percent	Cumulative Percent
1	0.14091	156.41	27.70	27.77
2	0.11645	129.26	22.95	50.72
2	0.07945	88.19	15.66	66.38
4	0.06378	70.79	12.57	78.94
5	0.05938	65.91	11.70	90.65
6	0.04746	52.68	9.35	100.00

Source: Author (2022)

Based on the inertia decomposition above, 78.94% of the association can be well represented in four dimensions. The dimensions are plotted based on Dimension 1 and Dimension 2, and subsequently Dimension 3 and Dimension 4, in order to examine the relationships among the variables.



Source: Author (2022)

Based on the data above, the first and second dimensions have shown that the food sector is highly associated with disrupted access to goods and products, internet and telecommunication disruption and the Covid-19 pandemic. Additionally, dimensions 3 and 4 have shown that retail services are located closer to the origin point, whereby the retail services are highly associated with the Covid-19 pandemic, internet and telecommunication disruption and electricity disruption. Additionally, the inertia (variance) decomposition was also constructed towards understanding the association of the strategies employed by the business operators and is shown below.

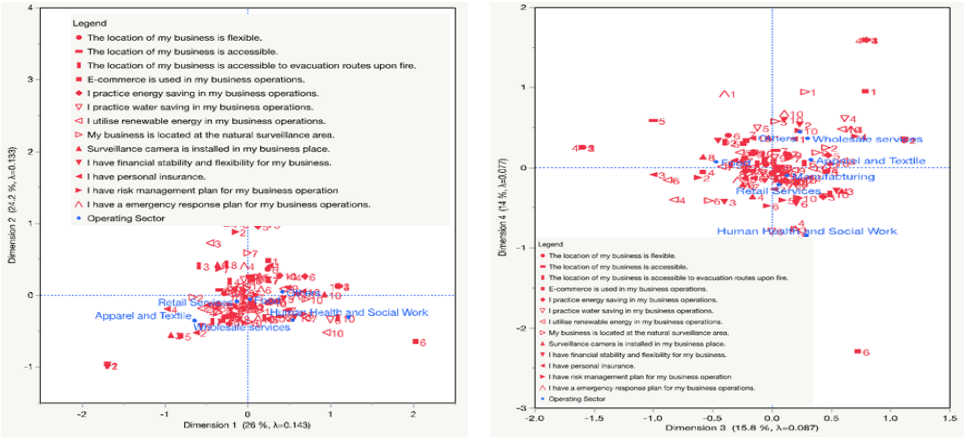
Table 8: Inertia Decomposition on the Resilience Strategies Adopted by the Operators

Dimension	Inertia	ChiSquare	Percent	Cumulative Percent
1	0.14344	206.99	26.00	26.00
2	0.13325	192.27	24.15	50.15
2	0.08715	125.75	15.80	65.95
4	0.07729	111.54	14.01	79.96
5	0.06374	91.97	11.55	91.51
6	0.04685	67.60	8.49	100.00

Source: Author (2022)

Based on the inertia decomposition on the resilience strategies, over 79.96% of the association are represented in four dimensions. The maps of

Dimension 1 with Dimension 2; and Dimension 3 with Dimension 4 are plotted below.



Source: Author (2022)

Based on Figure 2, food sector and retail services have high levels of association, where these sectors have adopted few resilience strategies such as E-commerce, and situating businesses at flexible and accessible locations. Additionally, in Dimension 3 and 4, the apparel and textile sector are highly associated with the use of E-commerce and being equipped with emergency response plans.

DISCUSSION

The association of these variables have shown that the ERI components of social development, microeconomic market efficiency and good governance play a significant role towards ensuring the resiliency of these informal economic activities. Few components of good governance such as disrupted access to goods and services and internet and telecommunication disruption, along with social development components such as the Covid-19 pandemic are highly associated with economic activities, and are threats that may affect businesses. Accordingly, based on the data collected, 83.6% of the operators acknowledged that the Covid-19 pandemic poses a threat towards their business operations. These results correspond to a study in India (Ghosh, Nundy, & Mallick, 2020) on the negative impact scenario of Covid-19 towards the economy, in which the closure of small, medium and large enterprises has created a “havoc” impact towards the Indian economy. Similarly, another study on the impact of Covid-19 towards the Turkish economy has witnessed a decline in the goods trade due to global economic disruptions (Açikgöz & Günay, 2020).

Furthermore, issues such as temporary business closures due to the pandemic has caused financial deficits and constraints among the operators to sustain their businesses. Common issues shared among the operators were the closure of businesses as the pandemic has caused them to incur loss in their businesses. In India, prolonged lockdown has caused additional economic burden, which include increased debt burden and the inability to sell products at reasonable prices (Rawal, Kumar, Verma, & Pais, 2020). In addition, based on the survey, 76.2% of the operators agreed that telecommunication and internet disruption could pose as a threat that refrains them from keeping their businesses resilient.

Digital economy has emerged as an opportunity, and digital resilience appears to be significant in addressing the adverse shocks of economy. Since the pandemic outbreak, operators have opted for digital economy as a selling platform. Most operators agreed that a paradigm shift from physical marketing transactions to E-commerce is vital towards sustaining their business operations. A study done by Raj, Sundararajan, and You (2020) has shown a positive survival rate among companies who utilise digital platforms in providing services to the consumers. Since 2018, the Sarawak Government has established the Sarawak Digital Economy Strategy 2018-2022, in which three missions are outlined. These missions include: (1) accelerate Sarawak's economic growth, (2) reduce socio-economic divide; and (3) increase youth employment. The importance of digital platform was highlighted as an opportunity in global marketing and sales in Sarawak. Additionally, the concept of sharing economy has been widely acknowledged, wherein it involves a platform that connects consumers and sellers through digital apps (Buheji, 2020). Based on the data collected, most of the respondents involved in food sector activities stated that using FoodPanda and GrabFood contributed in sustaining their businesses during the pandemic.

An additional suggestion that was raised numerous times during the interviews was that proper training with financial aids and grants are necessary. Based on the survey, a few financial aids have been channelled to these operators, which included financial grants such as *Geran Khas Prihatin* and other financial aids such as the *Bantuan Khas Sayangku* Sarawak, *Bantuan Khas* Covid-19 and *Bantuan Prihatin Rakyat*. Fiscal policy measures are necessary, as temporary protection and support are significant most specifically for informal economic operators (Williams & Kayaoglu, 2020) Nevertheless, lessons and seminars are also vital, whereby these operators agreed that trainings on marketing and promotion on an online platform is deemed as important. Additionally, regulations on providing accessible places should be enhanced as this action may empower these business activities (Handoyo & Wijayanti, 2021).

CONCLUSION

The ever-growing population in cities has created a situation in which a country's population is larger than its economic development. The aftermath of overurbanisation in cities has witnessed deteriorating socio-economic conditions among the society, which includes unsustainable adverse impacts such as income inequalities, social disparities and increase in unemployment rate. The recent global Covid-19 outbreak has created an urban economic vulnerability due to its exposure to shocks. Sudden closure of businesses to contain the spread of the virus has caused an economic downturn in a global scale, ranging from big to small businesses. Loss of employment and income has affected the livelihood of the community, where 86% of workers in South Asia are comprised of workers from the informal sector. This study has shown that the economic resilience index of informal business operators in Kuching city has revealed a moderate resilience index. This moderate resilience index is mainly due to low scores of resilience strategies adopted by the operators in terms of finance and security. An ideal resilient city suggests for interdependence and interconnectivity among public and private businesses to work together towards reducing risks and uncertainties. Both the resilience index and resilient scores measured in this study could provide insight for policy makers to improve the status of the informal economy. Early interventions and implementation of actions and measures are significant steps towards avoiding potential threats that may harm or disrupt businesses from being resilient.

ACKNOWLEDGEMENTS

This paper would not be made possible without the financial grant from UMCARES (UMCARES2020-1O). The authors would like to the informal businesses' operators for taking part and providing insightful information in the study. Additionally, the authors would like to also thank the reviewers for their constructive help and guidance in this study.

REFERENCES

Açikgöz, Ö., & Günay, A. (2020). The early impact of the Covid-19 pandemic on the global and Turkish economy. *Turkish journal of medical sciences, 50*(SI-1), 520-526.

Bakhtiari, S., & Sajjadieh, F. (2018). Theoretical and empirical analysis of economic resilience index. *Iranian Journal of Economic Studies, 7*(1), 41-53.

Blades, D., Ferreira, F. H., & Lugo, M. A. (2011). The informal economy in developing countries: An introduction. *Review of Income and Wealth, 57*, S1-S7.

Briguglio, L. (2014). A vulnerability and resilience framework for small states.

Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2006). Conceptualizing and measuring economic resilience. *Building the economic resilience of small states, Malta: Islands and Small States Institute of the University of Malta and London: Commonwealth Secretariat*, 265-288.

Buheji, M. (2020). Sharing economy and communities attitudes after covid-19 pandemic-review of possible socio-economic opportunities. *American Journal of Economics, 10*(6), 395-406.

Drobniak, A. (2012). The urban resilience–economic perspective. *Journal of Economics and Management, 10*, 5-20.

Ghasemi, H., & Arabmazar, A. (2020). Resilience Index of Budgeting System of Iran's Economy. *Quarterly Journal of Quantitative Economics, 17*(2), 173-199.

Ghosh, A., Nundy, S., & Mallick, T. K. (2020). How India is dealing with COVID-19 pandemic. *Sensors International, 1*, 100021.

Handoyo, E., & Wijayanti, T. (2021). THE FACTORS AFFECTING THE WELFARE OF STREET VENDORS IN INDONESIA. *PLANNING MALAYSIA, 19*.

Khan, M., & Idid, S. Z. A. (2016). FROM TRADE ROUTES TO STREETS CULTURES AN OVERVIEW OF THE SIGNIFICANCE AND CHARACTERISTICS OF SOUTHEAST ASIAN TRADITIONAL STREETS. *PLANNING MALAYSIA* (4).

Kijowsjki, F., Moore, S., Iqbal, S., Cronin, J., Milewski, L., Woods, N., & O'Reilly, S. (2021). Financial resilience among doctors in training and the COVID-19 pandemic. *Irish Medical Journal, 114*(6), 1-9.

Marinescu, A. (2016). Regional Resilience in Romania. *Knowledge Horizons. Economics, 8*(1), 111.

Muñoz, P., & Cohen, B. (2016). The making of the urban entrepreneur. *California Management Review, 59*(1), 71-91.

Naik, A. K. (2009). *Informal sector and informal workers in India.* Paper presented at the Special IARIW-SAIM Conference on 'Measuring the Informal Economy in Developing Countries' September.

Natarajan, P., Sivasankaran, S. K., & Balasubramanian, V. (2020). Identification of contributing factors in vehicle pedestrian crashes in Chennai using multiple correspondence analysis. *Transportation research procedia, 48*, 3486-3495.

Raj, M., Sundararajan, A., & You, C. (2020). COVID-19 and digital resilience: Evidence from Uber Eats. *arXiv preprint arXiv:2006.07204*.

Rawal, V., Kumar, M., Verma, A., & Pais, J. (2020). COVID-19 lockdown: Impact on agriculture and rural economy. *Society for Social and Economic Research*.

Shadbolt, N. M. (2016). Resilience, risk and entrepreneurship.

Simmie, J., & Martin, R. (2010). The economic resilience of regions: towards an evolutionary approach. *Cambridge journal of regions, economy and society, 3*(1), 27-43.

Spangenberg, J. H. (2005). Economic sustainability of the economy: concepts and indicators. *International journal of sustainable development, 8*(1-2), 47-64.

Williams, C. C., & Kayaoglu, A. (2020). COVID-19 and undeclared work: Impacts and policy responses in Europe. *The Service Industries Journal, 40*(13-14), 914-931.

Zaman, G., & Vasile, V. (2014). Conceptual framework of economic resilience and vulnerability at national and regional levels. *Romanian Journal of Economics, 39*(2), 48.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 260 – 271

UNDERSTANDING THE EVOLUTION AND GLOBAL TRENDS OF RESILIENCE AND URBAN PLANNING STUDIES: A BIBLIOMETRIC ANALYSIS

Evalina Zuraidi[1], Rosilawati Binti Zainol[2], Yahaya Bin Ahmad[3], Ashfa Achmad[4]

[1,2,3]*Faculty of Built Environment*
[2]*Centre For Sustainable Urban Planning and Real Estate (SUPRE), Department of Urban and Regional Planning, Faculty of Built Environment*
[2] *Centre for Transport Research*
[2] *Centre for Civilisational Dialogue*
UNIVERSITI MALAYA
[1,4]*Faculty of Engineering*
UNIVERSITAS SYIAH KUALA, INDONESIA

Abstract

This paper represents a bibliometric analysis of the Scopus database publications on resilience and urban planning. The study recalled 1,923 documents from 1997 to 2021 using keywords related to the research topic and analyzed this using Microsoft Excel 2019, VOSviewer and Harzing's Publish or Perish software. The findings show that the expansion rate of works in resilience and urban planning has steadily increased every year since 1997. This study's most frequently used terms are the main keywords, which are climate change, sustainability, urban resilience and spatial planning. Landscape and Urban Planning is recommended as the main target journal for publication of the results of this research analysis. Research on COVID-19 or pandemic resilience, public space and urban mobility may eventually supersede prior dominant themes. The findings suggest that researchers from less contributed countries should explore this topic more to provide nuance to this field.

Keywords: Urban planning, Resilience, Bibliometric, VOSviewer, Harzing's Publish or Perish

[2] Associate Professor at Universiti Malaya. Email: rosilawatizai@um.edu.my

INTRODUCTION

In recent years, countless natural and non-natural calamities have struck municipalities worldwide. Natural disasters have claimed lives and ruined inhabitants' spatial environments (Elysa, Fahmi, Evalina, & Myna, 2020). Within a century, disasters have taken more than 1 million lives, impacted 4 billion people, incurred approximately US$ 3 trillion in economic loss and destroyed urban space and its inhabitants (CRED & UNDRR, 2020; Zainol, Elsawahli, & Ibrahim, 2018). In addition, the COVID-19 outbreak that emerged in late 2019 around the world highlighted the vulnerabilities of living and functioning of existing urban environments (Sharifi & Khavarian-garmsir, 2020). This loss of life and property may be mitigated if cities and their people had sufficient resilience measures in place to deal with possible disasters (Achmad, Burhan, Zuraidi, & Ramli, 2020; Mahmoud, Ahmad, & Alias, 2019).

In response to this phenomenon, scientific studies of resilience and urban planning in recent decades have also grown significantly, accumulating more and more evidence of their importance in disaster risk reduction (Sagala, Anwar, Lubis, & Yamin, 2015). Furthermore, knowledge is constantly evolving, and the uniqueness of ideas from researchers is the primary cause for progressing scientific research with significant scientific and practical contributions (Gläser & Laudel, 2015). Thus, examining the evolution and trends of the study topic based on published literature is necessary for identifying gaps in the literature that must be filled to support the researcher's proposal. This study therefore aims to understand current scientific evolution and the worldwide trend, to help researchers understand the perspective of resilience and urban planning research.

LITERATURE REVIEW

The thought of resilience has grown in popularity as a subject of research and has been used in various fields, including psychology, physics and socio-ecological systems (Brown, 2014). The notion of resilience has been applied to urban areas to improve their ability to cope with calamities (Jabareen, 2013). To comprehensively understand the evolution and trends of resilience related to urban planning, many experts recommend using bibliometric analysis as an analytical tool. The bibliometric analysis was firstly described by Pritchard (1969) as “the application of statistical and mathematical methods to books and other media of communication.” Bibliometric studies are also frequently used to evaluate the number and quality of published papers to detect trends or patterns in a particular field of study (Ahmi & Mohamad, 2019).

This study found that six previous bibliometric articles on resilience-related urban planning have been published to date (Table 1). Three articles use the bibliographic analysis method as part of the analytical tool for a systematic literature review, namely (Castro & Lopez, 2021; Lopez & Castro, 2021; Meerow, Newell, & Stults, 2016). Meanwhile, the other articles, namely (L.

Wang, Xue, Zhang, & Luo, 2018; M.-H. Wang, Ho, & Fu, 2019; Zuraidi, Caisarina, & Agustina, 2021) used specific records, i.e., Scopus, Web of Science (WoS), or Google scholar as databases for analysing the publication's performance. While these articles focus on the study of resilience from precise angles such as sustainability, community and smart cities, the current study is the first to examine scientific publications of research related to the evolution of resilience and urban planning from larger data collections to comprehensively identify current trends in research interest and potential directions for future research.

Table 1: Prior Studies on Resilience Related Urban Planning and Bibliometric Indicators

Author	Keywords	Data-bases	Total Doc.	Indicator of Bibliometrics
Castro & Lopez (2021)	"Sustainability," "resilient cities," "COVID-19", "emerging cities"	Scopus, WoS, GoogleScholar	49	Co-occurrence of keywords
Lopez & Castro (2021)	"Urban* Planning*, "urban ecosystems," "sustainability," "urban resilience," "smart cities."	Scopus, WoS, Google Scholar	87	Co-occurrence analysis
Meerow et al. (2016)	"Urban resilience," "resilient cities."	Scopus, WoS	172	The most influential studies
Wang, Ho, & Fu (2019)	Phrases related to the sustainable city: resilient city, zero-carbon city, eco-city, sponge city	WoS	1457	Publication output, countries, author keywords
Wang et al. (2018)	"Resilience," and publication name.	WoS	405	Lead authors, institutions, journals, author contribution, keywords, evolutionary trends
Zuraidi et al. (2021)	Phrases related to spatial planning and community resilience	Scopus	144	Research productivity, citation analysis, publication growth

Source: Author (2021)

RESEARCH METHODOLOGY

The Scopus database was used for bibliometric analysis because it is one of the largest databases for scientific publications search and continuously expands and updates data compared to other databases (Wahid, Ahmi, & Alam, 2020). The following query was employed: TITLE-ABS-KEY (resilience AND "city planning," or "urban planning," or "town planning," or "spatial planning," or "land-use planning"). Data were retrieved on 28 September 2021 and resulted in 1,923 documents for further analysis.

This study presents a bibliometric analysis based on some parameters, including the growth of publications, most used keywords, most cited papers, highly cited writers, most cited institutions and more productive countries. This study used the Publish and Perish Harzing Tool to calculate citation metrics. To calculate the frequency and percentage of each publication and produce appropriate graphical representation, this study uses Microsoft Excel 2019. Bibliometric relations were created and represented using VOSviewer (version 1.6.17).

RESEARCH FINDINGS & DISCUSSION

Growth of publications

The study revealed that the annual growth in resilience and urban planning publications increased over the study period, reaching a peak in 2020 (Figure 1). Four publications were published in 1997, namely Berg & Nycander (1997), Dumanski (1997), Goetz & Szyliowicz (1997), and Krebs & Larsen (1997), which marked the beginning of resilience in urban planning studying sustainable land-use management, resource management, and infrastructure. In 2020, the highest number of documents were produced (295). The year with the most citations was 2013, with 4,648 citations.

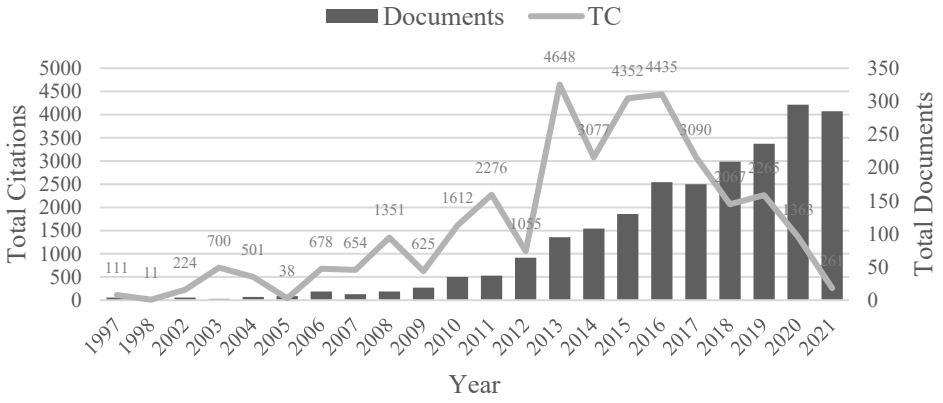
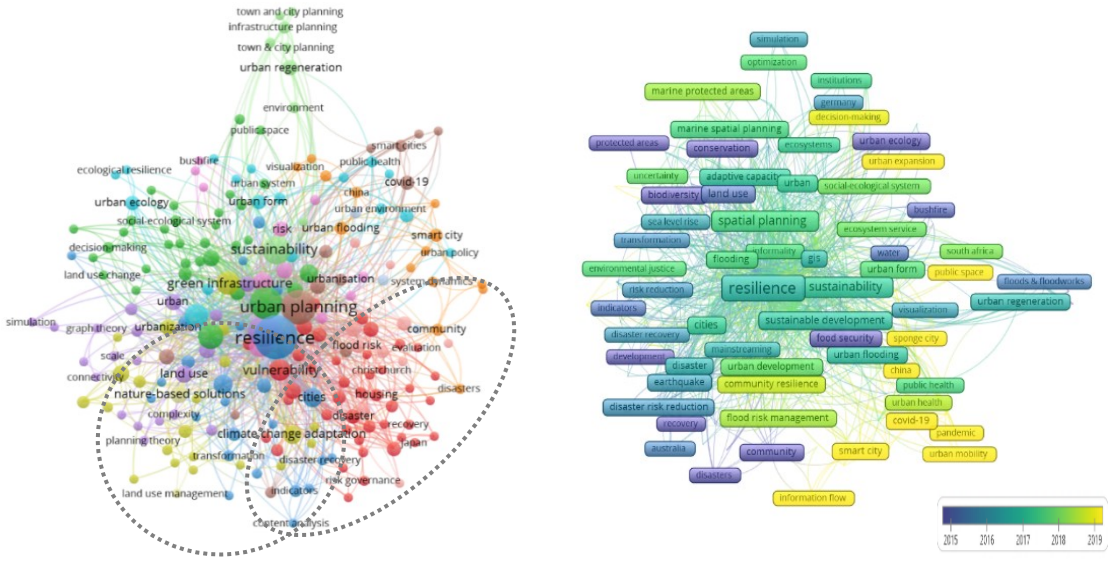


Figure 1: Publication growth and total citations
Source: Author (2021)

Our findings support a recent study performed by Sharifi et al. (2021) that employed the WoS database to gain publications data and claimed a continuing trend in the subject area, as evidenced by annual growth in the number of periodicals beginning in the 1990s and continuing to grow significantly since 2015.

Most used keywords

To address the current topic of debate, we use VOSviewer software's co-occurrence analysis. The author's keywords adequately reflect the publication's content, which is an essential assumption of keyword analysis (Wahid et al., 2020). VOSviewer depicts the strength of the relationship of keywords in colour, size of the circle or square, typeface, and width of connecting lines. Based on the analysis, 13 clusters have been established based on keywords used by the author. For instance, Figure 2(a) suggests that urban planning, COVID-19, pandemic, and urban mobility, coloured in brown, are closely connected and frequently appear together. One other group seen is resilience, cities, climate adaptation and environmental justice, highlighted in blue.



(a) **(b)**

Figure 2: (a) Network visualisation of author keywords, (b) Overlay visualisation of author keyword

Source: Author (2021)

Figure 2(b) also explains the evolution of themes that often appear in literature within the last five years (2015-2019). In 2015, the most widely used keywords included community, disasters and urban ecology. Some of the

researchers that focused on community related keywords are (Rabe et al., 2019; Sulaiman, She, & Fernando, 2019). In the following year, many topics related to resilience, urban planning, spatial planning and public health emerged. Towards the end of 2019, themes related to smart city, urban mobility, pandemics, COVID-19, China, and public space became topics researchers widely used. It is indicated that the COVID-19 outbreak, which began at the end of 2019, attracted researchers to explore its relationship with urban planning and urban resilience.

This study confirms that resilience and urban planning have become relevant social-disaster issues, as reflected by the evolution and trends in the keywords the authors used, which were recommended in a previous study (Sharifi et al., 2021). It is speculated that resilience and urban planning research related to pandemics and COVID-19 may eventually replace other dominant clusters in the research field, as illustrated by the network visualisation map.

Most cited articles

To know the most widely read article on resilience and urban planning, we analysed a total of 1,923 articles based on their overall number of citations. We employed Harzing's Publish or Perish package to assist with citation analysis. According to Table 2, the most cited article was "Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation-Lancet Commission on planetary health" written by Whitmee et al. (2015) with 781 citations.

Table 2: Highly Referenced Papers (Top 5)

Authors	Title	Year	Cites
(Whitmee et al., 2015)	"Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation-Lancet Commission on planetary health."	2015	781
(GÃ³mez-Baggethun & Barton, 2013)	"Classifying and valuing ecosystem services for urban planning."	2013	774
(Meerow, Newell, & Stults, 2016)	"Defining urban resilience: A review."	2016	694
(Godschalk, 2003)	"Urban hazard mitigation: Creating resilient cities."	2003	688
(Sandifer, Sutton-Grier, & Ward, 2015)	"Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation."	2015	456

Source: Author (2021)

Most productive authors

According to Table 3, Ayyoob Sharifi dominated the publications throughout the research period with 13 documents. The top 10 authors came from various research institutes, two in Japan, two in the US, two in France and four in the United Kingdom, Sweden, Australia and South Africa.

Table 3. Authors with the Most Output

Author's Name	TP	Affiliation	Country
Sharifi, A.	13	Hiroshima University	Japan
McPhearson, T.	11	Institute of Ecosystem Studies	US
Diab, Y.	10	Ecole des Ingenieurs de La Ville de Paris, Lab'Urba, Paris	France
Serre, D.	10	IFREMER Institut	France
Meerow, S.	9	Arizona State University	US
Wamsler, C.	9	Lund University	Sweden
Yamagata, Y.	9	National Institute for Environmental Studies of Japan	Japan
Coaffee, J.	8	University of Warwick	UK
Frantzeskaki, N.	8	Swinburne University of Technology	Australia
Andersson, E.	7	Stockholms universitet	South Africa

Notes: TP=total number of publications *Source: Author (2021)*

Most Productive Source Titles

All publications in this study were published in 160 resource names. To assess the level of productivity of source titles several indicators can be used, including the CiteScore, SJR or SNIP of each resource. The Cite Score is a metric that calculates the average number of citations collected per article published in a journal, and the SJR (SCImago Journal Rank) is a metric for measuring citations weighted by reputation. A journal with an SJR value >1 has above-average citation potential, while a journal with an SJR value <1 has below-average citation potential. The Source Normalized Impact per Paper (SNIP) metric quantifies citations weighted by subject field. A SNIP above 1.0 means the journal obtains more citations than the field average, while a SNIP below 1.0 shows the journal receives fewer citations than the field average. A SNIP over 1.5 usually indicates a highly cited journal.

As can be seen from Table 4, the journal Sustainability Switzerland has published 122 articles about resilience and urban planning within the study period, and most of the sources are published by Elsevier. Likewise, the Landscape and Urban Planning journal has long established a leading position in this field, with the highest Cite Score, SJR 2018, and SNIP 2018 (11.6; 1.938; 2.476) among the top 5 source titles in the sample.

Most Productive Countries

This study discovered that scientists from 40 countries participated in publishing recovered documents. The leading 20 nations that contributed to the journals as the most productive countries are listed in Table 5. The United States of America (USA) ranked first with 389 documents, followed by two European countries, the United Kingdom and Italy. Four Asian nations also placed among the top twenty, including China, India, Japan, and Indonesia. The USA's leading rank as the top productive country for publications is also supported by the total record number of article citations (14,428) and the highest h-index (57) and g-index (112) among other countries.

Table 4. Highly Prolific Source Titles

Source Title	TP	TC	Publisher	Cite Score	SJR 2018	SNIP 2018
Sustainability Switzerland	122	1260	MDPI AG	3.9	0.612	1.242
Cities	64	1860	Elsevier Ltd	8	1.771	2.58
Landscape And Urban Planning	40	3243	Elsevier BV.	11.6	1.938	2.476
Iop Conference Series Earth And Environmental Science	32	32	IOP Publishing Ltd	0.5	0.179	0.436
Land Use Policy	29	637	Elsevier Ltd	7.5	1.668	1.908

Notes: TP=total number of publications; TC=total citations *Source: Author (2021)*

Table 5. Leading twenty Countries that contributed to publications

Country	Continent	TP	NCP	TC	C/P	C/CP	*h*	*g*
United States	America	389	323	14428	37.09	44.67	57	112
United Kingdom	Europe	258	218	6703	25.98	30.75	39	74
Italy	Europe	188	141	2464	13.11	17.48	29	42
Australia	Australia	186	158	4106	22.08	25.99	31	59
China	Asia	140	104	1974	14.10	18.98	21	42
Germany	Europe	127	105	2874	22.63	27.37	25	51
Netherlands	Europe	126	109	3275	25.99	30.05	30	55
Canada	America	87	70	2337	26.86	33.39	23	47
Spain	Europe	85	68	2687	31.61	39.51	22	51
Sweden	Europe	82	72	2719	33.16	37.76	27	51
France	Europe	64	47	1029	16.08	21.89	15	31
South Africa	Africa	61	47	2222	36.43	47.28	17	47
India	Asia	48	33	571	11.90	17.30	11	23
Japan	Asia	47	38	840	17.87	22.11	16	28
Portugal	Europe	41	34	574	14.00	16.88	14	23
Brazil	America	39	27	858	22.00	31.78	9	29

Country	Continent	TP	NCP	TC	C/P	C/CP	*h*	*g*
New Zealand	Australia	37	31	662	17.89	21.35	13	25
Indonesia	Asia	34	18	644	18.94	35.78	8	25
Austria	Europe	32	28	1010	31.56	36.07	12	31
Poland	Europe	30	24	421	14.03	17.54	9	20

Source: Author (2021)

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Certain territories or zones show no more scientific articles than others within the research period. This study exposes the European countries that dominate urban planning and resilience research, with 10 European countries placing within the top 20 contributor countries list. Meanwhile, countries from the continent of Africa contributed the least, as seen in the geographic distribution of publications in Figure 3.

Figure 3. Geographical Distribution of Publication
Source: Author (2021)

CONCLUSION

This study aims to conduct a bibliometric analysis of the resilience and urban planning literature to detect emerging trends and possible additions. The evolution of resilience and urban planning works began in 1997, increasing gradually year by year. Besides the core keywords, the most used keywords in this study are climate change, sustainability, urban resilience, spatial planning, and land use management. Ayyoob Sharifi was identified as the most productive author and Sustainability Switzerland the most productive journal on resilience and urban planning research. The study also discovered that the US ranks as the most productive country for urban planning and resilience publications, and that four Asian countries are also in the top 20, including China, India, Japan and Indonesia.

This study recommends the Landscape and Urban Planning journal for the main targeted journal for publication. Also, it is hypothesised that resilience and urban planning research related to COVID-19 or pandemic, public space and urban mobility may later overtake other themes that earlier dominated the research topic. The final suggestion is for researchers from countries with less contribution to this research topic to explore resilience and urban planning to provide nuance to studies in this field.

Despite the informative bibliometric analysis results, the quality of the results can still be enhanced in future research. First, despite this study identifying the major research areas and their evolution, additional information about each main issue, such as techniques, theoretical underpinnings and key findings, is still required. Second, we analysed the papers within rigorous parameters to avoid receiving useless search results. This work could be updated in the future to produce more accurate outcomes while searching for scientific papers. Finally, it should be noted that the software employed in this study has limited capability, even though this technology has been used in many bibliometric research investigations. However, this paper's findings are based on objective data that are valid and reliable.

ACKNOWLEDGEMENTS

The authors are grateful for the funding support provided by *Pemerintah Aceh*, Indonesia, through the Ph.D. Split-site USK-UM Program.

REFERENCES

Achmad, A., Burhan, I. M., Zuraidi, E., & Ramli, I. (2020). Determination of recharge areas to optimize the function of urban protected areas on a small island. *IOP Conference Series: Earth and Environmental Science*, *452*(1). https://doi.org/10.1088/1755-1315/452/1/012104

Ahmi, A., & Mohamad, R. (2019). *Bibliometric Analysis of Global Scientific Literature on Web Accessibility*. (6), 250–258.

Berg, P. G., & Nycander, G. (1997). Sustainable neighbourhoods - A qualitative model for resource management in communities. *Landscape and Urban Planning*, *39*(2–3), 117–135. https://doi.org/10.1016/S0169-2046(97)00050-9

Brown, K. (2014). Global environmental change I: A social turn for resilience? *Prog. Hum. Geogr*, *38*(107–117).

Castro, A. I. G., & Lopez, L. J. R. (2021). Sustainability and Resilience of Emerging Cities in Times of COVID-19. *Sustainability*, *13*(16), 9480. https://doi.org/10.3390/su13169480

CRED, & UNDRR. (2020). *Human Cost of Disasters: An Overview of the last 20 years (2000-2019)*. https://doi.org/10.18356/79b92774-en

Dumanski, J. (1997). Criteria and indicators for land quality and sustainable land management. *ITC Journal*, *1997*(3–4), 216–222. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0031401079&partnerID=40&md5=13d5194b3eeba11cb87233746e602da6

Elysa, W., Fahmi, A., Evalina, Z., & Myna, A. (2020). The effect of morphology of post-tsunami coastal physiography on sustainability system of relocation settlement. Case study: Gampong Saney, Lhoong sub-district, Aceh Besar regency. *IOP Conference Series: Earth and Environmental Science*, *452*(1). https://doi.org/10.1088/1755-1315/452/1/012117

GÃ³mez-Baggethun, E., & Barton, D. N. (2013). Classifying and valuing ecosystem services for urban planning. *Ecological Economics*, *86*, 235–245. https://doi.org/10.1016/j.ecolecon.2012.08.019

Gläser, J., & Laudel, G. (2015). A bibliometric reconstruction of research trails for qualitative investigations of scientific innovations. *Historical Social Research*, *40*, 299–330. https://doi.org/DOI: 10.12759/ hsr.40.2015.3.299-330

Godschalk, D. R. (2003). Urban hazard mitigation: Creating resilient cities. *Natural Hazards Review*, Vol. 4, pp. 136–143. https://doi.org/10.1061/(ASCE)1527-6988(2003)4:3(136)

Goetz, A. R., & Szyliowicz, J. S. (1997). Revisiting transportation planning and decision making theory: The case of Denver International Airport. *Transportation Research Part A: Policy and Practice*, *31*(4 PART A), 263–280. https://doi.org/10.1016/s0965-8564(96)00033-x

Jabareen, Y. (2013). Planning the resilient city : Concepts and strategies for coping with climate change and environmental risk. *Cities*, *31*(April 2013), 220–229. https://doi.org/10.1016/j.cities.2012.05.004

Krebs, P., & Larsen, T. A. (1997). Guiding the development of urban drainage systems by sustainability criteria. *Water Science and Technology*, *35*(9), 89–98. https://doi.org/10.1016/S0273-1223(97)00187-X

Lopez, L. J. R., & Castro, A. I. G. (2021). Sustainability and resilience in smart city planning: A review. *Sustainability (Switzerland)*, *13*(1), 1–25. https://doi.org/10.3390/su13010181

Mahmoud, Z. A., Ahmad, Y., & Alias, A. (2019). Relevance to Post-disaster recovery in undergraduate Architectural Education: A Case of Southern Turkish Universities. *Pertanika Journal of Social Sciences and Humanities*, *27*(1), 491–505.

Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, *147*, 38–49. https://doi.org/10.1016/j.landurbplan.2015.11.011

Pritchard, A. (1969). Statistical Bibliography or Bibliometrics. *Journal of Documentation*, *25*(4), 348–349.

Rabe, N. S., Hussain, M. R. M., Tukiman, I., Zen, I., Muda, R. S., & Mamat, A. F. (2019). Respondents' area of preference when disaster strikes: A case study of Cameron Highland. *Planning Malaysia*, *17*(2), 343–351. https://doi.org/https://doi.org/10.21837/pm.v17i10.654

Sagala, S., Anwar, H., Lubis, W., & Yamin, D. (2015). *Strengthening Community Resilience from Spatial Plan Perspective*.

Sandifer, P. A., Sutton-Grier, A. E., & Ward, B. P. (2015). Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. *Ecosystem Services*, Vol. 12, pp. 1–15. https://doi.org/10.1016/j.ecoser.2014.12.007

Sharifi, A., Allam, Z., Feizizadeh, B., & Ghamari, H. (2021). Three decades of research

on smart cities: Mapping knowledge structure and trends. *Sustainability (Switzerland)*, *13*(13). https://doi.org/10.3390/su13137140

Sharifi, A., & Khavarian-garmsir, A. . (2020). The COVID-19 pandemic : Impacts on cities and major lessons for urban planning , design , and management. *Science of the Total Environment*, *749*, 1–3. https://doi.org/10.1016/j.scitotenv.2020.142391

Sulaiman, N., She, T. W., & Fernando, T. (2019). Community resilience frameworks for building disaster resilient community in Malaysia. *Planning Malaysia: Journal of the Malaysian Institute of Planners*, *17*(1), 94–103. https://doi.org/https://doi.org/10.21837/pm.v17i9.589

Sweileh, W. M., Al-jabi, S. W., Abutaha, A. S., Zyoud, S. H., Anayah, F. M. A., & Sawalha, A. F. (2017). *Bibliometric analysis of worldwide scientific literature in mobile - health : 2006 – 2016*. 1–12. https://doi.org/10.1186/s12911-017-0476-7

Wahid, R., Ahmi, A., & Alam, A. S. A. F. (2020). *Growth and Collaboration in Massive Open Online Courses : A Bibliometric Analysis*. *21*(4).

Wang, L., Xue, X., Zhang, Y., & Luo, X. (2018). Exploring the emerging evolution trends of urban resilience research by scientometric analysis. *International Journal of Environmental Research and Public Health*, *15*(10). https://doi.org/10.3390/ijerph15102181

Wang, M.-H., Ho, Y.-S., & Fu, H.-Z. (2019). Global performance and development on sustainable city based on natural science and social science research: A bibliometric analysis. *Science of the Total Environment*, *666*, 1245–1254. https://doi.org/10.1016/j.scitotenv.2019.02.139

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., Dias, B. F. D. S., … Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: Report of the Rockefeller Foundation. *The Lancet*, Vol. 386, pp. 1973–2028. https://doi.org/10.1016/S0140-6736(15)60901-1

Zainol, R., Elsawahli, H., & Ibrahim, W. (2018). Spatial assessment of the impact of flood to Melaka's economy. *International Journal of GEOMATE*, *14*(45), 73–77. https://doi.org/10.21660/2018.45.7286

Zuraidi, E., Caisarina, I., & Agustina, M. (2021). A bibliometric study of global trends in community resilience and spatial planning research (2000-2021). *IOP Conference Series: Earth and Environmental Science*, *881*(1). https://doi.org/10.1088/1755-1315/881/1/012067

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 272 – 286

TRANSFORMATIVE IMPACT OF COVID 19 PANDEMIC ON THE URBAN PUBLIC SPACES

Nur Aulia Rosni[1], Rosilawati Zainol[2]

[1,2] *Department of Urban and Regional Planning, Faculty of Built Environment*
[1,2] *Centre for Sustainable Urban Planning & Real Estate (SUPRE), Faculty of Built Environment*
[2] *Centre for Civilisation Dialogue*
UNIVERSITI MALAYA

Abstract

Urban areas attract population influx due to central economic, social, and technological growth. However, living in the city comes with an undesirable cost due to the scarcity of land area. People are forced to live in smaller housing without personal open space and lawns. Future urban population will opt for small living spaces and indirectly increase the need for public open spaces. Unfortunately, the Covid 19 pandemic outbreaks in 2020 have forced the urban community to be confined to their own home later negatively impacting the urban population's physical and mental health. This research aims to identify the possible long-term transformative impact of the covid 19 pandemic from the space and user context. Two types of approaches were adopted by the research, the Systematic Literature Review using the PRISMA method, and the questionnaire survey analysed using SPSS. The findings from SLR are coded and categorised into three themes: transformative impact on user behaviour and perception, the planning and design of space, and the Social-Political impact. Next, the survey was developed based on the themes of transformative impact. One of the most important conclusions is that the urban public space provision and accessibility vary according to the socioeconomic background of the community. By understanding the possible transformative impact of pandemics on urban public space, better policy and guidelines for planning and managing the public space can be made where the urban public space can be fully utilised, functional safely and conveniently and accessible for all in the post-pandemic era.

***Keywords**:* Post-pandemic planning, Covid 19 Pandemic, public space, urban public space, planning policy, post-pandemic city, urban solution, urban quality

[1] Senior Lecturer at Universiti Malaya. Email: nurauliarosni@um.edu.my

INTRODUCTION

Historically, humans construct cities and metropolitan areas for social connection, economic gain, and interpersonal imperatives (Allam & Jones, 2021). Cities are the epicenters of technical and economic development worldwide (Afrin et al., 2021). Most of the world's population currently lives in cities, contributing to more than 80% of global GDP (Sharifi, 2019). In comparison to rural areas, the urban area is fast developing, and it now houses more than half of the existing world population (UNDP, 2016). Nowadays, more individuals want to live in the city because of a better chance to gain socioeconomic opportunities, such as job openings and high-quality infrastructure.

According to the UN, more than 70% of the world's population will live in cities by 2050. However, many aspects must be considered and tolerated to live in the city. Some things need to be sacrificed in some cases, such as owning a landed property with a private open space or houses with more than three bedrooms. Housing quality in highly urbanised areas has been associated with morbidities such as infectious diseases and injuries related to building conditions and cleanliness. In recent years, the morbidity factor in urban housing shows more mental health issues due to the size of housing space and lack of social facilities (Krieger & Higgins, 2002). Before the pandemic, small living space or "micro-apartment" was not a critical problem for city dwellers as the community coped with a more significant problem: affordable housing. The younger generation and poor people can tolerate the small living space. They have to accept this lifestyle to secure minimal living conditions with the appropriate sense of safety within a limited budget (Hernández, 2016). They could satisfy their social needs by accessing urban public spaces such as urban parks or public gardens, but this situation has changed after a pandemic outbreak struck the global population in early 2020.

COVID-19 stunned cities around the world, exposing the vulnerability of urban lives and functions (Mishra et al., 2020; Yang & Lo, 2021). Most cities were subjected to a catastrophic disruption that persisted for an extended period (Lak et al., 2020; Santos Vieira de Jesus et al., 2020; Sharifi & Khavarian-Garmsir, 2020). Cities are to blame for the greater pandemic transmission rate because of fast urbanisation, dense city spaces, massive population growth, and high levels of transportation usage (Sharifi & Khavarian-Garmsir, 2020). Physical distancing and restrictions on the use of public space have been significant policy measures in limiting COVID-19 transmission and protecting public health (Geary et al., 2021; Geng et al., 2021; Honey-Rosés et al., 2020; Olszewska-Guizzo et al., 2021). During the peak of Covid 19 infections, the world's population was instructed to stay at home and avoid many public locations (Honey-Rosés et al., 2020). The depth and breadth of risk-reduction measures implemented by the authority to contain the infection are unknown, particularly those relating to the future design, usage, and perceptions of public

space (Afrin et al., 2021; Bereitschaft & Scheller, 2020; Herman & Drozda, 2021; Nundy et al., 2021; Salama, 2020).

Assessing the impact of Covid 19 from the perspective of the built environment helps to reduce the disparity that still exists in urban areas, particularly in terms of socioeconomic position and access to green spaces. As a result, this research has led to the question, "What are the built environment aspects that need to be transformed as a result of the Covid 19 pandemic in order to improve the accessibility of urban public spaces to diverse socioeconomic classes?" The purpose of this study is to identify the potential long-term disruptive impact of the covid 19 pandemic in terms of space and user context. In this paper, we focus on assessing covid 19 impact on urban public space by comparing data from two sources. The macro-level sources are the collection of findings from different countries, while the micro-level sources are from the questionnaire survey of local urbanites in Kerinchi, Kuala Lumpur. The findings are expected to help researchers develop pandemic-resilient urban strategies (response, mitigation, and preparedness phase) by analysing published literature and local community feedback.

LITERATURE REVIEW

Before the pandemic hit in 2020, there were already arising concerns among health practitioners, academicians, and decision-makers on non-communicable diseases due to physical inactivity among urban populations (Barbarossa, 2020; Hernández, 2016; Krieger & Higgins, 2002; Kyriazis et al., 2020; Labib et al., 2021; López-Bueno et al., 2020; Parlapani et al., 2020; Schwendinger & Pocecco, 2020). Various research has shown strong evidence on the relationship between physical inactivity with comorbidity diseases such as obesity and cardiovascular health (Gichu et al., 2018; Gomes et al., 2017; Schwendinger & Pocecco, 2020; Tcymbal et al., 2020; Yuan et al., 2021). During the Covid 19 pandemic, many countries imposed movement restrictions order to mitigate the spread of Covid 19. The moves, however, have indirectly contributed to a remarkable decrease in physical activity among urban dwellers, resulting in the increasing non-communicable disease rate (Labib et al., 2021; López-Bueno et al., 2020; Schwendinger & Pocecco, 2020). Covid 19's preventive measures have also been shown to contribute to the rising number of incidences of mental health disorders. The world now sees how being imprisoned in one's home with no access to open space has harmed people's mental health (Li et al., 2020; Olszewska-Guizzo et al., 2021). Without question, Covid 19 has negatively impacted mental health, social wellbeing, and economic prosperity (Afrin et al., 2021). Many countries are presently witnessing a rapid decline in population mental health. Those who survive the infections are more likely to develop mental health problems (López-Bueno et al., 2020). The disconnect between people and natural space has resulted in several mental breakdowns, particularly in densely populated areas and low-

income communities (Geary et al., 2021). Loss of income due to confinement and inability to leave the house has increased suicide and domestic violence incidents (Ghosh et al., 2020; Labib et al., 2021; Nundy et al., 2021). Covid 19 exposes the open truth of socioeconomic disparity among urbanites, in which the low-income class has little to no access to green space (Barbarossa, 2020; Gupte & Mitlin, 2021; Nundy et al., 2021). The community's easy access to green space areas led to a high-quality living lifestyle. (Geary et al., 2021) stated that communities that live near high-quality urban green space and blue outdoor spaces have favourable health outcomes and lower health inequality due to low income.

These findings conclude that communicable/non-communicable diseases and population living quality have an essential urban character. (Afrin et al., 2021; Mishra et al., 2020; Sharifi & Khavarian-Garmsir, 2020; UN-Habitat, 2021). Recently, UN-Habitat emphasised infectious disease's urban-centric nature. In 210 nations, the pandemic has hit over 1430 cities, with metropolitan areas accounting for well over 95 per cent of all cases (UN-Habitat, 2021). The scientific community has been examining the virus, its socio-environmental implications, regulatory/adaptation policies, and plans from the beginning of the COVID-19 crisis. However, most of this research has concentrated on the virus's detection, treatment, and cure rather than the aetiology, causes, and long-term impact on society (Afrin et al., 2021). The study of the pandemic from the standpoint of the built environment aids in determining the unsolved aspects of it. The appearance of COVID-19 has refocused attention on the vulnerability of cities to pandemics.

Urban planning plays a critical role in responding efficiently to this crisis and enabling rapid functional recovery in the post-disaster era (Afrin et al., 2021). Because the Covid 19 virus has the ability to spread from one individual to another, infection rates and patterns vary depending on the spatial location. A certain level of health safety must be maintained, and a new spatial design must be implemented. The steps include rethinking unsustainable urban patterns, risks, and socioeconomic disparities in order to be ready for emergent cases or developing pandemic-resilient city planning and management. This can be accomplished by examining the effects of various disasters in urban settings and the appropriate planning, adaptation, and design for greater resilience (Afrin et al., 2021; Sharifi, 2019; Sharifi & Khavarian-Garmsir, 2020).

METHODOLOGY

Two stages of research approaches are adopted to achieve the research aim, which is to identify the possible long-term transformative impact of the covid 19 pandemic from the space and user context. The first stage focused on the qualitative method. The PRISMA method was adopted to examine the result and findings from previous related research from 2020 to 2021. The data from this analysis are later coded and categorised into different themes. These identified

themes of transformative impact were used to formulate a questionnaire survey for the second stage. The second stage utilised the quantitative method, where data was collected on-site to get first-hand information on the user's perception.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method collected secondary data by narrowing the literature search based on the research purpose and scope. The PRISMA model is selected for this study because it is proven to be an evidence-based method that extracts relevant data sources for analysis purposes. Before beginning with the identification and screening process, eligibility and exclusion criteria related to the impact of Covid 19 on urban public space were established. These criteria include the type of data documentation, the data collection and publication date, the stage of data publication, and the language used to represent the data. The timeline of the data is from 2020 to 2021. Although the period is short, the Covid 19 pandemic is a relatively recent occurrence at the end of 2019. World Health Organisation only declared Covid 19 as a pandemic in early 2020. Despite the difficulties for researchers in collecting tremendous data, many researchers from different countries have come out with reliable data findings based on their local context. Therefore, this research was conducted based on the published data in Journal Articles, books, Chapters in books, and Conference Proceedings. Table 1 shows the summary of the inclusion and exclusion criteria.

Table 1: The inclusion and exclusion criteria

Criteria	**Inclusion**	**Exclusion**
Timeline	2020-2021	2019 and before
Document type	The article, Chapter Book, Book Chapter, Conference Paper, Review	Erratum, Book, Conference Review, Editorial, Proceeding Paper, Book Review, Early Access, Review, Discussion, Meeting Abstract, Note, Art Exhibit Review, News Item, Correction, Correction Addition, Data Paper, Item about an Individual, Letter and Retraction
Source type	Journal, Book, Conference and Conference Proceeding	Book Series, Trade Journal
Publication stage	Final	Article in press, Varying levels of completeness, Incomplete, Accepted Manuscripts
Language	English	Non-English
Access type	Open Access	Other

Source: Author (2022)

The second part of this research involves questionnaire survey. From May 2021 to September 2021, online surveys were disseminated to get user input on how the Covid 19 epidemic has influenced their relationship with the natural environment in the context of an urban park. The quantitative method was used

at this stage to obtain first-hand information on the user's perception. The respondents' participation was optional, and they were fully informed about the research's aim, process, and procedure and their right to withdraw from participating in the questionnaire survey at any time. The questionnaire was divided into three portions, each containing 25 questions. The random sampling technique was employed to collect responses from people of diverse socioeconomic backgrounds near Bukit Kerinchi Forest Park in Kerinchi, Kuala Lumpur. Data cleaning and validation have been conducted to validate the sample size of 215 respondents with a 90% confidence level.

FINDINGS

The data mining procedure began in October 2021 with the identification of significant keywords relevant to the research purpose. The data was gathered from a few scientific journal databases, Scopus, Web of Science, Google Scholar, and public reports from reputable government bodies. These sources yielded a total of 93 documents. The second stage was screening, in which seven items were eliminated based on defined eligibility and exclusion criteria. 86 full-text publications were evaluated during the eligibility stage. Following a thorough review, a total of 16 full publications were removed due to their lack of relevance to the research's purpose. The final round of the evaluation yielded a total of 45 articles for the qualitative analysis. Figure 1 shows the summary of PRISMA process.

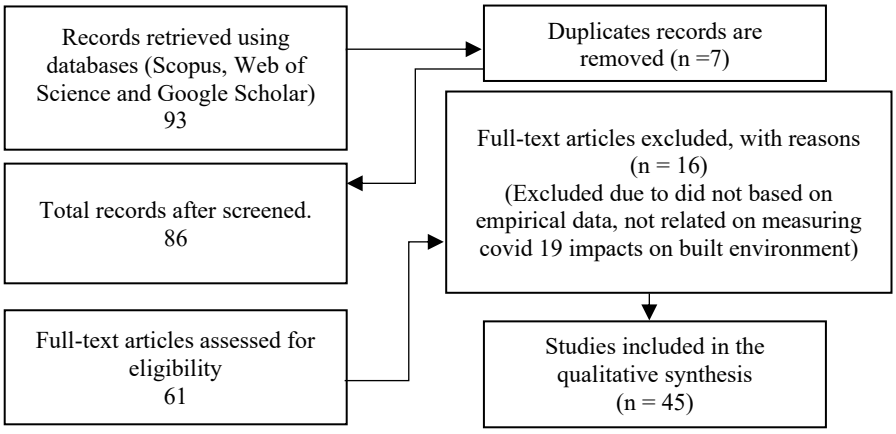


Figure 1: PRISMA
Source: modified from (Shaffril et al., 2018)

The remaining 45 papers selected for qualitative analysis were thoroughly evaluated and analysed. Efforts were focused on certain studies that addressed the paper's stated goal: The purpose of this study is to determine the potential long-term disruptive impact of the covid 19 epidemic in terms of space and user context. Following that, qualitative analysis was carried out by collecting information from the abstracts, methods, and data findings. The gathered data was then conceptually organised into themes. The most prominent impact of the covid 19 epidemic on the urban space and its people was then investigated using content analysis techniques. As mentioned earlier, the findings from the PRISMA method were coded and categorised into three themes: (i) space planning and design, (ii) transformative impact on user behaviour and perception, and (iii) Social-Political impact (refer to Figure 2). These three themes of transformative impact were used as a basis for formulating a questionnaire survey for the second stage.

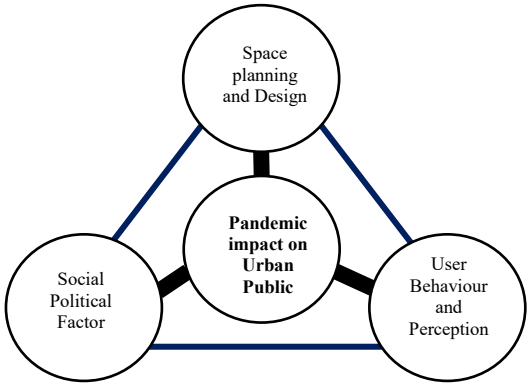


Figure 2: Pandemic impact on urban public spaces
Source: modified based on the model of significant features influencing social interactions in urban areas (Sanei et al., 2018)

Based on the conducted survey, it was found out that most of the respondents in this research lived near Taman Rimba Bukit Kerinchi, with 82.4% being residents are from Bangsar South and Kerinchi, Kuala Lumpur, while the remaining 17.6% are from Petaling Jaya, Selangor. The respondents were mainly female (57.3%) compared to male respondents (42.7%) and consisted of young adults and adults (87.8%). The majority of the respondents are also from the lower-middle-income group.

Based on the survey, the respondent was approached by using different types of placemaking where planning and design intervention of the spaces are presented. From the survey, the majority of the respondents are interested in the tactical type, with 48.8%. It is followed by standard type (45.1%), creative type

(29.3%), and strategic type (20%). A majority agree on a tactical placemaking program proving the solid need for urban planning and design reforms.

Since most of the respondents are from lower-middle-income groups and tactical placemaking programs scored the highest percentage, it is proven that the current public space and green area provision are not inclusive enough for all societal classes. Many people have less access to public spaces even before pandemic outbreak, and the situation gets worse after. Refer to Table 2.

Table 2: Favourable placemaking intervention program

Type of Program	Yes		No	
	Freq.	**(%)**	**Freq.**	**(%)**
Standard (events in public spaces)	37	45.1	45	54.9
Tactical (pop-up cafes, parking space conversions into parklets, community park/garden)	40	48.8	42	51.2
Creative (outdoor concerts, public art contests)	24	29.3	58	70.7
Strategic (provision of recreational amenities and cyclical events targeted to talented individuals)	20	24.4	62	75.6

Source: Author (2022)

Based on the survey conducted for this research, A Chi-Square Test was performed to assess the relationship between socio-demographic background and involvement with the community association. The chi-square results showed a significant relationship between age (p = .005), educational level (p = .001), and involvement with the community association. Refer to Table 3.

Table 3: Chi-square Test on Respondents' Socio-demographic Background and Respondents' awareness to practice self physical distancing in public spaces.

Variables	**Value**	**Asymp. Sig. (2-sided)**	**Contingency Coefficient**
Age	12.834 [a]	.005	.368
Gender	2.280 [a]	.131	.164
Ethnicity	7.234 [a]	.065	.285
Religion	.651 [a]	.722	.089
Education Level	29.195 [a]	.001	.512
Marital Status	4.419 [a]	.220	.226
Employment Status	4.469 [a]	.724	.227
Household Income	4.645 [a]	.795	.232

Source: Author (2022)

The respondents with higher educational qualifications and mature age are more willing to practice physical distancing in public spaces and more open to abiding by the rules. However, respondents from the lower-middle income group with less opportunity to have a high educational background are less likely

to practice physical distancing due to a lack of awareness. Therefore, the public spaces should be planned and designed to educate people from all social classes where the arrangement within the public spaces can increase their awareness and influence their behaviour and interaction (Kyriazis et al., 2020).

DISCUSSION

The global pandemic crisis has caused dread and tension in the community, mainly when the disease has caused humans to stop socialising. Suffering from the covid 19 pandemic is a novel experience for our generation, but epidemics and pandemics have always shaped the urbanisation process (Afrin et al., 2021). There is much ambiguity regarding how COVID-19 will influence future public space design, use, and perceptions. In the world of public space and design, a significant question is how long these effects will be felt and how transformative they will be. It may take years to determine how the global epidemic has affected public space planning and design (Honey-Rosés et al., 2020). The covid 19 outbreak has highlighted the crucial need to rethink urban public spaces. As a result, this research identified the potentially transformative impact of the covid 19 pandemic on urban public spaces.

Public spaces and green space areas are widely recognised to provide significant public benefits, especially in times of health emergency. The requirement for self-quarantine and physical distancing negatively impacts the population's mental health driven by fears of infection, frustration, boredom, and inadequate facilities and infrastructure in their living environment, emphasising the importance of public spaces like these parks and green areas. As a result of the disease's emergence and the government's response, the public has begun to recognise some previously overlooked park functions (Bereitschaft & Scheller, 2020; Fabris et al., 2020; Geng et al., 2021). It is widely assumed that higher infection rates will occur in high-density areas because people are unable to practise physical distancing due to space constraints, Afrin et al., (2021) discovered in their studies that there is no link between high population density and infection rates; instead, infection rates increase in high-density areas due to a lack of proper planning and design.

According to Herman & Drozda (2021), tactical urbanism interventions in public and green spaces during the COVID-19 pandemic are most effective because they immediately impact the shape and use of public spaces today. This study shows that many people have less access to the public spaces. This finding supports the findings by Eltarabily & Elghezanwy, (2020), who found that present urban developments have not been very successful in urban planning and health field. As a result, it is critical to emphasise the necessity of paying attention to how cities and the urban environment are designed in order to provide a healthy environment for people. The interdependence of city features such as buildings, streets, public parks, and infrastructure substantially impacts the quality and

effectiveness of life for city residents. The public spaces should be inclusive and accessible to all types of social class.

There is a silver lining to the Covid 19 outbreak. It has emphasised the vital need to reframe urban design and planning to reduce unsustainable urban development patterns. Responsive planning and design in creating a new trend of private and public spaces within the context of thoughtfully built environments that are described as healthy, epidemic-resistant, and inspiring a balanced existence are becoming more significant nowadays (Afrin et al., 2021; Alraouf, 2021). Public spaces will be treasured in the post-Covid period for their chances for socialisation, enjoyment, community development, and identity creation. Furthermore, public spaces are an essential aspect of a resilient city because they have the value of flexibility where public spaces can be changed for emergency health purposes. During the pandemic, many large green spaces and convention centres have been converted into emergency field hospitals (Honey-Rosés et al., 2020). Cities and towns must reformulate residential neighbourhood construction rules and regulations to develop human spaces rather than merely a quantitative intervention controlled by real-estate developers (Bereitschaft & Scheller, 2020). Urban planners must identify and promote residential and public space infrastructure that incorporates the required community facilities (Alraouf, 2021; Eltarabily & Elghezanwy, 2020; Mishra et al., 2020).

Several studies have emphasised the importance of planning and designing public areas to foster and preserve physical distancing. People must be allowed to spread out in public spaces, reducing crowding in less desirable areas. For example, green space planners may need to offer more locations for individual and introspective use instead of team sports. Trails and routes for running may be widened. In addition, new expectations about social distance may necessitate rethinking where people might exercise in green places (Geng et al., 2021; Honey-Rosés et al., 2020; Song et al., 2021; Wortzel et al., 2021; Yang & Lo, 2021). Streets may also be upgraded and used to offer additional public spaces to the public (Rahayu, Buchori & Widjajanti, 2019). The development of the public spaces should also be inclusive (Esfandfard, Wahab & Amat, 2018). Thus, the street design must be adaptable and not solely intended for motorised vehicles. Barbarossa, (2020) has emphasised the importance of creating greater spaces for bikes and pedestrians, particularly in highly populated urban areas, in order to reduce public transportation overcrowding and the usage of private cars. According to (Krellenberg & Koch, 2021), streets and pathways might be rebuilt to make alternative transportation more appealing and limit access to public and open spaces in order to meet current Covid-19 standards. To aid the movement in reimagining urban spaces and mobility, tactical placemaking interventions such as the provision of more cycling lanes, pedestrian and traffic calming areas, and sharing mobility programmes are extensively promoted (Sepe, 2021; Sharifi & Khavarian-Garmsir, 2020; Ugolini et al., 2020). Another excellent suggestion

is to develop green infrastructure, which is a network of connected green places. This concept is more helpful than isolated parks, and it entails a network of parks of various scales and purposes through which citizens may walk more easily and connect to nature (Eltarabily & Elghezanwy, 2020; Labib et al., 2021; Leng et al., 2020). The implementation of eco public art would also contribute to place making in many public spaces (Zakariya, Azhari, 2017).

Public spaces play a significant role in educating people and shaping their behaviour. A recent study by Geng et al., (2021) replicated and concluded that people's awareness of protecting themselves against pandemic infection by understanding and practicing social-distancing rules has gradually increased. On the assumption that today's people are aware of and adhere to physical-distancing rules, parks and green spaces can be used as a platform to educate and shape the behaviour of individuals and society. Martínez & Short, (2021) in their research have mentioned that pandemics and their repercussions have impacted cities throughout history. The city is a resilient organism, and each crucial episode has provided an opportunity to shape and rethink urban planning to maintain health and cleanliness, demonstrating a strong ability to develop following critical events.

CONCLUSION

The pandemic has shaped the development of urban areas in the past. As a result, instead of "returning to normal," future development should focus on adapting and responding to the current needs of sustainable and resilient cities. Because cities are at the forefront of these adaptive changes, this study highlights the potential transformative impact on our public spaces, allowing authorities and professional stakeholders to take appropriate action to mitigate negative connotations associated with the Covid 19 pandemic outbreak. This research is limited by data collection and information acquired during the movement control order (MCO), where most of the respondents answer the survey online, and the systematic literature review conducted lacks resources (publication from 2020-2022). As a result, we propose that future research focus on implementation of transformative policies that adhere with the people needs in the "new normal" era to ensure that urban public spaces are fully utilised and inclusive of all socioeconomic classes.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Universiti Malaya and MOHE for the funding of research grant IIRG008-19HWB that enabled us to conduct this research.

REFERENCES

Afrin, S., Chowdhury, F. J., & Rahman, M. M. (2021). COVID-19 Pandemic: Rethinking Strategies for Resilient Urban Design, Perceptions, and Planning. *Frontiers in Sustainable Cities*, *3*(May). https://doi.org/10.3389/frsc.2021.668263

Alraouf, A. A. (2021). The new normal or the forgotten normal: contesting COVID-19 impact on contemporary architecture and urbanism. *Archnet-IJAR*, *15*(1), 167–188. https://doi.org/10.1108/ARCH-10-2020-0249

Andres, L., Bryson, J. R., & Moawad, P. (2021). Temporary Urbanisms as Policy Alternatives to Enhance Health and Well-Being in the Post-Pandemic City. *Current Environmental Health Reports*, *8*(2), 167–176. https://doi.org/10.1007/s40572-021-00314-8

Barbarossa, L. (2020). The post pandemic city: Challenges and opportunities for a non-motorized urban environment. An overview of Italian cases. *Sustainability (Switzerland)*, *12*(17), 1–19. https://doi.org/10.3390/su12177172

Bereitschaft, B., & Scheller, D. (2020). How Might the COVID-19 Pandemic Affect 21st Century Urban Design, Planning, and Development? *Urban Science*, *4*(4), 56. https://doi.org/10.3390/urbansci4040056

Eltarabily, S., & Elghezanwy, D. (2020). Post-Pandemic Cities - The Impact of COVID-19 on Cities and Urban Design. *Architecture Research*, *10*(3), 75–84. https://doi.org/10.5923/j.arch.20201003.02

Esfandfard, E., Wahab, M. H. & Che Amat, (2018). Universal Design in Urab Public Spaces for Peope with Disability. A Case Study of Tehran, Iran. Planning Malaysia. 16(1), 173-182. https://doi.org/10.21837/pm.v16i5.421

Fabris, L. M. F., Camerin, F., Semprebon, G., & Balzarotti, R. M. (2020). New healthy settlements responding to pandemic outbreaks: Approaches from (and for) the global city. *Plan Journal*, *5*(2), 385–406. https://doi.org/10.15274/tpj.2020.05.02.4

Geary, R. S., Wheeler, B., Lovell, R., Jepson, R., Hunter, R., & Rodgers, S. (2021). A call to action: Improving urban green spaces to reduce health inequalities exacerbated by COVID-19. *Preventive Medicine*, *145*(July 2020), 106425. https://doi.org/10.1016/j.ypmed.2021.106425

Geng, D. (Christina), Innes, J., Wu, W., & Wang, G. (2021). Impacts of COVID-19 pandemic on urban park visitation: a global analysis. *Journal of Forestry Research*, *32*(2), 553–567. https://doi.org/10.1007/s11676-020-01249-w

Ghosh, A., Nundy, S., Ghosh, S., & Mallick, T. K. (2020). Study of COVID-19 pandemic in London (UK) from urban context. *Cities*, *106*(August), 102928. https://doi.org/10.1016/j.cities.2020.102928

Gichu, M., Asiki, G., Juma, P., Kibachio, J., Kyobutungi, C., & Ogola, E. (2018). Prevalence and predictors of physical inactivity levels among Kenyan adults (18-69 years): An analysis of STEPS survey 2015. *BMC Public Health*, *18*(Suppl 3). https://doi.org/10.1186/s12889-018-6059-4

Gomes, M., Figueiredo, D., Teixeira, L., Poveda, V., Paúl, C., Santos-Silva, A., & Costa, E. (2017). Physical inactivity among older adults across Europe based on the SHARE database. *Age and Ageing*, *46*(1), 71–77. https://doi.org/10.1093/ageing/afw165

Gupte, J., & Mitlin, D. (2021). COVID-19: what is not being addressed. *Environment and*

Urbanization, *33*(1), 211–228. https://doi.org/10.1177/0956247820963961

Hassankhani, M., Alidadi, M., Sharifi, A., & Azhdari, A. (2021). Smart city and crisis management: Lessons for the covid-19 pandemic. *International Journal of Environmental Research and Public Health*, *18*(15). https://doi.org/10.3390/ijerph18157736

Herman, K., & Drozda, Ł. (2021). Green infrastructure in the time of social distancing: Urban policy and the tactical pandemic urbanism. *Sustainability (Switzerland)*, *13*(4), 1–24. https://doi.org/10.3390/su13041632

Hernández, D. (2016). Affording Housing at the Expense of Health: Exploring the Housing and Neighborhood Strategies of Poor Families. *Family Issues*, *176*(1), 100–106. https://doi.org/10.1177/0192513X14530970.Affording

Honey-Rosés, J., Anguelovski, I., Chireh, V. K., Daher, C., Konijnendijk van den Bosch, C., Litt, J. S., Mawani, V., McCall, M. K., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. J. (2020). The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities. *Cities & Health*, *00*(00), 1–17. https://doi.org/10.1080/23748834.2020.1780074

Krellenberg, K., & Koch, F. (2021). Conceptualizing interactions between sdgs and urban sustainability transformations in covid-19 times. *Politics and Governance*, *9*(1), 200–210. https://doi.org/10.17645/pag.v9i1.3607

Krieger, J., & Higgins, D. L. (2002). Housing and health: Time again for public health action. *American Journal of Public Health*, *92*(5), 758–768. https://doi.org/10.2105/AJPH.92.5.758

Kyriazis, A., Mews, G., Belpaire, E., Aerts, J., & Malik, S. A. (2020). Physical distancing, children and urban health. *Cities & Health*, *00*(00), 1–6. https://doi.org/10.1080/23748834.2020.1809787

Labib, S. M., Browning, M. H. E. M., Rigolon, A., & Helbich, M. (2021). *Nature ' s contributions in coping with a pandemic in the 21 st century : A narrative review of evidence during COVID-19*. 1–40.

Lak, A., Asl, S. S., & Maher, A. (2020). Resilient urban form to pandemics: Lessons from COVID-19. *Medical Journal of the Islamic Republic of Iran*, *34*(1), 1–9. https://doi.org/10.34171/mjiri.34.71

Leng, J., Wang, Q., & Liu, K. (2020). Sustainable design of courtyard environment: From the perspectives of airborne diseases control and human health. *Sustainable Cities and Society*, *62*(June), 102405. https://doi.org/10.1016/j.scs.2020.102405

Li, X., Zhou, L., Jia, T., Peng, R., Fu, X., & Zou, Y. (2020). Associating COVID-19 severity with urban factors: A case study of Wuhan. *International Journal of Environmental Research and Public Health*, *17*(18), 1–20. https://doi.org/10.3390/ijerph17186712

López-Bueno, R., Calatayud, J., Casaña, J., Casajús, J. A., Smith, L., Tully, M. A., Andersen, L. L., & López-Sánchez, G. F. (2020). COVID-19 Confinement and Health Risk Behaviors in Spain. *Frontiers in Psychology*, *11*(June), 1–10. https://doi.org/10.3389/fpsyg.2020.01426

Martínez, L., & Short, J. R. (2021). The pandemic city: Urban issues in the time of covid-19. *Sustainability (Switzerland)*, *13*(6), 1–10. https://doi.org/10.3390/su13063295

Mishra, S. V., Gayen, A., & Haque, S. M. (2020). COVID-19 and urban vulnerability in

India. *Habitat International*, *103*(July), 102230. https://doi.org/10.1016/j.habitatint.2020.102230

Nundy, S., Ghosh, A., Mesloub, A., Albaqawy, G. A., & Alnaim, M. M. (2021). Impact of COVID-19 pandemic on socio-economic, energy-environment and transport sector globally and sustainable development goal (SDG). *Journal of Cleaner Production*, *312*(September 2020), 127705. https://doi.org/10.1016/j.jclepro.2021.127705

Olszewska-Guizzo, A., Mukoyama, A., Naganawa, S., Dan, I., Husain, S. F., Ho, C. S., & Ho, R. (2021). Hemodynamic response to three types of urban spaces before and after lockdown during the covid-19 pandemic. *International Journal of Environmental Research and Public Health*, *18*(11). https://doi.org/10.3390/ijerph18116118

Parlapani, E., Holeva, V., Voitsidis, P., Blekas, A., Gliatas, I., Porfyri, G. N., Golemis, A., Papadopoulou, K., Dimitriadou, A., Chatzigeorgiou, A. F., Bairachtari, V., Patsiala, S., Skoupra, M., Papigkioti, K., Kafetzopoulou, C., & Diakogiannis, I. (2020). Psychological and Behavioral Responses to the COVID-19 Pandemic in Greece. *Frontiers in Psychiatry*, *11*(August), 1–17. https://doi.org/10.3389/fpsyt.2020.00821

Rahayu, M.T., Buchori, I. & Widjajanti, R. (2019). The Need for the Improvement of Street Vendors Management in Public Spaces at Surakarta City. *Planning Malaysia*. 17 (3), 146 - 157. https://doi.org/10.21837/pm.v17i10.636

Salama, A. M. (2020). Coronavirus questions that will not go away: interrogating urban and socio-spatial implications of COVID-19 measures. *Emerald Open Research*, *2*, 14. https://doi.org/10.35241/emeraldopenres.13561.1

Sanei, M., Khodadad, S., & Khodadad, M. (2018). Flexible Urban Public Spaces and their Designing Principles. *Scienceline Publication Journal of Civil Engineering and Urbanism*, *8*(4), 39–43. www.ojceu.ir

Santos Vieira de Jesus, D., Kamlot, D., & Jacubowski Correia Dubeux, V. (2020). Innovation in the 'New Normal' Interactions, the Urban Space, and the Low Touch Economy: The Case of Rio de Janeiro in the Context of the COVID-19 pandemic. *International Journal of Social Science Studies*, *8*(5), 17. https://doi.org/10.11114/ijsss.v8i5.4900

Schwendinger, F., & Pocecco, E. (2020). Counteracting physical inactivity during the COVID-19 pandemic: Evidence-based recommendations for home-based exercise. *International Journal of Environmental Research and Public Health*, *17*(11), 2–6. https://doi.org/10.3390/ijerph17113909

Sepe, M. (2021). Covid-19 pandemic and public spaces: improving quality and flexibility for healthier places. *Urban Design International*, *26*(2), 159–173. https://doi.org/10.1057/s41289-021-00153-x

Shaffril, H. A. M., Krauss, S. E., & Samsuddin, S. F. (2018). A systematic review on Asian's farmers' adaptation practices towards climate change. *Science of the Total Environment*, *644*, 683–695. https://doi.org/10.1016/j.scitotenv.2018.06.349

Sharifi, A. (2019). Resilient urban forms: A macro-scale analysis. *Cities*, *85*(November 2018), 1–14. https://doi.org/10.1016/j.cities.2018.11.023

Sharifi, A., & Khavarian-Garmsir, A. R. (2020). The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. *Science of*

the Total Environment, *749*, 1–3. https://doi.org/10.1016/j.scitotenv.2020.142391

Song, X., Cao, M., Zhai, K., Gao, X., Wu, M., & Yang, T. (2021). The Effects of Spatial Planning, Well-Being, and Behavioural Changes During and After the COVID-19 Pandemic. *Frontiers in Sustainable Cities*, *3*(June), 1–15. https://doi.org/10.3389/frsc.2021.686706

Tcymbal, A., Andreasyan, D., Whiting, S., Mikkelsen, B., Rakovac, I., & Breda, J. (2020). Prevalence of Physical Inactivity and Sedentary Behavior Among Adults in Armenia. *Frontiers in Public Health*, *8*(May), 1–8. https://doi.org/10.3389/fpubh.2020.00157

Ugolini, F., Massetti, L., Calaza-Martínez, P., Cariñanos, P., Dobbs, C., Ostoic, S. K., Marin, A. M., Pearlmutter, D., Saaroni, H., Šaulienė, I., Simoneti, M., Verlič, A., Vuletić, D., & Sanesi, G. (2020). Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban Forestry and Urban Greening*, *56*(June). https://doi.org/10.1016/j.ufug.2020.126888

UN-Habitat. (2021). *Cities and Pandemics : Towards a More Just , Green and Healthy Future*. https://unhabitat.org/sites/default/files/2021/03/cities_and_pandemics-towards_a_more_just_green_and_healthy_future_un-habitat_2021.pdf

UNDP. (2016). *Sustainable Urbanization Strategy*.

Wortzel, J. D., Wiebe, D. J., DiDomenico, G. E., Visoki, E., South, E., Tam, V., Greenberg, D. M., Brown, L. A., Gur, R. C., Gur, R. E., & Barzilay, R. (2021). Association Between Urban Greenspace and Mental Wellbeing During the COVID-19 Pandemic in a U.S. Cohort. *Frontiers in Sustainable Cities*, *3*(July), 1–11. https://doi.org/10.3389/frsc.2021.686159

Yang, X., & Lo, K. (2021). Environmental health research and the COVID-19 pandemic: A turning point towards sustainability. *Environmental Research*, *197*(April), 111157. https://doi.org/10.1016/j.envres.2021.111157

Yuan, Q., Huang, H. Y., Chen, X. L., Chen, R. H., Zhang, Y., Pan, X. Bin, Chen, J. N., Liu, N., & Du, H. (2021). Does pre-existent physical inactivity have a role in the severity of COVID-19? *Therapeutic Advances in Respiratory Disease*, *15*, 1–7. https://doi.org/10.1177/17534666211025221

Zakariya, K. & Azhari, S. (2017). Eco Public Art Placemaking Fraework: A Case study of Laman Seni Shah Alam, Malaysia. *Planning Malaysia*. 15(4). 91-104. https://doi.org/10.21837/pm.v15i4.320

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 287 – 301

PERFORMANCE MEASUREMENT PRACTICES IN PROPERTY MANAGEMENT OF PUBLIC HOUSING MALAYSIA

Teo Jes She[1], Ainoriza Binti Mohd Aini[2], Zafirah Al Sadat Binti Zyed[3]

[1,2,3] *Centre for Sustainable Urban Planning and Real Estate (SUPRE), Faculty of Built Environment*
UNIVERSITI MALAYA

Abstract

Public Housing (PH) in Malaysia is commonly called for improvement, as property management issues continue to arise. To address these issues, performance measurement plays an important role in monitoring the efficiency and effectiveness of the operation in PH. However, limited performance measurement studies in PH provide an overview of what property management operations are to be measured. Hence, this paper aims to examine the performance measurement practices adopted in public housing. From here, six overarching themes, particularly management in tenancy, maintenance, building, social, financial, and administrative are identified. These six main themes are further divided into nineteen subthemes. Further, an interview is conducted with PH zone managers from Kuala Lumpur City Hall (DBKL) to examine the current management operation and performance measurement practices in PH Malaysia. This paper provides insightful information on the trend, indicators, and operations in the performance measurement practices in PH.

***Keywords**:* Performance Measurement, Public Housing, Property Management

[2] Corresponding author Email address: ainoriza@um.edu.my

INTRODUCTION

Public housing (PH) is developed worldwide by each local housing authority (LHA) or housing association (HA) to assist low-income groups under the governance of the central government. Generally, PH aims to improve living conditions by subsidising or providing a lower rental rate for PH tenants (Byun & Ha, 2016; Kim et al., 2004). Unfortunately, the PHs are commonly labelled with insufficient maintenance, lower-quality living environment, lack of operation and maintenance funding, high vandalism and crime rates, dilapidated buildings, poor allocation system, and tenant dissatisfaction (Blokland, 2008; Mohit et al., 2010; Salleh et al., 2011; P. White, 2013; Xu & Luo, 2021; Yuan et al., 2019). These issues arose as a consequence of mismanagement of property management (Luo et al., 2020; Priemus et al., 1999; Wei & Wang, 2021). To improve property management, performance measurement plays an important role to monitor the operation and current condition of the building to provide a clear direction on the parts that require further improvements (Hashim et al., 2015; A. D. White et al., 2011; Zailan, 2001). For this reason, various studies have suggested that multi-dimensional performance measurement in property management should be focused to ensure the efficiency and effectiveness of the PH operations (Flynn, 2007; Lam, 2008; Nath & Sharma, 2014; Postnikova et al., 2021; Puspitarini & Akhmadi, 2019; Walker, 2001).

Despite the proliferation of research on performance measurement, few studies have examined the trend and the performance measurement indicators in public housing over the years. Furthermore, previous studies in PH Malaysia have focused on identifying problems with property management issues (Hashim et al., 2015; Jabatan Perumahan Negara, 2017; Sulaiman et al., 2016) rather than proposing strategies for improvement. Thereby, to address the gap, this paper examined the trend of PH performance measurement practices in the property management context through an extensive literature review (LR). Besides, an interview was conducted with zone managers of the PH department from DBKL to understand the current management operation and performance measurement practices in Malaysia. The structure of this paper starts with an introduction and the rationale of PH performance measurement studies. This is followed by the methodology which explains the approaches used. Then, the outcome of the LR and the interview is presented. Finally, an insightful discussion and conclusion are provided.

THE RATIONALE FOR PERFORMANCE MEASUREMENT IN PUBLIC HOUSING

PH property management issues can be categorised into maintenance management issues, tenancy management issues, financial management issues, and social management issues. In detail, maintenance management issues include inadequate building and facilities maintenance (Xu & Luo, 2021). Besides, the

continual rise and the unaffordable property price in the market have led to tenancy management issues (Azmi & Bujang, 2021; Cagamas, 2013; Nasir et al., 2022). In detail, inequitable allocation unit of PH, illegally subletting to third parties, and low tenancy turnover rate (Bo, 2012; Li et al., 2017; Xu & Luo, 2021; Zeng et al., 2017). Further, financial management issues that arise in PH include lack of operation and maintenance funding (Tu, 2017), insufficient funds generated by rental income to cover operating and capital expenses *(Kushendar et al., 2021; Tu, 2017), and tenants who under economically disadvantaged group tend to default their rent payments and management fee (Luo et al., 2020). On top of that, social issues in PH include vandalism and high crime rates (Xu & Luo, 2021).* These highlighted property management issues degrade the fairness, efficiency, and effectiveness of the operation in PH.

In searching for solutions for improving property management issues in PH, performance measurement plays a vital role. However, according to previous studies, PH lacks specific approaches that clearly define each function or activity of the management within the operation in PH (Postnikova et al., 2021; A. D. White et al., 2011). This further increased the difficulty of performance measures implementation and the performance indicators identification for PH (Johnsen, 2005; Modell, 2005; Nath & Sharma, 2014). Thereby, this paper is guided by these research questions- What is the trend of performance measurement studies in the context of PH? What are the current management operation and performance measurement practices in PH Malaysia?

This paper examines the trend in property management performance measurement for PH and highlighted the current management operation and performance measurement practices in PH Malaysia to provide insights as well as directions for future research. Understanding where the focus of performance measurement studies in PH can provide insights into the types of performance measurement used based on the suitability and nature of the property management activities. This paper is critical to support those PHs that are searching for better approaches to evaluate the performance in property management activity.

METHODOLOGY

A qualitative research approach is adopted in this study. First, an extensive LR was conducted to identify the trend of performance measurement studies in the context of PH. This is followed by the interview conducted with zone managers and the head of the sales department from DBKL to examine the current management operation and performance measurement practices in PH Malaysia.

TREND OF PERFORMANCE MEASUREMENT PRACTICES IN PUBLIC HOUSING

To answer the first research question, this paper has examined the trend of PH performance measurement practices through an extensive literature review. The trend of the performance measurement practices in PH is presented based on the studies' objectives and the property management activities involved. The study's objectives are divided into problem identification (PI), framework development (FD), and comparison and evaluation (CE).

The problem identification studies focus on examining flaws and issues within current performance measurement practices. For example, the study from Nath & Sharma (2014) investigates the outcome of the performance measurement system (PMS) application in Vale. In detail, the study shows that the PMS provides substantial advantages to the five departments in PH and has avoided the complexity by being confined to some common indicators. However, the organisation has admonished PMS for not improving operational efficiency and the organisation's efforts have shifted away from the initial goal of serving underprivileged people who were locked out of the Fijian housing market. Besides, in Smith & Walker (1994) study, the adopted performance indicators were found to be inappropriate with a greater emphasis on the input indicators (economic efficiency) rather than the overall effectiveness. As a result, the performance measurement outcomes only reflect on partial picture, leading to the inability of the management authorities to justify the effectiveness of property management activities. Both studies, which aim to identify problems, have proposed some solutions to the existing problems. For example, Smith suggested relevant performance indicators which are seen as tools for evaluating the local authority housing management while Nath suggested the employment of critical theories to highlight the identified issues.

On the other hand, the framework development studies focus on performance indicator identification and performance measurement framework development. In general, most studies measure the management activities' performance based on tenant satisfaction parameters. This is because the survey-generated metrics through measuring satisfaction are less problematic than the 'cost' measures. The 'cost' measures metrics are too broad and complex to provide insight into the differences in housing management resources input, which results in little practical value (Pawson et al., 2015). Besides, for indicators selection during framework development, several studies demonstrated the use of factor analysis for selecting indicators through principal component analysis (Huang & Du, 2015) and partial least squared structural equation modelling (Postnikova et al., 2021). The factor analysis identifies the factors, also known as the indicators by looking at the statistical relationship between the indicators based on the outcomes using questionnaires data. In the study by Huang & Du (2015), the principal component analysis using varimax rotation is used to

confirm the indicators to be included in the performance measurement framework. While in the study by Postnikova et al. (2021), the screening of performance indicators are based on four assessment which includes internal consistency reliability, item reliability, convergent validity, and discriminant validity. However, these methods required huge labour to distribute and collect the results from the large-scale questionnaire surveys. Consequently, the formation of PMS can only be performed for considerably long periods.

Further, comparison and evaluation studies focus on studying the outcome of the performance measured through the application of the developed performance measurement framework. For example, Yan et al. (2021) evaluate the PH objectives by examining tenants' satisfaction regarding housing quality, housing quantity, and willingness to communicate with the PH governance. Besides, in Ibem & Aduwo (2013) study, residential satisfaction of three different modes of housing acquisition such as mortgage, outright purchase, and rental are compared and evaluated. The findings show that satisfaction levels were higher among mortgage holders, followed by outright purchase holders and renters in PH. This has resulted from the cost implications and conditions attached to outright purchase holders and renters in PH. Furthermore, another study aimed to compare and evaluate the residential satisfaction across three types of public housing schemes in China, particularly cheap rental housing, economic comfortable housing, and monetary subsidised housing (Huang & Du, 2015). The findings reveal that the PH allocation scheme greatly influences residential satisfaction and the residents allocated in different housing schemes will eventually be attached to different residential environment problems. As a result, the government should improve the physical environment of PH, the PH allocation, and the social environment to ensure PH's effectiveness.

Based on the extensive LR, this study summarises the performance measurement practices into six main themes and nineteen sub-themes according to the types of property management activities. The six main themes include tenancy management (4 sub-themes), maintenance management (4 sub-themes), building management (2 sub-themes), social management (4 sub-themes), financial management (3 sub-themes), and administrative management (2 sub-themes). The result presented in Table 1 and Table 2 provides a comprehensive overview of the trend of performance measurement in PH management. Table 1 shows the findings of performance measurement studies in PH based on the literature review while Table 2 describes the indicators found from the literature review in detail.

Table 1: Literature review summary of performance measurement studies in PH.

Source: Authors (years) - country		Yan et al. (2021) - China	Yuan et al. (2019) - China	Khair et al. (2015) - Malaysia	Postnikova et al. (2021) - Malaysia	Walker & Murie (2007) -UK	Smith & Walker (1994) -UK	Huang & Du (2015) -China	Nath & Sharma (2014) - NZ	Pawson et al. (2015)- AUS	Ibem & Aduwo (2013)- Nigeria	Ukoha & Beamish (1997) - Nigeria	Ilesanmi (2010) - Nigeria	Varady & Carrozza (2000) -US	Greenlee et al. (2018) -US
Main Aim		CE	FD	CE	FD	CE	PI	FD, CE	PI	FD	CE	FD, CE	CE	CE	CE
Methodology		QT	QT	QT	QT	QT	QL	QT	QL	MM	QT	QT	QT	QT	MM
Tenancy management	UA	√					√	√							
	TS		√						√	√					
	LT					√	√								√
	RR										√	√			
Maintenance management	SS	√													√
	ER			√		√									
	PM					√	√							√	√
	QP						√			√	√	√	√	√	
Building management	BD	√		√	√			√			√	√			
	PC	√		√	√						√	√			
Social management	NQ	√						√			√			√	
	SP			√						√	√	√			
	TP						√							√	
	TT									√					
Financial Management	RM			√		√	√			√		√			√
	OM					√	√		√						√
	AM								√						√
Administrative Management	CP			√					√	√		√		√	
	IM		√											√	

CP - Comparison and Evaluation
FD - Framework Development
PI - Problem Identification
QL - Qualitative
QT - Quantitative
MM - Mixed Method

UA - Unit Allocation
TS - Tenant Selection
LT - Lettings
RR - Rules & regulation
SS - Services Satisfaction
ER - Emergency repairs
PM - Planned Maintenance

QP - Quality performance
BD - Building design
PC - Physical condition
NQ - Neighbourhood Quality
SP - Safety performance
TP - Tenant participation

TT - Tenants support
RM - Rental management
OM - Operating management
AM - Asset Management
CP - Complaints
IM - Information management

Source: Author (2022)

Table 2: Detail descriptions of main themes and sub-themes.

Main theme	Description	Sub-theme	Indicators
Tenancy Management	Tenancy management activities cover tenants' selection, eligibility screening, lettings units, and attracting and finding potential tenants.	Unit allocation	Housing availability, Location suitability, Waiting time
		Tenant selection	Household income
		Lettings	Average re-let time, Number of vacant unit, Percentage of dwellings let, Vacancy rate changes, Percentage of unit turnarounds
		Rules and regulations	Satisfaction towards enforcement of rules and regulations
Maintenance Management	Maintenance management activities cover repairs, cleaning services, planned maintenance, corrective maintenance, and responsive maintenance to ensure the building operates and maintains in optimum condition.	service satisfaction	Satisfaction toward maintenance service delivery
		Emergency repairs	Post-occupancy evaluation survey, Number of emergency repairs, Average response time to emergency repairs
		Planned maintenance	Percentage of routine repairs completed within the target timeframe, Proportion of outstanding maintenance work, Timeline improvement in the repairing work
		Quality performance	Satisfaction towards maintenance service quality
Building Management	Building management focuses on building design and physical condition to ensure the building functions in good condition.	Building design	Comfort of tenant (thermal, visual, ventilation, acoustic) Dwelling size (unit, parking, corridor), Locations (access to public amenities and transport), Surrounding site (landscaping, green areas, pollution, land use, natural disaster)
		Physical condition	Quality of the actual living condition (walls, floors, windows, doors, painting, density, privacy, internal and external utility services, structural attributes, fire and plumbing systems)
Social Management	Social management covers the stimulation of tenant participation, neighborhood safety, and social services for residents to fulfil their welfare and non-housing needs.	Neighborhood quality	Tenant Satisfaction towards: Neighborhood safety and security, Percentage of green Quietness, Sanitation
		Safety performance	Tenant Satisfaction towards: Property and life security in the PH area
		Tenant participation	Tenant satisfaction towards the chance of tenant participation in the PH management and decision-making process
		Tenant support	Employment or training Aiding tenants with arrears Supporting tenants in maintaining tenancies
Financial Management	Financial management involved managing financial accounts, budgets, rental collection, and monitoring the	Rental management	Percentage of rental collection, Percentage of rent arrears, Percentage of rent reviews
		Operating management	Operating reserves, Average weekly management cost per dwelling, Total administrative cost to total revenue

	outgoings and the cost of operation.	Asset management	Current asset to current liabilities, Quick asset ratio, Percentage of unexpended fund within the specific period
Administrative Management	Administrative management covers administration services such as helpdesk, customer service functions, and database management.	Complaints	Customer complaint response time, Cases of complaints investigate
		Information management	Availability of the dynamic information management on: Multi-level housing security, management office System that archives for families with housing difficulties, Social credit investigation mechanism that focuses on credibility declaration

Source: Author (2022)

PUBLIC HOUSING UNDER DBKL MANAGEMENT

PH schemes in DBKL have been categorised into Public Housing (Perumahan Awam or PA) and DBKL's People's Housing Programme (Program Perumahan Rakyat or PPR). To be specific, there are two types of PPR housing programs, namely "PPR Disewa" (PPR Homes for rent) and "PPR Dimiliki" (PPR homes for ownership). The PH in DBKL is geographically distributed into 4 zones, as illustrated in Figure 1. A total of 63 PH projects have been developed by DBKL which comprised both PA and PPR projects. Based on Figure 1, zone 1 and zone 4 have the highest number of PH projects with a total number of 18 PH projects each, while zone 2 and zone 3 have 16 and 11 PH projects respectively.

The detailed information on the PH under DBKL management is presented in Table 3. On top of that, a total of 60957 housing units are developed and divided into two main categories, for rent and for sale. The proportions of the for rent units comprised 61% (37410 units) while for sale units comprised 39% (23547 units). In detail, for rent units in zone 1, 2, and 3 covers 62% (10200 units), 73% (13497 units), and 56% (7561 units) while for sale units covers 38% (6187 units), 27% (4898 units), and 44% (5822 units). However, in zone 4, the proportion of for sales housing units is larger as compared to for rent units, with 52% (6640 units) against 48% (6152 units).

Besides, based on the occupancy rate, the occupied unit stands at a higher percentage (97%) as compared to the vacant unit (3%). In detail, the occupied unit in zone 1 to 4 comprised 98%, 97%, 96%, and 98% as compared to the vacant unit where only 2%, 3%, 4%, and 2% are available for the applicants in PH. Meanwhile, among the total number of tenants in PH, 15% of tenants are found to be categorised under the disability and senior citizen categories. In detail, a total of 1294 tenants (1%) have been found under the disability category in Zone 1 to 4 and 19763 tenants (14%) are found under the senior citizen category.

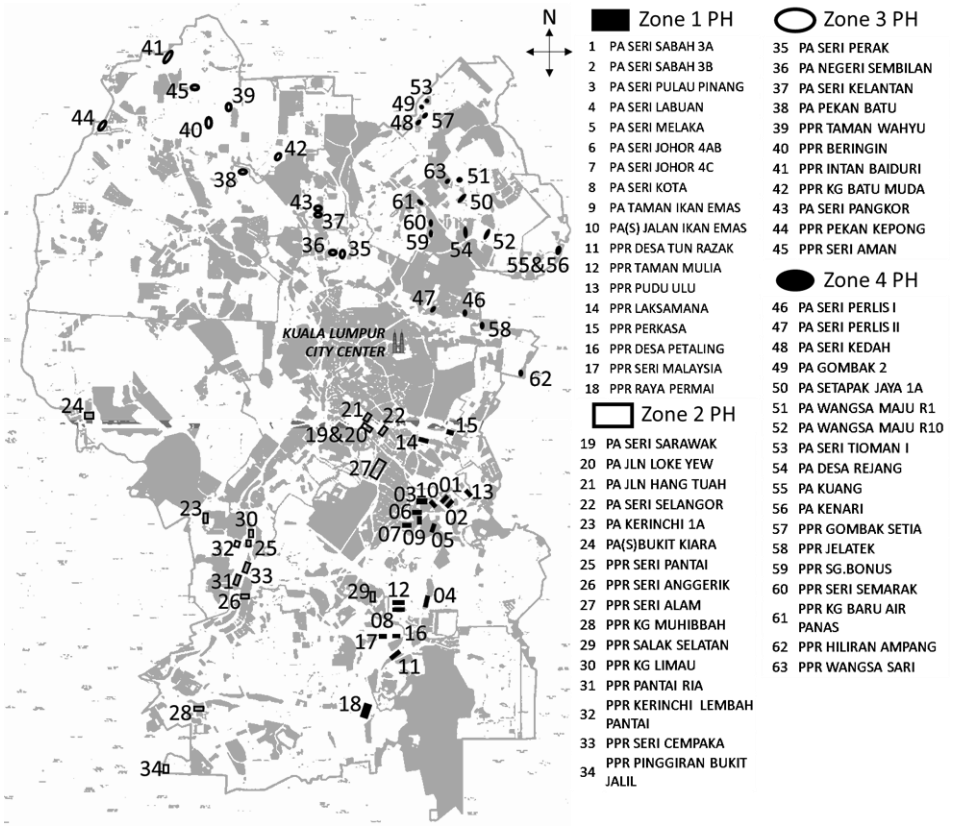


Figure 1: Geographical distribution of the PH under DBKL management.
Adapted source: City Planning System (CPS) by DBKL, (*2022*)

Table 3: Summary of PH under DBKL management.

	Zone 1	Zone 2	Zone 3	Zone 4	Sum Total
Number of PH					
PPR	8	10	7	7	32
(PPR/Total)	*(44%)*	*(63%)*	*(64%)*	*(39%)*	*(51%)*
PA	10	6	4	11	31
(PA/Total)	*(56%)*	*(38%)*	*(36%)*	*(61%)*	*(49%)*
Total	18	16	11	18	63
(Total/Sum Total)	*(29%)*	*(25%)*	*(17%)*	*(29%)*	
Number of units					
For Sale	6187	4898	5822	6640	23547
(Sale/Total)	*(38%)*	*(27%)*	*(44%)*	*(52%)*	*(39%)*
For Rent	10200	13497	7561	6152	37410
(Rent/Total)	*(62%)*	*(73%)*	*(56%)*	*(48%)*	*(61%)*
Occupied unit	10044	13062	7238	6059	36403
(Occupied/Rent)	*(98%)*	*(97%)*	*(96%)*	*(98%)*	*(97%)*
Vacant unit	156	435	323	93	1007
(Vacant/Rent)	*(2%)*	*(3%)*	*(4%)*	*(2%)*	*(3%)*
Total (Sale + Rent)	16387	18395	13383	12792	60957

(Total/Sum Total)	*(27%)*	*(30%)*	*(22%)*	*(21%)*	
Number of tenants					
Disability	337	464	191	302	1294
(Disability/Total)	*(1%)*	*(2%)*	*(1%)*	*(2%)*	*(1%)*
Senior Citizen	6773	6328	3,535	3,127	19763
(Senior Citizen/Total)	*(11%)*	*(25%)*	*(7%)*	*(26%)*	*(14%)*
Others	52073	18961	43562	8704	123300
(Others/Total)	*(88%)*	*(74%)*	*(92%)*	*(72%)*	*(85%)*
Total	59183	25753	47288	12133	144357
(Total/Sum Total)	*(41%)*	*(18%)*	*(33%)*	*(8%)*	

Source: Sales department in PH under DBKL as of December 2021.

MANAGEMENT OPERATION AND PERFORMANCE MEASUREMENT PRACTICES IN PUBLIC HOUSING MALAYSIA

The outcome of the interview answers the second research question by providing insights of the current management operation and performance measurement practices in PH Malaysia. As mentioned, the PH programs under DBKL comprise of for sales and for rent schemes. These housing programs are open for eligible low-income buyers and renters to apply through the Computerized Open Registration System (SPT).

At the ministerial level, the Housing Management and Community Department (HMCCD) are responsible for managing the operation and management of PH under DBKL. The visions of HMCCD are (1) to provide efficient and effective services for the prosperity of the city and (2) to ensure a prosperous community in the urban. Meanwhile, the missions of HMCCD comprised of (1) creating a better urban community by delivering quality and excellent public services and (2) creating excellent and quality service delivery through integrated planning and implementation between the organization and the citizens of the city.

To achieve the visions and missions of the HMCCD, two different types of management are assigned in PH, particularly PPR under full management by DBKL and the mixture of management by both DBKL and Joint Management Body (JMB). Figure 2 shows the organisational structure of the PH property management divisions under full management by DBKL under the governance of HMCCD. For the mixed management by both DBKL and JMB, the JMB is formed to manage the cleanliness within the PH only. Based on Figure 2, the management operation is divided into different units following the property management activities.

On the other hand, the current performance measurement practices in PH have been discussed during the interview session with zone managers. The outcome of the interview shows that the current performance measurement practices among PH are available but minimal. Particularly, only one indicator is

being measured each in both tenancy and administrative management. In detail, the indicators are "tenancy allocation must carry out within fourteen working days after the repairs are completed" for tenancy management and "The feedback towards the complaints must be responded no later than three days from the date of complaint receipt and follow up until the complaints are resolved" for administrative management. With only two indicators available in the current performance measurement practice, it is not sufficient to provide an overview of the performance of property management in PH. This is further supported by the zone manager during the interview, where he highlighted the need to have a comprehensive performance measurement practice that covers a broader range of indicators based on property management activities as performance measurement practices are important to provide greater interest to the general public.

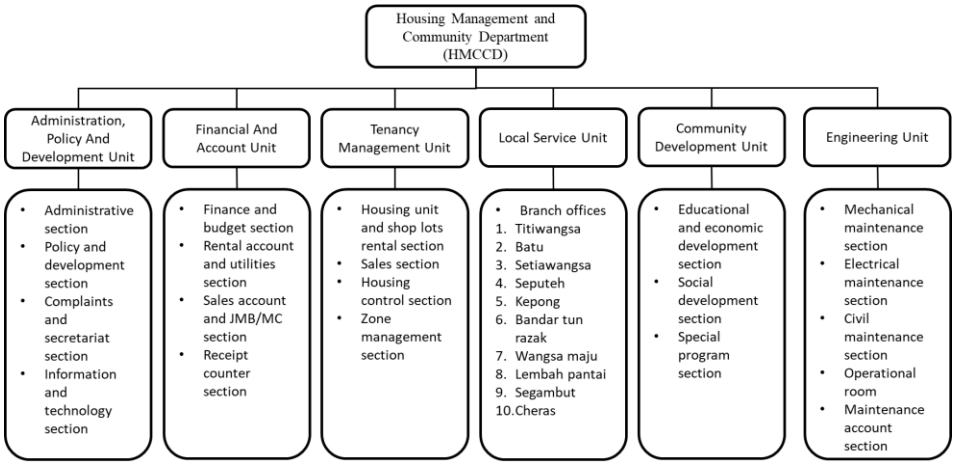


Figure 2: Organisation structure in HMCCD.
Source: HMCCD, DBKL, 2022

DISCUSSION AND CONCLUSION

The trend of the performance measurement studies in PH shows the importance and the applicability of the performance measurement framework for comparison and evaluation, and the outcome of PH performance could bring important insights for future improvement regarding housing allocation schemes and the building environment. Generally, most of the studies focus on measuring tenant satisfaction with different property management activities. However, tenant satisfaction shouldn't be the central focus of performance measurement practice as tenants may have little experience or knowledge in some property management services or may not have experienced the management activities provided for a considerable time (Clapham, 1992; Wei & Wang, 2021). Besides, several studies also concluded that satisfaction could not truly measure the quality of services

(Ma & Yang, 2019). In future studies, other performance measurement practices such as benchmarking with indicators, critical success factors, and service quality assessment (SERVQUAL) are suggested.

Based on the summary of the PH under DBKL management, future studies are suggested to focus on the rental scheme as this scheme comprised a higher percentage (61%) as compared to the sales scheme (39%). The targeted tenants for the rental scheme are also the more vulnerable ones in terms of housing affordability. Besides, future studies are suggested to focus on improving the facilities and fulfilling the needs of the senior citizen and disability groups as they formed a total of 15% among all tenants in the PH under DBKL management.

On top of that, based on the outcome of the interview with the zone managers, further work is required in developing a well-structured performance measurement framework that focuses not only on tenancy and administrative management but also on other property management activities. Based on the LR presented in this paper, the property management activities that involved six main themes and subsequent nineteen sub-themes are suggested as the guidelines on the indicators required for the performance measurement framework development. Further, the structure of the performance measurement indicators is suggested to translate into a system with input, throughput, output, and outcome to rationalise the complexity of what needs to be measured. A comprehensive performance measurement framework could improve the efficiency and effectiveness of the operation in PH without overburdening the government so that the public resources could be more efficiently utilised. The property measurement framework is also essential to better reflect on the performance in PH Malaysia and aids in performance monitoring for future strategy development and improvement.

ACKNOWLEDGEMENTS

The authors appreciatively acknowledge the grant provided by the Ministry of Higher Education Malaysia via the Fundamental Research Grant Scheme (FRGS/1/2020/SS0/UM/02/12) (FRGS 2020-1). and also appreciation to Prof. Dr. Wan Nor Azriyati Wan Abd Aziz, Dr. Nikmatul Adha Nordin, and Dr. Norngainy Mohd Tawil for their guidance and valuable input.

REFERENCES

Azmi, N., & Bujang, A. A. (2021). The Gap Between Housing Affordability And Affordable House: A Challenge For Policy Makers. *Planning Malaysia*, *19*(17). https://doi.org/10.21837/pm.v19i17.1016

Blokland, T. (2008). "You Got to Remember you Live in Public Housing": Place-Making in an American Housing Project. *Housing, Theory and Society*, *25*(1), 31–46. https://doi.org/10.1080/14036090601151095

Bo, G. A. O. (2012). Improving the mechanism of indemnificatory housing distribution and exit. *Modern Urban Research*.

Byun, G., & Ha, M. (2016). The Factors Influencing Residential Satisfaction by Public Rental Housing Type. *Journal of Asian Architecture and Building Engineering*, *15*(3), 535–542. https://doi.org/10.3130/jaabe.15.535

Cagamas. (2013). *HOUSING THE NATION: Policies, Issues and Prospects*.

City Planning System (CPS) by DBKL. (n.d.). Retrieved June 29, 2022, from https://cps.dbkl.gov.my/public/

Clapham, D. (1992). *The Effectiveness of Housing Munagement*. *26*.

Flynn, N. (2007). *Public sector management*. SAGE Publications Limited.

Hashim, A. E., Samikon, S. A., Ismail, F., & Ismail, Z. (2015). Managing Facilities on Malaysian Low-cost Public Residential for Sustainable Adaptation. *Procedia - Social and Behavioral Sciences*, *168*, 52–60. https://doi.org/10.1016/j.sbspro.2014.10.209

Huang, Z., & Du, X. (2015). Assessment and determinants of residential satisfaction with public housing in Hangzhou, China. *Habitat International*, *47*, 218–230. https://doi.org/10.1016/j.habitatint.2015.01.025

Ibem, E. O., & Aduwo, E. B. (2013). Assessment of residential satisfaction in public housing in Ogun State, Nigeria. *Habitat International*, *40*, 163–175. https://doi.org/10.1016/j.habitatint.2013.04.001

Jabatan Perumahan Negara. (2017). Kajian Kesejahteraan Komuniti Program Perumahan Rakyat (PPR). In *Jabatan Perumahan Negara*.

Johnsen, Å. (2005). What does 25 years of experience tell us about the state of performance measurement in public policy and management? *Public Money and Management*, *25*(1), 9–17.

Kim, I. J., Kim, G. Y., & Yoon, J. (2004). Estimation of the Tenants' Benefits Residing in Public Rental Housing with Unit Size Constraint in Korea. *Urban Studies*, *41*(8), 1521–1536. https://doi.org/10.1080/0042098042000226984

Kushendar, D. H., Rusli, B., & Muhtar, E. A. (2021). Public housing management: Review of Rusunawa policy in Cimahi city, Indonesia. *Academy of Strategic Management Journal*, *20*(5), 1–11.

Lam, T. Y. M. (2008). Optimisation of performance management for housing services. *Journal of Facilities Management*, *6*(3), 226–240. https://doi.org/10.1108/14725960810890154

Li, J., Wang, C. C., & Sun, J. (2017). Empirical analysis of tenants' intention to exit public rental housing units based on the Theory of Planned Behavior – The case of Wuhan, China. *Habitat International*, *69*, 27–36. https://doi.org/10.1016/j.habitatint.2017.08.006

Luo, D., van der Heijden, H., & Boelhouwer, P. J. (2020). Policy design and implementation of a new public rental housing management scheme in China: A step forward or an uncertain fate? *Sustainability (Switzerland)*, *12*(15). https://doi.org/10.3390/su12156090

Ma, L., & Yang, Y. (2019). How does public participation in government performance evaluation affect citizen satisfaction? Evidence from Chinese prefectural-level cities. *Adm. Trib*, *26*, 86–94.

Modell, S. (2005). Performance Management in the Public Sector: Past Experiences,

Current Practices and Future Challenges. *Australian Accounting Review*, *15*(37), 56–66. https://doi.org/10.1111/j.1835-2561.2005.tb00304.x

Mohit, M. A., Ibrahim, M., & Rashid, Y. R. (2010). Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat International*, *34*(1), 18–27. https://doi.org/10.1016/j.habitatint.2009.04.002

Nasir, Z. A., Mohd Yusof, R., & Mazlan, A. R. (2022). The Impact Of Monetary Policy On Housing Affordability In Malaysia. *Planning Malaysia*, *20*. https://doi.org/10.21837/pm.v20i20.1083

Nath, N., & Sharma, U. (2014). Performance management systems in the public housing sector: Dissemination to diffusion. *Australian Accounting Review*, *24*(1), 2–20. https://doi.org/10.1111/auar.12004

Pawson, H., Milligan, V., Liu, E., Phibbs, P., & Rowley, S. (2015). Assessing management costs and tenant outcomes in social housing: recommended methods and future directions. In *AHURI Final Report No. 257*. Australian Housing and Urban Research Institute Limited. internal-pdf://124.32.40.168/AHURI_Final_Report_No257_Assessing management.pdf

Postnikova, O., Bamgbade, J. A., & Wong, N. H. (2021). Performance index for public housing in East Malaysia. *Architectural Engineering and Design Management*, 1–19. https://doi.org/10.1080/17452007.2021.1956418

Priemus, H., Dieleman, F., & Clapham, D. (1999). Current developments in social housing management. *Journal of Housing and the Built Environment*, *14*(3), 211–223. https://doi.org/10.1007/bf02496678

Puspitarini, I., & Akhmadi, M. H. (2019). Measuring public asset performance using output-based approach: Evidence from Indonesia. *Planning Malaysia*, *17*(1), 292–304. https://doi.org/10.21837/pmjournal.v17.i9.606

Salleh, N. A., Yusof, N., Salleh, A. G., & Johari, N. (2011). Tenant Satisfaction in Public Housing and its Relationship with Rent Arrears: Majlis Bandaraya Ipoh, Perak, Malaysia. *International Journal of Trade, Economics and Finance*, *2*(1), 10–18. https://doi.org/10.7763/IJTEF.2011.V2.72

Smith, R., & Walker, R. (1994). The role of performance indicators in housing management: a critique. *Environment & Planning A*, *26*(4), 609–621. https://doi.org/10.1068/a260609

Sulaiman, F. C., Hasan, R., & Jamaluddin, E. R. (2016). Users Perception of Public Low Income Housing Management in Kuala Lumpur. *Procedia - Social and Behavioral Sciences*, *234*, 326–335. https://doi.org/10.1016/j.sbspro.2016.10.249

Tu, K. (2017). *Designing for Sustainable Public Housing from Property Management and Financial Feasibility Perspectives*. *106*(2), 163–171.

Walker, R. M. (2001). How to Abolish Public Housing: Implications and Lessons from Public Management Reform. *Housing Studies*, *16*(5), 675–696. https://doi.org/10.1080/02673030120080116

Wei, C. R., & Wang, Y. (2021). Research on the evaluation and influence mechanism of public housing service quality: A case study of Shanghai. *Sustainability (Switzerland)*, *13*(2), 1–22. https://doi.org/10.3390/su13020672

White, A. D., Abdullah, S., Abdul Razak, A., & Hamid Kadir Pakir, A. (2011). The characteristics of real estate assets management practice in the Malaysian Federal Government. *Journal of Corporate Real Estate*, *13*(1), 16–35.

https://doi.org/10.1108/14630011111120323

White, P. (2013). Ideologies, social exclusion and spatial segregation in Paris. In *Urban segregation and the welfare state* (pp. 162–181). Routledge.

Xu, Y., & Luo, D. (2021). Is China's public housing programme destined to fail? Evidence from the city of Changsha. *Population, Space and Place*, *27*(1), 1–13. https://doi.org/10.1002/psp.2375

Yan, J., Haffner, M., & Elsinga, M. (2021). Effective Public Rental Housing governance: tenants' perspective from the pilot city Chongqing, China. *Journal of Housing and the Built Environment*, 1001–1027. https://doi.org/10.1007/s10901-021-09872-7

Yuan, J., Li, W., Xia, B., Chen, Y., & Skibniewski, M. J. (2019). Operation Performance Measurement Of Public Rental Housing Delivery By Ppps With Fuzzy-Ahp Comprehensive Evaluation. *International Journal of Strategic Property Management*, *23*(5), 328–353. https://doi.org/10.3846/ijspm.2019.9820

Zailan, M. I. (2001). The management of public property in Malaysia. *International Conference FIG Working Week*, *2001*, 6–11.

Zeng, H., Yu, X., & Wen, H. (2017). What factors drive public rental housing fraud? Evidence from Hangzhou, China. *Habitat International*, *66*, 57–64. https://doi.org/10.1016/j.habitatint.2017.05.007

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 302 – 315

IMPLEMENTATION OF HERITAGE BUILDING INFORMATION MODELLING (HBIM) FOR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Hafez Salleh[1], Yap Jia Jee[2], Zulkiflee Abdul-Samad[3], Mahanim Hanid[4] & Nor Azlinda Mohamed Sabli[5]

[1,2,3,4,5] *Faculty of Built Environment*
UNIVERSITI MALAYA
[5]*Faculty of Architecture, Planning and Surveying*
UNIVERISTY OF TECHNOLOGY MARA

Abstract

Historic Building Information Modelling (HBIM) is a process applied to existing buildings which enable the creation of a model that can simulate the actual construction of the existing building by starting up with a digital survey using laser scanner or camera for photogrammetry. The implementation of HBIM in Malaysia construction industry is relatively low. However, the studies in Malaysia regarding HBIM implementation rarely focus on the technical information in implementing HBIM. Therefore, this research is aimed to develop a guideline of implementing HBIM in Malaysia heritage building by identifying the methods of data capturing and modelling. The research method adopted was quantitative approach via questionnaire survey. The research found that terrestrial laser scanner, photogrammetry and combination of image-based and range-based method are the data capturing's method while the processing of survey data will be data cleaning, data registration, surface meshing, texturing, and creation of orthographic image. The contribution of this research is that it can serve as a reference for the heritage architect in managing the heritage building by adopting HBIM.

Keywords: Heritage Building Information Modelling (HBIM), Building Information Modelling (BIM), 3D Laser Scanning, Photogrammetry, Point Cloud

[3] Associate Professor at Universiti Malaya. Email address: zulkiflee1969@um.edu.my

INTRODUCTION

According to Mphil (2012), the traditional approach employed to do the survey and record of historical building structure are categorised into various different systems which are firstly, manual measurement system which may be employed by using tapes and levels while a more upgraded manual measurement system will be implemented by using optical equipment such as theodolite and level. The next method will be the image-based systems which the rectified photography or photogrammetry will be applied. However, nowadays, the traditional methods have been substituted unconsciously by the digital technologies which may provide convenient in automating the capturing and processing of measurement data such as through the use of laser scanner (Abdul Shukor et.al, 2015). With that, 3D point cloud which is a set of data points in space will then be obtained (Newsroom, 2019). Aside from these, techniques applied for generating parametric model from point clouds has also been introduced (Mphil, 2012). In short, according to Mphil (2012), Historic Building Information Modelling (HBIM) is a new device that integrates these novel developments. HBIM is a tool that enable the collection of data with the use of survey technologies such as laser scanner point clouds, 3D models, digital ortho-photo and monitoring data in order to acquire a 3D model in the form of a geo-referenced spatial information structure (Georgopoulos et.al. 2013). According to Ali et al. (2017), there are only 183 buildings that have been gazetted as national heritage by the authority in Malaysia. According to Ali et al. (2017); (Khodeir et.al. 2016; Volk et.al.2014), the common issues that the construction industries are dealing in conserving the heritage buildings are loss of information, limited documentation, lack of technology adaption and reports reliability. Therefore, HBIM should be implemented in the industry as the HBIM model enable the information of any historical building to be stored as well as allow the sharing of information among stakeholders (Khodeir et al., 2016; Volk et al., 2014). It is known that the practice of HBIM is rare in Malaysia (Ali et al., 2018). Therefore, this research is conducted to provide a guideline of implementing HBIM for Malaysia heritage building.

METHODOLOGY

This research focused on the technical information of implementing HBIM such as the methods of data capturing, processing of data captured and methods of modelling the historical structure. The target of respondents will be the architects from Kuala Lumpur and Selangor. Architect will be chosen as the respondents because they are more likely to have come across with HBIM especially in terms of modelling. The questionnaire sends through email. The primary data collection is carried out to identify the underlying information that were unexplained due to limitation in literature. A list of questions designed for the

questionnaire accordingly and make sure the questions prepared can reach the research objective. To get a satisfied respond rate from the respondents, close-ended questions were prepared instead of open-ended questions. The respondents were the architects from Kuala Lumpur and Selangor. 320 sets of questionnaires have been distributed to the target respondents though email. However, there are only 61 sets of answered questionnaires being received back from the respondents. The data collected analysed by using Statistical Package for Social Science (SPSS) software.

DATA ANALYSIS AND RESULT

Methods of Data Capturing

The respondents are required to rate the level of basic abilities for each of the methods of data capturing divided to three categories, laser scanning techniques, photogrammetry, and combination of image-based and range-based method. Five-point Likert scale, from "very low" to "very high" will be the rating scale and the result of the analysis has been displayed on Table 2, Table 3 and Table 4, each for different method. Table 1 shows the description for each ability. Table 2 shows the result for laser scanning technique. "LST1" got the first ranking with the highest mean value of 4.2459, followed by "LST6" with the mean value of 4.2131. "LST5" has rank the third place with the mean value of 4.1967. Both "LST3" and "LST4" are having the same ranking with the same mean value of 4.1639. Lastly, it goes to "LST2" with mean of 4.1148. The lower the value of standard deviation, the less degree of varying responses happened among the respondents. In this case, "LST1" has the lowest standard deviation with the value of 0.74511 whereas the highest standard deviation is 0.79959 which goes to "LST4". Table 3 shows the result for the level of basic abilities for photogrammetry. In this case, "P5" got the first ranking with the highest mean value of 4.1967, followed by "P1" which got the mean of 4.1148. The third ranking is going to be "P6" with the mean value of 4.0984. This is then followed by "P4" with the mean value of 3.9836 and then "P2" that got the mean of 3.9180. Lastly, it comes to "P3", having the lowest mean value of 3.8689. The lowest standard deviation is "P1" and the highest is "P2" which means "P1" is having the least varying degree of responses. Table 4 shows the result for the level of basic abilities of the combination method. "C5" has the highest mean value of 4.2131, followed by "C6" with the mean value of 4.1803. "C3" has the third highest mean with the value of 4.1311 and the next will be "C1", having the mean of 4.0984. The second lowest is "C2" with the mean value of 4.0492, followed by "C4" with the lowest mean value of 3.9344. The lowest standard deviation in this case is "C3" while the highest standard deviation is "C4" which means "C4" is having the largest degree of varying responses among the respondents. In terms of median taken from three of the data capturing methods, they are all having the

same median which is 4.00. It means the level of basic abilities required to be implemented on heritage building from three of the approaches are high.

Table 1: Description of the basic abilities required by each data capturing methods

Variable	Description
Laser Scanning Techniques	
LST1	Ability to capture data in a short duration of time.
LST2	Importability of the data captured into BIM platform.
LST3	Spatial accuracy of the data captured.
LST4	Degree of automation.
LST5	Applicability in existing building.
LST6	The ability of data captured (point cloud) in providing 3D geometry information.
Photogrammetry	
P1	Ability to capture data in a short duration of time.
P2	Importability of the data captured into BIM platform.
P3	Spatial accuracy of the data captured.
P4	Degree of automation.
P5	Applicability in existing building.
P6	The ability of image data captured in providing texture.
Combination of Image-based and Range-based Method	
C1	Ability to capture data in a short duration of time
C2	Importability of the data captured into BIM platform.
C3	Spatial accuracy of the data captured.
C4	Degree of automation.
C5	Applicability in existing building.
C6	Ability to complete the data missing from each other

Source: Author (2022)

Table 2: Level of Basic Abilities for Laser Scanning Technique

Basic Abilities for Laser Scanning Technique	**Level of Basic Abilities**					**Mean**	**Medi -an**	**Standard deviation**	**Rank**
	Very low	Low	Med-um	High	Very high				
LST1	0	0	11	24	26 a	4.2459 b	4.0000	0.74511	1
LST2	0	1	13	25 a	22	4.1148 c	4.0000	0.79788	6
LST3	0	1	11	26 a	23	4.1639	4.0000	0.77847	4
LST4	0	1	12	24 a	24 a	4.1639	4.0000	0.79959	4
LST5	0	1	11	24	25 a	4.1967	4.0000	0.79204	3
LST6	0	1	11	23	26 a	4.2131	4.0000	0.79822	2

Source: Author (2022)

Note:
a. Likert item with highest frequency
b. Variable with the highest mean value
c. Variable with the lowest mean value

Table 3: Level of Basic Abilities for Photogrammetry

Basic Abilities for Photo-grammetry	**Level of Basic Abilities**					**Mean**	**Medi-an**	**Standard deviation**	**Rank**
	Very low	Low	Medi-um	High	Very high				
P1	0	0	14	26 a	21	4.1148	4.0000	0.75495	2
P2	1	4	13	24 a	19	3.9180	4.0000	0.97117	5
P3	0	6	13	25 a	17	3.8689 c	4.0000	0.93942	6
P4	0	4	13	24 a	20	3.9836	4.0000	0.90354	4
P5	0	2	10	23	26 a	4.1967 b	4.0000	0.83306	1
P6	0	3	12	22	24 a	4.0984	4.0000	0.88891	3

Source: Author (2022)

Note:
a. Likert item with highest frequency
b. Variable with the highest mean value
c. Variable with the lowest mean value

Table 4: Level of Basic Abilities for Combination of Image-based and Range-based Method

Basic Abilities for Combination of Image-based and Range-based Method	**Level of Basic Abilities**					**Mean**	**Median**	**Standard deviation**	**Rank**
	Very low	Low	Medi-um	High	Very high				
C1	0	0	15	25 a	21	4.0984	4.0000	0.76822	4
C2	0	4	11	24 a	22	4.0492	4.0000	0.90233	5
C3	0	0	14	25 a	22	4.1311	4.0000	0.76323	3
C4	2	3	12	24 a	20	3.9344 c	4.0000	1.01438	6
C5	0	0	13	22	26 a	4.2131 b	4.0000	0.77706	1
C6	0	0	13	24 a	24 a	4.1803	4.0000	0.76394	2

Source: Author (2022)

Note:
a. Likert item with highest frequency
b. Variable with the highest mean value
c. Variable with the lowest mean value

Processing of Laser and Image Survey Data

The respondents are required to rate the level of necessity to carry out the particular actions so that to know whether to be included into the data processing. Likert scale from 1 to 5 which indicates "very unnecessary" to "very necessary" will be used and the result for this section has been tabulated in Table 6. The descriptions of the actions to be taken for data processing have shown in Table 5. By looking at the mean value, it can be known that "DR1" will be at the first placing with the highest mean value of 4.4426. It is then followed by "DC1" with the mean value of 4.2459. Both "DC2" and "SM1" are having the same placing with the same mean value of 4.0656.

Table 5: Description of actions taken for data processing

Variable	Description
Data Cleaning and Resampling	
DC1	"Noise" such as moving persons, vehicles, tress, etc. have to be removed from the survey data.
DC2	Reduce the density of data for overly dense point clouds.
Data Registration	
DR1	Combine two or more point clouds taken from different scanning positions.
Surface Meshing	
SM1	Connect the series of random points in the point cloud into a consistent polygonal model to create a surface on the point cloud.
SM2	Modify the surface of the point cloud by filling the holes and correcting the edges.
Texturing	
T1	Map the correspondence image data onto the point cloud for more accurate identification of the surface's texture and features.
Orthographic Image	
O1	Create the orthographic image from point cloud so that the image and geometric data can be exported for modelling.

Source: Author (2022)

Table 6: Level of necessity to carry out the respective actions for data processing

Actions to be taken for data processing	Level of Necessity					Mean	Median	Standard deviation	Rank
	VU	U	N	Nc	VN				
DC1	0	1	11	21	28 a	4.2459	4.0000	0.80944	2
DC2	0	2	13	25 a	21	4.0656	4.0000	0.83404	3
DR1	0	0	6	22	33 a	4.4426 b	5.0000	0.67143	1
SM1	1	1	13	24 a	22	4.0656	4.0000	0.89198	3
SM2	1	1	13	27 a	19	4.0164	4.0000	0.86587	6
T1	0	3	12	25 a	21	4.0492	4.0000	0.86460	5
O1	1	7	9	25 a	19	3.8852 c	4.0000	1.03438	7

Source: Author (2022)

Note:
VU – Very Unnecessary; U – Unnecessary; N – Neutral; Nc – Necessary; VN – Very Necessary
a. Likert item with highest frequency

b. Variable with the highest mean value
c. Variable with the lowest mean value

Next will be "T1" and "SM2" with the mean value of 4.0492 and 4.0164 respectively. The lowest mean value of 3.8852 will go to "O1". For the ranking of standard deviation, "DR1" is having the lowest standard deviation value of 0.67143, followed by the second lowest which is "DC1" with the value of 0.80944. Next will be "DC2" and "T1" with the value of 0.80944 and 0.86460 respectively. It is then followed by "SM2", having the value of 0.86587 and "SM1", with the second highest value of 0.89198. Therefore, the highest value of 1.03438 will go to "O1" which indicates that this variable is having the most varying degree of responses among the respondents while "DR1" is having the least. In terms of median, aside of "DR1" which has the value of 5.00, the value for other variables are under 4.00. This means that "DR1" is the action that is very necessary to be conducted for data processing.

Methods of Modelling

The respondents are required to rate the level of acceptability towards the limitation of each modelling methods in order to determine the method that can be included into the guideline. Likert scale from 1 to 5 which indicates "very unacceptable" to "very acceptable" has been used and the result has been tabulated in Table 8. The description of the limitations for each methods of modelling have been shown in Table 7.

Table 7: Description of Limitation for each methods of modelling

Variable	Description
Mapping of Vectors into Point Cloud	
Vectors1	Creation of orthographic image and segmented point cloud is required to enable the mapping of vectors.
Vectors2	It is largely manual and comparatively time consuming than parametric modelling.
Vectors3	Vectors do not reveal as much details behind the object's surface as parametric objects.
Parametric Modelling Manually	
PMM1	Creation of orthographic image & segmented point cloud is required to enable the mapping of parametric objects.
PMM2	There is a high possibility to create a plug-in library of parametric objects that can incorporate with the irregular shapes of the historical structure.
PMM3	It is time consuming as number of steps required to manually map the parametric objects onto the point cloud are high.
Parametric Modelling Semi-automatically	
PMS1	It is only feasible to automatic modelling of point clouds that represent plane surfaces or primitive geometries.
PMS2	It will generate inaccurate results when trying to represent irregular geometries.
PMS3	The reading and interpretation of the qualitative data of a space or object such as the types of materials used, is difficult to be conducted.

Source: Author (2022)

Table 8: Level of acceptability towards the limitation for each modelling methods

Limitations for each methods of modelling	**Level of Acceptability**					**Mean**	**Median**	**Standard deviation**	**Rank**
	VU	U	N	A	VA				
Vectors1	0	6	17	23 a	15	3.7705	4.0000	0.93797	3
Vectors2	11	20 a	18	12	0	2.5082	2.0000	1.01033	6
Vectors3	11	23 a	16	11	0	2.4426	2.0000	0.99204	7
PMM1	0	3	13	24 a	21	4.0328	4.0000	0.87497	2
PMM2	0	3	12	25 a	21	4.0492b	4.0000	0.86460	1
PMM3	1	7	13	25 a	15	3.7541	4.0000	1.01087	4
PMS1	4	13	17 a	17 a	10	3.2623	3.0000	1.16764	5
PMS2	25 a	24	12	0	0	1.7869c	2.0000	0.75531	9
PMS3	13	22 a	18	8	0	2.3443	2.0000	0.96411	8

Source: Author (2022)

Note:
VU – Very Unacceptable; U – Unacceptable; N – Neutral; A – acceptable; VA – Very Acceptable
a. Likert item with highest frequency
b. Variable with the highest mean value
c. Variable with the lowest mean value

Based on Table 8, it shows that “PMM2” has the highest mean value of 4.0492, followed by “PMM1” with mean value of 4.0328. Next will be “Vectors1”, “PMM3” and “PMS1” with mean value of 3.7705, 3.7541 and 3.2623 respectively. “Vectors2” come right after “PMS1” with the value of 2.5082, followed by “Vectors3”, having the mean value of 2.4426. The second lowest of the mean will be “PMS3” with the value of 2.3443. Finally, 1.7869, the lowest value of mean goes to “PMS2”.The ascending order of the standard deviation will start from “PMS2”, with the lowest value of standard deviation which is 0.75531. This is then follow by “PMM2”, “PMM1”, “Vectors1”, “PMS3”, “Vectors3”, “Vectors2” and “PMM3”. The highest standard deviation will go to “PMS1” which is 1.16747 which means it has the highest degree of variation of responses whereas “PMS2” has the slightest variation of responses among the respondents as it has the lowest value of standard deviation. In respect of median, “Vectors2”, “Vectors3”, “PMS2” and “PMS3” are having the value of 2.00, which means most of the respondents found the limitations arise from the above methods unacceptable. On the other hand, only “PMS1” has the median value of 3.00, which indicates that most of the respondents found the limitation either acceptable or unacceptable. Lastly, “Vectors1”, “PMM1”, “PMM2” and “PMM3” have the median of 4.00. It means the respondents found the limitations arise from those methods are acceptable.

DISCUSSION

Methods of Data Capturing

It has been indicated that all the methods rated above mean of 3.00, which means they posed high level of abilities needed to conduct data capturing for heritage building. In terms of laser scanning technique, the ability to capture data in a short duration of time placed the first ranking. Laser scanning technique is a rapid technique in acquiring point clouds that describe the building's information in 3D forms with detail down to millimetre (Megahed, 2015). The second ranking for the abilities of laser scanning technique is the ability to capture data that can provide 3D geometry information. Laser scanner such as terrestrial laser scanner (TLS), aerial laser scanner (ALS) and so on can generate an accurate geometric reproduction of an object in the form of point clouds with geometric coordinates (x, y, z) (Lopez et al., 2018). The third ranking of the ability is the applicability of the method in existing building. As shown in the analysed data, laser scanning technique also provide high spatial accuracy as it can generate 3D point clouds with the accuracies of the measuring angles and distances up to millimetre (Lopez et al., 2018). The data captured is importable to BIM platform to carry out modelling that can contain intelligent data (Murphy et al., 2013). Laser scanning technique also has higher degree of automation as compared to conventional method which required the use of measuring tape (Ali et al., 2018b). In terms of photogrammetry, the first ranking is the applicability of the method to be used in existing building. Megahed (2015), Murphy et al. (2017), Lopez et al. (2018) had included the usage of photogrammetry as one of the surveying methods. The second ranking goes to the ability to capture data in a short duration of time. The ability to capture data that able to provide texture goes for the third ranking.

According to the analysed data, photogrammetry has high spatial accuracy, degree of automation and the data captured is importable into BIM platform. Photogrammetry not only able to provide texture, it also able to provide geometry with high accuracy and have moderate degree of automation with the data being captured able to be imported into BIM platform (Megahed, 2015). In respect of combination of image-based and range-based method, the first ranking of the ability goes to the applicability in existing building. This can be shown the case study of Nasif Historical House in Jeddah, Saudi Arabia (Baik, 2017) and Royal Castle in Bedzin (Klapa et al., 2017), where surveying of data has been conducted by using both laser scanning techniques and photogrammetry. The second highest ranking is the ability to complete the data missing from each other. This means whatever data missing from laser scanning technique can be acquired through photogrammetry or vice versa. As mentioned by Oreni et al. (2014), in the combination method, area will be reconstructed through image-based method when laser survey data unable to provide sufficient level of detail (LoD) or the data acquired is completely lacking. The third highest ranking will be the spatial

accuracy of the data captured. As mentioned above, the combination method can complete the data missing from each other, therefore, the data acquired will have comparatively high accuracy as compared to the single method. The analysed data also shows that this method has high ability to capture data in a short duration of time, importable to BIM platform and has high degree of automation. This is because this combination method consist of both laser scanning technique and photogrammetry technique where those abilities also included in the respective method. According to Megahed (2015), this method enable the 3D model to be quickly generated. Having reviewed back the data analysed for the three methods, it shows that spatial accuracy of data captured and applicability in existing building have always been in the three highest ranking from the respective methods.

Processing of Laser and Image Survey Data

Based on Table 6, the mean for all the variables are above 3.00, which indicates all the actions proposed are necessary to be carried out for data processing. The actions will be categorised into data cleaning and resampling, data registration, surface meshing, texturing, and creation of orthographic image. The actions that obtained the first ranking goes to the combination of two or more point clouds taken from different scanning positions, which is under the category of data registration. There will be point cloud data from several different positions as it is normally impossible to be able to capture the whole building structure only from one scanning position with no blockage existed (Lopez et al., 2018). Therefore, data registration has to be conducted to merge the point clouds from different observation points into a coordinate system (Murphy et al., 2017). The second and third ranking, which are to eliminate "noise" from survey data and reduce density of data, come from the same category of data cleaning and resampling. The survey data will always be clouded with erroneous data due to reflection from the scan through object, hence data cleaning will be carried out to remove the irrelevant points (Mustafa et al., 2019). There is a circumstance where the point cloud is too dense due to altering range to the object's surface when capturing data. The remaining actions which under their respective category of surface meshing, texturing and creation of orthographic image have also been rated as necessary to be carried out with the mean for the creation of orthographic image slightly lower than the rest. One of the actions under surface meshing has also been rated as the third highest, being described as: connect the series of random points in the point cloud into a consistent polygonal model to create a surface on the point cloud. This can be known as polygonal surface meshing with the points being joined in triangular networks (Mphil, 2012). Surface meshing also need to carry out the function of smoothing just like what being mentioned in "SM2", fill the holes, correct the edges and optimise the data. According to

Table 6, the data analysed shows that texturing is also necessary to be carried out and this action normally need to go along with the image data as the texture is arise from the mapping of image data onto the point cloud data. Even the mean for the creation of orthographic image is slightly lower than the others but it is still more than 3.00 (neutral). In a nutshell, all the actions have the mean values higher than 3.00 (neutral), which indicates the data processing might include all the categories.

Methods of Modelling

The overall result shows that the second limitation for parametric modelling semi-automatically (PMS2) has the mean value lower than 2.00 (unacceptable) which means the limitation is more than just unacceptable. Meanwhile, there are three limitations with the mean value lower than 3.00 (neutral) but higher than 2.00 (unacceptable), which are the second and third limitation for vectors mapping method (Vectors2 & Vectors3), and the third limitation of parametric modelling semi-automatically (PMS3). There are also three limitations with the mean value lower than 4.00 (acceptable) but higher than 3.00 (neutral), which are the first limitation for vectors mapping method (Vectors1), third limitation of parametric modelling manually (PMM3) and first limitation of parametric modelling semi-automatically (PMS1). Lastly, the remaining two limitation of parametric modelling manually (PMM1 & PMM2) have the mean value higher than 4.00 (acceptable) respectively. For the first methods of modelling, which is to map the vectors onto point cloud, it consists of limitations such as the necessity to create orthographic image and segmented point cloud so that the vectors can be plotted onto the correct surface (Vectors1), it is largely manual (Vectors2) and it is unable to provide detail behind the object's surface such as the type of material and construction method (Vectors3) Murphy et al., 2013). Except for "Vectors1", the other two limitations have the high possibilities for not being accepted as their mean value is lower than 3.00 (neutral). In terms of parametric modelling manually, which is a method used to map the parametric object, an intelligent object onto point cloud, the limitations are the necessity to generate orthographic image and segmented point cloud so that the parametric objects can be mapped precisely on the surface (PMM1), the necessity to create the library of parametric objects for historical building as the library in current BIM platform is meant for conventional building (PMM2), it is a time consuming method as there are a lot of preparation steps that have to be taken before starting with the modelling (PMM3) (Murphy et al., 2017; Murphy et al., 2013). All three limitations have high possibilities to be accepted as their mean value are above 3.00 (neutral) especially with "PMM1" and "PMM2" which have the mean value more than 4.00 (acceptable). In regards of parametric modelling semi-automatically, which is a method that can automate the creation of BIM

geometries from point clouds but not entirely as it still need to incorporate with manual method in some circumstance, and with this it leads to the first limitation. This method is only suitable for point clouds that represent primitive geometries and plane surfaces (PMS1), this is because this method will provide incorrect data when being used on building with complex geometries (PMS2) and this will be the second limitation as most of the historical buildings are of irregular geometries. The next limitation will be the difficulty of this method to interpret the qualitative data of an object (PMS3) as there is still lacking of any "smart algorithm" that is able to perform this function (Lopez et al., 2018). In this case, "PMS2" is totally unacceptable as its mean value is already lower than 2.00 (unacceptable) while "PMS3" has the high possibilities of not being accepted as the mean value is lower than 3.00 (neutral). "PMS1" might be accepted as the mean value is higher than 3.00 (neutral) but lower than 4.00 (acceptable). In a nutshell, two out of three limitations of the vectors mapping technique might not be accepted, all the limitations for parametric modelling manually might be accepted and lastly two out of three of the limitations of parametric modelling semi-automatically might not be accepted.

Proposed Guideline for HBIM Implementation

After analysing the data, two of the methods for modelling have been eliminated from the HBIM implementation guideline while the rest of the content such as the methods of data capturing, and processing of laser and image survey data still remain in the guideline (Figure 1). This is because the result obtained shows that the methods of mapping vectors onto point cloud and parametric modelling semi-automatically are unlikely acceptable among most of the respondents.

CONCLUSION

This research serve as a "reminder" that HBIM can be practiced within Malaysia heritage building. HBIM can be used to cope with the problem of lack of relevant documentation, details and information of the heritage buildings that are required to carry out the conservation works. This research indicates that HBIM can solve the problem of limited information in a heritage building by performing data capturing and transfer the data into BIM platform which enable the parametric objects, intelligent objects that enable the storing of graphical or non-graphical information, to be formed in regards of the historical building. This research also serves as to raise the awareness of practicing HBIM in Malaysia.

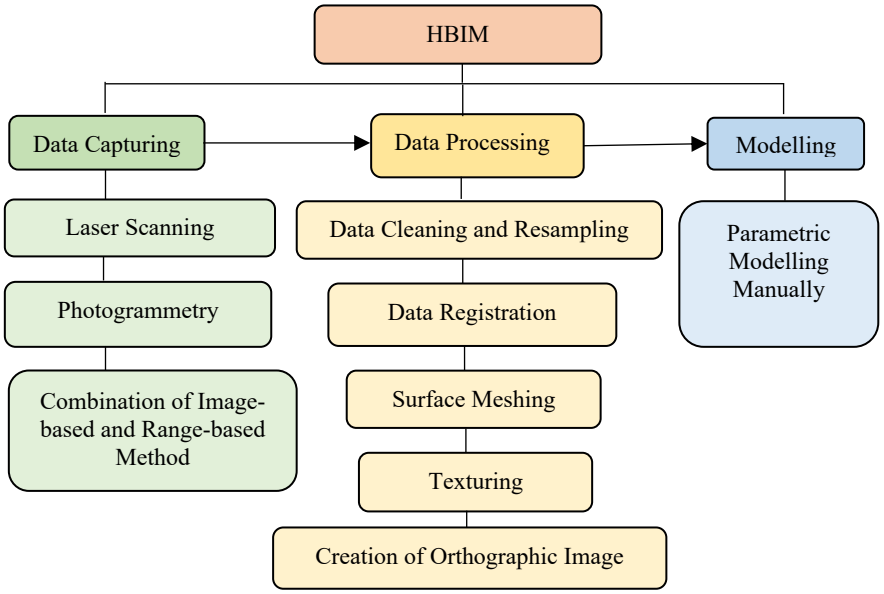


Figure 1: Proposed Guideline of HBIM Implementation

REFERENCES

Abdul Shukor, S., Wong, R., Rushforth, E., Basah, S., & Zakaria, A. (2015). 3D terrestrial laser scanner for managing existing building. *Jurnal Teknologi, 76*. doi:10.11113/jt.v76.5895

Ali, M., Ibrahim, M., Yunus, R., Yahya, M., Ismail, F., Din, A., & Ibrahim, M. (2017). Exploring Methods of Quantity Measurement for Heritage Conservation Works. *Advanced Science Letters, 23*, 6277-6280. doi:10.1166/asl.2017.9251

Ali, M., Ismail, K., Has-Yun Hashim, K., Suhaimi, S., & Mustafa, H. (2018). Historic building information modelling (HBIM) for Malaysian construction industry. *Planning Malaysia Journal, 16*. doi:10.21837/pmjournal.v16.i7.522

Baik, A. (2017). From point cloud to Jeddah Heritage BIM Nasif Historical House – case study. *Digital Applications in Archaeology and Cultural Heritage, 4*, 1-18. doi:https://doi.org/10.1016/j.daach.2017.02.001

Khodeir, L. M., Aly, D., & Tarek, S. (2016). Integrating HBIM (Heritage Building Information Modeling) Tools in the Application of Sustainable Retrofitting of Heritage Buildings in Egypt. *Procedia Environmental Sciences, 34*, 258-270. doi:https://doi.org/10.1016/j.proenv.2016.04.024

Klapa, P., Mitka, B., & Zygmunt, M. (2017). Application of Integrated Photogrammetric and Terrestrial Laser Scanning Data to Cultural Heritage Surveying. *IOP Conference Series: Earth and Environmental Science, 95*, 032007. doi:10.1088/1755-1315/95/3/032007

Lopez, F., Lerones, P., Llamas, J., Gómez-García-Bermejo, J., & Zalama, E. (2018). A Review of Heritage Building Information Modeling (H-BIM). *Multimodal Technologies and Interaction, 2*, 21. doi:10.3390/mti2020021

Megahed, N. (2015). Towards a Theoretical Framework for HBIM Approach in Historic Preservation and Management. *2015, 9*(3), 18. doi:10.26687/archnet-ijar.v9i3.737

Mphil, M. M. (2012). *Historic Building Information Modelling (HBIM) For Recording and Documenting Classical Architecture in Dublin 1700 to 1830.* (Doctor of Philosophy). Trinity College Dublin, Retrieved from https://www.academia.edu/8237173/Historic_Building_Information_Modelling_HBIM_PhD

Murphy, M., Corns, A., Cahill, J., Eliashvili, K., Chenau, A., Pybus, C., Truong-Hong, L. (2017). Developing Historic Building Information Modelling Guidelines and Procedures for Architectural Heritage in Ireland. *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-2/W5*, 539-546. doi:10.5194/isprs-archives-XLII-2-W5-539-2017

Murphy, M., McGovern, E., & Pavia, S. (2013). Historic Building Information Modelling - Adding intelligence to laser and image based surveys of European classical architecture. *ISPRS Journal of Photogrammetry and Remote Sensing, 76*, 102. Retrieved from https://www.academia.edu/21983254/Historic_Building_Information_Modelling_Adding_intelligence_to_laser_and_image_based_surveys_of_European_classical_architecture

Mustafa, M. H., Ali, M., Ismail, K. M., Hashim, K. S. H. Y., & Suhaimi, M. S. M. (2019). BIM Backed Decision Support System in the Management of Heritage Building. *International Journal of Built Environment and Sustainability, 6*(2), 63-71. doi:10.11113/ijbes.v6.n2.357

Newsroom. (2019). What is HBIM? Let's find out about BIM applied to existing building. Retrieved from http://biblus.accasoftware.com/en/what-is-hbim-lets-find-out-about-bim-applied-to-existing-buildings/

Oreni, D., Brumana, R., della torre, S., Banfi, F., Barazzetti, L., & Previtali, M. (2014). Survey turned into HBIM: The restoration and the work involved concerning the Basilica di Collemaggio after the earthquake (L'Aquila). *ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences, II-5*, 267-273. doi:10.5194/isprsannals-II-5-267-2014

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 316 – 327

THROWN INTO THE DEEP END: EXPERIENCES OF REAL ESTATE AND URBAN PLANNING STUDENTS IN NAVIGATING E-LEARNING DURING COVID-19

Hasniyati Hamzah[1], Nikmatul Adha Nordin[2], Yong Adilah Shamsul Harumain[3]

[1,2,3]*Faculty of Built Environment*
UNIVERSITI MALAYA

Abstract

Built environment undergraduates are future professionals who will shape cities in the future. Normally, they acquire adequate, relevant and current industry-related knowledge during their study. Yet, the COVID-19 pandemic has replaced their normal learning process with emergency online learning that must be navigated by educators and students alike. Under normal circumstances, the programme syllabi and materials are designed for conventional face-to-face learning specific to the future profession. The physical and social restrictions related to COVID-19 prevention have thrusted upon the built environment students learning limitations that are specific to their field. This paper aims to explore the experiences of real estate and urban planning students during the emergency online learning period not only to document the students' experiences but also to inform on future curricula development. A constructivist-based qualitative approach was adopted, with qualitative data collected from an online open-ended questionnaire on real estate and urban planning students. Using the framework by Khalil et al. (2020), a thematic content analysis was conducted around four core themes: (1) educational impact, (2) time management, (3) challenges encountered, and (4) preferences for the future. The findings support future syllabi that are emergency-resilient and can ensure professional education that is highly adaptable in emergency situations.

***Keywords**:* Online learning, e-Learning, COVID-19, emergency online learning, emergency-resilient education, built environment

[2] Senior Lecturer at Universiti Malaya Email: nikmatul@um.edu.my

INTRODUCTION

The COVID-19 pandemic that began at the end of 2019 triggered a world-wide disruption of various sectors including education, as evidenced by the sheer number of literatures on COVID-19's impact, management and adaptation. The Malaysian higher education sector is one of the affected areas that have swiftly adapted to the new circumstances under the nation-wide mandatory countermeasure known as the Movement Control Order (MCO). The MCO's severe physical and social restrictions on students and lecturers significantly impacted teaching and learning (T&L) at higher education institutions (HEIs) as T&L was switched from conventional to online learning. The impact of emergency online learning on the knowledge acquisition of built environment students is a cause for concern because a significant amount of knowledge and skill transfer are affected outside classrooms.

Various issues were explored with the emergency online learning such as T&L issues and learner performance. There is a discernible gap in the literature from the built environment field on how the emergency online learning at HEIs has impacted the knowledge acquisition of the built environment students. This gap is especially glaring in the context of Malaysia. As a developing country, it is imperative to ensure that the future built environment professionals have acquired the necessary skills embedded in their courses to undertake their future careers.

Based on the above, these questions need to be addressed: What were the issues faced by the built environment undergraduates in their emergency online learning? How did these students adapt to the online learning environment that is different from their normal learning environment? How can these experiences be used to inform future-ready built environment programmes? This paper aims to unpack the experiences of students of built environment programmes in adapting and immersing in the emergency online learning. A qualitative approach using open ended questionnaire survey was adopted in this exploratory study which involves planning students, a design-based programme, and real estate students, a survey programme, of Universiti Malaya (UM), Malaysia. Being the nation's top-ranked university, UM serves as the benchmark for T&L innovations and thus lessons learned in this study can be used to guide other built environment programmes. This paper is organized as follows. Firstly, a literature review on the impact of COVID-19 on higher education will be presented, bringing the focus to emergency online learning and professional degree programmes. Next, the context of the paper will be outlined, followed by the methodology. The findings will then be discussed before concluding with potential strategies to be adopted for a future-ready planning and real estate education.

RESEARCH BACKGROUND

COVID-19 and Emergency Online Learning

COVID-19 first appeared in Wuhan, China in late December 2019 and was first reported in Malaysia on 25 January 2020 (Ministry of Health, 2022). At the earlier phase of the pandemic, the tone of the literature on COVID-19's impact on higher education was one of uncertainty and despondence, mainly dwelling on how teaching and learning (T&L) was altered due to the strategy of social and physical restrictions to counter the pandemic (Mseleku, 2020). Due to mandatory lockdown, students in many countries had to stay at home and higher education providers had to switch to emergency online learning mode (Mseleku, 2020; Sun, Tang & Zuo, 2020).

Prior to the pandemic, online learning was seen as complementing the conventional T&L. Back then, ICT was seen as a function of social learning space and not as the main T&L platform (Ramu et al, 2020). Online T&L may occur either synchronously, i.e. involving live interaction between the instructor and students, or asynchronously, i.e. significant delays between instruction and receipt (Finklestein, 2006). The advantages of online learning include offering an interesting and flexible experience for the learner, a denser knowledge content compared to conventional classroom and greater time saving and utility (Khalil et al., 2020). However, the main disadvantage is the high reliance on internet connection and technology as the delivery mechanism, which may retard the teaching and learning process in less developed contexts (Mseleku, 2020; Paschal & Mkulu, 2020). Another requirement of online learning is planning; for instance, flipped classroom requires students to be given the material in advance (Khalil et al., 2020). As such, the unplanned emergency online learning will be less effective. The reduced non-verbal communication of online learning has also been criticised as important cues may be lost (Khalil et al., 2020).

The abrupt switch to online mode caused issues such as disruptions in research activities (Paschal & Mkulu, 2020), student isolation and associated mental health issues (Mseleku, 2020; Paschal & Mkulu, 2020), learning distraction (Khalil et al., 2020; Paschal & Mkulu, 2020) and prolonged study period (Paschal & Mkulu, 2020). The emergency online learning further accentuated the gap among students from different socio-economic backgrounds (Mseleku, 2020). Eventually however, a more positive outlook was presented as the pandemic was seen as a catalyst for online learning (see for instance Pham & Ho, 2020; Khalil et al., 2020). Synchronised online learning was reported to be well-received among students, due to the availability of student engagement during the course of learning (Khalil et al., 2020).

The Impact of Emergency Online Learning on Professional Degrees

The disruption of T&L in professional degrees brought upon by the pandemic has become a cause of concern and immediately became a hot topic of study in fields such as medicine (Findyartini et al, 2020; Khalil et al., 2020, Otaki et al, 2021; Papapanou et al., 2021), pharmacy (Roche, 2021), nursing (Cullum, 2020; Le et al., 2021), education (Mintz et al., 2020, Mseleku, 2020; Paschal & Mkulu, 2020), journalism (Yu, 2020) and law (Johnston-Walsh & Lintal, 2021). Compared to non-professional degrees, professional degrees are designed to deliver practical contents that oftentimes require personal guidance from the educator in the classroom or hands-on work-based learning field experience. The specific nature of professional programmes also requires specific tools or methods that were not accessible to students during the pandemic (Findyartini et al, 2020; Khalil et al., 2020). An immediate concern was on students' professional development when the attitudes, values, knowledge, beliefs and skills unique to the professional subgroup were not transferred to the students during the online learning (Findyartini et al, 2020).

Some of the challenges reported in studies on professional degree during COVID-19 pandemic include methodological, content perception, technical and behavioural (Khalil et al., 2020). For instance, medical students were prevented from having real patient exposure (Findyartini et al, 2020) whilst journalism students lost the vital communicative environment (Poluekhtova et al., 2020). For programmes that require the mastery of psychomotor skills, the process of knowledge transfer was significantly affected by online distance learning (Findyartini et al, 2020).

Within the context of professional degrees, and perhaps also generally true with other degrees, the emergency online learning forced students to use adaptive coping mechanisms in the unfamiliar mode of learning (Findyartini et al, 2020). Beyond the adjustment period, studies reported varied degrees of students' acceptance and preference of the online mode. Depending on the theory/practice ratio of the study, a module that has higher theory content is more likely to be accepted for online mode due to the perceived time savings (Khalil et al., 2020). Locally, there is a noticeable lack of studies in built environment education during the pandemic except for the work by Mohd Hussain et al. (2021) on landscape design students' performance.

This study involves students from UM's real estate and urban planning programmes. In terms of curriculum design, the pre-COVID syllabus delivery for both programmes are similar in terms of common T&L methods that include lecture, tutorial, seminar presentation, computer lab work, site visit and industrial training, with the exception of studio for urban planning students. Conventional assessment methods include tests, individual and group assignments and final examination. Typically, a course adopts a combination of two or more T&L and

assessment methods to fulfil the requirements from the accreditation bodies. The majority of courses have a combination of continuous and summative assessments, with some based on 100% continuous assessment.

During emergency online learning, changes to T&L methods included (i) online lectures and tutorials replacing face-to-face classroom interactions; (ii) secondary rather than field data for student assignments and projects; (iii) softcopy rather than physical assessment reports only in softcopy format and (iv) alternative modes of Summative Assessment comprising Online Open Book Exam and Reflection Notes in lieu of final examinations. Both synchronous and asynchronous modes of T&L were used to facilitate student-centred learning. At the start of the emergency online learning, the university recommended synchronous T&L to be done at least 3 times i.e. at the beginning, middle and end of the e-Learning period (Universiti Malaya, 2020).

METHODOLOGY

The research design was based on a constructivist-based qualitative approach (Creswell, 2014) which enabled an in depth understanding of the impact of COVID-19 on the education of built environment students, in particular real estate and urban planning.

Data Collection Instrument

An open-ended questionnaire was used to collect data from the respondents. The questionnaire was administered online because students were at their homes due to the ongoing COVID-19 pandemic. The open-ended questions ensured students could give detailed accounts of their perceptions and experiences of the emergency online learning. The questionnaire was prepared using Google Form, which was freely available.

Data Collection Procedure

Using purposive sampling, links of the online questionnaire survey were sent to all current Bachelor of Real Estate and Bachelor of Urban and Regional Planning students in Universiti Malaya. Table 2 summarises the profile of the respondents. Overall, the survey involved a total of 236 respondents comprising 133 real estate and 103 planning students.

Table 2: Characteristics of the study respondents (n=236)

Characteristics	**Variables**	*f*	%
Programme	Real Estate	133	56.4
	Urban and Regional Planning	103	43.6
Year of Study	First	68	28.8
	Second	74	31.4
	Third	67	28.4
	Fourth	27	11.4

Source: Author (2022)

Data Analysis

The qualitative data was in the form of written responses from the questionnaire survey. Using the framework by Khalil et al. (2020), a thematic content analysis was conducted around four core themes: (1) Educational impact, (2) Time management, (3) Challenges encountered, and (4) Preferences for the future. Deductive coding was also undertaken to generate sub-themes as prescribed by Marks & Yardley (2014) to ensure a more robust analysis.

FINDINGS

Generally, the findings were observed to be present equally in both programmes unless specifically highlighted.

Theme 1: Educational Impacts

Five sub-themes were generated under this theme i.e. (1) Content understanding, (2) Workload, (3) Screen fatigue, (4) Online collaborative learning and (5) Assessment.

Many respondents feel that learning certain courses online can be quite challenging especially for non-theoretical classes such as courses that require calculations among real estate students. The absence of teaching aids such as white board that are normally found in physical classrooms also poses a challenge for students especially when lecturers solely rely on their powerpoint slides using the share screen feature found in online meetings.

> "*For some courses, when the lecturer solely explains to us without a diagram or sketch, I might lose track and be unable to keep up with the explained content. The subject might be better delivered with the help of a whiteboard.*"

The challenge is deeply felt by students who are new to the field such as the first year students. Being new, the students need more guided learning and this is constrained by e-learning due to lack of face-to-face interactions where lecturers may not realize the struggles faced by the new students.

The second sub-theme emerged from the findings concerned workload. Contrary to the general perception that eLearning does not require much commitment from the students, many expressed the concern of juggling with too many assignments, with respondents commenting on "due dates" and "overlapping assignments". Additionally, respondents complained about being restricted by the MCO to obtain adequate and appropriate data to complete their assignments:

> "*Some assignment requirements are not suitable to be done during lockdown due to the unavailability of data. We tried to email the authority to get data but normally the emails were not replied*".

Another sub-theme that emerged concerned peer management. Some respondents expressed the need for real and face-to-face interactions with their peers to facilitate the learning process. Specifically, Urban Planning studio projects with a 12-hour studio time suffered when group members shirked their responsibilities, citing the pandemic for excuse:

> "*Meetings with team members are unproductive. Most of the time they will give excuses not to join meetings (although everyone agreed on date and time) and ask to record meetings instead. And this will burden other team members…"*

Nonetheless, some lecturers were creative in finding opportunities to stimulate collaborative learning by utilising online tools such as Google Docs where students can work together on certain topics given by lecturers. By writing together, it enables students to engage with their peers. Besides helping students who struggled to study alone, it also offered a degree of anonymity that could encourage shy students to participate, as revealed in the following response:

> "*…a question board for each subject/course that can be seen by the whole class, then we can post questions that everyone in the course can see… and lecturers can also answer all the question in one place… I think students dare to ask more questions if we can ask anonymously and the online writing tool can help with that*".

In preparing summative assessment during the pandemic, lecturers were inclined to develop questions based on High Order Thinking (HOT) that required answers beyond the lecture notes. For the assessment sub-theme, the respondents highlighted how the more difficult examination questions would require more time compared to conventional final examination. Additionally, students also reported anxiety and fear of losing internet connection during examination which further compounded the exam-related stress.

Theme 2: Time Management

No sub-themes were generated under this theme. In general, respondents from both programmes feel that eLearning allows them to manage their time better. The best thing about being able to attend online classes is that they do not have to travel or move from one place to another. Additionally, the availability of asynchronous online learning means that students may conduct learning activities at their own convenience.

Theme 3: Challenges Encountered

Two sub-themes were generated under this theme i.e. (1) Technical and (2) non-Technical. Technical challenges related to online learning mainly concerned connectivity and tools. Whilst online learning enables students to access educational content at the comfort and convenience of their home, effective T&L can only occur if students are equipped with reliable tools, high bandwidth and stable internet access. Ironically, many respondents felt that these were the main challenges that they have to face during online learning. As mentioned by a respondent:

> *"Everything is good for the teaching methods and materials provided by the lecturers. However, there were times we faced problems with our laptop and internet connection…"*

The challenge of online learning is also evident among international students who may have accessibility issues to online platforms used by the lecturers in conducting classes, as mentioned by this respondent:

> *"It is very inconvenient to use Google meet in China… Whatsapp is also not used in China, therefore it can quite troublesome for us communicate with our lecturers and friends"*

Apart from the technical challenges, respondents also indicated having faced non-technical challenges classified as (1) Self-motivation and (2) Familial Issues.

In terms of self-motivation, students reported a decline in their positive attitude as time went on. Lack of internal and external drive and stimulation and peer group dynamic were cited as reasons to lose motivation to study. Among keywords that typically appear were "lack of motivation", "lack of concentration" and "no vibes".

Quite a number of students from both programmes highlight experiencing screen fatigue due to the prolonged sessions of online learning. This can be seen from the following statement:

> "*Let's assume that there's 3 to 4 classes a day… with a period of 2 hours each, we'll need to face the monitor about 3 to 8 hours… and after the classes, we'll need to have meetings with our course mates for assignments as we know assignments require the close cooperation between members hence another 1-3 hours for each course…*"

Familial issues formed another non-technical challenge for some respondents. Respondents discerned having to juggle their learning schedules with household chores. Although both genders indicated being expected to contribute to household chores, the expectation on female students seemed to be higher.

Theme 4: Preferences for Future

No sub-themes were generated under this theme. A very noticeable preference related to online learning was increased lecturer-student engagement during T&L. Among suggestions were lecturers to call students' names during online class, lecturers asking students to present a topic and lecturers giving instantaneous feedback on student work.

Another preference was the variation in content delivery by having both synchronous and asynchronous lessons so that students who suffered from internet issues or screen fatigue would be able to catch up on their lessons.

DISCUSSION

Our analysis did confirm the framework by Khalil et al (2020) for emergency online experiences. Nonetheless, we further categorised the experiences into technological, human and syllabus based for the purpose of informing on future-ready real estate and planning education.

Several issues stemmed from having poor digital infrastructure and unfamiliarity with online applications and platforms. Despite the focus on student experiences, it can be inferred that these problems were encountered by students and lecturers alike, as also reported by Mseleku (2020) and Paschal & Mkulu (2020). Moreover, the digital gap was also observed in terms of the

intergenerational divide. The attitude and aptitude of lecturers must be right in order to successfully navigate such situations. In terms of attitude, lecturers must be innovative, creative and adaptive in changing from conventional to novel approach, whereas a degree of aptitude must also be present to enable the implementation of new technologies and pedagogical methods in delivering the curriculum.

Screen fatigue was found to be a major issue among the respondents and this could have prevented the lesson penetration and retention. The effects of prolonged study period during the pandemic was also observed by Paschal & Mkulu (2020). Students need peer support in their studies, not only to help in content reinforcement but also to offload stress and anxiety as reported by (Mseleku, 2020). For new students this may be challenging as they have spent little, if any at all, time together on campus. This has prevented them from establishing rapport and mutual trust among them.

Core subjects that require hands-on teaching and field experience have always been cited as the most difficult to adapt to online learning. For instance, valuation for real estate and planning studios require sensory experience on site which is unable to be relayed through online learning. The inability to physically explore the site will cause students to miss important cues, viz. the smell of a dumping ground next to a site. Another issue is data collection whereby students were not able to collect data and received little support from bureaucratic government agencies.

Future curriculum development may consider agile T&L and assessment elements. In other professions, the education providers were quick to capitalise on the situation by introducing new methods of learning. For instance, Papanou et al (2020) described an innovation in a medical programme where students were incentivised to volunteer in service-learning projects that can carry academic credits. Thus, curriculum structure should be flexible and adaptable to accommodate the sudden challenges and changes. This also must be supported with flexible assessment methods, which must garner full support from all stakeholders including MQA, HEIs and professional bodies.

CONCLUSION

Education is a collective responsibility among academia, government, industry and society. All stakeholders must provide the required support in providing a conducive ecosystem for online education, especially for built environment programmes that are more practice-based. Both the government and industry must provide a lifeline during emergency learning situations in terms of data and knowledge sharing and relaxing bureaucracy. The government, in particular, can support online learning by developing the required digital infrastructure and

ensuring reliable and user-friendly databases. The existence of good digital infrastructure and solid databases can indeed promote education resilience.

The findings support future syllabi that are agile and emergency-resilient, highly adaptable in emergency situations. The main lesson learned from the pandemic is how HEIs and professional bodies should expect the unexpected and not be too rigid in their standards and requirements. In the future, emergency situations may occur in the form of pandemic, war/strife, natural and man-made disasters, etc. Finally, improvements in digital infrastructure and pedagogical training must be carried out alongside a humane approach to T&L where communication and interactions are uninterrupted during emergencies.

In terms of T&L methods for online learning, micro lessons may be implemented to break the lessons into digestible chunks and interspersed with activities. This will prevent students from being overwhelmed by the amount of lesson time they have to sit through and also will retain their attention. The micro-lessons can adopt low-tech, hi-impact delivery methods such as Whatsapp. This is to ensure all students can follow the lessons in a timely, effective and inclusive manner, as well as saving on data consumption.

REFERENCES

Cullum, R. J., Shaughnessy, A., Mayat, N. Y., & Brown, M. E. (2020). Identity in lockdown: supporting primary care professional identity development in the COVID-19 generation. *Education for Primary Care*, *31*(4), 200-204.

Findyartini, A., Anggraeni, D., Husin, J. M., & Greviana, N. (2020). Exploring medical students' professional identity formation through written reflections during the COVID-19 pandemic. *Journal of Public Health Research*, *9*(Suppl 1).

Finkelstein, J. E. (2006). *Learning in real time: Synchronous teaching and learning online* (Vol. 5). John Wiley & Sons.

Johnston-Walsh, L., & Lintal, A. (2021). Tele-Lawyering and The Virtual Learning Experience: Finding the Silver Lining for Remote Hybrid Externships & Law Clinics after the Pandemic. *Akron Law Review*.

Khalil, R., Mansour, A. E., Fadda, W. A., Almisnid, K., Aldamegh, M., Al-Nafeesah, A., ... & Al-Wutayd, O. (2020). The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. *BMC medical education*, *20*(1), 1-10.

Li, Z., Zuo, Q., Cheng, J., Zhou, Y., Li, Y., Zhu, L., & Jiang, X. (2021). Coronavirus disease 2019 pandemic promotes the sense of professional identity among nurses. *Nursing outlook*, *69*(3), 389-398.

Marks, D.F. & Yardley, L. (2014) Content and Thematic analysis in Marks, D.F. & Yardley, L. (eds.) Research Methods for Clinical and Health Psychology, Sage Publications Limited, London.

Ministry of Health Malaysia (2022) Official FAQ on COVID-19 by the Ministry of Health accessed on 4 January 2022 https://covid-19.moh.gov.my/faqsop/faq-covid-19-kkm

Mintz, J., Wahood, W., Meghani, S., & Rajput, V. (2020). Emergency Transition to Virtual Education during COVID-19: Lessons and Opportunities for Experiential Learning and Practice Socialization. *MedEdPublish*, *9*.

Mohd Hussain, N. H., Md Sakip, S. R., Mansor, A., Bahaluddin, A., & Ilias, N. H. (2018). The Shift in Teaching Pedagogy for Independent Landscape Design During The Pandemic: An Analysis Of Student Performance In ODL. *Journal of the Malaysian Institute of Planners*, *19*(2), 131-140.

Mseleku, Z. (2020). A literature review of E-learning and E-teaching in the era of COVID-19 pandemic. *SAGE*, *57*(52), 588-597.

Otaki, F., Zaher, S., Du Plessis, S., Lakhtakia, R., Zary, N. M., & Inuwa, I. M. (2021). Introducing the 4Ps Model of Transitioning to Distance Learning: a convergent mixed methods study conducted during the COVID-19 pandemic. *medRxiv*.

Papapanou, M., Routsi, E., Tsamakis, K., Fotis, L., Marinos, G., Lidoriki, I. & Schizas, D. (2021). Medical education challenges and innovations during COVID-19 pandemic. *Postgraduate Medical Journal*.

Paschal, M. J., & Mkulu, D. G. (2020). Online classes during COVID-19 pandemic in higher learning institutions in Africa.

Pham, H. H., & Ho, T. T. H. (2020). Toward a 'new normal'with e-learning in Vietnamese higher education during the post COVID-19 pandemic. *Higher Education Research & Development*, *39*(7), 1327-1331.

Poluekhtova, I.A., Vikhrova, O.Y. and Vartanova, E.L. (2020). Effectiveness of online education for the professional training of journalists: Students' distance learning during the COVID-19 pandemic. *Psychology in Russia: State of the art*, *13*(4), 26-37.

Ramu, V., Taib, N., & Aziz, N. F. (2020). The attributes of future social learning built environments towards 21st century education in tertiary education. *PLANNING MALAYSIA*, *18*.

Roche, C. (2021). Prescription for Purposeful Adaptation of Professionalism-and-Ethics Teaching Strategies for Remote Delivery. Pharmacy 2021, 9, 55.

Sun, L., Tang, Y., & Zuo, W. (2020). Coronavirus pushes education online. Southeast University, Nanjing, China. https://doi.org/10.1038/s41563-020-0678-8

Universiti Malaya (2020) Teaching and Learning Guideline During COVID-19 Pandemic.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 328 – 339

FACTORS DETERMINING COVID-19 SEVERITY IN MALAYSIA: FROM SOCIAL, ECONOMIC AND ENVIRONMENTAL PERSPECTIVES

Bor Tsong Teh[1], Gabriel Hoh Teck Ling[2], Noor Hashimah Hashim Lim[3], Pau Chung Leng[4]

[1,3]*Faculty of Built Environment*
UNIVERSITI MALAYA
[2,4]*Faculty of Built Environment and Surveying*
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

This paper attempts to examine the factors affecting the COVID-19 pandemic situation in Malaysia. It investigates three major factors (social, economy and environment). Thirteen States and two Federal Territories of Malaysia were considered; and the data for the attributes of each major factor are derived from the official reports from the Department of Statistics Malaysia. Meanwhile, the infection rate and mortality rate of COVID-19 cases were obtained from the Ministry of Health, Malaysia. Using non-parametric statistical approach, the several interesting results are identified. Firstly, for the social factor, we found that the percentage of non-citizens has a positive relationship with both COVID-19 infection rate and mortality rate. Further, the number of students per teacher have a positive relationship with COVID-19 infection rate. Second, in terms of the economy factor, primary industry has a negative relationship with COVID-19 infection rate. Third, in the matter of social factor, it is found that population density and percentage of high-rise residential unit are positively related with COVID-19 infection rate. The result from this study can provides an insight for policymakers to understand factors contribute on the spread and severity of COVID-19 to informing better mitigation policy and control measures.

***Keywords**:* Malaysia; COVID-19; Social; Economy; Environment

[1] Senior Lecturer at Universiti Malaya. Email: tehbortsong@um.edu.my

INTRODUCTION

Nearly two years, our world has been greatly affected by the implications of the COVID-19 pandemic. To date, approximately 250 million population have been infected globally (WHO, 2021a) and this number is expected to increase with the emergence of more aggressive variants (WHO, 2021b). In terms of economy, the global financial system is facing the worst recession since Second World War (World Bank, 2020). Like the global situation, Malaysia too, experiencing the unprecedented challenges that brought by COVID-19 that has threatened the lives and livelihoods of our community. As of September 2021, Malaysia recorded nearly two (2) million COVID-19 confirmed cases (from the 32 million national population) and 24 thousand deaths due to pandemic (Ministry of Health Malaysia, 2021). During the nationwide Movement Control Order (MCO) in 2020, the World Bank survey (with more than 100 thousand companies in Malaysia) reveals that a high percentage of businesses were closed (35%) or partially operate (49%) (Kuriakose and Tran, 2020).

For COVID-19 and built environment, urban and regional planning related professions in Malaysia have initiated various discussion concentrating on the theoretical debates over the future direction of urban development in the context of COVID-19 era concerning to spatial planning (Rameli 2021; Gunasilan, 2020), density (Lim et al., 2021) and urban design (Ujang, 2021; Soo, 2020). Further, there have been several attempts of empirical studies can be found Malaysia. At the fine geography scale, Aw et al (2021) examine the relationship of population density with the COVID-19 cumulative cases and mortality rate in Malaysia, using Pearson regression focusing on 143 districts in Malaysia from January 25, 2020 – December 31, 2020. Meanwhile, Ganasegeran et al (2021) conducted ecology study by applying hierarchical cluster analysis and region-wise correlation on the cities of five (5) different regions in Malaysia to determine the correlation between population density with COVID-19 cluster and incidence between January 22, 2020 and February 4, 2021. In terms of empirical clinical study, Sim et al (2020) analyse COVID-19 patient admission records from 18 designated hospitals in Malaysia between the period of February 1, 2020 and May 30, 2020, focusing on the sociodemographic, clinical histories and diseases staging factors through univariate and multivariate logistic regressions. These studies demonstrates that there are limited research efforts in Malaysia to explore the determinant factors from a more holistic dimension of social, economy and environment that contribute to the COVID-19 severity.

To address this gap, this study aims to examine the social, economy and environment factors affecting the COVID-19 infection and mortality rate in Malaysia at state level. This investigation supports the growing literature on determinant factors and COVID-19, also providing insights to assist government policymakers, epidemiologists, environmentalist and urban planners in

formulating mitigation policy and control measure for COVID-19 and potential future pandemic disease.

METHODOLOGY

Study Design and Data Source

The present study includes thirteen States and two Federal Territories in Malaysia comprising of Perlis, Kedah, Pulau Pinang, Perak, Selangor, Negeri Sembilan, Melaka, Johor, Pahang, Terengganu, Kelantan, Sarawak, Sabah, Federal Territory of Kuala Lumpur, and Federal Territory of Labuan. Due to the absence of data, Federal Territory of Putrajaya is not included in this study. Furthermore, the study focusses on the timeframe from January 25, 2020 to June 30, 2021, about one year and a half of the pandemic calendar in Malaysia. The COVID-19 cases and deaths data by state in Malaysia were extracted from the Ministry of Health Malaysia's (MOH) official website (http://covid-19.moh.gov.my, accessed on August 1, 2021).

The following attributes of the social, economy and environment determinant factors were examined in this study: social factor (percentage of non-citizen, average household income, percentage of low-income household, number of students per teacher); economy factor (percentage of primary industry, percentage of secondary industry, percentage of tertiary industry); and environment factor (population density, percentage of high-rise residential, hospital beds per inhabitants, number of inhabitants per medical doctor, percentage of broadband penetration rate). The data regarding to the attributes of the social, economy and environment determinant factors are derived from the up-to-date state-level statistic report (My Local Stats) published by the Department of Statistics Malaysia (DOSM). The attributes for the social, economic and environment factors as well as COVID-19 outcomes are defined as follow: percentage of non-citizen is the percentage of resident population that is non-Malaysian citizenship; average household income is the mean monthly household gross income (RM, Ringgit Malaysia); percentage of low-income household is percentage of household that is low-income (as of year 2016, bottom 40%, B40 earning less than RM 4,360 per month); number of students per teacher is the ratio of student-to-teacher; percentage of primary industry is the proportion of gross domestic product that belongs to the primary industry; percentage of secondary industry is the proportion of gross domestic product that belongs to the secondary industry; percentage of tertiary industry is the proportion of gross domestic product that belongs to the tertiary industry; population density measures the number of resident population per land area (in terms of people per square kilometre of land area; percentage of high-rise residential is the percentage of housing stock that is high-rise residential; hospital beds per inhabitants is the number of hospital beds per resident population; number of inhabitants per medical doctor is the ratio of resident population to medical doctor; broadband

penetration rate is the percentage of both fixed-broadband subscriptions and mobile-broadband subscriptions (with the speed equal to and greater than one megabyte per second) per 100 inhabitants; COVID-19 infection rate is the ratio of COVID-19 confirmed cases to population; COVID-19 mortality rate is the ratio of COVID-19 deaths to population.

The summary of statistics (mean, standard deviation, minimum and maximum) on the attributes from social, economic and environment factors by state in Malaysia are enlisted in Table 1.

Table 1: Descriptive statistics of the social, economic and environment attributes adopted in the model and aggregated by Malaysian States.

Factors	Attributes	Mean	Standard Deviation	Minimum	Maximum
Social	Percentage of Non-Citizen (2018)	7.916	6.449	2.55	28.81
	Average Household Income (2016)	6330.53	1793.544	4214	10692
	Percentage of Low-Income Household (2016)	6.667	4.115	0.2	12.5
	Number of Students per Teacher (2018)	10.67	1.718	8	15
Economy	Percentage of Primary Industry (2018)	14.93	12.931	0	45
	Percentage of Secondary Industry (2018)	27.27	13.188	7	46
	Percentage of Tertiary Industry (2018)	57.00	13.701	35	88
Environment	Population Density (2018)	855.87	1860.607	22	7366
	Percentage of High-Rise Residential (2018)	21.67	21.396	3	77
	Hospital Beds (per 1,000 Inhabitants) (2017)	1.546	0.483	0.86	2.83

	Number of Inhabitants ('000) per Medical Doctor (2017)	0.641	0.218	0.28	1.05
	Broadband Penetration Rate (per 100 Inhabitants) (2018)	116.707	40.995	72.0	240.8
COVID-19 Outcomes	Infection Rate (per 1,000 Inhabitants) (June 30, 2021)	24.290	20.108	2.30	82.52
	Mortality Rate (per 1,000 Inhabitants) (June 30, 2021)	0.215	0.298	0.03	1.23

Source: Author (2022)

Data Analysis

Using SPSS, the study performed descriptive and inferential analyses for the descriptions of data characteristics (i.e., mean, frequency and standard deviation) and hypothesis testing, respectively. Based on the normality test of cumulative cases and infection rates of COVID-19 (see Table 2), showing the significance values of Shapiro-Wilk of <0.05, the distributions of the two set of data are not normal. The study therefore adopted a non-parametric test. More precisely, in light of the small sample size (i.e., 14) and data types of the twelves social-environmental-economic predictors which are interval scaled, Kendall's Tau-b, instead of the Spearman Rank correlation, was used. Another advantage of adopting the former is that it has better statistical properties where it is more insensitive to errors (i.e., the coefficient values, although usually smaller than Spearman, are more accurate).

Table 2: Descriptive statistics of the social, economic and environment attributes adopted in the model and aggregated by Malaysian States.

	Shapiro-Wilk			**Skewness**		**Kurtosis**	
	Statistic	df	Sig.	Statistic	Std Error	Statistic	Std Error
Cumulative_cases	.668	15	.000	2.824	.580	9.304	1.121
Infection_rate	.808	15	.005	1.900	.580	4.396	1.121

Source: Author (2022)

RESULTS AND DISCUSSION

Table 3 shows the results of the analysis. The following attributes of social, economy and environment factors demonstrate statistically significant relationship to the COVID-19 infection rate: percentage of non-citizen (p-value < 0.05 and τb of 0.467), average household income (p-value < 0.05 and τb of 0.543), number of students per teacher (p-value < 0.05 and τb of 0.411), percentage of primary industry (p-value < 0.05 and τb of -0.425), population density (p-value < 0.05 and τb of 0.390) and percentage of high-rise residential (p-value < 0.05 and τb of 0.394). All these attributes show strong and positive correlation with the COVID-19 infection rate, in exception for the percentage of primary industry (from economic) exhibit strong negative correlation with the COVID-19 infection rate. However, there were no relationship between the percentage of low-income household, percentage of secondary industry, percentage of tertiary industry, hospital bed per 1,000 inhabitants, number of inhabitants ('000) per medical doctor and broadband penetration rate per 100 inhabitants to the COVID-19 infection rate.

Meanwhile, the percentage of non-citizen (p-value < 0.05 and τb of 0.510) and average household income (p-value < 0.05 and τb of 0.567) are statistically significant relationship to the COVID-19 mortality rate. No relationship is found between COVID-19 mortality rate with the following attributes of social, economy and environment factors: percentage of low-income household, number of students per teacher, percentage of primary industry, percentage of secondary industry, percentage of tertiary industry, population density, percentage of high-rise residential, hospital bed per 1,000 inhabitants, number of inhabitants ('000) per medical doctor and broadband penetration rate per 100 inhabitants.

In respect to social factor, the percentage of non-citizen (primarily migrant workers) has a strong positive association with the COVID-19 infection rate and mortality rate. These results reflect the frequent major MOH COVID-19 outbreak information reported that many COVID-19 hot spots are linked to the migrant workers dormitory often at the manufacturing and construction workplace. Some migrant workers lived in an overcrowded accommodations and unsanitary condition. Further, they had poor access to healthcare and little protection for their right. Nevertheless, we are surprised to learn that the average household income has a strong positive association with the COVID-19 infection rate and mortality rate. The result implies that an increase of average household income (also mean a higher income) would give arise to COVID-19 infection rate and mortality rate. Our average household income finding contradicts to the previous studies demonstrates that low-income individual (which also can be interpreted it to the low-income household) has lesser COVID-19 behaviour intention (Clemens et al., 2021) and tend to have higher risk of COVID-19 death (Drefahl et al, 2020). Perhaps, this might be explained by the large number of

COVID-19 workplace cluster that appear at the Malaysian states with higher average household income (e.g., Federal Territory of Kuala Lumpur, Federal Territory of Labuan, Selangor, Johor, Pulau Pinang and Negeri Sembilan). The number of students per teacher and COVID-19 infection rate has a positively strong correlation. This could be due to the larger class size with more students leads to close-contact setting and escalate the spread of COVID-19 in school. The finding supports Philips et al (2021) agent-based model of COVID-19 transmission in primary school setting demonstrating that larger class size (comparing 15:2 ratio to 7:3 ratio) intensify the outbreaks of COVID-19.

On the opposite end of the spectrum, the percentage of primary industry attribute (of the economy factor) has a strong negative effect on the COVID-19 infection rate. This suggests that higher percentage of primary industry reduce the COVID-19 infection rate. The finding is differing from the early studies where among majority of the COVID-19 positive case individual were observed to be agriculture workers (Shi et al, 2020; Wang, L et al., 2020; Wang, R. et al., 2020). A possible explanation is that the workplace for the primary industry activities such as agriculture, forestry, and fishing are relatively taking on a more spacious places (ample space, less confine) and tend to be in an outdoor backdrop (a better air ventilation). Furthermore, in our analysis for environment factor, we found that population density and percentage of high-rise residential correlated positively with COVID-19 infection rate. The result is conforming to our expectations that crowded living and housing condition are more likely to become COVID-19 hot spots. This is consistent with the recent evidence from Malaysia empirical research of Aw et al (2021) and Ganasegeran et al (2021) demonstrating the COVID-19 has an association with population density. Similarly, the population density finding is supportive to the study results from China (Han et al, 2021) and United States (Roy and Gosh 2020; Smith et al, 2021) identified COVID-19 case is highly influence by the population density. Regarding our finding on the percentage of high-rise residential, this is supportive to the study by Jonhson et at (2020) found that multi-unit dwelling contributes to the risk of COVID-19 infection.

Table 3: Results of the Kendall's Tau-b Correlation examining the association between state-level social, economic and environment attributes with the COVID-19 Infection Rate and Mortality Rate.

Factors	**Attributes**	**COVID-19 Infection Rate**		**COVID-19 Mortality Rate**	
		Correlation Coefficient	***P-value***	***Correlation Coefficient***	***P-value***
Social	Percentage of Non-Citizen (2018)	**0.467***	**0.015**	**0.510****	**0.009**

	Average Household Income (2016)	**0.543****	**0.005**	**0.567****	**0.003**
	Percentage of Low-Income Household (2016)	-0.143	0.458	-0.125	0.519
	Number of Students per Teacher (2018)	**0.411***	**0.042**	0.395	0.053
Economy	Percentage of Primary Industry (2018)	**-0.425***	**0.029**	-0.332	0.090
	Percentage of Secondary Industry (2018)	0.135	0.487	0.117	0.550
	Percentage of Tertiary Industry (2018)	0.000	1.000	-0.580	0.766
Environment	Population Density (2018)	**0.390***	**0.042**	0.240	0.215
	Percentage of High-Rise Residential (2018)	**0.394***	**0.042**	0.379	0.052
	Hospital Beds (per 1,000 Inhabitants) (2017)	-0.106	0.585	-0.290	0.881
	Number of Inhabitants (‘000) per Medical Doctor (2017)	-0.124	0.520	-0.010	0.960
	Broadband Penetration Rate (per 100 Inhabitants) (2018)	0.257	0.181	0.221	0.254

Source: Author (2022)

Note: Statistically significant results (*P<0.05 and **P<0.01) are displayed in bold.
*P<0.05 Correlation is significant at the 0.05 level (2-tailed)
**P<0.01 Correlation is significant at the 0.01 level (2-tailed)

CONCLUSION

At the state-level of Malaysia, several social, economy and environment factors were found statistically significant correlated with COVID-19 outcomes. For social factor, the percentage of non-citizen and average household income shows strong positive relationship with the COVID-19 infection rate and COVID-19 mortality rate. The percentage of primary industry (from economic factor) has a strong negative association to the COVID-19 infection rate. Meanwhile, concerning environment factor, both the population density and percentage of high-rise residential are contribute positively to the COVID-19 infection rate. These findings could provide an insight and helpful to assist government policymakers, epidemiologists, environmentalist, and urban planners for the purpose of formulating mitigation policy and control measure for COVID-19. This is particularly important for the present situation where most countries including Malaysia is prepared to live with COVID-19 for a long period of time. Further, this can be also supportive for the future pandemic disease.

REFERENCES

Asemahagn, M.A. (2020). Factors Determining the Knowledge and Prevention Practice of Healthcare Workers towards COVID-19 in Amhara Region, Ethiopia: A Cross-Sectional Survey. *Tropical Medicine and Health*, 48:72. https://doi.org/10.1186/s41182-020-00254-3

Aw, S.B., Teh, B.T., Ling, G.H.T., Leng, P.C., Chan, W.H. & Ahmad, M.H. (2021). The COVID-19 Pandemic Situation in Malaysia: Lessons Learned from the Perspective of Population Density. *International Journal of Environmental Research and Public Health*, 18(12), 6566. https://doi.org/10.3390/ijerph18126566

Buja, A., Paganini, M., Cocchio, S., Scioni, M., Rebba, V. & Baldo, V. (2020). Demographic and Socio-Economic Factors, and Healthcare Resource Indicators Associated with the Rapid Spread of COVID-19 in Northern Italy: An Ecological Study. *PLOS ONE*, 15 (12), e0244535. https://doi.org/10.1371/journal.pone.0244535

Cao, Z., Tang, F., Chen, C., Zhang, C., Guo, Y., Lin, R., Huang, Z., Teng, Y., Xie, T., Xu, Y., Song, Y., Wu, F., Dong, P., Luo, G., Jiang, Y., Zuo, H., Chen, Y., Sun, L., Shu, Y. & Du, X. (2020). Impact of Systematic Factors on the Outbreak Outcomes of the Novel COVID-19 Disease in China: Factor Analysis Study. *Journal of Medical Internet Research*, 22(11), e23853.

Clemens, K.S., Matkovic, J., Faasse, K. & Geers, A.L. (2021). The Role of Attitudes, Affect, and Income in Predicting COVID-19 Behavioral Intentions. Frontiers in Psychology, 11:567397. https://doi.org/10.3389/fpsyg.2020.567397

Dalsania, A.K., Fastiggi, M.J., Kahlam, A., Shah, R., Patel, K., Shiau, S., Rokicki, S. & DallaPiazza, M. (2021). The Relationship Between Social Determinants of Health

and Racial Disparities in COVID-19 Mortality. *Journal of Racial and Ethnic Health Disparities*. https://doi.org/10.1007/s40615-020-00952-y

Department of Statistic Malaysia (2019). *My Local Stats 2018*. Putrajaya: Department of Statistics Malaysia.

Drefahl, S., Wallace, M., Mussino, E., Aradhya, S., Kolk, M., Branden, M., Malmberg, B. & Andersson, G. (2020). A Population-based Cohort Study of Socio-demographic Risk Factors for COVID-19 Deaths in Sweden. *Nature Communications*, 11:5097. https://doi.org/10.1038/s41467-020-18926-3

Ganasegeran, K., Amar Jamil, M.F., Ch'ng, A.S.H., Looi, I. & Peariasamy, K.M. (2021). Influence of Population Density for COVID-19 Spread in Malaysia: An Ecology Study. *International Journal of Environmental Research and Public Health*, 18(18), 9866. https://doi.org/10.3390/ijerph18189866

Goh, H.P., Mahari, W.T., Izazie Ahad, N., Chaw, L.L. Kifli, N., Goh, B.H., Yeoh, S.F. & Ming, L.C. (2020). Risk Factors Affecting COVID-19 Case Fatality Rate: A Quantitative Analysis of Top 50 Affected Countries. *Progress in Microbes and Molecular Biology*, 3(1), a0000171.

Gunasilan, P. (2020, Jun 27). COVID-19 and Its Effects on Town Planning. *The Star*. https://www.thestar.com.my/business/business-news/2020/06/27/covid-19-and-its-effect-on-town-planning

Johnson, D.P., Ravi, N. & Braneon, C.V. (2021). Spatiotemporal Associations Between Social Vulnerability, Environmental Measurements, and COVID-19 in the Conterminous United States. *GeoHealth*, 5(8), e2021GH000423. https://doi.org/10.1029/2021GH000423

Lim, S.B., Abdul Malek, J., Abdul Rashid, M.F. & Chee, K.Y. (2021). Rethinking Density in Urban Planning: Policy Directions in the Post-COVID-19 Era in Malaysia. *Planning Malaysia*, 19(2), 1-13.

Lin, Y., Zhong, P. & Chen, T. (2020). Association Between Socioeconomic Factors and the COVID-19 Outbreak in the 39 Well-Developed Cities of China. *Frontiers in Public Health*, 8, 546637. https://doi.org/10.3389/fpubh.2020.546637

Ling, G.H.T., Md Suhud, N.A.b., Leng, P.C., Yeo, L.B., Cheng, C.T., Ahmad, M.H.H. & Ak Matusin, A.M.R. (2021). Factors Influencing Asia-Pacific Countries' Success Level in Curbing COVID-19: A Review Using a Social-Ecological System (SES) Framework. *International Journal of Environmental Research and Public Health*, 18:1704. https://doi.org/10.3390/ijerph18041704

Ministry of Health Malaysia (2021). COVID-19 Malaysia. https://covid-19.moh.gov.my

Knittel, C.R. & Ozaltun, B. What Does and Does Not Correlate With COVID-19 Death Rates. *MIT Center for Energy and Environmental Policy Research Working Paper*, 2020. http://www.nber.org/papers/w27391

Koh, D. (2020). Migrant Workers and COVID-19. Occupational and Environmental Medicine, 77(9), 634-636.

Kong, J.D., Tekwa, E.W. & Gignoux-Wolfsohn, S.A. (2021). Social, Economic, and Environmental Factors Influencing the Basic Reproduction Number of COVID-19 Across Countries. *PLOS One*, 16(6), e0252373. https://doi.org/10.1371/journal.pone.0252373

Kuriakose, S. & Tran, T. (2020). *Impacts of COVID-19 on Firms in Malaysia: Results from the 1st Round of COVID-19 Business Pulse Survey*. World Bank.

Pana, T.A., Bhattacharya, S., Gamble, D.T., Pasdar, Z., Szlachetka, W. A., Perdomo-Lampignano, J. A., Ewers, K.D., McLernon, D.J. & Myint, P.K. (2021). Country-Level Determinants of the Severity of the First Global Wave of the COVID-19 Pandemic: An Ecological Study. *BMJ Open*, 11(2), e042034.

Philips, B., Browne, D.T., Anand, M. & Bauch, C.T. (2020). Model-based Projections for COVID-19 Outbreak Size and Student-days Lost to Closure in Ontario Childcare Centres and Primary Schools. *Scientific Reports*, 11:6402. https://doi.org/10.1038/s41598-021-85302-6

Rameli, A. (2021, September 21). *COVID-19 in Malaysia's 100 Year-Planning Story: Impact and Tips in Transforming Urban Planning.* Seminar presented at the JABT Virtual Professional Talk 2021 of Universiti Teknologi MARA, Perak.

Roy, S. & Gosh, P. (2020). Factors Affecting COVID-19 Infected and Death Rates Inform Lockdown-related Policymaking. *PLOS ONE*, 15(10), e0241165. https://doi.org/10.1371/journal.pone.0241165

Shi, Y., Yu, X., Zhao, Ho., Wang, H., Zhao, R. & Sheng, J. (2020). Host Susceptibility to Severe COVID-19 and Establishment of a Host Risk Score: Findings of 487 cases outside Wuhan. Critical Care, 24: 108. https://doi.org/10.1186/s13054-020-2833-7

Sim, B.L.H., Chidambaram, S.K., Wong, X.C., Pathmanathan, M.D., Peariasamy, K.M., Hor, C.P., Chua, H.J. & Goh, P.P. (2020). Clinical Characteristics and Risk Factors for Severe COVID-19 Infections in Malaysia: A Nationwide Observational Study. *The Lancet Regional Health – Western Pacific*, 4:100055. https://doi.org/10.1016/j.lanwpc.2020.100055

Smith, T.P., Flaxman, S., Gallinat, A.S., Kinosian, S.P., Stemkovski, M., Unwin, H.J.T., Watson, O.J., Whittaker, C., Cattarino, L., Dorigatti, I., Tristem, M. & Pearse, W.D. (2021). Temperature and Population Density Influence SARS-CoV-2 Transmission in the Absense of Nonpharmaceutical Interventions. *Proceedings of the National Academy of Sciences of the United States of America*, 118(25), e2019284118. https://doi.org/10.1073/pnas.2019284118

Soo, W.J. (2020, July 10). Experts: Rethink on Urban Design Much Needed as COVID-19 Reshapes What Malaysians Want, Need. *Malay Mail*. https://www.malaymail.com/news/malaysia/2020/07/10/experts-rethink-on-urban-design-much-needed-as-covid-19-reshapes-what-malay/1883132

Tian, T., Zhang, J., Hu, L., Jiang, Y., Duan, C., Li Z., Wang, X. & Zhang, H. (2021). Risk Factors Associated with Mortality of COVID-19 in 3125 Counties of the United States. *Infectious Diseases of Poverty*, 10:3. https://doi.org/10.1186/s40249-020-00786-0

Ujang, N. (2021, May 5). Urban Design, COVID-19 Pandemic and Urban Wellbeing. *Faculty of Design and Architecture, Universiti Putra Malaysia*. https://frsb.upm.edu.my/article/urban_design_covid_19_pandemic_and_urban_wellbeing-61486?L=en

Wang, L., Duan, Y., Zhang, W., Liang, j., Xu, J., Zhang, Y., Wu, C., Xu, Y. & Li, H. (2020). Epidemiologic and Clinical Characteristics of Cases of COVID-19 Arising from Patient-to-Patient Transmission in Liocheng, China. *Clinical Epidemiology*, 12, 387-391. https://doi.org/10.2147/CLEP.S249903

Wang, R., Pan, M., Zhang, X., Han, M., Fan, M., Zhao, F., Miao, M., Xu, J., Guan, M., Deng, X., Chen, X. & Shen, L. (2020). Epidemiologic and Clinical Features of 125 Hospitalised Patients with COVID-19 in Fuyang, Anhui, China. International Journal of Infectious Diseases, 95, 421-428. https://doi.org/10.1016/j.ijid.2020.03.070

Wirawan, G.B.S. & Januraga, P.P. (2021). Correlation of Demographics, Healthcare Availability, and COVID-19 Outcomes: Indonesia Ecological Study. *Frontiers in Public Health*, 9: 605290. https://doi.org/10.3389/fpubh.2021.605290

WHO (World Health Organisation) (2021a). WHO Coronavirus (COVID-19) Dashboard. https://covid19.who.int

WHO (World Health Organisation) (2021b). COVID-19 Weekly Epidemiological Update.

World Bank (2020). *Global Economic Prospects*. Washington: The World Bank.

You, H., Wu, X. & Guo, X. (2020). Distribution of COVID-19 Morbidity Rate in Association with Social and Economic Factors in Wuhan, China: Implications for Urban Development. *International Journal of Environmental Research and Public Health*, 17(10), 3417. https://doi.org/10.3390/ijerph17103417

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 340 – 351

PATHWAYS OF NEIGHBOURHOOD OBESOGENIC ENVIRONMENT DURING COVID-19: IMPACTS AND WAY FORWARD

Noor Hashimah Hashim Lim[1], M. Rafee Majid[2], Rosilawati Zainol[3], Bor Tsong Teh[4]

[1, 3,4]*Department of Urban and Regional Planning,*
Faculty of Built Environment,
UNIVERSITI MALAYA
[2]*Department of Urban and Regional Planning,*
Faculty of Built Environment and Surveying
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

Prior to the COVID-19 outbreak, obesity is already a pandemic illness on its own. It has been a public health priority in developing countries especially Malaysia where the obesity rate in the country is one of the highest in South East Asia. Early studies have concurred that the presence of COVID-19 makes anatomising the obesity pandemic even more urgent as impaired metabolic health increase complications and mortality in COVID-19 patients. COVID-19 induced movement restriction orders and related policies by the Malaysia government are believed to have altered the country's food and physical activity environments. The paper expanded the original Neighbourhood Environment, Health Behaviours and BMI (NEHB-BMI Model) where the pathways of neighbourhood obesogenic environment that reflects COVID-19 induced changes to the constructs from the perspective of Malaysia is presented. Through the discussion, three key variables were added to the model: 1) government environment; 2) establishment/business environment; and 3) individual psychosocial factors. Exploring the impacts of COVID-19 to the obesogenic environment constructs paves way to gauging insights by allowing associations between the presented variables to be tested in future studies, especially in the South East Asian region where such studies are very limited.

Keyword: Neighbourhood obesogenic environment, COVID-19, Malaysia

[1] Senior Lecturer at Universiti Malaya. Email: shimalim@um.edu.my

INTRODUCTION

Globally, obesity is a known risk factor for non-communicable diseases (NCDs) and is recently linked to increase complications among COVID-19 patients (Sim et al., 2020; Sanyaolu et al., 2020) which can lead to higher mortality rate. Being the fattest country in Southeast Asia, Malaysia's National Health and Morbidity Survey 2019 revealed that every five in 10 adults is prevalence to being overweight or obese. Nearly 67% of COVID-19 victims in Malaysia who were brought-in-dead to hospitals had at least one underlying NCD (Ministry of Health Malaysia, 2021a). As such, in the wake of COVID-19, those with obesity and other underlying comorbidities have been categorised as high-risk groups.

Currently (September 7, 2021), Malaysia has recorded a cumulative of 1,880,734 COVID-19 cases with 18,802 of fatalities and 1,609,930 of recovered patients (Ministry of Health, 2021b). Movement restrictions enforced by the Malaysia government are based on severity of aerial infection. It ranges from the less strict Recovery Movement Control Order (RMCO) to most strict Enhanced Movement Control Order (EMCO) and total lockdown, where each has its own sets of policies. With different types of movement restrictions enforced by location, it has now become an important factor influencing the environment.

As COVID-19 cases continue to surge on daily basis, the World Health Organization (2021) advised the public to maintain a good nutrition intake, stay hydrated and be physically active despite the movement restrictions. Supported by studies done during the COVID-19 pandemic, maintaining regular physical activity level (Aman & Masood, 2020) and a balanced diet (Christofaro et al., 2021), hand in hand, is essential to building strong body immune system and maintaining a healthy weight during quarantine. While physical activity and dietary behaviours were previously thought to be an individual choice, Ecological System Theory (Bronfenbrenner, 1992) presents the possible influence of environment to individual behaviours.

Though systematic reviews (Papas et al., 2007; Xu & Wang, 2015) attested the significance of association between built environment and obesity. An environment is considered as obesogenic when the physical, health and social contexts discourage healthy behaviours and facilitates obesity (Kirk, Penney & McHugh, 2010). Given the presence of COVID-19 and its potential impacts to our environment, it calls for a need to identify pathways that explains the obesogenic environment and health behaviours in Malaysia during the pandemic.

To date, a framework that describes Malaysia's obesogenic environment that explicitly studies the dynamics between energy intake (food environment and diet quality) and energy expenditure (physical activity environment and physical activity level) as well as social factors is still inconclusive. As such, the paper uses the Model of Neighbourhood Environment, Health Behaviours and BMI (NEHB-BMI Model) (Figure 1) developed by Majid et al. (2021) as a foundation for further discussion. The model suggests that the

food and built environments at the neighbourhood level have influences over individual health behaviours i.e., diet quality and physical activity as well as body mass index (BMI). Two groups of confounding variables considered in the model are socio-demographic characteristics including age, race, gender, highest education level and monthly household income: as well as neighbourhood socioeconomic status (SES).

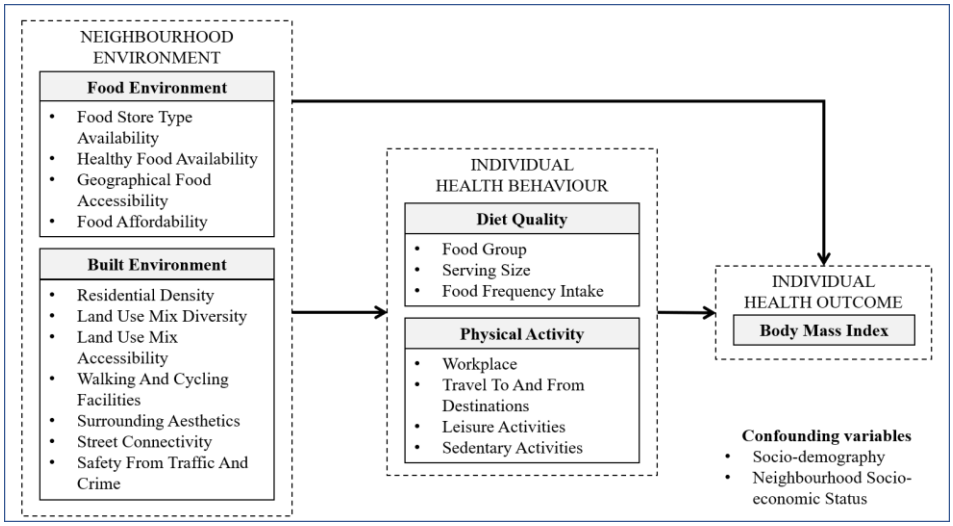


Figure 1: Model of Neighbourhood Environment, Health Behaviours and BMI (NEHB-BMI Model)
Source: Majid et al. (2021)

Currently in Malaysia, limited studies have been done on linking COVID-19 to the variables and constructs presented in the NEHB-BMI Model. Hence, content analysis on secondary data related to impacts of the pandemic towards Malaysia's obesogenic environment are collected from local newspapers, official government statistics and official government press releases as well as reports from legitimate organisations.

IMPACTS ON THE NEIGHBOURHOOD FOOD ENVIRONMENT

Inability of Non-Fast-Food Restaurants to Respond to Changes in Consumer Behaviours

A restaurant's responsiveness to the changes in consumer behaviours during the pandemic can determine its business survival, thus affecting neighbourhood food availability which can either encourage or discourage an obesogenic environment. When movement restrictions were announced by the Malaysia government, restaurants that have already incorporated digital infrastructures into

their business models prior to the pandemic are doing better than those that did not. Comparing fast-food and non-fast-food restaurants, Kee, et al. (2021a) highlighted that the former swiftly adapted to the new food environment thus becoming more customer-centric, while the latter was heavily impacted where around 2,000 recorded non-fast-food restaurants nationwide faced business closures. As pointed out by Richardson et al. (2015), more availability of fast-food restaurants than non-fast-food restaurants can further sustain an obesogenic environment which is detrimental to the diet quality of the affected population.

Public Health Messaging Limiting Visitations to Healthy Food Establishments

As healthy food stores are often set in large areas which tend to collect crowds such as grocery stores, supermarkets and wet markets, these places are more vulnerable to virus exposures. As such, it can be observed that public health messaging such as those released by the Federation of Malaysian Consumers Associations (2021) specifically warn consumers against frequent visits to those three places mentioned above to avoid being exposed to COVID-19. These kinds of messages can stunt revenue – affecting business survival. It is apparent as the Malaysia Retail Sales Report 2021 noted that supermarkets and hypermarkets in Malaysia had negative growth of monthly retail sales which is a trend that has persisted since year 2020. Small businesses including local grocery stores (Fabeil, Pazim & Langgat, 2020) also faces highest risk of business closures during these trying times. Furthermore, wet markets nationwide have been experiencing temporary shutdowns due to unexpected virus outbreaks from time to time (Ministry of Health Malaysia, 2020b). With the absence of similar health messaging, continuous positive revenue growth was reported for convenience stores in the Malaysia Retail Sales Report 2021 since year 2020. Hence, public health messaging is speculated to contribute to the decline of access to quality and selection of healthy foods within a neighbourhood, which then further encourages the obesogenic environment.

Restrictions To Movement and Food Accessibility Leading to The Rise of Home-Cooks

Strict movement restrictions forbidding more than 10-kilometre travels most of the time during the pandemic forces Malaysians to settle for food that are available and accessible to them within the radius. Here, their diet qualities can be directly impacted by the distribution and variety of food stores in their neighbourhoods. This is similar for those who rely on online delivery services where they are also somewhat confined to the food stores that are nearer to them as delivery charges gets higher for farther places. During these times, there are also those who turned to cooking at home due to having cleanliness concerns (Norshariani, 2020), creating the rise in “MCO cooks”. Newfound interests and

elevated skills in cooking at home are more prominent among those living in urban areas, whom prior to the pandemic relies more on dining out (Ali & Abdullah, 2017). As home-cooking often yields better diet quality such as greater daily consumption of fruit, vegetable or fresh raw vegetable (Norshariani, 2020), this may help in discouraging the obesogenic environment.

IMPACTS ON THE NEIGHBOURHOOD PHYSICAL ACTIVITY ENVIRONMENT

Higher Residential Density and Overcrowding Increases Risk Exposures

Higher density residences are naturally overcrowded, thus has been suspected (Alberta Health Services, 2020) and found to be positively associated with risk of COVID-19 infection (Huang et al., 2020). Similarly, most of the areas enforced with EMCO in Malaysia were of low-cost high-rise government housings such as the People's Housing Project (PPR) and flats (Bernama, 2021a; Harun, 2021); indicating a higher rate of COVID-19 infection within those vicinities. Living in higher populated residential areas can facilitate to developing sedentary behaviours as inhabitants are instructed not to loiter outdoor unnecessarily to limit risk of exposure.

Restrictions to Destinations and Operations of Activities

Higher land-use diversity and accessibility are said to result in more physical activity (De Bourdeaudhuij et al., 2005; Tung et al., 2016; Nordin & Nakamura, 2020) as it motivates destination to destination travelling (Chen & Lau, 2008). However, land use mix diversity and accessibility in Malaysia is severely affected as the government has set restrictions to visit public places like recreational parks and shopping malls (National Security Council, 2020a). Schools and other activities listed under non-essential services had to be closed temporarily as well (National Security Council, 2020b). As Huang et al. (2020) found a positive correlation between transport facility density with COVID-19 infection rate, the instruction to limit public transport ridership capacity for buses, rails and taxis by the National Security Council (2021) in Malaysia was called for. All these coupled with the encouragement to work from home by the government, can result in a significant drop of work, destination travelling and leisure-time physical activities.

Involuntary Physical Inactivity Due to Movement Restrictions

Prior to COVID-19, Malaysia neighbourhoods with greater walking and cycling facilities (Sreeramareddy et al., 2012; Law, Taib & Saad, 2014), street connectivity (Abdullah, Mirzaei & Haron, 2016), safety from traffic (Law, Taib & Saad, 2014) and crime (Cheah, Chang & Saimon, 2012; Saimon, Choo & Bulgiba, 2015; Abdullah, Mirzaei & Haron, 2016) as well as have a more pleasant surrounding aesthetics (Law, Taib & Saad, 2014; Abdullah, Mirzaei & Haron,

2016) have been linked to higher physical activity level regardless of the studied population. With COVID-19-related government policies enforced since March 2020, past concerns such as traffic congestion and crime rate were found to be declining (Fuad, 2021). Ideally, this would facilitate to higher physical activity among residents. However, outdoor activities and travelling are limited with movement restrictions in place. As such, even with the presence of encouraging built environmental features, involuntary physical inactivity can start to develop over time.

Higher Dependence on Online Technology and Working from Home Leading to Sedentary Lifestyles

Increasing dependence on online technology can cause physical inactivity (Yi, Samat & Muda, 2017), while working from home (WFH) has been linked to more sitting time and screen time (McDowell et al., 2020). With the presence of COVID-19 further normalising the trend of WFH, this has further propelled Malaysia's dependence on digital infrastructures. In fact, a recent national level survey by Mohammad, Mazalan & Wan Saidin (2020) on Malaysians' WFH experience revealed that the majority of respondents are favouring this new working method. This can be a detrimental trend which encourages sedentary lifestyles leading to higher BMI and other independent health risks (Warburton & Bredin, 2016).

DISCUSSIONS

The COVID-19 crisis is believed to have incurred unexpected changes specifically to the food and physical activity environments. It is speculated to worsen Malaysia's inherent obesogenic environment. From the impacts of COVID-19 presented above, a framework that conceptualises obesogenic environment pathways based on an ecological model of health perspective is proposed. Figure 2 shows the addition of three main variables to the original NEHB-BMI Model includes; 1) government environment which may be gauged by federal- and state-level policies and public health messaging; 2) establishment/business environment which may be gauged by their responsiveness to change, business model sustainability and marketing efficacy; and 3) psychosocial factors.

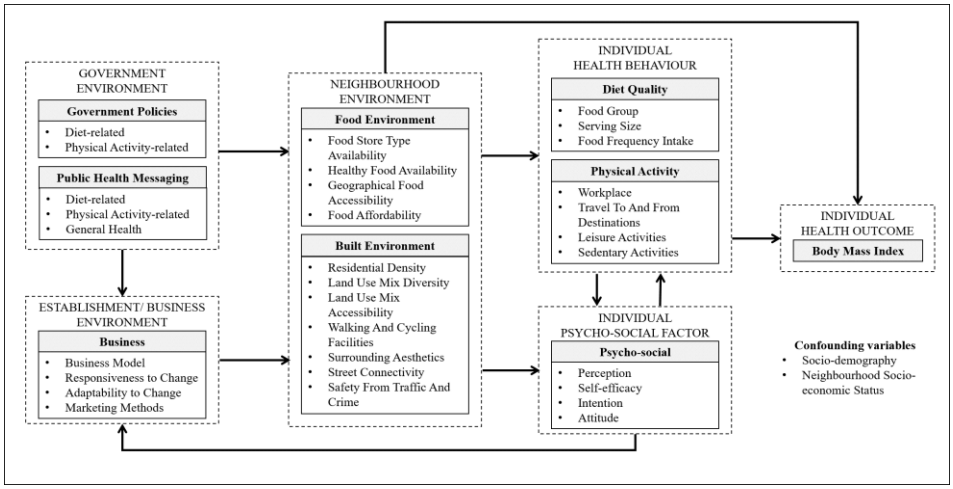


Figure 2: Proposed conceptual framework/ pathways of obesogenic environment impacted by the COVID-19 pandemic from Malaysia's perspective
Source: Author (2021)

When confronted with public health issues, studies have relentlessly punctuated not only on the importance, but also the need of inter-agencies collaboration between the government and related authoritative entities. The pandemic has become a platform to showcase how powerful government policies and public health messaging can have on the health environment. By controlling the operations of essential and non-essential services, it can influence the availability, accessibility and diversity of neighbourhood food and physical activity environments. This can then influence individual diet, physical activity level and BMI. The experience should be capitalised for future public health directives from planning and implementation to monitoring and achieving a desired environment that is no longer obesogenic.

It can also be observed that the food and physical activity environments are very much dependent on the sustainability and survival of related establishments. The businesses' ability or inability to respond to the changes in consumerism and operating climate can determine its availability and accessibility to customers. With COVID-19 measures in place, there is a need to assess the neighbourhood's availability, density and accessibility of food and physical activity-related establishments. This can give an indication of whether a person's neighbourhood environment is obesogenic or not. As such, two new pathways were drawn from the government environment and establishment/ business environment to the neighbourhood environment to indicate the direct impacts. Next, as the government environment is also assumed to have a direct

impact on the establishment/ business environment; the relationship between government environment and neighbourhood environment may be mediated by the establishment/ business environment.

When presenting the impacts of COVID-19 to the obesogenic environments, elements of individual psychosocial factors are always present. It ranges from motivation and perceived benefits to exercise, fear of infection, dependence on technology, opinions on working from home as well as eating attitudes and cooking skills. Hence, it is hypothesised that individual health behaviours may be influenced by individual psychosocial factors and vice versa. Also, a pathway was drawn from individual psychosocial factors to establishment/ business environment as it is speculated that cooking skills for example, may influence frequency of ordering online food services and thus affect sustainability of businesses.

The original pathways from neighbourhood environment to individual health behaviours and BMI are retained. As the neighbourhood environment is hypothesised to influence individual psychosociality, an additional pathway was drawn to reflect the direct relationship. With that in place, the association between neighbourhood environment and individual health behaviours can then be mediated by individual psychosocial factors, and subsequently influencing BMI. Socio-demography and neighbourhood SES remain as confounding variables in this framework. The framework can be used as a guide to understand the construct dynamics and develop measures to better manage the obesogenic environment from Malaysia's perspective. It is undeniable there are a large pool of variables that can potentially affect the obesogenic environment pathways during COVID-19. However, the paper is selective in identifying only those of highest impact yet are less estimated concurrently in this climate.

CONCLUSION

Globally, different countries are faced with different scenarios brought about by the pandemic and hence have to endure different government measures from time to time. As such, each country's environmental changes, health behaviours and health outcomes can be different. Having learnt that COVID-19 patients with obesity and other underlying comorbidities can increase complications and mortality, studies of the obesogenic environment is an urgent matter. This is more apparent for Malaysians as the population has a high rate of overweight and obese prevalence even way before the occurrence of COVID-19. In an effort to understand the pathways of the neighbourhood obesogenic environment that may have been impacted by COVID-19, variables and constructs that were believed to have induced or experienced change are identified and discussed. Public health-related interventions strategies during these recent times must consider the impacts of COVID-19 on the environment and individual behaviours as the pandemic has undoubtedly shaped a new normal that may alter results of previous

studies. Future research of neighbourhood obesogenic environments necessitates additional exploration of policy-, business- and psychosocial-related factors concurrently. Moreover, the re-examination of environmental factors and further assessment of inter-relationships between identified variables are highly recommended.

REFERENCES

Abdullah, A., Mirzaei, N. F., & Haron, S. H. (2016). Perception of neighbourhood-level built environment in relation to youth physical activity in Malaysia. *International Journal of Humanities and Social Sciences,* 10(11), 3596-3601.

Alberta Health Services (2020, July 16). *Have clusters of COVID-19 over time been described in condos, apartments and/or hotels? What are the most commonly hypothesized mechanisms of transmission?*. COVID-19 Scientific Advisory Group, Rapid Evidence Brief. https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-sag-transmission-in-condo-or-apartment-buildings-rapid-review.pdf

Ali, N., & Abdullah, M. A. (2017). The food consumption and eating behaviour of Malaysian urbanites: Issues and concerns. *Geografia-Malaysian Journal of Society and Space*, 8(6).

Aman, F., & Masood, S. (2020). How Nutrition can help to fight against COVID-19 Pandemic. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4), S121.

Bernama. (2021a, July 1). EMCO in 34 mukims in Selangor, 14 localities in KL from July 3. *The Edge Markets.* https://www.theedgemarkets.com/article/emco-several-subdistricts-and-localities-selangor-and-kl-only-food-daily-necessity-product

Bronfenbrenner, U. (1992). *Ecological systems theory*. Jessica Kingsley Publishers.

Cheah, W. L., Chang, C. T., & Saimon, R. (2012). Environment factors associated with adolescents' body mass index, physical activity and physical fitness in Kuching South City, Sarawak: a cross-sectional study. *International journal of adolescent medicine and health,* 24(4), 331-337.

Chen, H., Jia, B., & Lau, S. S. Y. (2008). Sustainable urban form for Chinese compact cities: Challenges of a rapid urbanized economy. *Habitat international*, 32(1), 28-40.

Christofaro, D. G., Werneck, A. O., Tebar, W. R., Lofrano-Prado, M. C., Botero, J. P., Cucato, G. G., ... & Prado, W. L. (2021). Physical activity is associated with improved eating habits during the COVID-19 pandemic. *Frontiers in Psychology,* 12.

De Bourdeaudhuij, I., Teixeira, P. J., Cardon, G., & Deforche, B. (2005). Environmental and psychosocial correlates of physical activity in Portuguese and Belgian adults. *Public health nutrition,* 8(7), 886-895.

Fabeil, N. F., Pazim, K. H., & Langgat, J. (2020). The impact of Covid-19 pandemic crisis on micro-enterprises: Entrepreneurs' perspective on business continuity and recovery strategy. *Journal of Economics and Business*, 3(2).

Federation of Malaysian Consumers Associations (FOMCA). (2021, June 8). Cut down on grocery runs to stay safe [Press Release]. http://www.fomca.org.my/v1/index.php/fomca-di-pentas-media/fomca-di-pentas-media-2021-21/1377-cut-down-on-grocery-runs-to-stay-safe

Fuad, F. (2021, May 13). National crime index declined during MCO. *The News Straits Times*. https://www.nst.com.my/news/crime-courts/2021/05/690010/national-crime-index-declined-during-mco

Harun, H. N. (2021, June 29). 3 areas in Selangor's Petaling to go under EMCO. *The News Straits Times*. https://www.nst.com.my/news/nation/2021/06/703514/3-areas-selangors-petaling-go-under-emco

Huang, J., Kwan, M. P., Kan, Z., Wong, M. S., Kwok, C. Y. T., & Yu, X. (2020). Investigating the relationship between the built environment and relative risk of COVID-19 in Hong Kong. *ISPRS International Journal of Geo-Information*, 9(11), 624.

Institute for Public Health. (2020). *National Health and Morbidity Survey (NHMS) 2019: Non-communicable diseases, healthcare demand, and health literacy—Key Findings.* Kuala Lumpur: Ministry of Health Malaysia. https://iptk.moh.gov.my/images/technical_report/2020/4_Infographic_Booklet_NHMS_2019_-_English.pdf

Kee, D. M. H., binti Misbah, N., binti Nazril, N. A., & binti Musa, N. H. (2021a). The Impact of COVID-19 on the Fast-Food Industry in Malaysia. *Journal of the Community Development in Asia* (JCDA), 4(2), 44-57.

Kirk, S. F., Penney, T. L., & McHugh, T. L. (2010). Characterizing the obesogenic environment: the state of the evidence with directions for future research. *Obesity reviews*, 11(2), 109-117.

Law, L. S., Taib, M. N., & Saad, H. A. (2014). Factors associated with physical activity level among adolescents in Sarawak, Malaysia. *J Phy Act Sports Exerc*, 2, 7-14.

Majid, M. Rafee, Hashim Lim, Noor Hashimah, Zaman, Musarrat, Ruslik, Noradila (2021). Exploring the Link between BMI, Perceived Neighbourhood Environment and Health Behaviours in Malaysia. *Journal of Sustainability Science and Management*, [Accepted in August, 2021].

Malaysia Retailers Association & Retail Group Malaysia. (2021, March). Malaysia Retail Sales Report 2021. https://ifranchisemalaysia.com/malaysia-retail-sales-report-march-2021-compiled-and-written-by-retail-group-malaysia.html

McDowell, C. P., Herring, M. P., Lansing, J., Brower, C., & Meyer, J. D. (2020). Working from home and job loss due to the COVID-19 pandemic are associated with greater time in sedentary behaviors. *Frontiers in public health,* 8, 750.

Ministry of Health Malaysia. (2020b, May 5). Updates on The Coronavirus Disease 2019 (Covid-19) Situation in Malaysia [Press release]. https://www.moh.gov.my/index.php/database_stores/attach_download/337/1539

Ministry of Health Malaysia. (2021a, August 5). Comorbidities, no screening linked to virus deaths [Press release]. https://covid-19.moh.gov.my/semasa-kkm/2021/08/comorbidities-no-screening-linked-to-virus-deaths

Ministry of Health Malaysia. (2021b, September 8). Current Situation of the COVID-19 Pandemic in Malaysia [Live report]. https://covid-19.moh.gov.my/

Mohammad, A. H., Mazalan, M., & Wan Saidin, W. Z. H. (2020). The impact of COVID-19 on behavioural and lifestyle changes, work from home & family planning. *Population and Family Research Division, National Population and Family Development Board.* Ministry of Women, Family and Community Development, Malaysia. Issue 2/ 2020, ISSN 1511-774X.

http://familyrepository.lppkn.gov.my/853/1/POP%20INFO%20JULY-DEC2020.pdf

National Security Council. (2020a, October 27). Standard Operating Procedures for Enhanced Movement Control Order: 3 blocks of BBN 1/7A, 1/7B and 1/7E, Bandar Baru Nilai, Negeri Sembilan. https://covid-19.moh.gov.my/faqsop/sop-perintah-kawalan-pergerakan-diperketatkan-pkpd-emco/SOP-PERINTAH-KAWALAN-PERGERAKAN-DIPERKETATKAN-PKPD-DI-BBN-kemaskini-27-Okt-2020.pdf

National Security Council. (2020b, October 31). Standard Operating Procedures for Conditional Movement Control Order: Kuala Lumpur, Putrajaya and Selangor. https://covid-19.moh.gov.my/faqsop/sop-pkp-pemulihan/SOP_PKPB_KL,PUTRAJAYA_DAN_SELANGOR_Kemaskini_31_OKTOBER_2020.pdf

National Security Council. (2021, May 31). Standard Operating Procedures for Public Transportation. http://cccovid19.mot.gov.my/assets/images/preview/MOT_PKP_SOP_Pengangkutan_Awam_Kemaskini_31_Mei_2021.pdf

Nordin, N., & Nakamura, H. (2020). The influence of the objective and subjective physical neighbourhood environment on the physical activity of older adults: A case study in the Malaysian Neighbourhoods of Johor Bahru. *Sustainability*, 12(5), 1760.

Norshariani, A. R. (2020). Dietary Patterns of Malaysians During the Movement Control Order (MCO) During the Covid-19 Pandemic. International Journal of Academic Research in Business and Social Sciences, 10(10), 97-109.

Papas, M. A., Alberg, A. J., Ewing, R., Helzlsouer, K. J., Gary, T. L., & Klassen, A. C. (2007). The built environment and obesity. *Epidemiologic reviews*, 29(1), 129-143.

Richardson, A. S., Meyer, K. A., Howard, A. G., Boone-Heinonen, J., Popkin, B. M., Evenson, K. R., & Gordon-Larsen, P. (2015). Multiple pathways from the neighborhood food environment to increased body mass index through dietary behaviors: a structural equation-based analysis in the CARDIA study. *Health & place*, 36, 74-87.

Saimon, R., Choo, W. Y., & Bulgiba, A. (2015). "Feeling Unsafe" A Photovoice Analysis of Factors Influencing Physical Activity Behavior Among Malaysian Adolescents. *Asia Pacific Journal of Public Health*, 27(2), NP2079-NP2092.

Sanyaolu, A., Okorie, C., Marinkovic, A., Patidar, R., Younis, K., Desai, P., ... & Altaf, M. (2020). Comorbidity and its impact on patients with COVID-19. *SN comprehensive clinical medicine*, 1-8.

Sim, B. L. H., Chidambaram, S. K., Wong, X. C., Pathmanathan, M. D., Peariasamy, K. M., Hor, C. P., ... & Goh, P. P. (2020). Clinical characteristics and risk factors for severe COVID-19 infections in Malaysia: A nationwide observational study. *The Lancet Regional Health-Western Pacific*, 4, 100055.

Sreeramareddy, C. T., Kutty, N. A. M., Jabbar, M. A. R., & Boo, N. Y. (2012). Physical activity and associated factors among young adults in Malaysia: an online exploratory survey. *Bioscience trends*, 6(3), 103-109.

Tung, S. E. H., Ng, X. H., Chin, Y. S., & Mohd Taib, M. N. (2016). Associations between parents' perception of neighbourhood environments and safety with physical activity of primary school children in Klang, Selangor, Malaysia. *Child: care, health and development*, 42(4), 478-485.

Warburton, D. E., & Bredin, S. S. (2016). Reflections on physical activity and health: what should we recommend?. *Canadian Journal of Cardiology*, 32(4), 495-504.

World Health Organization. (2021). *Stay physically active during self-quarantine.* https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/noncommunicable-diseases/stay-physically-active-during-self-quarantine

Xu, Y., & Wang, F. (2015). Built environment and obesity by urbanicity in the US. *Health & place,* 34, 19-29.

Yi, L. Y., Samat, N., & Muda, W. M. W. (2017). Accelerometer-Measured Physical Activity and its Relationship with Body Mass Index (BMI) and Waist Circumference (WC) Measurements: A Cross-Sectional Study on Malaysian Adults. *Malaysian Journal of Nutrition,* 23(3).

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 352 – 362

MODE CHOICE OF MOTHERS TRAVELLING WITH YOUNG CHILDREN IN MALAYSIA

Yong Adilah SH[1], Suhana Koting[2], Nur Sabahiah[3], Melasutra MD[4], Nurfatin F.[5], Osada Teppei[6]

[1,5]*Department of Urban and Regional Planning*
UNIVERSITY MALAYA
[2]*Centre of Transportation Research*
UNIVERSITY MALAYA
[3]*Faculty of Engineering*
UNIVERSITY SCIENCE MALAYSIA
[4]*Centre of Sustainable Urban Planning and Real Estate, SUPRE*
UNIVERSITY MALAYA
[6]*Faculty of Engineering*
UTSUNOMIYA UNIVERSITY JAPAN

Abstract

Transportation has evolved tremendously; concurrently, the discussion on gender-based transportation demands has grown over the last few decades. Attention is increasingly given to women's needs in transportation, as more women work and travel outside their homes. In developed countries, special considerations of women's travel needs are aimed to ensure their safety when using public transportation. However, as more women can afford a car and possess a driving license, independent travel has also become more feasible, accessible, and comfortable for women, worsening traffic congestion. This article looks at the challenges faced by women, in particular mothers with young children, when using public transportation in Malaysia. Factors like work-family duties, accessibility and connectivity, preference, and provision of public transportation facilities emerged from the analysis of 194 respondents' data. To move towards sustainable cities in Malaysia, these aspects of transportation must be explored to promote public transportation usage by mothers with younger children.

Keyword: Mother's Mobility, Children Mobility, Public Transportation

[1] Senior Lecturer at Faculty of Built Environment, University Malaya Email: adilah_shamsul@um.edu.my

INTRODUCTION

One of the common arguments raised by both men and women throughout our many focus group discussions on public transportation was the need to provide dedicated public transportation to a specific gender. Many early researchers in this field have commonly associated issues pertaining women's mobility with safety, especially in the case of dedicated public transportation for women. In fact, women often refuse or are intimidated by public transportation because of escalating safety problems like rape, molestation, assault, snatch theft, and robbery. Although the same incidents may happen to men, women find it harder to defend themselves, especially in countries with a high rate of crime against women. Delving deeper into this problem, we selected mothers with young children as the subject of our examination to understand why they do not prefer to use public transportation. Reasons may range from limited facilities (e.g., no designated space for strollers or no breastfeeding-friendly areas) to the lack of accessibility and comfort. As long as this issue is not discussed or carefully analyzed, low ridership in public transportation will persist, leaving only single women or men as users of public transportation.

Women's commuting behavior has been found to differ from men's based on general factors like trip behavior, safety, and even commuting activities. These differences, however, do not imply that these factors are the sole reasons women use public transportation or private vehicles more than men. Thus, there is still room for debate on the nature of women's commuting behavior, especially mothers of young children. Why do we even want them to commute using public transportation? Private vehicles make it easier to perform multiple trips with multiple travel occupants. This means in one commute, a mother is able to drive two or more kids in one vehicle to multiple places without having to transit between different stations and waste time waiting for the next transit. This also means mothers' journeys are more flexible and able to accommodate more luggage or children's needs. However, this trend will only lead single-turned-parent women to greater dependency on private vehicles, leaving public transportation as the last or forgotten option. Ultimately, difficulties will arise in reducing the percentage of cars on the road as well as in motivating people to use public transportation. Therefore, the issue now is whether we need to encourage mothers with young children to use public transportation.

As indicated in many previous studies, women's reliance on private vehicles assists mothers' daily travel by offering them the authority and autonomy to make better decisions about their trips. Switching from this mode to the public one means that mothers have to make sure their children's schools or kindergartens are closer to their workplace, allowing them to just drop their children on-foot while walking to work from a public transportation station. In fact, in many developed countries, working mothers with younger children show an incredibly promising dependence on public transportation, as more

kindergartens are developing near working places in the city and mothers have more public commuting options instead of only private vehicles.

In Malaysia, inspired by the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), Sustainable Development Goals (SDG), and the Beijing Action Plan, the government has launched the *Dasar Wanita Negara* and the *Pelan Tindakan Pembangunan Wanita* for female empowerment. The involvement of women in policy making roles has also increased in the Malaysian government sector, which aligns with the United Nations' goals; nonetheless, female participation in the private sector in Malaysia remains low at 25.8%.

With regard to public transportation, policy making falls within the jurisdiction of the Ministry of Transport Malaysia under the Economic Planning Unit (EPU). Although different agencies are responsible for different public transportation modes, the ministry oversees all their functions, responsibilities, and licenses. Based on the government's aspirations to increase public transportation usage to 60% by the year 2030, public transportation policy focuses more on land-based transport modes because they have a greater impact on the reduction of private vehicles on the road. In addition, transportation is also addressed by the Women and Family Affairs Ministry, which emphasizes inclusivity in providing friendly services to women, children, the elderly, and the disabled. Such inclusivity encompasses the use and accessibility of public transportation, as can be seen in the development and improvement of public transportation services over the years. Although the participation of women in the labor force is only 55.4%, the evolution of transportation has led to growing numbers of women joining the workforce. Moreover, with the aspiration to encourage lower income groups to use public transportation, programs like MY30 (where users had to pay only RM30 per month for a travel pass in June 2020) have given numerous benefits to public transportation users, including women. The Women and Family Affairs Ministry has also supported efforts to ensure children's rights in public transportation as well as the Child-Friendly Cities Initiative (CFC). This includes ensuring public transportation providers offer safe facilities and infrastructure for children, such as the accessible use of strollers in public transportation.

METHODOLOGY

This study used the survey instrument to collect data from working mothers in Malaysia. Data was gathered in two phases because the COVID-19 pandemic in Malaysia disrupted the administration of the first survey and caused significant delays. On the 1st of November 2020, the first survey was distributed to working women with children using the snowball sampling technique. The second survey was distributed randomly in several primary schools on 9th March 2021 to encourage more participation from mothers. A total of 194 respondents

participated voluntarily by completing the survey through an online Google Form. The main purpose of this study was to acquire an understanding of the travel behavior of working women (i.e., mothers) when traveling with their children aged below 12 years old. As this study was part of a larger research on women's travel behavior, only data on the participants' mode choice when traveling with younger children in Malaysia was extracted and examined from the main dataset. Cross-tabulation, Chi-square, and Spearman's rank order correlation were used to analyze the data.

Chi-Square Independent Test

The Chi-Square Independent Test is used to assess whether there is a relationship between two categorical variables, especially for nominal variables. Therefore, the researcher adopted this method to detect the association between variables through cross-tabulation. The tested variables were monthly income, educational status, parents' daily transportation to work, children's daily transportation to school/nursery, and the distribution of childcare duties among couples. Table 1 shows the cross-tabulation of respondents' age with their respective partner's age. A majority of the respondents and their partners were between 30 and 39 years old. It can thus be concluded that the age gap between couples is generally small. Additionally, this age group recorded the most children aged under 12. It appears that the higher their age, the lower the tendency of couples to have younger children. It was also revealed that women acquire higher educational qualifications than their spouse, as 168 respondents reported having a post-secondary education compared to only 129 spouses who had the same education level (see Table 2). However, as shown in Table 3, the monthly income distribution among couples indicates little variation, given that 117 respondents and 115 spouses earned a monthly income from below RM999 to RM4999, falling under the B40 income group. Overall, it can be concluded that there is a significant association between couples' educational status and monthly income. Notably, although most women are better educated than their male counterparts, some women still earn the same as or less than their partner's monthly income. In fact, several previous studies have reported that though women hold higher educational qualifications, their workforce participation is still low in the global context, while those in the workforce are not well-positioned for employment opportunities or are overqualified for current positions (Charlesworth et al. 2011; Craig et al. 2018; Risse 2018). Apart from that, despite their higher educational level, women could be lacking in terms of work experience compared to men, who typically enter the workforce immediately after graduating from an institution. This could also explain women's lower monthly income.

Table 1: Respondent's age * Partner's age Cross Tabulation

		Partner's age					Total
		20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	Others	
Respondent's age	20 to 29 years old	17	3	0	0	0	20
	30 to 39 years old	0	95	19	1	7	122
	40 to 49 years old	0	6	39	1	2	48
	50 to 59 years old	0	0	0	2	2	4
Total		17	104	58	4	11	194

Table 2: Respondent's Educational Status * Partner's Educational Status Cross Tabulation

		Partner's educational status								Total
		UPSR/PMR/SRP	SPM	STPM/Equivalent	Diploma	Degree	Master	Doctor of Philosophy	Not Applicable	
Respondent's	Informal	0	0	0	0	0	0	0	1	1
	SPM	2	10	0	2	1	0	0	5	20

educational status	STPM/Equivalent	1	2	0	1	1	0	0	0	5
	Diploma	0	16	0	12	4	1	0	0	33
	Bachelor's degree	0	13	3	17	41	10	5	5	94
	Master	0	6	1	3	12	7	0	0	29
	Doctor of Philosophy	0	0	0	1	6	0	5	0	12
Total		3	47	4	36	65	18	10	11	194

The analysis reported no association between respondents' monthly income and choice of transportation mode to work (see Table 3). The main transportation mode for women, regardless of income level, appears to be the car. Indeed, most respondents reported to choose a private car over other transportation modes. Meanwhile, their male partners' selection of transport modes is fairly distributed across their monthly income, wherein most men use a motorcycle or car to travel to work despite having multiple choices of transportation mode. From the findings, it can be assumed that women tend to travel by car because it does not only improve time management and schedule control, but is also more convenient and comfortable, especially when commuting with dependent children.

Table 3: Respondent's Monthly Income * Partner's Monthly Income Cross Tabulation

		Partner's monthly income							Total
		RM999 and below	RM1000 to RM1999	RM2000 to RM2999	RM3000 to RM3999	RM4000 to RM4999	RM5000 and above	Not Applicable	
Respondent's monthly income	RM999 and below	2	0	0	0	0	1	1	4
	RM1000 to RM1999	2	6	3	2	2	2	3	20
	RM2000 to RM2999	1	7	7	6	3	3	1	28

	RM3000 to RM3999	2	3	10	19	4	5	0	43
	RM4000 to RM4999	0	3	5	2	5	4	3	22
	RM5000 and above	3	2	5	6	5	53	3	77
Total		10	21	30	35	19	68	11	194

There is a significant association between a couple's transportation mode to their workplaces and their children's transportation mode to school/nursery. Notably, the highlighted value indicates that more mothers send their children to school/nursery by car than fathers. It can thus be concluded that though most couples share childcare duties, especially in sending children to school/nursery, there are still many women who hold on to the primary role in childcare. This was reported in previous studies as well, which found that men travel longer for work purposes while women travel longer for domestic purposes (Sanchez et.al, 2014; Motte-Baumvol et al. 2017).

The results show that there is a significant relationship between children's daily transportation mode to school/nursery and the distribution of childcare duties among couples. Given that most of the respondents send their children to school/nursery using a car, it can be concluded that a car is preferred over other transportation modes because mothers are responsible for sending children to school before going to work every morning. In addition, the total count for fathers and mothers is not vastly different from the total count for mothers alone, indicating a fair distribution of childcare duties among couples. Meaning that, both parents either take turns sending their children to school or send them together using one car (car-sharing).

Spearman's Rank Order Correlation

Spearman's correlation measures the direction and strength of the monotonic link between two continuous or ordinal variables. It a non-parametric measure used when data has violated assumptions by (1) not being normally distributed, (2) having outliers, and (3) having one or both variables in ordinal form. In addition, it uses ranking data rather than the absolute values of the variables. As the present analysis involved ordinal variables, this method was adopted in the study. The variables that were tested were work-family duties, accessibility and connectivity, preference, and provision of public transportation facilities.

As shown in Table 4, there is a significant positive correlation between work-family duties and accessibility to private transportation, especially during emergencies. This indicates that respondents' work-family duties are related to their access to transportation modes. As private transportation is more accessible

than public transportation, it is not surprising that it has a stronger influence women's mode choice to perform their duties. Indeed, if public transportation services offer higher connectivity and accessibility, there is a greater chance of women choosing these services as their daily travel mode.

Table 4: Spearman's Correlation for Work-Family Duties and Accessibility to Private Transportation

Correlations

			Work-family duties and other commitments	Higher accessibility to private transportation
Spearman's rho	Work-family duties and other commitments	Correlation Coefficient	1.000	.456**
		Sig. (2-tailed)	.	.000
		N	194	194
	Higher accessibility to private transportation	Correlation Coefficient	.456**	1.000
		Sig. (2-tailed)	.000	.
		N	194	194

**. Correlation is significant at the 0.01 level (2-tailed).

There is also a significant positive relationship between respondents' preference of travel modes and work-family duties, suggesting that the nature of their duties affect their preference for a particular transport mode (see Table 5). As women take on multiple roles and responsibilities in a day, transport modes must meet specific criteria in terms of convenience, safety, time management, unpredictable events, productivity, and more. In addition, there is a significant positive relationship between the provision of public transportation facilities and parental permission for children's independent travel to school. When more public transportation facilities are provided to secure children's safety, parents are more likely to allow their children to travel independently when they reach a certain age or maturity level. Although the correlation is not strong, it explains that most parents probably do not permit their children to travel independently due to safety issues, especially when they are not under adult supervision.

Table 5: Spearman's Correlation for Preference of Travel Modes and Work-Family Duties

Correlations

			Prefer private transportation over public transportation	Work-family duties and other commitments
Spearman's rho	Prefer private transportation over public transportation	Correlation Coefficient	1.000	.415**
		Sig. (2-tailed)	.	.000
		N	194	194
	Work-family duties and other commitments	Correlation Coefficient	.415**	1.000
		Sig. (2-tailed)	.000	.
		N	194	194

**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Children aged zero to six years old are far more dependent than older children aged seven to 12 years old, who also depend on their parents or caretakers to go to primary school. Although this situation may vary across cultures, demographics, and countries, children at these ages typically rely on adults for all decision making. From this perspective, this study's findings reveal several important takeaways. First, children are not able to decide their own travel mode based on the distance between their home and school and the lack of a good traffic environment to support independent travelling. Most urban areas in Kuala Lumpur sprawl across vast spaces, lengthening the distance between suburban houses and schools. In turn, mature housing areas are located near schools but have more elderly residents than young children. This has resulted in inefficient travelling, whereby children living far from schools have to go to school by car while the elderly living in housing areas near schools are disturbed by traffic congestions during peak hours. A bad traffic environment, including busy traffic, high traffic junctions, and poor pedestrian facilities with limited connections, also makes walking to school nearly impossible for children.

Second, mothers with younger children do not receive any privileges at their workplace. They are treated the same as women with elder children, women with no children, single women, and men. This means they receive equal amounts of work leave, salary, working hours, and entitlement as other workers. Consequently, mothers with younger children have no flexibility despite having to prepare and travel with their infants or babies to kindergartens, nurseries, or

caretakers. For mothers, travelling with children involves not only travelling with additional nursery bags and formula/breastfeeding milk but also travelling to several places if they have more than one dependent child. This makes travelling with a car more efficient and time-saving than waiting for public transport and walking to transit stations. Therefore, a car is a necessity and no more a choice for mothers with younger children.

Third, regardless of the role played by the husband or partner, mothers are always responsible for their younger children. Parents with younger children thus always depend on cars to travel to work or school in the city's urban locations, as most families seek bigger housing spaces commonly found in farther suburban areas. Even low-income families that live in the city center rely on cars to travel, albeit with differences in the type of vehicle they own. In certain cases, family members may live and travel separately during the work week and only meet on the weekends to save travelling time and costs.

Finally, it is difficult to justify the concepts of ability and perception as factors contributing to the reliance on public transportation. This is because none of the respondents in this study use public transportation to take their children to school or to any other places. Encouraging children to walk to school independently is also almost impossible with the poor conditions of land use, transportation integration, and public transportation infrastructure. While many studies have highlighted the use of public transportation in urban areas, they did not clearly discuss the use of public transportation among parents with younger children, whose impact may have been misconstrued as small. In reality, the use of cars by parents with younger children significantly exacerbates the high traffic volume predicament in Kuala Lumpur. Given that household characteristics will always determine travel behavior; attention must be directed to barriers for mothers to travel using public transportation.

CONCLUSION

This study enhances the understanding of the travelling choices of mothers with younger children. The findings in this research suggest that there is almost no reliance on public transportation among mothers of younger children in Kuala Lumpur, Malaysia, who only look to public transport as a last resort. Instead, a private car has become the first choice of mothers when travelling, which will persist even after the child has grown up. The use of cars is important for mothers to ensure their children are comfortable and to travel to work efficiently. Young children imitate their parents' behavior in various ways; consequently, parents' (especially mothers') culture affects the way children will behave as adults in the future. The cycle of dependence on private vehicles will therefore continue if certain interventions do not emerge within the child's life development. Ultimately, to reduce single-occupant vehicles on Kuala Lumpur roads, more people must use public transportation, including women. To this end, more

transit-oriented development or compact city initiatives can be implemented to shorten travel distances and improve public transportation facilities. However, this is not certain until further research is conducted, as perceptions of safety and security still play a key role for mothers to travel with younger children.

This study is limited by the scope of its variables. Some variables that were not discussed in this research include the number of cars owned, type of car, driving skills, weather, and accident experience, all of which can be secondary factors in the decision to travel by car or public transportation with younger children. Future research on this topic can incorporate these variables in more controlled sampling conditions, such as a sample of mothers of special needs children (e.g., autistic, disabled, etc.). This study is also descriptive in nature; as such, future studies can conduct more in-depth quantitative and qualitative analysis of this phenomenon.

ACKNOWLEDGEMENTS

We would like to acknowledge Ministry of Higher Education Malaysia for the Fundamental Research Grant number FRGS/1/2019/SS06/UM/02/2 and everyone who participated in the survey.

REFERENCES

Charlesworth, S., McDonald, P., & Cerise, S. (2011). Naming and claiming workplace sexual harassment in Australia. *Australian Journal of Social Issues*, *46*(2), 141-161.

Craig, L., & Mullan, K. (2011). How mothers and fathers share childcare: A cross-national time-use comparison. *American sociological review*, *76*(6), 834-861.

Risse, L., Farrell, L., & Fry, T. R. (2018). Do gender gaps in confidence explain gender gaps in wages?.

Sánchez, O., Isabel, M., & González, E. M. (2014). Travel patterns, regarding different activities: work, studies, household responsibilities and leisure. *Transportation Research Procedia*, *3*, 119-128.

Tey, N. P. (2022). Demographic dividend with a gender dimension in Malaysia.

Motte-Baumvol, B., Bonin, O., & Belton-Chevallier, L. (2017). Who escort children: mum or dad? Exploring gender differences in escorting mobility among parisian dual-earner couples. *Transportation*, *44*(1), 139-157.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 363 – 376

DETERMINING ELDERLY-FRIENDLY FEATURES BASED ON AN AGE-FRIENDLY CITY APPROACH: AN EMPIRICAL ANALYSIS ON LOCAL PERSPECTIVE IN TAIPING AND IPOH, MALAYSIA

Kushairi Rashid[1], Thuraiya Mohamed[2], Siti Norhawa Azyze Ellah Azyze[3], Hafiszah Ismail[4]

[1, 2,3] Department of Built Environmental Studies and Technology,
Faculty of Architecture, Planning and Survey,
UNIVERSITI TEKNOLOGI MARA, PERAK BRANCH, MALAYSIA
[4] Centre of Studies for Estate Management,
Faculty of Architecture, Planning and Survey,
UNIVERSITI TEKNOLOGI MARA, SELANGOR, MALAYSIA

Abstract

The elderly come from diverse backgrounds and experiences. Thus, they need strategies that can assist them in cherishing a pleasant and respected life, especially in the city. However, the state of age-friendly and elderly-friendly remains a subject for exploration, especially in Malaysia. This study was conducted to determine critical elderly-friendly city features and propose quick-win strategies to adapt Malaysian cities with ageing populations. The study primarily aims to develop an age-friendly city framework consisting of key city features based on Malaysia's local perspective. Quantitative deductive research applied structured surveys as the primary research strategy. Ipoh and Taiping, two cities with the highest elderly in Malaysia, were selected for the study. The Confirmatory Factor Analyses identified 24 key features as necessary, therefore considered to form the Malaysia Cities for Ageing Population Framework (MCAP). It endeavours that the study findings can become a steppingstone to further develop an age-friendly city for the ageing population, rejuvenate the city centre through better spatial planning and utilise available city features to maximise social capital building.

***Keyword**:* elderly-friendly, age-friendly city, elderly population, city features, Malaysia

[1] Lecturer at Universiti Teknologi MARA, Perak Branch Email: kusha575@uitm.edu.my

RESEARCH BACKGROUND

The world is ageing, with the number of the elderly expected to double globally, from 841 million in 2013 to more than 2 billion in 2050 (Hamid, 2015). Amount of people aged above 65 years globally is expected to double, from only 8% (524 million) in 2010 to 16% (1.5 billion) in 2050 (Kim et al., 2014). Within the next decade, the growth of the aged population will be fastest in developing countries.

In 2035, Malaysia is predicted to become an ageing country (Tan et al., 2016), with 15% of the population in the elderly group. The elderly population of Malaysia significantly increased from only 0.5 million in the 1970s to almost 2.3 million in 2010. Currently, out of the 28.5 million Malaysians, 2.2 million are elderly. Therefore, 1 out of every 13 people is an elderly person in Malaysia, and this trend is expected to increase each year (Aini et al., 2016) gradually.

Most Malaysians are unaware of the negative impacts of ageing on physical planning, mainly in terms of designing and accommodating the needs for housing, community engagement, health and well-being. Many scholars urge local authorities to develop future cities or urban areas that better integrate the elderly into the city environment through spatial planning (Abd Samad & Mansor, 2013; Aini et al., 2016; Hamid et al., 2012; Ismail et al., 2015; Knopf, 2007; Metz, 2000; Mohit & Ali, 2016; Tan et al., 2016).

Since the 1980s, World Health Organization (WHO) has developed frameworks to guide cities in providing an environment for the ageing population. The Active Aging Framework, launched in 2002 (Freestone, 2014), was framed based on security (dealing with vulnerability), activity (participation), health, and continuity of education, placing great emphasised on the older citizen's capability to access services and facilities. Then, the Age-Friendly City Guide was introduced while is based on eight key themes developed by engaging with the elderly from 35 cities (WHO, 2002; 2007).

The first three themes of the Age-Friendly City Guide emphasise outdoor spaces and buildings, transportation, and housing to improve personal mobility, safety from injury, security from crime, health behaviour and social participation. Respect and social inclusion, social participation and civic participation and employment are three themes that resonate with the social environment, culture, participation, and mental well-being (WHO, 2007). Meanwhile, communication and information, community support and health services consider social settings and health and social service factors.

The Age-Friendly Cities Guide (WHO, 2007) has been widely replicated in cities across the globe with the variation in scale, locality, actors and strategies involved. Adopting the guide requires integrating local socio-culture and aspirations (Rashid et al., 2021). Although changes were made to the guide, however, it was identified no apparent differences in the themes and city features application (Plouffe & Kalache, 2010). As age-friendly cities continue to grow,

variations of strategies, guidelines and standards of the guide are anticipated to continue widening due to deviation of community needs. Consequently, a precise mechanism to achieve the state of an age-friendly city environment remains a subject for exploration.

The issue poses questions on the suitability of adopting age-friendly city features developed in other countries to fit Malaysia's local context. Therefore, the paper's purpose is to determine city features for the elderly based on the age-friendly city approach that could be suitable for the Malaysian context. Considering the elderly population in Malaysia is increasing dramatically, the critical city features identified should be able to be applied as quick-win development strategies that are not only individually significant but also have collective influence.

RESEARCH DESIGN AND METHODOLOGY

The paper is based on a two-phase study on critical features of an age-friendly city in Malaysia. The initial stage of the study is centred on identifying city features documented by various forms of reports across the globe in implementing an age-friendly city. The results of the initial stage were documented in Rashid et al. (2021) as the main inputs for the second stage. On the contrary, the purpose of the second stage is to determine the suitability of the list of city features to be implemented in Malaysia based on local perspective. A deductive approach study in which a structured survey was selected as the research strategy.

The site for the main study was selected after population distribution, and the analysis observed that Perak has the highest population of elderly compared to other states in Malaysia. Accordingly, further municipal and city-level studies suggest Ipoh and Taiping are the two towns with the highest percentage of elderly in the state.

The second stage of the study involved applying two main methods: an expert survey and a structured interview using a questionnaire. The expert survey took place between 19 July and 26 July 2020, involving 40 respondents that are mainly community leaders, representatives of technical agencies, and academicians based in Perak. The study adopted a closed-ended questionnaire to assess each city's importance in an age-friendly town using an ordinal scale (5 Likert – scale items). Respondents were also encouraged to suggest important city features but were omitted. Feedback was analysed using an arithmetic mean to determine the degree of importance and finalise the key attributes.

The following stage is aimed to validate the key features based on local perspectives and subsequently form a framework for an elderly-friendly environment or Malaysia Cities for Ageing Population Framework (MCAP). The selection of samples was chosen using nonprobability and convenience sampling

techniques. The data gathering process was conducted from 21 August to 2 September 2020, and the study managed to gather a total of 315 respondents, which was more than the required sample size. Calculation of the elderly of 65 years and above using data from the Department of Statistics of Malaysia (Mahidin, 2020) identified the age group form a total population of 94,593. Therefore, the sample size required to achieve a 90% confidence level and 5% acceptable error is 270 respondents (Krejcie & Morgan, 1970).

The primary study survey questionnaire comprises three sections. The first section (Section A) is to obtain input from the respondents. Some basic details consist of five (5) simple questions requiring answers from respondents such as name, address, identification number (IC), category of respondents and phone number. The second section (Section B) attempts to define the age-friendly city baseline information in Ipoh and Taiping, where respondents responded based on their observations and perspective with a nominal scale. The third section (Section C) evaluates each city feature's importance in forming an elderly-friendly city in Ipoh and Taiping City using nominal and ordinal scales (5 Likert – scale items).

The critical city features and age-friendly framework are developed by conducting descriptive and confirmatory factor analyses. The descriptive analyses were mainly performed to determine the average mean and standard deviation (Start, 2006; Cohen et al., 2007; Greener, 2008), followed by Consistency Analyses (Cronch Alpha Result) to test the reliability. Cut-off points applied to determine the CFA's fitness include Bartlett's sphericity test, which should be $p < 0.05$ or smaller, and Kaiser-Meyer-Olkin value which should be 0.6 or above (Pallant, 2020). Initially, data screening was performed to identify possible outlier existence (Pallant, 2020). To further strengthen the findings of CFA, the Anti-image Correlation (Measures of Sampling Adequacy) and Communalities Value (CV) were analysed. Next, the anti-image correlation values (CV) where feature with value less than 0.5, was removes to improve the collective significant of the framework (Dillon & Goldstein, 1984).

RESULT

Expert Survey

Of the 40 respondents, 23 were community leaders, and 17 were from technical agencies and academia. The average age of the community leaders is 58 years, while technical experts involved younger respondents with average age were 40 years. The reliability test using Cronbach's Alpha (á) was identified to have more than 8.0, with values closer to 1 indicating better internal consistency of the items (Sekaran, 2003). Therefore, respondents' valuation of the city features involved were significant consistent.

Descriptive analysis observed an average score between 4.63 for a crime-free environment, while the lowest score was employment assistance with a score of 4.09. The analyses identified 25 features as significant. For inclusion in the framework, only the top three features with an average score of more than 4 (important) were selected as cut-off scores. The list includes four instead of three features from Dimension 3 or Housing that were determined to receive the same average score values.

Table 1: Average Scores for City Features During Expert Study

	Average	**Scale**
Theme 1: Building and Outdoor Spaces		
1. Age-friendly business environment (e.g.: provide suitable toilets and seating, shopping without the need for transportation)	4.28	Important
2. An age-friendly pedestrian system that includes railing and non-slippery surface	4.23	Important
3. Sufficient and accessible public toilets for all ages, mainly the elderly	4.45	Important
Theme 2: Transportation (T)		
4. Public transport service to key destinations (e.g.: hospitals, health centres, public parks and shopping centres)	4.25	Important
5. Training for transportation staff	4.23	Important
6. Roads that are well maintained	4.23	Important
Theme 3: Housing (H)		
7. Residential design for elderly	4.31	Important
8. Housing assist in living (e.g.: facility care, support services in meal and cleaning and home maintenance)	4.47	Important
9. Fund to own or rent a residential unit	4.28	Important
10. Elderly housing options (e.g. private retirement village, nursing home, independent living unit)	4.28	Important
Theme 4: Social Participation (S)		
11. Access to facilities	4.44	Important
12.Availability of age-friendly events and activities in the neighbourhood or city centre (e.g. senamrobik, taici)	4.25	Important
13. Guide service on social participation (e.g.: age-friendly schools, colleges, universities and events)	4.22	Important
Theme 5: Respect and Inclusion (R)		
14. Opportunities for older adults to participate in decision-making bodies (e.g: community councils or communities)	4.34	Important
15. Intergenerational cultural program/ celebration	4.56	Important
16. Provide service assistance to the elderly and respect	4.34	Important

Theme 6: Civic Participation and Employment (C)		
17. Employment assistant services for the elderly	4.09	Important
18. Staff training to conduct elderly program	4.25	Important
19. Volunteering option for the elderly	4.09	Important
Theme 7: Communication and Information (I)		
20. Communication database and record of the elderly living alone	4.31	Important
21.Information and communication methods with the elderly (e.g.: only essential and clear information to keep in touch, simple and familiar words)	4.34	Important
22. Real-time alert system - System that links the elderly with emergency service	4.47	Important
Theme 8: Community Support and Employment (E)		
23.Crime-free in the elderly living environment	4.63	Important
24. Emergency planning for disaster (e.g.: food and supply and medical kit)	4.59	Important
25. Health and support social services	4.50	Important

MAIN STUDY

Respondent Profile

The primary study involved 300 respondents comprising 50% from Taiping, followed by 48.3% from Ipoh, while only 1.7% from other areas. With most respondents being locals, the study strongly believes that local cultural and social aspirations are transpired in determining key city features for an elderly-friendly city. The highest respondents for Ipoh were caregivers, with 54.67%, while older people were 43.33%. Similarly, for Taiping, the highest respondents were caregivers or 57.24% of the total respondents' caregivers, while 42.76% were elderly aged 65. Although caregivers were slightly higher, their opinions were based on the experience of the elderly for whom they cared for. WHO adopted a similar approach for developing Global Age-friendly Cities: A Guide (WHO, 2007).

Table 2: Respondent Profile

Respondent Category	Frequency	Percentage (%)
IPOH		
Caregivers of elderly	82	54.67
Elderly aged 65 years and above	65	43.33
TOTAL	150	100
TAIPING		
Caregivers of elderly	83	57.24
Elderly aged 65 years and above	62	42.76

TOTAL	145	100
OTHERS		
Caregivers of elderly	5	100
Elderly aged 65 years and above	0	0
TOTAL	5	100
SUM		
Caregivers of elderly	173	56.67
Elderly aged 65 years and above	127	43.33
TOTAL	300	100.00

Baseline Information

The baseline study identified majority of respondents found it essential to stay in their current locality as they grow old. The level of participation in the socio-spatial environment is high, with 53.3% of the respondent using local recreation facilities between 1-5 times or 6-10 times per week, indicating good livelihood. However, the number of those who did not visit local recreation facilities was also high, 32%. In terms of health, Ipoh and Taiping respondents were healthy and active; only 36% were involved, although they had common diseases such as diabetes, high blood pressure etc. Observations on data regarding internet access show a balance between accessibility and inaccessibility to the communication medium. The study identified that 47% had good access, while the combination of no and unfamiliar brought the total to 53%, indicating the acceptable degree of access to the internet and digital information.

Table 3: Baseline Information of Respondent

	Frequency	**(%)**
How important for you to stay in Ipoh/Taiping as you grow old?		
Not Important	7	2.33
Important	163	54.33
Very Important	130	43.33
TOTAL	300	100
Health Condition Status		
Healthy and active	170	56.67
Active but has common diseases (diabetes, high blood pressure etc.)	108	36.00
Inactivity and limited movement	20	6.67
Inactive and bedridden	2	0.67
TOTAL	300	100
Participation: Recreation		
1 –5 times	78	26.0
6 –10 times	76	25.3

11 –20 times	33	11.0
20 –30 times	17	5.7
0 (Not Visited)	96	32.0
TOTAL	300	100
Participation: Internet Access		
Yes	142	47.33
No	85	28.33
Not familiar with smart devices or computers	73	24.33
TOTAL	300	100.00
Participation: Classes / Workshops / Educational Programs		
Yes	38	12.67
No	262	87.33
TOTAL	300	100

Descriptive Analysis
As evident from Table 4 below, the average score of 17 features was four (4) and above, while the other eight (8) features were averagely moderate with a score of 3 and above. However, the average score for all 25 features is 4.13. In addition, the standard deviation result shows all the features lie between the ranges of 0.59 to 1.14, indicating that the distribution is near normal.

Confirmatory Factor Analyses (CFA)
The CFA performed produced a KMO value of 0.874, which is higher than the minimum cut-off point of 0.5 and the p. value of Barlett's test was highly significant at 0.000. Thus, observation of the Anti-image Correlation (Measures of Sampling Adequacy) and Communalities Value (CV) identified that 24 of 25 features meet the minimum cut-off point. The feature B1 - Age-Friendly Business Environment was removed to produce a significantly fit model (Refer to Table 4).

DISCUSSION

The two stages of empirical analysis aim to determine elderly-friendly city features based on local perspective. The analysis approach was designed to observe the importance of city features individually and collectively as a whole framework. As such, descriptive analyses were initially conducted and preceded by Confirmatory Factor Analyses (CFA). The descriptive studies identified all features in each theme were ranked important, suggesting consistent findings with the expert survey. Further, analyses using CFA discover that 24 of 25 elements are significant.

Under Business, two features – premises equipped with railing and non-slip floor surfaces and a public toilet for the elderly – were above the minimum

cut-off extraction value, with feature B1-Age Friendly Business Environment not significant. Therefore, the feature was removed from the framework. The result suggests that the building's physical features, i.e. railing, surface and toilet, are more critical than marketing features such as offers and discount vouchers. Transportation-based features in theme 3 were all identified as relevant. For the public transportation system to be more elderly-friendly in Malaysia, public transport needs to provide better access to key destinations and train staff to be elderly cautious (Morris, 2016; Plouffe & Kalache, 2010; Society & Studies, 2007).

Transport intervention is essential to support the elderly to live independently by providing a regular, safe, and affordable transport system to be physically active and socially connected. Since private vehicle dependency among the elderly in Malaysia is high (Na'asah Nasrudin & Abdullah, n.d.), improvement of current road conditions and the public transportation system need to be weighted equally. Regularly maintained road includes roadside verge clearing and grass cutting, cleaning of silted ditches and culverts, patching, and pothole repair, which indeed provide a safer driving environment for the elderly.

Table 4: Evaluation of each feature based on importance in Ipoh and Taiping

	Features	Importance		Communalities	
		Mean	S.D	Initial	Extract.
B1	Age-friendly business environment	4.21	0.73	1.000	0.455*
B2	An age-friendly pedestrian system that includes railing and non-slippery surface	4.48	0.59	1.000	0.648
B3	Sufficient and accessible public toilets for all ages, mainly the elderly	4.28	0.71	1.000	0.625
T4	Public transport service to key destinations	4.43	0.67	1.000	0.584
T5	Training for transportation staff	4.19	0.73	1.000	0.711
T6	Roads that are well maintained	4.52	0.62	1.000	0.720
H7	Residential design for elderly	4.24	0.72	1.000	0.715
H8	Housing assist in living	4.04	0.81	1.000	0.619
H9	Fund to own or rent a residential unit	3.99	0.80	1.000	0.746
H10	Elderly housing options	4.02	0.78	1.000	0.599
S11	Access to facilities	4.09	1.01	1.000	0.696
S12	Availability of age-friendly events and activities in the neighbourhood or city centre	3.98	0.80	1.000	0.725
S13	Guide service on social participation (e.g.: age-friendly schools, colleges, universities and events)	3.83	0.91	1.000	0.705
R14	Opportunities for older adults to participate in decision-making bodies	3.73	0.93	1.000	0.797
R15	Intergenerational cultural program/ celebration	3.84	0.93	1.000	0.730
R16	Provide service assistance to the elderly and respect	4.32	0.65	1.000	0.528

C17	Employment assistant services for the elderly	3.43	1.14	1.000	0.615
C18	Staff training to conduct elderly program	3.83	0.97	1.000	0.702
C19	Volunteering option for the elderly	3.56	1.08	1.000	0.765
I20	Database of the elderly living alone	4.13	0.95	1.000	0.684
I21	Elderly-friendly information and communication tools	4.15	0.83	1.000	0.729
I22	The elderly emergency system that connects the elderly with emergency services	4.33	0.76	1.000	0.706
E23	Crime-free in the elderly living environment	4.59	0.63	1.000	0.688
E24	Emergency planning for disaster	4.56	0.64	1.000	0.775
E25	Health and support social services	4.53	0.65	1.000	0.797

Notes: B – Dimension 1: Building and Outdoor Spaces, T – Dimension 2: Transportation, Dimension 3: H – Housing, S – Dimension 4: Social Participation, R – Dimension 5: Respect and Inclusion, C - Dimension 6: Civic Participation and Employment, I – Dimension 7: Communication and Information, E – Dimension 8: Community Support and Employment.

Results for Theme 3 indicate that the Malaysian elderly has a substantial value on housing and support to allow them to age in place comfortably. Although the features' results were almost comparable, funds to own or rent a residential unit have a higher correlation score. An array of literature has well documented the preferences of the elderly in Malaysia to age in place compared to living in nursing facilities (Aini et al., 2017; Ismail et al., 2020; 2015; Tobi et al., 2017) mainly due to social and cultural preferences. As such, approaches such as age-friendly communities, lifetime homes and lifetime neighbourhoods should be explored and applied in Steels (2015). In this line, local governments can play their roles by influencing development by using planning and development policies to ensure a sufficient supply and application of age-friendly housing design.

In the theme of Social Participation, Access to Social Facilities; access, availability, and privilege; and guide events, activities and entertainment and participation in education formed key features. Social involvement and support are strongly connected to good health and well-being (Feng, 2017). Participation in society allows the elderly to exercise competence, enjoy respect and esteem, and maintain supportive and caring relationships (Stones & Gullifer, 2016). Similarly, the features in the theme Respect and Inclusion were identified to reconcile similar elements. Instilling respect and inclusion requires more intangible than physical features related to opportunity and assistance to participate in the community. Beyond the context of the research findings, parts of inclusion have existed in the form of inclusion of the elderly with a family member through facilitating the development of larger residential units, facilitating the building of adaptable housing, development of retirement villages and aged care facilities with city areas (Benjoe, 2018; Demirkan, 2007; Quintal & Thompson, 2007; South Australia, 2012).

For the theme of Civic Participation and Employment, the result suggests that an elderly-friendly city should provide an opportunity for the elderly to contribute to their communities after retirement. This contribution could be through unpaid and voluntary work in a city setting, augmentation strategies, recruitment services for the elderly, training for staff dealing with the elderly and a range of volunteering options for the elderly. Locally, such features align with the Strategic Plan under the Ministry of Human Resource Malaysia 2020-2025 (*Pelan Strategik Kementerian Sumber Manusia 2020 hingga 2025*).

The communication and information theme comprises a founding database of elderly living alone, elderly-friendly information and communication tools and an elderly emergency system. Such features at the community level connect events and practical information to manage life and receive the support and services the elderly require for themselves and those they care for. Although the importance of the features was highlighted in various documents (Agents et al., 2018; Southway Housing Trust, 2017; Steels, 2015), implementation in Malaysia may face significant challenges due to low technology literacy among the elderly. However, the desire to use the technology must be developed by providing simple and easy-to-use technology (Abdullah et al., 2011).

For the theme Community Support and Health Services, the features in the category received high mean scores, with the average score being more than 4.0. The tenet of the themes and the entailed features lay in the community effort to shape a conducive environment for the elderly (Ismail et al., 2020; Steels, 2015). Health and support services are vital to independently maintaining good health although ageing. The elderly could achieve good health by facilitating community service, especially during an emergency for the elderly and by creating a safer living environment through neighbourhood design. Besides that, an excellent conducive elderly environment community service should also be extended, including crime prevention and disaster management services.

CONCLUSION

Malaysia is predicted to become an ageing country by the year 2035, with 15% of the population in the elderly group. Developing a solution to meet the diverse needs and building capacity for elderly groups, such as housing, community engagement, health, and well-being, should be the primary consideration in any development plan in Malaysia. As the elderly are the vulnerable community segment and requires a unique physical and social environment, a comprehensive framework for developing inclusive cities emerged under various taglines such as 'healthy cities', 'liveable cities', 'lifetime neighbourhoods' and 'active ageing'. However, a precise mechanism to achieve the state of an age-friendly city environment remains a subject for exploration. Therefore, best practices based on the Malaysia local perspective context could have ensued.

The study proposed quick-win strategies to adapt Malaysian cities to the ageing population. Malaysia was identified to have a shorter time to prepare its cities for the ageing population. Therefore, it is critically important to determine the immediate needs of the elderly. Although the study has identified the critical city features based on a local perspective, the list needs to be revived to include multidimensional perspectives that include policymakers, city planners, developers and other professionals to build a mutually enhancing environment for the elderly. Thus, the complexity of cities consisting of multi-ethnicity, social classes, and administrative elements requires more studies to produce comprehensive development strategies.

ACKNOWLEDGEMENT

The researchers thank the Valuation and Property Services Department, Malaysia (INSPEN) and Fundamental Research Grant Schemes (FRGS), Ministry of Higher Education for funding research on elderly and promoting sustainable living. In addition, special thanks are also accorded to Universiti Teknologi MARA Perak Branch.

REFERENCES

Abd Samad, S., & Mansor, N. (2013). Population Ageing and Social Protection in Malaysia. Malaysian Journal of Economic Studies, 50(2), 139–156.

Abdullah, M. Y., Salman, A., Razak, N. A., Noor, N. F. M., & Malek, J. A. (2011). Issues affecting the use of information and communication technology among the elderly: A case study on JENii. 2011 IEEE *10th Malaysia International Conference on Communications*, 29–32.

Agents, I., Ar, I., Ke, O., Oe, O., Cohen, L., Manion, L., Morrison, K., Cottini, E., Lucifora, C., Cottini, E., Data, Q., Ebbinghaus, L., England, A., Faso, B., Guest, B. G., Fleming, P., Hancock, B., Namey, B. E. E., Trotter, R. T., … York, N. (2018). *Future of an Ageing Population. 8*(1), 342–386. https://doi.org/10.1177/216507991206001003

Aini, A. M., Azriyati, W. N., Aziz, W. A., & Zulkifli, N. F. (2017). Middle Adults' Housing Expectations for Old-age: A Study of Urban Area of Greater Kuala Lumpur. In *Journal of Design and Built Environment*.

Aini, A. M., Murni, N., & Abdul Aziz, W. N. A. W. (2016). Housing Aspirations of the Elderly in Malaysia: A Comparison of Urban and Rural Areas. In *Journal of Design and Built Environment* (Vol. 16, Issue 2).

Benjoe, K. (2018). Creating age friendly communities. *Planning Institute Australia*, A.1. http://sfx.scholarsportal.info.proxy.bib.uottawa.ca/ottawa?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=unknown&sid=ProQ:ProQ%253Acanadiannewsmajor&atitle=Creating+age+friendly+communities&title=Leader+Post&issn=08392870&date=2013-10

Demirkan, H. (2007). Housing for the aging population. *European Review of Aging and Physical Activity, 4*(1), 33–38. https://doi.org/10.1007/s11556-007-0016-z

Dillon, W. R., & Goldstein, M. (1984). Multivariate analysis: Methods and applications. New York: Wiley. 608 p.

Feng, J. (2017). The influence of built environment on travel behavior of the elderly in urban China. Transportation Research Part D: *Transport and Environment, 52,* 619–633. https://doi.org/10.1016/j.trd.2016.11.003

Freestone, R. (2014). Progress in Australian planning history: Traditions, themes and transformations. *Progress in Planning, 91*, 1–29. https://doi.org/10.1016/j.progress.2013.03.005

Hamid, T. (2015). Population Ageing in Malaysia. Population Ageing In Malaysia: A Mosaic of Issues, *Challenges and Prospects, 92*.

Hamid, T. A., Momtaz, Y. A., & Ibrahim, R. (2012). Predictors and Prevalence of Successful Aging among Older Malaysians. Gerontology, 43400, 366–370. https://doi.org/10.1159/000334671

Ismail, H., Halil, F. M., Abidin, A. W. Z., & Hasim, M. S. (2020). Ageing in Place or Late Life Move? The Malaysian elderly generation housing options. *Asian Journal of Behavioural Studies, 5* (18), 1–17.

Ismail, H., Muhamad Halil, F., Zainan Abidin, A. W., & Hasim, M. S. (2020). The Elderly (Senior) Housing Preferences among Generations in Malaysia. E*nvironment-Behaviour Proceedings Journal, 5*(13), 145. https://doi.org/10.21834/e-bpj.v5i13.2102

Ismail, N. W., Siti, H., Abdul, W., Aizan, T., & Abdul, T. (2015). Does Population Aging Affect Economic Growth in Malaysia? 10(September), 205–210.

Kim, D., Lee, J. H., & Ha, M. (2014). Exploring perceptions of designers and medical staff in south korea about design elements for the elder-friendly hospital. *Journal of Interior Design, 39*(4), 15–32. https://doi.org/10.1111/joid.12034

Knopf, A. (2007). Partnering for healthy aging in a small town. Northwest Public Health, 24(2), 16–17. http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=105880594&site=ehost-live

Mahidin, M. U. (2020). Current Population Estimates, Malaysia, 2020. Department of Statistics, Malaysia. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=155&bul_id=OVByWjg5YkQ3MWFZRTN5bDJiaEVhZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09#:~:text=Malaysia's population in 2020 is,to 3.0 million (2020).

Martin, D., Long, O., & Kessler, L. (2019). Planning for Aging in Place: Incorporating the Voice of Elders to Promote Quality of Life. *Journal of Housing for the Elderly, 33*(4), 382–392. https://doi.org/10.1080/02763893.2019.1593280

Metz, D. H. (2000). mobility of older people and their quality of life. 7, 149–152.

Mohit, M. A., & Ali, M. S. (2016). Neighbourhood satisfaction and qoul in middle-income housing in Kuala Lumpur city, Malaysia. *Planning Malaysia, 14*(5).

Morris, K. (2016). Making Cities Better for Aging: Lessons from U.K. Age-Friendly Cities. *Urban and Regional Policy Paper, 42*, 1–6.

Na'asah Nasrudin, H. M. N., & Abdullah, Y. A. (n.d.). Public Awareness towards Sustainable Transportation in Shah Alam, Malaysia.

Pallant, J. (2020). SPSS survival manual: A step by step guide to data analysis using IBM SPSS. Routledge.

Plouffe, L., & Kalache, A. (2010). Towards global Age-Friendly cities: Determining urban features that promote active aging. *Journal of Urban Health, 87*(5), 733–739. https://doi.org/10.1007/s11524-010-9466-0

Quintal, D., & Thompson, S. (2007). Gated Communities: The search for security. State of Australian Cities. The University of New South Wales. Retrieved April, 7, 2011.

Rashid, K., Mohamed, T., Azyze, S. N. A. E., Hazim, Z., Aziz, A. A., & Hashim, I. C. (2021). Determining the features of age friendly for city development. *Planning Malaysia, 19*.

Society, E. A., & Studies, T. (2007). Journal of the Eastern Asia Society for Transportation Studies, Vol. 7, 2007. *Transportation, 7*(2006), 1433–1445.

South Australia. (2012). Age-friendly Neighbourhoods Guidelines and Toolkit for Local Government. Government of South Australia. http://www.sahealth.sa.gov.au/wps/wcm/connect/

Southway Housing Trust. (2017). Age Friendly Strategy 2017 to 2020.

Steels, S. (2015). Key characteristics of age-friendly cities and communities: A review. *Cities, 47*, 45–52. https://doi.org/10.1016/j.cities.2015.02.004

Stones, D., & Gullifer, J. (2016). 'At home it's just so much easier to be yourself': older adults' perceptions of ageing in place. *Ageing & Society, 36*(3), 449–481.

Tan, O., Leng, S., Khan, S., Vergara, R. G., & Khan, N. (2016). Policies and Protections for Ageing Society In Malaysia. 2016. https://doi.org/10.5171/2016.

Tobi, S., Fathi, M., & Amaratunga, D. (2017). Ageing in place, an overview for the elderly in Malaysia. *AIP Conference Proceedings*, 1891 (October). https://doi.org/10.1063/1.5005434

World Health Organization. (2002). Active ageing: A policy framework. World Health Organization. In *World Health Organisation* (Vol. 11). https://doi.org/10.1080/tam.5.1.1.37

World Health Organization. (2007). Global age-friendly cities: A guide. In Community Health. World Health Organization. http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 377 – 390

HIERARCHY OF NEEDS AND SUBJECTIVE WELLBEING

Aisyah Abu Bakar

Department of Environment,
Faculty of Forestry and Environment,
UNIVERSITI PUTRA MALAYSIA

Abstract

Maslow's hierarchy of needs and Subjective Well-Being (SWB) are the two concepts that this paper addresses. The SWB measures used include Eudaimonic Wellbeing (EWB), Human Functioning (HF), and Satisfaction with Life (SWL). Issue: A range of human needs must be fulfilled in order to maintain SWB. However, SWB is not always dependent on the criteria that were considered significant; rather, it depends on the factors that respondents believe are most significant based on their cognitive assessments. Furthermore, people do not have to fully satisfy one need for the subsequent need to rise in the hierarchy. Purpose: In order to determine how SWB relates to the convenience and difficulty of meeting human needs, this study delves into such relationships. Method: Mann Whitney U-Tests were implemented to determine the median SWL across 24 human needs, accounting for both convenience and difficulty. These basic requirements for life are what people typically and widely strive for. Findings: SWB increased by how convenient the majority of human needs can be satisfied. The SWB did not significantly interact with some human needs, despite their being regarded vital.

***Keyword**:* hierarchy of human needs, subjective wellbeing, satisfaction with life, human flourishing, eudaimonic wellbeing

[1] Senior Lecturer at Universiti Putra Malaysia. Email: aisyah.ab@upm.edu.my

INTRODUCTION

Meeting human needs is one of the factors that affects social sustainability in urban settings. This study is a part of a larger body of research on the fulfilment of human needs across different dimensions of wellbeing. The aim of the study is to gauge the difference of SWB level between convenience and difficulties of human needs fulfilment. This paper reports on the statistical interaction between human needs fulfilment and subjective wellbeing (SWB).

LITERATURE REVIEW

The four notions discussed in the paper are (i) Life Satisfaction, (ii) Human Functioning, and (iii) Eudaimonic Wellbeing, all three are under Subjective Well-Being (SWB) field; and finally (iv) Maslow hierarchy of human needs.

The field of SWB is complex and dynamic, to begin with. SWB is a multifaceted construct explaining emotional, judgmental and psychological wellness of an individual as a representative of a bigger sample.

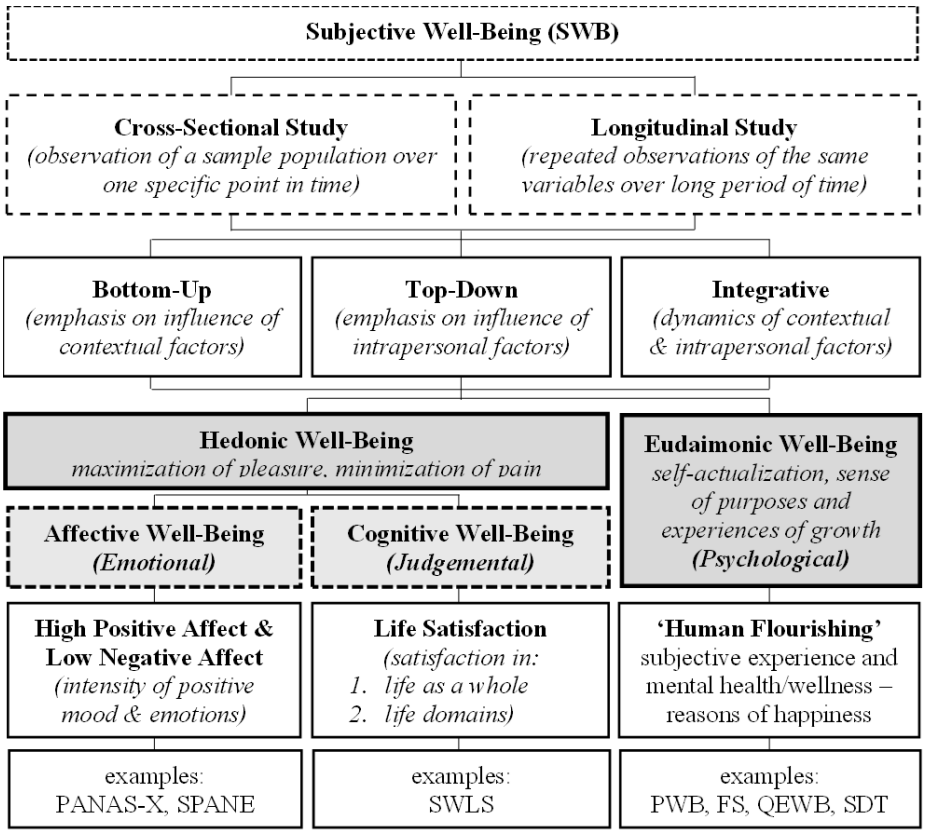


Figure 1: Basic Structure of Subjective Wellbeing

Two SWB philosophical streams of SWB are hedonistic and eudaimonic perspectives. The hedonic approach, defined as the maximising of pleasure and minimum of suffering, is comprised of two essential components: the cognitive or evaluative component and the affective or emotional component.

Life satisfaction refers to a judgement process in which individuals evaluate their lives based on their own unique set of characteristics or criteria (Diener, 1984). Not only is life satisfaction more consistent and long-lasting than happiness, but it also has a considerably broader reach. It is the general outlook on life and how pleased individuals are with how things are going. To the degree that a person has perceived life circumstances fit a self-imposed standard or set of expectations, he or she is likely to report a high level of life satisfaction. Thus, life satisfaction is an intentional cognitive appraisal of one's existence in which the judgement standards are up to the individual. It's easier to think about life pleasure in terms of its cognitive components.

The Satisfaction with Life Scale [SWLs] was developed by Diener et al. (1985) to address the cognitive component of subjective wellbeing. The SWLs is a tool designed to measure the mental and emotional well-being of people. Scales like the SWLS aren't designed to assist people comprehend how satisfied they are with their health, wealth, or relationships, but rather how satisfied they are with life in general.

Eudaimonic wellbeing (EWB) is the quality of a person's life that comes from realising their highest potentials and using those potentials to reach goals that are personally meaningful and in line with their own values. Eudaimonic behaviour is driven by how valuable the action itself is, not by how it makes the person feel. EWB is a concept, just like SWB, that is made up of both subjective and objective parts. As discussed in philosophy, EWB has two types of referents: (i) subjective elements refer to how people feel when they are striving for excellence in personal fulfilment, and (ii) objective elements refer to actions that help people pursue eudaimonic goals or are in some way related to them.

The Flourishing Scale is an 8-item summary that measures a person's perception of their success in key areas including relationships, self-esteem, purpose, and optimism. The measurement shows significant relationships with various levels of psychological wellness and has high psychometric characteristics. In order to live effectively and succeed, one must continually develop personally via interactions with others and the outside environment. Humans have certain potentials that they must be able to realise in order to be considered to be in a state of thriving, but they also have their own opinions, tastes, and goals for how to do this (Rump, 2015).

In response to eudaimonic philosophy, the Questionnaire for Eudaimonic Well-Being (EWB) was also developed to measure wellbeing. The EWB assesses a variety of elements of eudaimonic well-being, including self-discovery, the perception of one's highest potentials being realised, a sense of

meaning and purpose in life, intense involvement in activities, the expenditure of significant effort, and enjoyment of activities as personally expressive (Waterman et al., 2010). There are four ways to achieve eudaimonia: virtue-based wealth, independence, a comfortable and secure existence, or a flourishing state of body and property with the ability to keep and utilise it. A happy later life, money, healthy children, and numerous friends are all aspects of eudaimonia. Eudaimonia also includes physical benefits like health, beautiful looks, athletic ability, renown, fame, vast fortune, and morality (Schutte et al., 2013). This concept is exemplified by Maslow's Hierarchy of Needs (HON), which promotes a eudaimonic vision of human happiness and well-being.

The eudaimonic approaches of SWB are the accomplishment of expressive and self-aligned goals via the strengthening of individuals' best potentials (Biswas-Diener, 2011; Biswas-Diener et al., 2009; Diener et al., 2012; Tay & Diener, 2011). Why people are happy, not what makes them happy, is emphasised. The techniques are linked to Maslow's self-actualization and transcendence (HON).

The phases of human development have been recognised by Abraham Maslow's 1943 HON. Five tiers of motivational needs are arranged in a hierarchical pyramid to represent the phases of human development. The two categories for the five motivating needs are basic needs and growth needs. The biological and physiological requirements, safety needs, love and belonging needs, and esteem needs are in the basic needs, and they are listed in order of how urgently they must be met. The growth needs are those for self-actualization.

According to Maslow (1943), the lowest level of a person's basic needs must be satisfied in order for them to move up the HON. People must first have their basic needs addressed in order to be motivated to accomplish the next level. It becomes more urgent to meet the basic needs as time went on and they went unmet. The lower level of the basic needs requires to be satisfied in order for a person to advance to the higher level of the HON. The individual may go on to the next level and eventually the growth needs, which are self-actualization, after the basic needs have been met. The five stages of hierarchy needs are expanded to eight stages in the 1960s and 1970s. Between basic needs and growth needs, respectively, Maslow (1968) positioned cognitive needs and aesthetic needs. Later, Maslow (1970) expanded the hierarchy of needs by including transcendence needs as the eighth and final level (Maslow, 1943, 1954, 1962, 1970, 1987).

The major principles on HON highlight noteworthy discoveries from the SWB literature about the fulfilment of human needs for the improvement of SWB. Two opposing viewpoints may be derived from the concepts. To begin, it is usually assumed that meeting needs comes first, followed by SWB. That is, SWB is unattainable until the needs are met. Second, increase in some needs might be shallow, leading to dissatisfaction and illness. Unfulfilled or partially

fulfilled needs might add purpose to life and so improve SWB in certain situations.

While Maslow articulated the needs in a hierarchy, he recognized that satisfying any need is not an all-or-nothing phenomenon. As a consequence, there is no requirement for individuals to entirely fulfil one need in order for the next need to appear in the hierarchy. Maslow indicates that, at any given time, most people seem to have partially fulfilled each of their needs—and those needs that are lower in the hierarchy are usually those that people have made the most strides against (Wahba & Bridwell, 1976).

Table 1: Hierarchy of Human Needs

Hierarchy	Understanding
Biological and Physiological Needs	Homeostasis, or maintaining constant levels throughout distinct body systems. Motivation comes from the desire for shelter, water, food, warmth, rest, and health. This is the most important necessity.
Safety and Security Needs	Life and environment safety. These are attempts to avoid violent or hazardous environments, health hazards, illness, and economic pressures in contemporary society.
Belonging and Love Needs	Need for affection and belonging via helpful and communicative friendship, family, and intimate connections. Without these requirements, people may feel guilt, loneliness, melancholy, or poor extraversion.
Esteem Needs	Self-confidence and recognition. Achievement, accomplishment, admiration, and acknowledgment meet these requirements. Without it, people feel inferior.
Cognitive Needs	Knowledge and intellect satisfy the urge to know and comprehend. Learning, exploring, discovering, and creating improve worldview. Without it, confusion and identity crises may result.
Aesthetic Needs	The urge to refresh in nature while absorbing and monitoring their surroundings to extract the world's beauty. They want beauty and harmony.
Self-Actualization	The inherent urge to maximise talents and excel. This urge, when realised, leads to generativity - voting, forming, volunteering, nurturing, and guiding others for the future generation or to outlive oneself.
Transcendence Needs	Need to connect beyond ego and self or assist others achieve self-fulfillment and realise potential. Spiritual needs, accessible from multiple levels, contribute to integrity and a higher degree of being when met.

For the purpose of this research, the human needs are categorized under (i) basic necessities, (ii) complementary needs and (iii) desired opportunities (refer to Table 2). The biological system would suffer damage if the needs of Basic Necessities were not satisfied in time. If the complimentary requirements

were satisfied, there would be no disruption to the living system; nonetheless, life would be challenging. If the needs of desired opportunities were not satisfied, there would be no disruption to the living system, and lives would not be difficult. The HON was used to determine which aspects of human requirements were receptive to empirical investigation. These are the essentials and living conditions that human beings would want to work toward achieving.

Table 2: Human Needs Dimensions and Hierarchy

Human Needs Stages	Hierarchy of Needs	No.	Human Needs Fulfilment
Basic Necessities *Without it, living system is disrupted*	Biological & Physiological Needs	1	Nutritious Food
		2	Medical Treatment
		3	Clean Water (for Wash & Drink)
		4	Clean Air
		5	Well-Function Toilet
	Safety & Security Needs	6	Adequate Electricity
		7	Affordable Houses and Amenities
		8	Financial Stability
		9	Personal Security
		10	Health Assurance
Complementary Needs *Without it, living system is not disrupted, and lives would be difficult*	Belonging and Love Needs	11	Balance in Work and Personal Time
		12	Social Tolerance
		13	Communication Line
		14	Internet Connection
	Esteem Needs	15	Primary School Accomplishment
		16	Secondary School Accomplishment
Desired Opportunity *Without it, living system is not disrupted, and lives would not be difficult*	Cognitive Needs	17	Tertiary School Accomplishment
		18	Job Opportunity
	Aesthetic Needs	19	Well-Maintained Recreational Park
		20	Diversity of Flora and Fauna
	Self-Actualization	21	Rights to Choose Leaders
		22	Freedom of Speech
		23	Corruption Free Opportunities
		24	Freedom to Express Arts & Diversity

Thorough research resulted in the identification of 24 aspects of human needs fulfilment that are often and extensively fought for and which are used experimentally in this study (Abu Bakar et al., 2015; Abu Bakar, Mohamed Osman, Bachok, & Abdullah, 2017; Abu Bakar, Mohamed Osman, Bachok, & Ibrahim, 2016; Abu Bakar, Mohamed Osman, Bachok, Ibrahim, et al., 2016, 2017; Abu Bakar, Mohamed Osman, Bachok, Zen, & Faris Abdullah, 2017; Abu Bakar, Mohamed Osman, Bachok, Zen, Abdullah, et al., 2017; Abu Bakar, Mohamed Osman, Mariana Bachok, et al., 2017; Abu Bakar & Osman, 2021; Mohamed Osman et al., 2017).

METHOD

After the data screening procedure, an assessment of 4,315 samples was carried out. The respondents from Malaysia were provided with an 11-point Likert scale so that they could reply to questions on Satisfaction with Life (SWL), Human Flourishing (HF), and Eudaimonic Wellbeing (EW) (EWB). The respondents were also inquired whether they found each of the 24 human need difficult or convenient to meet. The scale of SWL, HF EWB provided a single-psychological score for SWL, HF EWB.

According to Kolmogorov-Smirnova, the results of the normality tests suggested that the data did not adhere to a normal distribution. As a result, the median value was employed in place of the mean value. Since the median is less likely to be affected by outliers and skewed data than the mean, it is the preferred measure of central tendency in situations in which the distribution is not symmetrical. For each of the 24 human needs, Mann Whitney U-Tests were carried out in order to establish the significance of the difference in the SWB (SWL, HF and EWB) scores between ease and difficulty.

RESULTS

The following tabulations demonstrate mean distribution of SWL, HF and EWB items along with the Mann Whitney U-Test results.

Table 3: Mean Distribution of SWL Items

Indicators	Code	$\bar{x}$	$\bar{x}$SWL
So far, I have gotten the important things I want in life	SWL1	8.08	7.96
If I could live my life over, I would change almost nothing	SWL2	7.85	

Note. Mean Distribution of PE Items ($\bar{x}$) and Overall Mean of SWL ($\bar{x}$SWL)

Table 4: Mann Whitney U-Test Results: Difference of SWL across Convenient and Difficult Human Needs

HUMAN NEEDS (SWL)	Difficult			Convenient			U	z	p
	N	$\bar{x}R$	$\tilde{x}$	N	$\bar{x}R$	$\tilde{x}$			
Nutritious Food	336	1983.82	8.0	3979	**2172.71**	8.0	609947.0	-2.680	.007
Medical Treatment	423	1962.77	7.5	3892	**2179.22**	8.0	740576.0	-3.408	.001
Clean Water (for Wash & Drink)	392	2211.78	8.3	3923	2152.63	8.0	747826.0	-0.900	.368

Clean Air	805	2065.29	8.0	3510	**2179.26**	8.0	1338147.0	-2.351	.019
Well-Function Toilet	428	2108.24	8.0	3887	2163.48	8.0	810519.0	-0.874	.382
Adequate Electricity	1114	2132.59	8.0	3201	2166.84	8.0	1754645.0	-0.794	.427
Affordable Houses and Amenities	1861	2008.48	7.5	2454	**2271.39**	8.0	2005184.5	-6.895	.000
Financial Stability	1578	1954.96	7.5	2737	**2275.06**	8.0	1839095.0	-8.164	.000
Personal Security	1330	2061.99	8.0	2985	**2200.78**	8.0	1857336.5	-3.394	.001
Health Assurance	1325	1969.48	7.5	2990	**2241.54**	8.0	1731081.0	-6.646	.000
Balance in Work and Personal Time	1582	1986.14	7.5	2733	**2257.48**	8.0	1889928.0	-6.924	.000
Social Tolerance	1310	1975.74	7.5	3005	**2237.45**	8.0	1729515.0	-6.373	.000
Communication Line	328	1999.82	8.0	3987	**2171.01**	8.0	601986.5	-2.403	.016
Internet Connection	923	2006.50	8.0	3392	**2199.22**	8.0	1425577.0	-4.185	.000
Primary School Accomplishment	313	2139.34	8.0	4002	2159.46	8.0	620472.5	-0.276	.782
Secondary School Accomplishment	390	2110.29	8.0	3925	2162.74	8.0	746769.5	-0.796	.426
Tertiary School Accomplishment	836	2033.38	7.8	3479	**2187.95**	8.0	1350039.5	-3.235	.001
Job Opportunity	1678	2008.52	7.5	2637	**2253.12**	8.0	1961607.5	-6.315	.000
Well-Maintained Recreational Park	1430	1967.95	7.5	2885	**2252.20**	8.0	1791000.5	-7.086	.000
Diversity of Flora and Fauna	1453	1985.54	7.5	2862	**2245.55**	8.0	1828664.5	-6.507	.000
Rights to Choose Leaders	1823	2016.47	7.5	2492	**2261.54**	8.0	2013445.0	-6.410	.000
Freedom of Speech	1957	2026.03	7.5	2358	**2267.52**	8.0	2049046.5	-6.366	.000
Corruption Free Opportunities	2247	2074.58	8.0	2068	**2248.64**	8.0	2135949.5	-4.605	.000
Freedom to Express Arts & Diversity	1531	1899.87	7.5	2784	**2299.96**	8.0	1735949.0	-10.137	.000

Note. Mean Rank of $\bar{x}\Sigma$ SWL across Difficult and Convenient; ***Bold*** *shows higher mean rank.*

22 out of 24 test-results were statistically significant, therefore suggesting with convenience of fulfilling all of the highlighted human needs (refer to Table 4), SWL was statistically greater. However, SWL did not significantly rise across difficulty nor convenience of fulfilment (i) clean water, (ii) well-function toilet, (iii) adequate electricity, (iv) primary school accomplishment and (v) secondary school accomplishment.

Table 5: Mean Distribution of HF Items

Indicators	**Code**	$\bar{x}$	$\bar{x}$**HF**
I lead a purposeful and meaningful life	HF 1	8.30	8.30
My social relationships are supportive and rewarding	HF 2	8.34	
I am engaged and interested in my daily activities	HF 3	8.35	
I actively contribute to the happiness and well-being of others	HF 4	8.21	
I am competent and capable in the activities that are important to me	HF 5	8.35	
I am a good person and live a good life	HF 6	8.31	
I am optimistic about my future	HF 7	8.37	
People respect me	HF 8	8.11	

Note. Mean Distribution of HF Items ($\bar{x}$) *and Overall Mean of PR* ($\bar{x}HF$)

Table 6: Mann Whitney U-Test Results: Difference of HF across Convenient and Difficult Human Needs

HUMAN NEEDS (HF)	Difficult			Convenient			U	z	p
	N	$\bar{x}R$	$\tilde{x}$	N	$\bar{x}R$	$\tilde{x}$			
Nutritious Food	336	2029.45	8.3	3979	**2168.86**	8.4	625279.5	-1.971	.049
Medical Treatment	423	1907.43	8.1	3892	**2185.23**	8.4	717167.5	-4.358	.000
Clean Water (for Wash & Drink)	392	2125.21	8.4	3923	2161.28	8.4	756053.5	-0.547	.584
Clean Air	805	1980.39	8.3	3510	**2198.73**	8.4	1269795.5	-4.487	.000
Well-Function Toilet	428	1909.99	8.1	3887	**2185.31**	8.4	725671.0	-4.341	.000

Adequate Electricity	1114	2178.41	8.4	3201	2150.90	8.4	1760225.5	-0.635	.525
Affordable Houses and Amenities	1861	2075.49	8.3	2454	**2220.57**	8.5	2129896.5	-3.790	.000
Financial Stability	1578	1971.59	8.3	2737	**2265.47**	8.5	1865338.5	-7.467	.000
Personal Security	1330	1949.75	8.1	2985	**2250.79**	8.5	1708059.0	-7.333	.000
Health Assurance	1325	1935.15	8.1	2990	**2256.75**	8.5	1685599.0	-7.826	.000
Balance in Work and Personal Time	1582	1986.06	8.3	2733	**2257.53**	8.5	1889800.0	-6.901	.000
Social Tolerance	1310	1986.21	8.3	3005	**2232.89**	8.5	1743225.0	-5.984	.000
Communication Line	328	1995.33	8.3	3987	**2171.38**	8.4	600513.0	-2.461	.014
Internet Line	923	2180.72	8.4	3392	2151.82	8.4	1544440.5	-0.625	.532
Primary School Accomplishment	313	1961.84	8.3	4002	**2173.34**	8.4	564915.5	-2.894	.004
Secondary School Accomplishment	390	1863.27	8.1	3925	**2187.28**	8.4	650431.5	-4.901	.000
Tertiary School Accomplishment	836	1952.94	8.1	3479	**2207.27**	8.4	1282796.0	-5.303	.000
Job Opportunity	1678	2081.12	8.3	2637	**2206.92**	8.4	2083436.0	-3.235	.001
Well-Maintained Recreational Park	1430	1971.93	8.3	2885	**2250.23**	8.5	1796688.5	-6.911	.000
Diversity of Flora and Fauna	1453	1978.95	8.1	2862	**2248.90**	8.5	1819082.0	-6.730	.000
Rights to Choose Leaders	1823	2031.94	8.3	2492	**2250.22**	8.5	2041657.5	-5.688	.000
Freedom of Speech	1957	2095.21	8.4	2358	**2210.11**	8.4	2184419.5	-3.018	.003
Corruption Free Opportunities	2247	2144.92	8.4	2068	2172.21	8.4	2294001.5	-0.719	.472
Freedom to Express Arts & Diversity	1531	1929.21	8.1	2784	**2283.82**	8.5	1780879.0	-8.950	.000

Note. Mean Rank of ***x̄Σ*** *HF across Difficult and Convenient;* ***Bold*** *shows higher mean rank.*

20 out of 24 test-results were statistically significant, therefore suggesting with convenience of fulfilling all of the highlighted human needs (refer to Table 6), HF was statistically greater. However, HF did not significantly rise across difficulty nor convenience of fulfilment for (i) clean water, (ii) adequate electricity, (iii) internet connection, and (iv) corruption free opportunities.

Table 7: Mean Distribution of EWB Items

Indicators	**Code**	**x̄**	**x̄EWB**
It is important to know what I am doing fits with purposes worth pursuing	EWB 1	8.61	8.42
My life is centered around a set of core beliefs that give meaning to my life	EWB 2	8.56	
I know my best potentials and I make an effort to develop those potentials	EWB 3	8.40	
I know more of what is best for me to do in my life than anyone else	EWB 4	8.36	
I have a clear direction and understanding of where my life is going	EWB 5	8.38	
When I engage in activities that involve my best potentials, I feel really alive	EWB 6	8.32	
It is important to me that I feel fulfilled by the activities that I engage in	EWB 7	8.45	
The adversities faced in doing something are valuable life experiences	EWB 8	8.49	
I can easily invest in the work that I do	EWB 9	8.19	
I believe I have discovered who I really am	EWB10	8.44	

*Note. Mean Distribution of EWB Items (****x̄****) and Overall Mean of EWB (****x̄EWB****)*

Table 8: Mann Whitney U-Test Results: Difference of EWB across Convenient and Difficult Human Needs

HUMAN NEEDS (EWB)	Difficult			Convenient			U	z	p
	N	x̄*R*	x̃	N	x̄*R*	x̃			
Nutritious Food	336	2093.63	8.5	3979	2163.44	8.6	646845.0	-0.987	.324
Medical Treatment	423	1917.21	8.3	3892	**2184.17**	8.6	721302.5	-4.187	.000
Clean Water (for Wash & Drink)	392	2085.55	8.5	3923	2165.24	8.6	740507.5	-1.208	.227
Clean Air	805	2031.64	8.4	3510	**2186.98**	8.6	1311056.0	-3.192	.001
Well-Function Toilet	428	1852.05	8.2	3887	**2191.69**	8.6	700872.0	-5.355	.000

Adequate Electricity	1114	2193.85	8.6	3201	2145.52	8.6	1743015.0	-1.116	.265
Affordable Houses and Amenities	1861	2120.31	8.6	2454	2186.58	8.6	2213302.0	-1.731	.083
Financial Stability	1578	2042.35	8.5	2737	**2224.68**	8.7	1976992.0	-4.632	.000
Personal Security	1330	2024.10	8.4	2985	**2217.66**	8.7	1806942.5	-4.714	.000
Health Assurance	1325	2010.08	8.3	2990	**2223.55**	8.7	1784877.5	-5.194	.000
Balance in Work and Personal Time	1582	2059.76	8.4	2733	**2214.87**	8.7	2006390.5	-3.942	.000
Social Tolerance	1310	2058.57	8.4	3005	**2201.35**	8.6	1838021.5	-3.463	.001
Communication Line	328	1910.22	8.4	3987	**2178.38**	8.6	572596.5	-3.748	.000
Internet Line	923	2226.79	8.7	3392	2139.28	8.6	1501916.5	-1.893	.058
Primary School Accomplishment	313	1812.10	8.2	4002	**2185.05**	8.6	518047.5	-5.102	.000
Secondary School Accomplishment	390	1862.55	8.3	3925	**2187.36**	8.6	650150.5	-4.912	.000
Tertiary School Accomplishment	836	1962.94	8.3	3479	**2204.87**	8.6	1291149.0	-5.043	.000
Job Opportunity	1678	2139.17	8.6	2637	2169.98	8.6	2180847.5	-0.792	.428
Well-Maintained Recreational Park	1430	2008.94	8.4	2885	**2231.88**	8.7	1849626.0	-5.535	.000
Diversity of Flora and Fauna	1453	2000.76	8.4	2862	**2237.83**	8.7	1850780.0	-5.909	.000
Rights to Choose Leaders	1823	2086.28	8.5	2492	**2210.47**	8.7	2140705.5	-3.236	.001
Freedom of Speech	1957	2131.89	8.6	2358	2179.67	8.6	2256203.0	-1.255	.210
Corruption Free Opportunities	2247	2184.51	8.6	2068	2129.20	8.6	2263835.5	-1.457	.145
Freedom to Express Arts & Diversity	1531	1949.61	8.3	2784	**2272.60**	8.7	1812101.5	-8.151	.000

Note. Mean Rank of $\bar{x}\Sigma$ EWB across Difficult and Convenient; ***Bold*** *shows higher mean rank.*

16 out of 24 test-results were statistically significant, therefore suggesting with convenience of fulfilling all of the highlighted human needs (refer to Table 4), EWB was statistically greater. However, EWB did not significantly rise across difficulty nor convenience of fulfilment for (i) nutritious food, (ii) clean water, (iii) adequate electricity, (iv) affordable houses, (v) internet connection, (vi) job opportunity, (vii) freedom of speech, (viii) corruption free opportunities.

DISCUSSION

The findings revealed that SWL, HF, and EWB increased when almost all of the human needs are convenient to meet. Thus, suggesting that the convenience to meet these human needs will heighten overall SWV. Nevertheless, for certain human needs, in particular (i) clean water and (ii) adequate electricity, none of the SWB (SWL, HF and SWB) scores significantly rise across difficulty nor convenience of fulfilment.

Table 9: Summary of Findings

Condition 1: Difficulty	Condition 2: Convenient	Condition 3: Neither
The difficulty to meet the human need increases SWB	The convenience to meet the human need increases SWB	Neither convenience or difficulty to meet the human need increases SWB
SWB is greater with difficulty to meet the human need.	SWB is greater with convenience to meet the human need.	SWB does not change with convenience nor difficulty to meet the human need.

Hierarchy of Needs		No.	Human Needs	SWL	HF	EWB
Basic Necessities	Biological & Physiological Needs	1	Nutritious Food	Cond.2	Cond.2	Cond.3
		2	Medical Treatment	Cond.2	Cond.2	Cond.2
		3	Clean Water (for Wash & Drink)	Cond.3	Cond.3	Cond.3
		4	Clean Air	Cond.2	Cond.2	Cond.2
		5	Well-Function Toilet	Cond.3	Cond.2	Cond.2

	Safety & Security Needs	6 Adequate Electricity	Cond.3	Cond.3	Cond.3
		7 Affordable Houses and Amenities	Cond.2	Cond.2	Cond.3
		8 Financial Stability	Cond.2	Cond.2	Cond.2
		9 Personal Security	Cond.2	Cond.2	Cond.2
		10 Health Assurance	Cond.2	Cond.2	Cond.2
Complementary Needs	Belonging and Love Needs	11 Balance in Work and Personal Time	Cond.2	Cond.2	Cond.2
		12 Social Tolerance	Cond.2	Cond.2	Cond.2
		13 Communication Line	Cond.2	Cond.2	Cond.2
		14 Internet Connection	Cond.2	Cond.3	Cond.3
	Esteem Needs	15 Primary School Accomplishment	Cond.3	Cond.2	Cond.2
		16 Secondary School Accomplishment	Cond.3	Cond.2	Cond.2
Desired Opportunity	Cognitive Needs	17 Tertiary School Accomplishment	Cond.2	Cond.2	Cond.2
		18 Job Opportunity	Cond.2	Cond.2	Cond.3
	Aesthetic Needs	19 Well-Maintained Recreational Park	Cond.2	Cond.2	Cond.2
		20 Diversity of Flora and Fauna	Cond.2	Cond.2	Cond.2
	Self-Actualization	21 Rights to Choose Leaders	Cond.2	Cond.2	Cond.2
		22 Freedom of Speech	Cond.2	Cond.2	Cond.3
		23 Corruption Free Opportunities	Cond.2	Cond.3	Cond.3
		24 Freedom to Express Arts & Diversity	Cond.2	Cond.2	Cond.2

The statistical results call for revision of both the top-down and bottom-up theories of SWB to be revised in light of the new information. Bottom-up theory contends that SWB may be defined as the state of having one's contextual human needs met. While top-down theories argue that basic human needs determine overall SWB in a given area, bottom-up theories suggest the opposite. Even though there are many factors that go into the fulfillment of human needs, achieving SWB is not always dependent on the parameters that researchers consider to be relevant; rather, it is dependent on the aspects that respondents believe to be the most important based on their cognitive evaluations.

In this instance, the respondents believed that the majority of the human needs are crucial in order to attain SWB. However, SWB does not depend on (i) clean water and (ii) adequate electricity. In other words, the respondents do not perceive the two human needs as meaningful to achieve SWB. Still, the respondents found the remaining 22 human needs meaningful in reaching wellbeing. The results also indicated that all SWB scores (SWL, HF and EWB) significantly increased with convenience of fulfilling 13 human needs. Within dimension of basic necessities, the needs are (i) medical treatment, (ii) clean air, (iii) financial stability, (iv) personal security, and (v) health assurance. Within complimentary needs, the needs are (vi) balance in work and personal time, (vii) social tolerance and (viii) communication line. Finally, within desired opportunities, the needs are (ix) tertiary education, (x) well-maintained recreational park, (xi) diversity of flora and fauna, (xii) rights to choose leaders, and (xiii) freedom to express arts and diversity

Another principle relevant to the result is the two contradictory perspectives of the HON. First, fulfilling needs is believed to come first, followed by SWB. Thus, SWB cannot be attained unless the demands are addressed.

Second, fulfillment of certain needs may be superficial, leading to discontent and illbeing. An example of this is money. Having too much money can lead to unhappiness. Therefore, in some circumstances, unfulfilled or partly satisfied needs may bring meaning to life, hence enhancing SWB. While Maslow outlined the requirements in a hierarchy, he understood that people are not required to completely fulfil one need in order for the next need to arise in the hierarchy. Therefore, although the aspects of needs are deemed to be important, partial fulfillment can be meaningful to heighten SWB.

CONCLUSION

This article is part of a bigger body of research that highlights the importance of addressing human needs in a variety of wellbeing domains. The study examines the interaction between SWB and the human needs fulfilment. The findings indicate that SWB improves greatly when the majority of human demands can be conveniently fulfilled. In future research, representations of human needs should also portray Malaysia's economic progress.

REFERENCES

Abraham Harold Maslow. (1943). A Theaory of Human Motivation. *Psychological Review*, *50*(4), 370–396.

Abraham Harold Maslow. (1954). *Motivation and Personality*. Harper and Row.

Abraham Harold Maslow. (1962). *Toward a Psychology of Being*. D. Van Nostrand Company.

Abraham Harold Maslow. (1970). *Motivation and Personality* (Second Edition). Harper & Row.

Abraham Harold Maslow. (1987). *Motivation and Personality* (Third Edition). Pearson Education.

Abu Bakar, A., Mohamed Osman, Mariana Bachok, S., Ibrahim, M., Abdullah, A.. (2017). Sustainable Well-Being: An Empirical Exploration on Human Interdependence with the Environment. *Advanced Science Letters*, *23*(7), 6357-6361(5). https://doi.org/https://doi.org/10.1166/asl.2017.9269

Abu Bakar, A., Mohamed Osman, M., Bachok, S., & Abdullah, A. (2017). Sustainable Well-Being Objective Indicators: Basic Necessities, Complementary Needs and Desired Opportunities. In B. McLellan (Ed.), *Sustainable Future for Human Security* (pp. 175–188). Springer, Singapore. https://doi.org/https://doi.org/10.1007/978-981-10-5433-4_12

Abu Bakar, A., Mohamed Osman, M., Bachok, S., & Ibrahim, M. (2016). Investigating Rationales of Malaysia Quality of Life and Wellbeing Components and Indicators. *Procedia - Social and Behavioral Sciences*, *222*, 132–142. https://doi.org/https://doi.org/10.1016/j.sbspro.2016.05.202

Abu Bakar, A., Mohamed Osman, M., Bachok, S., Ibrahim, M., & Abdullah, A. (2017). Assessment on Subjective Sustainable Well-Being for Central Region of Malaysia. *Advanced Science Letters*, *23*(4), 929-2933(5). https://doi.org/https://doi.org/10.1166/asl.2017.7609

Abu Bakar, A., Mohamed Osman, M., Bachok, S., Ibrahim, M., & Abdullah, M. F. (2016). Sustainable Well-Being: An Empirical Exploration on Human Needs and Human Interdependency. *PLANNING MALAYSIA Journal of the Malaysia Institute of Planners*, *XIV*, 29–38. https://doi.org/http://dx.doi.org/10.21837/pmjournal.v14.i5.181

Abu Bakar, A., Mohamed Osman, M., Bachok, S., Ibrahim, M., & Mohamed, M. Z. (2015). Modelling Economic Wellbeing and Social Wellbeing for Sustainability: A Theoretical Concept. *Procedia Environmental Sciences*, *28*, 286–296. https://doi.org/https://doi.org/10.1016/j.proenv.2015.07.037

Abu Bakar, A., Mohamed Osman, M., Bachok, S., Zen, I., Abdullah, A., & Abdullah, M. F. (2017). A Theoretical Assessment on Sustainable Wellbeing Indicators for People Interrelationships. *PLANNING MALAYSIA Journal of the Malaysia Institute of Planners*, *15*(1), 21–30. https://doi.org/http://dx.doi.org/10.21837/pmjournal.v15.i1.219

Abu Bakar, A., Mohamed Osman, M., Bachok, S., Zen, I., & Faris Abdullah, M. (2017). A Review on Sustainable Wellbeing Indicators for Human Interrelationships with the Enviroment. *PLANNING MALAYSIA Journal of the Malaysia Institute of Planners*, *15*(1), 357–368. https://doi.org/http://dx.doi.org/10.21837/pmjournal.v15.i1.252

Abu Bakar, A., & Osman, M. M. (2021). Satisfaction With Life and Human Needs Fulfillment. *PLANNING MALAYSIA Journal of the Malaysia Institute of Planners*, *19*(4), 197–206. https://doi.org/10.21837/pm.v19i18.1045

Biswas-Diener, R. (2011). Applied positive psychology: Progress and challenges. *The European Health Psychologist*, *13*(June), 24–26. http://www.ehps.net/ehp/issues/2011/v13iss2_June2011/EHP_June_2011.pdf#page=7

Biswas-Diener, R., Kashdan, T. B., & King, L. a. (2009). Two traditions of happiness research, not two distinct types of happiness. *The Journal of Positive Psychology*, *4*(3), 208–211. https://doi.org/10.1080/17439760902844400

Diener, E., Oishi, S., & Lucas, R. E. (2012). Subjective Well-Being: The Science of Happiness and Life Satisfaction. In *The Oxford Handbook of Positive Psychology, (2 Ed.)*. https://doi.org/10.1093/oxfordhb/9780195187243.013.0017

Mohamed Osman, M., Bachok, S., Abdullah, A., Ibrahim, M., & Bakar, A. A. (2017). Analysis on the Fulfillment of Hierarchy of Needs for Central Region of Malaysia. *Advanced Science Letters*, *23*(1), 417-421(5). https://doi.org/https://doi.org/10.1166/asl.2017.7203

Rump, S. (2015). *The Flourishing Scale in comparison with other well-being scales : The examination and validation of a new measure*.

Schutte, L., Wissing, M. P., & Khumalo, I. P. (2013). Further validation of the questionnaire for eudaimonic well-being (QEWB). *Psychology of Well-Being: Theory, Research and Practice*, *3*(2010), 3. https://doi.org/10.1186/2211-1522-3-3

Tay, L., & Diener, E. (2011). Needs and subjective well-being around the world. *Journal of Personality and Social Psychology*, *101*(2), 354–365. https://doi.org/10.1037/a0023779

Wahba, M. A., & Bridwell, L. G. (1976). Maslow reconsidered: A review of research on the need hierarchy theory. *Organizational Behavior and Human Performance*, *15*(2), 212–240. http://www.sciencedirect.com/science/article/pii/0030507376900386

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 391 – 403

THE CHALLENGES IN RURAL INFRASTRUCTURE PLANNING GOVERNANCE IN SARAWAK

Mark Anak Edward Tuah[1], Peter Aning Tedong[2], Melasutra Binti Md. Dali[3]

[1,2,3] *Faculty of Built Environment,*
UNIVERSITY OF MALAYA

Abstract

Infrastructure development strategies remain an integral part of Malaysia's rural development policies and strategies. For the state of Sarawak, rural infrastructure development still remains a challenge. By using qualitative approach, relevant government agencies involved in the rural infrastructure planning process were interviewed to gather their insight on the current practice and the challenge that they faced when planning for rural infrastructure in Sarawak. This paper explores the challenges in the rural infrastructure planning practice which needs to be tackled to improve rural infrastructure delivery. The findings shows that location is a prime challenge in the rural infrastructure delivery. While in terms of governance, lack of funding and investments, lack of coordination between stakeholders, and issues in public resistance are recurring challenges. The discussion suggest that these challenges have to be taken into account and indicates that the integration of governance through policies and institutional roles needs to be emphasize in the rural infrastructure planning practice. The results of this paper intend to promote the importance of rural infrastructure planning that enables practitioners and academics to move forward to recommend a better framework for infrastructure planning in rural settlements.

***Keyword**:* Infrastructure, Rural Infrastructure Planning, Rural Development, Governance

[2] Senior Lecturer at University of Malaya, Malaysia. Email: peteraning@um.edu.my

INTRODUCTION

The development of infrastructure is an integral part of development of a region for productivity and growth (Calderón & Servén, 2004; Srinivasu & Rao, 2013; World Bank, 2019). Through several global commitments and targets, such as the Sustainable Development Goals (SDGs), New Urban Agenda (NUA) and the Paris Agreement on climate change, the role of infrastructure is becoming more widely recognised. Infrastructure is a main driver in 5 of the 17 SDG goals (SDGs 3, 6, 7, 9 and 11), while 121 of the 169 SDG targets is influenced either directly or indirectly by infrastructure development (Thacker et al., 2019; UN Habitat, 2018). Despite the importance of infrastructure in development, is estimated that many worldwide still lacks accessibility to electricity, clean water, sanitation and about are not fully connected by proper roads (UN, 2016).

Often, it is mostly rural areas and their communities which faced this problem of inadequate basic infrastructure which causes income disparity and inequalities (World Bank, 2019) and affects the rural communities' quality of life (Calderón & Servén, 2004; Kaur & Kaur, 2018; Yusoff, Talib, & Pon, 2011). The disparity of infrastructure development remains a prevalent issue that requires attention when it comes to the level of infrastructure (Nedozi, Obasanmi, & Ighata, 2014; Songco, 2002; Srinivasu & Rao, 2013; World Bank, 2019) as rural communities will miss out certain services. Therefore, the importance of infrastructure has to be amplified in rural planning and development strategies and have specific actions to expand access to infrastructures in rural areas.

RESEARCH BACKGROUND

Malaysia as a developing country too faces the challenge of disparities in urban and rural development (Hoe, Wahab, Bakar, & Islam, 2017; Mohd, Azhar, Shakil, Senadjki, & Iran, 2018). Despite rapid pace of economic development in the last few decades and government initiated rural development policies and initiatives, development gaps still persist between the communities living in the urban and rural areas in particularly in the rural areas of the states in East Malaysia, Sabah and Sarawak which persistently have had lower coverage of rural infrastructure as compared to rural areas in Peninsular Malaysia (Arshad & Shamsudin, 1997; Ngah, 2009, 2011). The East Malaysian state of Sarawak continues to face the challenges in its development of rural areas. Issues of urban and rural disparities in Sarawak and pockets of rural settlements that still do not have access to basic infrastructure are problems that continues to be addressed in the Twelfth Malaysia Plan.

As of 2019, it is estimated that 40.6 % of Sarawak's population still live in rural areas (KPLB, 2019) making it the second state after Sabah with the most rural population among all the other states in Malaysia. According to the Ministry of Rural Development's Basic Data 2019, by taking the statistics in 2016, the incidence of poverty in rural areas of Sarawak stands at 1.1% compared to urban

areas which have only 0.3% (KPLB, 2019). This makes rural-urban income disparity in Sarawak still an important issue to be addressed. In 2019, the percentage of households with access to piped water at home was 86.4% while percentage of households in Sarawak with electricity supply was 99.8% (DOSM, 2019) which is relatively lower as compared to most of the states in Peninsular Malaysia which have already reached a coverage of 100%. The coverage of water and electric supply saw an increase by 0.4% and 0.2% respectively from the year period of 2016 to 2019 (DOSM, 2019) which shows that there have been improvement in the provision of water and electric supply to households, be it urban or rural, which can be attributed to the various policies that have been done by the Government. However, the statistics provided by DOSM may be questionable as on the ground, there are the pockets of areas in Sarawak which are mainly rural areas that lack the basic infrastructure of treated water and electricity and this problem still needs further attention.

Review on literatures found that most researchers stated that the factors for lower coverage of rural infrastructure in Sarawak is due to remote location of some of the settlements in remote areas with undulating topography which impose high cost for the provision of infrastructure (Gevelt, 2017; Khengwee et al., 2017). This presents a challenge to all stakeholders in the rural planning process to ensure the delivery of basic infrastructure to rural areas which is crucial to transform rural communities' livelihoods. For these reasons, this article aims to conduct a review on the infrastructure planning approach in rural development and planning practices in Sarawak to identify the challenges of rural infrastructure planning in the governance process in Sarawak. This article hopes that its findings can be built on to enable practitioners and academics to move forward to recommend and promote improvements in infrastructure planning in rural areas.

RESEARCH METHODOLOGY

The findings presented is from a study of rural infrastructure planning and development situation in Malaysia with the focus on the State of Sarawak (See Figure 1).

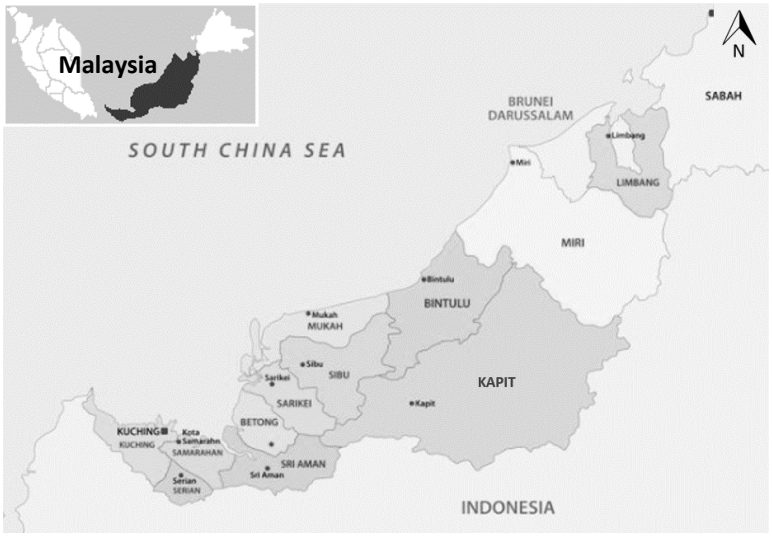


Figure 1: Map of Sarawak State
Source: First Author

For the needs of the research, this study uses a qualitative approach by conducting semi-structured interview with relevant stakeholder related to rural infrastructure planning in Sarawak. The use of structured interviews is used as it is able to provide insights into the research objectives by reflecting the various aspects of infrastructure planning according to the view of the participants. The structure of the interview involved 15 open and closed questions divided into 4 main parts which are first the background of the agency in rural infrastructure planning, secondly, infrastructure planning policies, strategies & programmes, thirdly, issues and challenges of infrastructure planning and finally processes and governance.

Semi-structured interview was conducted with relevant agencies at different policy levels involved with infrastructure planning in Sarawak. The agencies interview was the Sarawak Economic Planning Unit (EPU) which is the central development planning authority in Sarawak, Ministry of Infrastructure and Port Development (MIPD) which is responsible for policy formulation on infrastructure and port development and the Sarawak Public Works Department (JKR) which under its rural development branch, JKR plans, manage, design and implement rural infrastructure development projects in line with Sarawak's socio-economic needs and policies. Two interview sessions were conducted with one session involving EPU and a simultaneously interview session with both Ministry of Infrastructure and Port Development (MIPD) and the Sarawak Public Works Department (JKR) as JKR falls under the purview of MIPD. For each interview sessions, a group of representative officers from each agency or

department were interviewed. Table 1 gives the details of the interview sessions and the participants.

Table 1: Details of the interview sessions and the participants

Interview Session	Ministry/ Agency	Number of respondents
Interview Session 1	Sarawak Economic Planning Unit (EPU)	8 officers
Interview Session 2	Ministry of Infrastructure and Port Development (MIPD)	2 officers from MIPD
	Sarawak Public Works Department (JKR).	2 officers from JKR Sarawak

Based on the collected data from the interview, ATLAS.ti qualitative data analysis software was used for data analysis of the topic themes and objectives. The analysis results are thematically organised from to enable analytical comparison of the opinions of the participating agency's representatives in the topic of the research. Additionally, this data was supported with policy documents and past literature. Based on the results from this analysis, different themes of infrastructure planning governance and process challenges is identified and presented. These results are presented in the discussion section of this paper.

RESULT AND FINDINGS

This section presents the results from the interview sessions. Firstly, we present some statistics on the improvements in basic infrastructure in Sarawak as acknowledged by the officers. Through these projects, there have been significant improvement in the coverage of basic utilities and services in rural areas throughout the Sarawak State. As shown in Figure 2, the rural electricity supply coverage in Sarawak has steadily increased from year 2016 to 2020. It is projected to reach a coverage of 97.0% in the year 2021. Similarly, the rural water supply coverage in Sarawak also have shown an increase as shown in Figure 3 from year 2019 to 2020.

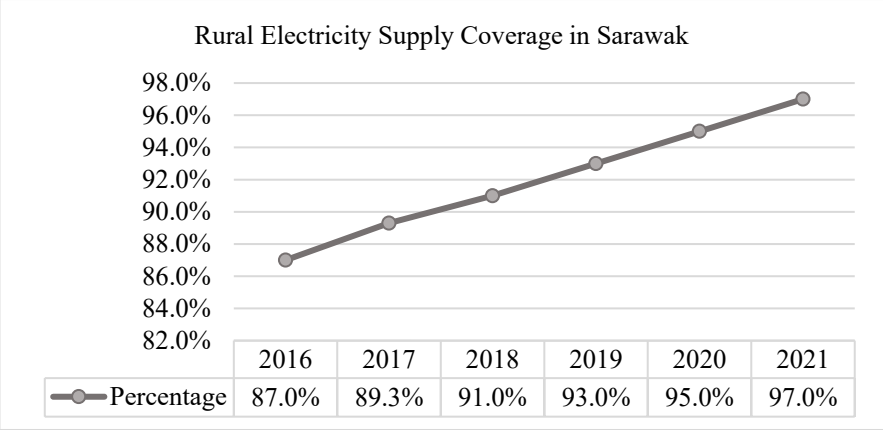


Figure 2: Rural Electricity Supply Coverage in Sarawak
Source: Ministry of Utilities & Sarawak Energy, 2021

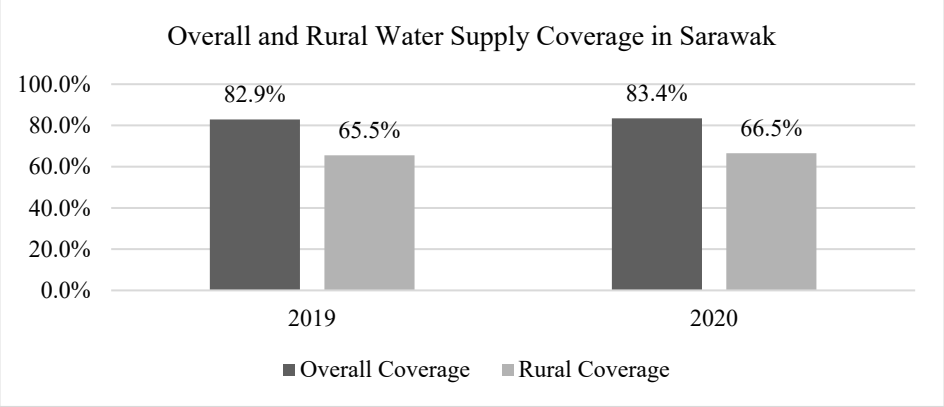


Figure 3: Overall and Rural Water Supply Coverage in Sarawak
Source: Ministry of Utilities & Sarawak Energy, 2020

Under the 2021 State Budget, a total sum of RM1.273 billion was provided for the development of various roads and bridges at several rural areas (Jee, 2020). MIPD records that of 2019, Sarawak has a total road network of 31,780 km of which 1540km is Federal Road and 30,420km of various road categories under MARRIS (Malaysian Roads Record Inventory System). However, this statistic does not fully reflect the coverage of the road network throughout the rural areas in the State. Nevertheless, major road projects such as the Pan-Borneo Highway and Coastal Road are seen as important links connecting towns and rural settlements.

Table 2: Details of Sarawak Total Road Network Year 2019

Type of road	Road Category	Road Length (km)
Federal Road	Federal Road	1,540
Roads registered under MARRIS	State Roads	7,583
	Town Roads	5,797
	Kampung Roads	12,023
	Agriculture Roads	3,805
	Low-Cost Housing Roads	852
	Back Lanes Roads	180
	Total Road Length	3, 0420

Source: Ministry of Infrastructure and Port Development Sarawak, 2021

While there has been improvement in the rural infrastructure, the findings from the interviews finds that the officers agree that development of infrastructure in rural areas in Sarawak remain a challenge. In this study, we were interested in the challenges of infrastructure planning in the rural areas in Sarawak. The discussion of findings from the interview identified four themes of challenges in the rural infrastructure planning governance and process. First is location factor, second is budget and investment, third is cooperation and implementation, and fourth is public resistance.

Location Factor

According to the officers interviewed, they agreed that the aspect of location is a significant challenge to be addressed. The officers expressed that due to Sarawak's vast and undulant geography, rural settlements are scattered around and located at various remote areas such as Lawas and Limbang divisions located at Northern region of Sarawak; and settlements areas at the Rajang River basin and coastal area of the Sarawak State. This factor influences many of the infrastructure projects in terms of technicality and feasibility. As an example, hinterland areas with rough terrain requires cutting and slope protection and expensive connecting infrastructures such as bridges, viaducts, and tunnels. These technicalities due to the geographical location are identified to add up to the expensive cost of rural infrastructure projects. As quoted, an officer explains the challenge of remote location to rural infrastructure delivery as follows:

> *... if you want to build the road for the settlement within the hinterland area but you don't have the main road going there or the access to that particular area, and we want to connect one settlement to another settlement in the hinterland, you don't have the major access to bring the materials in. Therefore, we use the alternative like logging road and plantation road.*

Adding to this issue of locational factor, these rural settlements which are located at remote locations have relatively very low population. Due to this, several officers explain that they face problems to request for funds as they are unable to justify the cost of project for a low population. As quoted from an officer, he explained that, "...we cannot simply bring mega road projects costing us billions to the rural area where there are only few thousand population". Another officer provided example of the present situation where rural settlements near to Hydroelectric Power (HEP) dams are not connected to the electricity supply transmission line connecting as it will involve unfeasible budget top tap down the “last mile” of electricity. Therefore, implementing agency relies on different strategies to provide infrastructure such as through off-grid infrastructure.

For the most part, in dealing with the locational factor, the ministry and agencies talked about how funds are significantly lacking to ensure the technicalities due to remoteness of rural areas can be dealt with. Therefore, they argued that better understanding of the ground situation by ministries and agency officers and support from government at higher level could assists in securing funds to tackle the planning and delivery of infrastructure in undulant rural areas in Sarawak.

Budget and Investments

A recurring theme among the officers interviewed was the lack of budgets and fundings to implement rural infrastructure projects. Agencies often have limited financial resources to implement projects that have been planned under relevant policies and plans as they rely on fundings from higher government levels. The reason is due to the technicality involving location as mentioned earlier, in addition to rural infrastructure projects that were not as cost-effective or are unable to have significant returns in investment. This creates conflicts in justifying the procurement of budget for rural infrastructure projects in the budget approval process. Additionally, some officers criticised the delays in projects caused by contractors and developers which requires the agencies to revisit the budget which most often increases due to higher cost of materials and resources.

To solve budget allocation issues, the ministries and agencies have come up with various strategies to overcome this problem. Such as, the setting up of a trust fund under EPU for engineering feasibility study or, another strategy adopted by the ministries is to implement road projects in phases due to the limited funds under the development plans. Another part of the strategy to ensure funds for infrastructure development in rural areas, an officer explains that they have to rely on megaprojects to justify projects so that budgets can be justified. As one officer explains:

> *We use this strategy because when we are dealing with the private sector and the federal government: such as when we built the HEP dams, we are using these dams where the investment is being made, employment are going to be generated, and the socio-economic benefit and all that to justify the roads going to the hinterland area….With these major roads being justified with the existence of HEP, it can be easily connected to the individual settlement along the way rather than trying to justify the billions for one or two settlements. That is the strategy.*

Undeniably, the ministries and agencies expressed that if more budget was allocated, the delivery of infrastructure to rural areas can be more effective. One officer suggests that there need to be look into new mechanism at how rural infrastructure projects can be prioritise through returns of investment so that it can fund subsequent future rural infrastructure projects. Additionally, officers also advised to have for better political will to secure budgets and investments to plan and develop rural infrastructure in Sarawak.

Cooperation and Implementation

Our data revealed that ministries and agencies have in part maintained a level of cooperation and coordination at the state level in the planning process. Although, our findings reveals that certain overlapping of roles do still occur between agencies. However, the officer clarified the agencies would work together to overcome the overlapping in their works.

On the other hand, our findings shows that there emerge some conflicts between the state level and federal level agencies whereby state level officers interviewed claimed that officers at the federal level do not have a clear understanding of the real ground situation and challenges in Sarawak which cause problems in securing budgets or funds for infrastructure development projects. However, some officers acknowledges that this issue is not due to lack of understanding but rather the rigid requirements in the approval process of budgets at the federal level which proof to be of a disadvantage to lesser developed state such as Sarawak where certain criteria are unjustifiable for rural areas. This challenge is reflected in the past experience of an officer involved in the development for the Batang Rajang Bridge to replace a ferry crossing.

> *To Federal EPU, they will be asking: can you justify the traffic volume? We say we cannot justify the volume. So, they say we cannot give you the money, a ferry is sufficient to cater. …Maybe we don't blame those officers in federal. They have all these guidelines to justify the project, such as we must have the rate of return, the traffic and all these. So, we say all these things, with special consideration for Sabah and Sarawak is different… If we justify, we don't have any development here.*

Some of the issues involving stakeholder is politically related. The findings of the interviews suggest debatable opinions on how political interference in the infrastructure planning process may make or break a project. One officer criticised past decision of the federal government to cancel certain rural infrastructure projects which were already in planning approval stage. An example given by an officer was the cancellation of the Batang Lupar Bridge project due to the change of Federal government in 2018. This creates delays in projects which affects the cost of project. However, on the contrary, another officer suggested that political influence may help advance a project such as the advancement of the development of Batang Rajang Bridge by persuading the Minister of Works at that time.

The officers interviewed have express their opinions on the role of private sectors who own large lands in the rural areas under provisional lease to conduct logging and plantation activities in the infrastructure planning process. Their role in rural development is well acknowledged by the ministries and agencies. However, the officers claimed there is lack of cooperation between these private sectors when the government wants to bring in new infrastructure to local communities such as cases where government agencies were barred from using the logging roads or charged by the private sector for using the plantation roads when delivering resources for infrastructure projects.

As a way forward, it is suggested that the government will have to cooperate and collaborate with private sector. The officers express that as some of the rural settlements are within the vicinity of the private sector operating them, the private sectors could have a more social approach in developing their lands where roads can be utilized collectively by the rural communities as a Corporate Social Responsibility (CSR) effort. In ensuring better rural infrastructure development, the respondents argue that they would need to be guided by clear guidelines while having certain exceptions to less developed states at the higher government levels to expedite financial resources for rural infrastructure development. Additionally, most of them emphasize the need to have a better working relationship with the federal level ministries and agencies and private sectors.

Public Resistance

It is noted that while generally a top-down planning approach through plans and policies, bottom-up efforts through engagements at the lower level of government: district and divisional levels and public engagement are also involved. The local communities are represented by their elected representatives. Officers acknowledge the role of the elected representatives as they know better the needs of the locals on the ground to propose the project to the relevant agencies or ministries within the allocation approved for them per year.

Therefore, localised data and opinion are captured utmost in the planning stage through public engagements before implementation of projects.

However, as acknowledge by several officers, this approach does not guarantee a smooth process for the implementing agencies. Implementing agency still faced problems with the public in terms of public resistance. Our findings reveal that land issues are a significant theme for the objection of local communities. It is gathered that rural residents are reluctant to allow development in the land as in some cases, their agricultural land may be taken and it has sentimental value to them and is their source of livelihood. For example, one officer said, "We have to acquire some land here and there and even some of the crop will be damage. When we acquire the land, they have a lot of sentimental value". Another reason in addition to this is some communities may object to the compensation offered by the government as an officer explained,

> *There's is always that kind of issue coming up when one individual is probably not happy with the quantum of the compensation, or for example, with the land under the state law is recognize as his land.*

Due to this, implementing agencies face challenges in convincing rural communities to develop their areas especially if the infrastructure project involves acquisition of communities' land. Nevertheless, implementing agency adopt a social approach in convincing local communities to accept infrastructure development project. One officer revealed that local communities became more acceptable to change after some time to previous rural infrastructure projects and reasoned that the perception of local communities to rural transformations takes time to understand and accepted. As quoted,

> *So, it is difficult to convince them (local communities). ...At that time, they don't appreciate it but now maybe with the new generation coming out from their hometown they appreciate the better roads. ... So maybe development takes time to get the people to accept it, to change the perception or maybe the younger people will come up to say it is better for the future.*

Hence, public participation remains a challenge in order to effectively engage the locals as implementing agencies will require communities' inputs in understanding their needs and concerns when developing infrastructure for them. Officers view that a win-win situation needs to be achieve in the planning approach when the project affects the local communities' livelihood.

CONCLUSION

In a nutshell, this paper aims to understand the challenge being faced in rural infrastructure planning in Sarawak. However, it is noted that the investigation of

the views of officers would have some limitations where it cannot describe the views for all other related agencies in the rural infrastructure planning process. Nevertheless, the study is able to present a look into the challenges being faced in planning for rural infrastructure in Sarawak. This paper highlights the challenges in the governance aspect which needs to be tackled to improve rural infrastructure delivery The recurring challenges faced by agencies and ministries are locational factor, lack of funding and investments, lack of coordination and cooperation between stakeholders, and public resistance. Hence, it is integral for collaboration and integration between all related stakeholders especially top-level governance, private sectors and community for rural infrastructure development. Therefore, this paper points towards a need for a more integrated process where the different stakeholders in the rural infrastructure planning process are able to build cooperation and coordination both at policy, planning and implementation levels of rural infrastructure development in a multidisciplinary way.

ACKNOWLEDGEMENTS

The authors would like to thank the agencies who participated in the interview sessions for their support in providing the information needed for this study. This study was funded by Ungku Aziz Centre for Development Study, University of Malaya, Kuala Lumpur (Vote no. PD002-2020).

REFERENCES

Arshad, F. M., & Shamsudin, M. N. (1997). *Rural Development Model in Malaysia*. Paper presented at the meeting with the Hon. President of Peru, Mr. Alberto Fujimori, Lima, Peru.

Calderón, C., & Servén, L. (2004). The Effects Of Infrastructure Development On Growth And Income Distribution. *Annals of Economics and Finance 15*(2), 1-43. doi:10.1596/1813-9450-3400

Department of Statistics Malaysia. (2019). *Household Income and Basic Amenities Survey Report By State And Administrative District, Sarawak, 2019*. Putrajaya: Department of Statistics Malaysia.

Gevelt, T. v. (2017). *Indigenous communities, ICT and Rural Development Case Studies in Tanzania and Sarawak, Malaysia*. Cambridge: Smart Villages.

Hoe, K. C., Wahab, H. A., Bakar, S. H. A., & Islam, M. R. (2017). Community Participation for Rural Poverty Alleviation: A Case of the Iban community in Malaysia. *International Social Work, 61*(4), 518 –536.

Jee, N. (2020). RM5.9 bln for infrastructure projects. *Sarawak Tribune*. Retrieved from https://www.newsarawaktribune.com.my/rm5-9-bln-for-infrastructure-projects/

Kaur, A., & Kaur, R. (2018). Role of Social and Economic Infrastructure in Economic Development of Punjab. *International Journal of Innovative Knowledge Concepts, 6*(5), 181-188.

Kementerian Pembangunan Luar Bandar. (2019). *Data Asas KPLB 2019*. Putrajaya: Department of Statistics Malaysia.

Khengwee, T., Hoole, P. R. P., Pirapaharan, K., Julai, N., Othman, A. H., Anyi, M., . . . Hoole, S. R. H. (2017). A Review of Sarawak Off-Grid Renewable Energy Potential and Challenges. *Journal of Telecommunication, Electronic and Computer Engineering, 9*(3), 29-33.

Mohd, S., Azhar, N. A., Shakil, N. S., Senadjki, A., & Iran, M. (2018). Pockets of Poverty in the Northern States of Malaysia. *Malaysian Journal of Society and Space 14*(4), 238-249.

Nedozi, F. O., Obasanmi, J. O., & Ighata, J. A. (2014). Infrastructural Development and Economic Growth in Nigeria: Using Simultaneous Equation. *J Economics, 5*(3), 325-332.

Ngah, I. (2009). Rural Development in Malaysia. In I. Yussof (Ed.), *Economy, Past, Present & Future*. Kuala Lumpur: Malaysian Strategic Research Centre.

Ngah, I. (2011). *Rural Planning and Development Experiences in Malaysia*. Paper presented at the International Symposium-Sustainable Rural Landscape And Planning In Asia Pacific Region.

Songco, J. A. (2002). *Do Rural Infrastructure Investments Benefit the Poor? Evaluating linkages : A Global View, A Focus on Vietnam*. Washington, DC. : World Bank.

Srinivasu, B., & Rao, P. S. (2013). Infrastructure Development and Economic Growth: Prospects and Perspective. *Journal of Business Management & Social Sciences Research, 2*(*1*), 81-91.

Thacker, S., Adshead, D., Fay, M., Hallegatte, S., Harvey, M., Meller, H., . . . Hall, J. W. (2019). Infrastructure for sustainable development. *Nature Sustainability, 2*, 324-331.

UN Habitat. (2018). *Leading Change: Delivering the New Urban Agenda through Urban and Territorial Planning*: UN-Habitat.

United Nations. (2016). The Infrastructure-Inequality-Reilience Nexus. In *Global Sustainable Development Report 2016* (pp. 21-40). New York: Department of Economic and Social Affairs

World Bank. (2019). *Mind the Rural Investment Gap: Disparities in Access to Basic Infrastructure and Directions for Mozambique's Public Investment Program*. Washington, DC.: World Bank.

Yusoff, N. B., Talib, A., & Pon, Y. (2011). Impak Pembangunan Infrastruktur ke atas Pembangunan Komuniti Penduduk di Daerah Pendang dan Kubang Pasu, Kedah Darul Aman, Malaysia. *Journal of Governance and Development, 7*, 16-36.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 404 – 414

PARTICIPATORY ACTION RESEARCH ON THE HEALTH AND WELL-BEING BENEFITS OF COMMUNITY GARDENING: A STUDY OF RESIDENTS IN AN ISLAMIC ELDERLY HOME

Nikmatul Adha Nordin[1], Rosilawati Zainol[2], Faizah Ahmad[3], Siti Nor Awang[4], Atikah Razali[5]

[1,2]*Centre for Sustainable Planning and Real Estate,*
UNIVERSITI MALAYA
[4]*School of Distance Education,*
UNIVERSITI SAINS MALAYSIA
[3]*FA Planning Consultant, Malaysia*
[5]*Kulliyyah of Education, Department Curriculum and Instruction,*
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

This study employs a Participatory Action Research (PAR) approach in finding practical solutions to promote sustainable active ageing living environment for the elderly in a Muslim based elderly home – the Baitul Maab, Temerloh. The study was conducted in three sequential phases: initialization, action and reflection utilizing multiple data collection methods which included visual assessment, Focus Group Discussion, collaborative mapping and survey. During the Focus Group Discussion, several proposals were put forward by the residents. One of the proposals by the FGD participants were to have a community garden as an outlet for the residents to engage in healthy activities collectively. Based on this, a community garden called Laman Herba and Sayuran was then created by the researchers and the residents through gotong royong activities. A survey was carried out a year later to determine the usage of the garden and how it helped the community in achieving a healthy lifestyle. The findings suggest that the community garden is perceived to be able to help the residents to be healthier and that it improved their well-being. The study also suggested that elderly below 65 years old were in the age group who most benefited from having a community garden as they still have the energy and strength to do gardening activities This study concludes that community gardening is perceived to yield many benefits to elderly's health and social well-being. However, for the garden to be efficient, it has to be equipped with the necessary infrastructure such as stools as resting place and easy-to-reach water supply.

***Keyword**:* Garden, Gardening, Healthy, Active Ageing, ageing people

[1] Senior Lecturer at Universiti Malaya. Email: nikmatul@um.edu.my

INTRODUCTION

According to the World Health Organization (WHO), (2010), aged people are those who are 65 years of age or older. The United Nations World Assembly on Ageing in Vienna (1982) defined aged people as those who are 60 years of age or older. According to statistics released by the Department of Statistics Malaysia (DOSM), the proportion of elderly in Malaysia will double, from 7.2 percent in 2020 to 15 percent in 2030.

The demographic shift warrants a reform in terms of elderly care. In response to this global phenomenon, the World Health Organization (WHO) developed a policy framework to inform discussion and formulation of action plans to promote healthy and active ageing. Active ageing refers to the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age (WHO, 2002). The document by WHO (2002) further elaborates the word active as continuing participation in social, economic, cultural, spiritual and civic affairs, and not just the ability to be physically active or to participate in the labour force. The need to prepare for the ageing population necessitates actions on a number of factors, including accessibility to healthcare services, the elderly's economic contribution, social relationships, quality of life, and overall wellbeing.

Malaysia's National Policy for Old People, which was approved on January 5, 2011, is a policy that it was developed in accordance to the WHO's ageing guidelines (Jabatan Kebajikan Malaysia, JKM, 2016). The main goal of the National Policy for Old People is to maximise the well-being of the elderly population by focusing on five dimensions: health (healthy ageing), social (active ageing), spiritual (positive ageing), environment (supportive ageing), and economic (productive ageing) (Ramely, Ahmad, and Harith, 2016).

In line with the global and national commitment in promoting the well-being of the elderly, The Ministry of Housing and Local Government, under Plan Malaysia (formerly known as Department of Town and Country Planning) introduced the Physical Planning Guidelines for the Elderly. The guidelines were prepared as a guidance to government agencies, non-governmental organizations (developers, private companies, individuals, non-governmental organizations) and other parties in the provision of settlement that are elderly friendly and promote ageing in place which allow the elderly to remain in the same community with some level of independence rather than being in residential care. The main purpose of the guidelines is to plan for the types of settlements for senior citizens to age actively, such as retirement villages and care centres, the relevant supporting facilities and social programmes. The guidelines include planning principles, design standards, minimum requirement for elderly-friendly facilities and also related social activities such as community farming and lifelong

learning. The following Figure 1 shows the scope of physical planning guidelines for the elderly.

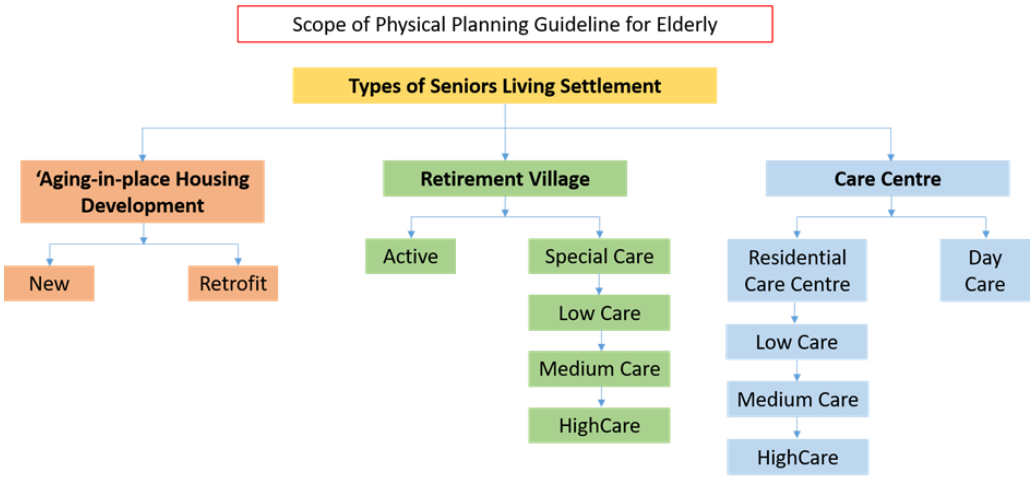


Figure 1: Scope of physical planning guidelines for the elderly

This research is in line with the objectives of the National Policy for Old People which is to provide the old people with healthy ageing, active ageing, and supportive ageing by proposing an ideal physical environment which is not only user friendly but also functioning as rehabilitation place for them. Funded by Universiti Malaya's research grant under the flagship of Living Lab, this participatory action research allows the researchers and the researched, the residents of Baitul Maab, in coproducing an ideal living environment to promote active ageing. The selection Baitul Maab as a study area as the home itself is an exemplary case of an elderly home that promotes active ageing. Known as "Pondok Moden", Baitul Maab offers residential facilities on "waqaf" basis for the elderly where their main activities revolves around religious activities such as reading the Quran, praying and other spiritual activities. The home is considered as "Active Retirement Village" as the residents in this home are able to take care of their own selves.

METHODS

This study employs a participatory action research approach that requires the researchers and the stakeholders to work together in designing the research and act together in an effort to understand and improve the practices or situations in which they are engaged. The PAR approach starts with the collective inquiry of

what needs to be improved and the actions that need to be taken to improve the practice or situation (Kou, Zang. et al. 2021).

Based on PAR approach, the research was conducted in three phases: Initialization, Action, Reflection. During the initialization phase, several activities were conducted in order to establish a mutual understanding between the researchers and the stakeholders that include the home management and the residents on the intention of co-producing an active ageing environment for the residents. Site visit, visual assessment and Focus Group Discussion were conducted to understand the institutional, social and physical context of the home (Figure 2). The highlight of this phase was the Focus Group Discussion where the researchers guided the elderly to express their ideas verbally and visually using collaborative mapping technique that produced several concept plans that illustrated their ideas and proposals (Figure 3).

Figure 2: Focus Group Discussion (FGD) with Baitul Maab residents

From the FGD and after a series of discussions, the researchers, the home management and residents agreed to create an edible community garden. The main purpose of the garden is to provide an avenue for the residents to engage in physical activities with fellow residents and allows for outdoor social interactions.

The Action phase of this study refers to the action of creating the community garden. A site was identified for the purpose. Through *gotong royong* activities that involved the researchers and the residents, a community garden was created and given the name *Laman Herba dan Sayuran* (Figure 4). The plants chosen for the garden mostly were herbs and vegetables.

The final part of the study, the Reflection phase, refers to the phase where the researchers assessed to what extent the objective of the study was met. during this phase which happened one full year after the creation of the garden, a questionnaire survey was conducted to assess residents' perceptions on the benefits and impacts of the garden to their overall health and well-being. A total of 30 respondents answered the questionnaire survey.

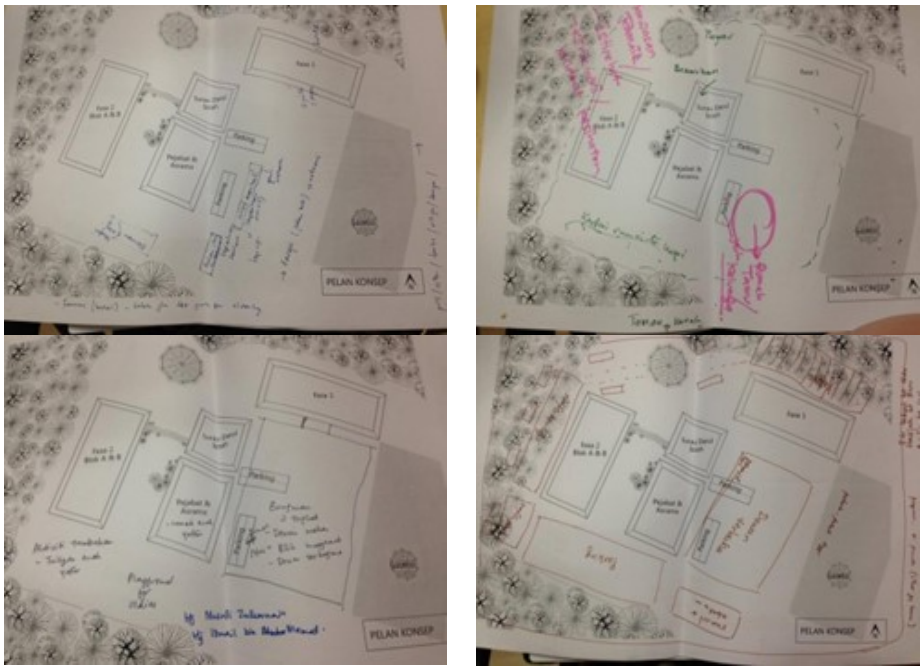


Figure 3: Concept plans of the proposals by the participants

Figure 4: Gotong royong activity to create the community garden in April 2017

FINDINGS AND DISCUSSIONS

This section will focus on the findings from the survey that was conducted a year after the creation of the community garden. Majority of the respondents (87%) are women. About 53% aged 65-70 years old, 10% belongs to the group below 60 years old. Majority of them (63%) owned the units at Baitul Maab.

Based on the survey, it was found only 37% respondents actively gardening at *Laman Herba & Sayuran.* The main reason why many residents did not engage in gardening activities at the provided garden was that they already had a place where they could engage in small-scale gardening, such as planting herbs in pots outside their apartment units. Some respondents highlighted that it is easier to do gardening outside their units due to the availability of water source. They also mentioned about the difficulty of gardening at community garden as they had to carry buckets of water to the garden and this is quite challenging for them due to their age and physical limitations. It is observed that the challenge is more obvious for those who are 65 years and above. The exposed drains and the absent of proper walkway were also cited as the reason why they do not like to do gardening at the community garden.

This research aims to understand the perceived impacts of gardening activities to the residents' physical health, psychological state and social life. The physical health by gardening can be improved by active movements of the gardeners. The gardening activities include but not limited to watering, weeding, raking, tending shrubs, digging and cutting. These activities require energy and movements from the gardeners which may help the gardeners to feel more active and energized.

In terms of psychological state, gardening offers opportunities for reconnection with nature. Scott, Masser and Pachana (2020) mention that gardening provides opportunities for mental stimulation in older adults. Touching and smelling plants provide a good therapy for the elderly, stimulates calmness, and provides sense of restoration and rejuvenation.

Gardening, especially community gardening, also provides opportunities for social interactions. Through community gardening, it allows the elderly to connect with one another, receive mutual support, exchange positively and these are all important factors to combat the feeling of isolation and loneliness. This is important especially when one is experiencing a change in one's life such as from fully paid employment to retirement and having children moving away from home.

In the questionnaire, a 5-point Likert Scale was used to get the opinion or perception of the impacts and benefits of gardening at *Laman Herba and Sayuran* on their physical health, psychological state and social interactions with the fellow residents. The 5-point Likert Scale used consisted of 1-Strongly Disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-Strongly Agree. A reliability

test was carried out for all items. Based on the reliability test, the Cronbach Alpha of the validity data is 0.984 shows that the validity data are good based on the rules of thumb of George and Mallery (2003).

Table 1: Descriptive Statistics on Respondents' Opinion on the Benefits of Community Gardening

Statements	Strongly agree to agree	Not sure	Disagree to strongly disagree	Standard deviation	Mean
Benefits on Physical Health					
I feel healthier with gardening activities	67	33	0	.699	3.83
Gardening improved my nerve system	64	30	0	.664	3.80
Gardening is considered as physiotherapy for me	73	27	0	.592	3.83
Gardening improved my movement and flexibility	73	27	0	.592	3.83
Gardening improved my balance	67	33	0	.626	3.77
Gardening reduced my weight	67	33	0	.626	3.77
Benefits on Psychological State					
I am more cheerful since involved with gardening activities	93	7	0	.531	4.17
Gardening is relaxing and calm	93	7	0	.531	4.17
I am more confident when gardening	87	13	0	.607	4.10
Gardening improved my spirit	87	13	0	.583	4.07
Gardening reduced my anxiety	90	10	0	.548	4.10
Gardening renewed my motivation in life	84	16	0	.521	4.07
Gardening reduced my loneliness	84	16	0	.521	4.07
Benefits on Social Life					
Gardening develop a sense of belonging	90	7	3	.615	4.03
Gardening activities develop friendship	97	3	0	.504	4.23
Gardening develop sense of sharing	97	3	0	.504	4.23
I am not feeling isolated when gardening	93	7	0	.507	4.13
Gardening makes me closed to the community	97	3	0	.481	4.10

In the physical health aspect, the top statements that received agreements from the respondents (73% respectively) were "Gardening is considered as physiotherapy for me" and "Gardening improved my movement and flexibility", while 27% stated that they were not sure (SD=0.592, $\bar{x}$ = 3.83).

In the psychological state aspect, the top two statements were that received agreements from the respondents (73% respectively) were "I am more cheerful since involved with gardening activities" and "Gardening is relaxing and calming", while 7% stated that they were not sure for both statements (SD=0.531, $\bar{x}$ = 4.17).

In terms of social benefits, 97% of respondents agree that "Gardening activities develop friendship", "Gardening develop sense of sharing" and "Gardening makes me closed to the community", while 3% were not sure for all the three statements (SD=0.531, $\bar{x}$ = 4.17).

The general findings show that the residents feel that gardening brought many benefits in terms of physical health, psychological state and social life. The highest value of mean represents the highest perceived benefit of gardening. From the data it appears that gardening yields more benefits on social life as compared to psychological state and physical health. The top three highest mean score for benefits are "Gardening activities promote friendship" (4.23), "Gardening developed sense of sharing" (4.23) and "I am not feeling isolated when gardening" (4.13).

The least benefits could be seen from physical health aspects with "Gardening improved my balance" had the lowest mean score of 3.77. This suggested that while gardening activities are perceived to be able to yield many benefits to the elderly's general well-being, quite a significant number of respondents were not sure on the benefits of gardening to their physical health. This can be seen from the data as all statements in the category on "Benefits on Physical Health" received less than 80% of agreements from the respondents.

CONCLUSION

The respondents in this sample reported that they experienced many benefits from the community garden, *Laman Herba & Sayuran*, which was created collaboratively by the researchers and the residents as an effort to create an active ageing environment for the home. Several important points need to be observed in this study. From the survey, it was found that less than half of the residents here actively utilize the garden for active gardening. Most of the residents prefer to do gardening at small scale outside their unit as it was more convenient for them. For those who involved in gardening at the community garden provided, the respondents in the sample reported numerous benefits of the activities in the aspects of physical health, psychological state and social life. This survey, however, only focused on the community garden gardeners. This limitation can

be addressed in future research by including the elderly who prefer to engage in gardening at the compound of their own unit. Having an understanding of the roles that gardening plays in promoting physical, psychological and social benefits may shape more effective and well-informed policies and practice in relation to support active ageing.

This study here warrants important implications for planners to establish opportunities for gardening in elderly home or retirement centre. Planning and designing for community gardens for elderly need to take into considerations of the physical limitations of this group of people. A centralized garden for the elderly needs to be planned and designed in a way that is friendly to the elderly, for example near to water sources, plenty of seating as elderly get tired easily and plenty of shades. It is also important to ensure that the design of the garden allows easy movement by the elderly through the provision of suitable pavements and flat surfaces.

It is also important to note that gardening opportunities should not be limited to the provision of a centralized community garden. Gardening opportunities should also be provided at incidental or shared spaces that can be easily accessed by the elderly with physical limitations. However, gardening activities at these shared spaces need to be properly governed so that it will not obstruct public and shared spaces and pose a nuisance to public health and safety.

REFERENCES

Agustina, I., & Beilin, R. (2012). Community gardens: space for interactions and adaptations. *Procedia-Social and Behavioral Sciences*, *36*, 439-448.

Arokiasamy, J. T. (1999). Malaysia's ageing population: challenges in the new millennium. *Medical Journal of Malaysia*, *54*(4), 429-432.

Centre for Civic Partnership. (2010). *Conducting aging well focus groups. Aging well in communities: a toolkit for planning, engagement & action*. Sacremento, California: Public Health Institute.

Chai, S. T., & Hamid, T. A. (2015). Population ageing and the Malaysian Chinese: Issues and challenges. *Malaysian Journal of Chinese Studies*, *4*(1), 1-13.

Chai, S. T., & Hamid, T. A. (2015). Population ageing and the Malaysian Chinese: Issues and challenges. *Malaysian Journal of Chinese Studies*, *4*(1), 1-13.

Dasar Warga Emas Negara (DWEN, 2011). Terbitan Jabatan Kebajikan Malaysia. Retrived date 7th February 2018. https://www.kpwkm.gov.my/kpwkm/uploads/files/converted/6803/DasarWargaEmas1.pdf

Department of Statistics Malaysia (DOSM, 2016). Population Projection (Revised), Malaysia, 2010-2040. Retrived date 22nd February 2018. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=118&bul_id=Y3kwU2tSNVFDOWp1YmtZYnhUeVBEdz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Department of Statistics Malaysia (DOSM, 2017a). Current Population Estimates, Malaysia, 2016-2017. Retrived date 22nd February 2018. https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=a1d1UTFZazd5ajJiRWFHNDduOXFFQT09

Department of Statistics Malaysia (DOSM, 2017b). Vital Statistics, Malaysia, 2017. Retrieved date 22nd February 2018.https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=165&bul_id=NXRCRDh0RENGeU13bC9EdzJ1cUFtZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Department of Statistics Malaysia (DOSM, 2017c). Selected demographic statistics estimates Malaysia, 2017. Retrived date 22nd February 2018. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=397&bul_id=SmtySjF1eXplQTIrVWh3Wkx5N1pyQT09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Fong, L., F. (2015). Silent 'epidemic' of ageing. *The Star online.* Retrived date 22nd February 2018. https://www.thestar.com.my/news/nation/2015/08/09/silent-epidemic-of-ageing-malaysia-like-many-of-its-neighbours-in-asia-is-in-danger-of-getting-old-b/

George, D., & Mallery, M. (2003). Using SPSS for Windows step by step: a simple guide and reference.

Haslam C, Steffens NK, Branscombe NR, et al. (2019) The importance of social groups for retirement adjustment: evidence, application, and policy implications of the social identity model of identity change. *Soc Iss and Pol Rev* ; 13: 93–124.

Hyman, M. R. & Sierra, J.J. (2016). Open- versus Close-Ended Survey Questions[1]. *NMSU Business Outlook.* Volume 14, Issue 2. Pp. 1-5.

Index Mundi. (2017). Total Fertility Rate. Retrived date 22nd February 2018, https://www.indexmundi.com/g/g.aspx?c=my&v=31

Jabatan Kebajikan Malaysia, (JKM, 2016). Dasar Warga Emas Negara. Retrived date 22nd February 2018. http://www.jkm.gov.my/jkm/index.php?r=portal/left&id=WjFUdFBURTV0Zis0N0NxYm05Qk9XQT09

Ju, C. A., & Jones, G. W. (1989). *Ageing in ASEAN: Its socio-economic consequences*. Institute of Southeast Asian Studies.

Karim, H. A. (1997). The elderly in Malaysia: demographic trends. *Medical Journal of Malaysia*, *52*, 206-212.

Kou, Huaiyun, Sichu Zhang, Wenjia Li, and Yuelai Liu (2021) "Participatory Action Research on the Impact of Community Gardening in the Context of the COVID-19 Pandemic: Investigating the Seeding Plan in Shanghai, China" *International Journal of Environmental Research and Public Health* 18, no. 12: 6243. https://doi.org/10.3390/ijerph18126243

Mugomeri, E., Chatanga, P., Khetheng, T. E., & Dhemba, J. (2017). Quality of Life of the Elderly Receiving Old Age Pension in Lesotho. *Journal of aging & social policy*, *29*(4), 371-393.

Parr, H. (2008). *Mental Health and Social Space: Towards Inclusionary Geographies?*.Blackwell Publishing: Oxford, UK

Parr, H. (2008). *Mental Health and Social Space: Towards Inclusionary Geographies?*.Blackwell Publishing: Oxford, UK

Phillipson, C., White, S., Aftab, F., & Hammond, M. (2013). *Old Moat: age-friendly neighbourhood report*. Retrieved fro Mancester: http://www.southwayhousing.co.uk/getattachment/Southway-in-Your-Community/Age-friendly-Neighbourhoods/Old-Moat-Age-friendly-Neighbourhood-Report.pdf.aspx

Ramely, A., Ahmad, Y., & Harith, N. H. M. (2016) Productive Ageing: The Opportunities And Challenges Faced By The Labour Workforce In Malaysia. *International Journal of Business, Economics and Law*, Vol. 11, Issue 3 (Dec.). Pp 27-32

Sahib, S. Z. (2015). Tingkat harga diri, kualiti hidup warga emas. Harian Metro. Retrieved date 17th February 2018

Scott TL, Masser BM, Pachana NA. (2020) Positive aging benefits of home and community gardening activities: Older adults report enhanced self-esteem, productive endeavours, social engagement and exercise. SAGE Open Med.

Tappert, S., Klöti, T., & Drilling, M. (2018). Contested urban green spaces in the compact city: The (re-) negotiation of urban gardening in Swiss cities. *Landscape and Urban Planning*, *170*, 69-78.

Taylor, L., & Hochuli, D. F. (2017). Defining greenspace: multiple uses across multiple disciplines. *Landscape and Urban Planning*, *158*, 25-38.

Tengku Abdul Hamid T.A. (2015). Population Ageing In Malaysia A Mosaic of Issues, *Challenges and Prospects*. Universiti Putra Malaysia Press: Serdang.

World Health Organization (WHO). (2002). Active ageing: A policy framework.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 415 – 427

DEVELOPMENT OF GUIDANCE FOR THE ADOPTION OF CIRCULAR ECONOMY IN CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Hafez Salleh[1], Chow Ke Ying[2], Mahanim Hanid[3], Zulkiflee Abdul Samad[4], Nor Azlinda Mohamed Sabli[5], & Sharifah Mazlina Syed Khuzzan[6]

[1,2,3,4]*Faculty of Built Enviroment,*
UNIVERSITI MALAYA
[5]*Faculty of Architecture, Planning and Surveying,*
UiTM SHAH ALAM
[6]*Kulliyyah of Architecture and Environmental Design,*
IINTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

The rise in the amount of construction and demolition waste and its negative impacts on the environment had made it become a hot issue globally. Therefore, efficient construction and demolition waste management are extremely important in the construction industry. The circular economy is introduced to shift the current linear economy practice of "take-make-consume-dispose" to "take-make-consume-reuse and recycle" toward a more sustainable and efficient construction and demolition waste management by decrease the illegal dumping and construction and demolition waste issues. However, the concept of circular economy has still not been widely developed in current practices of waste management where many of the players in the construction industry still in the process of understanding how to adopt circular economy practices. Thus, this research aims to develop the strategy for the adoption of Circular Economy (CE) for Construction and Demolition Waste Management (CDWM). The quantitative method is applied in this research to collect data and the data is collected through a questionnaire survey. A strategy is proposed on the adoption of the circular economy principle in the construction and demolition waste sector as a reference to improve the performance of the current construction and demolition waste management system.

***Keyword**:* building life cycle, circular economy, construction, and demolition waste management

[3] Senior Lecturer at Universiti Malaya. Email: mahanim@um.edu.my

INTRODUCTION

Environmental, economic, and social are the three aspects of sustainability that strongly influenced by the construction industry and the construction industry had greatly contributed to both Gross Domestic Product (GDP) and job opportunities. The construction industry is believed to be the major cause of environmental pollution as it had generated the most waste (Menegaki and Damigos, 2018). There are several ways to define C&D waste in different countries and regions. The most common definition of C&D waste is the waste generated throughout the process of construction, renovation, and repairing of any types of buildings such as individual premises or commercial buildings while the wastes arise from the razed structures been classified under demolition waste. Various pollutions would cause by C&D waste such as water, soil, air, and noise pollution. The continuous increase in C&D waste along with its environmental impacts made it become the biggest challenge of the construction industry (Ramón et al., 2019).

However, there is still lacking of awareness to adopt a proper CDWM in developing countries such as Malaysia (Esa et al., 2016b) with the evidence of an increase in illegal dumping cases (Nagapan et al., 2012). From the aspects of the built environment, the phases of the linear economy start from the raw material extraction and manufactured into new products which usually have no potential for reuse. The elements are then erected on-site and usually be disposed of before their real end of life when they are antiquated (Mangialardo and Micelli, 2018; Cheshire 2017; Ellen MacArthur Foundation, 2015).

To address the construction and demolition (C&D) waste problem, the construction industry had adopted the 3Rs principle (reduce, reuse, and recycle) as one of the measures to manage C&D waste sustainably but most of the cases that implement reuse and recycling practices for the waste management is inefficient which lead to increase in landfill and illegally dumping cases (Esa et al., 2017, Suárez et al., 2016). Circular economy (CE) is the concept that goes beyond 3Rs and is defined as “an industrial economy that is restorative or regenerative by intention and design” (Ellen MacArthur Foundation 2013). The focus of circular economy is on reducing (Osmani et al., 2006) and recycling C&D waste (Yuan and Shen, 2011) and explore the new design approach which like the design for deconstruction and increase the efficiency of materials (Kanters,2018; Kibert, 2003).

This provides an ideally shift from the current linear economy practice of “take-make-consume-dispose’’ to “take-make-consume-reuse and recycle” which is more sustainable. According to circular economy models, the components and materials are keeping in a closed loop which is proposed to reuse the end of life building materials and a new approach of material banks for a new building by using the deconstructed components (Hopkinson et al., 2019). Therefore, there is a need to shift to circular economy approach from the linear

economy approach in the construction industry to enhance the C&D waste management throughout the construction cycle (Dajian, 2004, IMSA, 2013) as efficient C&D waste management is a critical element to save the environment, natural resources, economy, society, etc. (Kabirifar et al., 2020). The shift to the circular economy approach needs a huge change in the society and structure of industry which this task is very challenging and usually related to business operation and waste management. (Lieder and Rashid, 2016). The circular economy approach is still not widely implemented in the construction industry even this approach already increasingly gaining interest. (Leising et al., 2018; Pomponi and Moncaster, 2017). This is because the construction project usually is complex and time consuming along with a large supply chain (Pomponi and Moncaster, 2017).

According to recent research, the researcher observed that there is only a minor shift from linear economy model to circular economy model (Mayer et al., 2019; Silva et al., 2017; and Haas et al., 2015). The shift to circular economy model need a better understanding on the entire building life cycle, the construction value chain and the involvement of stakeholder (Zimmann et al., 2016). Moreover, the concept of CE has still not been fully developed in current practices of waste management and the identification of new treatment methods of waste is lacking (Zhang et al., 2019; Bakajic and Parvi, 2018; and Fellner et al., 2017). The potentials for CE transition are relied on the efficiency of resources, waste reduction, investing in technology and tools, innovative practices, adoption of more flexible and modular concepts to create more value in the built environment. (EMF, 2017).

LITERATURE REVIEW

This section presents the discussion of the existing literature in the area of circular economy in various industries due to the limitation of circular economy studies conducted building construction context. The theoretical review and empirical review of the previous research in this field was reviewed to look into the issues related to the adoption of circular economy in construction industry, the circular economy practices in different building life cycle stages, identification of the relevant factors contributed to construction and demolition waste generation followed by of approaches and strategies needed for the adoption of circular economy in the construction and demolition waste management and ended with discussion. The result of this review will help in developing the components of the conceptual model of this study for the adoption of circular economy in the construction and demolition waste sector where the placement of each component is based on IPO model.

Building Life Cycle Stage (INPUT)

The wastes are generated throughout the building life cycle given that start from the materials of the demolition of previous construction on-site, polluted excavated materials, damage of materials, modification of changes, materials for temporary works, and so on (Schoenberger et al., 2018). Therefore, the connection between every building life cycle stage is essential for the communication across the entire network to facilitate circularity (BAMB, 2016).

Factors Contribute to Construction and Demolition Waste Generation (INPUT)

Identifying the root causes of construction and demolition waste generation is the key step that needs to be taken for successful waste management as the amount of waste generated depends on various factors (Ikau et al., 2016, Polat et al., 2017, Luangcharoenrat et al., 2019). The previous finding showed that the causes of C&D waste generation occurred throughout the whole project delivery. The factors found in the design and planning stage are more to decision making based while for other stages is more related to activity-based.

Building life cycle stage	Authors	Factors
Design and Planning stage	Ikau et al., 2016; Kaliannan et al., 2018; Whyte et al., 2018; Olabodec Emmanuel Ogunmakinde 2019; Luangcharoenrat et al., 2019	● Changes in design ● Communication problem among design team ● Design error ● Unfamiliar with alternative products ● Unclear client specifications
Construction stage	Ikau et al., 2016; Kaliannan et al., 2018; Whyte et al., 2018; Olabodec Emmanuel Ogunmakinde 2019; Luangcharoenrat et al., 2019	● Defective materials ● Poor supervision on site ● Poor storage systems ● Poor workmanship ● Construction method ● Lack of waste management plan ● Building shape ● Complex design
Operation stage	BAMB,2016; Benachio et al, 2020	● Lack of information on building components ● Hard to access for repair and update. ● Information on building did not keep up to date
End of life stage	Zimmann et al.,2016; Groh & Dubik,2018; Adams et al.,2018; Ruiz et al., 2020	● Demolition work ● Building component not suitable for reuse or recycle ● Building design not flexible and adaptable

Approaches for implementation of Circular Economy Strategies in Construction and Demolition Waste Management (PROCESS)

The circular economy principle is either implemented in the earlier stage (design stage) as a preventive measure or in later stages (construction, operation and management) as a management measure (Eberhardt et al, 2020).

Design stage

It could be effective to minimize the amount of CDW produced if the CDWM is adopted in the initial stage which is the design stage. The design decision made in this stage is closely linked to the following stage thus an effective design strategy could help in the reduction of waste, increase the rate of recycling and reuse of materials in the project. Many of the research had emphasized the need to implement a circular economy in the early stage of the project which is the design stage (Akanbi et al., 2018; Benachio et al., 2020). In the circular economy model, the buildings are designed for a lifecycle instead of just a simple end-use.

Construction stage

The construction method had a great impact on the amount of waste generated during construction. The techniques such as off-site manufacturing or construction using steel or timber frames could reduce the waste generation by 90% (Gálvez-Martos et al., 2018). The implementation of circular economy in the construction stage is mainly for the minimisation of waste generated on-site and the application of reusable and recyclable materials as the primary construction materials on-site (Groh & Dubik, 2018). With this, Adams et, al. (2017) recommended procuring reusable and recyclable materials and off-site construction.

Operation stage

The building should be designed in a manner that allows for minimal maintenance which eases any repair and upgrades the construction for new needs in order to extend the building lifespan (Groh & Dubik, 2018). Zimmann et al. (2016) also suggest that the buildings should be managed regularly through low energy and low-cost sensor technology which could help to maximise the lifespan of the building.

End of life

The end-of-life stage had been identified as the stage that generated the most CDW among the entire building lifecycle (Ruiz et al, 2020). The demolition practices are not encouraged under circular economy principles where the buildings are designed to adapt change and disassembly. The stakeholders could

decide to expand or contract the structure or redesign the building by reuse of the components (Zimmann et al., 2016; Groh & Dubik, 2018).

Circular Economy Strategies in Construction and Demolition Waste (OUTPUT)

Management sector

Reduce, reuse and recycle is known as 3Rs principles for the CDW management hierarchy where it offers an approach to manage CDW effectively (Kabirifar et al., 2020) while the promotion of CE in the construction and demolition industry had mostly focused on the reuse and recycling practices (Ginga et al., 2020).

Reduce

Waste reduction practice is the most preferable among the 3Rs principles as its priority in the waste hierarchy and its adverse impact on the environment is the lowest among all (Huang et al., 2018; Joensuu et al., 2020).

Reuse

The reuse practice is defined as all the construction materials, elements and building components collected could be used in a specific site (Gálvez-Martos et al., 2018).

Recycle

Waste recycling practice is carried out by breaking down the waste materials to form new materials or components or as part of another material (Huang et al., 2018; Ogunmakinde, 2019).

Design for change and disassembly

Disassembly refers to a systematic process to remove the desired components from a product at its end of life for further upgrade or fix (Groh & Dubik, 2018).

Material passport

According to BAMB (2016), materials passports are sets of data that provide the value of materials and components in both products and systems for present application and treatment at end-of-life based on the characteristics of materials and components shown in the data.

Selective deconstruction

Selective deconstruction is to boost the closing material loops and building components and materials for recovery by reverse the systematic building disassembling process.

Construction and demolition waste management plan

The development of a construction and demolition waste management plan is a must in a construction project coupled with the on-site waste management plan (SWMP). There are two stages for the development and implementation of SWMP where it is named as SWMP design and SWMP implementation.

Collection and segregation

The waste collection points are identified on-site and are separated into three types, i.e, normal waste collection, temporary waste collection and for hazardous wastes collection.

METHODOLOGY

The research employs the survey method, as this allows the collection of data from a sizeable population in a highly economical way, and it is easy to compare, explain and comprehend tangible evidence. The questionnaire forms will explore the strategies for implementing circular economy in the construction and demolition waste management sector, the existing and applicable circular economy practices for construction and demolition waste management, and how the practices could be adopted throughout the building lifecycle stages. This questionnaire survey will adopt the Likert-type scale, closed-ended questions and simple open-ended questions. The sample size will be 186 as according to Krejcie & Morgan's table (1970). The list of construction firms will be obtained from the Construction Industry Development Board (CIDB) Directory 2020 for the distribution and sending of the questionnaires. 186 firms sample size comprises of developer, consultant and contractor were selected based on their involvement in construction and demolition waste. The population size, which is 363 firms were obtained from the registration with Construction Industry Development Board (CIDB).

The conceptual model of this study was design based on Input-Process-Output (IPO) model and the components of this model was established based on theories and empirical evidences relating to circular economy in various industries. IPO model consist of 3 dimensions: input, process, and output. Input is defined as all factors that are independent, can be manipulated and directly impact the output through process (McCuspie, Hyman, Yakymyshy, Srinivasan, Dhau, & Drake, 2014; Cohen & Bailey, 1997). As for this study, input dimension is represented by factors that contribute to construction and emolition (C&D) waste Generation that was categorise according to the relevant building life cycle, in order to see what effects they have in which stage. Process is defined as a series of activities that influence by different input and affect the output (Herre, 2010; Cohen & Bailey, 1997). As for this study, process dimension is represented by

the element of approaches needed for every factors identified where the usage of every approach are influenced by different factors that contribute to C&D (input). While, output is defined as the result produced by the process (McCuspie, Hyman, Yakymyshy, Srinivasan, Dhau, & Drake, 2014)

DATA ANALYSIS AND DISCUSSION

The survey recorded a response rate of only 20%, or equal to 72 respondents, with a range of positions and years of experience in their fields of research. Roscoe (1975) proposes that a rule of thumb in terms of determining an appropriate sample size is that it should be greater than 30 and lower than 500 for most research.

Factors contributing to construction and demolition waste generation.

From the findings, the construction stage contributes the most to waste generation. In the design and planning stage, change in design is the most significant causes of waste generation ($\overline{x}$= 4.1528), followed by design error ($\overline{x}$= 4.0278), unclear client specifications ($\overline{x}$= 3.8611), lack of coordination and communication among the design team members ($\overline{x}$= 3.8611) and designer not familiar with alternative products ($\overline{x}$=3.7222). For the construction stage, the most significant cause is the lack of a waste management plan on-site ($\overline{x}$= 4.3333). Next is followed by the low quality of supervision ($\overline{x}$= 4.2778), poor storage system ($\overline{x}$=4.2394), the poor workmanship ($\overline{x}$=4.0278), construction method ($\overline{x}$=3.9583), defective materials ($\overline{x}$=3.8750), complex design ($\overline{x}$=3.5139) and building shape ($\overline{x}$=3.1806). In the operation stage, the significant factors are information on building did not keep up to date ($\overline{x}$=4.1389), hard to access for repair and update ($\overline{x}$=3.9028) and lack of information on building components ($\overline{x}$=3.762). Besides, in the end of life stage are demolition work ($\overline{x}$=4.3611), building design not flexible and adaptable ($\overline{x}$=4.1667) and building material could not be reused or recycle ($\overline{x}$=3.9861). In short, the factors that contribute to waste generation are determined through analysed the data collected and test is conducted. The results showed that all the factors listed are significant.

The circular economy strategies in construction and demolition waste sector.

It involves the knowledge on CE principle, material passport, design for disassembly, selective deconstruction and opinion of respondents toward the CE strategies. It helps to determine whether the CE strategies are suitable and effective for CDWM which is important in developing the strategy. From the result, most of the respondents have not come across with CE strategies such as material passport, design for disassembly and selective deconstruction. Therefore, a presumption is made that majority of the respondents had never

applied practices other than 3Rs practices to manage the C&D wastes. Among the strategies, reduce strategy is the most significant in respondents' opinion. In summary, the CE strategies are identified and the findings are supported by the literature review.

The approaches for implementation of Circular Economy (CE) for Construction and Demolition Waste Management (CDWM).

The approaches suggested are taken from the CE strategies that had been identified earlier. A test is also be conducted to determine the significance of the approaches. From the result, all the approaches showed are significant. According to the findings, it found that 70 of the respondents are agreed that the CDWM should be carried out throughout the whole building life cycle stage. In the design and planning stage, there are 8 approaches listed, optimization of materials choice ranked at first place ($\overline{x}$=4.3889), followed by effective design strategy ($\overline{x}$=4.3333), develop a waste management plan ($\overline{x}$=4.3333), estimate the amount of materials available for reuse or recycle through the adoption of BIM ($\overline{x}$=4.000), adoption of BIM to visualize the effects of materials on salvage performance of the building ($\overline{x}$=3.9167), adoption of design for disassembly ($\overline{x}$=3.9026), adoption of open-source design ($\overline{x}$=3.8333) and adoption of material passport as a design decision support tool ($\overline{x}$=3.7222).

There are 8 approaches in the construction stage, apply an on-site waste management plan is the most significant approach among them ($\overline{x}$=4.4028). Second go to off-site manufacturing and prefabrication ($\overline{x}$=4.2778) followed by application of reusable and recyclable materials as primary construction materials on-site ($\overline{x}$=4.2500), set up waste collection point according to waste type ($\overline{x}$=4.1111), evaluate the potential for salvage used products at the end of construction phase ($\overline{x}$=4.0417), use of resins and renewable materials for substrates ($\overline{x}$=3.9167), information on the location and connection method of the components be documented ($\overline{x}$=3.8889) and lastly application of 3D printing. For the operation stage there are two significant approaches which document the information of building keep up to date ($\overline{x}$=4.2778) and design the building with easy access to any repairs and upgrades of a construction ($\overline{x}$=4.1250). In the end of life stage, there are a total of 5 approaches and are considered significant. They are reuse of building components, selective deconstruction, closed-loop and open-loop recycling, redesign the building by reuse of the components and expand or contract the structure.

CONCLUSION

This study has explored the integration of circular economy concept in the construction industry, which were termed as sustainable construction as responds

towards sustainable development. In the context of building construction, sustainable construction aims to improve the existing ways of constructing buildings. Sustainable construction literature documented that, there are many models being developed purposely to enhance sustainable building construction, but there is only a minor study focusing on shifting from linear economy to circular economy in the construction industry. The shift to circular economy model can be done through the integration of the factors, approach and strategies included in Figure 1, which help in CE transition into building life cycle. Therefore, the objective of this study was achieved through the development of strategy for the adoption of CE in CDWM for encouraging the transition from linear economy to circular economy.

ACKNOWLEDGEMENT

We would like to thank the Ministry of Education for providing research funding for a research project entitled “Design Science Research as an Approach to Develop Green Cost Premium Model of Circular Economy for Sustainable Construction Practices” under grant number FRGS/1/2020/SS02/UM/02/2.

Table 1: Strategy on the adoption of CE in CDWM

BUILDING LIFE CYCLE STAGE	FACTORS (INPUT)	APPROACH (PROCESS)	STRATEGIES (OUTPUT)
Design and Planning	• Change in design. • Design error • Unclear client specifications • Poor communication problem • Designer not familiar with alternative products	• Effective design strategy • Optimize material choice • Open-source design • Visualize salvage performance of building through BIM • Develop waste management plan • Adoption of design for disassembly • Adopt material passport as design support tool.	• Reduce • Design for Disassembly • CDWM plan • Material Passport
Construction Stage	• Lack of waste management plan • Low quality of supervision • Poor storage system • Poor workmanship • Construction method • Defective materials • Complex design • Building shape	• Apply waste management plan. • Off-site manufacturing & prefabrication • Reusable & recyclable materials as primary construction materials on-site • Set up waste collection point according to waste type • information on the location and connection method of the components. • Apply 3D printing.	• Reduce • Reuse • Recycle • Design for Disassembly • CDWM Plan • Collection & Segregation
Operation Stage	• Hard to access for repair & update. • Lack of information on building components • Information on building did not keep up to date.	• Document the information of building keeps up to date. • Design the building with easy access to any repairs and upgrades of a construction.	• Reduce
End of Life Stage	• Demolition work • Building material could not be reused or recycle. • Building design not flexible & update	• Reuse of building components • Selective deconstruction • Closed-loop & open-loop recycling. • Redesign the building with reused components.	• Design for Disassembly • Selective deconstruction • Reuse • Recycle

REFERENCES

Akanbi, L. A., Oyedele, L. O., Akinade, O. O., Ajayi, A. O., Davila Delgado, M., Bilal, M., & Bello, S. A. (2018). Salvaging building materials in a circular economy: A BIM-based whole-life performance estimator. *Resources, Conservation and Recycling, 129*, 175-186. doi:https://doi.org/10.1016/j.resconrec.2017.10.026

Benachio, G. L. F., Freitas, M. d. C. D., & Tavares, S. F. (2020). Circular economy in the construction industry: A systematic literature review. *Journal of Cleaner Production, 260*, 121046. doi:https://doi.org/10.1016/j.jclepro.2020.121046

Di Maria, A., Eyckmans, J., & Van Acker, K. (2018). Downcycling versus recycling of construction and demolition waste: Combining LCA and LCC to support sustainable policy making. *Waste Management, 75*, 3-21. doi:https://doi.org/10.1016/j.wasman.2018.01.028

Eberhardt, L. C. M., Birkved, M., & Birgisdottir, H. (2020). Building design and construction strategies for a circular economy. *Architectural Engineering and Design Management*, 1-21. doi:10.1080/17452007.2020.1781588

Ellen Macarthur Foundation - Towards the circular economy Vol. 3. (2014). Retrieved from https://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-3-accelerating-the-scale-up-across-global-supply-chains

Esa, M. R., Halog, A., & Rigamonti, L. (2017). Developing strategies for managing construction and demolition wastes in Malaysia based on the concept of circular economy. *Journal of Material Cycles and Waste Management, 19*(3), 1144-1154. doi:10.1007/s10163-016-0516-x

Fellner, J., Lederer, J., Scharff, C., & Laner, D. (2017). Present Potentials and Limitations of a Circular Economy with Respect to Primary Raw Material Demand. *Journal of Industrial Ecology, 21*(3), 494-496. doi:https://doi.org/10.1111/jiec.12582

Gálvez-Martos, J.-L., Styles, D., Schoenberger, H., & Zeschmar-Lahl, B. (2018). Construction and demolition waste best management practice in Europe. *Resources, Conservation and Recycling, 136*, 166-178. doi:https://doi.org/10.1016/j.resconrec.2018.04.016

Ginga, C. P., Ongpeng, J. M. C., & Daly, M. K. M. (2020). Circular Economy on Construction and Demolition Waste: A Literature Review on Material Recovery and Production. *Materials (Basel), 13*(13). doi:10.3390/ma13132970

Groh, J., & Dubik, P. (2018). BIM As A Tool To Implement Circular Economy Into Construction Projects' Life-Cycle (Master's thesis, Aalborg University, The Faculty of Engineering and Science, Aalborg, UK). Retrieved from https://projekter.aau.dk/projekter/files/294311131/BIM_as_a_tool_to_implement_circular_economy_into_construction_projects__life_cycle.pdf

Heinrich, M., & Werner, L. (2019). BAMB publication: Materials passports – Best practice. Retrieved from https://www.bamb2020.eu/news/publication-materials-passports/

Honic, M., Kovacic, I., & Rechberger, H. (2019). Concept for a BIM-based Material Passport for buildings. *IOP Conference Series: Earth and Environmental Science*, 225, 012073. doi:10.1088/1755-1315/225/1/012073

Honic, M., Kovacic, I., & Rechberger, H. (2019). Improving the recycling potential of buildings through Material Passports (MP): An Austrian case study. *Journal of Cleaner Production, 217*, 787-797. doi:https://doi.org/10.1016/j.jclepro.2019.01.212

Ikau, R., Joseph, C., & Tawie, R. (2016). Factors Influencing Waste Generation in the Construction Industry in Malaysia. *Procedia - Social and Behavioral Sciences, 234*, 11-18. doi:https://doi.org/10.1016/j.sbspro.2016.10.213

Joensuu, T., Edelman, H., & Saari, A. (2020). Circular economy practices in the built environment. *Journal of Cleaner Production, 276*, 124215. doi:https://doi.org/10.1016/j.jclepro.2020.124215

Kabirifar, K., Mojtahedi, M., Changxin Wang, C., & Vivian W.Y, T. (2020). A conceptual foundation for effective construction and demolition waste management. *Cleaner Engineering and Technology, 1*, 100019. doi:https://doi.org/10.1016/j.clet.2020.100019

Kabirifar, K., Mojtahedi, M., Wang, C., & Tam, V. W. Y. (2020). Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management: A review. *Journal of Cleaner Production, 263*, 121265. doi:https://doi.org/10.1016/j.jclepro.2020.121265

Kaliannan, S. (2018). Determining Root Cause of Construction Waste Generation: A Global Context: *Civil Engineering Journal (C.E.J)*. doi: https://doi.org/10.28991/cej-03091179

Leising, E., Quist, J., & Bocken, N. (2018). Circular Economy in the building sector: Three cases and a collaboration tool. *Journal of Cleaner Production, 176*, 976-989. doi:https://doi.org/10.1016/j.jclepro.2017.12.010

Luangcharoenrat, C., Intrachooto, S., Peansupap, V., & Sutthinarakorn, W. (2019). Factors Influencing Construction Waste Generation in Building Construction: Thailand's Perspective. *Sustainability, 11*(13), 3638. doi: https://doi.org/10.3390/su11133638

Mangialardo, A., & Micelli, E. (2018). Rethinking the Construction Industry Under the Circular Economy: Principles and Case Studies (pp. 333-344). doi: http://dx.doi.org/10.1007/978-3-319-75774-2_23

Menegaki, M., & Damigos, D. (2018). A review on current situation and challenges of construction and demolition waste management. Current Opinion in Green and Sustainable Chemistry, 13, 8-15. doi:https://doi.org/10.1016/j.cogsc.2018.02.010

Ogunmakinde, O. (2019). Developing a Circular-Economy-Based Construction Waste Minimisation Framework for Nigeria. Retrieved from: https://www.researchgate.net/publication/348590337_Developing_a_Circular-Economy-Based_Construction_Waste_Minimisation_Framework_for_Nigeria

Polat, G., Damci, A., Turkoglu, H., & Gurgun, A. P. (2017). Identification of Root Causes of Construction and Demolition (C&D) Waste: The Case of Turkey. *Procedia Engineering, 196*, 948-955. doi:https://doi.org/10.1016/j.proeng.2017.08.035

Pomponi, F., & Moncaster, A. (2017). Circular economy for the built environment: A research framework. *Journal of Cleaner Production, 143*, 710-718. doi:https://doi.org/10.1016/j.jclepro.2016.12.055

Zimmann, R., Brien, H.O., Hargrave, J., & Morrell, M. (2016). Circular economy in the built environment. Retrieved from: https://www.arup.com/perspectves/publications/research/section/circular-economy-in-the-built-environment.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 428 – 437

TRIPLE HELIX MODEL IN HANDLING CHALLENGES TO THE INFORMAL ECONOMIC ACTIVITIES

Rosilawati Zainol[1], Faros Fadzira Roslan[2], Nor Shahida Azali[3], Nur Aulia Rosni[4], Chang Lee Wei[5]

[1, 2, 4] Centre for Sustainable Urban Planning and Real Estate,
Department of Urban and Regional Planning, Faculty of Built Environment,
[1] Centre for Transport Research, Faculty of Engineering,
[3] Department of Geography, Faculty of Arts and Social Sciences,
[5] Centre for Civilisational Dialogue,
UNIVERSITI MALAYA, KUALA LUMPUR, MALAYSIA

Abstract

The COVID19 pandemic and the multiple phases of MCOs have caused a massive impact on informal economic activities. The operators have to transform their economic activities from physical to online platforms. However, changing the economic activity platform is not as easy as it may seem. It requires the operators to acquire new skills. Therefore, this paper intends to unleash the challenges faced by the operators in transforming their businesses from physical to online platforms. This study employs a qualitative approach to achieve the objective of this study. The main respondent in this study is the fishermen's community. Three parties are involved in this study: the operators (fishermen and the entrepreneurs), the government, and the academia. Findings show that the triple helix model provides a positive platform for operators to continue their businesses online. The bonding between these three parties provides a new path for the informal operators to sustain their well-being and better quality of life.

***Keyword**:* fisherman, community, government, academia, operators, fishermen, entrepreneurs

[1] Associate Professor at Universiti Malaya. Email: rosilawatizai@um.edu.my

INTRODUCTION

The world did not anticipate that the COVID19 pandemic would have a huge impact globally. The pandemic caught the world by surprise (Goldstein, Koijien & Mueller, 2021). Almost all countries experience lockdowns. This situation has caused a huge impact socially, physically, economically, and environmentally (Mofijur, et al., 2021). It has both positive and negative impacts. Positive to the environment since the mobility of the motorised vehicles was restrained (Debata, Patnaik & Mishra, 2020). It has resulted in a cleaner environment in cities such as Delhi, Bengaluru, and Kolkata.

However, the economy of those countries that strictly imposed the movement control order (MCO) has experienced a very bad impact. Many researchers have highlighted the abrupt effect of COVID 19 control systems such as lockdown and physical distancing on the economy of each nation and how the economic downturn due to pandemic created a domino effect on other factors (Ghosh et al., 2020; Nundy et al., 2021). Among the significant domino effects is the rose unemployment rate. Many people are out of jobs. Companies started to reduce their sizes to curb revenue losses (Debata et al., 2020). Many economic sectors especially tourism, aviation, and hospitality were badly hit by the MCO globally and have malfunctioned (Lagos, Poulaki & Lambrou, 2021; Abbas, Mubeen, Jorember, Raza & Mamirkulova, 2021). There were almost no physical activities in these sectors.

Food, nevertheless, is essential during the pandemic. Demand for food intensified during the lockdown. However, agricultural outputs experience supply chain issues (Debata, Patnaik & Mishra, 2020). Farmers were forced to reduce the food prices and increase supply to meet consumer demand while coping with production issues. Farmers' social well-being and economic sustainability have to be maintained. The government has to produce a policy that is able to provide a fair distribution of wealth in any situation, e.g. a pandemic, a lockdown, a war, or any major issue that will harm the liveability of human beings and nature. Food security should be treated as one of the most important issues globally.

RESEARCH BACKGROUND

The Malaysian government has implemented the Movement Control Order (MCO) in various stages because of the COVID19 outbreak. The first MO was completely under lockdown from 18 March to 3 May 2020. Except for supermarkets, public markets, grocery stores, and convenience stores selling necessities, all movement and outside activities were restricted. The second MCO, which was conditional, occurred between May 4 and June 9, 2020. A recovery MCO was then used from 10 June 2020 to 31 March 2021. However, a new MCO was implemented between January 13, 2021, and May 31, 2021, due to the large number of instances that were occurring in several states. States

oversee it this time. A comprehensive lockdown was afterward implemented from June 1 until June 28, 2021. Finally, a National Recovery Plan was put into effect between June 15, 2021, and December 31, 2021.

The numerous instances of lockdown have had a significant negative impact on the environment, society, and the economy. Numerous enterprises were shut down. The tourism-related industries suffered a complete blow. The impact was most noticeable in the hotel and aviation industries. Many people experienced job losses. Entrepreneurs were unable to physically operate their enterprises. While businesses from other industries try to reorient towards measures intended to increase resilience, from rationalising manufacturing to redeploying talents, resetting management roles in the context of remote working, shifting operations, and launching new business models, some sectors, like travel, tourism, hospitality, or the arts, were severely affected by the pandemic (Pinzaru, Zbuchea & Anghel, 2020).

However, the fishing sector is still going strong because it provides a necessary source of food for people. Although there is a significant demand for fish-related products during the MCO, their mobility is restricted to a confined geographic area. The fishermen were unable to make a sufficient living as a result. Due to their ignorance of online enterprises, they were unable to sell online. Additionally, Abdul Ghani et al. (2017) find that the fishermen rely heavily on the financial assistance given to them by the government to survive. Government grants and subsidies have both positive and bad consequences on the ability of fishermen to live comfortably now and in the future. Prior to the introduction of the COVID19 epidemic, a number of projects tried to improve the living conditions of fishermen. Fishermen and their communities need to upgrade fishing technology and their technical abilities (Abdul Ghani et al., 2017).

The development of technology in the fishing sector has several potential advantages, say Mazuki, Abu Samah, Bolong, and Idris (2020). Therefore, it is essential to inform the fishing industry and the local population of these achievements. In order to improve the fishermen's quality of life, LKIM and other relevant organisations must be aggressive and creative in helping them develop skills and cutting-edge fishing technology (QOL).

There is still more work to be done in Malaysia in terms of food security. The national agro-food policy was recently updated to address the problem of food security. Consumers must continue to receive important food supplies from fishing. The probable effects of COVID-19 on Malaysia's aquaculture industry concentrate around two key factors: the decline in domestic and international demand, as well as the disruption of the supply networks for seafood. It is anticipated that the COVID-19-related interruptions and losses will be lessened by the Malaysian government's and other organisations' efforts to offer economic stimulus packages and various incentives (Khor Waiho et. al. 2020).

As the driving force behind socioeconomic development, entrepreneurship was also not immune from the MCO's effects (Hassan, Sade, Rahman, 2020). Many of them operated offline and were unprepared to switch to an internet platform. It was difficult for them to rapidly alter their enterprises because they had insufficient experience in online operations. The expense of moving the companies' operations online remained uncertain. Many of them require knowledge expansion. It was quite difficult.

The Malaysian government has generally developed several initiatives to encourage entrepreneurship among Malaysians. These plans include the Rural Development Policy, Dasar Agromakanan Negara 2021–2030, Dasar Agromakanan Negara 2011–2020, and Shared Property Vision 2030. These regulations were created specifically to satisfy the social, economic, and environmental needs of rural residents and business owners. The infrastructure for communication and transportation is one of the fundamental issues that the government must address right away. In terms of financial support, currently the Malaysian government provides *Tekun* and *Geran Padanan* (Matching Grant) to the entrepreneurs.

Social innovation is a novel approach to fostering inventive teamwork between various stakeholders. It departs from the conventional method of problem-solving. It offers a unique way to solve social and economic issues. According to Mazigo (2017), social innovation has given rise to the so-called "constraint wealth generators." It has been successful in releasing creative ideas and solutions to problems encountered by individuals, sectors, and society thanks to the provision of suitable spaces for debate.

Helix theory explores the cooperation between various parties aimed at creating a thriving innovation environment in a knowledge-based economic development (Vlados & Chatzinikolaou, 2019). These parties may include the community, academia, the government, and the industry. It has gone through three main phases, namely the theoretical foundation (1995-2000), the conceptual expansion (2001-2010), and finally the recent developments, a systematic attempt of implementation (2011 – 2018). Vlados and Chatzinikolaou (2019) discover that the triple helix model that emerged from the third phase can act as an innovative mechanism for all the parts and interdependence socioeconomic systems. Martini, et al. (2012) claim that developing human capital with humanities education, competence, and integrity is a must for the concept. The most effective use of these human resources will be made possible by utilising the currently highly educated workforce.

Therefore, this study examines the needs of the fishermen’s community in the post-MCO’s phase and develops a model that can be used to assist them to overcome the challenges that they are currently facing. This study was conducted in a fishermen’s village, Kampung Pulau Gajah in Kota Bharu, Kelantan. This

village is unique as it has decorative fishing boats which were designed and painted by the fishermen themselves. Figure 1 shows an example of a unique fishing boat.

Figure 1: The unique fishing boat in Kampung Pulau Gajah
Source: Field survey, 2022

METHODOLOGY

The research applied a qualitative method as part of the methodology. The interview approach is the primary method utilised in the data collection process. The interviewees were entrepreneurs and fishermen from a fishermen's community in Kampung Pulau Gajah, Kota Bharu, Kelantan. Their participation is on a voluntary basis and all the participants were informed on the details of the research project including the aim and objectives. The inquiries are detailed in Table 1.

Table 1: List of questions to the participants

Questions
What do you do? *Apakah pekerjaan anda?*
What is the condition of your work/business during the previous Movement Control Order (MCO)? *Bagaimanakah keadaan pekerjaan/perniagaan anda sewaktu Perintah Kawalan Pergerakan (PKP) yang lalu?*
What are the challenges faced? *Apakah cabaran yang dihadapi?*
Is online employment/business suitable for you? *Adakah pekerjaan/perniagaan melalui dalam talian sesuai untuk anda?*
Do you need assistance? *Adakah anda memerlukan bantuan?*
What help do you need? *Apakah bantuan yang anda perlukan?*
What kind of assistance is needed from the academics? *Apakah jenis bantuan yang diperlukan daripada ahli akademik?*
What kind of assistance is needed from the industry? *Apakah jenis bantuan yang diperlukan daripada industri?*
What kind of assistance is needed from the government? Apakah jenis bantuan yang diperlukan daripada kerajaan?

Source: Researchers' Interview Questions, 2022

FINDINGS

Five business owners and six fishermen took part in the interview sessions. The entrepreneurs are made up of business owners and housewives. All the fishermen continued to operate as usual throughout the MCO. Many of the business owners, however, were impacted by the MCO. Businesses with a physical presence were shut down entirely. For individuals who conduct business online, moving products remains a challenge. On the supplier's end, products were available. Transporting items was however impossible due to the shutdown.

The fishermen and business owners alike acknowledged the fact that they all needed help. When asked what kind of assistance they need, people provide varying responses. Among the answers given were suggestions for tools, food, skills, infrastructure, financial assistance, and communication tools. When asked what help they want from academicians, they give knowledgeable and competent answers. The fishermen were taught how to integrate tourism with their main source of income, fishing. They desire the academician's assistance in spreading information and advancing the integration process. Like businesspeople, fishers are curious to learn about marketing strategies that might be used to advertise their goods online.

However, they need knowledge of using social media platforms to advertise their products if they want to conduct business online. The necessary skills are shown in Table 2.

Table 2: Skills required by the fishermen's community

Skills		
Social Media Platform	Facebook, Tiktok, Instagram, Youtube,	Marketing skills such as copywriting, promotions, package
Website	Domain, Hosting	Visibility, Marketplace, Search Engine Optimization (SEO)
Point of Sale System (POS)	Payment system, Database system	Online payment systems such as Blizz, Toyyiba Database systems such as ME12Pay,

Source: Analysis by the Researchers, 2022

When asked what help they needed from the government, they mentioned a reliable internet connection and financial aid. Right now, their area's internet connection is terrible. They must leave their village if they need to access the internet. Given that Malaysia today uses 4G for internet connectivity, this condition is intolerable. To start doing business online, they also need financial support. Their money will come from this financial help, which will also aid in the transition of their company's move online. All of their attempts to move their company online would be useless without a strong internet infrastructure.

DISCUSSION AND CONCLUSION

This pandemic's effects have demonstrated the magnitude of the economic impact that MCO might have on any nation. Numerous business activities were halted or significantly slowed down. The outcomes of the investigations demonstrated that the MCO had an impact on the fishermen and their neighbourhood. The fishermen were able to continue their normal operations, but due to a shortage of consumers, they were unable to market their typical output. The shutdown had prevented their clients from visiting there to purchase fish-related goods. To advertise their products, they must acquire new information. The local businesses were dealing with similar circumstances. They were forced to cease operations because of a lack of understanding of the web business. They must also acquire fresh information.

The Triple Helix model gives this group a fresh perspective. The skills and capabilities of the fisherman and their communities can be improved by collaboration between the community, the government, and academia. They require the academicians' expertise and knowledge. This cooperation is highlighted by Martini et al. (2012) and also by Vlados and Chatzinikolaou (2019). To increase their mobility, they need the government to upgrade the communication and transportation systems. Furthermore, they also need the government's financial and technological support. Their society can establish capable cooperative management to oversee both their resource use and commercial activity. The community's role is important in uplifting their well-being (Malik, et al.,2018). These three parties can work together to improve the quality of life for the fishermen and their community. The Triple Helix Model, seen in Figure 2, calls for collaboration between the three stakeholders for the benefit of the fishermen and their community.

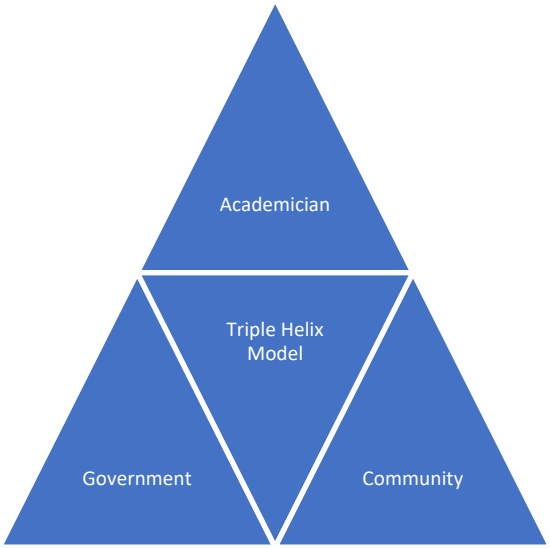


Figure 2: Triple Helix Model
Source: Analysis by the Researchers, 2022

This study shows the policy implications of cooperation between three parties: the community, the government, and the academician in proving a better quality of life for the fishermen and their community.

ACKNOWLEDGEMENTS
The authors would also like to recognize the financial support provided by the Universiti Malaya under Grant Number IIRG007A/19SAH.

REFERENCES

Abbas, J., Mubeen, R., Iorember, P. T., Raza, S., & Mamirkulova, G. (2021). Exploring the impact of COVID-19 on tourism: transformational potential and implications for a sustainable recovery of the travel and leisure industry. *Current Research in Behavioral Sciences, 2*, 100033. doi:https://doi.org/10.1016/j.crbeha.2021.100033

Abdul Ghani, N., Raub, M. A., Adam, F., Abdullah, B., & Afgani, Y. (2017). Fishermen's dependence on government funds and its impact on their quality of life (QOL) in the West Coast of Peninsular Malaysia. *Mani In India, 22*, 341 - 351.

Açikgöz, Ö., & Günay, A. (2020). The early impact of the Covid-19 pandemic on the global and Turkish economy. *Turk J Med Sci, 50*(Si-1), 520-526. doi:10.3906/sag-2004-6

Burns, J., Movsisyan, A., Stratil, J. M., Coenen, M., Emmert-Fees, K. M. F., Geffert, K., et al. (2020). Travel-related control measures to contain the COVID-19 pandemic: a rapid review. *Cochrane Database of Systematic Reviews*(9). doi:10.1002/14651858.CD013717

Cai, Y., & Amaral, M. (2021). The Triple Helix Model and the Future of Innovation: A Reflection on the Triple Helix Research Agenda %J Triple Helix. *8*(2), 217-229. doi:https://doi.org/10.1163/21971927-12340004

Debata, B., Patnaik, P., & Mishra, b. (2020). COVID-19 pandemic! It's impact on people, economy, and environment. *Journal of Public Affairs, 20*(4), 1 - 5.

Foo, L.-P., Chin, M.-Y., Tan, K.-L., & Phuah, K.-T. (2021). The impact of COVID-19 on tourism industry in Malaysia. *Current Issues in Tourism, 24*(19), 2735-2739. doi:10.1080/13683500.2020.1777951

Galvão, A., Mascarenhas, C., Gouveia Rodrigues, R., Marques, C. S., & Leal, C. T. (2017). A quadruple helix model of entrepreneurship, innovation and stages of economic development. *Review of International Business and Strategy, 27*(2), 261-282. doi:10.1108/RIBS-01-2017-0003

Ghosh, A., Nundy, S., Ghosh, S., & Mallick, T. K. (2020). Study of COVID-19 pandemic in London (UK) from urban context. Cities, 106(August), 102928. https://doi.org/10.1016/j.cities.2020.102928

Goldstein, I., Koijen, R. S. J., & Mueller, H. M. (2021). COVID-19 and Its Impact on Financial Markets and the Real Economy. *The Review of Financial Studies, 34*(11), 5135-5148. doi:10.1093/rfs/hhab085 %J The Review of Financial Studies

Hassan, H., Sade, A. B., & Rahman, M. S. (2020). Shaping entrepreneurial intention among youngsters in Malaysia. *Journal of Humanities and Applied Social Sciences, 2*(3), 235-251. doi:10.1108/JHASS-02-2020-0029

Khor Waiho, Hanafiah Fazhan, Sairatul Dahlianis Ishak, Nor Azman Kasan, Hon Jung Liew, Mohd Husin Norainy, Mhd Ikhwanuddin, Potential impacts of COVID-19 on the aquaculture sector of Malaysia and its coping strategies, *Aquaculture Reports*, Volume 18, 2020, 100450, ISSN 2352-5134, https://doi.org/10.1016/j.aqrep.2020.100450.

Lagos, D. G., Poulaki, P., & Lambrou, P. (2021). COVID-19 and Its Impact on Tourism Industry. *Adv Exp Med Biol, 1318*, 815-824. doi:10.1007/978-3-030-63761-3_45

Malik, S., Khilat, F., Tariq, F., & Arifin, K. (2018). NCIA-AMB Masuk Kampung Project: A paradigm of opportunities and challenges for sustainable rural development. *Planning Malaysia, 16*(3), 285-296.

Mazigo, A. F. (2017). Promoting Social Innovation Through Action Research: Evidence from an Empirical Study in the Fisheries Sector of Ukerewe District in Tanzania. *Journal of Human Development and Capabilities, 18*(2), 239-257. doi:10.1080/19452829.2016.1256276

Mazuki, R., Samah, A. A., Bolong, J., & Idris, K. (2020). The Challenges of Technology Usage Among Coastal Fishermen in Malaysia: Review. *International Journal of Academic Research in Business and Social Sciences, 10*(16), 392 - 400.

Melles, G. B. (2022). Designing Social Innovation for Sustainable Livelihoods. In G. B. Melles (Ed.), *Designing Social Innovation for Sustainable Livelihoods* (pp. 1-11). Singapore: Springer Nature Singapore.

Mofijur, M., Fattah, I. M. R., Alam, M. A., Islam, A. B. M. S., Ong, H. C., Rahman, S. M. A., et al. (2021). Impact of COVID-19 on the social, economic, environmental and energy domains: Lessons learnt from a global pandemic. *Sustainable Production and Consumption* 2021 Vol. 26 Pages 343-359

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., . . . Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *Int J Surg, 78*, 185-193. doi:10.1016/j.ijsu.2020.04.018

Nundy, S., Ghosh, A., Mesloub, A., Albaqawy, G. A., & Alnaim, M. M. (2021). Impact of COVID-19 pandemic on socio-economic, energy-environment and transport sector globally and sustainable development goal (SDG). Journal of Cleaner Production, 312(September 2020), 127705. https://doi.org/10.1016/j.jclepro.2021.127705

Pinilla, J., Barber, P., Vallejo-Torres, L., Rodríguez-Mireles, S., López-Valcárcel, B. G., & Serra-Majem, L. (2021). The Economic Impact of the SARS-COV-2 (COVID-19) Pandemic in Spain. *Int J Environ Res Public Health, 18*(9). doi:10.3390/ijerph18094708

Pinzaru, F., Zbuchea, A. & Anghel, L. (2020). The impact of the COVID-19 pandemic on business. A priliminary overview. Conference Paper: Strategica 2020. Crisis and Risk Management. https://www.researchgate.net/publication/345733364_The_Impact_of_The_COVID-19_Pandemic_on_Business_A_Preliminary_Overview

Priya, S. S., Cuce, E., & Sudhakar, K. (2021). A perspective of COVID 19 impact on global economy, energy and environment. *International Journal of Sustainable Engineering, 14*(6), 1290-1305. doi:10.1080/19397038.2021.1964634

Rahman, S. (2018). Emerging built heritage commodification of boutique hotels in world heritage site: evidence from George Town, Penang, Malaysia. *Planning Malaysia, 16*(4), 104-116.

Škare, M., Soriano, D. R., & Porada-Rochoń, M. (2021). Impact of COVID-19 on the travel and tourism industry. *Technological Forecasting and Social Change, 163*, 120469. doi:https://doi.org/10.1016/j.techfore.2020.120469

Vlados, C. M., & Chatzinikolaou, D. (2019). Developments on Helix Theory: Exploring a micro-evolutionary repositioning in Stra.Tech.Man terms. *International Journal of World Policy and Development Studies, 5*(10), 87 - 99.

Received: 28th September 2022. Accepted: 1st December 2022

PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 20 ISSUE 5 (2022), Page 438 – 451

REDEFINING URBAN-RURAL BOUNDARIES FROM THE DIGITAL DISPARITY PERSPECTIVE

Zakaria Alcheikh Mahmoud[1], Nikmatul Adha Nordin[2], Melasutra Binti Md Dali[3], Yong Adilah SH[4], Taiseer Mustafa Rawashdeh[5], Sara Alcheikh Mahmoud[6]

[1,2]*Department of Urban and Regional Planning, Faculty of Built Environment*
[3,4] *Centre for Sustainable Planning and Real Estate*
[5]*Department of Civil Engineering, Faculty of Engineering*
UNIVERSITI MALAYA, MALAYSIA
[6]*Department of Architectural Engineering, Faculty of Engineering*
ISRA UNIVERSITY, AMMAN, JORDAN

Abstract

There is no international consensus on a comprehensive criterion to classify human settlements into urban and rural settlements. Different national criteria are used for delineating the borders between the two types of settlements. The main components of the criteria are population size, population density, population economic activity, administrative and legal and services and facilities. Whether all these criteria have been used or some of them, an outright socio-cultural and economic distinction between the two categories of settlements have developed over years around the world. The widely used virtual space during the pandemic provided people with access to facilities and services and enabled them to work for places that usually require their physical presence. The literature has not yet covered this point. Therefore, this paper aims at revisiting the classification of urban and rural areas in the COVID-19 aftermath. Through desk work and employing qualitative and quantitative research approaches, secondary data was collected from published relevant journals, reports, books, and websites. Content and comparative analysis for analysing qualitative data and content and quantitative comparative analysis and tabulation were used to carry out the research. This paper suggested that the world is in a transitional period towards full urban status. During this period, accessibility to virtual space can be used as a comprehensive criterion for calcifying human settlements into urban and rural.

***Keyword**:* Urbanisation, Urban areas, Rural areas, COVID 19, Virtual space, Smart technology

[1] Zakaria Alcheikh Mahmoud E-mail addresses: zakaria2009@um.edu.my

INTRODUCTION

Criteria for classifying human settlements into urban and rural vary from country to country. They include population size, population occupation, administrative criteria, population density and residential density. Whether all these criteria have been used or some of them, an outright socio-cultural and economic distinction between the two categories of settlements have developed over years around the world. Urban areas usually have higher densities, better and higher-level of education, economic activities other than agriculture and consequently better employment opportunities, business activities and better community facilities. Even the introduction of Information and Telecommunication Revolution products was better in urban areas before COVID 19. For instance, early in 2020, 95 percent of the world urban population were covered by 4G mobile-broadband while 71 percent of the world rural population had access to this service. The products broke physical and time barriers as they created and enhanced virtual spaces for various uses and provided effective communication between people around the clock regardless of their physical location. The responding measures to the widespread of COVID-19 (started late in 2020) of full or partial close-down and work from home revealed two important consequences. Firstly, the significance of virtuality has been recognised when it was applied to keep human activities on during the pandemic. Students were able to receive higher education and employees of many firms were able to carry out their work when they were staying in their rural areas. Secondly, an urgent need has emerged to enhance communication networks in rural as well as urban areas. Under all these circumstances and considering the fact that life after COVID 19 is never like it before the pandemic, the pre-pandemic dichotomy of Urban- Rural classification is getting more and more blurry by virtual boundaries. This will have tremendous consequences, some of which have started emerging. Based on this backdrop, the aim of the paper is to revisit the classification of urban and rural areas in coping with these consequences in an efficient manner.

RESEARCH BACKGROUND

Classification of human settlements into urban and rural

The roots of the modern concept of urban and rural areas dates back to the industrial revolution. Since then, the concept has been one of the major concerns of social and urban theories. The distinction between rural and urban areas in social theories is derived from the concept of modernisation. Rural areas represent the "pre-modern" period and urban areas are always described as "modern" in many respects. The differences between rural and urban areas in urban theories came into existence with the development of an industrial city which was different from its rural counterpart in many basic social and economic characteristics. City is traditionally known as the centre where services and

employment opportunities are available along with commercial, educational and recreational functions. The city is connected with its peripheries through road networks and transportation modes (Hurriyet G. Ogdul, 2010). As summarised by the United Nations (2018), many countries rely on population-based statistics systems in classifying their settlements to urban and rural. Other organisations such as USDA focused on the type and importance of activities that are performed by the people in a landscape whether the activity is primary, secondary or tertiary (Gregor-Fors M., Ian, Vazquez L.-B., 2020).

The definitions of urban and rural vary with time when political and administrative changes take place in a country. Various definitions are made by national statistical offices responding to the complexity and speciality of the urbanisation process of the respective country. For instance, in Australia, before 2001, urban areas were referred to urban centres with 10,000 inhabitants or more Later, the urban areas are defined where their urban centre has a concentration of urban development and 10,000 people or more with a density of at least 200/km. In Brazil urban areas encompass cities and all towns, while in Canada, areas with a population of 1000 persons and more and a population density of 400 persons per KM2 and more are classified as urban. India's urban areas include "statutory places with a municipality, corporation, cantonment board or notified town area committee and areas that inhabited by 5000 people and more, have at least 400 persons per square Kilometre and the economic activities of at least 75% of their male working population are non-agriculture" (International Labour Organisation, no date, p. 1).

Malaysia classified urban based on three types of places: "1) Gazetted areas with their adjoining built-up areas, which had a combined population of 10,000 or more at the time of the Census 2010 or the special development area that can be identified, which at least had a population of 10,000 with at least 60 percent of population (aged 15 years and above) were involved in non-agricultural activities. 2) Built-up areas were contiguous to a gazetted area and had at least 60% of their population (aged 15 years and above) engaged in non-agricultural activities. 3)Special development areas are areas of development that can be identified and separated from any gazetted area or built- up area more than 5 km and the area had a population of at least 10,000 with 60% of the population (aged 15 years and above) were involved in non-agricultural" (Department of Statistics Malaysia, 2021).

Urban and Rural areas disparities: A Narrowing Gap

From the 1950s through the 1980s, the world witnessed, particularly in developing countries, a large-scale people movement from rural to urban areas. The people movement resulted in large-scale informal development in cities and urban environment degradation. Governments reacted by initiating rural development policies and programmes such as electrification, expanding basic education and other services which in general narrowed the gap between rural and urban areas. Since the 1990s onwards, the people's movement to urban areas decreased significantly due to improvement in policies and programs which include the installation of telecommunication infrastructure in rural areas. (Alcheikh Mahmoud, Z., 1999) Nevertheless, rural areas are still lagging behind and will continue, according to the United Nations (2020), to be so in the coming years.

The level of urbanisation and the gap between urban and rural areas differ between the developed and developing countries. It is estimated that 56.2 percent of the world population in 2020, 79.1percent of population lived in urban areas in developed regions and 51.7 percent in the less developed regions. (United Nations, 2018). Most developed countries have significantly decreased the disparities of economic structure and quality of physical infrastructure between rural and urban areas (Champion, 2011, UN, 2020). With the improvements in communication and transportation, for instance, people were able to leave cities and reside in the peripheral areas and keeping access to jobs and services in urban areas (Refer to Table 1)

Table 1: Selected development indicators in some countries

Country		Cameron	China	Indonesia	Ukraine	Colombia
Urban population	2014	54%	54%	53%	69%	76%
	2050	70%	76%	71%	79%	84%
Employment in Agriculture (% of total employment) 2004/2013		53%	35%	355	17%	17%
Population Below National Poverty Line (%) 2004/2013	Urban	12%	-----	8%	2%	28%
	Rural	55%	10%	14%	5%	47%
Lower Secondary School Completion Rate (%) 2004/2012	Urban	43%	-----	86%	99%	71%
	Rural	11%	-----	67%	98%	41%
	Urban	94%	98%	93%	98%	97

Population With Access to Improved Drinking Water Source (%) 2006/2012	Rural	52%	85%	76%	98%	74
Population With Access to Improved Sanitation Facility (%) 2006/2012	Urban	62%	74%	71%	96%	85%
	Rural	27%	56%	46%	89%	66%
Skilled Attendance at Delivery (%) 2004/2014	Urban	87%	100	76%	99%	98%
	Rural	47%	100	43%	99%	86%

Source: Constructed by author based on data from International Telecommunication Union. (2020)

Initiatives for redefining urban and rural areas

The narrowing gap between rural and urban areas, the absence of a uniform definition of these areas and the impact of this absence on national and international comparison have been behind the calls to search for a comprehensive, clear cut and precise definition of the boundaries between rural and urban areas. To cite some examples, Ripplinger D., Beck N., Hough J., (2008) proposed “urban population” to individually delineate urban areas and population density to demarcate rural areas. The proposed system is associated with transportation services. Blanca Arellano and Josep Roca (2017) suggested night lights as a new indicator for defining urban and rural areas. They argue that electricity has almost covered every corner of the globe and electricity light can be used as a reliable indicator. Dijkstra L., et al (2018) produced a new methodology with the criterion of “Degree of Urbanisation" as a comprehensive method to delineate urban and rural areas. This method depends on the population grid to classify human settlements into three categories: cities, towns & suburbs, and rural areas. Based on local conditions, the classification can encompass six categories: “cities, towns, suburbs, villages, dispersed rural areas and mostly uninhabited areas" (p. 13).

Technological advances

The dawn of the 21st century has witnessed the transition from the fourth industrial revolution to the fifth which is characterised with a fast pace of innovation creating new environments for more efficient and effective work and technological solutions. The most important production of the fourth industrial revolution is the virtual space which allows people to communicate, meet and

perform work around the clock regardless of their location (Schwab K., 2016). Social media such as Meta (Facebook) and WhatsApp have changed people's social networks and their goals. Artificial intelligence is the main product of the fifth revolution which is still going on. This revolution is producing smart tools and methods to reach smart solutions. Smart city, smart card, smart grid and smart roads are some examples. Smart technology helps to do many tasks at the same time with minimal effort. It utilises big data to help understand how improvements can be made (Kelly Bowers, 2019). Population coverage by 4G mobile networks in rural Europe has reached as high as 89 percent in 2019 and the percentage of households with Internet access at home in European rural areas was 78 percent, only 10 percent less than the rate in the urban areas in the same years (International Telecommunication Union, 2020). Refer Table 2.

Table 2: Achievement of urban and rural areas of the world, developing and developed world and selected countries in 2019

Country		Population coverage by 4G mobile network	Percentage of households with Internet access at home	Percentage of households with computer access at home, 2019
World	Urban	95%	72%	63%
	Rural	71%	37%	25%
Developed	Urban	100%	87%	84%
	Rural	86%	81%	66%
Developing	Urban	94%	65%	54%
	Rural	70%	28%	17%
Africa	Urban	77%	28%	17%
	Rural	22%	6%	2%
Arab States	Urban	76%	70%	67%
	Rural	44%	36%	34%
Asia & Pacific	Urban	100%	70%	60%
	Rural	89%	36%	22%
Europe	Urban	100%	88%	82%
	Rural	89%	78%	66%

Source: Constructed by author based on data from International Telecommunication Union. (2020)

To combat the widespread Corona virus and its consequences of infection and death, vast majority of the world's countries adopted full and partial closedown which imposed full or partial closure of real spaces where various functions used to take place. Despite the digital disparities between rural and urban areas in many places around the world, virtual space has been used very widely for various types of functions such as education, shopping and office work. Further, smart solutions have been a vital part of the measures that have been made to control the spread of the pandemic. (Sharif A., Khavarian-GAmsir

R. A., 2020). The expanding use of virtual space and smart technology significantly contributes to gradually removing the borders between rural and urban areas around the world (United Nations, 2020). However, no study concerns the potential of advanced technology as a comprehensive criterion to define urban and rural areas. Therefore, this paper aims at revisiting the delineation of urban and rural areas in the aftermath of COVIDS-19.

METHODOLOGY

To reach the above-mentioned aim, this research employed qualitative approach throughout the paper. Through desk work, data were collected from published secondary sources such as online database, websites, books and journal papers. Data was, then, analysed through component and comparison analysis for text data and tabulation and comparison analysis for numerical data. In the research process, a background was built up on classifying urban and rural areas, the narrowing gap between the two categories, initiatives on searching for new and more proper methods to delineate the borders between urban and rural areas, technological advances and COVID-19. In the last stage, the research concluded and suggested some research areas for future.

RESULT AND FINDINGS

During the pandemic, virtual space has been widely used in academic and other related activities at various levels of education, shopping, administrative and other types of works. The measures and the actions for combating the pandemic also provided a good opportunity to try smart solutions in dealing with societal issues. (Sharif A., Khavarian-GAmsir R. A., 2020). Analysing the situation during COVID-19 reveals the following facts
:

- Virtual space is efficient in fully accommodating or in supporting the performance of various types of functions that are usually performed in real space.
- Smart technology has been applied to, among other things, enforce and maintain social distancing, identify infected individuals and facilitate quarantine measures.
- Digital divide, which means the differences seen between individuals, companies, organisations, countries and cities in terms of access and use of the information communication technologies, also occur between rural and urban areas within the same country. People who inhibit the rural areas are less digitally included because rural areas experience less technological connectivity in quantity and quality. For example, in all European states the national broadband coverage is higher in urban areas than the rural ones. 2018 statistics show that only 52.3 % of

European rural households had access to high-speed services. (Esteban-Navarro et al., 2020). In an online survey conducted in Malaysia and involved 738 participants, 69% believed that there is urban-rural disparity in terms of internet access users' ability. (Star, 2020).

- There is a need for enhancing internet networks in urban as well as rural areas. Globally, during Covid-9, some students suffered from Poor internet connection (Plitnichenko, 2020) limited resources and ability to access and be involved in online learning. (Selvanathan et al., 2020). Students and teachers in rural parts of India are not familiar with digital technologies, making online learning for them even more challenging. Rural population is in need for proper training about digital technologies and more user-friendly platforms for comfortable online teaching and learning in this country (Dham, 2020).
- During COVID19, governments adopted some urgent measures to compensate for the shortcomings of infrastructure for telecommunication and internet in rural areas. Governments also start working on medium- and long-term plans for enhancing these infrastructures in rural and urban areas.
- Nevertheless, the boundaries between urban and rural areas are getting more and more blurred by virtual space.
- Smart technology and the relevant emerging application started penetrating to rural areas. This is expected to continue in an accelerating pace in the coming years. The expansion of smart technology applications to cover rural affairs will contribute to eliminating the boundaries between rural and urban areas.

Virtual space, the product of the advances of telecommunication and information technology, through internet and mobile networks has provided people with several advantages that were never possible earlier. Virtual space has broken distance and time barriers and enabled people to meet and carry out various types of activities with no need to be present in one physical space. Through virtual space, people can communicate, discuss, and work individually or in groups regardless of time and location. A person who is present in Asia for instance, can do through virtual space, office work for a firm in Latin America and a student in Europe can attend a university lecture organised in a university hall in Asia.

Virtual work performance

- Fully performance: Virtual space enables people to fully carry out some activities such as classroom lectures. A theoretical class in a school or a university can be executed interactively through a web platform. The

class can be recorded, and any student can watch the recorded class any time later. Exams can be carried out in virtual spaces as well.

- Partially performance: some other activities can be partially performed in the virtual spaces. For example, some stages of the planning process can be completed in virtual space such as discussing with the client, submission of documents for planning permission. Other stages require physical presence of people to carry out the planning process such as site preparation and development.
- Performance that is not possible virtually: At present, there are some functions that need full people's physical presence in the place of the activity. A barber is not able to conduct an online performance of a haircut (Schwab K., 2016). Figure 1 explains types of virtual work performance.

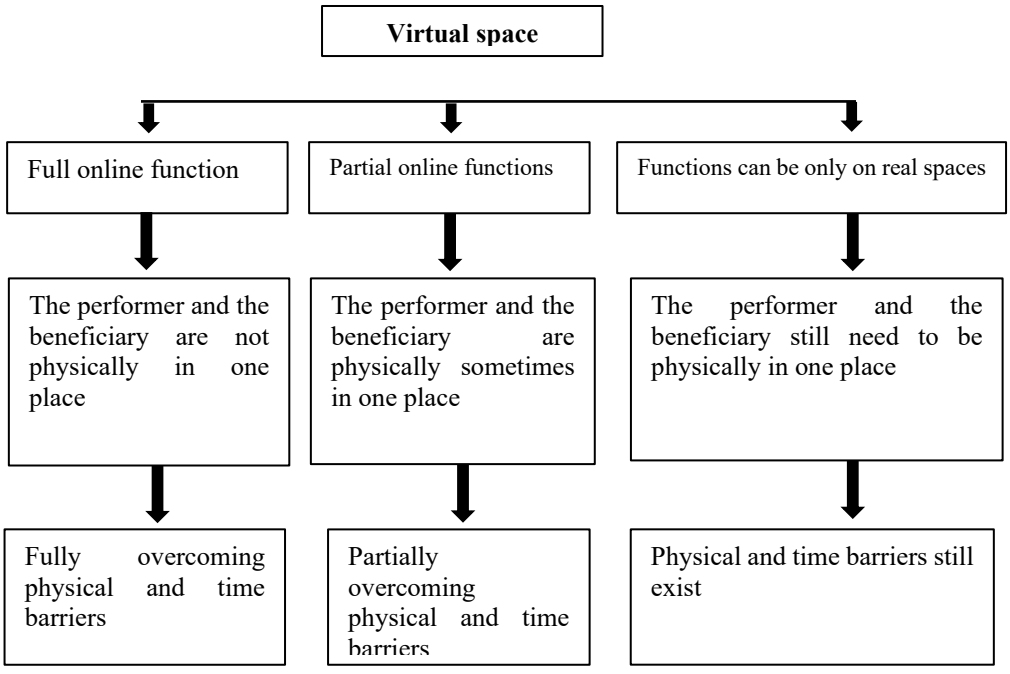


Figure 1: Types of virtual work performance
Source: Authors, 2021

Smart technology can understand the performance of people by analysing it and producing an automated, personalised service. It considers external factors, analyses them and supports them in making decisions. Smart technology makes processes and systems more efficient, and people more productive through

making use of big data to track and analyse what is going on for better results in the future (Kelly Bowers, 2019).

DISCUSSION

Virtual space and social media have provided to urban and rural populations alike easy accessibility to education, banking services, government administration units and other urban facilities. Students can join online educational classes from their rural villages or remote places. Concerned persons can join virtual conferences in urban areas of their country and outside it. People can now perform various types of banking transactions from their homes. With the gradual penetration of smart solutions to rural areas and the promising application of smart villages around the world, efficient health facilities will be available to rural areas in the near future.

The three utilities of electricity, drinking water and sanitation are not used individually or in combination as an independent criterion for defining urban and rural areas. They are always used along with other infrastructure facilities and amenities such as roads (United Nations, 2018). Virtual space has nothing to do with the three utilities, but smart technology is promising in providing smart solutions to make electricity, water and sanitation more available. Smart management system for water, sanitation (African Union Development Agency, 2021), and electricity (Kelly Bowers, 2019), has been successfully tried to improve the accessibility to each of the three utilities. On the other hand, there is in general, no wide gap of access to electricity between rural and urban areas. This fact motivated some researchers to call for using the intensity of night lights as a criterion for human settlements classification (Blanca Arellano, Josep Roca, 2017). The increasing dependency on renewable power sources such as solar energy along with smart technology which proved that could save energy (Kelly Bowers, 2019), making the differences between rural and urban areas in the availability of electricity will be of minimal importance. It is worth mentioning here that there are still urban localities with no proper access to electricity. In 2019, the rate of urban areas with access to electricity was 45%, 92.7% and 87.9 % in Malawi, Myanmar, and South Africa respectively (The World Bank, 2020). With all these facts, the three utilities cannot be considered alone as an efficient criterion for delineating borders between urban and rural areas.

The discussion above clearly shows that the advances in technology and their productions of virtual space and smart technology are abating the borders between rural and urban areas. However, the digital disparities between rural and urban areas are expected to continue for a time that will be different from country to country. Technological advances are getting on unabated leading to total collapse of borders between urban and rural areas in the near future. Consequently, accessibility to virtual space is suggested to be used as the criterion

for classifying human settlements into urban and rural. Accessibility may include sub criteria such as mobile per person, speed of the internet, number of hours of using the internet or may some other or more indicators. This needs further research. The ongoing scenario of gap narrowing between rural and urban areas which is expected to lead to fully an urban world is and will be having significant development implications.

CONCLUSION

There is no international consensus on a comprehensive criterion to classify human settlements into urban and rural settlements. Different national criteria are used for delineating the borders between the two types of settlements. The main components of the criteria are population size, population density, population economic activity, administrative, legal, services and facilities. The gap between rural and urban areas are narrowing down. However, disparities between the two settlement categories still exist in various forms. Significant portion of the rural population in some countries like Cameron (55%) is still below the poverty line of the country while the rate of urban population under the poverty line is 12% in this country. Even digital disparities can be found in world regions. 89% of Europe's rural areas are covered by 4G mobile networks and 44 % of the rural population of Arab states while 100% and 76 % of the population of the two regions respectively are covered by the same network. With the advancement of technology and the increasing usage of its products of virtual space and smart technology, particularly during the COVID-19 pandemic, the borders between rural and urban areas are getting more and more blurry. This paper has proved that virtual space and smart technology are abating the borders between rural and urban areas in particular economic activities and urban accessibility to urban facilities such as education. The continuity of digital disparities between rural and urban areas will depend on the national relevant development programme. However, with the enhancement of digitisation of rural and urban areas and with the increasing penetration of smart technology to rural areas, the borders between the two types of human settlements will collapse putting the world in full urban status. Till that day on which we do not need classification criteria, accessibility to virtual space is recommended as a comprehensive criterion for classifying human settlements into urban and rural. The move of the world to a fully urban world has significant consequences which needs special research attention and efforts.

REFERENCES

African Union Development Agency. (2021). A Water, sanitation, and hygiene revolution in Africa using smart technologies. Available at: https://www.nepad.org/blog/water-sanitation-and-hygiene-revolution-africa-using-smart-technologies, accessed September 2. 2021.

Alcheikh Mahmoud, Z. (1999). Cross national comparison of strategies to deal with unauthorized colonies in selected Asian cities. PhD thesis. School of Planning and Architecture, New Delhi.

Blanca Arellano, Josep Roca. (2017). Defining urban and rural areas: a new approach. Proceedings, SPIE 10431, *Remote Sensing Technologies and Applications in Urban Environments II*, Warsaw, Poland 104310E (4 October 2017); doi: 10.1117/12.2277902

Census United Sates. (2021). *Urban and Rural*. Available at: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html, accessed September 1, 2021.

Champion, Anthony (2011). The changing nature of urban and rural areas in the United Kingdom and other European countries. *In Population Distribution, Urbanization, Internal Migration and Development: An International Perspective,* United Nations, Department of Economic and Social Affairs, ESA/P/WP/223

Department of Statistics Malaysia. (2021). *Population ad Housing Census*. Available at: https://www.dosm.gov.my/v1/index.php?r=column/cone&menu_id=bDA2VkxRSU40STcxdkZ4OGJ0c1ZVdz09m accessed September 1, 2021.

Dham, K. (2020). Covid-19 impact: 4 major challenges faced by students of rural India. https://www.indiatoday.in/education-today/featurephilia/story/covid-19-impact-4-major-challenges-faced-by-students-of-rural-india-1709294-2020-08-10

Dijkstra L., Florczyk A., Freire S., Kemper T. and Pesaresi M. (2018). Applying The Degree of Urbanisation to The Globe: A New Harmonised Definition Reveals A Different Picture Of Global Urbanisation. *the 16th Conference of IAOS OECD Headquarters,* Paris, France, 19-21 September. Available at: https://www.oecd.org/iaos2018/programme/IAOS-OECD2018_Lewis-et-al.pdf, accessed August 23, 2021.

Esteban-Navarro, M.-Á., García-Madurga, M.-Á., Morte-Nadal, T., & Nogales-Bocio, A.-I. (2020). The Rural Digital Divide in the Face of the COVID-19 Pandemic in Europe—Recommendations from a Scoping Review. *Informatics*, 7(4), 54. https://doi.org/10.3390/informatics704005

Gregor-Fors M., Ian, Vazquez L.-B. (2020). Revisiting "rural". *Science of Total Environment*, 741 (2020), pp 1-4.

Hürriyet G. Ogdul (2010) Urban and Rural Definitions in Regional Context: A Case Study on Turkey, *European Planning Studies*, 18:9, pp. 1519 1541, DOI: 10.1080/09654313.2010.492589

International Labour Organisation. (No date). Inventory of official national-level statistical definitions for rural/urban areas. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/genericdocument/wcms_389373.pdf, accessed August 20,2021.

International Telecommunication Union. (2019). *Measuring digital development Facts and figures 2020*. Geneva Switzerland: ITU publication. Available at: https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf. Accessed August 1, 2020

Kelly Bowers .(2019). what is smart technology and what are its benefits? *Rezaid*. https://rezaid.co.uk/smart-technology-and-its-benefits/, accessed august 2.2021

Mohajan, Kumar, Haradhan. (2018). Qualitative Research Methodology in Social Sciences and Related Subjects. *Journal of Economic Development, Environment and People*, 7(1), pp. 23-48.

Netlingo. (2021). *Smart tech*. Available at: https://www.netlingo.com/word/smart-tech.php, accessed septembe 1, 2021

Rahman Shidur. Md (2017). The Advantages and Disadvantages of Using Qualitative and Quantitative Approaches and Methods in Language "Testing and Assessment" Research: A Literature Review. *Journal of Education and Learning*, 6 (1). Pp. 102-112.

Ripplinger D., Beck N., Hough J., (2008). Urban-Rural Classification: Identifying a System Suitable for Transit. North Dakota State University. Available at: https://www.ugpti.org/resources/reports/downloads/dp-207.pdf, accessed August 2.2021.

Plitnichenko, L. (2020). 10 Challenges of E-Learning during COVID-19. https://jellyfish.tech/10-challenges-of-e-learning-during-covid-19/

PRB. (2015). He urban-rural divide in health and development (data sheet). Available at: https://www.prb.org/wp-content/uploads/2015/05/urban-rural-datasheet.pdf, accessed June 1, 2020.

Schwab K. (2016). *The Fourth Industrial Revolution*. Geneva: World Economic Forum

Selvanathan, M., Hussin, N. A. M., & Azazi, N. A. N. (2020). Students learning experiences during COVID-19: Work from home period in Malaysian Higher Learning Institutions. *Teaching Public Administration*. https://doi.org/10.1177/0144739420977900

Sharif A., Khavarian-GAmsir R. A. (2020). Review the COVID-19 pandemic Impacts on cities and major lessons for urban planning, design and management. *Science of the Total Environment,* 749 92020), pp 1-12

Simplilearn. (2021). Top 7 Impacts of social media: Advantages and Disadvantages. Simple Learn, https://www.simplilearn.com/real-impact-social-media-article, accessed September 20, 2021.

Star, T. (2020). Need to address digital divide. https://www.thestar.com.my/opinion/letters/2020/07/31/need-to-address-digital-divide

The World Bank. (2020). Access to Electricity, Urban (% of urban population). Available at: https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS, accessed September 1, 2021.

TNQEEB. (2021). Distance jobs in Saudi Arabia. Avilable at: https://saudi.tanqeeb.com/ar/s/%D9%88%D8%B8%D8%A7%D8%A6%D9%81/%D9%88%D8%B8%D8%A7%D8%A6%D9%81-%D8%B9%D9%86-%D8%A8%D8%B9%D8%AF, accessed Septembe 23, 2021.

United Nations. (2018). *World Urbanization Prospects: The 2018 Revision*. Available at https://population.un.org/ wup/. Accessed on 13 June 2019.

United Nations. (2019). World Urbanisation Prospects The 2018 Revision. New York: United Nations. Available at: https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf, accessed August 2, 2021.

United Nations. (2020). *Urbanization: Expanding Opportunities but Deeper Divides.* Available at: https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/02/World-Social-Report-2020-Chapter-4.pdf, accessed September 30,2021

Wineman A., Ayala Y. D., Anderson L. C. (2020). Definitions of "rural" and "urban" and understandings of economic transformation: Evidence from Tanzania. *Journal of Rural Studies,* 79 (2020), pp. 254-268.

Received: 28th September 2022. Accepted: 1st December 2022

NOTES TO CONTRIBUTORS AND GUIDELINES FOR MANUSCRIPT SUBMISSION

INTRODUCTION

The Journal of the Malaysian Institute of Planners or PLANNING MALAYSIA is a multidisciplinary journal related to theory, experiments, research, development, applications of ICT, and practice of planning and development in Malaysia and elsewhere.

The objective of the journal is to promote the activity of town planning through dialogue and exchange of views concerning professional town planning practice. PLANNING MALAYSIA will welcome any news, feature articles, or peer reviewed (including book reviews, software review, etc.) articles for publication. All articles should be original work by the authors. **Articles, views and features will not be taken to be the official view of the Malaysian Institute of Planners (MIP) unless it carries the name of MIP as the author.** This is to encourage open discussion on diverse issues and opinion for the advancement of town planning practice. Articles and contributions will be accepted from MIP members and non-members worldwide.

In year 2010, PLANNING MALAYSIA Journal has been indexed in SCOPUS. Previous issues of PLANNING MALAYSIA Journal can be viewed on the MIP website.

SUBMISSION OF MANUSCRIPTS

Manuscript should be emailed to pmjournal@gmail.com. Manuscript should ideally be in the range of 8-10 pages long. Each manuscript should have a title page and an abstract of about 150 words. The title page should contain the title, full name(s), designation(s), organizational affiliation(s), a contact address, and an email address. All manuscripts are received on the understanding that they are not under concurrent consideration at another journal. One copy of the current Journal will be provided for each article. Additional reprints of article can be ordered, at cost, by the author(s). PDF format of the article (if available) can be obtained from the Publisher.

LAYOUT

Manuscript should be typed in single spacing (including footnotes, endnotes and references) on one side of the paper only (preferably A4) with the following margins: right and left - 4.25 cm, top - 5.5 cm and bottom - 5.2 cm (including header – 4.5 cm and footer – 4.3 cm) in 11 point Times New Roman font. Footnotes should be numbered consecutively and placed at the end of the manuscript. Footnotes should be kept to a minimum. Tables and diagrams should be provided in the text. References should follow the APA (6th Edition) referencing format. All foreign words must be typed and transliterated. The Editorial Board reserves the right to change the transliteration of all historical names, titles and non-English terminology to bring them into conformity with its own style.

USE OF FORMULA, FIGURES AND TABLES

Formula (mathematical formula) should be used only when necessary and the CONCLUSION derived must be explained and made intelligible to a non-mathematical reader. Wherever possible, authors are encouraged to place the mathematical parts of the article in an appendix. In cases of empirical articles, authors are expected to make readily available a complete set of data and any specialized computer programs to interested readers.

All illustrations, figures and/or tables in the manuscript must be captioned, in clear black and white (grayscale) and ready for reproduction.

REFEREEING PROCEDURE

Manuscripts will be acknowledged upon receipt. Only selected (preferred) manuscripts will be **reviewed by two (or three) referees** in addition to the editors. Editorial decision will normally be made within **two to six months**, but circumstances beyond control occasionally dictate a longer cycle. If authors are invited to prepare a revision for further consideration, the major issues to be resolved will be outlined and will be forwarded to them as quickly as possible.

ACCEPTED ARTICLES

Authors of accepted articles will be requested to provide a digital copy of the manuscript, preferably in Microsoft Word to the MIP (the Publisher) via email at pmjournal@gmail.com. MIP will not be responsible for the loss or damage of the digital copy.

COPYRIGHT

Contact:

Editor-in-Chief
PLANNING MALAYSIA
Journal of the Malaysian Institute of Planners
B-01-02, Jalan SS7/13B, Aman Seri, Kelana Jaya,
47301, Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: +603 78770637 Fax: +603 78779636
Email: pmjournal@gmail.com
Homepage: www.planningmalaysia.org

ETHIC STATEMENT

The Journal of the Malaysia Institute of Planners or **PLANNING MALAYSIA** is a peer-reviewed journal. This statement spells out ethical behaviour of all parties involved in the act of publishing an article for this journal, i.e. the author, the peer-reviewer, the chief editor and editors, and the publisher. This statement is based on COPE's Best Practice Guidelines for Journal Editors. URL: http://publicationethics.org/files/u2 /Best_Practice.pdf

DUTIES OF AUTHORS

Reporting Standards

Authors of original research should present an accurate account of the work done as well as an objective discussion of its significance. Data of the research should be represented accurately in the article. An article should contain sufficient detail and references to permit others to replicate the work. Fraudulent or knowingly inaccurate statements constitute unethical behaviour and are unacceptable.

Data Access and Retention

Authors may be asked to provide the raw data in connection with an article submitted for editorial review, and should be prepared to provide public access to such, if practicable, and should in any event be prepared to retain such data for a reasonable time after publication.

Originality and Plagiarism

Authors should ensure that they have written entirely original works, and if the authors have used the work and/or words of others this must be appropriately cited or quoted. Such quotations and citations must be listed in the Reference at the end of the article.

Multiple Publication

An author should not in general publish manuscripts describing essentially the same research in more than one journal or primary publication. Submitting the same manuscript to more than one journal concurrently constitutes unethical publishing behaviour and is unacceptable.

Acknowledgment of Sources

Proper acknowledgment of the work of others must always be given. Authors should cite publications that have been influential in determining the nature of the reported work.

Authorship of the Paper

Authorship should be limited to those who have made a significant contribution to the conception, design, execution, or interpretation of the study, and should be listed as co-authors. Others who have participated in certain substantive aspects of the research project, they should be acknowledged or listed as contributors.

Corresponding Author
Corresponding author is the author responsible for communicating with the journal for publication. The corresponding author should ensure that all appropriate co-authors and no inappropriate co-authors are included on the paper. All co-authors have seen and approved the final version of the paper and have agreed to its submission for publication.

Acknowledgment of Funding Sources
Sources of funding for the research reported in the article should be duly acknowledged at the end of the article.

Disclosure and Conflicts of Interest
All authors should disclose in their manuscript any financial or other substantive conflict of interest that might be construed to influence the results or interpretation of their manuscript.

Fundamental Errors in Published Works
When an author discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the journal editor or publisher and cooperate with the editor to retract or correct the paper.

DUTIES OF REVIEWERS

Contribution of Peer Review
Peer review assists the chief editor and the editorial board in making editorial decisions while editorial communications with the author may also assist the author in improving the paper.

Unqualified to Review or Promptness
Any reviewer who feels unqualified to review the assigned manuscript or unable to provide a prompt review should notify the editor and excuse himself/herself from the review process.

Confidentiality
Manuscripts received for review must be treated as confidential documents. They must not be shown to, or discussed with, others except as authorized by the chief editor. Privileged information or ideas obtained through peer review must be kept confidential and not used for personal advantage.

Standards of Objectivity
Reviews should be conducted objectively. There shall be no personal criticism of the author. Reviewers should express their views clearly with supporting arguments.

Acknowledgment of Sources
Reviewers should identify relevant published work that has not been cited by the authors. Any statement that had been previously reported elsewhere should be accompanied by the relevant citation. A reviewer should also call to the chief editor's attention any

substantial similarity or overlap between the manuscript under consideration and any other published paper of which they have personal knowledge.

Conflict of Interest
Reviewers should decline to review manuscripts in which they have conflicts of interest resulting from competitive, collaborative, or other relationships or connections with any of the authors.

DUTIES OF EDITORS

Decision on the Publication of Articles
The chief editor of the PLANNING MALAYSIA is responsible for deciding which of the articles submitted to the journal should be published. The chief editor may be guided by the policies of the journal's editorial board subjected to such legal requirements regarding libel, copyright infringement and plagiarism. The chief editor may confer with other editors or reviewers in making this decision.

Fair play
Manuscripts shall be evaluated solely on their intellectual merit.

Confidentiality
The chief editor/editors and any editorial staff must not disclose any information about a submitted manuscript to anyone other than the corresponding author, reviewers, potential reviewers, other editorial advisers, and the publisher.

Disclosure and Conflicts of Interest
Unpublished materials disclosed in a submitted manuscript must not be used by anyone who has a view of the manuscript while handling it in his or her own research without the express written consent of the author

PLANNING MALAYSIA
JOURNAL OF THE MALAYSIAN INSTITUTE OF PLANNERS

B-01-02, Jalan SS7/13B, Aman Seri, Kelana Jaya,
47301, Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: +603 78770637 Fax: +603 78779636
Email: pmjournal@gmail.com or mip@mip.org.my
Website: www.planningmalaysia.org

ISSN 16756215
9 771675 621005