# DEVELOPING A HOUSING PRICE MODEL BASED ON CARBON FOOTPRINT INDICATORS

WENDY LIM WEN XIN

A thesis submitted in fulfilment of the requirement for the award of the
Doctor of Philosophy in Real Estate and Facilities Management



Faculty of Technology Management and Business
Universiti Tun Hussein Onn Malaysia

OCTOBER 2023

*"It always seems impossible until it is done"*

## ACKNOWLEDGEMENT

This thesis would not have been possible without the constant support and assistance from many individuals. I would like to thank my advisor, Gs. Dr. Burhaida Burhan, for her patience, guidance, and encouragement. I have greatly benefited from her extensive knowledge and detailed feedback. She has been an inspiration as I hurdled through the path of this Ph.D. degree. She is the true definition of a leader and the ultimate role model. I am grateful for all the experiences she arranged for me and the opportunities she provided for my professional development. I am extremely grateful that she took me on as a student and continued to have faith in me over the years. I also could not have undertaken this journey without my defence committee, who generously provided knowledge and expertise. It is a privilege to be able to learn from Associate Professor Dr. Rozilah Kasim, Associate Professor Dr. Azlina Md Yassin, and Professor Sr Ts Dr. Haji Abdul Hadi bin Haji Nawawi. In addition, this endeavour would not have been possible without the Ministry of Higher Education (KPT) and Research Management Centre (RMC UTHM), which funded my research. The National Property Information Centre (NAPIC), the Ministry of Works (JKR), the Sustainable Energy Development Authority (SEDA), and the Department of Town and Country Planning (PLANMalaysia) are thanked for their assistance in supplying all the data required for this study. My gratitude also extends to my family, acquaintances, and postgraduate colleagues. I am grateful for the unconditional affection and support throughout the entire process of conducting research and composing my thesis.

# ABSTRACT

Housing is a major factor leading to carbon footprint emissions, which holds the utmost importance in gaining more insights into its emissions at a different location. Housing carbon footprints vary from each other in terms of connection to urban form and housing characteristics. However, it is unclear about the nexus between them. Considering that appropriate estimate is not available in Malaysia, the development of it is required. This research aims to develop a housing price model based on carbon footprint to measure direct carbon footprint emissions based on housing attributes, housing prices and the characteristics of urban form for terraced properties in Johor Bahru. Observing the implicit influences of each attribute is crucial in evaluating the carbon footprint emissions. Housing submarket analyses based on Principal Component Analysis (PCA) and Cluster Analysis; as well as two carbon footprint models, namely the energy-use model and transportation-use model, were used to facilitate the total calculation of housing carbon emissions. Studies on the relationship between housing attributes, especially housing price variables with carbon footprint emission are scarce. Thus, the current work not only highlighted the impact of housing attributes on carbon footprint emission, but also described the changes in housing price through the urbanisation process towards carbon footprint emission on the local scale. To summarise, a spatial pattern map embedded with housing attributes and housing price coefficient was generated on the spatial layout data by using Kernel Density Analysis to define the spatial variability of carbon footprint emissions on the geographical layout. It was found that the density of carbon footprint emissions index for terraced properties in Johor Bahru was doughnut-shaped, where carbon footprint emissions in the city core were lower and gradually building up in the suburban areas, especially Plentong and Tebrau area. Thus, the developed housing price model based on carbon footprint indicators has proven that housing attributes, urban form, and carbon footprint emissions have a strong and unique relationship with the tested variables. Notably, understanding the pattern and linkages of these variables is beneficial in offering new knowledge for urban studies, and to authorities such as JPPH, environmentalists, home buyers and property developers.

# ABSTRAK

Peluasan kawasan perumahan dan bentuk bandar telah menyumbang kepada peningkatan jejak karbon secara ketara. Perumahan merupakan faktor penyebab utama dalam kes peningkatan jejak karbon dan ia berbeza mengikut lokasi. Jejak karbon untuk perumahan berbeza antara satu sama lain berhubung dengan ciri-ciri bentuk bandar, struktur dan lokasi rumah. Namun begitu, tiada penjelasan yang terperinci telah dibincangkan. Memandangkan anggaran yang tepat masih tiada di Malaysia, maka pembangunan model baru amat diperlukan. Kajian ini bertujuan untuk menghasilkan satu model kluster harga jejak karbon untuk rumah teres di Johor Bahru dengan mengambil kira ciri-ciri struktur rumah, harga rumah dan bentuk bandar. Model ini adalah penting untuk menilai hubungan tersirat di antara ciri-ciri perumahan dengan jejak karbon. Analisa *housing submarket* melalui Principal Component Analysis (PCA) dan kluster analisis, bersama dengan dua model jejak karbon, iaitu model penggunaan tenaga dan model penggunaan kenderaan telah digunakan untuk mengukur jumlah pelepasan jejak karbon bagi rumah teres di Johor Bahru. Kajian tersedia ada mengenai hubungan antara ciri-ciri perumahan terutamanya harga rumah dengan jejak karbon adalah terhad. Maka itu, kajian ini bukan sahaja menilai impak ciri-ciri perumahan terhadap jumlah jejak karbon, malah turut membincangkan bersama faktor perubahan harga rumah akibat kesan urbanisasi terhadap jejak karbon pada skala tempatan. Untuk merumuskan, satu peta spatial yang merangkumi ciri-ciri perumahan dan pekali harga rumah telah dihasilkan untuk menghuraikan corak spatial jejak karbon secara geografi. Didapati bahawa indeks densiti jejak karbon untuk rumah teres di Johor Bahru berbentuk donut, di mana jejak karbon di kawasan bandar adalah lebih rendah dan kian meningkat di kawasan pinggir bandar terutamanya di Plentong dan Tebrau. Kesimpulannya, model kluster harga jejak karbon yang dibangunkan ini telah membuktikan bahawa ciri-ciri perumahan, harga rumah dan pelepasan jejak karbon mempunyai hubungan yang kukuh dan unik di antara satu sama lain. Memahami corak jejak karbon dan hubungan tersirat untuk semua pembolehubah yang dikaji menawarkan pengetahuan baru kepada bidang hartanah dan pihak berkuasa seperti JPPH, pembeli rumah dan pemaju perumahan.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# CHAPTER 1

# INTRODUCTION

## 1.1 Research Background

The current social and economic modernisation in metropolitan cities, which is better known as '*urbanisation*', has presented unprecedented growth. The world has embarked on the process of rapid urbanisation and modernisation. This process involves a rapid increase in the number and expansion of cities. Towns and cities are formed and expanded towards the peripheries, following the shift of people into the areas for living and working (Tey, 2022; Samat *et al*., 2020; Surya *et al*., 2020; Hasan and Nair, 2014; Yaakob, Masron and Masami, 2010).

Cities are possibly the most complex things created by humans. All cities in the developing countries and most other cities in other areas have been decentralised over the last decades (Clifford *et al*., 2022; Jha, 2018; Anas, Arnoot and Small, 1997). The urban spatial structure is continuously changing into a more polycentric and dispersed form (Grunsven and Benson, 2020; Mohd Yusop and Permana, 2016; Lee, 2015). Currently, major cities and metropolitan areas are characterised by decentralised home and working opportunities. The process of urbanisation reshapes the spatial distribution of occupations, industries, residential development, and land use (Penco *et al*., 2020). This phenomenon denotes that larger urban scale increases the reorganisation of industries and redistribution of residence and employment (Kuddus, Tynan and McBryde, 2020; Zhao, Lu and *de* Groo, 2011; Zhao, 2010).

Besides the rapid restructuring and uncontrolled massive population migration that have emerged due to urbanisation, cities are showing unprecedented growth and expansion (Zhu, Tu and Li, 2022; Yavuz, 2016; Bhatta, 2010), without adequate planning (Hossain and Huggins, 2021; Lanrewaju, 2012). Subsequently, the available resources such as farmlands, urban greenbelts, and green spaces are decreasing (Marzuki and Jais, 2020; Samat *et al*., 2020; Bhat *et al*., 2017). The failure in balancing between the continuous expansion of urban spatial structure and the growing need for housing leads to uneven land development (Ahmed *et al*., 2019; Deng and Huang, 2004), including environmental degradation and a decline in ecosystem services (Samat *et al*., 2020; Tian and Wang, 2020; Wang *et al*., 2020; Yavuz, 2016).

The disorganised expansion of cities with a lower mix of land use creates negative impacts on the ecosystem services when green spaces begin to contract and become smaller in size (Yi *et al*., 2017; Wang, 2014; Zhang and Hao, 2008). As a result, built-up areas spread widely, while the carbon sequestration or support for biodiversity is gradually replaced by residential development (Shao *et al*., 2020; Brody, 2013; Deng and Huang, 2004). Essentially, the urban form with a disordered sprawl pattern often produces a higher carbon footprint. The scattered and randomly dispersed urban land use encourages longer travelling distances between cities, further vehicle miles travelled, frequent traffic congestions, an increase in living space per capita, and higher residential energy consumption (Lee, 2015; Sun, Green and Wang, 2015).

Today, the world is facing two of the most pressing issues attributed to urbanisation, which include the expansion of urban spatial structure and escalating carbon footprint emissions. It is found that the carbon footprint growth in cities is exacerbated by the extension of urban form and fast-paced urbanisation (Mangum, 2016; Lee, 2015; Zhang, Yi and Li, 2015; Abesamis, Campos and Castell, 2013). Over the years, a considerable growth of interest has occurred around the emergence of carbon footprint due to urbanisation and human activities. According to Wiedmann and Minx (2008), carbon footprint could be described as the measure of human activities' impacts on the environment in terms of the number of greenhouse gases (GHG) produced. It is commonly measured in tons of carbon dioxide ($CO_2$). Notably, the increase and blooming of carbon footprint in developing cities is becoming a rising issue due to active urbanisation over the past few years (Bekhet and Othman, 2017;

Sovacool and Brown, 2010). In 2020, concentrations of greenhouse gases continued to rise, setting new records.

In 2015, the United Nations acknowledged the significance of sustainable development and established a set of 17 Sustainable Development Goals (SDGs) to be attained by 2030, with the objective of creating sustainable cities and communities, and addressing issues of responsible consumption and production. The issue of carbon footprint, which is the quantity of carbon dioxide ($CO_2$) emitted by human activities, is one of the greatest obstacles to achieving these objectives (United Nations, 2023).

Cities are places of change and innovation, which incorporate different elements to effectively shape sustainable development. Cities generally need formal urban planning to achieve sustainable urban development. However, the task of making a city a good environment to dwell in has been more challenging over the decades. Following the relatively fast rate of urbanisation in Malaysia, it was expected that the boundary of the cities would continue to expand to accommodate the growth (Bhat *et al*., 2017). The rapid urban growth in metropolitan areas has created more externalities to the environmental degradation, particularly the rise of carbon footprint emissions. Thus, exploring and demonstrating the impacts of urbanisation on carbon footprint emissions are crucial.

The issue of whether urbanisation and changes in urban spatial structure contribute to carbon footprint emissions has been widely discussed. Many researchers attempted to evaluate carbon footprint emissions through various parameters. These carbon footprint studies are mainly explored from the point of view of residents' lifestyles, household consumption, and urban population density. These research works seemed to overlook and disregard the importance of the most evident factors of the overall carbon footprint emissions, such as housing characteristics and urban form. Furthermore, despite the discussion of the previous studies and literature works regarding the influence of the variation of household consumption and urban form on the direct carbon footprint emissions, there is a wide and independent interpretation on this matter. The approaches and research findings are perceived as different concerns or points of issue. Lee (2015) also highlighted that household consumption has ambiguous and vague impacts to evaluate the exact total carbon footprint emissions.

The process of making a city more urbanised has significant influences on housing carbon footprint emissions. This relationship varies in different regions and economic developments (Li and Lin, 2015). Housing is heterogeneous and is the ideal entity to represent the overall spatial variability of carbon footprint emissions that stem from rapid urbanisation. However, it was also argued that most cities do not have a specific appraisal to monitor the direct carbon footprint emissions (Moran *et al*., 2017). Nearly forty percent of global carbon dioxide emissions are generated by the real estate sector (Carlin, 2022). Notably, housing is a major contributor to carbon footprint emissions, which receives more insights for its emissions at different locations.

Considering that such an estimate is not available or accessible in Malaysia, the development of it is crucial. In line with this, this thesis studied and evaluated the relationship between urban spatial structure and housing carbon footprint emissions for the terraced properties in Johor Bahru, Malaysia. The study was conducted to develop a specific calculation model for housing carbon footprint emissions by accounting for property attributes and urban form characteristics. A scenario analysis was performed to further reveal the current spatial variability of housing carbon footprint emissions for terraced properties in Johor Bahru, Malaysia. Understanding the pattern and linkages of both variables is beneficial in providing new knowledge for urban studies.



## 1.2 Problem Statements

Urbanisation plays an important role in carbon footprint emissions in the short term and long term (Mangum, 2016; Zhang, Yi and Li, 2015). The expansion of cities marks a spiralling outward growth into the peripheries from the existing urban core (Yi *et al*., 2017; Brody, 2013). It has been found that carbon footprint emissions are mostly concentrated in the areas with a high urban population (Abesamis, Campos and Castell, 2013; Makido, Dhakal and Yamagata, 2012) and the areas with higher development density (Moran *et al*., 2018).

Cities are the largest contributors to carbon footprint emissions. Despite occupying less than 2% of the entire land surfaces worldwide, cities lead to the storage and release of more than 75% of the total carbon footprint emissions (Moran *et al*., 2018; Churkina, 2016; Johansson *et al*., 2012; Dixon, 2009; Intergovernmental Panel

on Climate Change, 2007). This figure was expected to propel and continue to snowball in the near future. To illustrate, the survey from BP Statistical Review of World Energy 2019 demonstrated an increase in carbon footprint emissions by approximately 4% in 2018 compared to the previous year, marking it the fastest growth in six years. The report found that Malaysia's carbon footprint increased from 241.6 million tonnes in 2017 to 251.1 million tonnes in 2018 and 256.9 million tonnes in 2019, before decreasing to 240.6 million tonnes in 2020 and 238.6 million tonnes in 2021, during the course of the global COVID-19 pandemic (Greentech Malaysia, 2019). Carbon footprint emissions are a form of pollution that causes global warming and ultimately, climate change.

The increase in urban carbon footprint emissions is an after-effect of city expansion. The overall amount of carbon footprint emissions in the country has been expected to grow steadily in the coming years, which could lead to unfavourable urban environmental deterioration in the short and long terms. With cities leading to a significant increase in footprint emissions, this issue should not be overlooked. More parties and stakeholders have begun to emphasise the need to explore carbon footprint emissions in detail.

Many research works were accustomed to measuring carbon footprint separately through the urban population, household income, household electricity, and industrial manufacturing activities (Naderipour *et al*., 2021; Goldstein, Gounaridis and Newell, 2020; Yi *et al*., 2017; Huang *et al*., 2017; Cui *et al*., 2010). For example, Majid, Moeinzadeh, and Tifwa's (2014) study to measure carbon footprint emissions with the income of households in Iskandar Malaysia did not take any of the housing characteristics into account. The researchers suggested that household income acts as the most important indicator of lifestyle and would reflect the amount of household carbon footprint emissions. The analysis results demonstrated a significant correlation between the tested variables. Furthermore, high carbon footprint emissions were found in expensive residential areas due to the higher consumption of food, electricity, and personal vehicles among residents with higher incomes.

Saras and Kristanto (2021) measured the total carbon footprint emissions that occurred from electricity consumption with the number of residents in a household, income, and type of region. It was found that the use of household electricity was directly related to the total carbon footprint emissions. Moreover, household income

had a stronger impact on the carbon footprint emissions compared to household size, while urban areas generated more carbon footprint emissions than rural areas. The study results placed more focus on household consumption and lifestyles. It should be noted that limitations were present in quantifying the exact carbon footprint emissions.

Poumanvyong and Kaneko (2010) investigated the influence of urbanisation on household energy use and carbon footprint emissions, which varied across different stages of household income and development. Therefore, it was concluded that the impact of urbanisation on carbon footprint emissions was significant and positive for all tested income groups. A middle-income group led to the largest carbon footprint emissions compared to other income groups. Notably, this study placed more focus on the respondents' lifestyles rather than their living conditions and housing attributes.

Liu *et al*. (2015) defined the spatial pattern of commuting carbon footprint emissions through a list of spatial parameters, such as residential density, employment density, job-housing balance, and land use diversity. It is noteworthy that commuting carbon footprint emissions are lower in the first ring road (city centre), while the carbon footprint emissions intensity gradually increased upon its movement toward the second ring road (suburban areas). The uneven development in each city created a series of issues of imbalance between travel demand-supply, housing, and employment density. For instance, the Yanta district with the lowest job-housing balance generated the largest carbon footprint emissions due to higher reliance on private automobiles even for short commuting distance.

Despite the limited availability of literature works discussing the relation between urbanisation and carbon footprint emissions worldwide, it was found that many researchers solely focused on the source of urban population and its density. Additionally, there is a limitation in the empirical research and supporting literature on the method of evaluating the interlink between urbanisation, urban form structure, and housing carbon footprint emissions. To date, comprehensive studies calculating carbon footprint emissions in Malaysia are rare and not conclusive. The previous research scope and findings were found to be highly restricted and not well-established in urban studies.

Generally, the expansion of urban form is characterised by a steady urbanisation process and high demand for residential housing. Several studies in the recent years used urban population density as a point of reference to quantify the expansion of

urban form. However, the sole use of the urban population to evaluate urban expansion was insufficient and lacking in accuracy (Makido, Dhakal and Yamagata, 2012). The expansion of cities and urban areas is a complex procedure that cannot be measured independently by only one or two variables, although this approach was employed in many urban studies. These research works omitted several important variables such as residential built-up density, accessibility or housing characteristics, and neglected the possible interactions between these attributes with the expansion of urban spatial structure (Shao *et al*., 2020; Frenkel and Ashkenazi, 2008). Urban expansion should not be subject only to urban population or household income.

In fact, the urban spatial patterns could be further explored from their interconnection with the physical parts of cities, such as property type, housing density, accessibility, proximity, and neighbourhood development (Olanrewaju and Adegun, 2021; Williams, 2014). The increasing demand for housing is the main driving force for the widespread urban spatial structure (Al Jarah *et al*., 2019; Lin *et al*., 2018). For this reason, housing location and its characteristics, especially housing transaction price could be used to properly describe the transformation of urban spatial structure changes and urbanisation process.

Besides the aforementioned observations, many other studies were conducted to discuss the impacts of urbanisation on household energy consumption and link it to carbon footprint emissions (Zhang, Yi and Li, 2015; Connoly, Hagelman III and Fuhrmann, 2012; Kim, 2009; Duvarci and Kutluca, 2008). However, these studies did not include or review housing characteristics as parts of the research parameters. The majority of the earlier studies focused on measuring carbon footprint emissions independently through household lifestyle, consumptions, and density. However, the most essential yet impactful factor, which identified as the housing structural and locational attributes, was overlooked. Previous studies did not provide in-depth understanding of the increment of carbon footprint emissions that emerged due to urbanisation and the expansion of urban spatial structure through housing development growth.

Fundamentally, housing development is strongly related to urbanisation and urban spatial structure (Haffner and Hulse, 2019; Sun and Wang, 2018). The increasing demand for housing has caused the expansion of urban form and has outpaced the commercial and transportation systems development. With the building

sector facing a resurgence in growth, a massive direct and indirect impact on the environment has been reported. Notably, housing characteristics are the best supporting evidence to explain the phases of urbanisation and urban form growth, which eventually become highly relatable to the increase in carbon footprint emissions.

Housing accounts for a large share of global carbon footprint emissions due to its important role in driving the country economic growth and social development. It was found that the extensive amount of global carbon footprint emissions was highly associated with human activities (Yi *et al*., 2017; Fang and Pal, 2016; Wang, 2014). Reports also demonstrate that the increase in direct carbon footprint emissions is generally attributed to household electricity consumption and vehicle fuel emission (Khoo, 2019; Bekhet and Othman, 2017; Li and Lin, 2015). Household accounts for nearly 40% of the total carbon footprint emissions. The development of residential properties is dominating the worldwide building sector, which creates a common phenomenon where the energy consumption and carbon footprint emissions are rather prodigious. It was also postulated that household energy consumption, commuting patterns, and housing carbon footprint emissions are highly interrelated to each other (Zhang *et al*., 2021; Yi *et al*., 2017; Zhang, Yi and Li, 2015; Poumanvyong and Kaneko, 2010). It is notably that housing prices and carbon emissions have risen dramatically worldwide in the past two decades. However, it is unclear whether there is a nexus between them.

Housing is a heterogeneous product and the basic component of a city. It is summarised by a group of different structural and locational attributes. Provided that housing is identified to be the main factor of urban expansion and is significantly associated with the growing amount of household consumption emissions, housing characteristics would serve better as an important foundation to predict the overall carbon footprint emissions. The diversity of housing structural and locational characteristics would generate different levels of carbon footprint emissions and create a certain spatial difference between the adjacent areas of a city. This can be seen as particular neighbourhood appears to predispose towards smaller total carbon footprint emissions, while the opposite case takes place for others (Sovacool and Brown, 2010).

Overall, it could be concluded that a definite and positive connection is present between housing, land-use elements, and carbon footprint emissions (Lee, 2015; Zhang, Yi and Li, 2015; Poumanvyong and Kaneko, 2010). However, the link between

these variables needs further examination. The existing literature has only recorded preliminary information on the relationship between household consumption and carbon footprint emissions. Following the rapid urbanisation pace and expansion of an urban spatial structure, there is inadequate understanding regarding the spread of housing carbon footprint emissions in Malaysia and the different levels of total carbon footprint emissions based on housing characteristics. The exact relationship between housing and carbon footprint emissions remains unclear. Currently, the number of housing carbon footprint estimate studies available for further discussion is scarce, especially in Malaysia. The overall effect of housing characteristics on the country's carbon footprint emissions has not been fully explored.

In order to evaluate and analyse the distinct relationship between housing and carbon footprint emissions in Malaysia, a housing price model based on carbon footprint indicators should be developed. A carbon footprint pricing model comprising the housing price, housing attributes, and carbon footprint emissions can be utilised to relate and explain the implicit relationship between the components. Each component possesses its own fundamental insights that can be distinguished in order to comprehensively assess the carbon footprint emissions.

## 1.3 Research Questions

(a) What are the property attributes used to estimate housing carbon footprint emissions for terraced properties in Johor Bahru?

(b) How can the derived property attributes be incorporated into the carbon footprint models to measure the housing carbon footprint index for terraced properties in Johor Bahru?

(c) What is the relationship between urban spatial structure and housing carbon footprint emissions for terraced properties in Johor Bahru?

(d) How is the spatial distribution of housing carbon footprint pricing model for terraced properties in Johor Bahru?

## 1.4 Research Aims and Research Objectives

This study aims to explore the causal relationship between urbanisation growth, urban spatial structure changes, and housing characteristics while improving the description of carbon footprint emissions. It aims to develop a housing price model based on carbon footprint indicator for the terraced properties in Johor Bahru, Malaysia. The objectives of the study are as follows:

(a) To identify the property attributes used to estimate housing carbon footprint emissions in Johor Bahru.

(b) To determine the housing carbon footprint index for the terraced properties in Johor Bahru by incorporating the derived the property attributes into carbon footprint models.

(c) To discuss the relationship between urban spatial structure and housing carbon footprint emissions for terraced properties in Johor Bahru.

(d) To describe the spatial distribution of the housing carbon footprint pricing model for terraced properties in Johor Bahru.

## 1.5 Research Scope

This study aims to develop a housing price model based on the carbon footprint indicators for the terraced properties in Johor Bahru, Malaysia. To achieve the proposed research objectives, this study focused on the following scope and limitations.

This study was conducted in the most urbanised district in the southern part of Peninsular Malaysia, which is Johor Bahru. As the capital of Johor, Johor Bahru witnessed rapid urbanisation growth with an increasing amount of urban population and enormous residential development. The rapid growth has resulted in widespread urban land use in Johor Bahru. The most evident land-use change was the expansion of the built-up area, which increased by almost 304.98% from 11,932.71 hectares in 1984 to 48,324.17 hectares in 2015. It was also predicted that the built-up areas in Johor Bahru would extend to 96,296.17 hectares in 2030. Strategically, the extension of built-up areas would increase the number of residential properties and directly lead to increased carbon footprint emissions. Therefore, Johor Bahru is deemed the most suitable case study area to provide detailed information on housing carbon footprint emissions.

# REFERENCE


Abdualaziz, H. *et al*. (2018). Sprawling Growth and the Environment: A Case of Johor, Malaysia. *International Journal of Science, Environment and Technology*, *7(2)*, pp. 382-396.

Abdul Elrahman, A.S. & Assad, M. (2021). Urban Design and Urban Planning: A Critical Analysis to the Theoretical Relationship Gap. *Ain Shams Engineering Journal*, *12(1)*, pp. 1163-1173.

Abdul Lateef, O. *et al*. (2018). Factors Affecting Housing Prices in Malaysia: Analysis of The Supply Side. *Journal of Planning Malaysia*, *16(2)*, pp. 225-235.

Abdul Rahman, S.N. *et al.* (2019). The Artificial Neural Network Model (ANN) for Malaysian Housing Market Analysis. *Journal of the Malaysian Institute of Planners*, *17(1)*, pp. 1-9.

Abesamis, J., Campos, J.C. & Castell, C. (2013). Estimating the Effects of Urbanization on Carbon Emissions: Evidence on the Philippines. *Policy Brief - Young Economists' Perspective*, *7(1)*, pp. 1-4.

Adair, A.S., Berry, J.N. & McGreal, W.S. (1996). Hedonic Modelling, Housing Submarkets and Residential Valuation. *Journal of Property Research*, *13(1)*, pp. 67-83.

Agarwal, A. (2004). *A Comparison of Weekend and Weekday Travel Behavior Characteristics in Urban Areas*. University of South Florida: Master's Thesis.

Ahmad, M. (2019). Lower Limits for Foreigners to Buy Condos Only for Existing Unsold Units. *The Star Online*. Retrieved on October 17, 2019 from https://www.thestar.com.my/business/business-news/2019/10/13/lower-limits-for-foreigners-to-buy-condos-only-for-existing-unsold units#aVgbQOXuPmXoVfEt.99

Ahmad, N. & Dias, K. (2021). Validating "Data Validation". *Computer*, *54(10)*, pp. 129-132.

Ahmad, S. *et al*. (2019). Qualitative v/s Quantitative Research – A Summarized Review. *Journal of Evidence Based Medicine and Healthcare*, *6(43)*, pp. 2828-2832.

Ahmed Ali, K., Ahmad, M.I. & Yusup, Y. (2020). Issues, Impacts, and Mitigations of Carbon Dioxide Emissions in the Building Sector. *Sustainability*, *12*, pp. 1-11.

Ahmed, F. *et al*. (2019). Trends in Poverty and Income Inequality in Urban Malaysia: Emerging Issues and Challenges. *International Journal of Recent Technology and Engineering* (IJRTE), *8(2)*, pp. 517-523.

Al Jarah, S.H. *et al*. (2019). Urbanization and Urban Sprawl Issues in City Structure: A Case of the Sulaymaniah Iraqi Kurdistan Region. *Journal of Sustainability*, *11*, pp. 1-21.

Ala-Mantila, S., Heinonen, J. & Junnila, S. (2014). Relationship Between Urbanization, Direct and Indirect Greenhouse Gas Emissions, and Expenditures: A Multivariate Analysis. *Ecological Economics*, *104*, pp. 129-139.

Alkay, E. (2008). Housing Submarkets in Istanbul. *International Real Estate Review, 11(1)*, pp 113-127.

Aluko, O.E. (2011). Urbanization and Effective Town Planning in Nigeria. *Journal of African Research Review, 5(2)*, pp 126-139.

Anas, A., Arnott, R. and Small, K.A. *Urban Spatial Structure*. Working Paper. University of California Berkeley; 1997.

Anderson, W.P., Kanaroglou, P.S. & Miller, E.J. (1996). Urban Form, Energy and the Environmental: A Review of Issues, Evidence and Policy. *Urban Studies*, *33(1)*, pp. 7-35.

Augustin, R. (2019). Developer: Wrong to Blame Us for Oversupply of Unsold Units. *The Star Online*. Retrieved on October 16, 2019 from https://www.freemalaysiatoday.com/category/nation/2019/01/02/developer-wrong-to-blame-us-for-oversupply-of-unsold-units/

Aurand, A. (2010). Density, Housing Types and Mixed Land Use: Smart Tools for Affordable Housing? *Urban Studies*, *47(5)*, pp. 1015-1036.

Ayan, E. & Erkin, C. (2014). Hedonic Modeling for a Growing Housing Market: Valuation of Apartments in Complexes. *International Journal of Economics and Finance*, *6(3)*, pp. 188-199.

Azari, M., Billa, L. & Chan, A. (2022). Multi-Temporal Analysis of Past and Future Land Cover Change in the Highly Urbanized State of Selangor, Malaysia. *Ecological Processes*, *11(2)*, pp. 1-15.

Aziz, A., Anwar, M.M. & Dawood, M. (2021). The Impact of Neighborhood Services on Land Values: An Estimation through the Hedonic Pricing Model. *GeoJournal*, *86*, pp. 1915-1925.

Azzali, S. (2015). The Impact of Rapid Motorization and Urban Growth: An Analysis of the City of Doha, Qatar. *Arab World Geographer*, *18(4)*, pp. 299-309.

Badawy, M. *et al*. (2018). Analysis and Visualization of City Crimes. *Proceedings of the International Conference on Industrial Engineering and Operations Management*. Washington DC, USA. pp. 1136-1145.

Bagley, M.N. & Mokhtarian, P.L. (2002). The Impact of Residential Neighborhood Type on Travel Behavior: A Structural Equations Modeling Approach. *The Annals of Regional Science*, *36(2)*, pp. 279-297.

Ball, M. & Kirwan, R. (1977). Accessibility and Supply Constraints in the Urban Housing Market. *Urban Studies, 14(1)*, pp. 11-32.

Bapari, M.Y. *et al*. (2016). Impacts of Unplanned Urbanization on the Socio-Economic Conditions and Environment of Pabna Municipality, Bangladesh. *Journal of Environment and Earth Science*, *6(9)*, pp. 105-114.

Basu, S. & Thibodeau, T.G. (1998). Analysis of Spatial Autocorrelation in House Prices. *Journal of Real Estate Finance and Economics, 17*, pp. 61-85.

Bates, L.K. (2006). *A Housing Submarket Approach to Neighborhood Revitalization Planning: Theoretical Considerations and Empirical Justifications*. University of North Carolina: Ph.D. Thesis.

Begum, R.A., Sohag, K., Syed Abdullah, S.M. & Jaafar, M. (2015). $CO_2$ Emissions, Energy Consumption, Economic and Population Growth in Malaysia. *Journal of Renewal and Sustainable Energy Reviews, 4*: pp 594-601.

Bekhet, H.A. & Othman, N. (2017). Impact of Urbanization Growth on Malaysia $CO_2$ Emissions: Evidence from the Dynamic Relationship. *Journal of Cleaner Production*, 154(15), pp. 374-388.

Bhat, P.A. *et al*. (2017). Urban Sprawl and Its Impact on Landuse/ Land Cover Dynamics of Dehradun City, India. *International Journal of Sustainable Built Environment*, 6(2), pp. 513-521.

Bhatta, B. (2010). "Analysis of Urban Growth and Sprawl from Remote Sensing Data". *J. of Advances in Geographic Information Science*, 17-36.

Bibri, S.E. *et al*. (2020). Compact City Planning and Development: Emerging Practices and Strategies for Achieving the Goals of Sustainability. *Journal of Developments in the Built Environment*, 4, pp. 1-20.

Billah, K. *et al*. (2021). Analysis of Intersection Traffic Safety in the City of San Antonio, 2013–2017. *Journal of Sustainability*, 13(9), 5296.

Bin, S. & Dowlatabadi, H. (2005). Consumer Lifestyle Approach to US Energy Use and the Related $CO_2$ Emissions. *Journal of Energy Policy, 33*: pp 197-208.

Boori, M.S. *et al*. (2015). "Monitoring and Modeling of Urban Sprawl through Remote Sensing and GIS in Kuala Lumpur, Malaysia." *J. of Ecological Processes*, 4(15), 1-10.

Boots, N.B. & Getis, A. (1988). *Point Pattern Analysis*. Volume 8 of Scientific Geography Series. University of California: SAGE Publications.

Bourassa, S.C. *et al*. (1999). Defining Housing Submarkets. Journal of Housing Economics. 8: 160-183

Bourassa, S.C., Cantoni, E. & Hoesli, M. (2007). Spatial Dependence, Housing Submarkets and House Price Prediction. *Journal of Real Estate Finance Economics, 35*: pp 143-160.

Bourassa, S.C., Hoesli, M. & Peng, V.S. (2003). Do Housing Submarkets Really Matter? *Journal of Housing Economics, 12*: pp 12-28

Bourne, L.S. & Hitchcock, J.R. (2016). Housing Research and Policy Development: Themes from the Conference. *Urban Housing Markets*. Canada: University of Toronto Press.

Breheny MC. 1996. Centrists, Decentrists and Compromisers: Views on the Future of Urban Form. in Elizabeth Burton, M.J. & Williams, K. (Eds). *The Compact City: A Sustainable Urban Form*. London: E & FN.

Brittlebank, W. (2014). *Compact Cities to Address Climate Change*. Retrieved on October 10, 2021, from https://www.climateaction.org/climate-leader-papers/compact_cities_to_ address_climate_change

Brody, S. (2013). The Characteristics, Causes, and Consequences of Sprawling Development Patterns in the United States. *Nature Education Knowledge*, 4(5), pp. 1-4.

Brueckner, J.K. (2000). Urban Sprawl: Diagnosis and Remedies. *International Regional Science Review*, *23(2)*, pp. 160-171.

Burgalassi, D. & Luzzati, T. (2015). Urban spatial structure and environmental emissions: A survey of the literature and some empirical evidence for Italian NUTS 3 regions. *Cities*, 49, pp. 134-148.

Burhan, B. (2014). *Spatial Mechanism of Hedonic Price Functions for Housing Submarket Analysis*. Saga University, Japan: Doctoral Thesis.

Butcher, S.C. (2019). Creating a gap that can be filled: Constructing and territorializing the affordable housing submarket in Gauteng, South Africa. *Environment and Planning*, *52(1)*, pp. 173-199.

Callin, D. (2022). 40% Of Emissions Come from Real Estate; Here's How the Sector Can Decarbonize. Retrieved on July 1, 2023, from https://www.forbes.com/sites/davidcarlin/2022/04/05/40-of-emissions-come-from-real-estate-heres-how-the-sector-can-decarbonize/?sh=31fb005763b7

Camagni, R., Gibelli, M.C. & Rigamonti, P. (2002). Urban Mobility and Urban Form: The Social and Environmental Costs of Different Patterns of Urban Expansion. *Ecological Economics*, 40 (2), pp. 199-216.

Cameron, A.C. & Windmeijer, F.A.G. (1997). An R-Squared Measure of Goodness of Fit For Some Common Nonlinear Regression Models. *Journal of Econometrics*, 77 (2), pp. 329–342.

Can, A. (1998). GIS and Spatial Analysis of Housing and Mortgage Markets. *Journal of Housing Research*, 9(1), pp. 61-86.

Case, B. & Wachter, S. (2005). Residential Real Estate Price Indices as Financial Soundness Indicators: Methodological Issues. in Bank for International Settlements (ed.). *Real Estate Indicators and Financial Stability*. Bank for International Settlements. pp. 197–211.

Chandler, D. & Disney, R. (2014). *Measuring House Prices: A Comparison of Different Indices*. London: The Institute for Fiscal Studies.

Cheah, G.K.H. (2011). *The Relationship between Foreign Exchange Rate Fluctuations and Foreign Investment in the Malaysian Residential Real Estate Market*. Universiti Tun Hussein Onn Malaysia: Bachelor Degree's Thesis.

Chen, M.C. & Patel, K. (1998). House Price Dynamics and Granger Causality: An Analysis of Taipei New Dwelling Market. *Journal of The Asian Real Estate Society*, *1(1)*, pp. 101–126.

Chen, Z. & Cho, S.H. (2007). Forecasting Housing Prices under Different Submarket Assumptions. *American Agricultural Economics Association*. Portland. pp. 1-35.

Chen, Z. *et al*. (2009). Forecasting Housing Prices Under Different Market Segmentation Assumptions. *Urban Studies, 46(1)*: pp 167-187.

Chhabra, G., Vashisht, V. & Ranjan, J. (2019). A Review on Missing Data Value Estimation Using Imputation Algorithm. *Journal of Advanced Research in Dynamical and Control Systems*, *11(7)*, pp. 312-318.

Chin, N. (Ed.) (2002). *Unearthing the Roots of Urban Sprawl: A Critical Analysis of Form, Function and Methodology*. University College London: Centre for Advanced Spatial Analysis.

Chin, T.L. & Chau, K.W. (2003). A Critical Review of the Literature on the Hedonic Pricing Model and Its Application to the Residential Market in Penang. *International Journal for Housing Science and Its Applications, 27(2)*: pp 145-165.

Chowdhury, N. (2018). Benefits of Using A Heatmap Tool. Retrieved on October 12, 2021, from https://www.straightarrow.com.ph/blog/benefits-of-using-a-heatmap-tool

Christen, A.N. *et al.* (2011). Validation of Modeled Carbon-Dioxide Emissions from an Urban Neighborhood with Direct Eddy-Covariance Measurements. Journal of Atmospheric Environment, 45(33), pp. :6057-6069.

Churkina, G. (2016). The Role of Urbanization in the Global Carbon Cycle. *Journal of Frontiers in Ecology and Evolution*, 3(144), pp. 1-9.

Clark, A.L. (2009). Environmental Challenges to Urban Planning: Fringe Areas, Ecological Footprints and Climate Change. *Key Challenges in the Process of Urbanization in Ho Chi Minh City: Governance, Socio-Economic, and Environmental Issues*. Ho Chi Minh, Vietnam.

Clark, A.V.W. & Dieleman, F.M. (2017). Household and Housing: Choice and Outcomes in the Housing Market. 3rd ed. Taylor and Francis.

Clayden, A. *et al.* (2018). Cutting the Lawn − Natural Burial and Its Contribution to the Delivery of Ecosystem Services in Urban Cemeteries. *Journal of Urban Forestry and Urban Greening*, 33, pp. 99-106.

Clifford, J.P. *et al*. (2022). The Relationship Between City Size, Decentralisation and Economic Growth. *Journal of Economic Studies*, pp. 1-19

Connoly, M.H., Hagelman III, R.R. & Fuhrmann, S. (2012). Estimating Residential Carbon Footprints for an American City. *International Journal of Applied Geospatial Research*, *3(4)*, pp. 103-122.

Costello, G. *et al*. (2019). Drivers of Spatial Change in Urban Housing Submarkets. *The Geographical Journal*, pp. 1-15.

Cruz, F. (2013). *How to Do Everything Wrong in Real Estate and Still Be Successful*. Florida: S & B Publishing.

Cui, S.H. *et al*. (2010). Carbon Footprint Analysis of the Bus Rapid Transit (BRT) System: A Case Study of Xiamen City. The International Journal of Sustainable Development and World Ecology, 17(4), pp. 329-337.

Dale-Johnson, D. (1982). An Alternative Approach to Housing Market Segmentation Using Hedonic Price Data. *Journal of Urban Economics, 11*: pp 311-332.

Daoud, J.I. (2017). Multicollinearity and Regression Analysis. *Journal of Physics*, 949, pp. 1-6.

Day, B. (2003). Submarket Identification in Property Markets: A Hedonic Housing Price Model for Glasgow. *CSERGE Working Paper EDM 03- 09*.

Dempsey, C. (2012). Heat Maps in GIS. Retrieved on October 12, 2021, from https://www.gislounge.com/heat-maps-in-gis/

Deng, F.F. & Huang, Y. (2004). Uneven Land Reform and Urban Sprawl in China: The Case of Beijing. *Journal of Progress in Planning, 61*: pp 211-236.

Department of Environment Malaysia (2012). *Guidelines For Siting and Zoning of Industry and Residential Areas*. Malaysia: Guidance Document.

Department of Statistics Malaysia (2011). *Population Distribution and Basic Demographic Characteristic Report 2010*. Retrieved on September 3, 2017, from https://bit.ly/369skfm

Department of Statistics Malaysia (2017). *Population and Housing Census*. Retrieved on August 31, 2017, from https://bit.ly/366hE1l

Department of Statistics Malaysia (2017b). *Federal Territory of Kuala Lumpur*. Retrieved on September 2, 2017, from https://bit.ly/3N3qcGC

Department of Statistics Malaysia (2017c). *Selangor*. Retrieved on September 2, 2017, from https://bit.ly/3wpfEf9

Department of Statistics Malaysia (2021). *Population and Housing Census*. Retrieved on May 26, 2021, from https://bit.ly/37LbRyD

Desmond, M., Gerhenson, C. & Kiviat, B. (2015). Forced Relocation and Residential Instability Among Urban Renters. *Social Service Review*, *89(2)*, pp. 227-262.

Dijikstra, L. *et al*. (2021). Applying the Degree of Urbanisation to the Globe: A New Harmonised Definition Reveals A Different Picture of Global Urbanisation. *Journal of Urban Economics*, *125*, pp. 1-27.

Dixon, P. (2009). Future of Cities: Rapid Urbanization, Low Carbon. Retrieved on May 15, 2017, from http://www.globalchange.com/future-of-cities-rapid-urbanisation-low-carbon-use.htm

Dong, H. & Geng, Y. (2012). Study on Carbon Footprint of the Household Consumption in Beijing Based on Input-Output Analysis. *Journal of Resource Sciences, 34*: pp 494-501.

Dorsey, R.E. *et al*. (2010). Hedonic Versus Repeat-Sales Housing Price Indexes for Measuring the Recent Boom-Bust Cycle. *Journal of Housing Economics*, *19(2)*, pp. 75-93.

Druckman, A. & Jackson, T. (2008). Household Energy Consumption in the UK: A Highly Geographically and Socio-Economically Disaggregated Model. *Energy Policy, 36(8)*: pp 3177-3192.

Druckman, A. & Jackson, T. (2009). The Carbon Footprint of UK Households 1990–2004: A Socio-Economically Disaggregated, Quasi-Multi-Regional Input–Output Model. *Ecological Economics*, 68 (7), pp. 2066-2077.

Duvarci, Y. & Kutluca, A.K. (2008). Appraisal of Energy Efficiency of Urban Development Plans: The Fidelity Concept on Izmir-Balcova Case. *International Journal of Civil and Environmental Engineering*, *2(12)*, pp. 279-295.

Dwyer, J.F. & Childs, G.M. (2004). Movement of People Across the Landscape: A Blurring of Distinctions Between Areas, Interests, and Issues Affecting Natural Resource Management. *Landscape and Urban Planning,* 69, pp. 153-164.

Dziauddin, M.F., Ismail, K., & Othman, Z. (2015). Analysing The Local Geography Of The Relationship Between Residential Property Prices And Its Determinants. *Bulletin of Geography: Socio–economic Series*, *28*, pp. 21–35.

Edwards, F. (2007). *Vision – The Melbourne Principles for Sustainable Cities*. Retrieved on May 15, 2017, from http://www.sustainablemelbourne.com/visions/the-melbourne-principles-for-sustainable-cities/

Eichholtz, P.M.A. *et al*. (1995). Real Estate Portfolio Diversification by Property Type and Region. *Journal of Property Finance, 6(3)*: pp 39-59.

Environmental Protection Agency (EPA) (2021). Sources of Greenhouse Gas Emissions. Retrieved on May 30, 2021, from https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation

Estini, H. & Zagheni, E. (2019). Age matters: Ageing and household energy demand in the United States. *Energy Research and Social Science*, 55, pp. 62-70.

Fan, G.Z., Ong, S.E. & Koh, H.C. (2006). Determinants of House Price: A Decision Tree Approach. *Urban Studies, 43(12)*: pp 2301-2315.

Fang, C.L. & Yu, D.L. (2017). Urban Agglomeration: An Evolving Concept of An Emerging Phenomenon. *Landscape and Urban Planning*, *162*, pp. 126-136.

Fang, Y. & Pal, A. (2016). Drivers of Urban Sprawl in Urbanizing China – A Political Ecology Analysis. *Environment and Urbanization*, 28 (2), pp. 599-616.

Feng, J. (2016). From Urbanization to Urban Decay: The Problems of Modernization, Urbanization and Industrialization: The Case of Detroit. in Martinelli, A. & He, C.Q. *Global Modernization Review: New Discoveries and Theories Revisited*. Italy: World Scientific. pp. 91-99.

Feng, Y. & Jones, K. (2016). Comparing Two Neighbourhood Classifications: A Multilevel Analysis of London Property Price 2011-2014. *Proceeding of the 22nd Annual Pacific-Rim Real Estate Conference*. Queensland, Australia.

Fenwick, D. (2013). Uses of Residential Property Price Indices. in OECD, *et al*., *Handbook on Residential Property Price Indices*. Eurostat, Luxembourg. pp. 15–20.

Fetner, C. *et al*. (2016). Urban Sprawl and Growth Management - Drivers, Impacts and Responses in Selected European and US Cities. *Future Cities and Environment*, *2(9)*, pp. 1-13.

Fink, S. (2018). *Compact Cities are Environmentally and Economically More Sustainable*. Retrieved on October 8, 2021, from https://www.planetizen.com/news/2018/12/101779-compact-cities-are-environmentally-and-economically-more-sustainable

Fraser, P. (1995). An Empirical Analysis of the Relationship Between UK Treasury Bills and the Term Structure of Certificates of Deposit. *Bulletin of Economic Research 47(2)*: pp 143-160.

Frenkel, A. & Ashkenazi, M. (2008). Measuring Urban Sprawl: How Can We Deal with It? *Journal of Environment and Planning B: Planning and Design*, 35(1), pp. 56-79.

Frost, J. (2020). Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries. US: Statistics by Jim Publishing.

Furuta, S. *et al*. (2021). New Hedonic Quality Adjustment Method using Sparse Estimation. *Bank of Japan Working Paper Series*, 21(8): pp. 1-46.

Gabrielli, L., Giuffrida, S. & Trovato, M.R. (2017). Gaps and Overlaps of Urban Housing Sub-Market: Hard Clustering and Fuzzy Clustering Approaches. In Stanghellini, S. *et al*. (Ed.). *Appraisal: From Theory to Practice*. Italy: Springer. pp 203-219.

Galster, G. *et al*. (2010). Wrestling Sprawl to The Ground: Defining and Measuring an Elusive Concept. *Housing Policy Debate*, *12(4)*, pp. 681-717.

Gao, Y.L., Li, H.B. & Song, Y. (2021). Interaction Relationship between Urbanization and Land Use Multifunctionality: Evidence from Han River Basin, China. *Land*, *10(938)*, pp. 1-21.

Gatrell, A.C. & Bailey, T.C. (1995). Interactive Spatial Data Analysis in Medical Geography. *Journal of Social Science & Medicine*, 42(6), pp. 843-855.

Gau, G.W. & Kohlhepp, B. (1978). Multicollinearity and Reduced-Form Price Equations for Residential Markets: An Evaluation of Alternative Estimation Methods. *Real Estate Economics, 6(1)*: pp 50-69.

Geng, B. *et al*. (2020). Evaluation of Urban Residential Land Use Efficiency with A Neural Network from the Perspective of Service Facility Capacity. *Journal of Land Use Science*, *16(4)*, pp. 413-432.

Giuliano, G., Kang, S.Y. & Yuan, Q. (2019). Agglomeration Economies and Evolving Urban Form. *The Annals of Regional Science*, *63*, pp. 377-398.

Glaeser, E.L. (2011). *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: Penguin Press.

Glaeser, E.L. & Kahn, M.E. (2010). The Greenness of Cities: Carbon Dioxide Emissions and Urban Development. *Journal of Urban Economics*, 67(3), pp. 404-418.

Goldstein, B., Gounaridis, D. & Newell, J.P. (2020). The Carbon Footprint of Household Energy Use in the United States. Proceedings of the National Academy of Sciences of the United States of America (PNAS), 117,0(32), pp. 19122-19130.

Goodhart, C. & Hofmann, B. (2008). *House Prices, Money, Credit and The Macroeconomy*. Germany: European Central Bank.

Goodman, A.C. & Kawai, M. (1982). Permanent Income, Hedonic Prices, and Demand for Housing: New Evidence. *Journal of Urban Economics,12(2)*: pp 214-237.

Goodman, A.C. & Thibodeau, T.G. (2003). Housing Market Segmentation and Hedonic Prediction Accuracy. *Journal of Housing Economics, 12*: pp 181-201.

Goodman, A.C. & Thibodeau, T.G. (2007). The Spatial Proximity of Metropolitan Area Housing Submarkets. *Journal of Real Estate Economics, 35 (2)*: pp 209-232.

Gramacki, A. (2018). Bandwidth Selectors for Kernel Density Estimation. in *Nonparametric Kernel Density Estimation and Its Computational Aspects*. Switzerland: Springer International Publishing. pp. 63-83.

Greentech Malaysia (2019). Malaysia Continues Efforts to Reduce Carbon Footprint. Retrieved on May 26, 2021, from https://www.mgtc.gov.my/2019/09/malaysia-continues-efforts-to-reduce-carbon-footprint/

Grigsby, W. *et al*. (1987). The Dynamics of Neighbourhood Change and Decline. Oxford: Pergamon.

Grunsven, L.V. & Benson, M. (2020). Urban Development in Malaysia: Towards A New Systems Paradigm. *Malaysia's Urban Futures*, *2*, pp. 1-11

Habibi, S. and Asadi, N. (2011). "Causes, Results and Methods of Controlling Urban Sprawl". *Procedia Engineering*, 21, 133-141.

Haddaoui, C. (2018). *Cities Can Save $17 Trillion by Preventing Urban Sprawl*. Retrieved on October 8, 2021, from https://www.wri.org/insights/cities-can-save-17-trillion-preventing-urban-sprawl

Haffner, M.E.A. & Hulse, K. (2019). A Fresh Look at Contemporary Perspectives on Urban Housing Affordability. *International Journal of Urban Sciences*, 25(1), pp. 59-79.

Hajela, G., Chawla, M. & Rasool, A. (2020). A Clustering Based Hotspot Identification Approach for Crime Prediction. Procedia Computer Science, 167, pp. 1462-1470.

Hale, B.W. (2018). Mapping Potential Environmental Impacts from Tourists Using Data from Social Media: A Case Study in the Westfjords of Iceland. Journal of Environmental Management, 62, pp. 446-457.

Han, S. & Qin, B. (2004). The Compact City and Sustainable Urban Development in China. *Urban Planning International*, 19 (6), pp. 23-27.

Hancock, K. (1991). *The Determination of Housing Submarkets: Case Studies Using Scottish Data*. University of Glasgow: Centre for Housing Research.

Haron, R. & Ibrahim, K. (2019). Residential Property Price Hike and Speculation. *Planning Malaysia Journal*, *17(1)*, pp. 328-337.

Harrison, R.M. *et al*. (2021). More Mileage in Reducing Urban Air Pollution from Road Traffic. *Environment International*, 149, pp. 1-8.

Hasan, A.R. & Nair, P.L. (2014). Urbanisation and Growth of Metropolitan Centres in Malaysia. *Malaysian Journal of Economic Studies*, 51 (1), pp. 87-101.

Hashim, Z.A. (2010). House Price and Affordability in Housing in Malaysia. *Akademika*, *78*, pp. 37–46.

Hassan, J. (2014). Building Energy Consumption in Malaysia: An Overview. Journal of Technology, 70 (7), pp. 33-38.

Hoffmann, E.M. *et al*. (2019). Is the Push-Pull Paradigm Useful to Explain Rural-Urban Migration? A Case Study in Uttarakhand, India. Journal of PLoS One, 14(4), pp. 1-22.

Hoornweg, D., Sugar, L. & Trejos Gómez, C.L. (2011). Cities and Greenhouse Gas Emissions: Moving Forward. *Environment and Urbanization*, 23 (1), pp.207-227.

Horton, F.E. & Reynolds, D.R. (1971). Effects of Urban Spatial Structure on Individual Behavior. *Economic Geography*, *47(1)*, pp. 36-48.

Hossain, M. (2006). Integrated Management of Malaysian Road Network Operations through ITS Initiatives: Issues, Potentials and Challenges. *International Seminar on Intelligent Transport Systems (ITS) in Road Network Operations*. pp 1-17.

Hossain, M.A. & Huggins, R. (2021). The Environmental and Social Impacts of Unplanned and Rapid Industrialization in Suburban Areas: The Case of the Greater Dhaka Region, Bangladesh. *Journal of Environment and Urbanization ASIA*, 12(1), pp. 73-89.

Hu, J. *et al*. (2020). The Ripple Effect and Spatiotemporal Dynamics of Intra-Urban Housing Prices at the Submarket Level in Shanghai, China. *Sustainability*, *12*, pp. 1-17.

Hu, L.Q. *et al*. (2019). Urban Spatial Structure and Travel in China. *Journal of Planning Literature*, *35(1)*, pp. 6-24.

Hu, L.R., He, S.J. & Su, S.L. (2022). A Novel Approach To Examining Urban Housing Market Segmentation: Comparing The Dynamics Between Sales Submarkets and Rental Submarkets. *Computers, Enviroment and Urban Systems*, *94*, pp. 1-16.

Huang, W. *et al*. (2017). Carbon Footprint and Carbon Emission Reduction of Urban Buildings: A Case in Xiamen City, China. Procedia Engineering, 107, pp. 1007-1017.

Hubbard, R. & Allen, S.J. (1987). An Empirical Comparison of Alternative Methods for Principal Component Extraction. *Journal of Business Research, 15(2)*: pp 173-190.

Hulse, K., Pawson, H. & Reynolds, M. (2014). Disadvantaged Places in Urban Australia: Analysing Socio-Economic Diversity and Housing Market Performance. AHURI Final Report, 225, pp. 1-107.

Hummel, D. (2020). The Effects of Population and Housing Density in Urban Areas on Income in the United States. *Local Economy*, 35(1), pp. 27-47.

Hussain, T. *et al*. (2019). The Effect of Sustainable Urban Planning and Slum Disamenity on The Value of Neighboring Residential Property: Application of The Hedonic Pricing Model in Rent Price Appraisal. *Journal of Sustainability*, 11(4), pp. 1-20.

Hwang, S. & Thill, J.C. (2009). Delineating Urban Housing Submarkets with Fuzzy Clustering. *Environment and Planning B: Planning and Design, 36(5)*: pp 865-882.

Ichimura, M. (2003). "Urbanization, Urban Environment and Land Use: Challenges and Opportunities". *Asia-Pacific Forum for Environment and Development Expert Meeting*. Guilin, China: APFED 3(5), pp.1-14.

Iizuka, S. *et al*. (2020). Environmental Impact Assessment of Introducing Compact City Models by Downscaling Simulations. *Journal of Sustainable Cities and Society*, 63, pp. 1-9.

Intergovernmental Panel on Climate Change (IPCC) (2007). *Climate change 2007: Synthesis Report, Fourth Assessment Report*. Cambridge: IPCC and Cambridge University Press.

Intergovernmental Panel on Climate Change (IPCC) (2015). *GHG Protocol - Calculating $CO_2$ Emissions from Mobile Sources*. Cambridge: IPCC and Cambridge University Press.

International Energy Agency (IEA) (2008). *World Energy Outlook*. Paris: International Energy Agency.

Ismail, M.F. (2015). *Urbanisation and Urban Growth in Malaysia*. Retrieved on May 26, 2020, from https://bit.ly/3In2OAA

Jha, R. (2018). Decentralised Urbanisation Holds Key to Healthy Urban Growth. Retrieved on November 22, 2021, from https://www.orfonline.org/expert-speak/decentralised-urbanisation-holds-key-to-healthy-urban-growth/

Johansson, T.B. (2009). Will Restrictions on $CO_2$ Emissions Require Reduction in Transport Demand? *Journal of Energy Policy, 37(8)*: pp 3212-3220.

Johansson, T.B. *et al*. (2012). *Global Energy Assessment: Toward a Sustainable Future*. United States of America: Cambridge University Press.

Jones, C., Leishman C. & Watkins, C. (2005). Housing Market Processes, Urban Housing Submarkets and Planning Policy. *The Town Planning Review, 76(2)*: pp 215-233.

Jones, C., Leishman, C. & Watkins, C. (2002). Examining the Persistence of Housing Submarket Price Differences. *Proceeding of the Pacific Rim Real Estate Society Conference*. New Zealand: PRRES. pp. 1-17.

Juneau, P. (2015). Quantification of Heat Map Data Displays for High-Throughput Analysis. *Journal of Pharmacogenomics and Pharmacoproteomics*, 6(2), pp. 1-7.

Kahn, M.E. (2000). The Environmental Impact of Suburbanization. *Journal of Policy Analysis and Management*, 19, pp. 569-586.

Kalini, M. & Krisp, J.M. (2018). Kernel Density Estimation (KDE) vs. Hot-Spot Analysis - Detecting Criminal Hot Spots in the City of San Francisco. Proceeding of Geospatial Technologies for All: The 21st AGILE Conference on Geographic Information Science. Lund University, Sweden.

Kang, H. (2013). The Prevention and Handling of the Missing Data. *Korean Journal of Anesthesiology*, *64(5)*, pp. 402-406.

Kassim, S., Redzuan, N.H. & Harun, N.Z. (2017). What Drives House Price in Malaysia? In Search of An Alternative Pricing Benchmark for Islamic Home Financing. *Planning Malaysia: Journal of The Malaysian Institute of Planners*, *15(4)*, pp. 21–34

Kauko, T. (2004). A Comparative Perspective on Urban Spatial Housing Market Structure: Some More Evidence of Local Sub-Markets Based on a Neural Network Classification of Amsterdam. *Urban Studies, 41(13)*: pp 2555-2579.

Kaya, A. et al. (2013). Constructing A House Price Index for Turkey. *Proceedings of The Sixth IFC Conference on Statistical Issues and Activities in A Changing Environment*. Basel. Bank for International Settlements. pp 153–171.

Keskin, B. (2008). Hedonic Analysis of Price in the Istanbul Housing Market. *International Journal of Strategic Property Management, 12(2)*: pp 125-138.

Keskin, B. & Watkins, C. (2016). Defining Spatial Housing Submarkets: Exploring The Case for Expert Delineated Boundaries. *Urban Studies*, pp. 1-17.

Khattak, A.J. & Rodriguez, D. (2005). Travel Behavior in Neo-Traditional Neighborhood Developments: A case study in USA. *Transportation Research Part A*, 39 (6), pp. 481–500.

Khoo, E. (2019). Malaysia Continues Efforts to Reduce Carbon Footprint. Retrieved on May 26, 2020, from https://www.theedgemarkets.com/article/malaysia-continues-efforts-reduce-carbon-footprint

Kim, T.H. (2009). Application of Carbon Footprint in Urban Planning and Geography. In Muthu, S.S. (Ed.). *The Carbon Footprint Handbook*. U.S.: Taylor & Francis. pp 163-182.

Kim, Y.H., Baik, J.J. (2005). Spatial and Temporal Structure of the Urban Heat Island in Seoul. *Journal of Applied Meteorology*, 44, pp. 591-605.

Kim, Y.J. *et al*. (2016). A Review of Driving Factors, Scenarios, and Topics in Urban Land Change Models. *Land*, *9(246)*, pp. 1-22.

Ko, J. *et al.* (2015). Who Produces the Most $CO_2$ Emissions for Trips in the Seoul Metropolis Area? *Journal of Transportation Research Part D: Transport and Environment, 16(5)*: pp 358-364.

Koedijk, K. & Schotman, P. (1989). Dominant Real Exchange Rate Movements. *Journal of International Money and Finance, 8(4)*: pp 517-531.

Korsu, E. (2012). Tolerance to Commuting in Urban Household Location Choice: Evidence from the Paris Metropolitan Area. *Environment and Planning A: Economy and Space*, *44(8)*, pp. 1951-1968.

Kotulla, T. *et al*. (2019). What Does It Take to Make the Compact City Liveable for Wider Groups? Identifying Key Neighbourhood and Dwelling Features. *Journal of Sustainability*, 11, 3480.

Krehl, A. (2014). Urban Spatial Structure: An Interaction Between Employment and Built-Up Volumes. *Regional Studies, Regional Science*, *2(1)*, pp. 290-308.

Kromer, M.A., Bandivadekar, A. and Evans, C. (2010). Long-term Greenhouse Gas Emission and Petroleum Reduction Goals: Evolutionary Pathways for the Light-Duty Vehicle Sector. *Journal of Energy, 35(1)*: pp 387-397.

Kuddus, M.A., Tynan, E. & McBryde, E. (2020). Urbanization: A Problem for The Rich and The Poor? *Public Health Reviews*, *41(1)*, pp. 1-4.

Kulyk, V., & Sossa, R. (2018). Determining the Tourist Attractive Regions by GIS Analysis Using Heatmaps. *Journal of Geodesy and Cartography*, 44(1), pp. 22-27.

Kumar, P. (2019). Malaysian Property Market: Wake Up and Smell the Coffee. *The Star* Online. Retrieved on October 16, 2019 from https://www.thestar.com.my/business/business-news/2019/05/11/malaysian-property-market-wake-up-and-smell-the-coffee#cETfcIKTV5ojTjGU.99

Kwan, C.L. (2012). Influence of Local Environmental, Social, Economic and Political Variables on the Spatial Distribution of Residential Solar PV Arrays Across the United States. *Energy Policy*, 47, pp. 332-344.

Laakso, S. & Loikkanen, H.A. (1995). Finnish Homes – Through Passages or Traps. *Real Estate Economics*, *23(4)*, pp. 475–495.

Lampe, O.D. & Hauser, H. (2011). Interactive Visualization of Streaming Data with Kernel Density Estimation*. IEEE Pacific Visualization Symposium 2011*. Hong Kong: IEEE. pp. 171-178.

Landis, J. & Reina, V.J. (2021). Do Restrictive Land Use Regulations Make Housing More Expensive Everywhere? *Economic Development Quarterly*, *35(4)*, pp. 305-324.

Lang, W. *et al*. (2019). Understanding Livable Dense Urban Form for Shaping the Landscape of Community Facilities in Hong Kong Using Fine-Scale Measurements. Cities, 84, pp. 34-45.

Lanrewaju, A.F. (2012). Urbanization, Housing Quality and Environment Degeneration in Nigeria. *Journal of Geography and Regional Planning, 5(16)*: pp 422-429.

Lee, S.W. (2015). *The Role of Urban Spatial Structure in Reducing VMT and GHG Emissions*. Ph.D. Thesis. University of Illinois Urbana-Champaign; 2015.

Leishman, C. (2009). Spatial Change and The Structure of Urban Housing Sub-markets. *Journal of Housing Studies, 24 (5)*: pp 563-585.

Leishman, C. *et al*. (2013). The Predictive Performance of Multilevel Models of Housing Sub-Markets: A Comparative Analysis. *Urban Studies*, *50(6)*, pp. 1201-1220.

LeRoy, S.F. & Sonstelie, J. (1983). Paradise Lost and Regained: Transportation Innovation, Income, and Residential Location. *Journal of Urban Economics*, *13(1)*, pp. 67-89.

Levkovich, O., Rouwendal, J. & Van Marwijk, R. (2016). The Effects of Highway Development on Housing Prices. *Journal of Transportation*, 43(2), pp. 379-405.

Li, C.H., Baciu, G. & Han, Y. (2014). Interactive Visualization of High Density Streaming Points with Heat-Map. *International Conference on Smart Computing 2014*. Hong Kong: IEEE. pp 145-149.

Li, J. *et al.* (2017). Relationship Between Built Environment, Socio-Economic Factors and Carbon Emissions from Shopping Trip in Shenyang City, China. *Journal of Chinese Geographical Science*, 27, pp. 722-734.

Li, K. & Lin, B.Q. (2015). Impacts of Urbanization and Industrialization on Energy Consumption/ $CO_2$ Emissions: Does The Level of Development Matter? *Journal of Renewable and Sustainable Energy Reviews*, 52, pp. 1107-1122.

Liang, *et al*. (2018). The Effects of Locational Factors on The Housing Prices of Residential Communities: The Case of Ningbo, China. *Journal of Habitat International*, 81, pp. 1-11.

Liew, C. & Haron, N.A. (2013). Factors Influencing The Rise of House Price In Klang. *International Journal of Research in Engineering and Technology*, 2(10), pp. 261-272.

Lin, J. *et al*. (2013). Using Hybrid Method to Evaluate Carbon Footprint of Xiamen City, China. *Energy Policy*, 58, pp. 220-227.

Lin, Y.C. *et al*. (2018). The Impact of Population Migration in Urban Housing Prices: Evidence from China's Major Cities. *Journal of Sustainability*, *10*, pp. 1-14.

Linden, L. *et al*. (2020). Quantifying Carbon Stocks In Urban Parks Under Cold Climate Conditions. *Journal of Urban Forestry and Urban Greening*, 49, pp. 1-9.

Lisi, G. (2019). Property Valuation: The Hedonic Pricing Model – Location and Housing Submarkets. *Journal of Property Investment and Finance*, 37(6), pp. 589-596.

Liu, J. & Ong, H.Y. (2021). Can Malaysia's National Affordable Housing Policy Guarantee Housing Affordability of Low-Income Households? *Journal of Sustainability*, 13, pp. 1-19.

Liu, S.W., Zhang, P.Y. & Lo, K. (2014). Urbanization in Remote Areas: A Case Study of the Heilongjiang Reclamation Area, Northeast China. *Journal of Habitat International, 42*, pp 103-111.

Liu, Y.Y. *et al*. (2015). "The Spatial Distribution of Commuting $CO_2$ Emissions and the Influential Factors: A Case Study in Xi'an, China". *Advances in Climate Change Research,* 6(1), pp. 46-55.

Liu, Z.L., Ma, J. & Chai, Y.W. (2016): Neighborhood-Scale Urban Form, Travel Behavior, And CO2 Emissions in Beijing: Implications for Low-Carbon Urban Planning. *Urban Geography*, pp. 1-21.

Lonati, G., Giugliano, M. & Cernuschi, S. (2006). The Role of Traffic Emissions from Weekends' and Weekdays' Fine PM Data in Milan. *Atmospheric Environment*, *40*, pp. 5998-6011.

Longford, N. T. (Ed.) (2009). A House Price Index Define in the Potential Outcomes Framework. Barcelona, Spain: SNTL and UPF.

Maclennan, D. (1994). *A Competitive UK Economy: Challenges for Housing Policy*. United Kingdom: Joseph Rowntree Foundation.

Maclennan, D., Munro, M. & Wood, G. (1987). Housing Choices and the Structure of Housing Markets. *Scandinavian Housing and Planning Research, 4*: pp 26-52.

Majid, M.R., Moeinzadeh, S.N. & Tifwa, H.Y. (2014). Income-Carbon Footprint Relationships for Urban and Rural Households of Iskandar Malaysia. *IOP Conference Series: Earth and Environmental Science*, *18(1)*, pp. 1-5.

Makido, Y., Dhakal, S. & Yamagata, Y. (2012). Relationship between Urban Form and $CO_2$ Emissions: Evidence from Fifty Japanese Cities. *Journal of Urban Climate, 2*, pp55-67.

Malaysia Energy Commission (2018). *National Energy Balance 2018*. Malaysia: Energy Commission.

Manganelli, B. *et al.* (2014). Using Geographically Weighted Regression for Housing Market Segmentation. *International Journal of Business Intelligence and Data Mining, 9(2)*, pp 161-177.

Mangum, K. (2016). The Role of Housing in Urban Carbon Emission. *Policy Studies Research Paper Series, 16-15*: pp 1-72.

Marcotullio, P.J. *et al.* (2014). Urbanization and The Carbon Cycle: Contributions from Social Science. *Journal of The Earth's Future, 2*: pp 496-514.

Marzuki, A. & Jais, A.S. (2020). Urbanisation and The Concerns for Food Security in Malaysia. *Journal of The Malaysian Institute of Planners*, 18(3), pp. 202-217.

Masrom, T. *et al*. (2017). Population and Spatial Distribution of Urbanisation in Peninsular Malaysia 1957 – 2000. *Malaysia Journal of Society and Space*, *8(2)*, pp. 20-29.

Mat Lazim, M.S. (2020). Evolution of Migration for Urban and Rural. *Newsletter of Department of Statistics Malaysia*, 62(4), pp. 1-4.

McManus, P. & Haughton, G. (2006). Planning with Ecological Footprints: A Sympathetic Critique of Theory and Practice. *Journal of Environment and Urbanization, 18(1)*: pp 113-127.

Md Yusof, A. & Ismail, S. (2012). Multiple Regressions in Analysing House Price Variations. *Communications of the IBIMA*, pp. 1-9.

Mendonca, R. *et al*. (2017). Organic Carbon Burial in Global Lakes and Reservoirs. *Journal of Nature Communications*, 8, pp. 1-7.

Michaels, R.G. & Smith, V.K. (1990). Market Segmentation and Valuing Amenities with Hedonic Models: A Case of Hazardous Waste Sites. *Journal of Urban Economics, 28*: pp 223-242.

Miles, J. (2014). *R Squared, Adjusted R Squared*. United Kingdom: Wiley StatsRef Statistics Reference Online.

Miles, J. & Shevlin, M. (2001). Applying Regression and Correlation. A Guide for Students and Researchers. London: SAGE Publications Ltd.

Miller, N.G., Sah, V. & Sklarz, M.A. (2018). Estimating Property Condition Effect on Residential Property Value: Evidence from U. S. Home Sales Data. *Journal of Real Estate Research*, *40(2)*, pp. 179-198.

Mishra, S. (2012). Impact of Urbanization on Environment. *Asian Journal of Environmental Science*, 7 (2), pp. 235-238.

Mohamad, J. & Kiggundu, A.T. (2007). The Rise of Private Car in Kuala Lumpur, Malaysia: Assessing the Policy Options. *International Association of Traffic and Safety Sciences Research, 31(1)*: pp 69-77.

Mohamed Nazri, N.N.I. *et al*. (2020). Investigation of Traffic Noise Pollution at Puchong Residential Area. *Proceedings of the 6th International Conference on Civil, Offshore and Environmental Engineering (ICCOEE 2020)*. Singapore: Springer Nature Singapore Pte. Ltd. pp. 799-806.

Mohd Diah, M.L. *et al*. (2014). Comparison of Empirical Models in Malaysia House Price Index Construction. *Proceeding of the 20th Annual Pacific-Rim Real Estate Society Conference*. Christchurch, New Zealand.

Mohd Noor, N., Asmawi, M.Z. & Abdullah, A. (2015). Sustainable Urban Regeneration: GIS and Hedonic Pricing Method in Determining the Value of Green Space in Housing Area. *Procedia - Social and Behavioral Sciences*, 170(27), pp. 669-679.

Mohd Radzi1, M.S. *et al*. (2012). Forecasting House Price Index Using Artificial Neural. *International Journal of Real Estate Studies*, *7(1)*, pp. 43–48.

Mohd Rahim, F.A. *et al*. (2020). Factors Affecting The Ownership of Low-Cost Housing for Socio-Economic Development in Malaysia. *Journal of Building Performance*, *10(1)*, pp. 1-16.

Mohd Shafie, S.H. & Mahmud, M. (2020). Urban Air Pollutant from Motor Vehicle Emissions in Kuala Lumpur, Malaysia. *Journal of Aerosol Air Quality Research*, 20(12), pp. 2793-2804.

Mohd Yusop, A. & Permana, A.S. (2016). Spatial Pattern, Transportation and Air Quality Nexus: The Case of Iskandar Malaysia. *International Journal of Built Environment and Sustainability*, 3(3), pp. 199-208.

Mok, O. (2018). Penang Property Market Still Robust Despite Oversupply. *Malay Mail*. Retrieved on October 15, 2019 from https://www.malaymail.com/news/malaysia/2018/12/31/penang-property-market-still-robust-despite-oversupply-says-official/1707738

Moran, D. *et al*. (2018). Carbon Footprint of 13,000 Cities. *Journal of Environmental Research Letters*, 13, pp. 1-9.

Morawakage, P.S. *et al*. (2022). Housing Risk and Returns in Submarkets with Spatial Dependence and Heterogeneity. *Journal of Real Estate Finance and Economics*, pp. 1-40.

Morrow, R.W. *et al.* (2010). Analysis of Policies to Reduce Oil Consumption and Greenhouse-Gas Emissions from The US Transportation Sector. *Journal of Energy Policy, 38*: pp 1305-1320.

Mouratidis, K. *et al*. (2019). Urban form, Travel Behavior, and Travel Satisfaction. *Transportation Research Part A Policy and Practice*, 129, pp. 306-320.

Mulligan, G., Franklin, R. & Esparaza, A. (2002). Housing Prices in Tucson, Arizona. *Urban Geography, 23*: pp 446-470.

Mumuni, Z. (2017). Assessing the Impact of Land Use and Travel on Carbon Dioxide Emissions in Portland, Oregon. Portland State University: Master's Thesis.

Musa, Z. (2019). Johor Govt Urged to Address Outdated Housing Policies. *The Star*. Retrieved on October 15, 2019 from https://www.thestar.com.my/business/business-news/2019/08/07/johor-govt-urged-to-address-outdated-housing-policies

Mussa, A., Nwaogu, U.G. & Pozo, S. (2017). Immigration and Housing: A Spatial Econometric Analysis. *Journal of Housing Economics*, 35, pp. 13-25.

Naderipour, A. *et al*. (2021). Assessment of Carbon Footprint from Transportation, Electricity, Water, and Waste Generation: Towards Utilisation of Renewable Energy Sources. Journal of Clean Technologies and Environmental Policy, 23, pp. 183-201.

Naeema, M.A. (2016). Policies and Issues Concerning Urban Sprawl and Compact Development Paradigm Adoption in Greater Kuala Lumpur, Malaysia. *Malaysia Sustainable Cities Program - Working Paper Series*, pp. 1-17.

Naess, P. (2011). 'New Urbanism' or Metropolitan-Level Centralization? A Comparison of the Influences of Metropolitan-Level and Neighborhood-Level Urban Form Characteristics on Travel Behavior. *Journal of Transport and Land Use*, 4(1), pp. 25-44.

Nagaraja, C.H., Brown, L.D. & Wachter, S.M. (2014). Repeat Sales House Price Index Methodology. *Journal of Real Estate Literature*, *22*.

National Property Information Centre (NAPIC) (2018). *Southern Region Property Market Report First Half 2018*. Malaysia: Valuation and Property Services Department.

National Property Information Centre (NAPIC) (2019a). *Property Stock Report H1 2019*. Malaysia: Valuation and Property Services Department.

National Property Information Centre (NAPIC) (2019b). *Residential, Commercial and Industrial Status Report H1 2019*. Malaysia: Valuation and Property Services Department.

National Property Information Centre (NAPIC) (2019c). *Property Market Status Table (Newly Launched Residential Units and The Sales Performances for Q4 2018p, Q1 2019p & Q2 2019p By State, District, Type and Price Range in Malaysia*). Malaysia: Valuation and Property Services Department.

National Property Information Centre (NAPIC) (2023). *Residential, Commercial and Industrial Status Report 2022*. Malaysia: Valuation and Property Services Department.

Navaneethan, R., Ismail, S. & Mar Iman, A.H. (2009). Testing for the Existence of Housing Sub-Markets in Penang, Malaysia. *Malaysian Journal of Real Estate, 4(1)*: pp 52-70.

Nero, B.F. *et al*. (2017). Urban Green Spaces Enhance Climate Change Mitigation in Cities of the Global South: The Case of Kumasi, Ghana. *Procedia Engineering*, 198, pp. 69-83.

Netek, R., Pour, T. & Slezakova, R. (2018). Implementation of Heat Maps in Geographical Information System – Exploratory Study on Traffic Accident Data. *Journal of Open Geosciences*, 10(1), pp. 367-384.

Netzell, O. (Ed.) (2010). A Method for Combining Transaction- and Valuation-Based Data in a Property Price Index. Stockholm: Building and Real Estate Economics, Royal Institute of Technology.

Ng, K.K. (2020). Johor Bahru's Urban Transformation: Authority and Agency Revisited. in Hutchinson, P.E. & Rahman, S. *Johor: Abode of Development?* Singapore: ISEAS - Yusof Ishak Institute. pp. 407-423.

Nicholson, R.J. & Topham, N. (1973). Step-wise Regression and Principal Components Analysis in Estimating a Relationship in an Econometric Model. *The Manchester School, 41(2)*: pp 187-205.

Nicolas, J.P. & David, D. (2009). Passenger Transport and $CO_2$ Emissions: What Does the French Transport Survey Tell Us? *Journal of Atmospheric Environment, 43(5)*: pp 1015-1020.

Nik Mohd Sukrri, N.N.A., Abdul Wahab, N. & Mohd. Yusof, R. (2019). Constructing An Enhanced House Price Index Model in Malaysia: Empirical Evidence. *Jurnal Ekonomi Malaysia*, *53(3)*, pp. 1-14.

Nuissl., H. & Siedentop, S. (2020). Urbanisation and Land Use Change. *Sustainable landa Management in A European Context*, pp. 75-99.

O' Sulivan, D. & Unwin, D.J. (2003). Geographic Information Analysis. 2nd ed. New Jersey, USA: John Wiley & Sons.

Olanrewaju, S.D. & Adegun, O.B. (2021). Urban Sprawl and Housing: A Case for Densification in Nigerian Cities. in Nubi, T. G. *et al*. *Housing and SDGs in Urban Africa*. Singapore: Springer. pp. 287-299.

Ong, H., Mahlia, T. & Masjuki, H. (2011). A Review on Emissions and Mitigation Strategies for Road Transport in Malaysia. *Renewable and Sustainable Energy Reviews*, 15 (8), pp. 3516-3522.

Ooi, G.L. & Phua, K.H. (2007). Urbanization and Slum Formation. *Journal of Urban Health*, *84(3)*, pp. 27-34.

Organization for Economic Co-operation and Development (OECD) (2018). *Rethinking Urban Sprawl: Moving Towards Sustainable Cities*. Paris: OECD Publishing.

Osland, L. (2010). An Application of Spatial Econometrics in Relation to Hedonic House Price Modelling. *Journal of Real Estate Research*, *32(3)*, pp. 289-320.

Oyana, T.J. & Margai, F. (2016). *Spatial Analysis - Statistics, Visualization, and Computational Methods*. 1st ed. New York: CRC Press.

Palm, R. (1978). Spatial Segmentation of the Urban Housing Market. *Economic Geography, 54(3)*: pp 210-221.

Pankaj, C.K. (2019). Home Prices Are Affordable but… *The Star Online*. Retrieved on October 21, 2019 from https://www.thestar.com.my/business/business-news/2019/07/27/home-prices-are-affordable-but

Paramasivam, C.R. & Venkatramanan, S. (2019). *An Introduction to Various Spatial Analysis Techniques*. in Venkatramanan, S., Viswanathan, P.M. & Chung, S.Y. (Ed.). GIS and Geostatistical Techniques for Groundwater Science. Elsevier Science. pp. 23-30.

Pebesma, R.E & Bivand, R. (2021). *Spatial Data Science with Applications in R.* Retrieved on October 12, 2021, from https://keen-swartz-3146c4.netlify.app

Penco, L. *et al*. (2020). Knowledge Based Urban Environments and Entrepreneurship: Inside EU Cities. *Journal of Cities*, 96, pp. 1-17.

Peng, J. *et al*. (2021). The Impact if New Urbanization Policy on In-Situ Urbanization: Policy Test Based on Difference in Differences Model. *Land*, *10 (178)*, pp. 1-15.

Petkar, A.S., Macwan, J.E.M. & Takkekar, D.L. (2012). Urbanization and Its Impacts on Housing.

Petruccelli, U. (2016). Impact of Built Environment Dispersion on Urban Mobility. *Environmental Management and Sustainable Development*, *5(1)*, pp. 228-251.

Pissourios, I. *et al*., (2012). The Use of Point Pattern Statistics in Urban Analysis. in Gensel, J., Josselin, D. & Vandenbroucke, D. *Bridging the Geographic Information Sciences*. France: Springer. pp. 347-364.

Poumanvyong, P. & Kaneko, S. (2010). Doe Urbanization Lead to Less Energy Use and Lower $CO_2$ Emissions? A Cross-Country Analysis. *Journal of Ecological Economics, 70*: pp 434-444.

Pramono, R.W.D. (2018). Housing Development on the Urban Fringe and its Challenges to Sustainable Urban Growth. *IOP Conference Series: Earth and Environmental Science*, 158, pp. 1-13.

Pravitasari, A.E. *et al*. (2018). Identifying the Driving Forces of Urban Expansion and Its Environmental Impact in Jakarta-Bandung Mega Urban Region. *IOP Conference Series: Earth and Environmental Science*, *149*, pp. 1-10.

Pryce, G. (2013). Housing Submarkets and the Lattice of Substitution. *Urban Studies, 50(13)*: pp 2682-2699.

Razali, A. *et al*. (2018). Land Use Change In Highland Area and Its Impact on River Water Quality: A Review of Case Studies in Malaysia. *Ecological Processes*, 7(19), pp. 2-17.

Rekha, M. (2019). Correlation and Collinearity – How They Can Make or Break A Model. Retrieved on March 22, 2021 from https://correlation-and-collinearity-how-they-can-make-or-break-a-model-9135fbe6936a

Ren, L., Wang, W., Wang, J. & Liu, R. (2015). Analysis of Energy Consumption and Carbon Emission during the Urbanization of Shandong Province, China. *Journal of Cleaner Production, 103*: pp 534-541.

Rerat, P. (2012). Housing, the Compact City and Sustainable Development: Some Insights from Recent Urban Trends in Switzerland. *European Journal of Housing Policy*, 12(2), pp.115-136.

Ritchie, H. & Roser, M. (2019). Urbanization. Retrieved on December 5, 2021, from https://ourworldindata.org/urbanization#how-many-people-will-live-in-urban-areas-in-the-future

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy, 82(1)*: pp 34-55.

Rosmera, N.A. & Mohd Diah, M.L. (2016). Housing Market Segmentation and the Spatially Varying House Prices. *The Social Sciences, 11(11)*: pp 2712-2719.

Rosmera, N.A., Mohd Diah, M.L. & Omar, A.J. (2012). The Revisited of Malaysian House Price Index. *Proceedings International Conference of Technology Management, Business and Entrepreneurship 2012*. Melaka: Faculty of Technology Management, Business and Entrepreneurship. pp. 656–667.

Rosni, N.A. & Mohd Noor, M. (2016). A Review of Literature on Urban Sprawl: Assessment of Factors and Causes. *Journal of Architecture, Planning and Construction Management*, *6(1)*, pp. 12-35.

Rosni, N.A., Mohd Noor, M. & Abdullah, A. (2016). Managing Urbanisation and Urban Sprawl in Malaysia by Using Remote Sensing and GIS Applications. *Planning Malaysia*, *14(4)*, pp. 17-30.

Rubiera-Morollón, F. & Garrido-Yserte, R. (2020). Recent Literature about Urban Sprawl: A Renewed Relevance of the Phenomenon from the Perspective of Environmental Sustainability. *Journal of Sustainability*, 16, 6551.

Said, R. & Abdul Majid, R. (2014). Housing Market: What Does The Malaysian House Price Index Tell Us About The Housing Market Performance? *International Surveying Research Journal*, *4(1)*, pp. 45–54.

Samat, N. *et al*. (2014). Urban Expansion and Its Impact on Local Communities: A Case Study of Seberang Perai, Penang, Malaysia. *Journal of Social Science and Humanities*, *22(2*, pp. 349-367.

Samat, N. *et al*. (2020). Modelling Land Cover Changes in Peri-Urban Areas: A Case Study of George Town Conurbation, Malaysia. *Journal of Land*, 9, pp. 1-16.

Santamouris, M. *et al*. (2007). On The Relation Between the Energy and Social Characteristics of the Residential Sector. *Energy Building*, 39 (8), pp. 893-905.

Saras, A. & Kristanto, G.A. (2021). Carbon Footprint Analysis on Household Consumption in Indonesia Based on The Indonesia Family Life Survey (IFLS) in 1993 and 2000. *IOP Conference Series: Earth and Environmental Science*, *824(1)*, pp. 1-9.

Sasaki, M. & Yamamoto, K. (2018). Hedonic Price Function for Residential Area Focusing on the Reasons for Residential Preferences in Japanese Metropolitan Areas. *Journal of Risk Financial* Management, *11(39)*, pp. 1-18.

Saynajoki, E.S., Heinonen, J. & Junnila, S. (2014). The Power of Urban Planning on Environmental Sustainability: A Focus Group Study in Finland. *Journal of Sustainability, 6*: pp 6622-6643.

Schnare, A.B. & Struyk, R.J. (1976). Segmentation in Urban Housing Markets. *Journal of Urban Economics, 3(2)*: pp 146-166.

Schneider, D. (2016). "Urbanization". *Unpublished*.

Schwartz, A. (2015). People Are Commuting Longer And Longer, Because The Jobs All Moved Far Away. Retrieved on Oct 28, 2021, from https://www.fastcompany.com/3045034/people-live-are-commuting-longer-and-longer-because-the-jobs-all-moved-far-away

Shammin, M.R. *et al.* (2010). A Multivariate Analysis of the Energy Intensity of Sprawl Versus Compact Living in the US for 2003. *Ecological Economics, 69 (12)*: pp 2363-2373.

Shao, Z.F. *et al*. (2020). Urban Sprawl and Its Impact on Sustainable Urban Development: A Combination of Remote Sensing and Social Media Data. *Journal of Geo-Spatial Information Science*, 24(2), pp. 241-255.

Sharma, R.P. (2002). *Urbanization, Planning and Development: Consequences, Opportunities and Future*. Retrieved on November 29, 2016, from https://www.academia.edu/2029224/Urbanization_Planning_and_Development_Consequences_Opportunities_and_Future

Shi, D. *et al*. (2015). An Innovative Clustering Approach to Market Segmentation for Improved Price Prediction. *Journal of International Technology and Information Management, 24(1)*: pp 15-32.

Shirazi, M.R. (2020). Compact Urban Form: Neighbouring and Social Activity. Journal of Sustainability, 12, pp. 1-18.

Shirazi, M.R. & Falahat, S. (2012). Compact Urban Form, Question or Solution? Examining the Compact City in the Middle Eastern Context: Challenges and Opportunities. International Journal of Urban Sustainable Development, 4(2), pp. 246-259.

Shukla, R. & Trzcinka, C. (1990). Sequential Tests of the Arbitrage Pricing Theory: A Comparison of Principal Components and Maximum Likelihood Factors. *Journal of Finance, 45(5)*: pp 1541-1564.

Simorangkir, Y.V., Octavia, S. & Raubaba, H.S. (2019). Slums as A Result of Urbanization. *IOP Conference Series: Earth and Environmental Science*, 343, pp. 1-5.

Smith, M.J., Goodchild, M.F. & Longley, P.A (2015). Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools. 6th ed. Winchelsea, UK: The Winchelsea Press.

Soloman, S. (2009). Irreversible Climate Change Due to Carbon Dioxide Emissions. *Proceedings of the National Academy of Sciences*, 106 (6), pp: 1704-1709.

Soltani, A. *et al*. (2021). Housing Price Variations Using Spatio-Temporal Data Mining Techniques. *Journal of Housing and the Built Environment*, *36(7)*, pp. 1-29.

Song, Y. *et al*. (2017). The Relationships between Urban Form and Urban Commuting: An Empirical Study in China. *Journal of Sustainability*, 9, 1150.

Sovacool, B.K. & Brown, M.A. (2010). Twelve Metropolitan Carbon Footprints: A Preliminary Comparative Global Assessment. *Journal of Energy Policy, 38*: pp 4856-4869.

Spumont, F. & Viti, F. (2018). The Effect of Workplace Relocation on Individuals' Activity Travel Behavior. *The Journal of Transport and Land Use*, 11(1), pp. 985-1002.

Stephan, A. & Crawford, R.H. (2016). The Relationship Between House Size and Life Cycle Energy Use: Implications for Building Energy Efficiency Regulations. *Energy*, 116 (1), pp. 1158-1171.

Straszheim, M.R. (1975). *An Econometric Analysis of the Urban Housing Market*. New York: National Bureau of Economic Research.

Strohbach, M., Arnold, E. & Haase, D. (2012). The Carbon Footprint of Urban Green Space: A Life Cycle Approach. Journal of Landscape and Urban Planning, 104(2), pp. 220-229.

Sun, L.Q. *et al*. (2020). Dramatic Uneven Urbanization of Large Cities throughout the World in Recent Decades. *Nature Communications*, *11*, pp. 1-9.

Sun, Q.Y. & Wang, M.Y. (2018). Exploration of Threshold Analysis in the Relation between Urbanization and Carbon Emissions: The Case of China. *Open Journal of Business and Management*, 6(2), pp. 438-453.

Sun, S.H., Green, R. & Wang, M.Y. (2015). *A Review of Towards Low Carbon Cities in China: Urban Form and Greenhouse Gas Emissions*. Routledge, New York.

Surya, B. *et al*. (2020). Land Use Change, Spatial Interaction, and Sustainable Development in the Metropolitan Urban Areas, South Sulawesi Province, Indonesia. *Land*, *9(95)*, pp. 1-43.

Surya, B. *et al*. (2021). Land Use Change, Urban Agglomeration, and Urban Sprawl: A Sustainable Development Perspective of Makassar City, Indonesia. *Land*, *10(556)*, pp. 1-31.

Sutton, G.D. (2002). Explaining Changes in House Prices. *BIS Quarterly Review September 2002*, pp. 46–55.

Swilling, M. (2016). The Curse of Urban Sprawl: How Cities Grow, and Why This Has to Change. Retrieved on October 2, 2021, from https://www.theguardian.com/cities/2016/jul/12/urban-sprawl-how-cities-grow-change-sustainability-urban-age

Tammaru, T. *et al*. (2020). Relationship Between Income Inequality and Residential Segregation of Socioeconomic Groups. *Regional Studies*, *54(4)*, pp. 450-461.

Tan, T.H. (2010). The Impact of Neighborhood Types on The Prices of Residential Properties. *Sunway Academic Journal*, *7*, pp. 77–88.

Tan, Y.K. (1999). *An Hedonic Model For House Prices In Malaysia*. International Real Estate Society Pacific Rim Real Estate Society & Asian Real Estate Society.

Thasha, J. (2019). Govt Needs to Resolve Property Overhang to Prevent Crisis. *Malay Mail*. Retrieved on October 21, 2019 from https://www.malaymail.com/news/malaysia/2019/10/15/govt-needs-to-resolve-property-overhang-to-prevent-crisis-says-pm/1800413

Thean, L.C. (2017). Central Depository Required to Resolve Housing Overhang. *The Star Online*. Retrieved on October 21, 2019 from https://www.thestar.com.my/business/business-news/2017/11/23/central-depository-required-to-resolve-housing-overhang

Thevendran, M. & Jarnell, D. (2019). Solutions to Housing Affordability Issues. *The Star Online*. Retrieved on October 15, 2019 from https://www.thestar.com.my/business/business-news/2019/10/05/solutions-to-housing-affordability-issues#78uxd0PL467Xk1Fq.99

Tian, Y.S. & Wang, L. (2020). The Effect of Urban-Suburban Interaction on Urbanization and Suburban Ecological Security: A Case Study of Suburban Wuhan, Central China. *Journal of Sustainability*, 12, pp. 1-22.

Tiwari, P. & Parikh, J. (1998). Affordability, Housing Demand And Housing Policy In Urban India. *Urban Studies*, *35(11)*, pp. 2111–2129.

Tobi, S.U.M., Jasimin, T.H. & Rani, W.N.M.W.M (2020). Overview of Affordable Housing from Supply and Demand Context in Malaysia. *IOP Conference Series Earth and Environmental Science*, 409, pp. 1-8.

Tomal, M. (2021). Housing Market Heterogeneity and Cluster Formation: Evidence From Poland. *International Journal of Housing Markets and Analysis*, *14(5)*, pp. 1166-1185.

Tong, K.K. & Ma, K.M. (2012). Significant Impact of Job-Housing Distance on Carbon Emissions From Transport: A Scenario Analysis. Acta Ecologica Sinica, 32, pp. 2975-2984.

Travisi, C.M., Camagni, R. & Nijkamp, P. (2010). Impacts of Urban Sprawl and Commuting: A Modelling Study for Italy. *Journal of Transport Geography*, 18(3), pp. 382-392.

Troy, P., Holloway, D., Pullen, S. & Bunker, R. (2003). Embodied and Operational Energy Consumption in the City. *Journal of Urban Policy and Research, 21(1)*: pp 9-44.

Tu, Y. (1997). The Local Housing Sub-Market Structure and Its Properties. *Urban Studies, 34(2)*: pp 337-353.

Tu, Y., Sun, H. & Yu, S.M. (2007). Spatial Autocorrelations and Urban Housing Market Segmentation. *Journal of Real Estate Finance Economics*, *34*, pp. 385-406.

United Nations (2023). Take Urgent Action to Combat Climate Change and Its Impacts. Retrieved on July 1, 2023, from https://unstats.un.org/sdgs/report/2021/goal-13/

United Nations Children's Fund (UNICEF) (2012). UNICEF Urban Population Map. Retrieved on January 22, 2020, from https://www.unicef.org/sowc2012/urbanmap/?lan=en

Usman, H., Mohd Diah, M.L. & Adekunle, M.U. (2020). Property Price Modelling, Market Segmentation and Submarket Classifications: A Review. *Journal of Real Estate Management and Valuation, 28(3)*: pp 24- 35.

Uttara, S., Bhuvandas, N. & Aggarwal, V. (2012). Impacts of Urbanization on Environment. *International Journal of Research in Engineering and Applied Sciences, 2(2)*: pp 1637-1645.

Van Poeck, A. & Van Gompel, J. (1994). Dominant Interest and Inflation Differentials within the EMS: A Comment. *European Economic Review, 38(8)*: pp 1661-1663.

Vanags, S. *et al*. (2017). Housing Heterogeneity Dimensions and Their Elements: A Systemic Approach. *Journal of Real Estate Economics and Construction Management*, *5*, pp. 23-37.

Venerandi, A., Quattrone, G. & Capra, L. (2018). A Scalable Method to Quantify the Relationship Between Urban Form and Socio-Economic Indexes. *EPJ Data Science*, *7(4)*, pp. 1-21.

Wackernagel, M. & Rees, W.E. (1996). *Our Ecological Footprint - Reducing Human Impact on the Earth*. Canada: New Society Publishers Gabriola Island.

Wang, H.Y. & Hong, M. (2013). Residential Hedonic Price Multivariate Linear Regression Model Based on Approximative Normalization. *Information Technology Journal*, *12(23)*, pp. 7427-7434.

Wang, P.Z., Lyu, L.G. & Xu, J.G. (2021). Factors Influencing Rural Households' Decision-Making Behavior on Residential Relocation: Willingness and Destination. *Land*, *10(1285)*, pp. 1-18.

Wang, Q. (2014). Effects of Urbanisation on Energy Consumption in China. *Energy Policy*, 65, pp. 332-339.

Wang, W.J. *et al*. (2020). Urbanization Impacts on Natural Habitat and Ecosystem Services in the Guangdong-Hong Kong-Macao "Megacity". *Journal of Sustainability*, 12, pp. 1-17.

Wang, Y. *et al*. (2016). Does Urbanization Lead to More Carbon Emission? Evidence from a Panel of BRICS Countries. Applied Energy, 168, pp. 375-380.

Warren, C.M.J., Elliott, P. & Staines, J. (2017). The Impacts of Historic Districts on Residential Property Land Values in Australia. *International Journal of Housing Markets and Analysis, 10(1)*: pp 66-80.

Watkins, C.A. (1999). Property Valuation and the Structure of Urban Housing Markets. *Journal of Property Investment and Finance, 17 (2):* pp 157-175.

Watkins, C.A. (2001). The Definition and Identification of Housing Submarkets. *Journal of Environment and Planning, 33 (12)*: pp 2235-2253.

Watrianthos, R. *et al*. (2020). Mapping of Traffic Accidents in Labuhanbatu Regency using GIS Support. *Journal of Physics: Conference Series*, 1566.

Waugh, D. (2009). *The New Wider World*. 3rd Ed. Oxford: Oxford University Press.

Wei, Y.M. *et al.* (2007). The Impact of Lifestyle on Energy Use and $CO_2$ Emission: An Empirical Analysis of China's Residents. *Journal of Energy Policy, 35*: pp 247-257.

Weintraub, E. (2018). What Location, Location, Location Means in Real Estate. Retrieved on October 21, 2019 from https://www.thebalance.com/what-location-means-in-real-estate-1798766

Weir, G. & Muneer, T. (1998). Energy and Environmental Impact Analysis of Double-Glazed Windows. *Energy Conversion and Management 39 (3–4)*: pp 243–256.

Weir, G. *et al.* (2001). Effects of Household Consumption Patterns on $CO_2$ Requirements. *Journal of Economic System Resources*, *13*: pp 259-274.

Wemegah, T.D., Zhu, S. & Atombo, C. (2018). Modeling the Effect of Days and Road Type on Peak Period Travels Using Structural Equation Modeling and Big Data from Radio Frequency Identification for Private Cars and Taxis. *European Transport Research Review*, 10 (39), pp. 1-14.

Wen, F.H. & Ren, L.R. (2017). The Measurement of Urbanization Level Based on Entity Space: A Case Study of JingJinJi Region, China. *Proceeding of Materials Science, Engineering and Chemistry* (MATEC), 100, pp. 1-8.

Whitehead, C. (1999). *Urban Housing Markets: Theory and Policy*. Handbook of Regional and Urban Economics. Oxford: Elsevier Science.

Wiedmann, T & Barett, J. (2010). A Review of The Ecological Footprint Indicator Perceptions and Methods. *Journal of Sustainability, 2*: pp 1645-1693.

Wiedmann, T., & Minx, J. (2008). *A Definition of 'Carbon Footprint'*. Haupaugge, New York, USA: Nova Science Publishers.

Wilhelmsson, M. (2000). The Impact of Traffic Noise on The Values of Single-Family Houses. *Journal of Environmental Planning and Management*, *43(6)*, pp. 799–815.

Wilhelmsson, M. (2002). Spatial Models in Real Estate Economics. *Housing, Theory and Society, 19*: pp 92-101.

Williams, K. (2014). *Urban Form and Infrastructure: A Morphological Review*. Bristol (England): UK Government's Foresight Future of Cities Project.

Wilson, J. *et al.* (2013). Blame the Exurbs, Not the Suburbs: Exploring the Distribution of Greenhouse Gas Emissions Within a City Region. *Energy Policy, 62*: pp 1329-1335.

Wong, V.K. & Aralas, S. (2019). Macroeconomic Variables and Housing Price. *Proceedings of the International Conference on Economics 2019* (ICE 2019). Malaysia, Universiti Malaysia Sabah. pp. 23-34.

Wood, R. (2005). A Comparison of UK Residential House Price Indices. in Bank for International Settlements (ed.). *Real Estate Indicators and Financial Stability*. Bank for International Settlements. pp. 212–227.

World Bank Group (2015). *East Asia's Changing Urban Landscape: Measuring A Decade of Spatial Growth.* Urban Development, Washington.

Wu, C. *et al*. (2018a). Modified Data-Driven Framework for Housing Market Segmentation. *Journal of Urban Planning Development, 144(4)*: pp 1-15.

Wu, C. S. & Sharma, R. (2012). Housing Submarket Classification: The Role of Spatial Contiguity. *Journal of Applied Geography, 32*: pp 746-756.

Wu, H. *et al*. (2018b). Housing Price Prediction Based on Multiple Linear Regression. *Sustainability*, *10(1676)*, pp. 1-17.

Xu, G. *et al*. (2020). Compact Urban Form and Expansion Pattern Slow Down the Decline in Urban Densities: A Global Perspective. Land Use Policy, 94, pp. 1-12.

Yaakob, U., Masron, T. & Masami, F. (2010). Ninety Years of Urbanization in Malaysia: A Geographical Investigation of Its Trends and Characteristics. *Journal of Ritsumeikan Social Sciences and Humanities, 4*: pp 79-101.

Yang, S. *et al.* (2015). Quantifying and Mapping Spatial Variability of Shanghai Household Carbon Footprints. *Journal of Front Energy, 9(1)*: pp 115-124.

Yang, S. *et al.* (2017). Analysis of traffic state variation patterns for urban road network based on spectral clustering. *Advances in Mechanical Engineering*, 9 (9), pp. 1-11.

Yang, X. (2017). *Urban Morphology and Housing Submarkets*. Singapore: Springer Geography.

Yasin, M.Y. *et al*. (2021a). The Urbanization and Growth of Malaysia: Case Study of Iskandar Region. *International Journal of Social Science and Economics Invention*, 7(3), pp. 53-66.

Yasin, M.Y. *et al*. (2021b). Urban Sprawl Literature Review: Definition and Driving Force. *Malaysian Journal of Society and Space*, *17(2)*, pp. 116-128.

Yavuz, A. (2016). The Relationship Between Sustainable Urbanisation and Urban Renewal: An Evaluation of Trabzon City Sample. in Mustafa Ergen. *Sustainable Urbanization*. United Kingdom: Intech Open. pp.155-177.

Ye, H. *et al.* (2011). Relationship Between Construction Characteristics and Carbon Emissions from Urban Household Operational Energy Usage. *Energy and Building, 43(1)*: pp 147–152.

Yeap, G.P. & Lean, H.H. (2020). Nonlinear relationship between housing supply and house price in Malaysia. *International Journal of Strategic Property Management*, *24(5)*, pp. 1-10.

Yi, Y. *et al*. (2017). An Empirical Study on the Relationship between Urban Spatial Form and $CO_2$ in Chinese Cities. *Journal of Sustainability*, 9 (672), pp. 1-12.

Yiu, C.Y. & Cheung, K.S. (2022). The Age-Period-Cohort Problem in Hedonic House Prices Models. *Econometrics*, *10(4)*, pp. 1-11.

Yu, C. & He, Z.C. (2017). Analysing The Spatial-Temporal Characteristics of Bus Travel Demand Using The Heat Map. *Journal of Transport Geography*, 58, pp. 247-255.

Yu, S. *et al*. (2017). The Relationships between Urban Form and Urban Commuting: An Empirical Study in China. *Journal of Sustainability*, 9, 1150, pp. 1-17.

Yuan, Y. *et al*. (2020). Point Pattern Analysis. in Wilson, J.P. (Ed.). *The Geographic Information Science and Technology Body of Knowledge (1st Quarter 2020 Edition)*. New York: University Consortium for Geographic Information Science.

Yusof, I. & Fauzi, R. (2019). The Spatial Relation Between Land Use and Crime. *Malaysian Journal of Society and Space*, *15(2)*, pp. 102-116.

Yusoff, N. (2016). Income and Employment to Achieve A Sustainable Economy from Urbanization in Malaysia. *International Journal of Business, Economics and Law*, 10(3), pp. 1-8.

Zakaria, R. *et al*. (2009). Indoor Environment Sustainability of Residential Industrial Housing in Malaysia. *Malaysian Journal of Civil Engineering*, 21(1), pp. 98-109.

Zakka, S.D., Permana, A.S. & Majid, M/R. (2017). Urban Spatial Pattern and Carbon Emission Interconnectivity in a Sub-Saharan City, Nigeria. *Journal of the Malaysian Institute of Planners*, 15(3), pp. 51-62.

Zegras, P.C. (2010). The Built Environment and Motor Vehicle Ownership and Use: Evidence from Santiago de Chile. *Urban Studies (Edinburgh, Scotland, 47(8)*: pp 1793-1817.

Zen, I.S. *et al*. (2022). Socioeconomics Determinants of Household Carbon Footprint in Iskandar Malaysia. *Journal of Cleaner Production*, *347(1)*, pp. 1-15

Zhang, H.Z. & Hao, S.Y. (2008). Urban Space Expansion and Land Intensive Utility. *Economic Geography*, 28 (3), pp. 419-424.

Zhang, J.X. *et al*. (2022). Influencing Factors of Urban Innovation and Development: A Grounded Theory Analysis. *Environment, Development and Sustainability*, pp. 1-26.

Zhang, J.Y. *et al*. (2021b). Household Consumption Characteristics and Energy-Related Carbon Emissions Estimation at the Community Scale: A Study of Zengcheng, China. *Journal of Cleaner and Responsible Consumption*, 2, pp. 1-14.

Zhang, X.F. (2021a). An Analysis of Common Applications on Hedonic Pricing Model in Valuing Ecosystem Services: Similarities and Difference Between Europe, US, and China. *International Journal of Engineering Technologies and Management Research*, 8(1), pp. 1-11.

Zhang, Y.J., Yi, W.C. & Li, B.W. (2015). The Impact of Urbanization on Carbon Emissions: Empirical Evidence in Beijing. *Journal of Energy Procedia, 75*: pp 2963-2968.

Zhao, P. (2010). Sustainable Urban Expansion and Transportation in A Growing Megacity: Consequences of Urban Sprawl for Mobility on the Urban Fringe of Beijing. *Journal of Habitat, 34(2)*: pp 236-243.

Zhao, P., Lu, B. & de Groo, G. (2011). Impact of the Jobs-Housing Balance on Urban Commuting in Beijing in the Transformation Era. *Journal of Transport Geography, 19(1)*: pp 59-69.

Zhao, S.Q. *et al*. (2006). Ecological Consequences of Rapid Urban Expansion: Shanghai, China. *Frontier in Ecology and Environment*, 4 (7), pp. 341-346.

Zheng, J. *et al*. (2020). Comparative Analysis of The $CO_2$ Emissions of Expressway and Arterial Road Traffic: A Case In Beijing. *Journal of Energy Materials*, 15(4), pp. 1-15.

Zheng, X.W. *et al*. (2014). Characteristics of Residential Energy Consumption in China: Findings from A Household Survey. *Energy Policy*, 75, pp. 126-135.

Zhu, K., Tu, M. & Li, Y.C. (2022). Did Polycentric and Compact Structure Reduce Carbon Emissions? A Spatial Panel Data Analysis of 286 Chinese Cities from 2002 to 2019. *Journal of Land*, *11(2)*, pp. 1-15

Zhuo, C. *et al*. (2009). Forecasting Housing Prices Under Different Market Segmentation Assumptions. *Urban Studies, 46 (1)*: pp 167-187.

# VITA

The author was born in Batu Pahat, Johor, Malaysia, on October 2, 1989. She attended secondary school at Sekolah Menengah Kebangsaan Convent, Batu Pahat, Johor. 2013 marked her graduation from Universiti Tun Hussein Onn Malaysia with a Bachelor of Science in Real Estate Management (Hons). She earned a Master of Science in Real Estate and Facilities Management from Universiti Tun Hussein Onn Malaysia following her graduation in 2015. Ms. Wendy attended Universiti Tun Hussein Onn Malaysia in 2015 and was accepted into the Ph.D. program in Real Estate and Facilities Management. During this period, she was a research assistant for the Fundamental Research Grants Scheme (FRGS), sponsored by the Ministry of Education Malaysia. Additionally, she served as a teaching assistant for the Faculty of Technology Management and Business. Ms. Wendy is a co-author of a number of publications in the fields of Housing Submarkets and Spatial Economics. She is a member of the Royal Institution of Surveyors Malaysia (RISM) at the present time.