

FORECASTING HOUSING DEMAND IN TERENGGANU USING
MULTINOMIAL LOGIT

IZZAH SOFEA BINTI IBRAHIM

A thesis submitted in
fulfillment of the requirement for the award of the
Degree of Master of Civil Engineering



Faculty of Civil and Environmental Engineering
Universiti Tun Hussein Onn Malaysia

JULY 2018

DEDICATION

Dedication for

Beloved mummy and abah

Hayati Bt Yusoff and Ibrahim B. Deraman

Dearest sisters and brothers

Ihfayuliani, Ihfasuziella, Iznan and Ijlal Aqil

My special one

Iskandar

Dedicated Supervisors

Prof Madya Dr Noor Yasmin Bt Zainun

And

All my friends

Thank you for the endless supports, prayers, sacrifices and advices. I love all of you.

ACKNOWLEDGEMENT

First of all, I would like to thanks Allah for giving me strength and courage to accomplish this research.

Secondly, I would like to express my deepest gratitude for my beloved supervisor, **Prof. Madya Dr. Noor Yasmin binti Zainun** who guided me throughout this research. If not for her support and guidance, I would not have accomplished this Master's thesis successfully.

In this special moment, I would like to thank to my parents, **Ibrahim bin Deraman** and **Hayati binti Yusoff** and my sister and brother, **Ihfa Yuliani, Ihfa Suziella, Muhammad Iznán and Muhammad Ijlal Aqil** for their love and supports. Without their support and encouragement this study will be hardly to complete.

Last but not least, I would like to thanks to all my friends and all parties contribute in this research.



ABSTRACT

Housing demand is defined as the number of homes needed as residence per household. There are 3 types of housing developed in Terengganu which are low medium cost housing, medium cost housing and high cost housing. According to the NAPIC, during the 2nd quarter of 2016, Terengganu recorded the highest number of overhang units in the East Coast. This problem shows that there is a mismatch between supply and demand. Therefore, to overcome this housing supply and demand mismatch, a reliable technique to forecast the demand is carried out as a basis for the house provider to supply adequate units of housing. The aim of this study is to determine the demand for housing in Terengganu state based on the 3 types of housing. Relevant variables from Census data of 2010 was filtered and analysed to determine the headship rate. After that, the population was forecasted using Double Exponential Smoothing (DES). Model of forecasting housing demand was developed and the model was validated. The results showed that the elderly age group recorded the highest headship rate (11%) while the youngest age group recorded the lowest headship rate (0%) for the year 2010. In contrast, the population among the residents in Terengganu was the highest (16%) for the youngest age group and the lowest (0.95%) for the elderly age group. The total housing demand in Terengganu increases in parallel with the population. Significant indicators of housing demand were income, age and education attainment. The forecasting model showed that in 5 years duration, low medium cost housing had the highest demand followed by medium cost housing and high cost housing. The validation analysis showed that this model is reasonable and can be used to forecast housing demand in Terengganu with a Mean Absolute Percentage Error (MAPE) value of 22.45%. These forecasted housing demands will be useful for key players in housing industry such as government authorities and developers in providing numbers of housing unit that match the demand to avoid under supply or over supply.

ABSTRAK

Permintaan perumahan bermaksud bilangan rumah yang diperlukan untuk satu kediaman bagi setiap ketua isi rumah. Terdapat 3 jenis rumah yang dibangunkan di negeri Terengganu iaitu rumah kos sederhana rendah, kos sederhana dan kos tinggi. Menurut NAPIC, pada suku tahun kedua 2016, Terengganu mencatatkan rumah terbengkalai tertinggi di Pantai Timur. Masalah ini menunjukkan ketidaksepadanan antara penawaran dan permintaan. Oleh itu, untuk mengatasi ketidaksepadanan antara penawaran dan permintaan rumah, teknik yang boleh dipercayai untuk meramalkan permintaan dilakukan sebagai asas bagi pembekal rumah untuk menawarkan unit perumahan yang mencukupi. Tujuan kajian ini adalah untuk menentukan permintaan perumahan di negeri Terengganu berdasarkan 3 jenis rumah. Pembolehubah yang berkaitan dari data banci tahun 2010 ditapis dan dianalisis bagi menentukan kadar ketua isi rumah. Selepas itu, populasi diramalkan menggunakan Pelicinan Eksponen Berganda (DES). Model permintaan perumahan di Terengganu gunkan dan model disahkan. Keputusan menunjukkan golongan tua mencatatkan kadar ketua isi rumah yang tertinggi (11%) manakala golongan muda mencatatkan kadar ketua isi rumah yang paling rendah (0%) bagi tahun 2010. Sebaliknya, populasi penduduk di Terengganu tertinggi (16%) untuk golongan muda dan paling rendah (0.95%) untuk golongan tua. Permintaan perumahan di Terengganu meningkat seiring dengan populasi. Faktor permintaan perumahan yang signifikan adalah pendapatan, umur dan pendidikan. Model ramalan bagi 5 tahun masa menunjukkan rumah kos sederhana rendah adalah permintaan tertinggi diikuti dengan rumah kos sederhana dan rumah kos tinggi. Pengesahan analisis menunjukkan model ini munasabah dan boleh digunakan untuk meramal permintaan perumahan di Terengganu dengan nilai peratusan ralat min mutlak (MAPE) 22.45%. Ramalan permintaan perumahan akan berguna sebagai kunci utama di dalam industri perumahan seperti pihak berkuasa kerajaan dan pemaju dalam menyediakan bilangan

perumahan sepadan dengan permintaan untuk mengelakkan kekurangan penawaran dan lebih penawaran.



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LIST OF SYMBOL AND ABBREVIATIONS

KOPERAT	-	<i>Konsortium Perumahan Rakyat Terengganu</i>
NHP	-	National Housing Policy
NAPIC	-	National Property Information Centre
RMM	-	<i>Rumah Mampu Milik</i>
MAPE	-	Mean Absolute Percentage Error
PR1MA	-	<i>Perumahan Rakyat 1 Malaysia</i>
DES	-	Double Exponential Smoothing
MNL	-	Multinomial Logit
ARIMA	-	Autoregressive Integrated Moving Average
ANN	-	Artificial Neural Network
Q1	-	1 st Quarter
Q2	-	2 nd Quarter
Q3	-	3 rd Quarter
Q4	-	4 th Quarter



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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Housing is one of the most important element and basic human need in life. Humans need houses as a physical shelter and to carry out cultural activities (Rakoff, 1977). Other than that, houses can also be used to express feelings, ways of thinking and social processes. Therefore, humans need a house to ensure well-being and to achieve a perfect life (Adebayo and Wee, 2008).

People normally have wrong interpretations of housing need, housing supply and housing demand. To put it simply, housing need is defined directly as the quantity and type of housing that society regards as minimally acceptable by households. The type of housing depends on the household size, age and other household characteristics (Whitehead, 1991). Housing need is also defined as the number of households that do not have access to accommodation that meet certain normative standards (Heath, 2014). This measure mainly refers to the level of need for more or improved social housing. In an economy market, government intervention is needed to make sure that housing needs are met.

Besides that, housing supply is critical to understanding housing markets. High price always reflect the intersection of strong demand in limited supply (Rameli, Johar and Siong, 2006). Theoretically, the market should be operated to achieve an equilibrium between demand and supply. But in actual fact the housing market system fails to provide a balanced situation between housing demand and supply. Imperfection of the market system and unethical speculation by housing developers are amongst the factors contributing to the market failure, resulting in an oversupply of housing property. Besides faulty market systems, there is an argument

that irresponsiveness of the current planning practice also contributes to the issue of oversupply (Bramley, 1995). The nature of planning system which focuses on housing needs, neglects the element of effective demand in housing forecasting.

Meanwhile, housing demand is defined as the number of homes needed as residence per household (Hansen, Stephensen, & Kristensen, 2013). In a market-driven concept, housing demand is associated with the type and number of houses where users choose a house based on their preferences and ability to pay. Ability factors principally relate to the financial aspect but a mismatch between the price and household income will happen if the purchase of the house is based on the availability of the stock (Hoek-smit & Diamond, 2003). This is because not all households can afford to buy the types of houses provided. For example, even though many medium cost houses are available, low income households cannot afford to buy them. This condition is referred to as a mismatch between the ability of buyers to afford housing and the supply of houses (Shuid, 2005). This mismatch has been identified as a major problem in the construction of housing in Malaysia (Ministry of Housing and Local Government Malaysia, 2001).

The housing sector in Malaysia has an important role in the government's aspiration to achieve the status of a developed nation with high income by 2020 (Utusan Online, 2010). In setting out the direction of the housing sector in Malaysia, the government has established a policy which is the National Housing Policy. The main purpose of the National Housing Policy (NHP) is formulated by taking into account all policies and legislation to create a comprehensive document as a reference point (Star, 2012). The objective of NHP is to provide adequate housing which are affordable for Malaysian from all income groups, especially the low-income group (National Housing Department, 2012). In 2016 Budget, 315,500 housing units was projected to multiple agencies for all income groups (Berita Harian, 2015).

There are 4 types of housing in Malaysia namely low cost housing, low medium cost housing, medium cost housing and high cost housing (Report of Statistics, 2012). However, the types of housing are different for each state in Malaysia including Terengganu. Currently there are only 3 types of housing developed in Terengganu which are low medium cost, medium cost and high cost housing (NAPIC, 2016). Other than that, the state government has developed

affordable housing Rumah Mampu Milik (RMM) which is under the low medium cost housing category.

1.2 Problem Statement

Issues of overhang or unsold housing are persistent problems which exist in the Malaysian housing market. In Malaysia, 81,894 housing units were launched during the first quarter (Q1) of 2016 and 18,908 (23%) units remained unsold (Jayaraman, 2016). In addition, latest statistics from the National Property Information Centre showed that 13,438 (23%) out of 57,713 were overhang units which were launched in the second quarter (Q2) of 2016 (NAPIC, 2016b). In the third quarter (Q3) 2016, 62,812 units of housing were launched and 14,193 (22%) were overhang units (NAPIC, 2017a). Moreover, during the fourth quarter (Q4) 2016, statistics showed that 14,792 (23%) of 64,677 units were overhang units (NAPIC, 2017b).

According to the Property Market Status Report reported by NAPIC (2016b), in the second quarter (Q2) of 2016, Terengganu recorded the highest number of overhang housing units in the East Coast with 248 units, representing 35.5% of the total housing units in the East Coast which cost RM 44.8 million. Of the total, Kemaman holds 100% (248 units) of the overhang units which is the highest among other districts. The majority of overhang units are made up of 2-3 storey terrace houses and 2-3 storey semi-detached houses which are priced around RM 300,001 until RM 500,000. This overhang problem showed that there is an oversupply of housing in Terengganu. An imbalance of housing supply against demand can be a crucial part of an economic crisis. For an example, Thailand had an economic crisis during year 1996 to 1997 as there is oversupply of housing (Vajiranivesa, 2008).

In 2015, the Terengganu State Secretary Office reported that the demand for *Rumah Mampu Milik* in Terengganu was 25,551 units. Currently, based on the Property Stock Report, in the 2nd Quarter 2016, Terengganu was supplying 93,281 housing units including all types of houses and 24,709 units will be supplied in the future (NAPIC, 2016f). Therefore, this study was carried out to make the supply in line with the demand for each type of housing in Terengganu.

Based on previous research by Yahya, (2002); Bakhary, Yahya and Ng (2004); Zainun (2004); Zainun, Rahman and Eftekhari (2010); Zainun, Rahman and

Eftekhari (2011); Yassin, Ramlan and Al-Amin (2011); Zainun (2011); Nawi et al., (2012) and Zainun and Mohd Sallehudin (2015) on housing demand in Malaysia, there was only data on the total housing demand for all types of housing or only one type of housing. There was no specific study on housing demand based on the types of housing. Because of these problems, the mismatch between supply and demand occurred. The research which had been done from the year 2002 until 2015 forecast only the demand of one type of housing which was low cost housing. On the other hand, this study was conducted to develop a model for forecasting housing demand based on the 3 types of housing in Terengganu.

This research aims to forecast housing demand in Terengganu based on housing types to avoid imbalance demand and supply for every income group in Malaysia. The forecasting model was developed using the data from Census Data and actual data gathered from a survey. This research is important since housing demand could be predicted in the future to avoid over- and under construction for every type of housing. The output could assist housing developers and designers from both the government and private sectors to plan and execute strategies in the housing market (Kumarasamy, 2005).

1.3 Research Question

The research questions were developed before the objectives of this study were determined. The research questions for this study are as follows:-

- i. What is the headship rate and population in Terengganu?
- ii. How is the housing demand in Terengganu?
- iii. How can housing demand in Terengganu be forecasted based on 3 types of housing?
- iv. What is the reliability of the developed forecasting model?

1.4 Objective

The main goal of the study is to determine the demand for housing in Terengganu state based on 3 types of housing namely low medium cost, medium cost and high cost housing. Therefore, the study was conducted based on the following objectives: -

- i. To determine the headship rate and population in Terengganu.
- ii. To establish total housing demand in Terengganu.
- iii. To develop a forecasting model of housing demand by the type of housing using the Multinomial Logit method.
- iv. To validate the forecasting model using Mean Absolute Percentage Error (MAPE).

1.5 Scope and Limitation of the Study

This research was fully sponsored by the MOSTI grant. After discussion, MOSTI allocated 4 regions in Peninsular Malaysia as case study samples to represent housing demand. The regions include the North, South, West and East Coast. This study only focused on Terengganu state since it represents the East Coast region.

The study area covers all districts in Terengganu which consists of 8 districts. This includes Kuala Terengganu, Kuala Nerus, Dungun, Setiu, Kemaman, Besut, Marang and Hulu Terengganu. The study area consists of 1,295,512 hectares of land area (Town and Country Planning Department, 2006). Data from the 2010 Census showed that the total population in Terengganu is 1,035,977 people in 2010 (Department of Statistics Malaysia, 2010).

This study was limited to 2% of the census data in 2010 which was used to determine the headship rate and the population in Terengganu. The data such as head of households and population was synthesised and analysed based on different age groups which include 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79 and above 80. This age group range followed census data provided by Department of Statistics of Malaysia. The data was used to determine the headship rate and sample size. Data on the population was needed to determine

the sample size using the Morgan table. Using the population data obtained from census data year 2010, the population was forecasted for the year ahead using Double Exponential Smoothing (DES). The total housing formation can be obtained by multiplying the headship rate and the population. Questionnaires were designed based on housing demand indicators gathered from the literature review. Then, the questionnaires were distributed among selected residents based on their house type. By generating a Multinomial Logit analysis, significant indicators were determined to calculate the choice probabilities of respondents to choose a house. A forecasting model based on types of housing was developed using the formula of total housing formation multiplied by choice probabilities. Finally, the model was validated using Mean Absolute Percentage Error (MAPE).

This study had a limitation of data. Data on housing demand obtained from the Terengganu State Secretary Office (SUK) was limited to project data which was registered by the local authorities only. Some of the private developers did not register their projects and constructed houses.

1.6 Significance of the Study

According to Miron (1998), housing demand is defined as housing formation. Followed by this statement, this study was based on housing formation. In order to determine household formation, the headship rate needs to be calculated and multiplied by population. In order to get headship rate, Paciorek (2013) defined headship rate as the ratio of the head of households to the population. As conclusion, housing demand in Terengganu depends on the head of households and the population.

Using data of head of households and population in Terengganu, headship rate can be determined. Population also can be forecasted. By using multinomial logit method, the choice probability of people to choose a house whether low medium cost, medium cost or high cost can be determined. Then housing demand by types of housing in Terengganu can be determined.

The output of this research which is housing demand by types of housing, will assist the authorities and developers including the government and private sectors to supply housing in line with the demand in Terengganu. It is hoped that there would

be no more over supply, overhang or under supply of housing in the future. Furthermore, there would be a lot of advantages if better planning was done so that the housing sector will be more systematic and effective in terms of budget, time and man power.

1.7 Thesis Layout

This thesis is divided into 5 chapters which include: 1) introduction; 2) literature review; 3) methodology; 4) results and discussion; and 5) conclusion and recommendations.

The first chapter which is the introduction discusses about the purpose of this study, research problems, research questions, objectives, scope, limitation of the study and the significance of the study.

The second chapter elucidates the housing situation in Malaysia. Previous research studies related to housing demand, housing issues, concept and types of housing in Terengganu as well as the types of indicators that can contribute to housing demand are discussed. Besides that, this chapter also explains and discusses previous methods of forecasting that had been used.

The third chapter which is about the methodology employed in this study presents the information of the case study area, the research flow and the development of the questionnaire used for this study. This chapter also discusses how primary and secondary data were collected for this study. In addition, the process developing a forecasting model using Double Exponential Smoothing (DES), Multinomial Logit (MNL) and the process of validating data using Mean Absolute Percentage Error (MAPE) were also discussed in this chapter.

The fourth chapter highlight the results and discussion of the findings. This chapter also discusses the results obtained from the multinomial logit analysis and double exponential analysis. The validation of the model was also presented in this chapter.

The fifth chapter which includes the conclusion and recommendations will summarise the results based on the objectives of the research. Some recommendations are suggest for future research.



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The aim of literature reading is to review previous researches and theories related to housing. This chapter discussed about the housing situation in Malaysia, housing issues, housing indicator and so on. Method of forecasting that had been used in previous research also discussed in this chapter. The advantage and disadvantage of that method were elaborated.

2.2 Housing in Malaysia

Shelter is a basic need to ensure the well-being of an individual. It also symbolises the present status of a family life for both individual and family needs (Zulkepli, 2011). According to the Department of Statistics (2007), houses can be defined as separate and independent structures or residential units that are home to an occupant. Khoo (1995), defined a house as a separate and independent residence intended for habitation by a household. However, in Malaysia, there are housing units which are occupied by more than one household (Department of Statistics, 2010).

Housing demand will increase when the population increases to fulfil the needs of the people (Tawil *et al.*, 2011). According to the Department of Statistics (2016), the population in Malaysia is estimated to have increased up to 31.7 million in the year 2016 compared to 31.2 million in the year 2015. The increment will continue in the next few years (Department of Statistics, 2016). Besides that, the population in Terengganu is estimated up to 1.18 million persons in the year 2016 compared to 1.16 million persons in the year 2015 and 1.14 million in the year 2014 respectively (Department of Statistics, 2016). The growth of the population will

increase the demand for housing and the change in the quantity of housing demand will affect the housing supply (Phua, 2003). NAPIC (2016) indicated that a total of 24,709 units of housing will be supplied in Terengganu and another 20,385 units are in the process of being developed.

During the Tenth Malaysia Plan (RMK-10), efforts were directed towards providing high quality housing which are sustainable and environmentally-friendly, streamlining the delivery system and fostering an active housing industry. Various housing programs have been implemented to provide affordable housing for urban and rural communities in line with the goal of inclusive development. During the Eleventh Malaysia Plan (RMK-11), the focus will continue to be given to the provision of affordable housing to meet the housing needs of a growing population, especially among the poor, low income and medium income households (Economic Planning Unit, 2016).

Besides that, in Budget 2016, a total of 351,500 units of housing will be built involving multiple agencies to all segments of society in order to address the issue of home ownership and reduce the cost of living. Furthermore, a total of 175,000 units of the *‘Perumahan Rakyat 1 Malaysia’* (PR1MA) will be built and sold at 20 percent below market price with the provisions of RM1.6 billion (Bernama, 2015). Until March 2015, PR1MA Corporation Malaysia approved the proposed construction of 119,933 housing unit across the country and 18,400 units are under construction.

Table 2.1 shows the housing supply in Malaysia for the 1st Quarter (Q1) of 2016 until the 4th Quarter (Q4) of 2016. In the 1st Quarter (Q1) 2016, a total of 793,586 houses were to be supplied in Malaysia and 577,732 units were to be developed. In the 2nd Quarter (Q2) of 2016, a total of 816,174 houses were to be supplied and 576,101 to be developed followed by 837,251 units to be supplied and 576,420 to be developed in the 3rd Quarter (Q3) of 2016. Besides that, a total of 829,687 houses were supplied and 601,671 were to be developed in Malaysia.

In the 1st Quarter (Q1) of 2016, Selangor recorded the highest number of housing supply which was 160,453 units (20.2%) and Wilayah Persekutuan Labuan recorded the lowest number which was 1,680 units (0.21%). Johor recorded the highest number of developed houses which was 147,706 units (0.26%) and Wilayah Persekutuan Putrajaya recorded the lowest number with only 92 units (0.02%).

REFERENCES

- Adebayo, C. O., & Wee, S. T. a. (2008). Comfort in Low Cost Houses: Theoretical Framework Development. *Proceedings 3rd International Conference on Human Habitat & Environment*, pp. 42–51.
- Alias, A. R., Zainun, N. Y., & Rahman, I. A. (2016). Comparison between ARIMA and DES Methods of Forecasting Population for Housing Demand in Johor. In *MATEC Web of Conferences* (Vol. 81, pp. 07002). EDP Sciences.
- Bajari, P., & Kahn, M. E. (2005). Estimating housing demand with an application to explaining racial segregation in cities. *Journal of business & economic statistics*.
- Bajari, P., Chan, P., Krueger, D., & Miller, D. (2013). A dynamic model of housing demand: Estimation and policy implications. *International Economic Review*, 54(2), pp. 409-442.
- Bakhtyar, B., Zaharim, A., Sopian, K., Saadatian, O., & Moghimi, S. (2013). Quality housing in affordable price for Malaysian low income. *WSEAS Transactions on Environment and Development*, 9(2), 78-91.
- Bernama. (2014). Kerajaan Negeri Tubuh Jawatankuasa Khas Selesai Isu Perumahan. *Utusan Online*. Kuala Lumpur. Retrieved on May 15, 2016, from <http://ww1.utusan.com.my>
- Bernama. (2015). Bajet 2016: 315,500 Unit Rumah Bakal Dibina Tangani Isu Pemilikan Rumah. *Berita Harian*. Kuala Lumpur. Retrieved on May 15, 2016, from <http://www.bharian.com.my>
- Bernama. (2015). Terengganu Bina 10,000 Unit Lagi Rumah Mampu Milik. *Berita Harian*. Kuala Lumpur. Retrieved on Jun 20, 2016, from <http://www.bharian.com.my>
- Besar, J. A., Fauzi, R., & Ghazali, A. S. (2012). Penilaian awal impak pelaksanaan Dasar Perumahan Negara terhadap sektor perumahan di Kuala Lumpur Preliminary assessment of the impact of the National Housing Policy on the

- housing sector in Kuala Lumpur. *Geografia Online: Malaysian Journal of Society and Space*, 6(6), pp. 90–108.
- Bojórquez, E., Iervolino, I., Reyes-Salazar, A., & Ruiz, S. E. (2012). Comparing vector-valued intensity measures for fragility analysis of steel frames in the case of narrow-band ground motions. *Engineering Structures*, 45, pp. 472–480.
- Börsch-Supan, A., Heiss, F., & Seko, M. (2001). Housing demand in Germany and Japan. *Journal of Housing Economics*, 10(3), pp. 229–252.
- Boschi, E., & Trammell, B. (2006). Bidirectional Flow Measurement, IPFIX, and Security Analysis.
- Boyce, D., & Bar-Gera, H. (2003). Validation of multiclass urban travel forecasting models combining origin–destination, mode, and route choices. *Journal of Regional Science*, 43(3), pp. 517–540.
- Bozarth, C. (2011). Double Exponential Smoothing : Approaches to Forecasting : Tutorial. Retrieved on October 29, 2016, from <http://scm.ncsu.edu>
- Bramley, G., Bartlett, W. and Lambert, C. (1995). *Planning, The Market and Private Housebuilding*. London : UCL Press Ltd.
- Brown, J. D. (2001). *Using surveys in language programs*. Cambridge University Press. Retrieved on September, 12, 2016 from www.cambridge.org
- Bujang, A. A., Zarin, H. A., & Jumadi, N. (2010). The relationship between demographic factors and housing affordability. *Malaysian Journal of Real Estate*, 5(1), 49–58.
- Byrne, R. F. (2012). Beyond Traditional Time-Series: Using Demand Sensing to Improve Forecasts in Volatile Times. *The Journal of Business Forecasting*, 31(2), pp. 13.
- Carliner, M. (2003). Headship rates and housing demand. *Housing Economics*, June.
- Co, H. C., & Boosarawongse, R. (2007). Forecasting Thailand's rice export: Statistical techniques vs. artificial neural networks. *Computers & industrial engineering*, 53(4), pp. 610–627.
- De Myttenaere, A., Golden, B., Le Grand, B., & Rossi, F. (2016). Mean Absolute Percentage Error for regression models. *Neurocomputing*, 192, pp. 38–48.
- Department of Statistics Malaysia. (2010). 2% Population and Housing Census of Malaysia Report 2010, Percetakan Nasional Berhad, Kuala Lumpur.
- Department of Statistics. (2012). Laporan Perangkaan Tahunan 2012. Percetakan



National Berhad. Kuala Lumpur.

Department of Statistics. (2016). Population Quick Info. Retrieved on April 20, 2016, from <http://pqj.stats.gov.my>

Department of Survey and Mapping Malaysia (JUPEM). (2017). Retrieved on January 2, 2017, from <http://www.jupem.gov.my>

Economy Planning Unit. (2016). RMK-11 Menyediakan Perumahan Mampu Milik yang Mencukupi dan Berkualiti. Retrieved on August 20, 2016 from <http://www.epu.gov.my>

Efendigil, T., Önüt, S., & Kahraman, C. (2009). A decision support system for demand forecasting with artificial neural networks and neuro-fuzzy models: A comparative analysis. *Expert Systems with Applications*, 36(3), pp. 6697-6707.

Eğrioğlu, E., Aladağ, Ç. H., & Günay, S. (2008). A new model selection strategy in artificial neural networks. *Applied Mathematics and Computation*, 195(2), pp. 591-597.

Ermisch, J. F., & Overton, E. (1985). Minimal household units: A new approach to the analysis of household formation. *Population Studies*, 39(1), pp. 33-54.

Gao, F., Guan, X., Cao, X. R., & Papalexopoulos, A. (2000). Forecasting power market clearing price and quantity using a neural network method. *Power Engineering Society Summer Meeting*, 4, pp. 2183-2188.

Gareta, R., Romeo, L. M., & Gil, A. (2006). Forecasting of electricity prices with neural networks. *Energy Conversion and Management*, 47(13), pp. 1770-1778.

George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.

Ghiassi, M., Saidane, H., & Zimbra, D. K. (2005). A dynamic artificial neural network model for forecasting time series events. *International Journal of Forecasting*, 21(2), pp. 341-362.

Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Goodman, L., Pendall, R., & Zhu, J. (2015). Headship and Homeownership: What Does the Future Hold?. Washington DC: Urban Institute.

- Greene, W. H. (2012). *Econometric Analysis*. 7th Edition. New York University: Pearson.
- Hamzah, N. (2011). Faktor Luaran dan Dalam yang Mempengaruhi Harga Rumah Teres Di Bandar Baru Bangi. *Journal Design and Built*, 4, pp. 1–8.
- Hanke, J. E., & Wichern, D. W. (2014). *Business forecasting*. Pearson Education Limited.
- Hansen, J. Z., Stephensen, P., & Kristensen, J. B. (2013). Household Formation and Housing Demand Forecasts. DREAM Report. Retrieved on September 5, 2016 from www.dreammodel.dk/SMILE
- Harrison, A. J., & Paris, C. (1978). Needs and resources: housing. *CES Review*, 4, pp. 27-34.
- Hashim, M. F. (2010). Kesan Punca Masalah Projek Sakit. *Utusan Malaysia*. Retrieved on July 9, 2016 from <http://ww1.utusan.com.my>
- Heath, S. (2014). Housing demand and need. *Social Policy Section*, pp. 1–21.
- Hoek-Smit, M. C., & Diamond, D. (2003, March). The design and implementation of subsidies for housing finance. In *World Bank Seminar on Housing Finance, March* (pp. 10-13).
- Homik, K., M. Stinchcombe., & H. White. (1989). Multilayer Forward Networks are Universal Approximators. *Neural Network*. pp. 253-239.
- Ioannides, Y. M., & Zabel, J. E. (2008). Interactions, neighborhood selection and housing demand. *Journal of urban economics*, 63(1), 229-252.
- Iv, C. (1957). Headship Rate Method, pp. 31–40.
- Iyer, K. C., & Jha, K. N. (2006). Critical factors affecting schedule performance: Evidence from Indian construction projects. *Journal of construction engineering and management*, 132(8), pp. 871-881.
- Jayaraman, P. (2016). Unsold Properties Increase Despite Higher Demand. *The Malaysian Reserve*. Retrieved on November 6, 2016, from <http://themalaysianreserve.com>
- Jeniri Amir. (2014). Harga Rumah Mahal Tak Setanding Mutu. *Berita Harian*. Retrieved on August 29, 2016 from <http://www.bharian.com.my>
- Kaffashi, S., Shamsudin, M. N., Clark, M. S., Sidique, S. F., Bazrbachi, A., Radam, A., & Rahim, K. A. (2016). Are Malaysians eager to use their cars less? Forecasting mode choice behaviors under new policies. *Land Use Policy*, 56,



pp. 274-290.

- Karaaslan, A., & Özden, K. Ö. (2016). Housing Demand in Turkey: Application of Grey Forecasting Model. *Mediterranean Journal of Social Sciences*, 7(2), pp. 52-62.
- Khoo, S. G. (1995). *Laporan Am Banci Perumahan Malaysia Banci Penduduk dan Perumahan Malaysia 1991*. Jabatan Perangkaan Malaysia.
- KOPERAT. (2016). Konsortium Perumahan Rakyat Terengganu Sdn Bhd. Retrieved on September 21, 2016, from <http://koperat.com.my>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities Robert. *Educational and Psychological Measurement*, 38(1), pp. 607–610.
- Kumarasamy, S. (2005). Kumarasamy Property Management Important. *The Sun*. Retrieved on November, 1, 2016 from <http://www.thesundaily.my>
- Laerd Statistics. (2016). *Multinomial logit Regression using SPSS Statistics*. Retrieved on October 9, 2016, from <https://statistics.laerd.com>
- Levy, P. S., & Lemeshow, S. (2013). *Sampling of populations: methods and applications*. John Wiley & Sons.
- Lindh, T., & Malmberg, B. (2008). Demography and housing demand—what can we learn from residential construction data?. *Journal of Population Economics*, 21(3), pp. 521-539.
- Luce, R. D. (1959). Individual choice behavior: A theoretical analysis. *New York, 115*. pp. 191-243.
- Mackellar, F. L., Lutz, W., Prinz, C., & Goujon, A. (1995). Population , Households , and CO2 Emissions, 21(4), pp. 849–865.
- Mahamud, R., & Hussein, K. (2002) *Kajian Ke Atas Keupayaan Golongan Berpendapatan Sederhana Dalam Memiliki Rumah di Kawasan Johor Bahru*. Universiti Teknologi Malaysia: Master Thesis.
- Makridakis, S., Wheelwright, S. C., & Hyndman, R. J. *Forecasting methods and applications*. 3rd Ed. John Wiley & Sons. 2008
- Malaysia Goverment. (2005). Eight Malaysia Plan. Percetakan Nasional Berhad. Kuala Lumpur.
- Malaysia Goverment. (2006). Nineth Malaysia Plan. Percetakan National Berhad.



- Kuala Lumpur.
- Malaysia Government. (1996). Seventh Malaysia Plan. Percetakan Nasional Berhad. Kuala Lumpur.
- Malaysia Government. (2015). Eleventh Malaysia Plan. Percetakan Nasional Berhad. Kuala Lumpur.
- McCullagh, P. and J.A. Nelder, (1983). *Generalized Linear Models*. Second Edition. Chapman and Hall, New York, New York.
- Ministry of Urban Wellbeing, Housing and Local Government. (2015). KPKT Selected Statistics until 31 March 2015. Retrieved on November, 2, 2016 from www.kpkt.gov.my
- Ministry of Urban Wellbeing, Housing and Local Government. (2001). Country Report of Malaysia : Istanbul + 5 Special Session Of The United Nations General Assembly, (June), pp. 6–8.
- Miron, J. R. (1988). *Housing in postwar Canada: demographic change, household formation, and housing demand*. McGill-Queen's Press-MQUP.
- Mostafa, A., Wong, F. K., & Hui, C. M. (2006). Relationship between Housing Affordability and Economic Development in Mainland China—Case of Shanghai. *Journal of Urban Planning and Development*, 132(March), pp. 62–70.
- NAPIC, *Property Overhang Q1 2016*, Property Market Status Report, Ministry of Finance, Putrajaya, Malaysia (2016a)
- NAPIC, *Property Overhang Q2 2016*, Property Market Status Report, Ministry of Finance, Putrajaya, Malaysia (2016b)
- NAPIC, *Property Overhang Q3 2016*, Property Market Status Report, Ministry of Finance, Putrajaya, Malaysia (2017a)
- NAPIC, *Property Overhang Q4 2016*, Property Market Status Report, Ministry of Finance, Putrajaya, Malaysia (2017b)
- NAPIC. (2016c). Laporan Unit Kediaman Baru Dilancarkan 2015. Putrajaya. Ministry of Finance.
- NAPIC. (2016d). Property Market Status Report, Putrajaya. Ministry of Finance. (7), pp. 1–68.
- NAPIC. (2016e). Residential Property Stock Table Q1 2016. Property Stock Report. Ministry of Finance.



- NAPIC. (2016f). Residential Property Stock Table Q2 2016. Property Stock Report. Ministry of Finance.
- NAPIC. (2017g). Residential Property Stock Table Q3 2016. Property Stock Report. Ministry of Finance.
- NAPIC. (2017h). Residential Property Stock Table Q4 2016. Property Stock Report. Ministry of Finance.
- National Housing Department. (2012). National Housing Policy. Ministry of Urban Wellbeing, Housing and Local Government.
- National Housing Department. (2016). Laporan Perangkaan Suku Tahun Pertama 2016, 1–21. Retrieved on July 6, 2016, from <http://ehome.kpkt.gov.my>
- National Research Council. (1980). Estimating Population and Income for Small Places. Washington, D.C.: National Academy Press.
- Nawi, N. M., Hamid, N. A., Zainun, N. Y., Rahman, I. A., & Eftekhari, M. (2012). Forecasting low cost housing demand in urban area in Malaysia using a modified back-propagation algorithm, *Proceedings of the 2nd World Conference on Information Technology (WCIT-2011), Antalya, Turkey*, pp. 913-921.
- Nelson, A. C., Pendall, R., Dawkins, C. J., & Knaap, G. J. (2002). The Link Between Growth Management and Housing Affordability: The Academic Evidence. *And Affordable Housing*, (February), pp. 1–56.
- Ng, S. T., Skitmore, M., & Wong, K. F. (2008). Using genetic algorithms and linear regression analysis for private housing demand forecast. *Building and Environment*, 43(6), pp. 1171-1184.
- Nunnally, J., & Bernstein, L. (1994). Psychoeducational Assessment (34rd ed). New York: McGraw-Hill.
- Nygaard, C. (2011). International migration, housing demand and access to homeownership in the UK. *Urban Studies*, 48(11), pp. 2211-2229.
- Paciorek, A. (2013). The long and the short of household formation. *Real Estate Economics*, 44(1), pp. 7-40.
- Patel, K. (2016). Sowing the seeds of conflict? Low income housing delivery, community participation and inclusive citizenship in South Africa. *Urban Studies*, 53(13), 2738-2757.
- Phua, K. L. (2003). What's ahead for Malaysia? Current challenges and emerging trends.



- Pontius, R. G., & Schneider, L. C. (2001). Land-cover change model validation by an ROC method for the Ipswich watershed, Massachusetts, USA. *Ecosystems & Environment*, 85(1), pp. 239-248.
- Rakoff, R. M. (1977). Ideology in Everyday Life: The Meaning of the House. *Politics & Society*, 7(1), pp. 85–104.
- Rameli, A., Johar, D. F., & Siong, A. P. D. H. C. (2006). The Management of Housing Supply in Malaysia : Incorporating Market Mechanisms in Housing Planning Process. *International Conference on Construction Industry 2006 (ICCI 2006)*, (February), pp. 1–17.
- Reis, B. Y., & Mandl, K. D. (2003). Time series modeling for syndromic surveillance. *BMC Medical Informatics and Decision Making*, 3(1), pp. 1-11.
- Robin, T., Antonini, G., Bierlaire, M., & Cruz, J. (2009). Specification, estimation and validation of a pedestrian walking behavior model. *Transportation Research Part B: Methodological*, 43(1), pp. 36-56.
- Roslan, F. W. (2015). *Membina Rangkaian Neural Buatan (ANN) Bagi Kajian Penggunaan Bahan Api untuk Bas Berenjin Euro 4*. Universiti Tun Hussein Onn Malaysia: Master's Thesis.
- Roslan, N., Memon, A. H., & Zainun, N. Y. (2013). Indicators of Low-Cost Housing Demand in Malaysia. *Proceedings of Malaysian Technical Universities Conference on Engineering & Technology (MUCET)*, (December), pp. 3–4.
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of cleaner production*, 16(15), pp. 1699-1710.
- Shuid, S. (2005). Low Medium Cost Housing In Malaysia : Issues and Challenges. *Universiti Islam Antarabangsa*, pp. 1–13.
- Sim, L. L., Yu, S. M., & Han, S. S. (2003). Public housing and ethnic integration in Singapore. *Habitat International*, 27(2), 293-307.
- Sinar Harian. (2014). Kuala Nerus diisytihar daerah ke-8 Terengganu. *Sinar Harian*. Retrieved on August 20, 2016, from www.sinarharian.com.my
- Sinar Harian. (2015). Dilema penduduk pesisir pantai - Terengganu. *Sinar Harian*. Retrieved on August 28, 2016, from <http://www.sinarharian.com.my>
- Smith, L. B. (1984). Household headship rates, household formation, and housing demand in Canada. *Land Economics*, 60(2), pp. 180-188.

- So, Y., & Kuhfeld, W. F. (1995). Multinomial logit models. In *SUGI 20 conference proceedings*, pp. 1227-1234.
- Srivastava, S. K. (2007). Green supply-chain management: a state-of-the-art literature review. *International journal of management reviews*, 9(1), pp. 53-80.
- Stellwagen, E. (2015). *Forecasting 1 1: A Guide to Forecast Error Measurement Statistics and How to Use Them*.
- Swanson, D. A., Tayman, J., & Bryan, T. M. (2011). MAPE-R: a rescaled measure of accuracy for cross-sectional subnational population forecasts. *Journal of Population Research*, 28(2-3), pp. 225-243.
- Tadesse, T., Ruijs, A., & Hagos, F. (2008). Household waste disposal in Mekelle city, Northern Ethiopia. *Waste Management*, 28(10), pp. 2003-2012.
- Tawil, N. M., Hamzah, N., Khoiry, M. A., Ani, A. I. C., Basri, H., & Bina, A. (2011). Capitalist factor that affecting the prices of double storey terrace houses in university town case study: Bandar Baru Bangi. In *Seminar Pendidikan Kejuruteraan and Alam Bina (PeKA'11), Kongres Pengajaran and Pembelajaran UKM*.
- Taylor, J. W. (2003). Short-Term Electricity Demand Forecasting Using Double Seasonal Exponential Smoothing. *Journal of Operational Research Society*, 54(0), pp. 799-805.
- Terengganu State Government. (2006). *Rancangan Struktur Negeri Terengganu*. Retrieved on October 15, 2016 from www.terengganu.gov.my
- Terengganu State Government. (2016). *Senarai Projek Perumahan di Terengganu*. Retrieved on July, 9, 2016 from www.terengganu.gov.my
- Terengganu State Secretary Office. (2016). *Housing Supply Report*. Retrieved on Jun, 29, 2016 from suk.terengganu.gov.my
- Vajiranivesa, Pon. (2008). *A Housing demand model: A case study of the Bangkok Metropolitan Region, Thailand*. RMIT University: PhD Thesis.
- Vautard, R., Beekmann, M., Roux, J., & Gombert, D. (2001). Validation of a hybrid forecasting system for the ozone concentrations over the Paris area. *Atmospheric Environment*, 35(14), pp. 2449-2461.
- Wang, W. C., Chau, K. W., Cheng, C. T., & Qiu, L. (2009). A comparison of performance of several artificial intelligence methods for forecasting monthly discharge time series. *Journal of hydrology*, 374(3), pp. 294-306.



- Whitehead, C. M. (1991). From need to affordability: an analysis of UK housing objectives. *Urban Studies*, 28(6), pp. 871-887.
- Yahya, K. (2002). *Penilaian Terhadap Keupayaan Model Rangkaian Neural bagi Meramal Permintaan Rumah Kos Rendah Kawasan Bandar di Negeri Selangor*. Universiti Teknologi Malaysia: Master's Thesis.
- Yassin, A. M., Ramlan, R., & Al-Amin, M. H. (2011). Peramalan Terhadap Permintaan Perumahan Awam Kos Rendah, *International Seminar on Application of Science Mathematics*, Malaysia.
- Yassin, A., M., Ramlan., R., & Al-Aminr., M., H. (2011). *Peramalan Terhadap Permintaan Perumahan Awam Kos Rendah*. *Proceeding of International Seminar on Application of Science Mathematics 2011*.
- Yatim, N. (2014). Hartanah di Kuala Terengganu Mahal. *Sinar Harian*. Retrieved on July, 6, 2016 from www.sinarharian.com.my
- Yoo, S. H., Kwak, S. J., & Lee, J. S. (2008). Using a choice experiment to measure the environmental costs of air pollution impacts in Seoul. *Journal of Environmental Management*, 86(1), pp. 308-318.
- Zainun, N. Y., Ghazali, M., Ezanee, F., & Mohamad Rawan, N. (2015). Key parameters for medium cost housing demand in Malaysia.
- Zainun, N. Y., Memon, A. H., & Anuar, M. F. (2014). Significant Indicators Of Low Cost Housing Demand: Comparison Between Results Obtained From Principal Component Analysis, Back Elimination And Regression Analysis Methods. *Journal of Technology Management and Business*, 1(2).
- Zainun, N. Y., Rahman, I. A., & Eftekhari, M. (2011). Forecasting low-cost housing demand in an urban area in Malaysia using artificial neural networks: Batu Pahat, Johor. *The Sustainable world*, 142, pp. 51-58.
- Zainun, N. Y., Rahman, I. A., & Eftekhari, M. (2010). Forecasting low-cost housing demand in Johor Bahru, Malaysia using artificial neural networks (ANN). *Journal of Mathematics Research*, 2(1), 14.
- Zainun, N. Y., Rahman, I. A., & Eftekhari, M. (2011). Forecasting low-cost housing demand in Pahang, Malaysia using Artificial Neural Networks. *International Journal of Sustainable Construction Engineering and Technology*, 2(1).
- Zainun, N., Y., & Mohd Sallehudin, M., S. (2015). Forecasting Low Cost Housing Demand in Malaysia: Comparison between ANN and ARIMA Method. *Journal of Advances in Mathematics*, 11(1), pp. 3936-3940.



Zulkepli, M. (2011). *Pembangunan Model Penentuan Keperluan Perumahan. Kajian kes: Johor Bahru, Malaysia. Penerbit Universiti Tun Hussein Onn Malaysia.*



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PERPUSTAKAAN TUNKU TUN AMINAH