House Price Estimation Using Multiple Regression Analysis Approach for Mass Appraisal Model in Kaduna north, Nigeria

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ABSTRACT

House is shelter to support a household living and basic needs for all humanity. Owning a house is a means of life which everybody is pursuing with. House price is the key major concern to make decision for owning a house. House price also has been used as a basis for property taxation. The accuracy of valuation exercise is very important to real estate profession and other market players. However, the traditional method of valuation contributes to the inconsistency, subjectivity of assessed value because location factors are not considered objectivity, there are also errors involved. The purpose of this research is to apply MRA model in estimating house price for mass appraisal in Kaduna north, Nigeria. Two basic micro determinant of house price were considered namely structural attributes and location of property. Using a sample of 106 house sale transaction data which were recorded between 2011 to 2015. MRA was used to determine the structural variables and locational that has statistically influence on the house price. It was established that among the variables included in the MRA six (6) were significant except number of bedroom, number of living room, type of ceiling, condition the house. The significant variables were year of transaction, type of house, availability of swimming pool, availability of security post, type of door and location of the property. Using these significant variables a mass appraisal model was developed for the study area. The performance of the model was evaluated using the ratio study method and the model was found to be satisfactory. It was recommended that, this model be used in mass appraisal of residential properties in Kaduna north in the future, with a view to improve accuracy, objectivity, efficiency, and fairness of the property taxation system, which will lead to generating more revenue for the government which will encourage physical infrastructural development in Kaduna North.

ABSTRAK

Rumah merupakan satu tempat perlindungan untuk menampung kehidupan dan juga merupakan satu keperluan asas untuk manusia. Memiliki rumah adalah satu keperluan yang diinginkan oleh semua orang. Harga rumah adalah kunci utama dalam membuat keputusan untuk memiliki rumah.Harga rumah juga digunakan sebagai asas penetapan cukai harta. Ketepatan dalam menilai rumah adalah sangat penting bagi profesion harta tanah dan peserta pasaran yang lain. Walaubagaimanapun, terdapat beberapa kesalahan dalam kaedah penilaian tradisional yang menyumbang kepada ketidakselarasan dan, ketidaktetapan harga yang dinilai kerana faktor lokasi tidak diambilkira secara objektif. Tujuan kajian ini adalah untuk mengaplikasikan model Regresi berganda(MRA) dalam menganggar harga rumah untuk penilaian rumah-rumah di utara Kaduna, Nigeria. Terdapat dua penentu asas mikro untuk menentukan harga rumah iaitu struktur dan lokasi harta tanah tersebut. Sebanyak 106 buah rumah yang telah direkodkan pada tahun 2011 sehingga 2015 dijadikan sebagai sampel. MRA telah digunakan untuk menentukan pembolehubah lokasi dan struktur yang mampu mempengaruhi harga rumah. Hanya enam pemboleh ubah MRA yang digunapakai dalam kajian ini, iaitu tahun transaksi, jenis rumah, kolam renang, pos pengawal, jenis pintu dan lokasi harta tanah tersebut. Bilangan bilik tidur, bilangan ruang tamu, jenis siling dan keadaan rumah tersebut tidak digunapakai dalam kajian ini. Dengan menggunakan pembolehubah - pembolehubah ini, satu model penilaian rumah telah direka untuk kawasan kajian. Prestasi model tersebut telah dinilai menggunakan kaedah pembelajaran nisbah dan hasilnya adalah memuaskan. Model ini berupaya untuk digunakan dalam proses penilaian rumah di kawasan perumahan di utara Kaduna pada masa akan datang dengan tujuan untuk meningkatkan ketepatan, objektiviti, kecekapan, dan keadilan sistem cukai harta, yang akan membawa kepada peningkatan penjanaan pendapatan bagi kerajaan yang akan menggalakkan pembangunan infrastruktur di utara Kaduna.

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Living in suitable housing condition is one the most significant aspect of peoples live. It can also be seen or serve as a long term investment which will amount to a large amount of household wealth.(Bin, 2004). For many house owners, housing serves as a significant asset in their portfolio (Case *et al.*, 2001). Housing is important to the basic needs of people such as shelter, but it is not a question of four walls and a roof. Housing should offer a place to sleep and rest where the people would feel secured and a place to raise a family.

The property market is a place in which real estate are being exchange between a willing buyer and a seller. The market is not a single entity; there are other ways in which it can be categorized. Such categorization can be by sector(commercial, industrial, residential, agricultural, recreational,

The categorization can also be done by with respect to location(local, regional, national and international), or by types of demand(occupation, ownership, investment, speculations or development)(Shapiro *et al.*, 2012).

The property market has its inherent characteristics such as heterogeneity, enormous some of capital involved are high cost of transaction as well as the method of conducting transaction, all this contribute to the imperfection,(Shapiro*, et al.*, 2012). These transactions would continue to remained private and confidential as the successful buyers and sellers are not willing to disclosed the amount to which the property were exchanged (Blackledge, 2009).

The valuation of property is required for different purposes which include valuation for sale, purchase, letting, leasing, taxation, insurance, mortgages, balance sheet, inheritance, compensation, investment and financing(Blackledge, 2009), (Pagourtzi *et al.*, 2003). In the same vein, the knowledge of house agents, banks and the other financial institutions, property developers, investors, financial analyst, local authorities, tax assessors, policy makers, insurers as well as the general public(Pagourtzi*, et al.*, 2003). The valuation of real estate has been done using the traditional methods approaches which are residual method of valuation, investment method of valuation, residual method of valuation and also profit method (Selim, 2009)

Presently, the conventional methods of valuation mostly use in the study area for rating purposes are comparison method of valuation, contractors / cost method of valuation. Comparison method of valuation compares the similarities and dissimilarities between the subject property and other similar properties within same neighborhood (Sipan, 2014). The main problems of this method is lack of sufficient record of sales to compared with and if the subject property is considerably large, it will be difficult for valuers to subjectively cope with the analysis of all attributes bearing in mind the heterogeneous nature of properties. Despite the shortcomings of this method, it has been accept as the most widely used valuation method in estimating market value of properties (Scarrett, 2008).

The other conventional method that is commonly used by valuers is the cost approach. This is also known as depreciated replacement cost or contractors method. It was also found among Nigerians valuers the reasons for preference to this method is production of estimates that are closer to market prices. But cost approach to valuation is a method that is built upon premises that support special purposes built properties which seldom transaction in the market. This method does not support usage on income producing properties, yet in Nigeria, valuers use it for the purpose property taxation (Amidu *et al.*, 2008). How does the cost approach work? The current cost of building construction, less depreciation at certain rate percent, add the value of land. In using cost approach, the current rate of construction per meter square is obtained from the local builders/ quantity surveyors to apply to the dimension of the property.

A recent study found by(Ogunba and Ojo, 2007) found that result produce by cost method is not consistent; hence to use this method it must pass the consistency test for its acceptability. More ever, the study of (Adewunmi *et al.*, 2009) on approaches of cost method of valuation for income producing properties in Abuja, Nigeria, found it as inappropriate. However, these approaches are still useful in the single property valuation. However, it is argued that in the literature that they are no longer efficient for conducting mass appraisal purposes, this is because large numbers of properties were involved. Therefore, there is a need to look for more reliable approach in conducting mass appraisal. Thus, new approaches and technique have been introduced. MRA Model has become the standard approach for estimation of house prices because of its objectivity and low cost involved and accuracy in assessing the value of a large number of properties very quickly (Sipan, 2015). There are other techniques that are being used in order to improve valuation accuracy which include hedonic model, artificial networks, spatial analysis, fuzzy logic, kringing,(Sipan, 2015).

Mass appraisal is the process in which large number of properties are being valued at a given date and using common data, standardized methods, and statistical

testing ((International Association of Assessing Officers, 1990). It normally involves large number of properties as against individual property(d'Amato, 2008). Mass appraisal of properties started long ago in the united state of America dated 1920s, and since that time, it has continued(The Florida Department of Revenue,2012).The developed countries such as united kingdom, America and other European countries have adopted mass appraisal. The research concerning mass appraisal have gained a lot of concerned in the developed countries like Malaysia. However, there is very minor evidence in the application of multiple regression analysis model in house price knowledge, especially in the context of mass appraisal in the Nigerian property market.

House price can also be influence by both macro and micro factors. The macro factors that can affect house price are interest rate, unemployment, taxes as well as government policies. While the micro factors include(type of house ,no of bedrooms, no of living rooms, availability of security post, condition of property, roof type, ceiling type ,door type, window type, floor type, year of transaction, location of property, boys quarters)(Mohamad, 2012). The MRA model is used to estimate the extent to which each of these attributes affect the price of a house. Base on the above background, this research work intends to apply MRA price model with the intention of identifying the micro factors that affect house price in the study area.

1.2   Problem Statement

House price are often influence by some factors, the level of influence can be different across different property types etc. What affect house price in one property could be different to what affect other in another property? Also property tax is one of the major sources of revenue to the local government authority (Owusu-Ansah, 2012). Therefore, there is need to propose a more reliable way of assessing house price by the local government for the purpose of administration of tax. This will make sure equity and fairness in the assessment exercise both to the local

government and tax payers. It will also help in cutting down cost of property assessment as well as time saving.

The accuracy and consistency of any valuation exercise is of paramount important in the real estate practice profession (Sipan, 1996). However, the traditional single method of valuation contributes to the inconsistency of the value being assessed, because location is not considered objectively. The inconsistency and error involved and also lack of evidence to be use in the traditional comparison approach makes the valuation process difficult, thereby resulting to the in accuracy of opinion of valuation. With this reasons there is a need to employed new approaches for the estimation of house price for mass appraisal.

The major advantage which MRA model had over subjective method of assessment was its objectivity and impartiality in arriving at value, a pre requisite for taxation purposes. Another advantage demonstrates was its low cost and time saving and also accuracy in assessing the values of large number of properties very quickly,((d'Amato, 2008). These are the major benefits for taxation / rating assessors especially in the area under study, considering down fall of Nigerian economy due to huge amount of money spend on security matters.

Presently, there is no any published research work applying the MRA price model in house price estimation for mass appraisal in Kaduna housing market. As a result of this, the research work is encouraged by the need to apply the MRA approach in estimating house price in the area of study, with the intension of providing a suitable model for mass property assessment. It will also serve as a basis for further research in the area.

1.3   Research Question

The study intends to answer the below research questions:

i.   What is the relationship between housing attributes and house price?

ii.   What are the significant housing attributes for mass appraisal in the study area?

iii. How can MRA model be used in improving house price estimation for mass appraisal?

1.4   Aim and Objectives

The aim of this research work is to apply MRA model in estimating house price for mass appraisal. The following are the objectives:

i.   To identify the housing attributes that affect house price.

ii.   To determine the significant housing attributes for mass appraisal.

iii. To develop MRA model of the house price estimation for mass appraisal.

1.5   Scope

The study will focus on developing mass appraisal model for residential properties. The study will be base on residential transactions. The secondary data on sales transaction will be obtained from registered estate surveying and valuation firms that handle property transaction in the area under study. The scope of study also defined include housing attributes especially housing the physical characteristics which include (type of house, no of bedrooms, no of living rooms, availability of security post, condition of property, roof type, ceiling type, door type, window type, floor type, year of transaction, location of property, boys quarters).These attributes are the most important considering the previous studies in the past as evidence. The geographical scope of the study covers Kaduna north local government of Kaduna state, Nigeria. The year of the transaction is from(2011 to 2015).The reasons for considering only the housing physical attributes is that MRA is a model that allows various component of a property to be incorporated in to it to arrived at its market value.(Pagourtzi*, et al.*, 2003)

1.6   Methodology

The methodology adopted for the purpose of this research work involves the theoretical and the empirical approach. The researcher has revisited literatures from the previous studies on the application of house price estimation using MRA model approach in mass appraisal. Secondary data were collected from the registered estate firms and SPSS was used to analyze the data and the research result were presented.

This research work has been conducted in three different stages; the first stage will involve theoretical part of the study and followed by the empirical part which will involve the use of statistical tools. Later on, the identification of the

research issue, review of the related literature will followed and then aim and objectives will be formulated. The reasons behind this, is to launch a theoretical framework for the research. It was later on followed by the empirical aspect which will include the use of MRA model to identify the significant factors that influence house price in the study area and the level of influence in the study area. These factors were then used to develop a mass appraisal model for residential properties in the study area. The last stage will involved the use of an evaluation tools to test the suitability of the developed model for the purpose of the mass appraisal. This would be done by the use of ratio study.

The analysis will involve regressive observed sales for the house against the housing attributes which are the determinant of the house price. As mentioned earlier, in the scope of the study, the attributes that influence the price of the house include, (floor type, house type, number of bedrooms, number of living room, year of the transactions, condition of the property, location of the property, roof type, ceiling type, door type, window type, availability of security post, boys quarters .

Therefore, the specification for the MRA model price function can be represented as

Price= f (type, rooms, security post, year, condition, floor, location, living, roof, ceiling, door, window, BQ).

Where

Price = price of the house

Type = type of the house

Rooms = number of rooms in the house

Condition = physical condition of the house

Year = year of the transaction

Location = location of the house

Security post = Availability of security post

Roof = Roof type

Ceiling = Ceiling type

Door = type of door

Floor = type of floor

Window = type of window

BQ = Availability of boys quarters

1.7 Significance of the Study

The study will benefit property market players in easing the process of estimating house price. It will also assist Kaduna north local authorities in mass property assessment for rating purposes. Properties valuers will find it easier to value house using the MRA model, which will hopely improve the objectivity, efficiency and accuracy of the valuation process.

In addition to the above, the knowledge of MRA model will be use by real estate developers and marketers in developing a better marketing plan which will be guided by the Identified attributes that appeal to the target customers in a particular market, given the nature and development type. Identifying these attributes will give the properties developers idea of what the customers desire and willing to pay for in a house.

Finally study of this nature will be of great benefit or basis for researchers to carry out further academic investigation in this direction. This is due to the lack of much published research on the application of MRA model in house price, particularly developing countries like Nigeria.

1.8   Structure of the Thesis

This thesis is made up of five chapters, brief description of the contexts of each of the chapter are as follows:

Chapter one produce an overview of the research work set out to achieve. Its contain the background of the study, the problem statement, the research questions, aim and objectives, scope of the study, brief methodology as well as benefit to be derived from the study which is the significance of the study.

Chapter two deals with the theoretical framework of the research, it begins with explanation of some basic concept of property market and market value. It was later on followed by identifying the factors influencing property prices from the previous studies. The chapter also gives an overview of the MRA model and its

applications. Finally, the concept of mass appraisal and ratio study were also discussed.

The third chapter, described in details the methodology adopted in the study, which included the source of data and method of data collection as well as the analysis. It also contains description of the study area and the general overview of the Nigerian property market and the study area in particular.

Chapter four covers the analysis and the empirical aspects, which dwells on the examining the relationship between housing attributes and house price. Later on MRA model was developed and the suitability of using the model to estimate house price for mass appraisal in the study area was also evaluated using appraisal performance evaluation tools.

Chapter five which is the last chapter of this thesis provides a summary of the research findings, the research limitation and useful recommendation as well as suggestion were presented and then logical conclusion was made.

1.9   Conclusion

This chapter has provided an overview of the research work starting with the general background on housing and a description of the research problems. It was later on followed by the formulation of research questions, aim and objectives of the study. The scope of the study was also defined and brief explanation of the methodology adopted. The research work also explains the significance that is attached in carrying out the research of this nature. Finally, the sequences of the chapters in the thesis were presented.

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