Importance of Accessibility to Reliable Data for Real Estate Practice

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Abstract *Availability of and accessibility to accurate, reliable and timely data is germane to the operation of the property market, in the field of estate surveying and valuation either for valuation/appraisal, management and agency purposes. In this study, the researcher examines the factors militating against accessibility to such data. The study was conducted using questionnaires, administered on practicing Estate Surveyors and Valuers, within Lagos Metropolis. 190 questionnaire was retrieved out of 300 questionnaire (i.e. 63%) administered on the respondents selected from the Nigerian Institution of Estate Surveyors and Valuers' Directory and this was used for the analysis. The study revealed that inaccessibility to reliable data is a major barrier to valuation consistency. The study further revealed that there is the need for members of the Nigerian Institution of Estate Surveyors and Valuers, just like their counterpart in RICS, UK, to join hands together and create a strong databank comparable to that of the Investment Property Databank (IPD). The databank created as such should therefore be available and accessible to anyone that requires such information, even at a token.*

Keywords: *Data Availability, Databank, Information, Property Market, Valuation Practice*

1. Introduction

Accurate, reliable and timely information is vital to effective decision-making in almost every aspect of human endeavour, whether it be by individuals, community, organisations, businesses or governments. It is an essential component of any effort to persuade individuals, businesses or governments to make different decisions from the ones which they might have make in the absence of particular pieces of information. Also, it is an integral part of any attempt to hold those who make decisions accountable for the consequences of the decisions which they make. In other words, the importance of reliable data generally cannot be overemphasised especially for decision making purposes. Absence or inadequate reliable data will result in inappropriate decision or even no decision at all. That is, in the absence of accurate, reliable and timely information, people and organisations will make bad decisions, they will be unable to help persuade others to make better decisions, and no one will be able to ascertain whether the decisions made by particular individuals or organisations were the best ones that could have been made. The dearth and inaccessibility to reliable data, to support property decision making, has become increasingly recognised over recent years. Transactions (sales, letting and valuation) in relation to property investment require the availability of an up-to-date data and the lack of data would greatly impair the performance of surveyors in turning out reports that could stand the test of time. Information technology has turn the whole world to a global village (i.e. the world is flat) therefore, the Estate Surveyor and Valuer (ESV) cannot operate in isolation of other colleagues in the field. There must be a cross fertilisation of ideas in relation to the happenings within the profession and allied professions (in the built environment). There is no gain-saying that property data sources are perceived to be fragmented and incomplete, sometimes the by-

product of administrative processes and assembled with minimal co-operation from the originators of the data. It is not impossible to see evidence of inadequate data provision within the property market coupled with the reluctance to release transaction evidence by valuers (most transactions are carried out secretly and this hinders accessibility to reliable data). The result therefore is that ESVs frequently have to rely on secondary and, inadequate information. Confidentiality clauses and the inaccessibility of government records represent barriers to data exchange within the property market, which already is naturally complex and diverse (Wyatt. 1995). It also need be mentioned that data on project start, project completion and project size and tenure mix are all important for efficient performance of the ESV. The collection and compilation of data for changes in residential property prices, for example, will provide insights into changes in transaction prices which will be of immense help to the ESV, on similar properties. In the opinion of de Soto (2000) property systems do more than just record and organise land and real estate assets, a detailed and transparent property system where accessible can enhance a nation's productivity. Besides that, statistics on the value of the housing stock can also constitute an important piece of information, e.g. for analysing wealth effects. According to Eiglsperger, (2006) reliable data about price level would allow the identification of differences between various markets at a certain point in time. Price data are not the only statistics required for a comprehensive analysis of the housing market. The ratio of rented and owner-occupied houses and flats, the number and value of transactions, statistics on building permits/approvals, housing starts and completions provide important insights into the structure and the dynamics of the market and their driving factors from the supply and the demand sides.

A data is as good as its source(s), therefore for a reliable impute into the work of the ESV, sources such as national statistical office, Ministries, mortgage firms (banks), land registry, estate firms, to mention just a few would be of good use. Car (2006), states that it is better that a combination of sources be used in order to collect reliable data. The reliability of data on real estate prices is affected by other factors besides the variety of sources, for example:

- The non-uniformity of data with regards to its geographic aspects, in other words its coverage,
- Insufficient and different structuring of data according to apartment type,
- Differences in the way real estate is sold (for cash, or under a loan),
- The weight schemes used to ensure that the original data is representative,
- Different collection periods, and so on.

Lizieri and Venmore-Rowland (1991) suggest that Valuers should seek to widen the set of information used to arrive at an appraisal and reduce their reliance and dependence on inadequate and often inconsistent property market data. McNamara (1994) pursuing the same theme argues that much of the forecasting work which is done in the UK is data constrained and utilizes less-than-adequate information. Furthermore the Mallinson Report (RICS, 1994) considers that although the property profession has a history of protecting information in the interest of competition, much could be done to improve data availability without violating confidentiality. The report recommends that the RICS take all possible steps to encourage the wider availability of data necessary for the performance of valuations.

2. Importance of Data Sharing

That Valuers depend greatly on access to comprehensive, reliable and timely evidence of property transactions in order to make informed predictions of value is not in doubt but unfortunately, such data access does not currently exist within the property market in Nigeria as all transactions are concluded secretly. Though there is a wide range of data sources, it should be noted that one single source may not offer the reliable information that Valuers required, therefore there is need for a combination of information from various sources. The need to combine information from various sources emanate from legislative restrictions on data release

to the public, confidentiality constraints, lack of trust on professional colleagues and conservative attitudes. Surveyors however expressed concern over poor access to comprehensive property transaction data (Ajibola, 2006). Property transaction data has traditionally been available through a network of professional contacts. The 'jungle telegraph' can work well if the surveyor has established contacts throughout the property sector and in the area in which he practices. However, in many cases it can be difficult to access the required information especially where estate surveying firms tend to be secretive or the market is sluggish. Other sources include in-house data, building society surveys, market reports, auction results and information published by the press. It is worthy to note that the quality and accuracy of these sources could be improved; many are too general, others are out-of-date or are published too infrequently. An enviable solution, to this dilemma, may be a centralized, accurate, up-to-date and accessible source of property data, to be kept by the Nigerian Institution of Estate Surveyors and Valuers (NIESV).

It is worthy to note that all valuation techniques rely on the collection and analysis of data; general data such as social, economic, planning and environmental attributes, and specific data including local market conditions, details of transactions such as location, physical and functional form and legal characteristics constitute the gamut of information required by the Valuer to carry out his assignment. "The validity of a final estimate of market value depends to a great extent on how well it can be supported by market data" (Appraisal Institute, 2001). Indeed, a Valuer's experience includes stored knowledge of past transactions (Anstey, 1970). Due to legislative restrictions on the release of property data into the public domain, market data are often difficult to obtain and therefore Valuers rely on their own knowledge and experience. When data are available they are often incomplete with legal or negotiating positions of the parties unknown. Confidentiality clauses and the inaccessibility of government data are two artificial barriers to data exchange within a property market that is naturally complex and diverse. Lack of data is thus a significant factor affecting the operation of valuation methodology.

The property market is unique; and government intervention, a fixed supply of land, the long development period for new property and poor information availability distort its operation. A valuation should reflect the assimilation of all known data. However, the Nigerian property market is characterized by a lack of data on which to base investment decisions in comparison to alternative investment markets. Commenting on this, Lizieri and Venmore-Rowland (1991) state that "outside the property industry, there is widespread suspicion of the valuation process" and "valuers should seek to widen the set of information used to arrive at an appraisal and reduce their reliance and dependence on incomplete and often inconsistent property market data". In the same vein, Brown, et al, (1984) commented that analytical techniques have been adapted from other investment markets to property but argue that adequate information provision is also required if the property market is to display consistency and compatibility with other investment markets. The "ability to collect and compile data to analyse is sadly lacking ... partly due to secrecy problems and confidentiality and lack of motivation" (Feenan and Dixon, 1992) and a report by Currie and Scott (1991) highlighted the dichotomy between the complex property markets and the data available to analyse them. Millington (2000) refers to the relationship between property valuation and property data; he argues that the comparative method is the most widely used valuation technique and that it is essential to have as much information as possible, yet this is often lacking in real world. The solution, therefore, would be to improve access to and the dissemination of property data.

In UK, a number of authoritative sources have addressed the problems associated with data quality, utility and availability in the property sector. The Society of Property Researchers (SPR, 1995) study states that the property sector's capacity to use and develop analytical techniques is advancing beyond the ability to generate detailed and reliable information. The Mallinson report (RICS, 1994) reiterates the point by inferring that practice and attitudes have improved in recent years, yet property market information is restricted under confidentiality clauses which militate against the profession and the generality of clients particularly in the area of valuation. Wyatt

(1996) also argues that despite a wide array of data sources none can offer the detailed information that valuers require due to restrictions on data release to the public, confidentiality constraints and conservative attitudes. Although each study approaches the problem from differing perspectives there is a consensus that the availability of property data is often incomplete, fragmented and internally inconsistent.

With investment management becoming increasingly analytical, access to reliable information on the performance of asset classes is essential. Morrell (1995) argues that fundamental problems relating to property indices have potentially serious implications for property as an asset class.

Indeed the lack of standardization which surrounds property performance indices has led to considerable confusion both within and outside the surveying profession. Although substantial progress has been made by the Investment Property Databank (IPB) through subscribing institutions and property companies, Brown, Morell et al (1984) highlight the need for improvements if property indices are to come of age and command the level of respect comparable with indices produced for other asset classes.

In practical terms a comprehensive data set is considered to be one which can be disaggregated, if required, to the level of its most fundamental components (SPR, 1995). The more data that can be assimilated the more robust the analysis is likely to be. The scope of information required ranges from broad macroeconomic indicators to the microeconomic aspects of the property market, down to the individual characteristics of the property concerned (Hargitay and Yu, 1993). Furthermore the individualistic nature of property makes it a unique investment category requiring even more data compared to other investment media. In considering the adequacy of commercial property data the SPR report (1995) specifies a fourfold test in which data must be accurate, complete, up-to-date and accessible, but in many cases data fails to meet these criteria.

In spite of the clamour for a more formalised approach to forecasting and strategic investment planning, there is still a continuing tendency amongst practitioners to rely upon personal information. Indeed a strategic implication for information technology in the property market is the accessibility of information versus control of competitive advantage. Many institutional investors and managers and even professional colleagues, are reluctant to disclose details of specific investments, with the result that restrictions on information availability can constrain the expansion of markets (Roulac, 1996). Indeed the property market, unlike other investment markets, has no formal market place making data collection difficult. The fragmented nature of information sources, inconsistent geographical definitions and difficulties involved in data assembly further complicates analysis.

A major difficulty facing property research is the reliance upon sample based data with the result that available sources are frequently generalised and fragmented. As published indices may represent only a subset of the total market, difficulties may arise in reconciling the results of top-down analysis with bottom up approaches. There is a tendency for data sources to concentrate on prime property which can leave secondary areas lacking in market data and may also restrict analysis in geographical or functional terms. In addition the analysis of current economic conditions with property market relationships is frequently frustrated by information which is historic with indices often overtaken by market events by the time they are published. Although historic time series data is useful the validity of some cross-sectional comparisons can deteriorate with time (SPR, 1995).

The Nigerian property market experience is not different from what the UK property market had experienced, and with that we can take a cue from what was done in the UK to find solution(s) to lingering problems emanating from using data that are not properly tested, for our property analysis. Data problems in the Nigerian property market can broadly be categorized into three, viz;

- Complete blanks: where there is no information at all to support the analysis of the market/market issues to be considered;

- Improvements in proxy measures: where no direct information on market activity exists, but there are direct proxy measures which could be brought into closer relationship with market activity; and
- Shortfalls in direct measures: where direct information exists for the variables but it could be improved upon.

However in spite of the many deficiencies in the information on property markets it is not impossible to have, in principle, a complete solution. Thinking about resolving the issues relating to data availability, the development of a National Land Information Service (NLIS), using information technology to aid the assimilation of comparable evidence for valuation purposes cannot be over emphasized (Wyatt, 1996). In addition, the construction of a National Valuation Evidence Database (NVED) to which all Valuers contribute and all have access would increase the availability of data, improve objectivity and lead to more reliable valuations. The NLIS provides an ideal framework within which to construct a NVED (Rowley, 1995), while the RICS through the Mallinson Report (1994) have recognised the need for a national database to improve the valuation process. Such an effort would not be a waste, in the bid to enhance the performance of Nigerian Valuers and to compete favourably with other investment analysts, to which investors are shifting to due to failure to get their investment satisfaction from the Valuers.

The development of Geographic Information Systems (GIS) is also considered necessary to facilitate the unified storage, manipulation and analysis of property data, both spatially and aspatially, thus reducing time consuming operations. More specifically a GIS based approach will considerably help in the analysis of spatial references which are often examined implicitly in traditional valuation methodology due to difficulties in spatial data manipulation but would necessitate overcoming barriers to the release of data into the public domain (Rowley, 1995).

3. Criteria for Property Data

The primary aim of collecting data is to maximize the amount and accuracy of transfer of information from researcher (Fellows, 2003). The criteria for quality property data can be measured by the use of publicly available raw data, the use of internationally accepted factors and comprehensiveness of raw data. Most publicly available raw data are facts; for example, the data recorded in the Land Registry is the legal right information, available for public access for a fee. Such data generally includes ownership and title, land-related information, property size and structure, year of built, and used material. Also, the sales price of properties and transaction data from real estate firms is raw data. The use of such publicly available data to create proprietary indices suggests that the proprietary indices are considered to have statistical validity.
Internationally accepted factors for the indices are indicators of both reliability and validity of datasets. Property researchers rely on such data which specifically relates to local standards that have gained international acceptance. The building consents, which provides data by local government on both the number of square meters as well as the projected expenditure for any permitted project, is an example of data collected in relation to internationally accepted building standards. Both government and private organizations can possess data which is internationally recognized. Some private organizations such as banks and consultants construct indices and data for their own usage. These data sets may to be used by worldwide investors, analyst and potential customers. The obvious examples are the IPD Property Index provided by the Investment Property Databank and Russell Property Index which is used in Australia and Canada.

Comprehensiveness of raw data is an important component of reliability. Property has a combination of special characteristics which differentiate it from other commodities; to wit; physical, legal, market and costs. Burns (2000) was of the opinion that because of these four interrelated characteristics, there are three necessary requirements for property forecasting data viz; there should be a very large sample size which provides a good representation of the population, there should be a wide range of market variables (however, information on different

types of property is never sufficient) and the data should be reliable (which means consistency with accuracy). Though interpretation of data changes over time, transparency is expected in historical datasets to incorporate the changes of recording and reasons for those changes.

4. Accuracy of Property Data

Lum (2004) suggested that the accurate measurement of real estate price movements is an issue of great concern to both market participants and policymakers who rely on price signals for decision-makings. Accuracy is a problem because of the fundamental heterogeneity of all property market data. (Dunse, *et al.*, 1998) posits that the unique location every building occupies, the physical design, neighborhood qualities, and such factors as convenience as measured by the distance to the city centre or public services all create measurement problems which have not been solved to-date.

According to Lum (2004) there are serious defects in the way property indices are computed in many Commonwealth countries. The methodological issues identified include the choice of weighting procedures and the index number formula, the large degree of variation in the weightings to create the index and the interpretation of the factors. In addition, when differences in composition, construction and disaggregation are encountered measurement issues arise. The composition of the published measures varies significantly by sample size, type and size of fund, distribution by sector and region. In term of data construction, significant differences exist in the way returns are calculated and methodology. Some annual returns are calculated on a money-weighted basis, some on a time-weighted basis depending on the availability of data. Morrell (1995) was of the opinion that when using disaggregation, most measures provide a breakdown of composition and results by sector which is not particularly helpful

5. Materials and Methods

In carrying out this study questionnaire was used, to elicit required information from the respondents. 300 copies of the questionnaire were administered out of which 190 (63%) were returned. The questionnaire was administered mainly on Estate Surveyors and Valuers as advisers on property indices for mortgage operations and property investment. The data collected was collated and analyzed using descriptive statistics and deductions were made based on the outcome of the analyses. Response to the questions helped in arriving at the findings contained in the study as shown in Tables 1-5.

Table 1: *Firm's Area of Specialization*

Specialization	Frequency	Percentage
Property Development	30	16
Feasibility and Viability Studies	6	3
Valuation	14	7
General Practice Firm	140	74
Total	**190**	**100**

Source: *Field Survey 2010*

Specialization in a particular service or industry can be a very successful strategy for small firms, like we have in the study area. It makes it possible to focus finite resources on one or two practice areas, makes it easier to build a reputation in the field and can enhance the performance of the firm in the chosen aspect of the profession. From Table1 above, it is evident that majority of the firms (74%) are in general practice. The more technical areas of practice such as feasibility

and viability studies, property development and valuation received very small proportion of the respondent firms' engagement. The import here is that apart from a few firms (50, i.e. 24%) that specialize, the practice of Estate Surveying and Valuation is still been conducted in a generalized form which may not really give room for proper data collection and storage.

Table 2. *Sources of Information*

Source	Frequency	Percentage
Use of in-house data bases	149	78
Other local Valuers	13	7
Personal experience	10	5
Use of in-house Valuers	3	2
Property Press	15	8
Total	**190**	**100**

Source: *Field Survey 2010*

Information gathering and application is very important for any credible transaction in real estate in general and valuations in particular, hence the respondents were requested to indicate the sources of their information. The results as contained in Table 2 above shows that a chunk of the respondents – 78% relied on in-house databases. Apart from the fact that data from such sources may not be subjected to thorough scrutiny, they are usually shielded from public accessibility.

Table 3. *Easy Accessibility to Sufficient Market Evidence*

Response	Frequency	Percentage
Yes	20	11
No	170	89
Total	**190**	**100**

Source: *Field Survey 2010*

The use of investment method of valuation is predicated on getting accurate and reliable market evidence (data). Table 3 above shows that 89% of the respondents were of the view that they could not have access to sufficient market evidence. Where this is the situation, time tested/reliable opinion may be difficult to form and by extension, decision making may be negatively impacted.

Table 4. *Support for and Subscription to National Property Data Bank*

Response	Frequency	Percentage
Yes	165	87
No	25	13
Total	**190**	**100**

Source: *Field Survey 2009*

As stated earlier, information is very germane to investment method of valuation. The absence has been recognized as indicated in Table 3. The question then is how to make the information available. Table 4 above reveals the willingness of respondent Estate Surveyors and Valuers

(87%), to subscribe to the idea of National Property Databank by N1ESV. Only 13% of the respondents are averse to such idea. The implication of this is that Surveyors recognized the need for a coordinated source of information for effective practice.

Table 5. *Benefits of National Property Databank*

Opinion	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
Data Bank would improve efficiency of Firms	100	65	12	11	2	**190**
Enhance quality of Service to the client	110	60	10	9	1	**190**
Improve the image of Estate Surveying Profession	90	80	11	8	1	**190**
Improve availability of market data comparables	120	60	8	1	1	**190**

Source: *Field Survey 2010*

Table 5 reveals that the respondents were of the opinion that there are huge benefits that could be derived from having National Property Databank. Across board, majority of the respondents attest to the huge benefits derivable from maintaining national property databank. Considering the benefits derivable from a centrally managed data, the time has come for NIESV to set up such databank as this will equally help in reducing the problem of valuation inaccuracy.

6. Results and Discussions

Dealings in real estate market, in whatever form, depend on availability and accessibility of adequate, reliable and current (timely) information to aid the decision making process. Clients (either individuals or corporate organizations) rely much on the advice of Estate Surveyors and Valuers to enable them take various decisions with respect to real estate. The advice given by the Estate Surveyor and Valuer is as good as the source(s) of data used in coming up with his opinion of value. It is evident from Table 1 above that estate surveying and valuation practice is conducted in a generalized approach. Table 2 shows that information used by majority of the respondents is sourced using in-house data bases. Apart from the secrecy surrounding the generation of such data, reliability is in question since they are not subjected to tested treatments. Respondents are unanimous, in their decision that there is no free access to sufficient market evidence and are all ready to support and make contribution to National Property Databank, which they agreed has immense benefits. Their opinions are contained in Tables 3 – 5 above. Responsible information sharing enhances productivity and generates significant benefits such as: enables decision makers to be informed rapidly and at low cost, affords access to a wide range of data and improves efficiency and significantly reduces the cost of many products and services

7. Conclusions and Recommendations

Lack of reliable databank contributes, a great deal, to inaccurate professional advice. The presence of databank similar to the Investment Property Databank (IPD) of UK provides property indices for performance measurement and accuracy tests. Lack of databank constitutes a major drawback to the desired result from an Estate Surveyor and Valuer. A substantial part of the problem associated with professional inefficiency will be solved with the existence of adequate national property databank. Taking a cue from RICS (UK), NIESV and ESVARBON

should establish a regularly updated property databank to which Valuers can have unhindered access even at a token. Majority of the respondents indicated their preparedness to subscribe to National Property Databank – data on concluded transactions. The possibility of members sending data (in a specified format) on all transactions should be explored and canvassed by NIESV. It may not be out of place for NIWSV and ESVARBON to organize workshop and/or seminar where members can be more informed of the benefits they stand to gain by supporting the project. The benefits of such centrally generated pool of information cannot be over emphasized.

References

Ajibola, M. O. (2006) The Accuracy of Investment Method of Valuation in Nigeria: A Case Study of Lagos Metropolis. An Unpublished M. Sc. Thesis submitted to the Department of Estate Management, Faculty of Environmental Sciences, University of Lagos, Akoka. Lagos.

Anstey, B. (1970) An Introduction to the Theory of Value. Building. Pp 63-66

Appraisal Institute, (2001) *The Appraisal of Real Estate*, 12th Edition. Chicago, The Appraisal Institute.

Brown, S., Morrell, G., Unsworth, R. and Ward, C. (1984) "Property Indices Research Report". Society of Property Researchers, Technical Paper Number 1

Burns, R. B. (2000) *Introduction to Research Methods.* London: SAGE Publications, p. 336.

Car, M (2006) Monitoring Residential Property Prices in Slovakia. *BIATEC:* Vol. XIV. 1

Currie, D. and Scott, A. (1991) *The Place of Commercial Property in the US Economy.* London Business School de Soto, H. (2006) *The Mystery of Capital.* Bantam Press. Great Britain.

Dunse, N., Jones, C., Orr, A. and Tarbet, H. (1998) The Extent and Limitations of Local Commercial Property Market Data, Vol. 16, No. 5, pp 455 – 473.

Eiglsperger, M. (2006) Residential Property Statistics for the Euro Area and Selected EU Countries. Being Paper-Prepared for the OECD-IMF Workshop "Real Estate Price Indices". Paris

Feenan, R. and Dixon, T. (1992) *Information and Technology Applications in Commercial Property.* Macmillan, London.

Fellows, R (2003) *Research Methods for Construction*, London: Blackwell Science.

Hargitay, S and Yu, S.M. (1993) *Property Investment Decisions, A Quantitative Approach.* E & FN Spon, London.

Lizieri, C. and Venmore-Rowland, P (1991) Valuation Accuracy: A contribution to the debate. *Journal of Property Research*, Vol. 8; pp 115 – 122.

Lum, S. K. (2004) Property Price Indices in the Commonwealth – Construction Methodologies and Problems, *Journal of Property Investment & Finance*, Vol. 22, No. 1, pp 25 – 54..

McNamara, P. (1994) Property Forecasting: Nothing to fear but fear itself, Estates Gazette, 9240, 140-143.

Millington, A. (2000) *An Introduction to Property valuation.* 5th Edition. Estates Gazette, London.

Morrell, G. (1995) Property Indices: A coming of age? *Journal of Property Valuation and Investment*: Vol. 13, No. 3, pp 8 – 21.

R1CS (1994) The Mallinson Report: Report of the President 'a Working Party on Commercial Property Valuations. The Royal Institution of Chartered Surveyors, London, 5IPP

Roulac, S.E. (1996) Strategic implications of information technology for the real estate sector, *Journal of Property Finance*, Vol. 7, No. 2, pp 28 – 44.

Rowley, S. (1995) The development of Valuation Data Recording Standards For National Land Information System Proceedings of The Cutting Edge Property Research Conference, University of Aberdeen. The Royal Institution of Chartered Surveyors, London, Vol. 2, 221 – 232.

SPR (1995) *The Adequacy and Accuracy of Commercial Property Data.* Society of Property Researchers, London, 32pp

Wyatt, P. (1995) A Spatial Analysis of Property Values, Proceeding.1, of The Cutting Edge Property   Research Conference, University of Aberdeen, Conference Proceedings. The Royal Institution of Chartered Surveyors, London, Vol. 2, pp 21 – 33.

Wyatt, P. (1996): Using a Geographical Information System for Property Valuation, *Journal of Property Valuation and Investment*, Vol. 14, No. 1, pp 67 – 79.