

SOURCES OF ANCHOR DATA AND ADJUSTMENT AMOUNTS IN THE VALUATION OF RESIDENTIAL PROPERTIES

Obinna L Umeh (Ph.D),
Department of Estate Management, University of Lagos, Nigeria

ABSTRACT: *This paper ascertained how valuers generate anchor data based on past valuations experiences and how adjustments were made on the anchors to obtain capital values of residential properties. From a Total population of 260 registered firms, 164 were located. Yamane's (1967) formula with 0.05 sampling error was adopted in determining sample size. It was found that sources of anchor and what valuers have been adjusting for varies. Additionally, generating anchor data from local experts was more common than from firms' records; while general adjustment of anchor for differences in identified attributes has highest adoption rate (92.3%). Previous value experience of subject property is the most common of considered anchor sources. Externally generated anchor ranked higher in use than internally generated anchor; but ranked lower in terms of adjustment. Adjusting without identification of differences in attributes should be avoided to prevent misrepresentation of comparable and loss of clients' confidence.*

KEYWORDS- Adjustment, anchor, data, valuation, residential property.

INTRODUCTION

Behavioural research in problem solving can be categorized into two: the macro-oriented and micro-oriented. Macro-oriented research is concerned with demographic shifts as well as society's evolving values, beliefs and practices affecting buyer interaction within the market place. However, micro-orientated research investigates individual behaviours and the reasons behind their actions (Ayedun, 2008). Yiu, Tang, Chiang, and Choy (2006) classified the later behavioural contention into anchoring bias and survival bias. While clients' influences on appraisal outcomes fall under survival bias, anchoring to asking price (See Northcroft and Neal, 1987; Black and Diaz, 1996; Black, 1997) and to other references (See Gallimore, 1994 & 1996; Gallimore and Wolverton, 1997; Gallimore et. al, 2000 and Gallimore & Gray, 2002) fall under anchoring bias (See Northcroft and Neal, 1987; Black and Diaz, 1996; Black, 1997).

Anchoring bias are biases resulting from heuristic behaviours. Heuristic behaviours are cognitive shortcuts used in processing complex information; and were derived from cognitive psychology (Havard, 1998). In 2005, a conference was held at the Université du Québec at Montreal (UQAM) and allowed researchers from various fields to interact and discuss interdisciplinary issues. Cognitio 2005 was an occasion for philosophers, cognitive scientists and biologists to present the latest developments in their discipline. The book provided a general overview of current research in the field of cognitive decision-making. In 2007, modern-day behaviourism, known as "behaviour analysis", became a thriving field. Also, the Association for Behaviour Analysis

International (ABAI) has come into existence with 32 state and regional chapters within the United States. Approximately 30 chapters have also developed in Europe, Asia, South America, and Australia. Apart from the 34 annual conferences held by ABAI in the United States and Canada, ABAI held the 5th annual international conference in Norway in 2009.

Quesada, Kintsch and Gomez (2005) opined that solving complex problem is an area of cognitive science that has received a sizeable amount of attention in the field, but theories have not progressed accordingly. Contrary to this view, study evidences exist to show that the study of behaviourism in solving complex problems by scholars assumes importance in different fields of endeavour in some fields of endeavour and some developed world like: United Kingdom, United States of America, Australia, Honk Kong. Walsh (1995) earlier observed that the study of cognition in organizations has burgeoned in the recent years. Also, quoting Yiu et.al (2006), “research on behavioural influences has been gaining momentum”. These research studies have been more concerned with finding out the causes of variances when solving complex valuation problems; and heuristic behaviours have been one major observed line of actions exhibited by valuers in solving these problems (Havard, 2001; Diaz and Wolverton, 1998; Black and Diaz, 1996; Diaz and Hansz, 1998).

According to Havard, (1996), it is well known that different behaviours are exhibited in dealing with the same circumstances, and variances in outcomes can be ascribed to it. For valuers to improve in solving valuation problems by minimising variances in values, it is important to accord reverence to Diaz III (1990) emphasis that actual valuer behaviour must be understood before valuation improvement can be engineered. This study is also important in Nigeria where there are patches of evidences in various banks that variances in values for the same valuation problem are realities. This is because no known study in Nigeria has actually probed how valuers determining the values of residential properties generate the anchor data in the exercise except for this study. Appropriate prescriptive approaches to future valuation practices can be effectively coined after endowment with past knowledge on the (or descriptive) decisions and actions taken by experts (registered estate surveyors and valuers) at various process stages in solving similar valuation problems.

Knowledge of how valuers have managed valuation problems in the past no doubt has implications for developing pedagogical practices. The mess of tabling wide variances in value opinions of a property to the same client (especially Banks) when the same method is used for the same valuation purpose has made clients to question the competence of valuers. Presently, clients increasingly require more accurate and consistent valuation estimates from valuation consultants (Ayedun, 2008). Also, the current clients’ demands for standards and transparency in how values are determined by valuers suggest that improvement is pertinent for practicing valuers to retain clients’ confidence and their exclusive preserve. Value estimates of residential properties and other property types will gain better clients’ confidence by tracing the causes of variances in opinions of valuers and checkmating those causes. This study therefore enlightens valuers on the sources of anchor and where the commonness of sources of anchor data and adjustment amounts lie as a prerequisite to correcting the variances. The achievement of this objective is to allow for a better

understanding of the valuation mechanics and more informed and successful steps in restructuring the valuation process.

This study therefore is to help interest groups and the regulating Board for estate management practices understand the aspect of actual valuer problem solving (descriptive or behavioral research) that apply which will serve as solid bases for offering practicing valuers methods of improvement. In order to achieve the aim of the study, answers to the following questions: how do valuers in Lagos generate anchor data when anchoring on and adjusting values of residential properties; and how do valuers in Lagos adjust for differences in attributes between the anchored property and the subject were sought.

REVIEW OF RELATED LITERATURE

SOURCES OF ANCHOR

The Standard Anchor: The standard sources of anchor could be internally or externally generated anchor; or the market data obtained from any of the branches of an estate firm where the valuer works (Diaz, 1990; Wyatt 2003). The internally sourced kind are anchors obtained from internal records of estate firms; while the external anchors are market prices obtained from estate firms that valuers are not staffed; or from local experts familiar with a property markets (Wyatt, 2003). In unfamiliar markets, some valuers source anchor from the experience and knowledge of local experts (Diaz 1997; 2002).

Non-standard anchors or Intuitive Approximation: Non-standard anchors are sources of anchor data when there is no access to information from local experts or internal records (Umeh, Egolum, Kalu, 2014). Levy and Schuck (1999) found that student valuers in an experimental context were influenced by previously undertaken task. Also, Diaz and Wolverton (1998) found that United States appraisers anchor to their own previous estimates of value. Anchor data could also be on previous price experience of subject property (Aycock, 1999). Tversky and Kahneman (1973) observed that decision makers have implicit tendency to spontaneously generate their own independent hypotheses about states of the world based on available raw data and to anchor their final decisions onto these initial hypotheses. Diaz and Hansz (1997) found that United States appraisers valuing property in areas which they have limited knowledge anchor to anonymous appraisers' prior opinion. According to Diaz and Hansz's (2000), United States experts operating in unfamiliar market anchor on knowledge of pending price (or uncompleted contract prices) of the subject and prices of similar properties. Knowledge and experience of previous sales prices and values retained in the memory of valuers are sources of anchor data (Gallimore and Wolverton, 1997; and Havard, 2000).

Adjustments of Non-standard Anchors

Outside the standard anchor, cognitive-load manipulations have been shown to influence judgments in a manner consistent with a process of adjustment, from an initial assessment stage (Pelham, Sumarta, & Myaskovsky, 1994). Problem solvers adjust anchor values known to be incorrect but close to their target values. However, precision in adjusting these evidences are not

guaranteed because adjustments are usually insufficient and subjective (Slovic & Lichtenstein 1971; Epley & Gilovich, 2004). According to Epley, Keysar, Van Boven, & Gilovich, (2004), the insufficiency is because valuers stop adjusting once they reach a certain range of plausible values close to the original anchor.

Valuers' Familiarity with Neighbourhoods

In the absence of an efficient (or familiar) property market, the valuer is forced to rely on experience and knowledge of the local market in making subjective judgements (Adair., Berry, & McGreal, 1996). However, rational valuers will not intensively adjust prices obtained from local experts for differences in specific attributes if similar properties were not inspected to guide in adjusting for their differences in attributes with the subjects.

Diaz (1990) opined that valuers are likely not to anchor on data obtained from local experts in areas they are also familiar with but may anchor on past values of similar properties in valuing analogous real properties. That is, the valuer uses personal knowledge about the property, its sub market, past performance and expectations about future performance to arrive at a value (Aluko, 2007). As valuers are by definition frequently active in that area, the success of their valuation would be reinforced by feedback from the market that their opinions are correct and the methods of working are sound. Consequently, they would be encouraged to adopt the same method of working in all similar circumstances (Havard, 2001).

RESEARCH METHOD

Questionnaires were administered to valuers that operate in: Lagos Mainland, Lagos Island, Eti-Osa (Ikoyi, Victoria Island), Apapa, Ikeja, and Surulere local government areas; to find out what they have been doing in valuing residential properties for mortgage purpose. This study was limited to valuation of property for mortgage value purpose. The limitation prevents a non-directional study of all purposes of valuation that could lead to conclusions which may be general and without specific implications or applications in the real estate business (Ayedun, 2008).

The selected areas were justified because most estate firms cluster within the six local government areas in metropolitan Lagos and could stand as good representation for valuers in the area (Ogumba, 1997). The numbers of urban local government areas selected constitute approximately 31% of the total numbers of 20 urban local governments in metropolitan Lagos as at the time of survey. The consideration of the study areas was also justified by the records from the Directory of Estate Surveyors and Valuers (2009) that the areas have the highest concentration of practicing valuers. Estate surveyors and valuers studied on are in private establishment since they appear to be more in executing valuation instructions (Ayedun, 2008).

As at May 24th, 2011; 2679 were registered with Estate Surveyors and Valuers Registration Board of Nigeria (Source: Estate Surveyors and Valuers Registration Board of Nigeria, Lagos, 2012). The registered members randomly selected from six local governments have been carrying out valuation for mortgage purposes exercises till date. These local governments are where firms of

estate surveying and valuation cluster in Lagos. The data collected from these firms is retrospective; and therefore based on past valuation events experienced by valuers.

Data obtained from Lagos State Branch of the Nigerian Institution of Estate Surveyors and Valuers showed that there are approximately 260 registered firms and 700 registered valuers in Lagos state as at May 24th, 2011. In this study, the 260 registered firms represent the listed population; while the sample frames is the 164 registered firms that were accessed through a reconnaissance survey. In order to determine the appropriate sample size (n) from the accessible population, the statistical formula of Yamane (1967) and a sampling error of 0.05 was adopted as shown:

$$n = \frac{N}{1+Ne^2}$$

Where n represents sample size,

N represents population size,

e represents

sampling

error.

Inputting values in the formula, we have:

$$n = 164 / (1 + (164 \times 0.05^2))$$

$$n = 164 / 1.41$$

$$\hat{n} = 116 \text{ estate firms}$$

This sample size of 116 firms which is 71% of the sample frame met Nwana’s (1981) recommendation of a minimum of 40% of the total population when the population is in few hundreds. The sampling fractions (n/Ni) of the sample size which represent firms in each local government (stratum) are not equal, but proportional to the number of accessible firms in each stratum. Of the 116 estate firms (n) which make up the sample size, 79 firms responded; and 144 valuers were outreached. However, 104 valuers amounting to 72.2% response rate participated in the valuation experiments.

FINDINGS AND DISCUSSIONS

Sources of Anchor Data and Adjustment Approaches

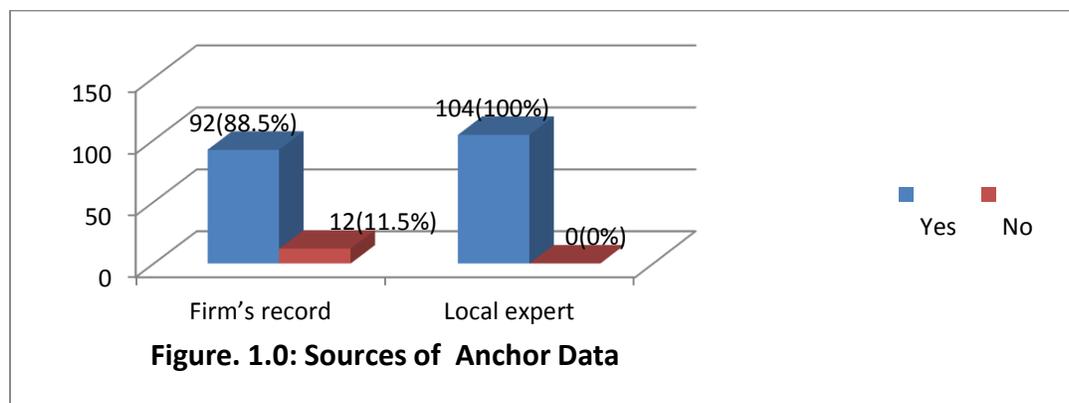


Figure 1.0 presents the number of valuers to their corresponding source(s) of anchor. There were two sources of anchor data considered. The percentage of the valuers that had anchored on recent sales prices of residential properties obtained from internal records before was 88.5% (92 valuers). On the other hand, the 104 valuers had sought the assistance of local expert to access data required in determining the capital values of residential properties for mortgage purpose in the past. The result implies that the use of market evidences as a source of data was more skewed towards local expert source than to the firms' records. Local expert source is therefore a more common source of anchor data than firms' records.

Adjustment of Market Evidence Data

Table 1: Means and Approaches in Making Adjustment

		Adopted	Not Adopted
Means	Enquiries from local experts on attributes to guide adjustment	104 (100%)	0 (0%)
	Inspection on the comparables local experts gave price clues on to guide adjustment	None	All
Approaches	Individual adjustment for differences in the identified attributes	90 (86.53%)	14 (13.47%)
	General adjustment for differences in the identified attributes	96 (92.3%)	8 (7.7%)
	Arbitrarily adjusted without identification of attributes	7 (6.74%)	97(93.26%)

Adjustment means and approaches on data based on recent sales price(s) of similar properties were shown in table 1. The table shows that all the valuers were guided in their adjustments by enquiries from local experts. Inspection on the comparables local experts gave price clues on was found not to be applicable amongst the valuers. The most applicable approach adopted by the valuers adjusting anchor values is the *general adjustment for differences in the identified attributes* with adoption rate of 92.3%; followed by *individual adjustment for differences in the identified attributes* has 86.53% adoption rate; while *arbitrary adjustment without identification of attributes* has adoption rate of 6.74%.

Sources of Non-Market Based Anchor Data and Adjustment Approaches.

Valuers were first questioned to verify if they have experienced situations where data from local experts to aid in determining capital values of residential property in a neighbourhood is not accessible and the responses were presented thus:

Table 2: Determined Capital Values of Residential Property in an Unfamiliar Market

	Number of Valuers	Percentage of Valuers
Yes	60	57.7
No	44	42.3
Total	104	100

Data presented in table 2 showed that sixty (57.7%) valuers out of 104 had experienced situations where data from local experts to aid in determining capital values of residential property in a neighbourhood were not accessible.

Table 3: Anchor Values Used to Assist in the Determination of Capital Values

Self-generated data	Used	Not Used
PVESP	41 (39.4%)	63 (60.6%)
PPESS	36 (34.6%)	68 (65.4%)
PVESPS	33 (31.7%)	71 (68.3%)
PVKS1	11 (10.6%)	93 (89.4%)
PVKS2	3 (2.9%)	101(97.1%)
KPP2	36 (34.6%)	68 (65.4%)
KPP2	13 (12.5%)	91(87.5%)

Considered in this study were seven non-market anchor sources commonly documented in past studies which were used by valuers who have faced situations where information from local experts is not accessible? These methods are: Previous value experience of the subject property valued (PVESP); Previous price experience of similar property to the subject valued (PPESS); Previous value experience of similar property to the subject valued (PVESPS); Previous value knowledge of the subject property valued (PVKS1); Previous value knowledge of the similar property (PVKS2); Knowledge of pending price of the subject property valued (KPP1); Knowledge of pending price of the similar property (KPP2). From the table 3, it shows that forty-one (representing 39.4%) of the valuers have used PVESP, while 36 (representing 34.6%) valuers have used PPESS. For KPPI, PVKS2, PVKS2, PVEPS, and KPP2, there were 33, 11, 3, 36, and 13 users respectively, which represent accordingly 31.7, 10.6, 2.9, 34.6, and 12.5% of the valuers' population.

Table 4: Frequency of Use of Anchor data in determining the Capital Values for mortgage purpose cum Relative Impact Index

	5 Very frequent	4 Frequent	3 Occasionally	2 Rare	1 Not used	Relative impact index	Total
Internally generated	8	52	19	4	21	0.642	104
Externally generated	89	14	1	0	0	0.969	104

The formula for Relative Impact Index (RII) used in ranking the extent of usage in table 4 is:

$$(RII) = \frac{5m_1 + 4m_2 + 3m_3 + 2m_4 + 1m_5}{5(m_1 + m_2 + m_3 + m_4 + m_5)}$$

m_1 represents number of respondents who rated “Very frequent”

m_2 represents number of respondents who rated “Frequent”

m_3 represents number of respondents who rated “Occasionally”

m_4 represents number of respondents who rated “Rare”

m_5 represents number of respondents who rated “Not used”

Table 4 presented a five-point likert scale that weighs the extent to which anchor data from two sources are used. Under the extent of usage of anchor data and adjustments in the table; the internally generated anchor and externally generated anchor were considered.

Table 5: Relative Impact Index and Ranking of Use of Sources Anchor data

	Relative Impact Index	Rank
Externally generated	0.969	1
Internally generated	0.642	2

In Table 5, the extents to which sources of anchors were used were ranked using a relative impact index. Externally generated ranked higher in use than internally generated anchor.

Table 6: Frequency of Adjustment of Anchor data from Different Sources and Relative Impact Index

	6 Very frequent	5 Frequent	4 Occasio nally	3 Rare	2 Not adjusted	1 Not used data	Relative impact index	Total
Internally generated	10	52	22	6	14	0	0.5609	104
Externally generated	0	4	8	32	60	0	0.4295	104

The formula for Relative Impact Index (RII) used in ranking the frequency of adjustments is:

$$(RII) = \frac{5m_1 + 4m_2 + 3m_3 + 2m_4 + 1m_5}{5(m_1 + m_2 + m_3 + m_4 + m_5)}$$

m_1 = number of respondents who rated “Very frequent”

m_2 = number of respondents who rated “Frequent”

m_3 = number of respondents who rated “Occasionally”

m_4 = number of respondents who rated “Rare”

m_5 = number of respondents who rated “Not Adjusted”

Table 6 is a five-point likert scale that weighs the frequency of adjustments of anchor data from different sources.

Table 7: Relative Impact Index and Ranking of Adjustment of Sources of Anchor data

	Relative Impact Index	Rank
Internally generated	0.5609	1
Externally generated	0.4295	2

The frequencies of adjustments in anchor data were ranked in table 20, using a relative impact index. Externally generated anchor ranked lower in terms of adjustment than internally generated anchor.

Table 8: How Valuers Accounts for Differences in the Attributes in Determining Capital Values in the past

	Number of Valuers	Percentage of Valuers
Adjusted adopted anchor value always	45	43.3
Adjusted adopted anchor value sometimes	14	13.5
Always adopted anchor values without adjusting to account for the difference	45	43.3
Total	104	100

From the result in table 8, 45 (representing 43.3%) of the valuers accounted for differences in attributes by adjusting adopted anchor value at all times, 14 (representing 13.5%) did the same thing but only some times (not always). On the other hand, 45 which are 43.3% of the sample size had always adopted anchor value without adjusting to account for the differences. It therefore meant that up to 59% of the valuers have in the past accounted for differences in attributes of comparables and that of the subject of valuation by adjusting adopted anchor value to get their capital values.

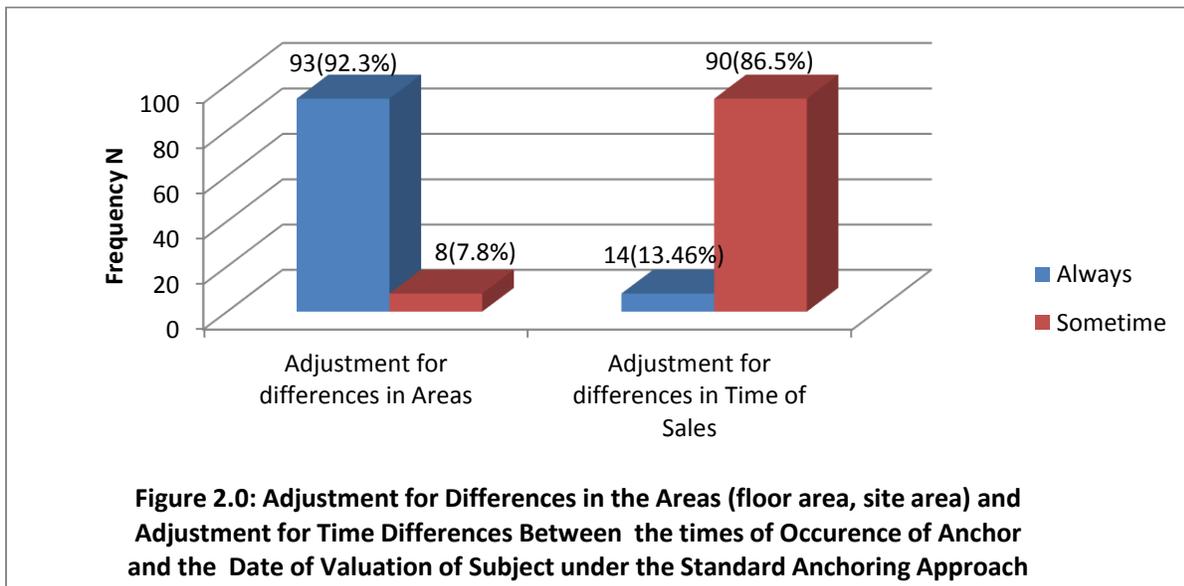


Figure 2.0 is a graph showing the number of valuers who make adjustments for the differences in areas (floor area, site area) and time of sale of similar property and the subject. Adjustment for differences in areas is more practiced compared to adjustment for differences in time of sale. Valuers who always adjust data for differences in areas of the comparable and the subject to get the final value were 94. On the other hand, adjustment for different time of sale is practiced by few expert valuers possibly because the sales are recent sales.

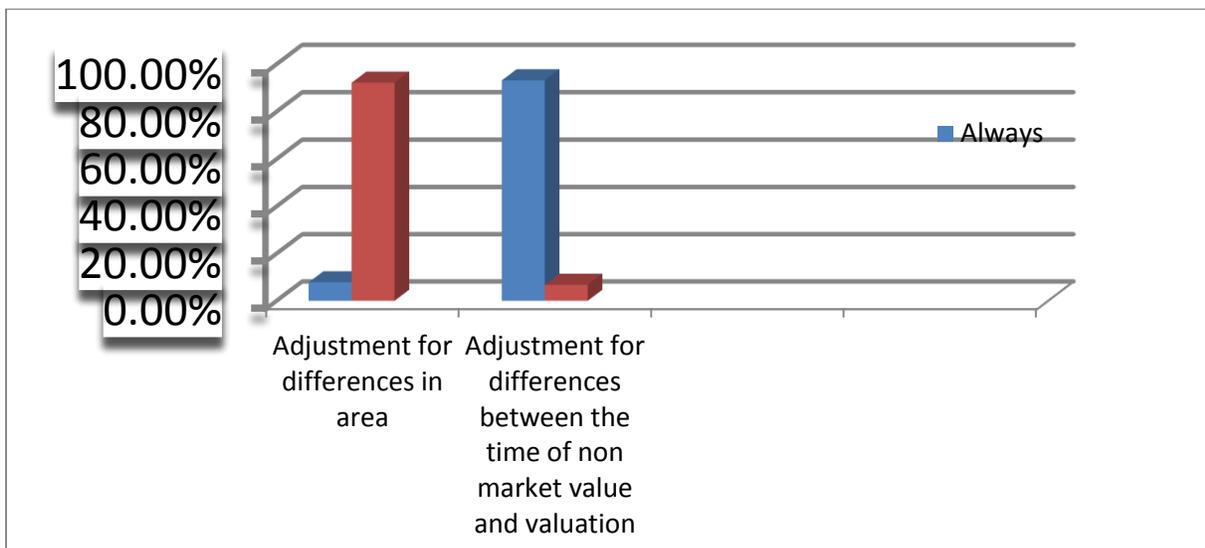


Figure 3.0: Adjustment in the Differences in Areas (floor area, site area); and Adjustment for the Time Difference between the times of Occurrence of Anchor and the Date of Valuation of the Subject outside the Standard Anchoring Approach

Figure 3.0 is a graph showing the number of valuers who make adjustments for the differences in areas (floor area, site area); and time of sale of similar property and the subject. Adjustment for time differences between non-market evidence and valuation is more commonly practiced compared to adjustment for differences in time of sale. This is probably because some anchors may be based on primacy effect instead of recency effect. Valuers who always adjust data for this difference were 93.20% of the sample size. On the other hand, adjustment in the difference in area is practiced by few expert valuers (7.85% of sample size).

CONCLUSION AND IMPLICATION TO PRACTICE

The result from the field survey showed that valuers generate anchor data in the valuation process from internal records and local experts. These findings agree with Wyatt (2003) that to determine capital values of various properties, valuers may source anchor values from internal records or from local experts. Generating anchor data from local experts was found to be more common approach by the valuers than from firms' records. In addition to the finding, the most applicable approach adopted by the valuers adjusting anchor values is the *general adjustment for differences in the identified attributes* with adoption rate of 92.3%. Other findings are that the: previous value experience of the subject property (PVESP) is the most common of all the sources of anchor data; externally generated anchor ranked higher in use than internally generated anchor; externally generated anchor ranked lower in terms of adjustment than internally generated anchor.

Notwithstanding the most common source of anchor and adjustment, the anchor data required to solve a valuation problem given the same scenario differed from valuer to valuer. Some valuers obtain standard anchor data from local experts; while others source from internal records. Valuers on few occasions obtained anchor data from non-standard sources. More so, the approach in making adjustment for differences in attributes differed amongst valuers. Having found that some valuers made no adjustments; one can conclude that outside the anchoring and adjustment heuristics, there are actually other behaviours of valuers which may fall into representativeness, availability, or confirmation heuristics.

In the standard anchoring approach, it was found that the valuers have not been inspecting the comparable local experts gave price clues on to guide their decisions; but only made few enquiries before making adjustments. This approach would obviously have contributed to the significant variances in final value outcomes complained by clients.

The wider the variances, the lesser the confidence clients will have in values advised by professionals. Arbitrary adjustment approaches without identification of differences in the attributes on the site should be avoided as this may lead to misrepresentation of comparable.

Related Areas of Future Research Study

This study can serve as good reference point to further related studies suggested as follows:

- Clients Satisfaction with Valuers' Judgements Resulting from Behavioural Approaches
- Analyses of Variances in Capital Values of Properties Resulting from Anchoring and Adjustment Heuristics in areas other than Lagos

REFERENCES

- Adair, A., Berry, J. and McGreal, S. (1996). Valuation of Residential Property: Analysis of Participant Behaviour.
- Aluko, B.T. (2007). Examining valuer's judgment in residential property valuations in metropolitan Lagos, Nigeria. *International Journal of Strategic Property Management*, 25 (1), 98-107.
- Aycock, S.A. (1999). The anchoring heuristic in real estate negotiations: The impact of multiple reference points on final settlement price. Dissertation, Georgia State University.
- Ayedun, C.B, (2008). Reliability and consistency of the investment method of valuation: a study of Lagos metropolis. An unpublished PhD thesis submitted to the Department of Estate Management, Covenant University Ota.
- Black, R.T. and Diaz III, J. (1996). The use of information versus asking price in the real property negotiation process. *Journal of Property Research*, 13 (4), 287-297.
- Black, R.T. (1997). Expert property negotiators and pricing information. Revisited. *Journal of Property Valuation and Investment*, 15(3), 274-281.
- Diaz III, J. (1990a). "How appraisers do their work: A test of the appraisal process and the development of a descriptive model. *The Journal of Real Estate Research*, 5(1), 1-15.
- Diaz III, J. (1990b). The process of selecting comparable sales. *The Appraisal Journal*, 533-544.
- Diaz III, J., & Hansz, J. A. (1997). The use of previous expert value estimates by expert appraisers operating in geographic unfamiliarity. Presented at the 13th ARES Conference, Sarasota, Florida.
- Diaz, J. III, & Hansz, J. A. (1997). How valuers use the value opinions of others. *Journal of Property Valuation and Investment*, 15(3), 256-60.
- Diaz, J. III, & Hansz, J. A. (2000) Use of reference points in valuation judgment. *Journal of Property Research*, 18 (2), 141-48.
- Diaz III, J., & Wolverton, M.L. (1998). A longitudinal examination of the appraisal smoothing hypothesis. *Real Estate Economics*, 26, (2), 349-358.
- Epley, N., & Gilovich, T. (2004). The anchoring-and-adjustment heuristic: Why the adjustments are insufficient. *Psychological Science*, 17, 311-318.
- Epley, N., Keysar B., Van Boven, L., & Gilovich T., (2004). Perspective taking as egocentric anchoring and adjustment. *Journal of Personality and Social Psychology*, 87, 327-339.

- Gallimore, P. (1994). Aspects of information processing in valuation judgment and choice. *Journal of Property Research*, 11, 97-110.
- Gallimore, P., & Wolverton, M.L. (1997). Price-knowledge induced bias: A cross-cultural Comparison. *Journal of Property Valuation and Investment*, 15(3), 261-281.
- Gallimore, P., Hansz, J.A., & Gray, A. (2000). Decision making in small property companies. *Journal of Property Investment & Finance*, 18(6), 602-612.
- Gallimore, P., & Gray, A. (2002). The role of investor sentiment in property investment decisions. *Journal of Property Research*, 19(2), 111-20.
- Havard, T.M. (1996). Investigating the Causes of Valuation Variance: The impact of personality type on valuer behavior. Valuation Variance: A Study of the relationship between process, character and behaviour. *RICS Foundation Research*.
- Havard, T.M. (1998). The Influence of data presentation on price knowledge and market knowledge anchoring on commercial valuations in an experimental context. *Centre for Property Development and Management, University of Manchester, Institute of Science and Technology*, 5.
- Havard, T.M. (2000). An examination of the relationship between anchoring and adjustment heuristic and variance in commercial property valuation: A process tracing experiment. *RICS Foundation Research*.
- Havard, T.M. (2001). An experimental evaluation of the effect of data presentation on heuristics bias in commercial valuation. *Journal of Property Research*, 18(1), 51-68.
- Levy, D.S., & Schuck, E. (1999). The influence of clients on valuations, *Journal of Property Investment and Finance*. 17(4), 380-400.
- Northcroft, G., & Neale, M. (1987). Experts, amateurs, and real estate: An anchoring perspective 3 on property pricing decision. *Organizational Behavior and Human Decision Processes*, 39(1), 84-7.
- Nwana, O.C. (1981). *Introduction to Educational research for Students-Teachers*. Hienemann Educational Books, (Nig.) Ltd., Ibadan.
- Ogunba, O.A. (1997). A Study of Valuation and Pricing Methods in the Residential Property Market in Lagos Metropolis. Unpublished M.Sc. Dissertation Submitted to the Department of Estate Management, Obafemi Awolowo University, Ile Ife.
- Pelham, B.W., Sumarta, T.T., & Myaskovsky, L. (1994). The easy path from many to much: The numerosity heuristic. *Cognitive Psychology*, 26, 103-133.
- Quesada, J. Kintsch, W. and Gomez, E. (2005). Complex problem-solving: a field in search of a definition? *Theoretical Issues in Ergonomics Science*, 6(1), 5-33.
- Slovic, P. & Lichtenstein S. (1971). Comparison of bayesian and regression approaches to the study of information processing in judgment. *Organizational Behavior and Human Performance*, 6, 649-744.
- Tversky, A. & Kahneman, D. (1973). 'Availability: a heuristic for judging frequency and probability'. *Cognitive Psychology*, 5(2), 207-232.
- Umeh, O.L, Egolum C.C., Kalu, I.U. (2014) Variances in property values resulting from market evidence and non-standard anchoring and adjustments by valuers. *Elixir International Journal*. 75(2014), 27508-27513.
- Walsh, J.P., (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, 6(3), 280.

Wyatt, P. (2003). How much wrong is right? Variance in commercial property valuation, <http://www.ricsfoundation.org>.

Yamane, T. (1967). *Statistics: An Introductory Analysis*, 2nd Ed., New York: Harper and Row.

Yiu, C.Y. Tang, B.S. Choy L.H.T, & Chiang, Y.H. (2006) Alternative Theories of Appraisal Bias. *Journal of Real Estate Literature*, 14(3), 323.