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Full Length Research Paper

Appropriateness of depreciation measurement in the cost method of property valuation in Lagos, Nigeria

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Valuation has been considered as an important tool for decision making in property transaction all over the world. This action requires that the valuers are expected to give reliable and consistent opinion of values. Unfortunately, this does not occur often in the estimation of depreciation in cost valuation in Nigeria. The aim of this paper is to evaluate the appropriateness of the depreciation in the cost method of valuation with a view to providing better information for the stakeholders in the built environment. Questionnaire were structured and distributed on registered estate surveyors and valuers firms in Lagos Metropolis where the head offices of the majority of estate surveying and valuation practititioners are accommodated. Stratified sampling technique was adopted in selecting firms within the districts of the study area. 154 questionnaires were distributed but 131 were retrieved for the purpose of analysis. Relative Importance Index method of analysis was adopted with the use of student T-test to determine the relationship between the depreciation generated by S-curve and the method found to be in frequent usage. The paper discovered no significant relationship. The P value (< 0.5) indicated that the variance of methods (S-curve on one hand versus the methods used) were not equal. This showed that the use of depreciation in the cost methods of valuation has accuracy deficiencies. The paper therefore concluded that depreciation measurement in the study area is user friendly, but inaccurate, inconsistent and incapable of separating components. The professional board of Estate Surveyors and Valuation Registration Board of Nigeria (EVERBON) is further challenged to regulate the use of deprecation methods in use among majority of the practititioners in the interest of accuracy, and called for further research in this area in order to develop models that will capture all the indicators of good depreciation measurement.

Keywords: Valuation accuracy, Market values, standard, obsolescence, Property

INTRODUCTION

The cost approach to value is well understood by the valuers. Ogunba,(2011) observe that the principle of substitution is the technical basis of the cost approach, which states that no rational person will pay more for a property than the amount for which he can obtain, by purchase of a site and construction of a building, with undue delay; a property of equal desirability and utility. The cost approach therefore seeks to determine the value of property by aggregating the cost involved in its development. Depreciation is introduced into cost approach because the cost involved in development alone addresses newly completed development; they may not provide an accurate estimate of the loss in value over time.

Depreciated replacement cost is defined by RICS, (2005) and IVSC, (2007), as “the current cost of replacing an asset with its modern equivalent asset less deductions for physical deterioration and all relevant forms of obsolescence and optimization”. Another definition is provided by Hoesli and Macgregor (2000): that depreciation is the loss of rent or capital income of an

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ageing property when compared with an equivalent new property.

In valuation standards across the world, depreciation is seen as a composite term consisting of three items: physical deterioration, functional obsolescence and economic obsolescence (RICS, 2005; NIESV, 2006; IVSC, 2007). Physical deterioration is depreciation that results from wear and tear over time, including any lack of maintenance. Functional obsolescence is caused by advances in technology that result in new assets capable of more efficient delivery of good and services, rendering previously existing assets fully or partially obsolete in terms of current cost equivalency. Economic obsolescence results from changed economic conditions which affect the supply and demand for goods and services produced by the asset or the cost of its operation.

The measurement of depreciation in the use of cost approach methods for valuation purposes has been a subject for a number of several empirical studies (Taubman and Rashe, 1999; Hulten and Wykcoff, 2003; Follain and Malpezzi, 2004; Jones et al., 2004; Connaday and Sunderman, 2006 among others). There is however no current consensus within the valuation professionals as to which of the several approaches is to be used in estimating accrued depreciation so as to adequately address the key indices that are of concern to valuers viz; age, level of physical deterioration, functional and economic obsolescence. This paper is conceived with the understanding that the development of consensus as to the best way to depreciate replacement cost of subject properties within the cost approach to valuation is crucial to the development of accurate and consistently operated cost valuation models.

Against this backdrop, there seems some challenges in the depreciation measurement literature especially in Nigeria, and hence reinforces the need for a thorough research on the subject matter if our valuation report is to be reliable, consistent and accurate. Consequently, this paper intends to fill this vacuum by drawing on the experimental approaches adopted by researchers on the subject (Baum, 1997; Hoesli and Macgregor, 2000; Johnson, 2000; Plimmer and sayce, 2006; Ogunba, 2009; Ogunba, 2011). Thus, the research questions motivating this study are:

- What are the current models adopted for the measurement of depreciation in Depreciated Replacement Cost Approach (DRC) for valuation in Lagos, Nigeria?
- What are the patterns that depreciation follows in residential property types?

Following these questions, the aim of the paper therefore is to examine the appropriateness of measuring depreciation in the cost method to valuation with a view to improving the current practice.

The specific objectives are to:

1. Investigate the current models adopted for the measurement of depreciation in Lagos,Nigeria;
2. Examine the patterns of depreciation for residential properties in the study area.

Contribution to Knowledge

This paper is justified by its originality and the gap it fills in literature. Most of the discussions on property depreciation in US and UK focused mainly on non real property and do not categorical on the appropriateness of the depreciation methods to adopt.

The extensive research works of Baum (1991, 1997 and 1998) did not separate the component part of depreciation of different property types, the gap which this paper tried to fill. Over the years, researchers in US and UK have devoted considerable attention to the designing of models for the measurement of depreciation on different types of assets. Notable early studies in USA include Griliches (2000), who estimated depreciation rates for farm tractors and Hall (1999), on pickup trucks. Somewhat later, Hulten and Wyckoff's (2001) more comprehensive studies yielded estimates of depreciation rates for many different types of equipment and structures, and the Bureau of Economic Analysis (BEA) has adopted their figures for use in the U.S. National Income and Product Accounts. For high-tech assets, however, the literature on depreciation is remarkably thin given their importance in the economy. Hulten and Wykoff's pioneering research predated the explosion in demand for information technology. Thus, their study did not include real property, and they treated quality change in a relatively limited way.

In UK, Oliner (1993, 1994) estimated depreciation rates for mainframe computers and computer peripheral equipment, but these results are somewhat limited to non real estate without given the best method for measurement.

To the researcher's knowledge, only two prior studies – Geske, Ramey, and Shapiro (2003) and Wyckoff (2003) – have designed models for depreciation for real properties. Wykoff's paper, though, mainly concerns methodology, and his empirical work uses a very small sample of property prices merely to illustrate his approach. Geske, Ramey, and Shapiro have a richer dataset, which they employ to estimate depreciation for commercial properties and to highlight the role of obsolescence in driving depreciation for these assets. These research works however failed to consider the available data on the physical and economic life of different property types to determine the appropriate depreciation measurement.

Within the Nigerian context, except the work of Ogunba (2011), which reviewed seven models for depreciation in

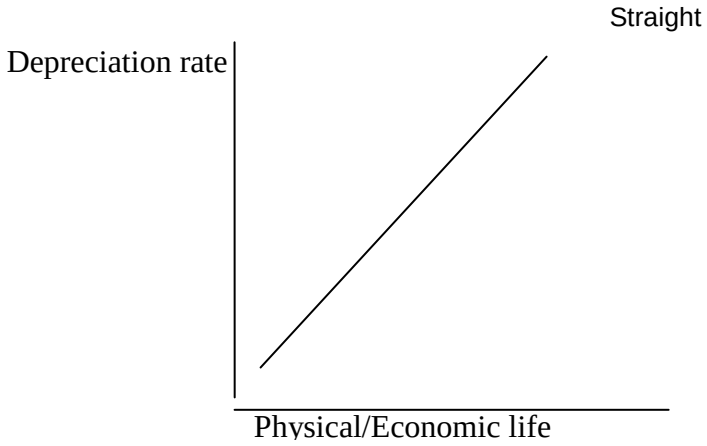

Figure 1. The Pattern of Depreciation Assumed in Straight Line

USA and UK, there were not empirical studies in the appropriateness of depreciation models on physical and economic life of property in DRC valuation in Nigeria.

The paper sees the need for the study for a more in-depth understanding of the depreciation measurement with a view to improve on the current practice.

Literature review

Ogunba, (2011) observed that there are unresolved controversy in cost valuation; an unrequited need in the worldwide operation of depreciation modeling in the cost approach as employed by the valuation profession. Within the profession, there is a general consensus on the components of depreciation at least at the level of valuation standards. There is also a measure of consensus as to the models available for the measurement of depreciation. A group of such methods are very common and are widely used both in the valuation and accounting professions particularly the age-life methods such as the straight-line reducing balance and sinking fund methods (Gyamfi and Ayittey, 2006).

There is no consensus as to practitioner choices among the variety of depreciation methods available. For example, in the US, Dotzour (2005) sees the chief perceived disadvantage of the cost approach among practitioners as the difficulty of accurately estimating accrued depreciation. In the UK, Plimmer & Sayce (2006) note that inconsistency in the cost depreciation approach has resulted in concern amongst UK client public sector organizations which have found that their ability to budget for their core services has been compromised as a result.

In essence, employing a straight line pattern of depreciation means a constant money value is ascribed to depreciation from the cost price each year so that the asset price declines with age along a constant (straight line) path (See figure 1). However, this method is often criticized because depreciation rarely follows a straight line and because the model is simplistic and unreliable (see for instance Plimmer and Sayce, 2006).

In accelerated methods, depreciation is assumed to accelerate in the earlier years of the physical/economic life relative to the latter years (See figure 2). Dotzour (2005) suggests that most US appraisers use age-life methods for depreciation. Two accelerated models are considered here: the reducing (or declining balance) depreciation model and sum of year's digits model.

In the reducing balance method, the assumption is a constant percentage rate of depreciation, albeit from a reducing base. A constant percentage rate is applied to the residual value of the asset every year, reducing the amount charged as depreciation over the course of the asset's life. The method appears reasonable for cars and other machinery that depreciate at a higher rate during the earlier years.

The depreciation rate in this model is calculated using the following expression:

$$Annual\ Depreciation\ Rate = \left(1 - \sqrt[N]{S/P}\right) \quad \text{or}$$

$$1 - \left(S/P\right)^{1/N} \quad \text{..... (2.2)}$$

Where P = the replacement cost new; S = the salvage value (value at the end of the useful life) and N
N = the number of years of useful life (of course, to covert the rate to percentage, it would be multiplied by 100).

This method writes off about two thirds of an assets' replacement cost (or historic book value for accountants) in the first half of its service life. The declining value assumption is arguably more accurate over time than the straight line method. However, this method has been criticized as being unrealistic because it assumes a constant percentage rate of depreciation, despite the reducing base.

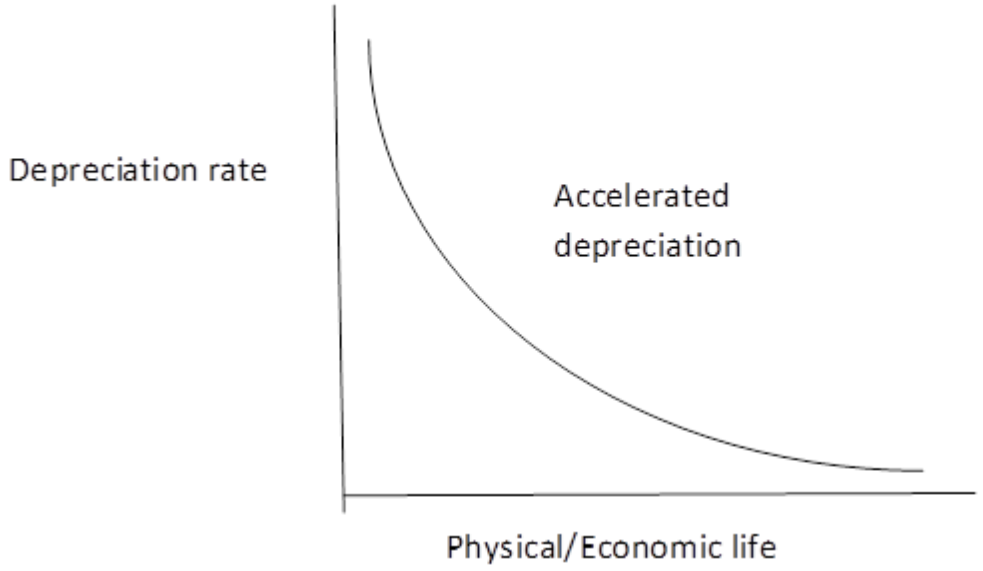

Figure 2: The Pattern of Depreciation Assumed in Accelerated Models

Sum of the years' digits method: This is calculated by multiplying the total depreciable amount for the asset's useful life by a fraction whose numerator is the remaining useful life and whose denominator is the sum of the year digits. The denominator is the sum of the year's digits of the depreciable life. The formula for the denominator is n(n+1)/2, where n is the depreciable life of the asset concerned. Thus, annual depreciation equals:

$$\text{Original Cost- Salvage Value} \times \frac{\text{Remaining Useful Life}}{\text{Sum of the Year Digits}} \quad \text{.....(ii)}$$

Mathematically, it could be expressed as

$$D = \frac{(P-S)(2N + 1 - n)n}{N(N + 1)} \quad \text{.....(iii)}$$

It is considered that this method along with declining balance depreciation give a true reflection of the depreciation pattern of plant and equipment than straight line methods (Ogunba, 2009). Cannaday and Sunderman (1986) also suggest that the sum of the years digits method, more closely reflects reliable depreciation for single-family houses. However, the model suffers from the criticism of all accelerated methods: they are unrealistic because they assume a constant percentage rate of depreciation, despite the reducing base. Decelerated age life models write off the value of the asset in the latter years than the earlier years (figure 3).

In Nigeria, Ogunba (2009), observed that the cost approach is relatively simple in concept, but there is still confusion and subjectivity about the estimation of depreciation. Most Surveyors do not account for functional or economic obsolescence in their depreciation calculations. The estimated percentage approach which most surveyors especially in Nigeria adopt does not permit an explicit accounting for such functional or economic obsolescence. Most of the mathematical age life approaches (straight-line approach accelerated depreciation approaches and decelerated approaches) focus only on physical deterioration. Moreover, a necessary input for the age-life methods is the useful life of the building/plant/machinery. But how does one determine the useful life of different types of building? Does a building even have a definite life especially where the depreciation/obsolescence is curable, which implies that with adequate maintenance/refurbishment, the building could well last indefinitely? The above questions demonstrate that there is obviously much need for research into the depreciation aspect of cost approach as well as a need for international standardization of depreciation approach. The latest edition of IVSC (2007) does not yet provide much guidance on these questions.

METHODOLOGY

For the purpose of this study the appropriate study population capable of addressing the data required for the study is from the Estate Surveyors and Valuers. The focus was the firms of Estate Surveyors and Valuers in Lagos metropolis. Lagos is the largest city in West Africa, and serves as Nigeria's main commercial city as well as being a major air and seaport. Its strong economic base has resulted in a high rate of migration into the city. A 1985 Federal Office of Statistics survey indicates that the

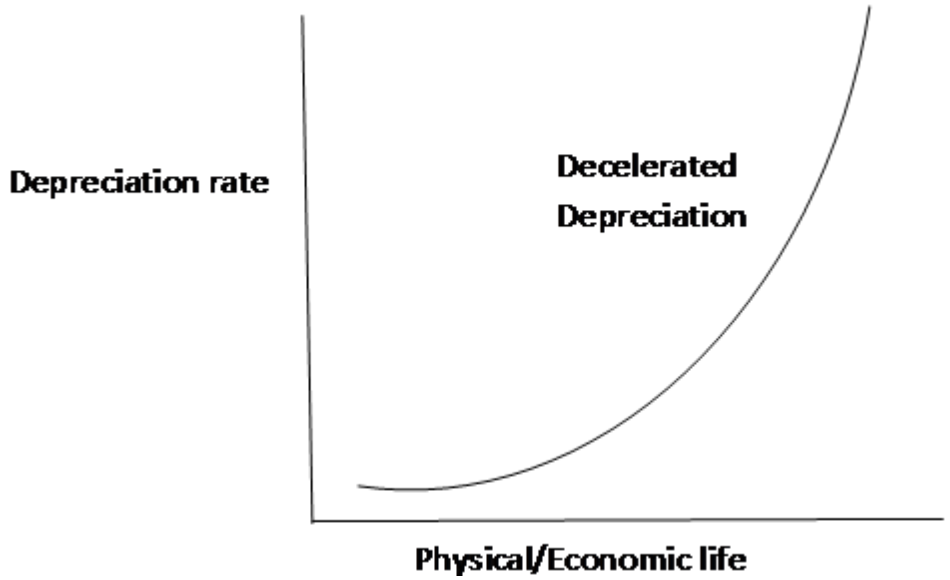

Figure 3: The Pattern of Depreciation Assumed in Decelerated Models

metropolis contains 38.12% of all the industrial establishments in the country, while also accounting for 45.19% of total employment in industries. These commercial activities are concentrated mainly around the six business districts (the Lagos, Victoria/Ikoyi and Apapa islands, Surulere and Ikeja). At these business districts, commercial properties are a most dense concentrated use of land (Ajayi, 1996), resulting in very high land, rental and market values. Most development appraisers, that is estate surveying firms and lending institutions aggregate around these major business districts (see NIESV Directory, 2009 & NDIC, 1998). The focus of valuation questionnaire in each of the firm will be the principal partners or at least the head of valuation department in each firm. According to Babawale (2009), Estate Surveyors and valuers are the only professionals statutorily empowered to undertake valuation of proprietary interests in real estate and related assets in Nigeria. His earlier studies further showed that in spite of the unique privilege, most estate surveying and valuation firms in Nigeria do not carry out appreciable number of valuations per time (Babawale and Koleosho, 2006; Babawale, 2008). However, 154 estate firms were randomly selected using the Directory of membership of Nigerian Institution of Estate Surveyors and Valuers (NIESV, 2009). Only 144 of the questionnaire served were returned out of which only 131 are considered duly completed and suitable for further analysis. The questionnaire was designed to elicit information on the valuation methods and procedure for depreciation measurement, their understanding of cost method and the frequency of usage etc. Secondary data were mainly from past journal and online materials relevant to the study. In order to facilitate a good result from the study, the researcher had in a pilot survey identified a suitable block of 3 bedroom flats in the area. Pictures of this flat was taken and presented to respondents together with a detailed description of the building features. Respondents were asked to use estimated percentage depreciation, straight line depreciation and reducing balance depreciation to estimate depreciation rates for these buildings for every five years of the buildings' physical life. The results are presented below and compared with the depreciation rates from S shape time series.

Data analysis and discussions

Table 1 indicates that a high proportion of the respondents (35.88%) used the cost approach between 41 -60% of time for valuation exercises.19.84% only employed the approach between 0 -20% of the time, 9.92% used it between 21 – 40% of the time,26.72% used it between 61 – 80% of the time while 7.63% used it between 81 – 100% of the time. These responses reveal that most of the valuations exercises carried out by surveyors are done with the use of cost approach.

Table 2 reveals that estimated percentage depreciation model has the highest score of 3.781, meaning that this model is almost always used. Age Life models ranked second with a Relative Importance Index score of 2.9618, meaning that this group of models is often used. Cross-sectional models ranked last with a Relative Importance Index score of 1.8092, meaning that it is seldom used. This result tallies with the earlier findings of Ogunba (2011) which suggested that most of Surveyors in Lagos employed the estimated percentage method for

Table 1. Frequency of use of Cost Approach to Valuation

Response	Frequency	Percentage (%)
0 -20 %	26	19.84
21 – 40 %	13	9.92
41 – 60 %	47	35.88
61 - 80 %	35	26.72
81 – 100 %	10	7.63
Total	100	100.00

Source: Author's Field Survey, (2014)

Table 2: Depreciation Models Used by Respondents

Method	Always use W = 4	Often use W =3	Seldom use W = 2	Never use W =1	∑WF	∑WF /N	RANKING
Estimated Percentage	91(69.50)	20(15.28%)	30(22.90%)	10 (7.63%)	494	3.7810	1ST
The Age Life	67(51.11%)	40(30.53%)	16(12.21%)	8(6.11%)	388	2.9618	2ND
Time – Series Analysis	29(22.14%)	31(23.66%)	47(35.88%)	24(18.32%)	288	2.1985	4TH
Cross - sectional	12(9.16%)	18(13.74%)	38(29.00%)	63(52.67%)	237	1.8092	7TH
Breakdown Method	17(12.97%)	22(16.79%)	45(34.35%)	52(39.69%)	266	2.0305	6TH
Market Extraction	16(12.21%)	28(21.37%)	50(38.17%)	37(28.24%)	285	2.1756	5TH
Hedonic Regression	1(0.076%)	53(40.46%)	56(42.74%)	69(52.67%)	344	2.6260	3RD

Source: Author's Field Survey, (2014)

depreciation modeling, despite the fact that this model is quite subjective.

Table 3 explains the relative importance of the factors responsible for the usage of the models considered. The table shows that most important factor influencing the use of estimated percentage model (53.44%)is that it is the model that was taught in the school. The other important factor considered for this model (37.40 %) is its perceived accuracy. The most important factor (60.31%) influencing the use of the Age life models is that it was taught in school. The other important factor (32.06%) is that the model is considered by some to be accurate in useage. 5.34% of respondents say it is the model that is easy to use while 2.29% says it is the model that other valuers use.

Pattern of depreciation for residential property

The section addresses two issue: first the expected physical life of residential property and second the pattern of depreciation over time. Accordingly, respondents were asked to estimate: (a) the expected physical life for a typical 3 bedroom property in their study area and, (b) the pattern of depreciation rates they would adopt for every 5 years of the estimated physical life of these 3 bedroom flats.

We note that many models of depreciation (particularly the age life models) rely on property's physical and economic life. In this research, the respondents were asked to provide their opinion on the physical life of the residential and commercial of property types which was measured with the use of a Likert scale of 1-5.

Table 4 shows the opinions on the physical life of a block of 3-bedroom flat at Ikeja, Lagos. The table confirms that a 3-beroom flat reaches it physical life at the age of 40 - 45 years. This is so from the three RII scores of 3.0213 corresponding to 31 – 35, 36 -40 and 41 – 45 years and all ranked first. The highest of these was selected as the expected physical life.

Depreciation rate

The table 5 and figure 4 clearly show the depreciation patters follow S shapes in the study area considered. We note that this S shaped pattern agrees with the pattern found in the UK by Connellan (1997).

Conformity of identified models to depreciation patterns

This section addresses objective number three which requires an evaluation of the conformity of the identified methods most often used with the S shaped time series data of objective two. The data requirement for this section involves the comparison of data generated from

Table 3. Factors responsible for the Use of the Models

Method	model is accurate	model is easy use	Model is the one other valuers use	Model is the one that taught
Estimated Percentage	49(37.40%)	10(7.63%)	2(1.53%)	70(53.44%)
The Age Life	42(32.06%)	7(5.34%)	3(2.29%)	79(60.31%)
Time–Series Analysis	25(19.08%)	3(2.29%)	10(7.63%)	61(46.56%)
Cross – Sectional	10(7.63%)	30(22.90%)	8(6.11%)	83(63.33%)
Breakdown Method	11(8.39%)	25(19.08%)	15(11.45%)	80(68.70%)
Market Extraction	8(6.11%)	13(9.92%)	35(26.72%)	75(57.25%)
Hedonic Regression	2(1.53%)	28(21.37%)	30(22.90%)	71(54.20%)

Source: Author's Field Survey, (2014)

Table 4. Physical Life of Residential Property: Block of 3-bedroom Flat- Lagos metropolis

Period of Physical life Year	Very Strongly Agree W=5	Strongly Agree W =4	Mildly Agree W =3	Disagree W = 2	Strongly Disagree W = 1	WF	∑WF/N	Rank
0- 5	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)	47(100%)	47	1.000	7th
6 -10	0(0.00%)	0(0.00%)	0(0.00%)	2(4.25%)	45(95.74)	49	1.0425	6th
11 -15	0(0.00%)	0(0.00%)	0(0.00%)	3(6.38%)	44(93.62%)	50	1.0638	5th
16 -20	0(0.00%)	0(0.00%)	0(0.00%)	7(14.89%)	40(85.11%)	54	1.1489	4th
21 -25	0(0.00%)	2(4.25%)	5(10.64%)	15(31.91%)	25(53.19)	78	1.6596	3rd
26 -30	2(4.26%)	5(10.64%)	10(21.28%)	15(31.91%)	15(31.91%)	105	2.2340	2nd
31 -35	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	142	3.0213	1st
36 -40	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	142	3.0213	1st
41 – 45	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	142	3.0213	1st
46 – 50	2(4.26%)	5(10.64%)	10(21.28%)	15(31.91%)	15(31.91%)	105	2.2340	2nd
51 -55	0(0.00%)	2(4.25%)	5(10.64%)	15(31.91%)	25(53.19)	78	1.6596	3rd

Source: Field Survey, (2014)

Table 5. Depreciation Pattern of Residential Property: Block of 3-bedroom Flats at Lagos Metropolis

Period of Physical life Year	Depreciation Rate						
	0 -5%	6 – 10%	11 – 15%	16 -20%	21% and above	WF	∑WF/N
0- 5	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)	00	0..000
6 -10	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)	00	0.0000
11 -15	0(0.00%)	0(0.00%)	0(0.00%)	3(6.38%)	44(93.62%)	47	1.0040
16 -20	0(0.00%)	0(0.00%)	0(0.00%)	7(14.89%)	40(85.11%)	48	1.0050
21 -25	0(0.00%)	2(4.25%)	5(10.64%)	15(31.91%)	25(53.19)	67	1.3001
26 -30	2(4.26%)	5(10.64%)	10(21.28%)	15(31.91%)	15(31.91%)	110	2.3400
31 -35	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	138	2.9342
36 -40	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	151	3.2120
41 – 45	10(21.28%)	5(10.64%)	15(31.91%)	10(21.28%)	7(14.89%)	148	3.1489
46 – 50	2(4.26%)	5(10.64%)	10(21.28%)	15(31.91%)	15(31.91%)	144	3.0638
51 -55	0(0.00%)	2(4.25%)	5(10.64%)	15(31.91%)	25(53.19)	139	2.9543

Source: Field Survey, (2014)

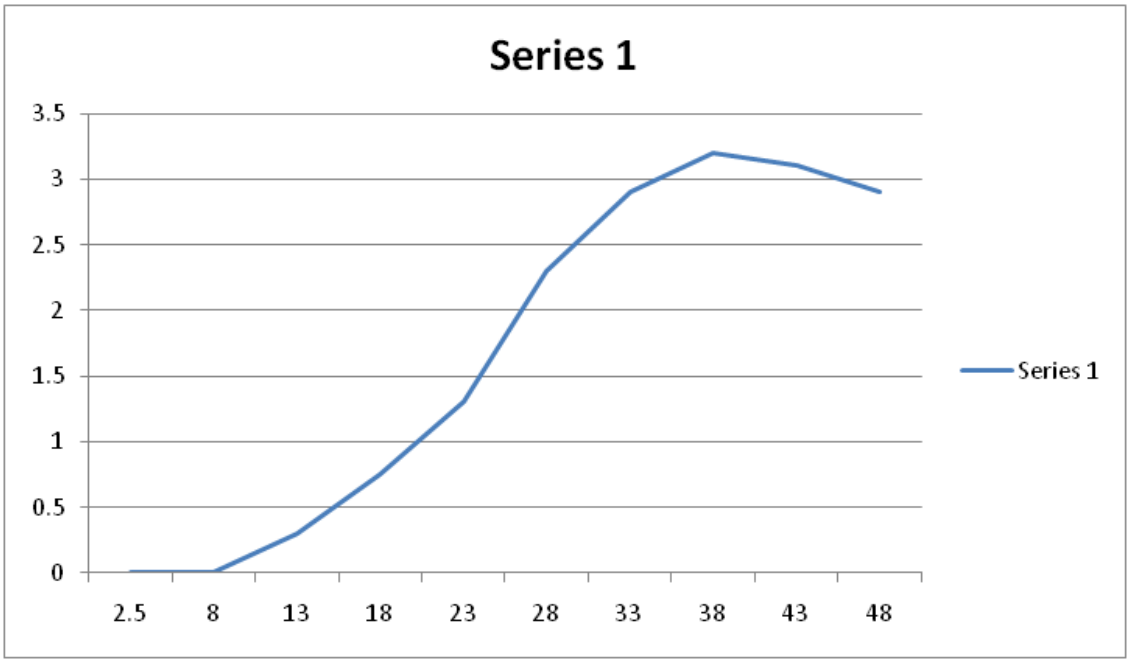

Figure 4. Time Series Analysis of Depreciation pattern of Residential property in Lagos Metropolis

Table 6. Mean Scores of the Pattern of depreciation of Physical life of a Block of 3-bedroom flat in Lagos using S Shape time series versus Estimated percentage, Straight line, and Reducing Balance models.

Year of physical life	S shape Depreciation	Estimated % Depreciation	Straight line Depreciation	Reducing Balance Depreciation
2.50	0.00	0.00	0.50	7.70
8.00	0.00	0.50	0.80	5.90
13.00	0.30	1.00	1.20	4.50
18.00	0.70	1.50	1.50	3.50
23.00	1.00	1.80	1.80	2.70
28.00	2.10	2.20	2.00	2.00
33.00	2.90	2.50	2.30	1.60
38.00	3.20	2.70	2.80	1.20
43.00	3.10	3.00	3.00	0.90
48.00	3.00	3.20	3.30	0.70

Source: Author's Field Survey, (2014)

objective one with the S shaped time pattern discovered to be the accurate pattern of depreciation in objective two. Responses to objective one suggest that the most often used depreciation models are the estimated depreciation and the Age life models(straight line depreciation and reducing balance depreciation).The attempt in this section is to compare depreciation rates from estimated percentage depreciation and the Age life models with the more accurate S shaped time series depreciation rates discovered in the second objective.

In order to facilitate the comparison, the researcher had in a pilot survey identified a suitable block of 3 bedroom flats in each of the state capitals. Pictures of these flats were taken and presented to respondents together with a detailed description of the building features. Respondents were asked to use estimated percentage depreciation, straight line depreciation and reducing balance depreciation to estimate depreciation rates for these buildings for every five years of the buildings' physical life. The results are presented in table 4, 33 where they are compared with the depreciation rates from S shape time series of objective two by means of the Student T-test.

From table 6 and figure 5, the depreciation pattern of

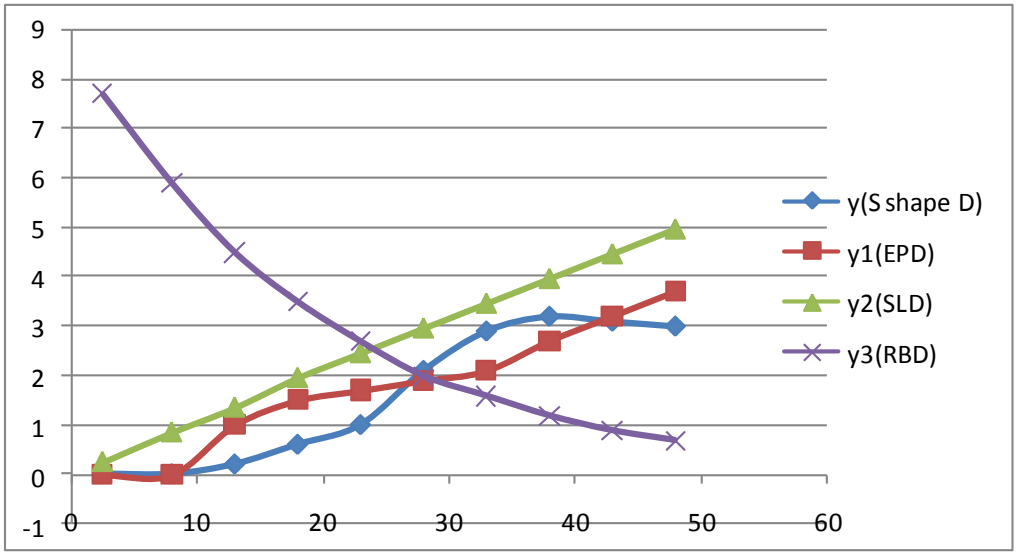

Figure 5. Pattern of depreciation of Physical life of a Block of 3-bedroom flat in Lagos using S Shape time series versus Estimated percentage, Straight line, and Reducing Balance models (Source: Author's Field Survey, 2014)

Table 7: Student T- Test of Relationship between S shaped time series model and models used in Ikeja

Variables	T value	P value	Conclusion
S shaped Time series vis-à-vis estimated % depreciation	1.5700	0.00	Variance not equal at 5%
S shaped Time series vis-à-vis straight line Depreciation	1.6300	0.00	Variance not equal at 5%
S shaped Time series vis-à-vis Reducing Balance Depreciation	2.2900	0.00	Variance not equal at 5%

Source: Authors's Field Survey, (2011)

the accurate S curve is clearly different from the pattern of the Estimated Depreciation Percentage, Straight line depreciation model and the reducing balance depreciation model, meaning that the use of the estimated percentage depreciation, straight line and reducing balance depreciation would lead to substantial inaccuracy. The student T- test is further used below to show if there is a statistical difference between the S-curve depreciation rates and those of estimated percentage, straight line and reducing balance depreciation models.

Table 7 shows the result of T tests which examines the proposition that the variances of two groups are equal. A small P value (< 0.5) indicates that this proposition is false at 5% level of significance. P values for the relationship between S curve versus Estimated Percentage Depreciation (EDP), Straight line Depreciation (SLD) and Reducing Balance Depreciation (RBD) are all below 0.05, meaning that there is significance difference between the depreciation patterns. This means that the use of EPD, SLD and RBD is substantially inaccurate.

IMPLICATIONS OF FINDINGS

The findings demonstrate that the most often use models are estimated percentage depreciation and the Age life models (i.e. straight line depreciation and other models such as reducing balance depreciation etc). However, the analysis also showed that though the most often used models and most user friendly models are not necessarily the most consistent models and they are not necessarily the models that separate the components of depreciation. In fact, the analysis showed that the most often used model scored the least in term of separation of the components of depreciation. The implication here is clear; user friendliness is not the only yard stick for a good depreciation model. The most appropriate model will be the model that is not only user friendly but also consistent in use, capable of separating and identifying depreciation components according to IVSC (2007) standards and also capable of accurately followed the pattern that depreciation follows over useful life of the property.

A further source of worry is prosperity of valuers in their application of depreciation models. This called for special concerted guidance from professional regulatory bodies such as (NIESV and ESVERBON) as to the most accurate, consistent and user friendly models which also separate between depreciation components? We note in the UK, the RICS regularly provides valuation information papers which guide valuers in their usage of valuation models. Perhaps, in Nigeria valuation regulatory bodies might wish to consider doing the same.

Recommendations

The most important findings in this study is that depreciation models most often used are inaccurate compared with what the S curve pattern. This study accordingly recommends as follows.

It is confirmed that depreciation of residential property follows an S shape in all the six cities that were studied. Nigerian valuation regulatory bodies (NEISV and ESVERBON) should publicize the results of this study so as to demonstrate to valuers that the models that are frequently used are not necessarily the best from the available options. The goal of valuers should be to ensure that the depreciation models used are consistent, accurate and user friendly and that they that they distinguish between valuation components according to IVSC standards. Estate surveyors should know the accurate depreciation rate to use at different stages of the physical life of the property.

Since most often used models are found to be inaccurate, the regulatory bodies should organize mandatory Professional development programmes and enlightenment seminars to ensure that valuers are aware of full range of valuation models across the world so as to widen options and discourage the use of those models that may lead to poor valuation results. The study has observed that Nigerian valuers are preoccupied with valuation models taught in old UK textbooks. More recently depreciation modeling in the UK and the USA has broadened to include several innovative models which most valuers in the study areas are not very aware of. It could be useful to further examine the relative merit and disadvantages and applicability of these new models painstakingly and particularly consider those emerging models in USA appraisal such as the breakdown model and the market extraction model.

Conclusion

The paper has attempted to bridge a research gap arising from the paucity of empirical research into the depreciation measurement in DRC valuation in Nigeria. It has also added to the limited body of knowledge in study of valuation methodology and practice in the country. The paper discovered that the traditional method of depreciation measurement adopted by valuers do not provided the appropriateness models to be used. The paper also concluded that the training received by the valuers from the colonized country reflected their understanding of depreciation measurement which does not conform to the modern method of depreciation measurement of S-curve shape as discovered by Connellan (1997) in UK.

In view of all the above, the study conclude that depreciation measurement in Southwestern Nigeria is inaccurate, inconsistent and incapable of separating depreciation components.

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