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Influence of Physical Characteristics on the Performance of Office Properties in Lagos, Nigeria

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Abstract
The purpose of this paper is to examine the influence of property physical characteristics on the performance of office properties in Lagos, Nigeria. By recognizing which physical features made significant contribution, market participants will know how physical features influence the performance of office property market. The trend in returns of office property investments is examined by using multiple regressions to establish a relationship between total return and underlying physical characteristics. The impact of age, building size, average floor space, building services, state of repairs, fixtures and fittings and design quality were explicitly considered. The results indicate that age of the property and building services made significant contribution to office property performance. The influence of other physical characteristics such as average floor space, building size, state of repairs, design quality and fixtures and fittings is not statistically significant. Overall, the age of the property could be regarded as giving the highest contribution to the performance of office property market. The study offers evidence of assessment of office properties performance and provides useful information for developers, investors and practitioners in the real estate market.
Keywords: Office property, Physical characteristics, Performance, Property investment, Nigeria

1. Introduction

One of the major trends in real estate literature in recent years is in trying to understand the performance of real estate assets. The case for performance measurement is compelling and well understood by investors. It is of utmost importance owing to the following reasons. First, investors in their quest to achieve maximum return from their investment and minimize the associated risks usually seek appropriate investment vehicle which can only be identified after measuring the past performance of alternative investment media. Second, the performance appraisal of individual assets forms the foundation of all portfolio analysis. That is the performance of an asset is only as good as the performance of its constituent holdings (Hall, 1985). Furthermore, the need for performance measurement arises to ensure accountability and knowledge of the actual performance against goals (Kalu, 2001). Owing to the peculiar characteristics of real estate, it is essential that the decision to invest in real estate must be guided by objective and quantified evidence. While subjectivity can never be eliminated from investment decision making process, a rational approach to the formulation of investment strategies is essential (Hargitay and Yu, 1993). In short, performance appraisals are to guide investors and trustees of a fund in decision making as to the choice of a rightful investment vehicle and on the strategy for improvement of the funds or portfolio. However, just knowing performance is not sufficed to make a wise investment decision. The understanding of factors influencing the performance provides important insights in to the behavior of the investment market.

Prior empirical research focusing on the influence of physical characteristics on the performance of office property is quite limited. The bulk of the previous studies have shown the relationship between the economic forces such as interest rate, GDP, unemployment rate, vacancy rate, construction costs and office property performance. For example Glascock, Kim and Sirmans (1993), West and Worthington (2003), Foo ng and Higgins (2006), Holies (2007), Ke and White (2009), and Oyewole and Ajayi (2013) identified key economic variables as the determinants of office property markets. However, few studies have examined the influence of physical characteristics on office property performance.

The effect of physical characteristics is very unique when compared to other factors like economic, location and social forces. Since the physical characteristics have great and unique influence on the level of demand by office users, investigating into the influence on the performance of the property is worth studying. Second, the study seeks to bridge the gap in literature in the area of real estate performance appraisal. The bulk of the past studies focused mainly on the performance of property investment without examining the factors driving the performance.A study of the influence of physical characteristics on office market in Lagos will therefore reveal the physical features that drive office property returns in Lagos. The objectives of the studies are to: identify the physical features that influence the performance of office property and evaluate to what extent the factors influence office property performance. The results of the study should provide useful information for investors and stakeholders in property industry on which physical characteristics influence the performance of office property in Lagos. The rest of the study has four sections. These are literature review, data and methodology, results and discussion and conclusion.

2. Literature review

Several studies that have relevance to the understanding of factors influencing real estate performance have been carried out in the last three decades, particularly in the developed and more matured economies. Most of the previous studies were based on the relationship between economic variables and office property performance. The influence of physical characteristics on the performance of office property has hardly been addressed in empirical research..

Glascock, Kim and Sirmans (1993) examined variations in office building rents in Baton, Rouge, Louisiana, United States of America. The data which were collected by a telephone survey of leasing agents for various office buildings from 1984 to 1989 was used to undertake a variety of parameter constancy tests, using random effects and heteroscedastic-autoregressive models. The authors concluded that the driving factors of office rents vary across time, location and class of building. Viezer (1999) developed real estate econometric model of office rent determination across cities in the United States. This model attempted to link the space and capital markets across both short-run and long-run time frames. Using stochastic equation for each property type; the study predicted occupancy, real rents, capitalization rates, market value per square foot, net change in stock and real construction costs.

Adair, Berry and and MicGreal (1997) conducted a comparative study of office market performance of forty-three European countries. The study employed a cross-sectional approach to consider the extent to which variation in rental values of office properties can be explained by regional differences in macroeconomic and social-economic factors. The results indicate that macroeconomic variables and stock related characteristics which influence demand and supply relationships accounted for the variation in the performance

Wyatt (1999) examined the geographical spread of, and shift in, office property values in Bristol, UK to determine whether a geographical analysis of property values can aid business location planning. The author developed a geo-spatial database to examine the proximity of office property to geographical features that were regarded as important influences on value by respondent to the survey. The study revealed that both city centre and edge-of-town office occupiers regard accessibility to customers, clients and complementary business activities as the fundamental element of a property decision over and above the physical and legal characteristics of the property.

Gardiner and Matysiak (2005) examined the holding periods of individual office properties sold in UK between 1983 and 2003. The authors employed the descriptive and performance measures to quantify the holding periods of sold properties and examined the relationship between the holding period and investment performance. The result showed that the distribution of excess returns over different holding periods was widely spread with the risk of under-performance greater under short holding periods. Hollies (2007) aimed at examining the relationship of yields to other factors across a large number of office markets, over five years in order to establish relationships with important explanatory factors. The study which employed a panel approach revealed that shot-time interest rates, market liquidity, market transparency and lease terms were the factors influencing office property performance.

In Germany, Kurzrock, Rottke and Schiereck (2009) investigated the factors that influence the performance of office property using single-property data from Germany. The study which employed multivariate regressions was aimed at identifying market and property related influence factors explaining relative performance differences. The outcome of the study revealed that property location, property management and lease parameter were the major factors influencing office property performance in Germany.

Chin (2003) investigated the macroeconomic drivers of office rental values in south east Asia cities (Singapore, Hong Kong, Tapei Kuala Lumpur and Bangkok). The study used the existing single equation model to examine the impact of real GDP, unemployment rate, floor space of office buildings, interest rate, lending rate, consumer index and service sector output on office rental values. The result showed that in Singapore and Taipei office markets, rental values were mainly determined by changes in office floor space, while in Hong Kong and Kuala Lumpur office markets, lending rates had a greater effect on rental values. The study also showed that there were no significant factors in the Bangkok office market.

Foo ng and Higgins (2006) was a notable study from an emerging economy. It adopted single regression model to construct a rent determination model for Singapore's office property market for the period from June 1992 to December 2005. This is in an attempt to provide a clear structure to understand the key determinants driving property market performance. Using the data from government agencies and property companies, stepwise and manual selection approaches were undertaken to drop the contemporaneous and lagged values of the explanatory variables which did not take the correct sign from the estimates. The stability and robustness of equation was also tested. The results indicated that changes in previous year vacancy rates, construction costs, the prime lending rate and office sector employment were identified as the key determinants of variation in gross office rents in the central region of Singapore.

The few studies that have examined the influence of property features were carried out in developed and some emerging economies outside of Africa. Such studies include Hartzell et al (1986), Hartzell et al (1987),

Dunse and Jones (1998), and Gat (1998). Hartzell, Hekman and Miles (1986) analyzed the various dimensions within the commercial real estate investments and concluded that property size was a major determinant of the performance of office property. They found that institutional investors preferred larger buildings as those required less management effort. The finding is in line with Hartzell, Shulman and Wutzenbach (1987) who analyzed the regional diversification issue by segmenting United States into eight regions based on similar underlying economic fundamentals. The authors concluded that larger buildings offered more diversified tenant portfolios and therefore achieved superior returns.

Dunse and Jones (1998) applied hedonic analysis to identify significant determinants of rental values of office property in Glasgow city. The study employed data from University of Paisley's monitoring initiatives and Scottish Property Network and emphasized the importance of age and location as principal determinants of rents. Gat (1998) investigated the influence of urban foci points and design quality on office property rents in Tel Aviv, Israel. The study hypothesized employed multiple regression analysis to reveal the impact of variables on the performance of office market. The study showed that the quality of building design was an important factor, while the building height and floor area were lesser contributors to the value of office property in Tel Aviv. The result also indicated that the age of the building was a detractor of office property value. Apart from the fact that the study was carried out in a different social, economic and political setting, the focus of the study is rent and not on risk adjusted return performance.

In a more recent study, Fuss, Richit and Thomas (2012) investigated the sources of real estate returns and their relative performance against Investment Property Data (IPD) benchmark returns in Germany. The study found that property characteristics rather than property management contributed largely to the performance of real estate. However, knowing the extent of the contribution of each of property features is essential.

This paper contributes to and expands on existing research from a different perspective. There are two major contributions. First, the study seeks to bridge the gap in literature in the area of real estate performance appraisal in the country. Past studies (e.g Bello 2003; Oyewole 2006; Amidu and Aluko 2006; Olaleye et al 2010) conducted in the country focused mainly on the performance of property investment without examining the factors driving the performance. The only study that attempted to investigate the drivers of property performance is Oyewole and Ajay (2013) which focused on the influence of macroeconomic factors. This study aims at complementing and extending the previous studies by unfolding the various factors affecting property investment performance. Second study seeks to investigate the influence of property characteristics on the performance of office property. The underlying motivation is to enquire whether property features influence the performance of office property in Nigeria. The study will identify which of the features make significant contribution to office property performance and ascertain the relative contribution of each.

3. The study area

Lagos is the most populous conurbation in Nigeria with about 8 million inhabitants at the 2006 census. It is currently the second most populous city in Africa and 7th fastest growing city in the world. Formerly the capital of Nigeria, Lagos serves as the Nigeria's economic and financial capital as well as being a major air and seaports (Oyewole, 2012). Lagos is Nigeria's most prosperous city where much of nation's wealth and economic activity are concentrated. Consequently, the city has attracted many young entrepreneurs and migrants seeking a better life from throughout the country and beyond.

Lagos city has a considerable amount of high rise which makes up its skyline and situated mainly in the central business district. Most commercial, financial and business centers of Nigeria remain at the central business district in Lagos Island. This is also where most of the country's largest banks and financial institution and headquarters of big corporations are located. Lagos is home to many Nigeria's financial institutions, banks and insurance companies. Victoria Island and Lekki Island are situated to the south of Lagos Island. The islands have some of the most expensive real estate properties in Africa. Victoria Island occupies a major area of Lagos, which boasts of several shopping districts and a sizeable number of office properties. Other commercial areas where office properties are situated are Lagos mainland and Ikeja

The study area witnessed rapid growth in the demand for office properties especially during the oil boom era of 1970s and early 1980s. Property developers and investors responded to high demand through direct construction of properties or redevelopment of existing ones (Oni, 2010).In meeting soaring demand, many residential properties in the central business districts such as Lagos Island and Ikoyi were converted to offices. Most of the developers, who lacked professional experience of the property market started large project without thorough investment analysis. The resultant oversupply in office properties became apparent in 1984 and 2010 with economic recession.

4. Data sources and Methodology

4.1. Data sources

The study examines physical characteristics that influence office property performance in Lagos, the economic

and commercial nerve centre of Nigeria where property market is most active in the country. Over fifty percent of real estate practitioners in the country have their headquarters located in Lagos while about ninety percent of property investment companies are based in Lagos. The sample size of the property investors represents all eighteen property companies identified in the directory of real estate developers in Nigeria (Nigeria Galleria.com). In the case of estate surveyors and valuers (real estate practitioners), approximately 70% (189) of the population was sampled based on the latest (2009) edition of Nigerian Institution of Estate Surveyors and Values (NIESV). The total responses were 133 (49.26%) and 14 (77.78%) for estate surveying and valuation firms and property companies respectively.

The sample period for the analysis was January 1999 to December 2014. The year 1999 was significant in the country marking the beginning of the fourth republic and democratization of the nation's polity and major revolution of the economy with the involvement of foreign investors in telecommunication sectors and the government liberalization policies. Data on rental transactions and capital values of office properties were obtained from the firms of estate surveyors and valuers and property investment companies operating in the study area. The second set of data were physical characteristics of the office properties used to explore the sensitivity of property performance to physical features such as age of the property, building size, average floor space, building services state of repairs, fixtures and fittings and design quality. These set of data were obtained through the surveying firms and field survey by one of the authors and trained field assistants.

4.2. Model specification

In order to achieve the aim of this study, the interaction between these variables and the dependent variables (PERFP, the measure of performance) was investigated and analyzed using multiple regression analysis. The goal of the multiple regression analysis is to form an equation relating PERFP (office performance) in this study to independent variables, age of property (AGPTY), building size (BDSZ), average floor space (AVFSP), building services (BLDSER), state of repairs (REPARST), fixtures and fittings (FXTNGS) and design quality (DSQTY) so that the PERP (office performance in terms of return) can be predicted for given values of various independent variables with considerable confidence. Then, the factors affecting the performance can be found. The multiple regression model used is described by the following equation:

$$Y = A + B_1X_1 + B_2X_2 + \cdots + B_KX_K \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where Y = is the predicted value on the dependent variable

A = value of Y when all the x values are zero

X_S = the various independent variables (of which there are k), the physical characteristics expected to influence the performance of office properties (in terms of return) are age of the property, building size, average floor space, building services, state of repairs, fixtures and fittings, and design quality.

B_S = the coefficient assigned to each of the independent variable.

The analysis builds on the premise that physical characteristics determine office property returns and consequently office property performance. In the existing literature, authors who employed the same methodology include Ambrose (1991) and Kuzrock et al (2009).

The model of office property returns in Lagos takes the following form:

PERFP = f(AGPTY, BDSZ, AVFSP, BLDSER, REPARST, FXTNGS, DSQTY)………………………………………..(2)

Where PERP is the office property performance; AGPTY, the age of the property; BDSZ, the building size; AVFSP, the average floor space; BLDSER, building services; REPARST, the state of repairs; FXTNGS, fixtures and fittings and DSQTY, the design quality.

5. Analysis and results

5.1. Physical features of the properties

Table1 presents the physical features of the properties. These include age of the properties, state of repairs, quality of finishes, quality of design, conditions of building services, fixtures and fittings and size of the properties.

Table**1: physical characteristics of office properties**

Variable	Frequency	Percent
(a)Ages of the Sampled Properties		
1-10	15	5.9
11-20	75	29.4
21-30	105	41.2
Above 30	60	23.5
Total	**255**	**100**
(b) The State of Repairs of Sampled Properties		
Very Good	90	35.3
Good	105	41.2
Fair	45	17.6
Poor	15	5.9
Total	**255**	**100**
(c) Quality of Finishes of Sampled Properties		
Very Good	90	35.3
Good	135	52.9
Fair	-	-
Poor	30	11.8
Total	**255**	**100**
(d) Quality of Design of Sampled Properties		
Very Good	74	29.0
Good	181	71.0
Fair	-	-
Poor	-	-
Total	**255**	**100**
(e) Availability and Conditions of Building Services		
Very Good	27	10.6
Good	39	15.3
Fair	108	42.3
Poor	66	25.9
Very Poor	15	5.9
Total	**255**	**100**
(f) Availability and Conditions of Fixtures and Fittings		
Very Good	30	11.8
Good	105	41.2
Fair	75	29.4
Poor	15	5.9
Very Poor	15	5.9
Total	**255**	**100**
(h) Sizes of the Sampled Properties		
Below 2000m^2	59	23
2000m^2 – 4000m^2	59	23
4001m^2 – 6000m^2	59	23
Above 6000m^2	78	31
Total	**255**	**100**
(i) Types of Parking Facilities		
External	75	29.4
Internal	105	41.2
External and Internal	45	17.6
None	30	11.8
Total	**255**	**100**

Source: Author's Field Survey, 2014.

From Table 1, 5.9% of the properties were aged between 1 and 10 years, 29.4% between 11 and 20 years, 41.2% between 21 and 30 years, and 23.5% above 30 years. The state of repairs was estimated to be very good for 35.3%, good for 41.2%, fair for 17.6% and poor for 5.9%. The quality of finishes of the office properties was assessed to be very good for 35.3%, good for 52.9% and poor for 11.8%. Twenty nine percent (29%) of the properties had very good quality design, while seventy one percent (71%) had good quality design. The availability and condition of building services was estimated to be very good for 10.6%, good for 15.3%,

fair for 42.3%, poor for 25.9% and very poor for 5.9%. In terms of availability and condition of fixtures and fittings, 11.8%, 41.2%, 29.4%, 5.9% and 5.9% of the properties were estimated to be very good, good, fair, poor and very poor respectively.

The average estimated size of the properties was 5199 square metres with 23% below 2000 square metres, 23% between 2000 and 4000 square metres, 23% between 4001 and 6000 square metres and 31% above 6000 square metres. The average size per unit space was 162.5 square metres. The result also revealed that 41.2 percent, 29.4 percent, 17.6 percent and 11.8 percent of the office properties had internal parking facility, external parking facility, both internal and external parking facilities and no parking facility in that order. Information contained in Table1 showed that the office properties covered in this study were fairly distributed in terms of age, size, building services, design quality, fittings and fixtures, quality of finishes and parking facility, some of the physical characteristics with which this study is concerned.

5.2. Physical Characteristics influencing Office Properties

The focus in this section is to determine which of the seven property physical characteristics already identified make significant contribution to office property performance and to ascertain the relative contribution of each. Table 2 presents the Pearson correlation coefficients between PERFP, the measure of performance and the seven explanatory variables (physical characteristics). The correlation result indicate that three of the seven independent variables (building services, state of repairs and design quality) are positively correlated while others are negatively correlated with PERFP, the measure of performance. There was a strong relationship between building services and state of repairs; between building size and average floor space and between building size and building services. The result also showed that the relationship between office performance and the age of property and the state of repairs was statistically significant.

Table 2: Correlation Coefficients of Physical Characteristics and Performance

	PERFP	AGPTY	BDSZ	AVFSP	BLDSER	REPARST	FXFTNGS	DSQTY
PERFP	1.000	-.541*	-.326	-.311	.360	.477*	- .306	.309
AGPTY		1.000	.301	.431	.356	-.317	.342	-.305
BDSZ			1.000	.637**	.593*	.323	.-311	-.332
AVFSP				1.000	-.319**	-.338*	-.401	-.322
BLDSER					1.000	.572*	.340	.340
REPARST						1.000	.318	.318
FXTNGS							1.000	.640*
DSQTY								1.000

The variance inflation factor (VIF) was calculated for each independent variable to determine if the variables display collinearity among themselves. Table 3 presents the VIFof each variable. The rule of thumb (Nether) cited in Fehribach et al (1993) is that an independent variable with a variance inflation factor above 10 0r the mean of all the independent variables significantly above 1 will indicate a severe effect on the regression model. None of the VIF is greater than 10 and the mean below 2. The data set therefore does not appear to have problem of multicollinearity and no remedial methods need to be performed.

Table 3: Multicollinearity Determination

Variable	Variance Inflation Factor
Age of the Property	1.91274185
Building Size	1.17382263
Average Floor Space	2.12834971
Building Services	1.66934525
State of Repairs	2.86743826
Fixtures and Fittings	1.54376823
Design Quality	1.35824739
Total	12.65371332
Average	1.80767333

Table 4 contains the results of the multiple regression analysis with the performance of office properties (PERFP), the dependent variable regressed on the seven physical characteristics as explanatory variables. The coefficient of determination (R^2) which provides the level of explanation of the model is 0.536 suggesting that the seven physical characteristics explained 53.6% of the variations in office property performance. In other words, about 46.4% in the observed relationships are not explained by the seven explanatory variables in this sub-group.

Table 4: Model Summary of Multiple Regression showing the relationship between the seven Property Characteristics and Measure of Performance (PERFP)

R	R Square	Adjusted R square	Std. Error of the Estimate
.893	.536	.493	3.6856

The results in Table 4 also provide information on adjusted R^2 which was found to be 0.493 implying that 49.3% variance in the performance of office properties in Lagos state can be explained by the multiple regression adjusted for the number of predictors and sample size. The result in the Table also reveals that a significant relationship existed between the dependent and the set of explanatory variables.

Table 5: Multiple Regression showing the Predictive and Relative Importance of Explanatory Variables (Physical Characteristics)

s/n	variables	B.coef.	beta eight	t-value	Sig.	sr^2(cum)	ranking
1	AGEPTY	-.649	-1.123	-2.675	.003	.237(0.237)	1st
2	BDSZ	- .406	-.826	- 1.607	.107	.086 (0.323)	4th
3	AVFSP	-.123	- .179	-.436	.165	.006(0.329)	6th
4	BLDSER	.627	.871	1.861	.037	.114(0.443)	2nd
5	REPARST	.589	.8431	.675	.161	.093(0.536)	3rd
6	FXTNGS	-.346	-.376	-.514	.151	.009(0.545)	5th
7	DSQTY	003	.018	.096	.488	.000(0.545)	7th
8	CONSTANT	1.745	18.201	.000			

The result in Table 4 provides information on which of the physical characteristics made significant contribution to office property investment performance in Lagos state; whether there is significant difference in individual contribution of these variables; and the contribution of each variables relative to others. For instance, the square semi partial correlations which provide the order of importance and relative contribution of the independent variables, showed that the seven physical characteristics contribute differently to performance.

The age of the property makes the largest contribution ($sr^2 = 0.237$). This was followed by building services ($sr^2 = 0.114$), state of repairs ($sr^2 = 0.093$), building size ($sr^2 = 0.086$), fixtures and fittings ($sr^2 = 0.009$), average floor space ($sr^2 = 0.006$) and design quality ($sr^2 = 0.000$).

The result showed that only two variables: age of the property and building services made statistically significant contribution at 95% confidence level. Other variables: building size, average floor space, state of repairs, fixtures and fittings and design quality made no statistically significant contribution at 95% confidence level. The negative relationship between the age of the property and performance indicated that the higher the age, the lower the performance. The result conformed to the finding of Dunse and Jones (1998) that age of property explains the most variation with values falling with increasing age of property.

Using the sr^2 the unique contribution of each of the seven independent variables to R^2 is as shown in Table 5 The multiple regression constant and coefficients provided by the unstadardized coefficients in Table 5 give the linear multiple regression equation as:

PERFP = 1.745-0.649AGEPTY + 0.627BLDSER + 0.406BLDSZ + 0.589REPAIRST + 0.346FXFTNG + 0.123AVFLSP-0.03DSQTY ……(3)

The analysis of variance (ANOVA) test as indicated in Table 6shows that R^2 is significant at 99% confidence level.

Table 6: Analysis of Variance (ANOVA) Testing the Significance of a Set of Regression Co-efficients of Predictive Variable (Physical Characteristics)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2565.801	7	366.543	15.945	.000
Residual	2873.497	125	22.987		
Total	5439.298.	132			

6. Conclusion

The paper has attempted to examine the relationship between physical characteristics and office property performance in Lagos, Nigeria. Office property performance in terms of returns has been tested against some physical characteristics of office property. The physical characteristics tested are the age of property, building size, building services, average floor space, state of repairs, fixtures and fittings and design quality.

The finding from the study showed that the age of the property was the key physical characteristic

determining office performance in Lagos. The finding is similar to Dunse and Jones (1998) that age of the property explains most variations with values falling with increasing age of the property. However, the findings must be treated with caution owing to the poor quality of data occasioned by the lack of consistent and comparable information for a reasonable sample size and relatively short period of time coverage. In addition, the model explains only about 50 percent in variation in performance. The result indicated that the explanatory power was not very high. The finding may be explained by the fact that some variables of office property performance cannot be quantified and so cannot be included in the analysis. However, the level of analysis notwithstanding, this form of analysis can at as an aid to property investment appraisal in the country.

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