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Comparative analysis of risks and returns on residential property sub-market in Lagos: Case study of 1004 Estate

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The study appraised the viability of investing in residential real estate submarket in Lagos State, using the apartments in 1004 Estate as case study with a view to providing a guide for investors and portfolio managers on investment decision-making in Lagos. Lagos, a mega city being a point of attraction to real estate investors makes it necessary to undertake real estate investment performance evaluation. To achieve this, the study ascertained the various risk status of each of the property submarkets and the return strength of the various apartments in 1004 Estate. The study further identified the risk adjusted rate of return of the various apartments in 1004 Estate and also examined the potential of diversifying within residential real estate sub-markets. The study depended largely on secondary sources of information. Data were sourced from the books of the company over a sample period ranging from 2010 to 2017. The data collected were analyzed using descriptive and inferential statistics. The findings show that the risk attached to the various apartments is high and there is strong relationship between the apartments' returns. This implies that the apartments are not fit to be contained in a portfolio. Recommendations from the study are that diversification should be discouraged within a specific real estate submarket as the apartments are usually affected by similar traits.

Key words: Residential property submarket, investment, return, risk.

INTRODUCTION

The goal of any prudent investor is to make profit. In view of this, a potential investor before making an investment decision for a particular type of investment would like to know its related risk-return characteristics. The key criteria in the investment decision-making process for international levels are expected return and risk (MacGregor and Nanthakumaran, 1992; Newell and

Webb, 1996 cited in Adair et al., 2006). Similarly, an investor who has made an investment would like to know how the investment has performed in comparison with similar assets and with different types of investment options. In this regard a comparative performance analysis of investment options is necessary (Ting, 2003).

Real estate has been perceived as one of the

consistent and favourable investment opportunities. There are a number of reasons for this assertion but the most commonly promoted intuitive arguments for real estate are that it acts as an inflation hedge, provides diversification benefits, and has the potential for superior returns (Amidu and Aluko, 2006). Real estate is a tangible asset with intrinsic value and inflation hedge qualities. Direct investment in real estate has been an important strategic allocation for portfolio managers of endowments, foundations and pension funds for decades: they seek its potential for high income, stable total returns, and added diversification to investment portfolios in volatile markets (Brooks, 2011; Keating, 2011).

However, the characteristics of real estate as well as the emerging nature of Lagos as a mega city call for a comparative assessment of residential real estate investment within a submarket. Hence, this paper is aimed at appraising the viability of investing in residential real estate submarket in Lagos state, using the apartments in 1004 Estate as case study with a view to providing a guide for investors and portfolio managers on investment decision-making in Lagos as an emerging smart city. To achieve this aim, the following objectives were set:

(1) To ascertain the various risk of each of the apartments as well as the return strength of the various apartments in 1004 Estate.
(2) To identify the risk adjusted returns of the various apartments in 1004 Estate.
(3) To examine the potential of diversifying within residential real estate sub-markets.

LITERATURE REVIEW

Concept of real estate investment

Real estate investment involves the purchase, ownership, management, rental and/or sale of land and building for profit-making purposes. Improvement of real property as part of a real estate investment strategy is generally considered to be a sub-specialty of real estate investing called real estate development. The real estate industry has grown substantially in the recent years and is recognized in various literatures as consisting of several classification based on property use and types (Wikipedia, 2019). Sirota (2016) gave the numerous and diverse investment opportunities in real estate to include land, residential developments, office buildings, shopping centers, industrial projects and mobile-home park.

Real estate as an asset form describes a considerable investment vehicle for the private, commercial and institutional investors. Investment in properties reveals different features compared to conventional assets like stocks and bonds (Steffen and Alexander, 2009). It applies to long term investments and is recognized with

low correlations and a distinctive risk/return structure, which in turn is accountable for being classified as an alternative asset. With respect to issues of asset allocation, investment in real estate therefore provides remarkable potential for diversifying an investor's portfolio. Earlier studies measuring the diversification benefits such as Eichholtz (1996), Eichholtz et al. (1998) and Liu et al. (1997) found favorable characteristics of real estate investments, including high stability of value, comparatively low volatilities and opportunity to hedge against inflation.

Risk associated with real estate

Ajayi (1998 cited in Oni, 2010) opined that investors in property of various types are uncertain about the outcomes of their actions. Future events are difficult to forecast in precise terms and over time such forecast becomes unreliable. He stated further that risk is the level of probability that required return measured in terms of capital value and income would be achieved. Uncertainty implies that neither alternative outcomes nor their probabilities could be identified.

Oni (2010) further explained that risks occur in many and diverse ways at every stage of the investment process and include systematic and non-systematic risks. Systematic risk, also called market risk, refers to the risk common to all securities and cannot be diversified away within one market. Unsystematic risk is associated with assets value caused by factors that are specific to the subject real estate. There is also the downside risk derived from volatility in the development variables that affect the investor's profit, such variables are rent, void period, yield, construction cost, building period, land cost, and marketing cost, as reported by Ogunba (2002) and Ogunba et al. (2003).

Similarly, Baker (2001) while analyzing the investment in residential rental real estate identified that residential property investment are prone to being affected by the two types of risk which are systematic risk or market risk which cannot be reduced by diversification and unsystematic risk or specific risk which can be reduced or eliminated by diversification. Baker (2001) further explained that residential rental real estate is more likely to be affected by unsystematic risk than systematic risk and identifies them as follows: **Systematic risk** (general economic conditions, changes in interest rates, taxation) and **Unsystematic risk** (location, covenants, construction, neighbourhood, building quality, its general condition, age of property, depreciation, tenant and lease structure).

Return on real estate investment

The properties of real estate return distribution are of importance for the portfolio manager as they provide key

inputs into the assets allocation process. Lizieri and Ward (2000) review the literature on return distributions and return generating processes of physical and financial real estate investment in the U.S. and the UK. Much of the existing research has focused on testing for normality in real estate returns. Lizieri and Ward (2000) argue that much of the non-linearity and autocorrelation of direct market returns remain even after corrective procedures. They suggest that a better explanation can be found in the fact that many return observations are close to zero as a result of the illiquid market and slow arrival of information (Georgi, 2002).

Georgi (2002) established that like many economic fundamentals, real estate markets follow cycles and further cited the literature reviewed on real estate cycles and emphasize the importance of incorporating cycle forecasting into assets allocation models for real estate by Pyhrr et al. (1999). The aforementioned authors differentiate between two general categories of cycles that affect return on real estate as macroeconomic and microeconomic. Macroeconomic cycles occur at the regional, national and international levels. These include the general business cycle, inflation and currency cycles, technological cycles and demographic and employment cycles. Microeconomic cycles work on a metropolitan area, location and property levels. Demand and supply cycles can be either macro-or micro-level, depending on the focus. Other microeconomic cycles are urban and neighborhood cycles, physical life cycles, rent rate and occupancy cycles. For any investment horizon, many different cycles interact in complex ways to affect the returns on real estate investment.

West and Worthington (2003) while reviewing literatures on the macroeconomic risk factor in Australian commercial real estate discussed that, there are number of macroeconomic factors that affect return on direct property investment which include, interest rate, inflation rate, general demand and supply condition and further explains that Interest rates and interest rate spreads, for instance, are considered good indicators of economic activity and are therefore posited to contain information about property return movements. "The main reason for this link is the assumption that returns relate directly to the present and future state of the economy and business conditions, and these are in part governed by interest rates" (Brooks and Tsolacos, 2001). They conclude that several studies have found that interest rates help explain a significant proportion of the variability in property returns (Chen et al., 1986; Chan et al., 1990; McCue and Kling, 1994; Liow, 2000; Brooks and Tsolacos, 2001; Liow et al., 2003).

West and Worthington (2003) included that property investment is often regarded as an inflation hedge and the relationship between inflation and property returns is a recurrent theme in the literature (Hoesli, 1994; Liu et al., 1997; Bond and Seiler, 1998; Quan and Titman, 1999; Stevenson and Murray, 1999; Onder, 2000). Bond and Seiler (1998) have justified this interest on the basis that "…financial assets, such as common stocks and bonds, have been found to be poor performers when inflation is higher than expected. Therefore, if real estate is an effective hedge against expected inflation, then it should likely be included in efficient portfolios".

Finally, West and Worthington (2003) ascertained that property returns are also likely to be influenced by other demand and supply-side factors that can be easily measured at the macro level. Employment growth in particular industries, for example, may signal superior property returns through the flow of increased demand for commercial space to rental rates and valuations (Liang and McIntosh, 1998). The contention that macro-demand and supply conditions influence property returns has also been addressed by focusing on its link with construction activity (Eppli et al., 1998), industrial production (Karolyi and Sanders, 1998), stock markets (Quan and Titman, 1997, 1999; Lizieri and Satchell, 1997), aggregate consumption (Ling and Naranjo, 1997, 1998; Crone and Voith, 1999) and monetary policy (Johnson and Jenson, 1999).

Georgi (2002) also identified Ling and Naranjo (1997, 1998) analysis on macroeconomic risk factors priced in real estate market to include growth in consumption, real interest rates, the term structure of interest rates and unexpected inflation as systematic determinants of real estate returns. West and Worthington (2003) concluded while citing Stringer (2001) that direct property values, for example, are based on appraised valuations while listed property is priced daily to market. Consequently, direct property returns are often less volatile than listed property returns since the appraisal-based valuations have a smoothing effect and that it is recognized that direct property returns are highly correlated with the changing demand fundamentals in the economic cycle, while listed property returns are more closely aligned with changes in the liquidity cycle, reflecting the conduct of monetary policy.

RESEARCH DATA AND METHOD

In order to garner enough data and ensure credibility, the management of 1004 Estates Limited was consulted for data as the basic method of data collection. The management of the estate opinion was sought for more assertion about the rent on the various kinds of apartments in 1004 Estates. The data garnered is rental value of the various apartments from 2010 to 2017.

The data obtained from the comprehensive survey are analysed using descriptive statistics as applicable in portfolio management (modern portfolio theory models) introduced by Markowitz (1952). The mean and standard deviation are used to calculate the return and risk attached to the individual investment. Inferential statistic, correlation was used to assess the diversification potential within the real estate submarket. Data analysis was done using Microsoft Excel.

Study area

The 1004 Housing Estate, Victoria Island, Lagos

The monetization policy gave rise to the privatization of all public

properties which in turn brought about the sale of the 1004 Housing Estate in Victoria Island amongst other Federal Government owned properties nationwide. The 1004 Housing Estate is built on 100 ha of land. It is bordered by Sir Adetokunbo Ademola Street, Ozumba Mbadiwe and Samuel Manuwa streets in Victoria Island, Lagos State. The estate which was originally built for civil servants was purchased by a consortium of companies known as 1004 Estates Limited with UAC Property Development Company (UPDC) as the major shareholder. The estate that was formally known as 1004 flats became one 1004 Estates.

Description of housing types

The apartments in the 1004 Housing Estate are located on crescents A, B, C, D and streets E and F. The street consists of fourteen (14) storey residential blocks while the crescents are made up of several four (4) storey blocks of flats in addition to fourteen (14) storey high-rise which holds eighteen (18) number flats, consisting of nine (9) on each side of the centrally located lift/staircase area. These flats are connected by vertically placed service duct, which housed the plumbing, telephone and electrical cables and devices.

Accommodation details: The estate basically consists of 1004 (one thousand and four) living apartments made up as follows: (a) 252 Nos.: 1 and 2-bedroom high rise; (b) 504 Nos.: 3 bedroom high rise; (c) 48 Nos.: 3 bedroom low rise; (d) 200 Nos.: 4 bedroom flats. A typical apartment within the high-rise blocks consists of the following accommodation details: kitchen, living room, family lounge, bedrooms (2, 3 and 4), toilet/bathrooms (number varies depending on the type of flats).

Performance measurement tools

The performance measurement tools used in this study are shown subsequently.

Rate of return

The rate of return is the percentage difference in returns associated with the holding period. The rate of return measures the difference in rental value (rental appreciation) over the measurement period divided by the beginning rental value and contributions (additional investments) period. It is used to estimate the rate of return at the individual submarket level. It is calculated using the single period return formulae. *Rental return* formula is given as:

$$RR_t = \frac{RV_t - RV_{t-1}}{RV_{t-1}}(\%)$$

where RR_t represents average rental return for period t, RV_t represents rental value at the start of measurement period, and RV_{t-1} represents rental value at the end of period t-1.

Asset return

The asset return from each asset class was calculated using arithmetic mean. The asset return formula is given as:

$$\bar{R}_t = \frac{\sum_{i=o}^{n} R_t}{n}$$

where $\bar{R}_t$ represents the mean return of each investment for the year in review, $\sum_{i=o}^{n} R_t$ represents the summation of all return of an investment at various periods under review, and n represents the number of observation.

Asset risk

Standard deviation was adopted in measuring asset risk and is seen as the appropriate tool based on Levišauskait's (2010) opinion. The formula is given as:

$$\delta = \sqrt{\frac{\Sigma(R_t - \bar{R}_t)^2}{n}}$$

where R represents the return of an investment for a period, $\bar{R}_t$ represents the mean return of an investment, N represents the number of observation, and δ represents the standard deviation of the an asset class.

Risk-return profile

The risk adjusted rate of return of each of the assets was obtained by doing a mean variance analysis using the following formula:

$$R = \frac{\bar{R}_t}{\delta}$$

where R represents the risk adjusted rate of return, $\bar{R}_t$ represents the asset mean annual return, and δ represents the standard deviation (risk) of an asset class.

Correlation

Pearson Product Moment Correlation was adopted to observe whether there is any similarity or dissimilarity in the behaviour of various pairs of assets. The formula is given as:

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

where X_i represents the annual return of investment X, Y_i represents the annual return of investment Y, $\bar{y}$ represents the mean return of investment Y for period n, and $\ddot{X}$ represents the mean return of investment X for period n.

DATA PRESENTATION AND ANALYSIS

Table 1 shows the average net rental value of the various apartments in 1004 Estate for a period of 8 years (2010-2017). It shows summarized data collected from 1004 Estate and this is used for the analysis. From the table it can be deduced that there is an increase in the average rental value of each of the apartments annually from 2010 to 2013. The rental values remain unchanged in

Table 1. Average net rental value.

| Year | Apartments | | | |
	1 bedroom	2 bedroom	3 bedroom	4 bedroom
2010	500,000	2,000,000	2,000,000	2,800,000
2011	800,000	2,500,000	2,500,000	3,000,000
2012	1,500,000	3,000,000	3,000,000	3,800,000
2013	2,000,000	3,500,000	3,500,000	4,500,000
2014	2,000,000	3,500,000	3,500,000	4,500,000
2015	1,500,000	3,000,000	3,000,000	4,000,000
2016	1,500,000	3,000,000	3,000,000	4,000,000
2017	2,000,000	3,000,000	3,000,000	4,000,000

Source: Field Survey (2018).

Table 2. Mean variance analysis.

| Year | Apartments | | | |
	1 bedroom	2 bedroom	3 bedroom	4 bedroom
2010				
2011	60	25	25	7
2012	88	20	20	27
2013	33	17	17	18
2014	0	0	0	0
2015	-25	-14	-14	-11
2016	0	0	0	0
2017	33	0	0	0
Mean (Return)	27	7	7	6
Standard Deviation (Risk)	38.7114717	14.0602964	14.0602964	12.8022078
Mean ÷ standard deviation (risk-return profile)	0.6981	0.4814	0.4814	0.4588

Source: Field Survey (2018).

2014 while there is a slight decline in 2015 across the apartment types. Average rental values are stable from 2015 to 2017 for two, three and four bedroom apartments in the study area, while one bedroom apartments have a stable average rental value for 2015 and 2016 with an increase in 2017. The table additionally shows that two and three bedroom apartments move in a perfectly positive direction.

Analysis of the risk adjusted rate of return

Table 2 summarizes the return at the individual submarket level; this was calculated by finding the average of each apartment for the sampled period. The return obtained for one bedroom apartments is 27%, 7% for both two and three bedroom apartments and 6% for four bedroom apartments. This indicated that return on investment (ROI) in the various apartments is the highest in one bedroom apartments, which is significantly higher

than the other classes of apartments. It is followed by two and three bedroom apartments with the same ROI and lowest in four bedroom apartments.

Risk attached to investment in each of the apartments in 1004 Estate using the standard deviation measure shows that risk is the highest in one bedroom apartments with a risk level measured at 38.71% followed by investment in two and three bedroom apartments with risk measured to be same at 14.06% and lowest is four bedroom apartments with risk measured to be 12.80%. The standard deviation here highlights the volatility of the investment, that is, how the expected income could spread around return.

Having analyzed risk and return of the various investments, it is expedient to obtain the risk adjusted rate of return in order to ascertain which of the investments performs best. The risk adjusted rate of return was obtained using the mean-variance analysis. Table 2 displays the risk adjusted rate of return of each of the investments, showing that one, two, three and four

Table 3. Correlation matrix.

Correlation	1 bedroom	2 bedroom	3 bedroom	4 bedroom
1 bedroom	1			
2 bedroom	0.882575	1		
3 bedroom	0.882575	1	1	
4 bedroom	0.855042	0.832697	0.832697	1

bedroom apartments have 0.6981, 0.4814, 0.4814 and 0.4588 as risk adjusted rates of return, respectively. This advocates that one bedroom apartments exhibit the highest risk adjusted return while four bedroom apartments exhibit the lowest.

Diversification benefit within the sub-market

Table 3 shows a strong positive correlation between one and two bedroom apartments, with a correlative figure of + 0.8826, a strong positive correlation between one and three bedroom apartments, with a correlative figure of + 0.8826, a strong positive correlation between one and four bedroom apartments, with a correlative figure of +0.8550, a strong positive correlation between two and four bedroom apartments, with a correlative figure of + 0.8327 and a strong positive correlation between three and four bedroom apartments, with a correlative figure + 0.8327. This is an indication that the respective compared apartments move in same direction but at different magnitudes. The table further shows a perfect positive correlation between two and three bedroom apartments, with a correlative figure of +1. This confirms that the two apartments move in the same direction and at same magnitude.

The table basically shows a correlation matrix of the combination of the apartments in the submarket, showing that 1bedroom/2bedroom, 1bedroom/3bedroom, 1bedroom/4bedroom, 2bedroom/4bedroom and 3bedroom/4bedroom apartments are all positively strongly correlated; while 2bedroom/3bedroom apartments are perfectly correlated, that is, they move at the same pace in one direction. Hence, the apartments exhibit a weak portfolio diversification characteristic.

CONCLUSION AND RECOMMENDATION

This study has been able to identify that real estate is one of the major investment options worldwide. It is one of the consistent and favourable investment opportunities. There are a number of reasons for this assertion but the most commonly promoted intuitive arguments for real estate are that it acts as an inflation hedge, provides diversification benefits, and has the potential for superior returns (Amidu and Aluko, 2006; Andonov et al., 2013; Oloke et al., 2015). All agreed to at least one of this. The provision of diversification benefits and the potential for superior returns is the basis for this research.

Analyses done have shown that investment in flats or apartments also gives high return as all the apartments in 1004 Estate have high returns. As expected the risk attached to investment in the various kinds of apartments are also very high, as the general theory in investment states that the higher the risk the higher the return of an investment.

The analysis emphasizes that one bedroom apartments exhibit the highest risk adjusted rate of return. It is thus safe to posit that one bedroom apartments are the most attractive and lucrative amongst the apartments in term of investment.

The essence of combining various kinds of investments that do not react alike to the same economic condition in a portfolio is to prevent a complete financial ruination of the portfolio. The idea here is that if a particular economic condition does not permit certain investments to perform better, it may permit better performances of other kinds of investments found in the portfolio. It is the performance benefit attributable to this kind of combination of investments that is commonly referred to by various studies as diversification benefits (Umeh and Okonu, 2018). The analysis also shows that diversification within a real estate submarket is not wise to be ventured in as all the apartments move in the same direction. Whatever affects one apartment performance will most likely affect the performance of the other in either the same proportion or at a very close proportion. Hence, the apartments should not be advised to constitute in an investment portfolio. This finding aligns with findings in Emele and Umeh (2013), who in a similar study, while measuring the behavior of returns on real estate equities and the returns on common stocks discovered a positive correlation between the returns of both assets. Their findings suggest that integrating real estate and common stock in a portfolio would yield little or no diversification benefits.

The main recommendation in this study is that investors, when investing should consider other real estate diversification techniques rather than diversification within a particular real estate submarket, not just basing their investment decisions on the high level of return that could be realised in investing in properties within a submarket.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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