NEIGHBOURHOOD INFRASTRUCTURE CONDITIONS: INDICATOR FOR IDEAL RESIDENTIAL PROPERTY INVESTMENT RETURNS IN ABUJA, NIGERIA

BY

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ABSTRACT

Functional neighbourhood infrastructure creates the platform for real estate investment market to flourish and also enhances returns on propertyinvestment (both rental and capital appreciation).This study focused on the assessment of the effect of neighbourhood infrastructure conditions as indicator for ideal residential property investment returns in Abuja. The study adopted stratified random sampling technique and structured survey questionnaires were administered to get relevant data from practicing estate surveyors and valuers and residents of selected neighbourhoods in Abuja, Nigeria. Out of 1,302 questionnaires administered in the selected neighbourhoods, in Abuja, 718 were duly completed, returned and retained for the analysis. Descriptive Mean method of data analysis was employed, coefficient of variation and Spearman's Rank-Order Correlation Modelwere used to compare the property investment return in the selected areas of Abuja. It was discovered that,the infrastructure condition indices in Wuse II and Maitama is higher than ideal condition index (Benchmark), ranges between 82%-92% and 81%-94% when compared with average international standard at 60%, while infrastructure conditions in Kubwa and Lugbe found a bit below the average international standard condition .Kubwa and Lugbe property market of Abuja performed better than Maitama and Wuse on the basis of risk-return ratio analysis, of which Lugbe and Kubwa revealed the most consistent property market performance while Maitama and Wuse residential market showed high level market volatility due to risky nature of the market.Kubwa and Lugbe markets showed a stable market at minimum risk ranges between 8%-36%.The study concluded that, infrastructure have significant impact on residential property investment returns and this implies that, infrastructure development should be taken very seriously in order to achieve sound real estate investment decision making

Keywords: *Residential property, Investment returns, Infrastructure conditions, Neighbourhood, Abuja,*

1. Introduction

Infrastructure stands out as one of the indicators of an ideal urban economic development, it also plays a vital role in the growth and development of any urban setting and its role in-turn creates attraction for all forms of investments including real estate investment (Tomlinson, 2001). Infrastructure is referred to as the fundamental facilities serving neighbourhood, city or country for proper functioning of its economy. It is typically characterized by technical structures such as roads, bridges, tunnels, water supply, sewers, electrical grids, systemic communications, that enable sustain sand enhance societal living conditions Mendez, (2007). According to Tomlinson, (2001) more than 75.5% of the countries in the world that have moved away from poverty and subsistence economy have the

access to adequate infrastructure services, hence, moving away from global poverty and subsistence economy.

Ajayi, (2014) asserted that, property investment indicates real property purchased or developed with the target of earning a return through rental income or future resale of the property. The property may be held by an individual investor, or a group of investors, or a corporation. Ogbuefi, (2002) convincingly discussed it that, development of property investments performance indicators such as value indices, yields and total returns promote improvement in the analysis of the property investment returns.

Bello et al,(2006) opined that, all over the world, infrastructure is among one of the significant pointers of real estate development with the approximate 29.75% contribution to the economic development of the developed world. World Bank Group, (2004) postulated that, infrastructure has attractive capacity to bring about the actual worth of investment for corporate earnings which in-turn bring relative returns on investment and increase the value for the purchasing power of the real estate investors. Real estate investment is declared as one of the worthwhile and lucrative form of investments in the world-wide investment market. This statement is connected to its investment attributes in which high return profile (rental/capital appreciation), divergence benefits as well as capability for hedge against inflation (Ogunba, Obiyomi & Dugeri, 2013). Also, property investment like any other investment is to generate profit which could be achieved through income or through a profitable resale. The author specifically pointed it out that; returns on property investment indicate the percentage of the invested money returned to a property investor after the deduction of every other incidental costs (John, 2008).

Ajibola et al, (2013) suggested that, residential property investments returns cannot be regarded as being sustainable as long as there is occurrence of the inherent problem of inadequate and functional-deficiency in infrastructure, there is problem of low or no returns in property investment in urban and peri-urban neighbourhoods in some areas of Abuja. In the study of (Ajibola *et al.*, 2013), the authors laid a foundation towards getting answer to the identified problem which is a course for action; to answer the question of the development of residential investment property returns indices that does not take into consideration the condition of infrastructure indices on the residential property, such indices as value indices, and yields help residential property investors to identify viable residential neighbourhoods for investment purposes. It is on this basis that the study assessed the effect of infrastructure conditions on residential property investment returns in Abuja, Nigeria and the study evaluates the trends in returns on residential property investment relative to infrastructure conditions in Abuja between year 2009 and 2018.

2. Literature Review

Infrastructure is described as social "overhead capital", and it include public utilities such as power, telecommunication, water supply, sanitation and sewerage; and public works such as roads, dams, and drainage (World Bank Group, 2004).

Previous studies have found out that, infrastructure is a life behind real property investment and it is fundamental to property investment returns. Several findings from empirical studies on infrastructure and property investment proven to this because property investment have linked with infrastructure and many of these studies have hypothesized that infrastructure is the pivotal of property investment and have therefore succeeded in evaluating the effect of infrastructure on property returns (Hammer

et al.,2000; Mendez, 2007; Alausa 2007; Ajibola *et al.*, 2013).

Canning and Pedroni (2008) agreed that there is a positive correlation between improved infrastructure and economic growth. There has been improved economic growth at 5% per annum in the recent past despite the World Economic Forum Global Competitiveness. Index of 2012 – 2013 indicating that Africa remained the least competitive global region. Shah (1992) opined that, infrastructure facilitates open-up and development of a neighbourhood. This is deduced from their study "perception of the people on their locational choice preference", it was resulted that, availability of infrastructure among other factors prompted the more than 75% of the resident to choose a particular location.

Nweke (2000) also divided infrastructure into two parts; "first, those that bring about urbanisation and second, those that are necessitated by the urbanisation". The author further, placed a good number of natural factors, which provide facilities and services in the first group, are favoured location for growth of human settlements or cities. This concept was tested in a research in two studied locations using a new sited town with infrastructure and already sited town without infrastructure. The aftermath effect of 'with and without infrastructure' is that, newly sited town with infrastructure pulled people from already sited town without infrastructure and the property investment values and return drastically improved in the newly sited town as against already sited town. At times, in modern time new towns could be sited where these factors do not exist but are created for the required purposes. It is these two sets of factors that the builders of urban centres attempt to create in form of infrastructure. As a result of the above explanation, infrastructure in this context has come to be used to refer to all facilities and services which are necessary for the enhancement of settlements and residential neighbourhoods. The perception of Nweke (2000) is being agreed to here, because he laid much emphasis on the infrastructure as what stimulates urbanisation as well as what is essential for urbanisation.

Property investment is the extent of committing huge capital outlay (resources)to housing project in form of labour and capital with the primary aim of the anticipated returns (Kuye, 2008). The author further reiterated that, the returns may be un-realisable without the influence of infrastructure such as access road, potable water, electricity, correct waste disposal system to mention but a few. Shipely (2012) has studied the impact of historic designation of infrastructure under heritage legislation on residential property returns; this study is constrained by legislative regulation and not subject to forces of demand and supply under the free-market system, the outcome cannot be generalised and inference cannot be empirically made. This current study is based on a free-market analysis of demand and supply in the residential property market. Walter (2009) studied the analysis of the relationship between infrastructure and residential property investment value. The study was done in Kumash, between 2001 and 2008. The study could not account for the categories of infrastructure measured for the study and analysis is temporary which can make the study to be obsolete hence, this justifies the need for the current study.

MacGregor, (2000) stated the most common real estate investment returns measure, which also referred to as the return on investment. It is calculated by dividing the cost of the investment by the difference between the cost of the investment and gain on the investment. It is the most generic way to calculate return and is the basic formula used to calculate other return measures, the measures are return on equity, returns on assets, average

return, capital, total, income and return on growth which is depicted by the formula.

Return on Growth = (Present Value of Investment – Past Value of Investment)
Past Value of Investment

Hammer et al (2000) stated that the provision of adequate infrastructure is central to property investment returns. This is based on the study conducted in the Britain, collected data on rental and property prices data across twelve (12) County Councils juxtaposed with the provision of neighbourhood infrastructure in each of the county councils, many of the councils with high quality of facilities had higher returns on property class. Using inferential method of data analysis and analytical tool of correlation model, Johnson *et al*, (2005) opine that one of the determinants of property investment returns is infrastructure, the contribution of infrastructure results to high capital value appreciation in property investment and was concluded that, the annual returns of property is influenced by infrastructure. Majority of these studies did not consider the forces of demand and supply under the free-market system, and inference cannot be empirically made as this is a gap this study filled as it based on a free-market analysis of demand and supply in the residential property market because the study accounted for the categories of infrastructure

3. Methodology

This study geographically covered residential properties developed for investment purpose and have the capacity to generate income for the investor in the selected neighbourhoods of Abuja.. Abuja; the Federal Capital Territory is selected as case study on the basis that, it is an inorganic city that is civically growing with the influence of governmental resources for the provision of neighbourhood infrastructure. The study adopted cross-sectional research design and quantitative approach which was directed towards a framework that reflected the effect of the neighbourhood infrastructure conditions on residential property investment returns in Abuja. The framework required dependent variable; the property investment returns, and independent variable; the infrastructure condition. The data was sourced primarily from registered estate firms and residents in the selected neighbourhoods through a structured questionnaire by using stratified random sampling technique. Out of 1,302 questionnaires administered in the selected neighbourhoods, in Abuja, 718 were duly completed, returned and retained for the analysis. The Statistical Package for the Social Sciences (**SPSS**) was used for data coding, data entry as well as data cleaning. Analytical techniques includedescriptive methods of data analysis; Descriptive Graph Mean was adopted and Ranking method of data analysis (Likert Scaling) with a 5-point scoring format (1 = Very poor, 2 = Poor, 3 = Fair, 4 = Good, and 5 = Very good) was considered and employed for all the items and Bench Mark for minimum acceptable condition for infrastructure conditions index (ICI) was adapted. Also, Kendall Coefficient of Concordance was applied to test relationship among the ranked factors. Furtherance to methodology, infrastructure condition rating standard was introduced as basis for infrastructure condition index as adapted form Australian Association of Higher Education Facilities Officers (AAPPA).

Table 1: Showing Neighbourhood Infrastructure Condition Rating Standard

Condition	General Description	Rating	Condition Index
Very Poor	Neighbourhood in bad state, unit for occupancy, Absence of infrastructure and facilities, pollution and environmental degradation.	1	0.00 - 0.19
Poor	Deteriorated neighbourhood, structural problems, none functional infrastructure, contamination and pollution elements.	2	0.20 - 0.49
Fair	Average neighbourhood condition, evident of significant defects on infrastructure, malfunctioned of infrastructure facilities, minor environmental and pollution elements.	3	0.50 - 0.74
Good	Minor deterioration of neighbourhood, major maintenance on infrastructure not required, good condition of infrastructure.	4	0.75 - 0.94
Very Good	Neighbourhood not deteriorated, infrastructure is new and in good state, absence of contamination and pollution	5	0.95 -1.00

Source: Adapted from the AAPPA- Australian Association of Higher Education Facilities Officers (updated in 2010)

NOTE:
The Infrastructure Condition Index (ICI) is an index number that indicates the current condition of the infrastructure measured relative to its ideal 'perfect' condition.

$$ICI = \frac{\text{Infrastructure Current Condition}}{\text{Perfect condition}}$$

4. Results and Discussion

This section focuses on the data presentation and analysis, it is arranged such that infrastructure condition index in each of the neighbourhoods, average infrastructure condition index and test of relationship among the ranked infrastructure conditions in the study area are presented in tabular form coupled with returns on residential property investment computed using total return model in tabular form followed by their graphical representations of trends indices

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Table 2: Showing Infrastructure Condition Index (ICI) across the selected Areas in Abuja

Infrastructure	Kubwa (Alpha-α @0.77)					Lugbe (Alpha-α @0.79)					Wuse II (Alpha-α @0.86)					Maitama (Alpha-α @0.89)				
	N	Sum	Mean	ICI	Status	N	Sum	Mean	ICI	Status	N	Sum	Mean	ICI	Status	N	Sum	Mean	ICI	Status
Water supply	157	507	3.23	0.65	Good	183	615	3.36	0.67	Good	193	886	4.59	0.92	Good	185	854	4.62	0.92	Good
Electricity	157	567	3.61	0.72	Good	183	651	3.56	0.71	Fair	193	793	4.11	0.82	Good	185	871	4.71	0.94	Good
Access Road	157	515	3.28	0.66	Fair	183	581	3.17	0.63	Fair	193	795	4.12	0.82	Good	185	864	4.67	0.93	Good
Security Infrastructure	157	471	3.00	0.60	Fair	183	515	2.81	0.56	Fair	193	800	4.15	0.83	Good	185	793	4.01	0.80	Good
Drainage System	157	460	2.93	0.59	Fair	183	560	3.06	0.61	Good	193	790	4.10	0.82	Good	185	850	4.59	0.92	Good
Waste Disposal	157	482	3.07	0.61	Good	183	585	3.20	0.64	Fair	193	801	4.15	0.83	Good	185	759	4.10	0.82	Good
Recreation Facilities	157	504	3.21	0.64	Fair	183	621	3.39	0.68	Fair	193	794	4.11	0.82	Good	185	745	4.03	0.81	Good
Education Infrastructure	157	463	2.95	0.59	Good	183	512	2.80	0.56	Fair	193	809	4.19	0.84	Good	185	746	4.03	0.81	Good
Health Infrastructure	157	495	3.15	0.63	Good	183	590	3.22	0.64	Good	193	799	4.14	0.83	Good	185	784	4.24	0.85	Good
Street Light	157	512	3.26	0.65	Fair	183	610	3.33	0.67	Good	193	820	4.25	0.85	Good	185	796	4.30	0.86	Good
Valid N (list-wise)	157					183					193					185				

Source: Author, 2018

Table 2 shows the result of the mean analysis and the reliability test carried out to ascertain the degree of internal consistency among the items. The result indicated that, at minimum acceptable alpha of 0.75 (75%), all the items across the study areas maintained a high level of internal consistency at 77%, 79%, 86% and 89% for Kubwa, Lugbe, Wuse II and Maitama respectively. The hypothesised mean or benchmark is calculated as (5+4+3+2+1= 15/5=3). Also, any infrastructure with mean condition higher than the average threshold or hypothesised mean is referred to as infrastructure with a better condition. Therefore, the infrastructure showed good and fair conditions except for education infrastructure and security infrastructure in Lugbe and Kubwa. The average mean condition index or hypothesised mean condition index (benchmark) at 0.6 (3/5) for five–point Likert scale is used to determined infrastructure with better condition, in other word, any infrastructure condition index that is more than 60% (0.60) showed a better condition index. Infrastructural condition index in Kubwa ranges between 0.59 and 0.72 (59% - 72%), in Lugbe, infrastructure condition index ranges between 0.56 and 0.71 (56% - 71%), in Wuse II, ICI ranges between 0.82-0.92 (82% - 92%) and in Maitama, ICI ranges between 0.81 – 0.94 (81%-94%). This further suggests that the infrastructure condition in Wuse II and Maitama are far better than Kubwa and Kubwa is a bit better than Lugbe.

Table 3: Average Infrastructure Condition Index across the Study Neighbourhoods in Abuja

	Study Areas	N	Mean	Status	Standard Deviation
Abuja	Kubwa	10	3.1690	63%	.20119
	Lugbe	10	3.1900	64%	.24499
	Wuse II	10	4.250	85%	.14723
	Maitama	10	4.3300	87%	.28983

Source: Author, 2018

Table 3 reflected the average infrastructure condition index in the selected neighbourhoods. All the selected areas showed a better and fair conditions and therefore, Maitama and Wuse II areas of Abuja have good infrastructure condition at 87% and 85% at highest property investment performance only Kubwa and Lugbe showed a fair condition at 63% and 64% relative condition index respectively.

Table 4: Test of Relationship among the Ranked Infrastructure Condition in Abuja

Infrastructure	Abuja							
	Kubwa	Lugbe	Wuse II	Maitama	T_1	$\sum T_1^2$	W	r_s
Water supply	4	3	1	3	11	121		
Electricity	1	1	7	1	10	100		
Access Road	2	7	6	2	17	289		
Security Infrastructure	8	9	4	8	29	841		
Drainage System	10	8	8	4	30	900	0.753	0.543
Waste Disposal	7	6	4	9	26	676	(0.021)	(0.035)
Recreation Facilities	5	2	7	7	21	441		
Education Infrastructure	9	10	3	7	29	841		
Health Infrastructure	6	5	5	6	22	484		
Street Light	3	4	2	5	14	196		

Source: Author, 2018

Further analysis of the opinion of the respondent on the level of agreement on the condition of infrastructure using Kendall coefficient of concordance and Spearman Rank Order Correlation is presented in table4. The result of Kendall's Coefficient of Concordance (W) at 0.753 revealed a statistical evidence of a fair association in the ranking of the infrastructure condition across the study area in Abuja, while the average rank correlation of variables between all possible pairs of the areas r_s = 0.543 indicating a weak agreement to the condition of infrastructure across the selected neighbourhoods in the study area. This result thus suggests that, though each neighbourhood has its own peculiar condition and therefore the overall ranking of these factors across the study area are fairly associated.

Table 5: Rate of Returns on 2B/R Property Investment in Abuja

Period (Year)	Kubwa	Lugbe	Wuse II	Maitama
2009	21.43	22.88	10.34	20.34
2010	38.95	26.94	16.42	29.19
2011	17.99	17.54	27.10	30.35
2012	13.70	17.25	36.76	39.36
2013	21.52	21.52	27.73	22.59
2014	21.28	21.24	17.77	11.41
2015	16.96	16.96	28.37	22.68
2016	11.96	11.97	17.81	32.93
2017	13.34	6.55	34.98	18.85
2018	14.05	11.26	37.84	30.98
Average Rate of return	19.12	17.41	25.51	25.87
Standard deviation	6.85	6.13	9.52	18.16
Coefficient of variation	0.36	0.35	0.37	0.70

Source: Author's Field Survey

Table 5indicatesthe aggregated rate of return trending on double digit relative to aggregated condition of available infrastructure, but standard deviation and coefficient of variation on 2B/R property across the selected residential market areas identified individual market performance on the basis of risk. Kubwa residential market revealed that an investor is undertaking a risk of 36% in order to have 19.12% return on investment, in Lugbe residential market, an investor is undertaking a risk of 35% in order to have 17.41% return on investment, In Wuse II, an investor is undertaking a risk of 37% in order to have 25.51% return on investment and while investor in Maitama residential market is undertaking a risk of 70% in order to have 25.87% return on property investment. Therefore, Lugbe residential property market is considered desirable and better market, because investor is taking a minimum risk at a comparable average return. Maitama residential market showed a high volatility and more risky than property market in other locations.

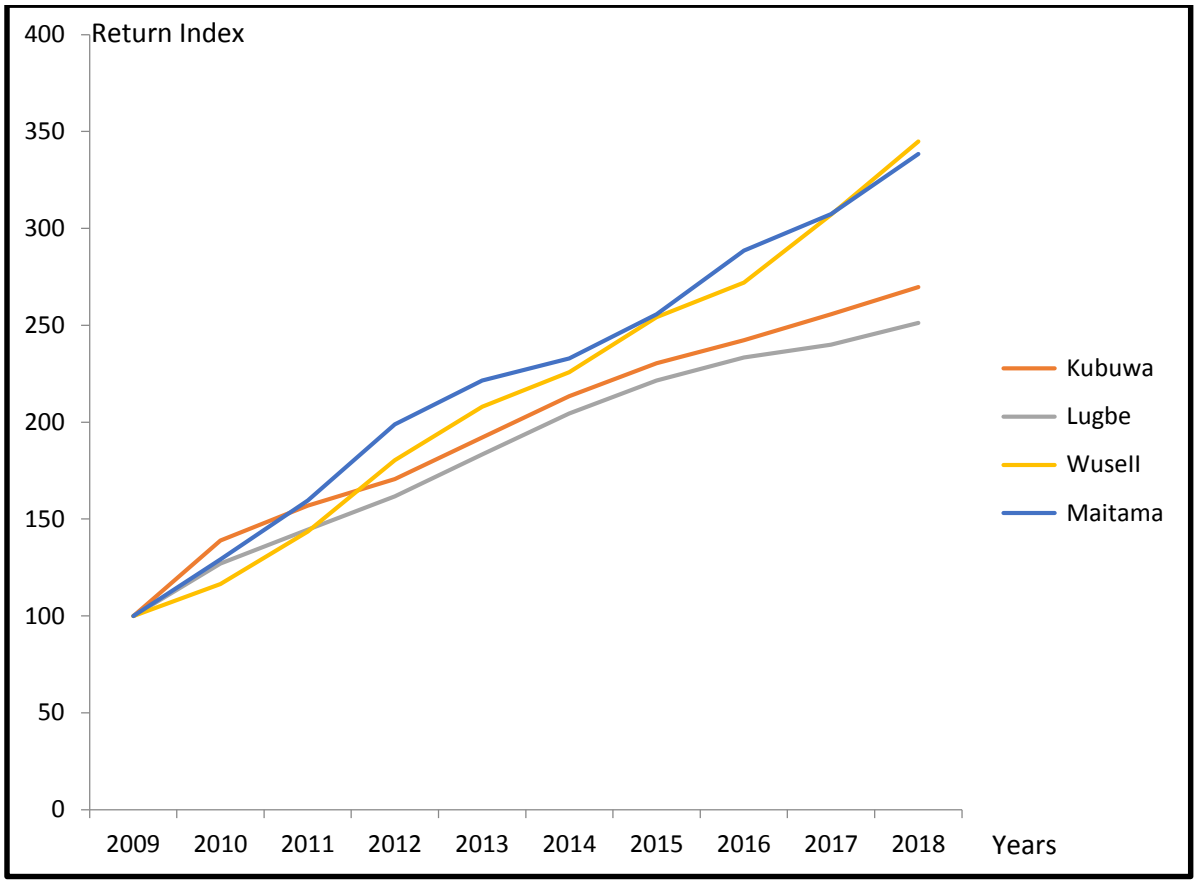

Figure1: Trend in 2B/R Property Market Return Index in Abuja

Figure 1 is a graphical representation of the movement of 2B/R properties returns across the selected areas of Abuja. Wuse II and Maitama moved in the same direction and overlapped Kubwa and Lugbe while Lugbe and Kubwa moved gently over certain period on the same direction. The markets showed a moderate movement between 2009 and 2012 after which there was drastic change. This indirectly showed that, these two neighbourhoods are similar in terms of property market operation relative to infrastructure conditions.

Table 6: Rate of Returns on 4B/R Property Investment in Abuja

Period (Year)	Kubwa	Lugbe	Wuse II	Maitama
2009	18.86	22.19	16.34	27.21
2010	20.32	20.32	10.79	21.89
2011	21.27	21.09	10.80	19.65
2012	20.06	20.45	10.88	15.93
2013	26.44	26.22	11.03	33.92
2014	24.69	24.69	11.53	22.80
2015	23.34	22.79	12.08	13.30
2016	18.10	20.98	11.27	6.63
2017	23.54	21.46	3.75	36.42
2018	21.67	21.45	9.08	41.18
Average Rate of return	21.83	22.16	10.75	23.89
Standard deviation	2.65	1.92	3.09	10.87
Coefficient of variation	0.12	0.08	0.29	0.46

Source: Author's Field Survey

In Table 6, double digit annual rate of returns was reflected over the periods, which indirectly indicates better performance in property market relative to infrastructure conditions, with the exception of Wuse II and Maitama in 2017 and 2016 which showed a single digit rate of return which is the signal of a fair performance in the property market in those two years. Analysis of individual market performance was carried out using standard deviation and coefficient of variation to establish the risk contents in 4B/R property market across the selected residential market areas. Kubwa residential property market revealed that an investor is bearing a risk of 12% in order to get 21.83% return on investment, in Lugbe residential market, an investor is undertaking a risk of 8% in order to have 22.16% return on investment, In Wuse II residential market, an investor will take a risk of 29% in order to have 10.75% return on investment and while investor in Maitama residential market is undertaking a risk of 46% in order to have 23.89% return on property investment. Then from the table, Lugbe and Kubwa residential markets are adjudged better residential market, because investor is taking a tiniest risk when compare with other markets. Maitama and Wuse II residential market showed a high unpredictability and more risky than other property market locations in Abuja.

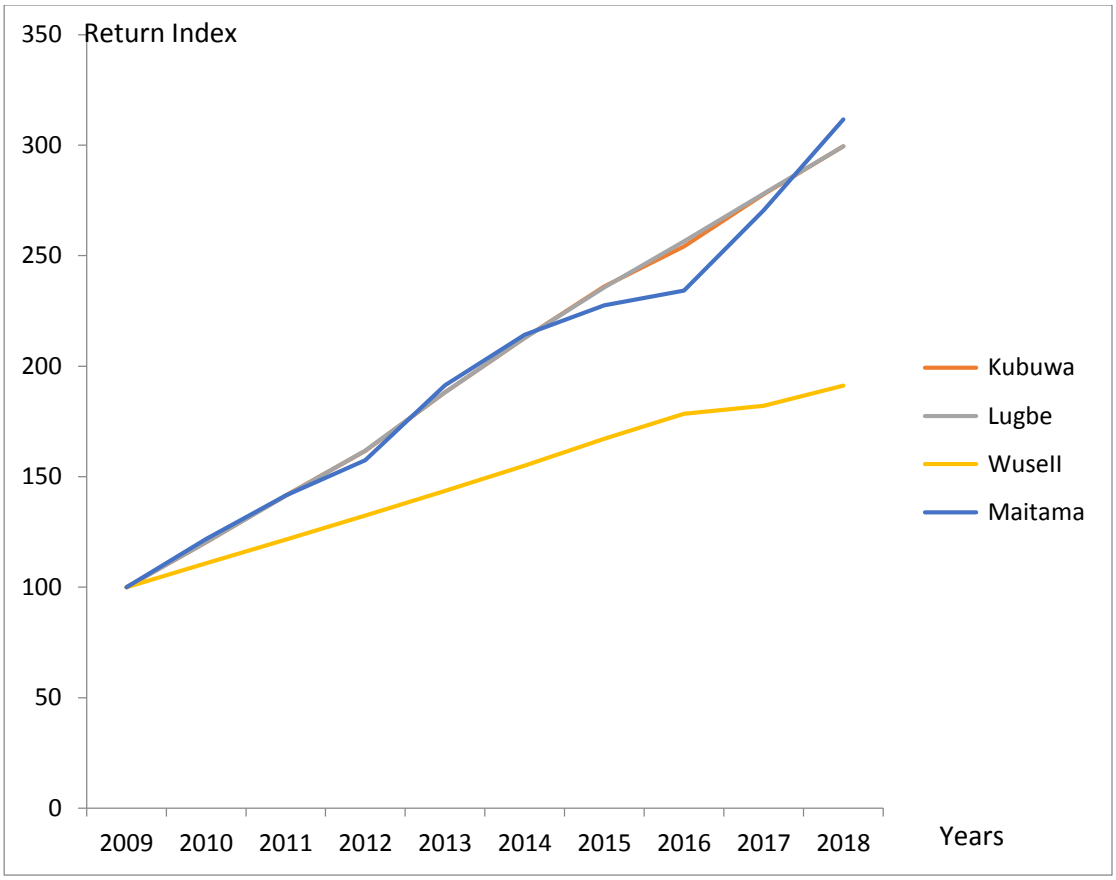

Figure 2: Trend in 4B/R Property Market Return Index in Abuja

The 4B/R property market returns moved upwardly over the period of the study as shown in figure 2. The 4B/R property market in Lugbe and Kubwa move in the same direction over the period which signified that the market is highly demanded and frequent market transaction was in operation. Maitama has similar movement from 2009 to 2015 after which there was a dewdrop in 2016 due to recession in the Nigerian economy which drastically affected the property market. Only Wuse II property market was behind other locations in Abuja. This indicates that the market changed as a result of demand for 4B/R in Wuse II that was the reason for low movement compared with property market in other neighbourhoods

5. Summary of Findings

The variation in property investment returns in selected areas of Abuja found between 60% and 70% is influenced by infrastructure condition and residential property investment in Kubwa and Lugbe areas of Abuja performed better than Maitama and Wuse on the basis of risk-return ratio analysis and showed a stable and profitable market at minimum risk ranges between 8%-36%.The study lastly revealed that, infrastructure condition indices in Wuse and Maitama seemed to be higher than ideal condition index (Benchmark) and the condition index ranges between 82%-92% and 81%-94% for WuseII and Maitama respectively. Infrastructure in Kubwa and Lugbeis found a bit bellow expected average standard, but few were fair in standard.

6. Conclusion

This study has substantiated that, functional infrastructure is the strength of ideal real estate investment as it provided a statistically significant effect on property investment returns in the selected neighbourhood of

Abuja. Indicating that, an improvement on the standard of infrastructure will bring about unit increase on the return(s) of real property investment. The result of the study has shown that return on residential property investment is hanged on the quality of infrastructure condition. Therefore, the outcome from the study has convincingly deduced that, quality neighbourhood infrastructure influence residential property investment returns in an ideal property market situation. As a result of this, there is need for quality and adequate provision of functional infrastructure to boost residential property investment returns' sustainability which could be achieved through Public Private Partnership (PPP). Low maintenance cost concept should also be adopted through planned and unplanned maintenance schedule as this will keep the available infrastructure functioning and not to be found below average international standard.

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