

Forecasting Demand for Office Spaces in Ikeja, Nigeria

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***Abstract** This study was undertaken to analyze the demand for office spaces in Ikeja, Nigeria with a view to determining models useful for forecasting the demand. In attaining the stated aim and objectives of the study, one hypothesis that “there is no significant relationship between rental values and demand for office” was tested. Data were collected from the primary and secondary sources. Primary sources were data on demand, supply, and rental values of office spaces over a five-year period obtained through questionnaires administered on one hundred estate surveyors randomly selected in the study. Statgraphic Centron XV statistical software was used to analyze the data and determine the relationship between the rental value and demand for office spaces in the study area at 95% confidence level. The study found that there was statistically significant relationship between the variables P -value = 0.0207, and R^2 statistic indicates that the model as fitted explains 87.0188% of the variability in Average Rental Value; while the correlation coefficient of 0.932839 indicates a relatively strong relationship between the variables. In addition, it was found that demand for banking spaces would continue to decrease whereas purpose-built and converted office spaces would attract increasing demand from year to year.*

***Keywords:** rental value, office spaces, demand, supply, forecasting*

1. Introduction

The problems in the property market in Nigeria, especially in urban areas, are many. One of the problems is inadequate information about the market and inability to determine what amount of properties that tenants will apply for. Many of the properties have been abandoned and have been left uncompleted. Many that are completed are not occupied because there is no demand for them. Many of such properties are commercial properties including office spaces which this study will look at.

According to Pilinkienė (2008), the intensive competition and rapid market changes have increased the need for forecast information related to general market demand. Little experience in market demand forecast under dynamic market conditions predetermines inaccurate market demand research results and unsubstantiated enterprise operations decisions. The effective selection of market demand forecast methods and their application can reduce risk and in real estate development. The forecast results have become of particular importance to the Lithuanian industrial enterprises who seek to forecast market development prospects and tendencies in order to survive on the competitive market.

In Nigeria, the phenomenal rate at which urbanization is occurring has overwhelmed those tasked with managing them. Cities like Lagos, Abuja, Port Harcourt, face the dual challenge of exploding populations and scarce resources (Oni, 2010). Regardless of the scarce resources associated with managing increasing population, demand for commercial properties has increased with investors and developers attracted. The developers and investors rely on forecasting of demand to determine the feasibility and viability of development projects they carry out from time to time.

Demand forecasting is the activity of estimating the quantity of a product or service that consumers will purchase. It involves techniques which include informal methods and qualitative methods. Informal method includes educated guesses while quantitative methods involve the use of historical sales data or current data from test markets. It may be used in making pricing decisions, in assessing future capacity requirements, or in making decisions on whether to enter a new market.

There is need to know the trend in demand for properties because investments in properties of various types are capital intensive and takes long time for it to be recouped. This is why developers, banks that grant loan to development, and estate surveyors take demand for the types of properties now and in future very serious before starting investment, granting loans, or carrying out feasibility and viability studies. This study intends to examine demand and develop model for forecasting the demand for office spaces. In this regard, the type of office spaces available and average rental values of office spaces in Ikeja were determined; the trend in demand for and supply of office spaces in the study area in the past five years was appraised; the relationship between demands for offices and rental values in the study area in the last five years was established, while model for forecasting demand for offices in the study area was developed.

Ikeja city is a large component of Lagos metropolis, which itself, is the largest city in Nigeria. It is located at 6°34'60"N, 3°19'59"E along the West African coast and was the capital city of the country before it was replaced with Abuja on 12th December, 1991. However, Lagos remains the commercial nerve centre of Nigeria and has become a typical example in the history of growth and development of urban areas in the country. According to Official Website of Lagos State, the Western Region administered the city along with Agege, Mushin, Ikorodu, Epe, and Badagry until Lagos State took off as an administrative entity, and in 1976 Ikeja replaced Lagos Island as the capital of Lagos State.

2. Literature Review

In attaining the stated aim and objectives of this study, literatures were reviewed along three issues: demand forecasting, and methods of forecasting.

2.1 Demand Forecasting

Demand forecasting is the activity of estimating the quantity of a product or service that consumers will purchase, and involves techniques including both quantitative and informal methods. Informal methods include educated guesses, and quantitative methods make use of historical sales data or current data from test markets. Demand forecasting may be used in making pricing decisions, in assessing future capacity requirements, or in making decisions on whether to enter a new market (*Wikipedia, the free encyclopedia*).

A number of studies have been carried out on demand for office spaces. For instance, *Urbanics Consultants* (2010) reported a list of offices in respect of which studies on demands were conducted in Western Canada. Each office space analysis entailed undertaking employment growth projections, office absorption projections, and demand-based development forecasting. One study determined the market feasibility of a proposed development within the context of the plan specifications, current office and residential trends, and related dynamics in the downtown Vancouver area. The second study focused on determining the financial feasibility of the project's two components; office market study was carried out to evaluate the suitability of the site for office development, determine the appropriate size and timing of the

office opportunities over a five year period, and establish recommended development programme indicating optimal rental rates, the preferred tenant mix, and the preferred building configuration for the proposed development. Furthermore, a study was prepared on office market study for a 52,000 square foot West Side Vancouver Office site located at the southeast corner of downtown Vancouver. The purpose of the study was to determine the annual demand for office space at the subject site over a ten year period and to set out a development strategy indicating the preferred size and timing for the office component of the project; with preliminary assessment of the office development potential and forecasting of population trends within the Fleetwood area examined in conjunction with the existing supply of competitive office space and probable demand levels for the next years. In Nigeria, Oni (2009) determined demand for commercial properties along the arterial roads and developed models for predicting demand and commercial property values in Ikeja. Similarly, Urbanics Consultants prepared a study to determine the annual demand for business office space at a 6.25 acre at Guildford Office Park site, in Surrey, B.C. and set out development strategy indicating the preferred size, timing and building configuration for the office park. Other studies include mixed use study of Gateway, Grande Prairie, and Alberta Alderbridge Centres, Richmond, B.C. to review the dynamics of supply and demand for such uses in Richmond, and subsequently determine the feasibility of such development; and Medical Office Complex, New Westminster, B.C. to assess the development opportunities of a medical complex on a 0.8 acre site in New Westminster, from both market and financial perspectives. The analysis involved the examination of trends in the supply of medical office space in a large study area.

2.2 Methods of Forecasting

Forecast method is defined as a way of task solution or forecast development that guarantees the identification of the way out for different forecast users. The main objective of the forecast method is to transfer the current information into the future and move from the processed information to forecast. Due to the abundance of the forecast methods (there are more than 200 methods mentioned in the economic literature), it is rather cumbersome to review all of them. Therefore, the analysis was carried out by classifying them into groups. Depending on the research area and research object, the most commonly used forecast method classification in the research literature is based on some criteria which include type of information (quantitative and qualitative forecast methods), forecast time span (short-term, mid-term and long-term forecast development methods), forecast object (micro and macro economic indicator forecast methods), forecast goal (genetic and normative forecast methods). The most popular and universal, and the most commonly applied in research papers is the classification based on quantitative and qualitative forecast methods because of its characteristic to involve the methods classified in other groups (Bails, 1993; Bolt, 1994; Peterson, 1999; and Cox, 2001). As stated in Pilinkienė (2008), different forecast method classification criteria were analyzed by Bails (1993), Bolt (1994), Peterson (1999), McGuigan (1989). Kinnear (1996), Reekie (1998), and Kennedy (1999) support the priority of the quantitative forecast methods and use qualitative forecast methods as an auxiliary or alternative means; whereas, Bolt (1994), Hall (1994), Clement (1989), Kirsten (2000), Goodwin (2002), Larrick (2006), and Green (2007) state that the synthesis of quantitative and qualitative forecast methods guarantees more reliable and informative forecast.

According to Pilinkienė (2008), one is often confronted with the problem of inappropriate selection of a forecast method. Every actual forecast situation methods have their advantages and disadvantages, hence, it is important to define and analyze forecast method selection criteria. Firstly, most of the quantitative forecast methods are based on the assumption that a certain reasonable linkage that existed in the past, will remain in the future. Secondly, the forecast accuracy by using any forecast method gets reduced with the increase of the forecast time span, indicating that long-term forecast is less reliable than the short-term one due to the factors that cause potential uncertainty. Thirdly, the forecast for the whole market demand is usually more accurate than the forecast for a separate product because in the former case, the demand forecast errors for separate product groups just eliminate each other (Herbig, 1994).

The analysis of the most significant forecast method criteria in the research literature discloses two-sided opinion: on the one hand, Bails (1993) states that the selection of the forecast method should be based on the assessment of its accuracy; while on the other hand, Waddell (1994); Clifton (1998) associate the forecast process with defined forecast objectives. According to Bails (1993), the restriction of the application of high accuracy methods is caused by inappropriate definition of the research object, and involvement of the economic processes that are not substantiated by approved regularities. Simple quantitative forecast methods are applied for short- and mid- period of time (simple moving average and exponential smoothing), while for long-term forecast regression and econometric models are applied. However, the selection concept of the forecast method reflects only one criterion - either forecast accuracy or forecast objective. The selection of the forecast method should be based on several criteria taking into account forecast method applicability and additional things proposed by researchers such as forecast accuracy degree, time span, amount of necessary initial data, forecast costs, and result implementation and applicability level. The priorities of forecast method application are determined according to the forecast time span which is traditionally divided into short- (1 - 3 months), mid-(3 months - 2 years) and long- (more than two years).

The moving averages which include simple moving average, and weighted moving average, is a forecasting method based on arithmetic average of a given number of past data points; exponential smoothing (single exponential smoothing, double exponential smoothing) is a type of weighted moving average that allows inclusion of trends; mathematical models (trend lines, log-linear models, and Fourier series): linear or non-linear models fitted to time-series data, usually by regression methods; and autocorrelation methods (Box-Jenkins methods) used to identify underlying time series and to fit the "best" model. Simple moving average techniques forecast demand by calculating an average of actual demands from a specified number of prior periods. Each new forecast drops the demand in the oldest period and replaces it with the demand in the most recent period; thus, the data in the calculation "moves" over time. The formula for this technique is:

$$\text{Simple Moving Average: } A_t = \frac{D_t + D_{t-1} + D_{t-2} + \dots + D_{t-N+1}}{N}$$

where,

N = total number of periods in the average,

A_t = Forecast for period $t+1$: F_{t+1} ,

Key decision is in respect of how many periods that should be considered in the forecast, depends on the tradeoff: With higher value of N - greater smoothing, lower responsiveness; and with lower value of N - less smoothing, more responsiveness the more periods (N) over which the moving average is calculated, the less susceptible the forecast is to random variations, but the less responsive it is to changes. A large value of N is appropriate if the underlying pattern of demand is stable; a smaller value of N is appropriate if the underlying pattern is changing or if it is important to identify short-term fluctuations.

Some of the criteria for selecting a forecasting method depend on the objectives of the study, which may be to maximize accuracy and minimize bias, while the potential rules for selecting a time series forecasting method are to select the method that gives the smallest bias, as measured by cumulative forecast error (CFE); or gives the smallest mean absolute deviation (MAD); or gives the smallest tracking signal; or supports management's beliefs about the underlying pattern of demand or others. In this regard, the forecasting method adopted for the study is the time series with three year moving averages.

3. Material and Methods

Data were collected from the primary and secondary sources. The primary data were obtained through questionnaires with oral interviews of estate surveyors in the study area, while the secondary data were from earlier studies. The secondary data include literature on topics relevant to the study obtained from the internet and research projects. This research identified one study group for investigation which is the firm of

estate surveyors and valuers in Ikeja. There are one hundred and ten firms operating in the study area, and a sample of seventy-five firms was randomly selected using Bartlett, et al's (2001) model, and one questionnaire was administered at each of the sampled firms.

In analyzing the data, the simple regression models and Microsoft Excel packages and Statgraphic statistical were used to determine the relationship between demand and rental values of offices, while the moving average of demand for offices between 2005 and 2009 was calculated to derive the direction of demand using the trend line options in the MS Excel Spreadsheet. In this study, supply and demand for office spaces are based on requests that were effectively made for and in respect of which transactions were concluded by the respondents within the study period.

4. Analysis and Discussion

The attempt in this section was to attain the stated aim and objectives of study and in doing so, the type of offices spaces available in the study area, and the trend in the supply and demand for offices spaces are determined.

4.1 Determination of the Types of Office Spaces Available in the Study Area

Attempt is made in this section to attain the objectives of the study which is "to determine the types of office spaces available in the study area". This was made possible from the respondents' opinion guided by a list of types of three types of office spaces, which are: banking spaces, purpose-built office spaces, and converted office spaces. Details of the respondents' opinions are given in Table 1

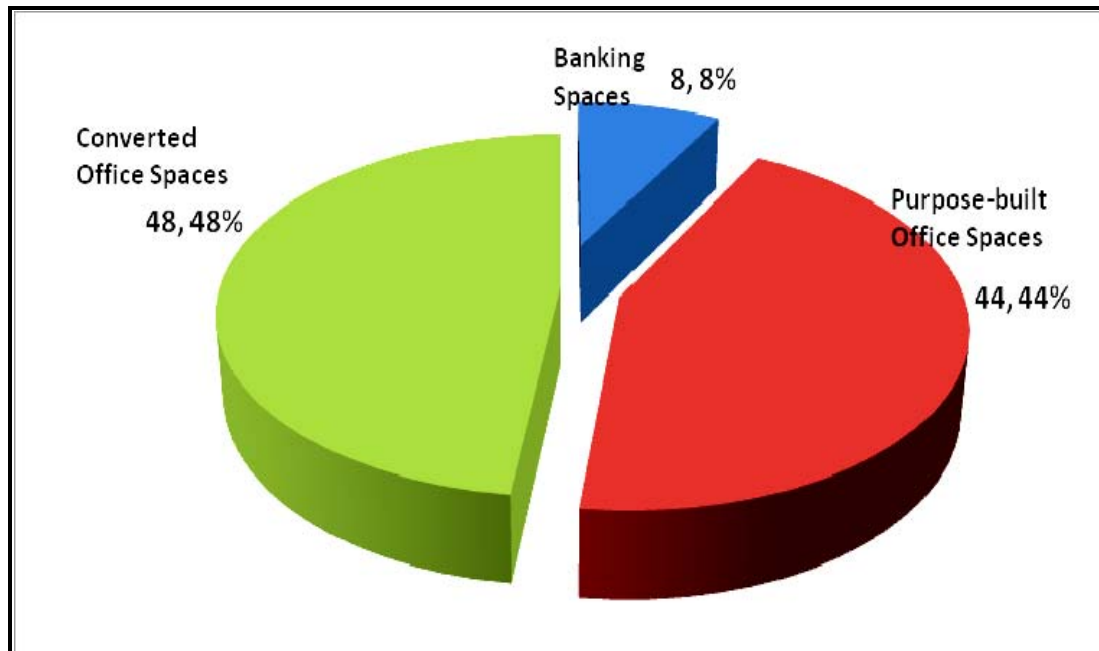
Table 1: Types of Office Spaces in Ikeja

S/N	Type of Office	Frequency	Percentage
1	Banking Space	12	16.0
2	Purpose-built (open-plan)	39	52.0
3	Converted (small unit offices)	24	32.0
Total		75	100

Source: Oni, 2010

From Table 1, out of seventy-five respondents, 12 (16%) stated that that banking spaces are mostly available; 39 (52%) stated that purpose-built open-plan offices are available; while 24 (32%) stated that converted offices are mostly available. This implies that the type of office spaces mostly available in the study area is the purpose-built open-plan office spaces. However, the respondents claimed that they have more of small unit office spaces under their management portfolios as shown in Fig. 1 below

Fig. 1. Pie Chart Showing Percentages of Available Offices Spaces in Ikeja



Source: Oni, 2010

Fig.1 shows that the most available type of office spaces in the study area is the converted type of offices which makes up to 48%, followed by purpose-built office spaces (44%), while Banking spaces made up 8%. This indicates that converted office spaces are common in the study area; and may be as a result of conversion of structures that were earlier of residential user. The study area was mainly of residential properties before it became the capital of Lagos State and demand for office spaces has probably encouraged owners to convert to office uses.

4.2 Trend in Demand for Office Spaces in Ikeja

Details of the types of office spaces available in the study area between 2005 and 2009 are given in Table 2

Table 2. Details of Requests for Office Spaces in Ikeja

S/N	Type of Space	Year				
		2005	2006	2007	2008	2009
1	Banking Space	31	15	6	10	19
2	Purpose-built Offices	160	165	180	310	396
3	Converted Offices	325	376	397	430	407
Total		516	556	583	750	822

Source: Oni, 2010

From Table 2, analysis of the total number of transaction-based demand for office spaces in the study area showed that there has been increase in the requests. For instance, in 2006 it increased by about 7.75%; slightly (4.86%) in 2007 from the 2006 figures; substantially by 28.65% in 2008; and by 9.6% in 2009. The lower rate recorded in 2009 may probably be due to the international economic crisis which has also affected the study area.

4.3 Analysis of the Moving Average of Demand

Analysis of the moving average of data in Table 2 was carried out for each of the type of office spaces as shown in Tables 3.

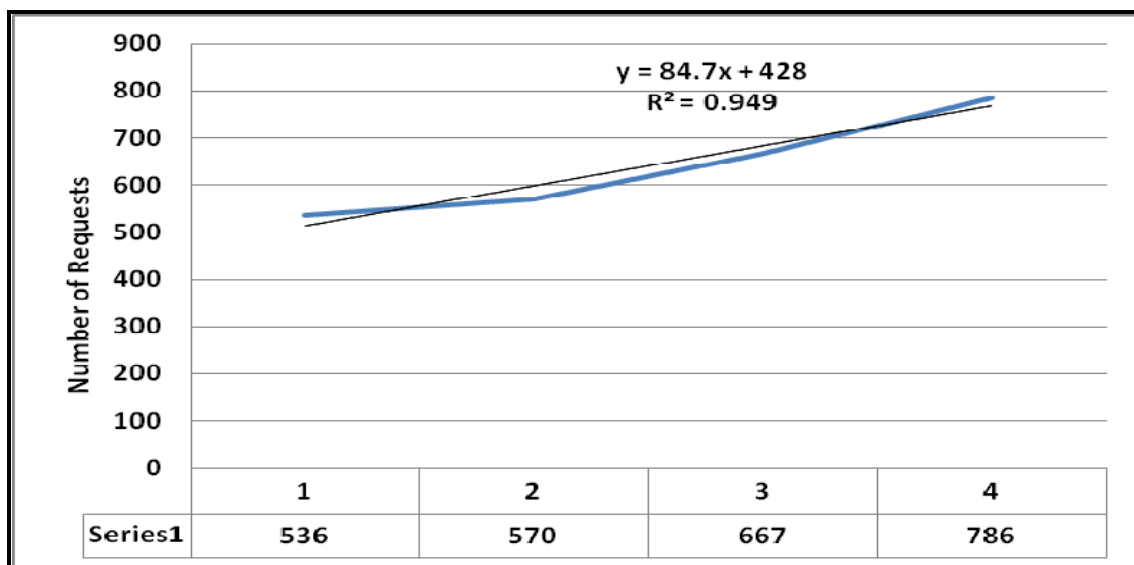
Table 3. Moving Average of Demand for Office Spaces in Ikeja

S/N	Year	Number of Requests	Moving Average
1	2005	516	
2	2006	556	536
3	2007	583	570
4	2008	750	667
5	2009	822	786

Source: Oni, 2010

Table 3 shows that two-yearly moving average indicated steady increase in demand for office spaces across the study area. To show the trend and forecast the demand for office spaces in the study area, further analysis showed an increasing trend as shown in Fig. 2

Fig. 2. Trend of Demand for Office Spaces in Ikeja



Source: Oni (2010^a)

Fig. 2 shows that there has been increase in demand for office spaces in the study area from year to year between 2005 and 2009. This may be as a result of influx of offices to the study area from high rental neighborhoods to Ikeja as a result of global economic crisis that has affected many private firms who now relocate to Ikeja to pay lower rent. Another reason may be that there has been increase in population of office users in the study area.

4.4 Trend in Supply of Office Spaces in Ikeja

Supply of office spaces in the study area was based on the number of such properties that was met through letting transactions effectively completed within the period as shown in Table 4.

Table 4. Details of Requests for Office Spaces Supplied

S/N	Year	Number of Spaces Let	Moving Average
1	2005	415	
2	2006	470	443
3	2007	523	497
4	2008	623	573
5	2009	707	665

Source: Oni (2010^a)

Table 4 shows that there have been increases in number of office spaces let between 2005 and 2009.

4.5 Analysis of the Moving Average of Supply

The supply of office spaces was derived from transaction-based number of requests for different offices that respondents effectively satisfied. Analysis of the moving average of supply was carried out for each of the type of office spaces as shown in Table 5.

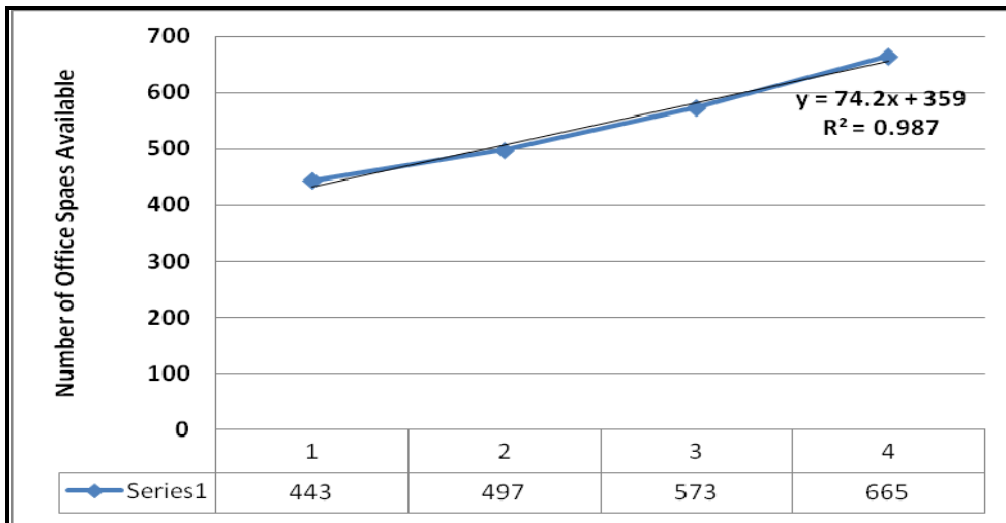
Table 5. Moving Average of Supply of Office Spaces in Ikeja

S/N	Year	Number of Spaces Let	Moving Average
1	2005	415	
2	2006	470	443
3	2007	523	497
4	2008	623	573
5	2009	707	665

Source: Oni (2010^a)

From Table 2, the two-yearly moving average of office spaces let between 2005 and 2010 was determined, and a linear trend analysis was carried out and shown in Fig. 2

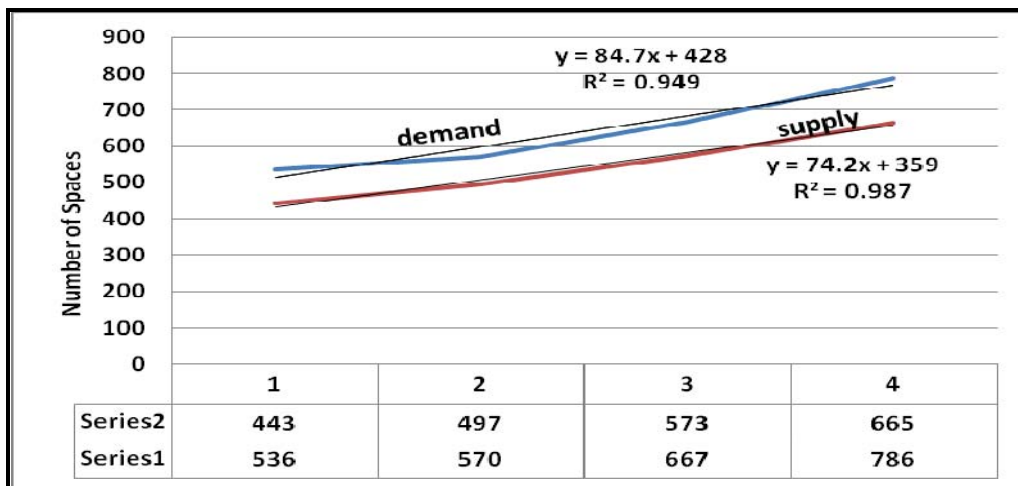
Fig. 2. Trend of Supply of Office Spaces in Ikeja



Source: Oni (2010^a)

Fig. 2 shows that trend line increased from year 2005 to 2009; and comparing the demand for and supply of office spaces in the study area, the moving averages of demand and supply in Figs. 3 and 4 above were combined as shown in Fig. 3 below

Fig. 3. Combined Trends of Demand and Supply of Office Spaces in Ikeja



Source: Oni (2010^a)

4.6 Deriving Models for Forecasting Demand for and Supply of Offices in Ikeja.

From the previous sections, the basis for forecasting demand for office spaces have been laid, and it is important to develop an equation that may be used to forecast demand for office and supply of different types of office spaces in the study area. In doing so, the MS Excel spreadsheet was used to establish the moving average of the demand for and supply of office spaces between 2005 and 2009 with options for linear trend lines and R-square value selected.

4.6.1 Forecasting Demand and Supply of Banking Space in Ikeja

The attempt here is to determine the forecasting model of different types of office spaces using the moving average. The number of requests for banking spaces and the number of such requests met between 2005 and 2009 were considered on two-yearly moving average as shown in Table 6

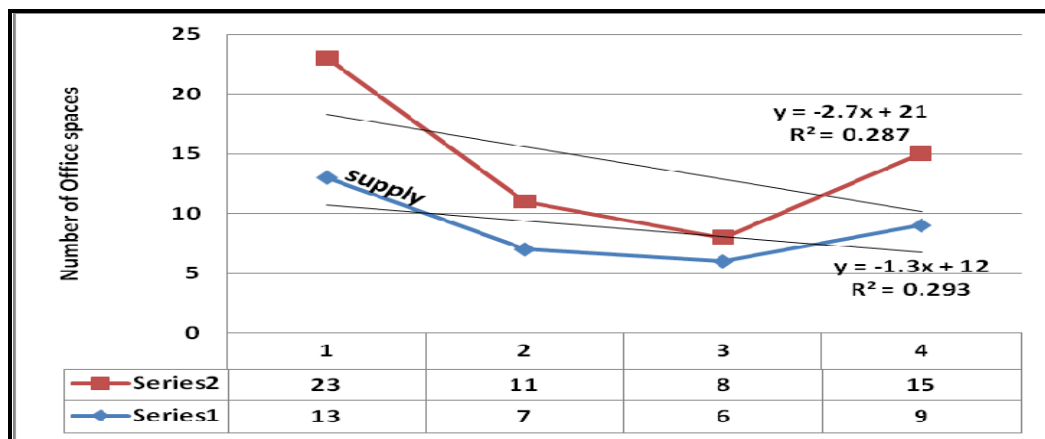
Table 6. Moving Average of Demand and Supply of Banking Spaces in Ikeja

S/N	Year	Demand		Supply	
		Number of Requests	Moving Average	Number Lettings	Moving Average
1	2005	31		15	
2	2006	15	23	10	13
3	2007	6	11	3	7
4	2008	10	8	8	6
5	2009	19	15	10	9

Source: Oni (2010^a)

The data in Table 6 show that the two-yearly moving averages for demand and supply of banking spaces dropped in 2007 and further in 2008 before increasing in 2009; this is further explained in Fig.4.5

Fig. 4. Combined Trends of Demand and Supply of Banking Spaces in Ikeja



Source: Oni (2010^a)

From Fig. 4, the trend in demand and supply has shown continuous decrease and that this will continue into the future. Models for forecasting demand and supply of banking space are also derived as shown in Eqns. 1 and 2

(i) Model for Forecasting Demand for Banking Space in Ikeja:

$$y = - 2.7x + 21$$

... Eqn. 1

(ii) Model for Forecasting Supply

$$y = - 1.3x + 12$$

... Eqn. 2

4.6.2 Forecasting Demand and Supply of Purpose-Built Office Spaces in Ikeja

The attempt here is to determine the forecasting model of purpose-built office spaces using the moving average. The number of requests for purpose-built office spaces and the number of such requests met between 2005 and 2009 were considered on two-yearly moving average as shown in Table 7.

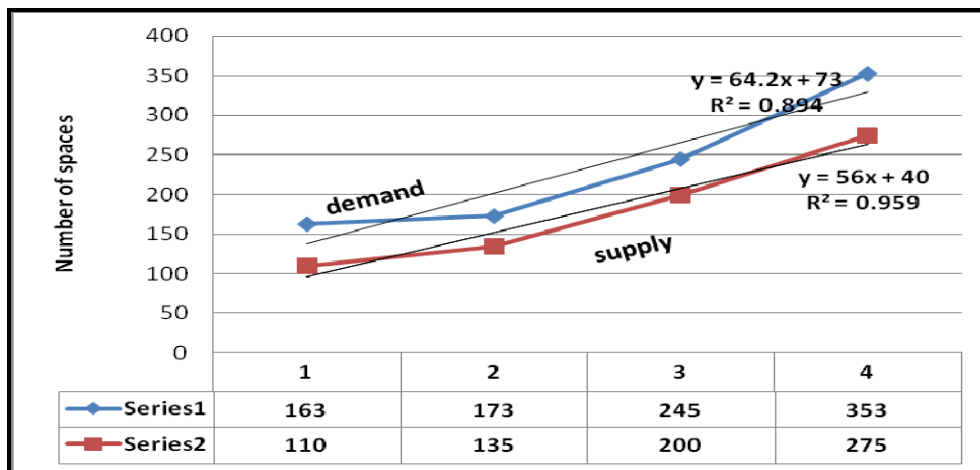
Table 7. Moving Averages of Demand and Supply for Purpose-built Offices in Ikeja

S/N	Year	Demand		Supply	
		Number of Requests	Moving Average	Number of Lettings	Moving Average
1	2005	160		100	
2	2006	165	163	120	110
3	2007	180	173	150	135
4	2008	310	245	250	200
5	2009	396	353	300	275

Source: Oni (2010^a)

The moving averages of demand and supply in Table 7 show that the two-yearly moving averages for demand and supply of purpose-built office spaces increased steadily from 2007 up to 2009. This is further illustrated by Fig.5

Fig. 5. Combined Trends of Demand and Supply of Purpose-built Office Spaces in Ikeja



Source: Oni (2010^a)

As shown in Fig. 4.6, the trend lines for demand and supply of purpose-built office spaces in Ikeja has shown continuous increase from year to year, and models for forecasting the trend are in Eqns. 4.3 and 4.4

(iii) Model for Forecasting Demand for Purpose-built Office Spaces in Ikeja:
 $y = 64.2x + 73$... Eqn. 3

(iv) Model for Forecasting Supply of Purpose-built Office Spaces in Ikeja:
 $y = 56x + 40$... Eqn. 4

4.6.3 Forecasting Demand and Supply of Converted Office Spaces in Ikeja

The attempt here is to determine the forecasting model of converted office spaces using the moving average. The number of requests for office spaces and the number of such requests met between 2005 and 2009 were considered on two-yearly moving average as shown in Table 8.

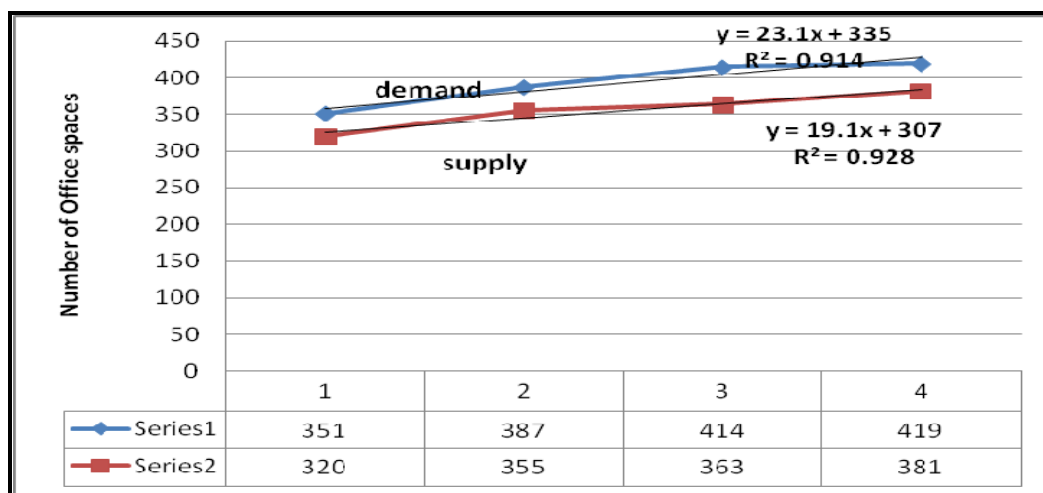
Table 8: Moving Average of Demand and Supply of Converted Offices in Ikeja

S/N	Year	Demand		Supply	
		Number of Requests	Moving Average	Number of Lettings	Moving Average
1	2005	325		300	
2	2006	376	351	340	320
3	2007	397	387	370	355
4	2008	430	414	365	363
5	2009	407	419	397	381

Source: Oni (2010^a)

The data in Table 8 show that the two-yearly moving averages for demand and supply of converted office spaces increased every year from 2007 to 2009, as also illustrated by Fig. 6

Fig. 6. Combined Trends of Demand and Supply of Converted Office Spaces in Ikeja



Source: Oni (2010^a)

From Fig. 6, there has been a slight but steady increase in both demand and supply of converted office spaces in the study area from year to year between 2005 and 2009, and the trend may continue into the future. Models for forecasting the trend are given in Eqns. 5 and 6

(i) Model for Forecasting Demand for Converted Office Spaces in Ikeja:
 $y = 23.1x + 335$... Eqn. 5

(ii) Model for Forecasting Supply of Converted Office Spaces in Ikeja
 $y = 19.1x + 307$...Eqn. 6

4.7 Determination of the Average Rental Values of Office Spaces in Ikeja

Attempt in this section is to attain the fourth objective which is to determine the average rental values of office spaces in the study area. In this case, the rental values obtained from the respondents were considered, by finding the average of the lowest and highest rents stated for each year as shown in Table 9

Table 9. Rental Values of Office Spaces in Ikeja (2005 – 2009)

S/N	Type of Office Space	Rental Value (in Naira per square metre per annum)				
		2005	2006	2007	2008	2009
1	Banking	10, 000	12, 000	15,000	18,000	25,000
2	Purpose-built	10, 000	12, 000	15,000	15,000	18,000
3	Converted	7, 500	7, 500	8,500	8,500	12,500
Average Rental Value		9, 200	10, 500	12, 800	13, 800	18, 500

Sources: Oni (2010^a)

From Table 9, the average rent per square metre per annum increased from year 2005 but the highest rate of increase was indicated between 2008 and 2009.

4.8 The Relationship Between Demand for Offices and Rental Values in Ikeja

The aim of this section is to determine the relationship between demands for offices and rental values in the study area in the last five years. In doing so, one hypothesis was set in the null as follows: "There is no significant relationship between demand for office spaces and rental values in the study area" In doing so, the average demand for office spaces and average rental values for 2005 to 2009 were regressed using the Statgraphic with confidence level set at 95%. For this purpose, the transaction-based requests earlier analyzed were compared with average rental values of offices in the study area as shown in Table 10

Table 10. Demand and Average Rental Value of Offices in Ikeja (2005 – 2009)

S/N	Year	Demand	Average Rental Value (Naira, per annum)
1	2005	516	9200
2	2006	556	10500
3	2007	583	12800
4	2008	750	13800
5	2009	822	18500

Source: Oni (2010^a)

A Simple Regression of the Average Rental Value (the dependent variable) and Demand for office spaces (the independent variable) using a linear model $Y = a + b \cdot X$ resulted in coefficient, and analysis of variance shown in Tables 11 and 12

Table 11 Coefficients of the Relationship between Rental Value and Demand for Office Spaces in Ikeja

Parameter	Least Squares Estimate	Standard Error	T-Statistic	P-Value
Intercept	-3299.96	3686.92	-0.895044	0.4367
Slope	25.1936	5.61798	4.48446	0.0207

Table 12. Analysis of Variance

Source	Sum of Squares	Degree of freedom	Mean Square	F-Ratio	P-Value
Model	4.49122E7	1	4.49122E7	20.11	0.0207
Residual	6.69985E6	3	2.23328E6		
Total (Corr.)	5.1612E7	4			

Correlation Coefficient = 0.932839; R-squared = 87.0188 percent; R-squared (adjusted for degree of freedom) = 82.6918 percent; Standard Error of Est. = 1494.42; Mean absolute error = 1001.16; Durbin-Watson statistic = 3.18297 (P=0.8794); Lag 1 residual autocorrelation = -0.698935

The P-value in the ANOVA table is 0.0207 which is less than 0.05, implying that there is a statistically significant relationship between Average Rental Value and Demand at the 95.0% confidence level. The R-Squared statistic indicates that the model as fitted explains 87.0188% of the variability in Average Rental Value. The correlation coefficient of 0.932839 indicates a relatively strong relationship between the variables.

The mean absolute error (MAE) of 1001.16 is the average value of the residuals. The Durbin-Watson (DW) statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in your data file. Since the P-value is greater than 0.05, there is no indication of serial autocorrelation in the residuals at the 95.0% confidence level.

5. Research Findings

The study showed that the type of office spaces mostly available in the management portfolios of firms in the study area is the purpose-built open-plan type; while the type of office spaces mostly requested in the study area is the converted type which makes up to 48% of the office spaces, followed by purpose-built office spaces (44%), while Banking spaces made up 8%. This may be as a result of lower rent that converted structures offer.

It was also discovered that the total number of transaction-based demand in terms of effective requests for office spaces in the study area has been on the increase. For instance, in 2006 it increased by about 7.75%; slightly (4.86%) in 2007 from the 2006 figures; substantially by 28.65% in 2008; and by 9.6% in 2009. The lower rate recorded in 2009 may probably be due to the international economic crisis which has also affected the study area. There has been increase in demand for office spaces in the study area from year to year between 2005 and 2009. This may be as a result of influx of offices to the study area from high rental neighborhoods to Ikeja as a result of global economic crisis that has affected many private firms who now relocate to Ikeja to pay lower rent. Another reason may be that there has been increase in population of office users in the study area.

The trend in demand and supply has shown continuous decrease and that this will continue into the future. Models for forecasting demand and supply of banking space were derived. The Model for Forecasting Demand for Banking Space in Ikeja is $y = -2.7x + 21$. For instance, the demand for banking spaces in the study area in 2015 (ten years from 2005) is: $y = -2.7(10) + 21 = -6$. This means that in future demand for banking space will fall below 0, since banks now prefer owning their properties instead of renting.

Similarly, the model for forecasting supply of banking space, which is: $y = -1.3x + 12$, indicates that by 2015, the supply would be $-13 + 12 = -1$. This implies that supply will automatically drop below zero as no investor would like to put up banking structure that may not be let. However, this is not the case with the purpose-built office spaces. The trend lines for demand and supply of purpose-built office spaces in Ikeja showed continuous increase from year to year. For instance, applying the model for derived for forecasting the demand for purpose-built office spaces in the study area, that is: $y = 64.2x + 73$, by 2015, the demand for purpose-built office spaces would be: $64.2(10) + 73 = 642 + 73 = 715$; while supply would be $y = 56x + 40 = 560 + 40 = 600$ office spaces.

The study revealed that there has been slight but steady increase in both demand and supply of converted office spaces in the study area from year to year between 2005 and 2009, and the trend may continue into the future. Models for forecasting the trend of demand for converted office spaces in the study area, that is, by 2015, the demand for converted office spaces in the study area would be: $y = 23.1x + 335 = 23.1(10) + 335 = 566$. Similarly, the supply of converted office spaces in the study area within the same period would be: $y = 19.1x + 307 = 191 + 307 = 498$. This implies that supply would be lower than demand by 12%. This will have the effect of the rent for converted office spaces remaining high in the study area.

The simple regression analysis showed that P-value in the ANOVA table is 0.0207 which is less than 0.05; this implies that there is a statistically significant relationship between Average Rental Value and Demand at the 95.0% confidence level. The R-Squared statistic indicates that the model as fitted explains 87.0188% of the variability in Average Rental Value. The correlation coefficient of 0.932839 indicates a relatively strong relationship between the variables.

6. Conclusion

The real estate investors must beware of developing banking spaces because the overall effects of the findings is that in the future demand for the type of space will fall below zero, and investment in such type of property may be a failure. The study covered forecasting of demand for office spaces in the capital city of Lagos State in Nigeria, and models and a number of findings have been discussed. It is expected that the findings will be of benefits to the estate surveyors and valuers, the Nigerian Institution of Estate Surveyors and Valuers, and students who may want to study further along the study.

References

- Bails, D. G. (1993). *Business Fluctuations*: London: Prentice Hall International, 1993.
- Bartlett, J. E.; J. W., Kotlik; and C. C. Higgins (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research. *Information Technology, Learning, and Performance Journal*, 19, 1, Spring 2001
- Bolt, G. (1994). *Sales Forecasting*. London: Kogan Page, 1994.
- Clement, R. T. (1989). Combining Forecasts: A Review and Annotated Bibliography. *International Journal of Forecasting*, 1989, No. 5, p. 559–583. Retrieved June 14, 2009, from <http://www.google.com>
- Clifton, P. (1998). *Market Research: Using Forecasting in Business* New York: John Wiley & Sons, 1998.
- Cox, J. E. (2001). Diffusion of Forecasting Principles Through Books. In J. S. Armstrong (ed.), *Principles of Forecasting*. Boston: Kluwer Academic Publishers, 2001.
- Goodwin, P. (2002). Integrating Management Judgment and Statistical Methods to Improve Short-term Forecasts. *International Journal of Management Science*, 2002, Vol. 30, p. 127–35.
- Green, K. C. (2007). Structured Analogies for Forecasting. *International Journal of Forecasting*, 2007, No. 23, p. 365–376.
- Hall, S. G. (1994). *Applied Economics Forecasting Techniques*. Cambridge: University Press, 1994.

- Herbig, P. (1994). Differences in Forecasting Behavior between Industrial Product Firms and Consumer Product Firms. *Journal of Business and Industrial Marketing*, 1994, Vol. 9, No. 1, p. 60–69.
- Kennedy, P. A. (1999). *Guide to Econometrics*, 4th ed. Malden Mass.: Blackwell.
- Kinney, T. C. (1996). *Marketing Research*, 5th ed. New York: McGraw Hill.
- Kirsten, R. (2000). *Business Cycles: Market Structure and Market Interaction* Heidelberg: Physica-Verlag.
- Larrick, R. P. (2006). Intuitions about Combining Opinions: Mis-appreciation of the Averaging Principle. *Management Science*, 2006, No. 52, p. 111–127.
- McGuigan, J. R. (1989). *Managerial Economics* New York: West Publishing Company.
- Oni, A. O. (2009). Arterial Road Network and Commercial Property Values in Ikeja, Nigeria. PhD Thesis, Department of Estate Management, Covenant University, Ota, Nigeria.
- Oni, A. O. (2010). *The Lagos State Land Use Charge and Vision 20:2020 Housing Theme*. Paper presented at the 40th Annual Conference organized by the Nigerian Institution of Estate Surveyors and Valuers, at Eko Hotel, Lagos 26th April to 1st May, 2010, pp 28 – 42
- Oni, T. O. (2010^a). Forecasting Demand for Office Spaces in Ikeja, Nigeria. B.Sc. Project, Department of Estate Management, Federal University of Technology, Akure
- Peterson, H. C. (1999). *Managerial Economics*. New Jersey: Prentice Hall, 1999.
- Pilinkienė, V. (2008). Selection of Market Demand Forecast Methods: Criteria and Application, *Engineering Economics* 2008. No 3 (58) Economics of Engineering Decision.
- Reekie, W. D. (1998). *Managerial Economics: a European Text* New York: Prentice Hall.
- Urbanics Consultants Ltd (2010) in <http://www.urbanics.com/peOffice.html>, accessed 12 June 2010.
- Waddell, D. (1994). Forecasting: the Key to Managerial Decision-Making. *Management Decision*, 1994, Vol. 32, No. 1, p. 41–49.