Teleworking and the Demand for Office Space in Lagos Island, Nigeria

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Abstract

The influence of the developments in information and communication technologies (ICT) on real property market is becoming an important issue for academic discussion. This paper therefore, examined the effects of teleworking on the demand for office space in Lagos Island, Nigeria. With a random sample of 216 office users, the study showed that the long commuting time and cost coupled with the benefits of Information and Communication Technology (ICT), would result into Teleworking, reduction in the number of staff employed by their organisations and consequently a reduction in per square meter of office space required. In addition ,the study showed that the rent being paid is not a significant factor influencing the propensity to telework, but the traditional '8-to-5' office commuting time would however, become flexible.

Keywords: ICT, Teleworking, Commuting and space demand

1. Introduction

Recent advances in Information and Communication Technology (ICT), especially mobile telephones and high speed computer with networking facilities (internet and intranet) have re-defined many aspects of living. The home, factory, school and office environments have been witnessing substantial influences in where and how activities are performed. In the real estate sector, discussions on the effects of ICT have concentrated on two commercial sub-sectors of offices and retail shops; namely, effects of teleworking on the demand for office space and the effects of e-commerce on the demand for retail shops. Studies have shown that teleworking, which is the flexibility in work locations taking advantage of the use of ICT (Nile, 1999 and Lake, 2007) would significantly affect the traditional office demand; while e-commerce; would erode the physical patronage of first class retail locations thereby destroying property values (Frank 2000; Chesterton 2000; Doidge and Higgins 2000; Lucas 2001). .

On the impact of ICT on the demand for office space, Dent and White (1998) used mailed questionnaires to investigate the effect that the use of computer, 'hot desking' and 'hotelling' in business would have on the demand for office space in Birnigham, United Kingdom. Their study showed that not many office occupiers in Birmingham are IT users, but among users; the large occupiers were expressing much desire for less office space. Lucas (2001), in his United State's based examination of the effect of Information Technology (IT) on physical space, was of the view that since IT facilitated the design of new type of organizations, institutions and partnering arrangements, its implementation would have second – order effects on demand for physical space of manufacturing, retailing and offices in the industrialized world.

Oluwoye et al (2002) observed that teleworking would significantly affect demand for what they classified as 'A' and 'B'-grade office spaces within the Central Business District (CBD) of Sydney, Australia, with the lower grades possibly becoming obsolete. They noted that with subsisting low rental costs and the prevalence of incentives in lease agreement, these circumstances would not support the likelihood of teleworking luring away office users in the nearest future. In another emprical study, Pantoni (1995) found that 4% of the Australian workforces were working from home with projection that this would grow to 15% within the following decade. These findings would not be unexpected as Littlefield et al (1970) had observed that office space is essentially required to facilitate working processes and as such, it cannot be viewed to be as indispensable as residential premises. Thus, office users with difficult journeys (either because of travel distance or traffic congestion) would be most willing to take up flexible working schedule (Lake 2007).

Interestingly, while much work has been done in this area in some countries including Britain (Dent and White, 1998 and Dixon and Marston, 2002), the United States (Worzala and McCarthy, 2001) and Singapore (Foo, 2002), presently, no such study has been done in Nigeria. In fact, studies in the office property market have not been extensively carried out in Nigeria (Oladapo, 2000). And since the preponderance of studies is largely confined to these countries with different contextual and cultural settings as well as property market characteristics; the implication is that a generalization cannot be made and the conclusion reached in any of the studies cannot be extended to explain the Nigerian situation. This study is important therefore, as it will bring into limelight new evidence that is relevant to the Nigerian property market.

2. Methods

The study area is Lagos Island, Nigeria. The city was once the administrative seat for both the Federal and Lagos State Governments. The Island has over six million people working and living in an area of about 8.7 square kilometers and has been identified with overcrowding, lack of parking space and chaotic traffic situation – both vehicular and pedestrian (P M News, 2009).

This study concentrates on determining the influencing factors on office space demand and the propensity to engage in teleworking. In order to achieve this, the study employed structured questionnaires administered to a random sample of 216 office users from various business types. Data were obtained on the following:

- motive for office space demand,
- daily commuting cost,
- morning-period commuting time,
- level of computer literacy,
- amount spent on IT infrastructure,
- age,
- level of satisfaction with the rent paid, and
- satisfaction with parking facilities.

The main tools for data analysis included:

- the weighted score based on likert scale;
- multiple linear; and
- logit regressions.

The regression models employed here are:

1) Multiple Linear Model of the form : SDD= b_0 +b_1 RPS +b_2 OGS + μ 1

and

2) Logit Regression of the form:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = b_0 + b_1 SPS_i + b_2 DCC_i + b_3 MCT_i + b_4 LCL_i + b_5 ASI_i + b_6 AGE_i + b_7 SWR_i + b_8 SWP + \mu_i ....2$$

Where

$\dfrac{P_i}{1-P_i}$ = odd ratio,

b_0 = intercept

$b_1 ... \ b_7$ = regression coefficients

μ = error term

The odd ratio describes the propability of office users engaging in teleworking. This is measured by the proportion of transactions per week executed out of office with ICT facilities. These are activities which, hitherto would have taken place in the office. Other variables in the model are as described in Table 1.

The Logit Model (Equation 2) is based on the premise that teleworking, telecommuting, home working, e-business or whatever form of flex place is more of a responsive action. While computer and telephone can attract, sufficient repelling factors (such as lack of parking space and chaotic traffic situation) are required. Thus, findings from one place may not necessarily provide clue to the situation in the other and only an empirical study can establish a local market effect.

3. Results

Table 2 shows the relative significance of the factors influencing the need for office space. The need for working environment for staff and storage of equipment with the highest Relative Importance Index (RII) of 4.11 is the most significant factor influencing the decision to acquire an office space. This is closely followed by the need for separate identity and business image (RII=4.05). On the other hand, the need for face to face contact at work ranks as the least important (RII = 3.31). This is not unexpected because of an upsurge in the number of official business transactions, which are often conducted out of the office location, perhaps, in the client's office or by 'off-sight' communications like telephone and mails (Niles, 1999).

Tables 4, 5 and 6 show the model summary, analysis of variance and coefficient estimates of the Multiple Regression Model. The performance of the model is good, as indicated by the R^2 statistic ($R^2 = 0.997$). This shows that the combination of an organization's size (OGS) and rental value (RPS) accounted for over 99.7% of variations in office space demand (Table 4). The computed F statistic (F=1.609E4) falls in the rejection region, signifying that at least one of the model coefficients is non-zero, therefore the model appears to be useful for

predicting office space demand. The linear regression shows that the organization size (OGS) has a significant impact on the per square meter of office demanded (SDD). On the other hand, the impact of rent (RPS) is not significant (Table 6). This is not unexpected. Rent has been found to influence the choice of location/neihgbourhood and property characteristics(Bello and Bello, 2008). Therefore, having made the choice of location and the property on the basis of rent, it is plausible that the effective square metre demanded will naturally be on the basis of need as reflected by organizational size. Nevertheless, ICT usage might, invariably, cause reduction in office space need since teleworking is expected by respondents to among other things, yield gains in terms of less CBD space requirement. This is consistent with findings by Foo (2002) that ICT usage has the tendency of changing staffing structure through reduced need for Clerical staff and reduction in storage space for document.

Table 7 shows the result of the logit regression used to model the probability of office users engaging in Teleworking, Since this is a Binary Regressand model, the conventional measure of goodness of fit (R^2) is not particularly useful. Similar measures such as likelihood ratio, McFadden R-squared and host of others are employed in place of R^2. However, in Binary Regressand model, it has been observed that "goodness of fit is of secondary importance, what matters is the expected signs of the regression coefficients and their statistical and /or practical significance"(Gujarati and Sangeetha, 2007). From Table 7, the McFadden R-squared of 0.844543 is high and is a reflection of high goodness of fit. With the exception of Amount Spent on IT Infrastructure (ASI) and Space for Staff (SPS), all the other regressors have significant impact on the probability of the office users engaging in teleworking. Also, while Age (AGE) and Satisfaction With Rent (SWR) have an indirect relationship with the chance of teleworking, all other variables do have direct relationship. This is expected since, ordinarily, the higher the level of Satisfaction With Rent, the lower the chance of office users lowering their space demand or moving to other location. Similarly young people are more adventurous and can easily adapt to change and embrace new ideas and methodology; teleworking inclusive. The specific contribution of each of the variables to the odds in favour of teleworking is shown in Table 8

Fom Table 8, for a unit increase in Morning Period Commuting Time (MCT), the probability of the office users engaging in teleworking increases by 2.0847. Also, office users with adequate Level of Computer Literacy (LCL) are more than 26 times likely to engage in teleworking than users with less than adequate Level of Computer Literacy(LCL).

The significance of Morning Period Commuting Time (MCT) is further shown in Fig.1 with about 50% of respondents spending upwards of one hour commuting to the office every morning. Actually, 33% spend between 1-2 hours while 16% are on road for upwards of 2 hours with an aggregate weighted average of 1.24 hours. The weighted average Daily Commuting Cost is over ₦450.00 with more than 64% actually spending beyond ₦400.00 daily (Fig.2). Table 9 shows the satisfaction with commuting time and cost, about 25% answered in the affirmative while approximately 75% expressed dissatisfaction. When those dissatisfied were further asked whether the situation could push them into an alternative office culture with the aid of mobile telephone and computer networking, 65% of them or a net 49% of entire respondents agreed to such possibility. Thus, travel substitution in the nature of going to work at flexible hours, as against the regular 'eight-to-five', was regarded as a major benefit of ICT with over 60% of the respondents expressing desire for partial home-working.

Office rent within Lagos Island during the study period was found to range from ₦12, 000/m^2 to as much as ₦30, 000/m^2 per annum (Table 3). Table 10 shows the Satisfaction of the Respondence with Rent Paid . Of the 216 respondents, only 58 or about 27% expressed disatisfaction with their level of rental obligation. In fact, there is no much resentment against the general level of rent in the study area with an aggregate of just about 20% (44 out of 216) of the respondents contemplating either reduction in space or a shift to secondary location on rental basis. If the findings in   Oluwoye et al (2002) that dissatisfaction with level of rental payment was a needed push factor for teleworking to significantly influence CBD space demand is to be considered, then ordinarily, this low level of dissatisfaction in the study area would mean teleworking cannot pose any significant threat to phisical space demand in Lagos Island Office Market. However, as shown in Table 7, the tendency for this to affect the Odd Ratio in favour of the office users in the area engaging in Teleworking is significant

4. Conclusion

The study has shown that teleworking' is favourably perceived by office users as a welcome alternative to regular office commuting in Lagos Island. The study finds explanation for this in discomfort of long commuting time and high cost of travel to work. Hence, with travel substitution representing an immediate outcome of ICT-facilitated office business, urban planners have the responsibility to anticipate more even traffic movement across normal working period. In addition, as face-to-face contact at work has been found not to be a significant factor in office space demand, coupled with growing tendency of ICT to replace some traditional clerical office personnel, the demand for physical space in Lagos Island is expected to decline in real terms. This would favour residential premises with expressed desire for partial home-working. Thus, the gap between residential and office premises' design, construction and usage will tend to narrow down with implications on load-bearing capacity, equipment installation, energy requirements and safety, among others.

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Table 1. Variable List And Description

S/NO	VARIABLE	DESCRIPTION	REMARKS
1	DCC	Daily Commuting Cost in Naira ₦	Function of Traffic Situation
2	MCT	Mornig period Commuting Time in Hours	Function of Traffic Situation
3	LCL	Level of Computer Literacy 1 if adequate, 0 otherwise	Function of ICT attraction
4	ASI	Amount Spent on IT Infrastructure in Naira ₦	Function of ICT attraction
5	AGE	Age of Office Users in years	Influences Change and Adaptability
6	SWR	Satisfaction With Rent 1 if satisfied, 0 otherwise	Function of Office Property Market
7	SWP	Satisfaction With Parking Facilities 1 if satisfied, 0 otherwise	Function of Traffic Situation
8	SPS	Space for Staff, 1 if important, 0 otherwise	Motive for the Demand for space
9	SDD	Demand For Space	Square Metre
10	RPS	Rent per Square Metre	₦ /m^2
11	OGS	Size of Firm	Nnumber of Staff

Source: Compiled by the Author, 2009

Table 2. Factors Influencing Need for Physical Space

Factor	R A N K E D L E V E L					Relative Importance Index
	Very important(5)	Important(4)	Difficult to say (3)	Unimportant (2)	Very unimportant.(1)	
Space for staff & equipment.	99	64	39	7	7	4.11
Seperate identity & Bussines image	81	82	35	18	0	4.05
Face to face contact	46	64	35	53	18	3.31

Source: Field survey (2009)

Table 3. Descriptive statistics of Determinants of Quantity of Space demanded

	N	Range	Minimum	Maximum	Mean	Std. Deviation
SDD	216	310.00	10.00	320.00	74.9213	102.71092
OGS	216	108.00	2.00	110.00	24.0648	32.86598
RPS	216	1.80E4	12000.00	30000.00	2.0495E4	7225.27713
Valid N (listwise)	216					

Table 4. Model Summary of the Multiple Linear Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.997[a]	.993	.993	8.36725

Table 5. Analysis of Variance (ANOVA) of the Multiple Linear Regression Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2253237.357	2	1126618.679	1.609E4	.000
Residual	14912.305	213	70.011		
Total	2268149.662	215			

Table 6. Multiple Linear Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients			Correlations	
	B	Std. Error	Beta	T	Sig.	Zero-order	Partial
Constan t	2.241	1.757		1.276	.203		
OGS	3.115	.017	.997	179.370	.000	.997	.997
RPS	.000	.000	-.008	-1.415	.158	.018	-.097

Table 7. Logit Regression Results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
MCT	0.734605	0.340241	2.159074	0.0308
LCL	3.264085	1.027590	3.176448	0.0015
ASI	5.96E-07	2.53E-06	0.236066	0.8134
AGE	-0.574693	0.073279	-7.842556	0.0000
SWR	-3.010807	0.612412	-4.916310	0.0000
SWP	1.899991	1.183891	1.604871	0.1085
SPS	3.268615	1.388046	2.354832	0.0185
C	20.57408	3.813649	5.394853	0.0000
Mean dependent var	0.592593	S.D. dependent var		0.492493
S.E. of regression	0.188738	Akaike info criterion		0.284221
Sum squared resid	7.409383	Schwarz criterion		0.409231
Log likelihood	-22.69587	Hannan-Quinn criter.		0.334725
Restr. log likelihood	-145.9946	Avg. log likelihood		-0.105073
LR statistic (7 df)	246.5975	McFadden R-squared		0.844543
Probability(LR stat)	0.000000			
Obs with Dep=0	88	Total obs		216
Obs with Dep=1	128			

Table 8. Individual Infuence of Each Variable on the Probability of Teleworking

VARIABLE	DESCRIPTION	COEFFICIENT	ANTILOG OF COEFFICIENT
MCT	Mornig period Commuting Time	0.734605	2.0847
LCL	Level of Computer Literacy	3.264085	26.1562
ASI	Amount Spent on IT Infrastructure	5.96E-07	1.0000
AGE	Age	-0.574693	1.7766
SWR	Satisfaction with Rent Paid	-3.010807	20.3038
SWP	Satisfaction with Parking Facilities	1.899991	6.6858
SPS	Space for Staff	3.268615	26.2749

Table 9. Satisfaction with Commuting Time&Cost and Reduction in Space /Shift to Secondary Location

	Comtemplating Reduction in Space/ Shift to Secondary Location		
	NO	YES	
Satisfied	54(25%)	0	54 (25%)
Not Satisfied	56(26%)	106(49%)	162(75%)
TOTAL			216(100%)

Table 10. Satisfaction with Rent and Reduction in Space /Shift to Secondary Location

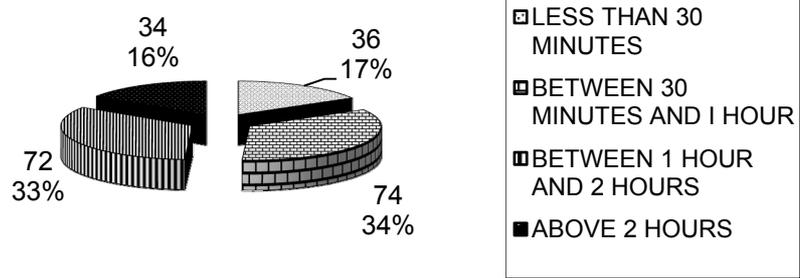|	Contemplating Reduction in Space/ Shift to Secondary Location		
	NO	YES	
Satisfied	158(73%)	0	158(73%)
Not Satisfied	14(7%)	44(20%)	58(27%)
TOTAL			216(100%)

FIG. 1: DAILY COMMUTING TIME

FIG. 2: DAILY COMMUTING COST