International Business Management 1 (4): 70-78, 2007
ISSN: 1993-5250

Impact of Information Technology Investments on Banking: Operations in Nigeria

J.O. Adewoye
Department of Agronomy, Ladoke Akintola University of Technology,
P.M.B. 4000, Ogbomoso, Nigeria

Abstract: Businesses have continued to invest enormous sums of money on computers and related technologies expecting substantial payoff. Yet, a variety of studies present contrasting evidence as to whether these expected benefits have materialized. The rising cost of Information Technology (IT) in Nigerian banks together with higher benefit expectations associated with it have increased the need for understanding the costs and benefits relating to IT. The broad objective of this study is therefore to evaluate the impacts of IT investments on banking operations in South-Western Nigeria. Among the specific objectives of the study was the determination of the effect of IT investments on productivity and profitability. The study was carried out mainly on 10 insured pre-merger banks within the Southwestern geopolitical zone of Nigeria in which 8 were selected from Lagos Metropolis via a purposive sampling technique while 2 banks (one old generation and new generation bank) were picked from outside Lagos. The study developed a production function of the form in line with Cobb-Douglas function. This was used to determine the nature of relationship between IT investments and firm's productivity and profitability. Data for the study were obtained essentially from the financial reports of the selected banks covering a period of 5 years. Questionnaire and scheduled interview were administered on heads of systems units and engineers in the selected banks. Two-stage least squares, ordinary least square and analysis of variance, were used to determine the nature of the relationship between: IT investments and productivity; IT investments and profitability. Results showed that while IT investments made positive contributions to gross marginal output and net marginal output (after deduction for depreciation and expenses) IT-capital made zero and perhaps negative contribution to output (-1.360 and -1071). However, investments in IT-labour were associated with a high increase in the output of the banks given its elasticity values which were 104.189144 and 2.304. However, IT investments made zero contribution to and not significant to banks' profit. Findings indicated that IT investments have increased productivity but have not resulted in supranormal business profitability; rather, there were some evidences of small or negative impact on profitability. It was concluded that while modeling techniques used need to be improved, these results were consistent with economic theory.

Key words: Impact, information technology, investment on banking, Nigeria

INTRODUCTION

Business organization, especially the banking industry of the 21st century operates in a complex and competitive environment characterized by changing conditions and highly unpredictable economic climate. From the global perspective and within the context of national boundary of individual organizations, these changing environmental constraints not only affect their internal structure but also their survival, growth and development. Information Technology (IT) is at the center of this global change curve. Laudon and Laudon (1991) contend that managers cannot ignore Information System because they play a critical role in contemporary organizations. They pointed out that the entire cash flow of most fortune 500 companies is linked to Information System. Information Technology directly affects how managers decide, how they plan and what products and services are produced.

The lack of accurate quantitative measures for the output and value created by IT has made managers' job of evaluating Information Technology investment particularly difficult. However, whether investments done in IT actually bring real benefits to the organizations is still a matter of debate in the academy. Adetayo *et al.* (1999) and Boyett and Boyett (1995), emphasized the

effect of IT on business and the effect of business on IT while Oyebisi *et al.* (2000) claimed that only banks that overhaul the whole of their payment and delivery systems, operations and apply IT devices are likely to survive and prosper in the new millennium.

The evidences on the impact of IT investments on bank productivity have been mixed. Despite all these, banks or financial institutions have spent millions of naira in information technology, having their products and services basically supported by it (Brynjolfsson and Hitt, 1998, 2000). In some sectors, such as financial services, computers are the predominant production technology and even in manufacturing industries, computers have led to significant changes in the way products are produced and delivered (Litchtenberg, 1995). Given this indispensable use of IT devices in virtually all financial sectors, it becomes imperative to examine the implications of IT investments on bank operations. The study therefore intends to provide answers to the following research questions among others:

- What effect does IT investments have on productivity and profitability?
- Is there a relationship between investment on IT capital and IT labour as it affects organizational performance?

The broad objective of the study is therefore to evaluate the implications of Information Technology Investments on banking operations in South-western Nigeria. Among the specific objectives of the study are to evaluate the effect of IT investments on productivity and profitability and to determine the relationship between investment on IT capital and IT labour and their effect on organizational performance.

To provide answers to the research questions and also achieve the stated objectives, the following propositions were developed and tested empirically:

- IT investments do not make positive contribution to output.
- IT investments do not make positive contribution to output after deductions for depreciation and labour expenses (the net marginal product is positive).
- IT investments make zero contribution to and not significant to profit or stock market value of the firm.

The study was carried out mainly on banks in the Southwestern geopolitical zone of Nigeria. The study covered 5 years of the pre-merger era (2000-2004). Ten banks were used for the study, eight banks from the Lagos Metropolis via a purposive sampling technique, two banks (One old generation and one new generation bank) outside Lagos but within the zero.

The study provides information on the types of Information Technology devices relevant to the banks' operation and the extent of their adoption in the South-western Nigeria. The findings of the study would be of immense benefits to commercial banks and their directors because, it would guide the management on the need for recruitment, training and retraining of staff. It will also guide management in making information technology investment decisions and in assessing returns on these investments and thus enhanced their productivities.

For several years, scholars and policy makers lacked conclusive evidence that the high levels of spending on IT by businesses improves their productivity, leading to the coining of the term 'IT productivity Paradox. Morrison and Bernact (1990), Baily (1986b), Strassman (1995) and Franke (1987) posited that additional investments contributed negatively to productivity, arguing that 'estimated marginal benefits of investments (in IT) are less than the estimated marginal costs.

In recent times, researchers working with firm-level data have found significant contributions from IT toward productivity (Lichtenberg, 1995; Brynjolfson, 1993, 1996; Bresnahan *et al.*, 1999; Brynjolfson and Hitt, 1995, 1996, 1998, 2000; Barua *et al.*, 1991; Harris and Katz, 1991). Barua *et al.* (1991), Steiner and Teixeira (1991), Strassmam (1995), Hitt and Brynjolfson (1996) and Renkema (2000) all argued that although IT investments have invreased productivity, it has not resulted in supranormal business profitability rather there were some evidences of small or negative impact on profitability.

MATERIALS AND METHODS

The study area: The study was carried out on insured banks within the South-Western Nigeria. Of the 89 insured banks within the zone, 75 have their headquarters in Lagos and using ratio method, 1 old generation bank and 7 new generation banks were selected for the study in Lagos while 2 were picked outside Lagos Table 1.

Data collection methods: The study was based only on relevant information obtained from the headquarters of the selected banks within the zone. Data was also obtained from secondary sources such as relevant bank

Table 1: The 7 new generation banks selected with their number of branches

Bank	No. of branches
Zenith bank plc	77
Standard trust bank	104
Intercontinental bank plc	59
Inland bank	47
Diamond bank ltd	52
Oceanic bank plc	45
Guaranty trust bank plc	51

Source: Field survey (2005)

records, journals, annual abstract of statistics, banks' annual reports, central bank reports and reports from international financial institutions such as International Monetary Funds and the World Bank. Twenty questionnaire were administered during office hours through personal contact. Since the personnel in charge of computer-automated devices were not many, ten questionnaire were administered on the head of IT units and ten on the engineers in the system department of each of the bank selected for the study.

Models of the study: This study modeled banks as operating according to the Cobb-Douglas production function. The following models and equations were therefore developed for the study.

Model I

$$Q = f(C\ K\ S\ L)$$
$$Q = \alpha+\beta_1(C)+\beta_2(K)+\beta_3(S)+\beta_4(L)+e \quad (1)$$

Where,

α = Constant
Q = Output of the firm
C = Information Technology capital
K = Non-Information Technology Capital
S = Information System labour expenses
L = Non-Information System labour expenses

$\beta_1, \beta_2, \beta_3, \beta_4$ are the associated output elasticities and e represented the error term.

Also for estimation purposes, the above function was linearized by taking logarithms of Eq. 1 and adding an error term. This is done by using a system of 5 equations, one for each year:

$$\text{Log}(Q_{01}) = {}_{01}+{}_1\text{Log}(C_{01})+{}_2\text{Log}(K_{01})+{}_3\text{Log}(S_{01})+ {}_4\text{Log}(L_{01})+{}_{01} \quad (2)$$

$$\text{Log}(Q_{02}) = {}_{02}+{}_1\text{Log}(C_{02})+{}_2\text{Log}(K_{02})+{}_3\text{Log}(S_{02})+ {}_4\text{Log}(L_{02})+{}_{02} \quad (3)$$

$$\text{Log}(Q_{03}) = {}_{03}+{}_1\text{Log}(C_{03})+{}_2\text{Log}(K_{03})+{}_3\text{Log}(S_{03})+ {}_4\text{Log}(L_{03})+{}_{03} \quad (4)$$

$$\text{Log}(Q_{04}) = {}_{94}+{}_1\text{Log}(C_{04})+{}_2\text{Log}(K_{04})+{}_3\text{Log}(S_{04})+ {}_4\text{Log}(L_{04})+{}_{04} \quad (5)$$

$$\text{Log}(Q_{05}) = {}_{05}+{}_1\text{Log}(C_{05})+{}_2\text{Log}(K_{05})+{}_3\text{Log}(S_{05})+ {}_4\text{Log}(L_{05})+{}_{05} \quad (6)$$

Where Q, C, K, S and L were defined in Eq. 1

This model was used to determine the relationship between IT investments and productivity and profitability.

Research instrument: The two research instruments adopted in this study were questionnaire administration and interview schedules. A set of questionnaire was designed and administered on:

- Head of systems department (unit heads of departments in charge of IT devices).
- Computer Engineers.

A structured interview guide consisting of fifteen questions was designed for this purpose. Oral interview was conducted to corroborate and augment information generated from the questionnaire. An interview schedule listing the questions and noting their order of importance were prepared. This helped to streamline the pattern of questions. Secondary data were obtained from the financial statement from the banks and the NDIC report.

Reliability and validation of research instrument and testing: To ascertain the content appropriateness of the survey instruments, a pilot study was carried out in four banks in Lagos to determine the validity of the measurements. The data collected from the pilot study were analysed using regression analysis. The result showed that there were relationships between the variables. This assisted in determining the level of comprehension and proper interpretation of the questions.

Data processing and analytical techniques: Both descriptive and inferential statistics were used in the data analysis. Statistical Package for the Social Sciences (SPSS) was employed for data analysis using such tools as rating indices, correlation analysis, t-test, chi-square and regression and ANOVA.

A software application was developed and used. It incorporates, the two least squares regression scheme based on the Cobb Douglas production model. It was used to carry out regression analysis of system having multiple dependent and independent variables.

Interpretations of tables and graphs: It could be deduced from Table 2 that the average investment in IT and non-IT capital and labour are N357.9 millions, N49.8 million, N1644.3 million and N878.0 millions, respectively. It is thus apparent that the banks under study invested more on non-IT capital and labour in year 2000 when compared with the banks investment in IT capital and labour in the same year.

Table 2: Analysis of the 10 banks' records for year 2000 [in millions N]

Banks	Loans and deposits	Net income	ROA	ROE	IT capital	IT labour	Non-IT capital	Non-IT labour
Union	120909	3127	2.48	29.41	796	232	7205	4415
Coop	13761	205	1.72	16.8	49	23	564	362
Stb	11738	226	1.73	22.11	68	7	282	129
Tib	46149	1096	2.72	42	333	41	1135	644
Fidelity	10463	208	2.07	22.52	58	9	346	167
Oceanic	18931	972	4.51	45.12	315	61	1805	1162
Diamond	37124	1875	3.86	54.75	1429	53	2049	751
Inland	24836	252	1.11	10.36	253	30	1659	463
Intb	23185	997	4.2	35.46	176	34	960	546
Gtb	7528	130	1.54	15.45	102	8	43	141

Source: Banks Annual Reports for year 2000, KEY: GTB-Guaranty Trust Bank PLC, TIB-Trans-International Bank PLC, INTB-Intercontinental Bank, STB-Standard Trust Bank PLC, OCEANIC-Oceanic Bank PLC, COOP-Cooperative Bank PLC, UNION-Union Bank Nigeria PLC, INLAND-INLAND Bank PLC, Diamond-Diamond Bank PLC, FIDELITY-FIDELITY Bank PLC

Table 3: Analysis of the generalized data of the 10 banks for year 2001 [in millions N]

Banks	Loans and deposits	Net income	ROA	ROE	IT capital	IT labour	Non-IT capital	Non-IT labour
Gtb	7654	78	0.98	8.46	150	18	586	294
Tib	12125	430	3.27	34.75	90	20	295	227
Intb	36415	1178	3.16	34.09	438	70	1422	808
Stb	75136	1848	3.06	45.98	620	112	1584	1285
Oceanic	30461	2063	6.38	39.57	349	72	2145	1360
Coop	17251	277	1.84	20.4	58	31	787	371
Union	207902	5035	2.34	36.52	1127	744	8169	8568
Fidelity	11654	401	3.15	30.81	158	18	601	287
Diamond	47514	1783	3.72	48.71	1629	55	2149	866
Inland	41842	620	1.6	23.86	264	52	1684	599

Source: Banks annual reports for year 2001

Table 4: Analysis of the generalized data of the ten banks for year 2002 [in millions N]

Banks	Loans and deposits	Net income	ROA	ROE	IT capital	IT labour	Non-IT capital	Non-IT labour
Union	249833	4726	1.79	15.6	1841	784	9506	7060
Coop	20698	462	2.72	19.09	59	45	929	399
Stb	82669	1994	2.86	33.5	875	217	2163	1588
Tib	15238	424	2.93	19.02	102	36	502	362
Fidelity	17215	540	3.45	28.16	238	42	661	423
Oceanic	50807	2186	4.1	33.4	1471	124	1745	1421
Diamond	49077	1312	2.48	28.57	2082	122	2983	1402
Inland	47638	1482	3.56	39.32	693	95	2037	852
Intb	48187	1882	3.74	25.15	491	189	2011	1387
Gtb	10723	55	0.48	2.84	200	35	690	399

Source: Banks annual reports for year 2002

Given that investments in IT capital and IT labour were lower than the investments in non-IT capital and labour, respectively, it meant that the share of IT capital in the total stock of capital was low; likewise the share of IT labour. The implication is a low level of capital deepening and low multifactor productivity. The higher the capital deepening the higher the need for IT labour.

Summary statistics in Table 3 showed that the banks in our sample have an average of N48795.4 millions in term of loans and deposits and N1371.3 million in terms of revenue generated in the year 2001. Also, average investment in IT and non-IT capital and labour in the year 2001 were: N488.3 millions, N119.2 millions, N1942.2 millions and N1466.5 millions, respectively. It was apparent that the banks under study invested more on non-IT capital and labour in the year 2001.

The investments in IT capital and IT labour were lower than the investments in non-IT capital and labour, respectively meaning that the share of IT capital and IT labour in the total stock of capital were low. This implies still, a low level of capital deepening and low multifactor productivity. This is because as earlier mentioned; the higher the capital deepening the higher the needs for IT labour.

In Table 4, the banks in the study sample have an average of N59208.5 millions in terms of Loans and Deposits and N1506.3 million in terms of revenue generated in the year 2002. Also, average investment in IT and non-IT capital and labour in the year 2002 were: N805.2 millions, N168.9 million, N2322.7 millions and N1839.5 millions. It is apparent from this analysis that the banks understudy invested more on non-IT capital and labour in the year 2002.

Sequel to the above results, it could be observed that there is a common trend as the investments in IT capital and IT labour were lower than the investments in non-IT capital and labour, respectively as in the earlier years. This implies still, a low level of capital deepening and low

Table 5: Analysis of the generalized data of the 10 banks for year 2003 [in millions N]

Banks	Loans and deposits	Net income	ROA	ROE	IT capital	IT labour	Non-IT capital	Non-IT labour
Union	287907	6600	2	20.16	2195	993	9017	7281
Coop	22263	185	0.95	21.13	188	86	1240	626
Stb	96661	3034	3.32	32.81	815	342	1262	2103
Tib	19211	149	0.077	6.27	138	51	499	373
Fidelity	24063	857	3.81	34.06	263	82	721	602
Oceanic	62241	2818	4.34	35.34	526	200	2015	1476
Diamond	56660	513	0.87	10.47	2367	180	2921	1624
Inland	64502	1448	2.36	20.06	730	194	2266	1419
Intb	71908	2569	3.6	29.98	930	493	1933	2244
Gtb	15815	557	2.47	23.53	200	88	1200	647

Source: Banks Annual Reports for year 2003

Table 6: Analysis of the generalized data of the 10 banks for year 2004 [in millions N]

Banks	Loans and deposits	Net income	ROA	ROE	IT capital	IT labour	Non-IT capital	Non-IT labour
Union	320923	7750	2.11	21.54	2729	1673	9672	8781
Coop	28697	371	1.55	13.2	151	150	1169	847
Stb	136549	4170	3.06	20.84	750	463	2436	2428
Tib	22309	521	2.59	18.16	187	83	661	468
Fidelity	30292	914	2.6	25.96	247	135	761	762
Oceanic	93205	3287	3.78	31.73	457	270	2227	1527
Diamond	61834	357	1.24	13.3	3007	258	3145	1890
Inland	91680	967	1.35	12.02	934	412	3133	2334
Intb	94122	2137	2.45	23.78	1044	688	2164	1769
Gtb	34186	638	2.03	23.58	251	135	1593	762

Source: Banks annual reports for year 2004

multifactor productivity. It could be rightly concluded that the higher the level of IT capital employed, the higher the need for IT labour.

The summary statistics in Table 5 showed that we have an average of N72123.1 millions in loans and advances. Also, we have N1873.0 millions in terms of revenue generated in the year 2003. Also average investment in IT and non-IT capital and labour in the year 2003 are: N835.2 million, N270.9 million, N2397.4 millions and N1839.5 millions, respectively. It is also apparent to note that the banks under study invested more on non-IT capital and labour in the year 2003.

It could be observed from the above results that the common trend observed earlier continues as the investments in IT capital and IT labour were lower than the investments in non-IT capital and labour, respectively. This implies still, a low level of capital deepening and low multifactor productivity. It could be rightly concluded that the higher the level of IT capital employed, the higher the need for IT labour.

From the summary statistics in Table 6, the banks in the sample have an average of N91379.7 millions in terms of loans and deposits and N2111.2 millions in terms of revenue generated by the banks in the year 2004. Also, average investment in IT and non-IT capital and labour in the year 2004 are: N975.7 millions, N426.7 million, N2696.1 millions and N2156.8 millions. It is apparent from this analysis that the banks understudy invested more on non-IT capital and labour in the year 2004 as shown in the time plot graph.

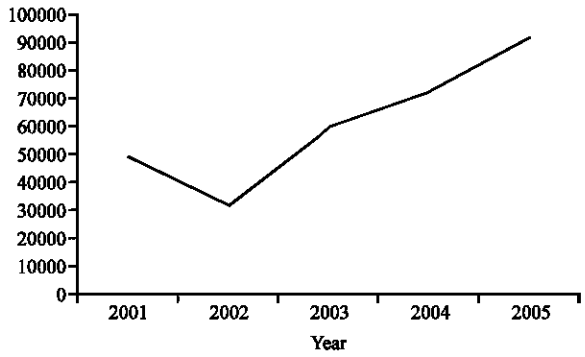

Fig. 1: Time plot of loan and deposit

The above results confirms the earlier experienced trend of investments in IT capital and IT labour being lower than the investments in non-IT capital and labour, respectively. It finally confirms the low level of capital deepening and multifactor productivity. The low level of capital employed led to zero or negative impact on productivity. It could thus be rightly concluded that the higher the level of IT capital employed, the higher the need for IT labour and the higher the level of productivity.

The behaviour of the variables under study was reflected in the time plots in

Figure 1-5 generated using the SPSS package and the application software developed.

There was a sharp drop in loan and development in between 2001 and 2002 and an increase 2002, 2003 and beyond.

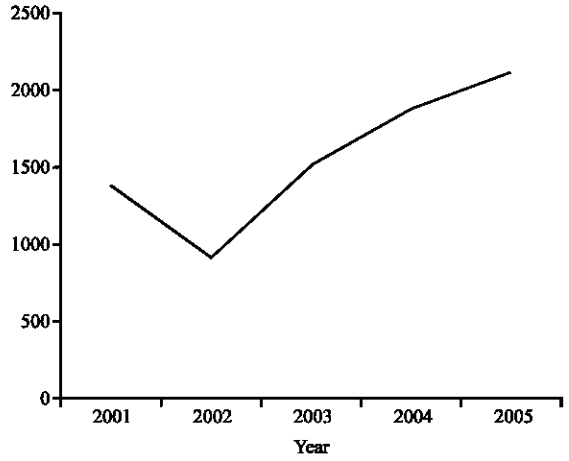

Fig. 2: Time plot of net income

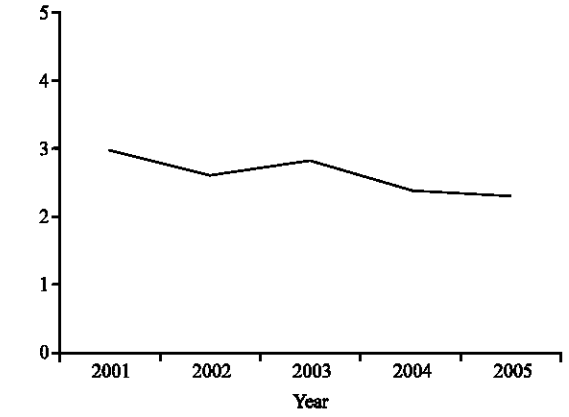

Fig 3: Time Plot of ROA

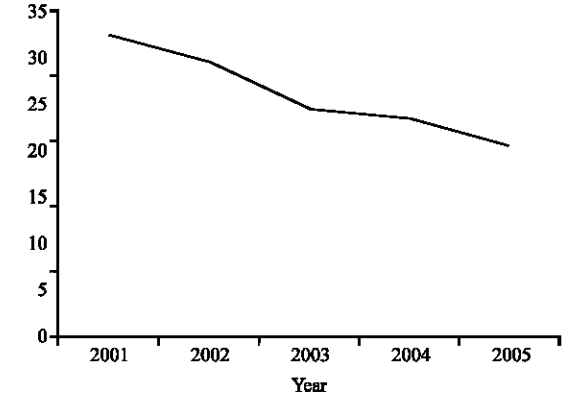

Fig. 4: Time Plot of ROE

There was a sharp drops in NI between 2001 and 2002 and an increasing trend maintained since 2002 till 2004.

The return on assets drops during the year 2000. it rises again to reach peak in the year 2002 only to fall again and maintain an almost steady level in between 2003 and 2004.

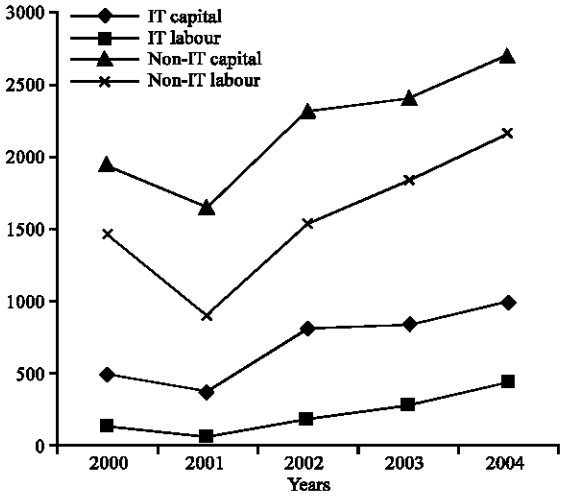

Fig. 5: Time plot for IT-capital, IT-labour, non-IT-capital and non-IT-labour

The return on Equity drops during the year 2000. it rises again to reach peak in the year 2002 and only to fall from 2003 till 2004.

A sharp drop in IT-capital between 2000 and 2001 another sharp increased began in 2001 and then, there is almost a steady movement until 2004. The time plots for Non-IT capital and non-IT labour also follows the same trends.

Using the software application, Fig. 5 was derived. It was apparent that the banks understudy invested more on non-IT capital and non-IT labour and least on IT capital and IT-labour in the 5 years (2000-2004).

Consequently, this implied low level of capital deepening and low level of multifactor productivity. Thus the banks under study can improve on the value of their IT investments by increasing the share of IT capital in the total share of capital available to them.

HYPOTHESES TESTING

Hypothesis 1

HO: IT investments do not make positive contribution to Output

The results as reported in the SPSS is shown in the Table 7 and 8, using loans and deposits as the Dependent variable and IT-Labour, Non-IT Capital and Labour as the independent variables, respectively.

Given R^2 [0.959] and adjusted R^2 of 0.955 that is 95.9 and 95.5%, respectively and Analysis of Variance: f=261.42134 and Significant f = 0.000, it means the general model effects of all the regression parameters were significant. Then, the null hypothesis is rejected and the alternative hypothesis that IT investments do contribute to output is accepted.

Table 7: Results of two-stage least squares

R	R-square	Adjusted R-square	F	Sign
0.979[a]	0.959	0.955	261.421	0.000a

Table 8: Results of two-stage least squares

Model	Unstandardized coefficient B	T	Sig
Constant	4705.642	1.480	0.146
IT CAP	-1.360	-0.321	0.750
IT LAB	104.189	6.030	0.000
NONITCAP	12.071	2,.799	0.0008
NONITLAB	5.521	0.970	0.337

Loan dep = 4.705.6 + 104.189144 (IT labour) – 1.360365 (IT capital) + 12.070988 (Non-IT Capital) + 5.520840 (Non-IT Labour) + e.

Table 9: Results Of two- weighted least squares

R	R-square	Adjusted R-square	F	Sign
0.915[a]	0.837	0.822	57.75275	0.000a

Table 10: Results of two- stage least squares

Model	Unstandardized coefficient B	T	Sig
Constant	391.944524	2.555	0.0141
IT CAP	-1071754	-0.351	0.7274
IT LAB	2.304080	2.764	0.0083
NONITCAP	0.069936	0.336	0.7384
NONITLAB	0.368985	1.344	0.1856

NETINC = 391.944524-0.71754 (IT Capital)+2.304080 (IT labor)+0.69936 (Non-IT Capital)+0.368985 (Non-IT Labor).

Table 11: Results of two-stage least square

R	R-square	Adjusted R-square	F	Sign
0.133[a]	0.018	-0.070	0.202	0.936

Table 12: Results of two-stage least square

Model	Unstandardized coefficient B	T	Sig
Constant	2.738	10.284	0.000
IT CAP	4.738E-05	0.122	0.904
IT LAB	-0.001	-0.639	0.526
NONITCAP	0.000	-0.635	0.529
NONITLAB	0.000	0.706	0.484

ROA = 2.738+(0.001) (IT labour)+4.320E-05 (IT capital)+0.000 (N on-IT Capital)+0.000 (Non-IT Labour)+e, Output = Return on Equity (ROE)

Table 13: Results of two-stage least square

R	R-square	Adjusted R-square	F	Sign
0.246[a]	0.060	-0.023	0.723	0.581

Table 14: Results of two-stage least square

Model	Unstandardized coefficient B	T	Sig
Constant	26.100	10.481	0.000
IT CAP	4.320E-05	0.122	0.392
IT LAB	-0.023	-1.676	0.101
NONITCAP	-0.02	-0.721	0.475
NONITLAB	0.005	1.135	0.262

Model: Yi $\alpha+\beta_1x_1+\beta_2x_2+B_3(x_3)+B_4(x_4)+e$ ROE = Constant+β_1 (ITCAP)+β_2 (ITLAB)+β_3 (Non ITCAP)+β_4 (Non IT LAB)+Error, ROE = 28.100+.005 (Non IT LAB)+.003 (ITCAP)-0.023 (ITLAB)-0.002 (Non ITCAP) +e

It was noted that the elasticity of IT capital was negative, implying that Non IT capital investment was relatively better than investment in IT capital. Since the marginal product of IT labour (N104.189) was higher than the marginal product of Non-IT capital, it could safely be concluded that IT labour was associated with a high increase in the output of the banks.

Hypothesis II

HO: IT investments do not make positive contribution to output after deduction for depreciation and labour expenses [Net Income]

Test of hypothesis when output is Net Income

The multiple Regression was 0.91486; the explained variance R^2 was 0.837 and the adjusted R^2 was 0.822; the multiple coefficient of determination was 0.83696 while the Analysis of variance was 57.75275 and the Significant f = 0.000 (Table 9). In effect, it means that the general regression model of all the parameters is significant. Thus, the alternative hypothesis that IT investment makes positive contribution after deductions for depreciation and labour expenses is accepted (i.e., the net marginal product is positive). The analysis showed that the elasticity (the coefficient) associated with IT LAB, Non-IT CAP and Non-IT LAB expenses were positive but IT LAB was more desirable than the others because it was the only significant variable (Table 10).

Using loans and deposits and net income as measures of productivity, results showed that the banks in the study were using only a small fraction of their total stock of capital as IT Capital. This accounted for the reason why IT capital was negative and not significant. Therefore increasing the share of IT capital would lead to increase in the contribution of IT capital to productivity and thus generate the need for more IT labour. Since, IT labour was the most profitable, banks by investing more on IT labour would be able to increase their productivity more than investing on other independent variables.

Hypothesis III

HO: IT investments make zero contribution to and not significant to profit or stock market value of the firm.

IT investments make zero contribution to profits or stock market value of the firm.

Here, the multiple R = 0.13281; the multiple coefficient of determination = 0.01764; R^2 is 0.018; F = 0.20200 while the significant F = 0.9360. this implies that the model has no explanatory power and that the null hypothesis (that IT investment make zero contribution to and not significant to profit) should be accepted (Table 11).

The SPSS results first described a model summary in which Return on Equity was the dependent variable [Y], while IT Capital, IT-Labour, Non-IT capital and non-IT labour were the independent variables, respectively (Table 12).

Multiple R = 0.24576 showed that the parameters have little or no significant effect on each others. R^2, was .06040 implying that 6% of the total variation in Y was explained by all the independent variables (Table 13).

The SPSS results first described a model summary in which Return on Equity was the dependent variable [Y], while IT Capital, IT-Labour, Non-IT capital and non-IT labour were the independent variables, respectively (Table 14).

Findings form the impact of IT investments on bank's productivity showed that the general model effects of all the regression parameters used were significant. Thus there was significant relationship between IT investments and bank's productivity. It was also found that IT-Capital had negative impact while Non-IT Capital was significant or had positive contribution to output.

Findings from the impact of IT investments on bank profitability showed that there was weak correlation between the parameters. Thus, there was no significant relationship between IT investments and firms' profitability.

CONCLUSION

This study has shown the importance of IT labour in the overall productivity and profitability of the Nigerian banking industry. However, while, it has been established that IT investments makes positive and significant contributions to productivity, it makes zero or no contribution to profitability. Howbeit, it is possible or likely that IT investments do actually affect profitability, but the modern techniques and datasets used by these studies were unable to measure the impacts.

RECOMMENDATIONS

Sequel to the above findings, the study recommends that Nigerian banks should invest more on IT capital. This will assist in improving the contribution of IT capital to productivity and further enhance the contribution of IT investments to productivity.

Nigerian banks should adopt policies that support the employment of more IT labour because it is the most significant of all the independent variables in the study. Banks also need to support researches aimed at evolving better strategy for making IT investments to enhance profitability.

Finally, there is need to develop better datasets and models that will be able to control for more of the additional factors that affects profitability with the possibility of revealing a relationship between IT investment and financial performance while the use of intermediate outputs such as inventory levels, planning cycles, assets utilization and other measures of operations performance known to have direct link with profitability to establish the impact of IT investments could be adopted.

REFERENCES

Adetayo, J.O., S.A. Sanni and M.O. Ilori, 1999. The Impact of Information Technology on Product Marketing: A Case Study of Multinational Company in Nigeria. Technovation, Elsevier Sci. Ltd., pp: 58-100

Baily, M.N., 1986b. What Has Happened to Productivity Growth?. Edu. Resour. Inform. Centre, 234: 443-451.

Barua, A.C. Kriebel and T. Mukhopadhyay, 1991. Information Technology and business value: An Analytic and Empirical Investigation. Inform. Sys. Res., 6: 3-23.

Boyett, J.H. and J.T. Boyett, 1995. Beyond Workplace 2000: Essential Strategies for the New American Corporation, New York: Dutton.

Bresnahan, T.F., E. Brynolfsson and L.M. Hitt, 2002. Information Technology, Workplace Organization and the Demand for Skilled Labour. Firm-Level Evidence. Quart. J. Econ. Rev., 117: 338-376.

Brynjolfsson, E., 1993a. The Productivity Paradox of Information Technology: Review and Assessment. Communications of the ACM, Association for Information System. ACM Press New York, USA., 36: 67-77.

Brynojolfsson, E. and L. Hitt, 1993. Is Information System Spending Productive? New Evidence and New Results. Proceeding of the 14th International Conference on Information systems. J.I. Degross, R.P. Bostrom and D. R obuy (Eds.). Orlando, FL., pp: 47-64.

Brynojolfsson, E., 1993b. Some estimates of the contribution of Information Technology to Consumer Welfare. MIT Sloan School of Management Working paper.

Brynjolfsson, E. and L.M. Hitt, 1998. Beyond the Productivity Paradox: Computer has Catalyse for Bigger Changes. Commun. ACM, 41: 49-55.

Brynjolfsson, E. and L.M. Hitt, 2000. Beyond Computation: Information Technology, Organisational Transformation and Business Performance. J. Econ. Perspectives, 14: 23-48.

Harris, S.E. and J.L. Katz, 1991. Organization Performance and Information Technology Investment Intensity in the Insurance Industry, Org. Sci., 2: 263-296.

Hitt, C.M. and E. Brynjolfson, 1996. Productivity, Business Profitability and Consumer Surplus. Three different measures of information technology value. MIS Quart , 20: 121-142.

Laudon, D.P. and J.P. Laudon, 1991. Business Information System: A Problem Solving Approach. New York, HBJ, College Publishers.

Lichtenberg, F.R., 1995. The Output Contributions of Computer Equipment and Personnel: A Firm Level Analysis. Econ. Innovations and New Technol., 3: 201-217.

Morrison, C.J. and E.R. Bernact, 1990. Assessing the productivity of Information Technology Equipment in the U.S. Manufacturing Industries. National Bureau of Economic Research working paper, 3582.

Oyebisi, T.O., M.O. Ilori, L.O. Ogwu and E.R. Adagunodo, 2000. A Study on the Assimilation of Information Technology in Selected Banks and Insurance Firms in Nigeria, Nigeria Financial Rev., 9: 57-69.

Renkema, T.J.W. and Berghout, 1997b. Methodologies for Information Systems Investment Evaluation at the Proposal Stage: A Comparative Review. Inform. Software Technol., 39: 1-13.

Renkema, T.J.W., 2000. The IT-value Quest: How to capture the business value of IT based infrastructure. Chichester Wiley.

Strassmann, P., 1995. Information Payoff: The Transformation of Work in the Electronic Age. New York, Free Press.