

Information and Communication Technology Use and Firm Performance: Evidence from Lagos State, Nigeria

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Abstract: Against the backdrop of dwindling performance of manufacturing firms as evident in the retrenchment and folding up of many firms in Nigeria lately, The Manufacturing Association of Nigeria for example reported that in 2009, a total of 834 firms closed shop across the country out of which 214 were from Lagos State. This study was consequently undertaken to investigate the effect of Adoption of Information and Communication Technology solutions on the Performance of Manufacturing firms in Lagos State. The objectives of the study are to: identify the benefits of ICT adoption to manufacturing firms in Lagos State, identify the types of ICT solutions being employed by manufacturing firms in Lagos State and also to determine the effect of ICT adoption on Performance of Manufacturing firms in Lagos State. The study made use of primary data. 528 questionnaires were administered to the forty-four firms sampled for the study out of which 494 were returned representing 94% response rate. The study found out that a strong relationship exists between the five explanatory variables (types of ICT solutions, need for ICT solutions, investment on ICT Solutions, effectiveness of use of ICT solutions, and benefits of ICT solutions.) and the dependent variable (Performance of Manufacturing Firms). This is evident from the value of the respective coefficients of the explanatory variable obtained from the estimated model which are as follows: Types of ICT Solutions (1.024), Need for ICT Solutions (1.071), Investment on ICT Solutions (0.821), Effective Use of ICT Solutions (1.511), and Benefits of ICT Solutions (0.636). According to the model, the Coefficient of Determination (R^2) explained about 87.9% of the variations in the performance of manufacturing firms. The study concludes that ICT solutions have significant potential to considerably boost the performance of manufacturing firms when optimally utilized. Thus, managers of manufacturing firms should implement strategies to exploit its benefits to the fullest in the interest of improved organization performance.

Keywords: ICT, Performance, Adoption

Introduction

The Nigerian Manufacturing firms has of recent been confronted with severe economic conditions which has led to several manufacturing firms closing shop and others that are yet to close down have been cutting down on their workforce. The rationale for this study stemmed from the need to revamp the economic sector thereby restoring its lost glories. This study aimed at establishing the relevance of ICT as an enabler of performance. Rashiti, Ramadani, Abazi, and Ratten 2017; Santos, 2003 maintained that ICT has a remarkable influence and are conceptualized to continually determine the competitive nature of businesses. Oduyoye, Binuyo, and Sanda, 2013a; Rogers, 2003 assert that advances in ICTs were pivotal to the recent social and economic transformation in both the industrialized and developing countries. Oduyoye, Binuyo, and Sanda, 2013 emphasized that the diffusion and implementation of ICTs is crucial to the development of productivity and hence competitiveness, with many services more or less directly linked to the performance of the manufacturing sector. According to Menor, Mohan and Scott (2002), the viability of many manufacturing concerns is highly dependent on effective application of ICTs. Noor, Kamardin and Ahmi (2017) contended that managers cannot ignore ICTs because they play a critical role in contemporary organisations. ICTs affect how managers decide, how they plan and what products and services are produced. ICTs have been facilitating response activities to environmental pressures on business. Bresenahan, Brynjolfsson, and Hitt (2002) and

Binuyo, Oduyoye and Bakare (2013) emphasized the effect of ICTs on business and the effect of business on ICTs. They maintained that in order to succeed (or even to survive) in this dynamic world, companies must take not only traditional actions such as lowering cost, but keep pace with ever changing capabilities of ICTs. The study purposed to evaluate the effects of ICT on operations of manufacturing organizations in South-western Nigeria by providing answers to the following research questions:

- i. What are the benefits of adoption of ICT solutions to the manufacturing firms in Lagos State?
- ii. What are the types of ICT solutions being employed by manufacturing firms in Lagos State?
- iii. Has adoption of ICT solutions any significant effect on Performance of Manufacturing firms in Lagos State?

The Nigerian Manufacturing Environment

Literature Background

Copious literature exists on the effect of ICT on firms' performance. According to Bharadwaj (2000) firms with a high level of ICT capability tend to outperform rivals on a variety of profit and cost-based performance measures. Possibilities for achieving competitive advantage in the context of ICT capability have been suggested by Binuyo (2010). He argued that an innovative ICT system can provide a company with competitive advantage by:

- Intimating companies with new ways of doing business;
- Lowering cost of doing business;
- Improving ability to quickly respond to market shifts;
- Differentiating or customizing the value offer;
- Improving service quality;
- Outperforming competitors by extended value offerings; and
- Building switching costs and barriers to entry.

There is empirical evidence to indicate that firms with high ICT capability tend to outperform rivals on a variety of profit and cost-based performance measures (Bharadwaj, 2000). According to Tagliavini (2000), ICT effectiveness is without doubt one of the most debated subject for both IS researchers and practitioners, as the continuous development of innovations constantly pushes companies to increase ICT investments. Sakai (2002) study also stress that the extensive use of ICT can allow micro-enterprises with ideas and technologies to remain small and profitable or generate substantial global sales by exploiting their intellectual property over the Internet.

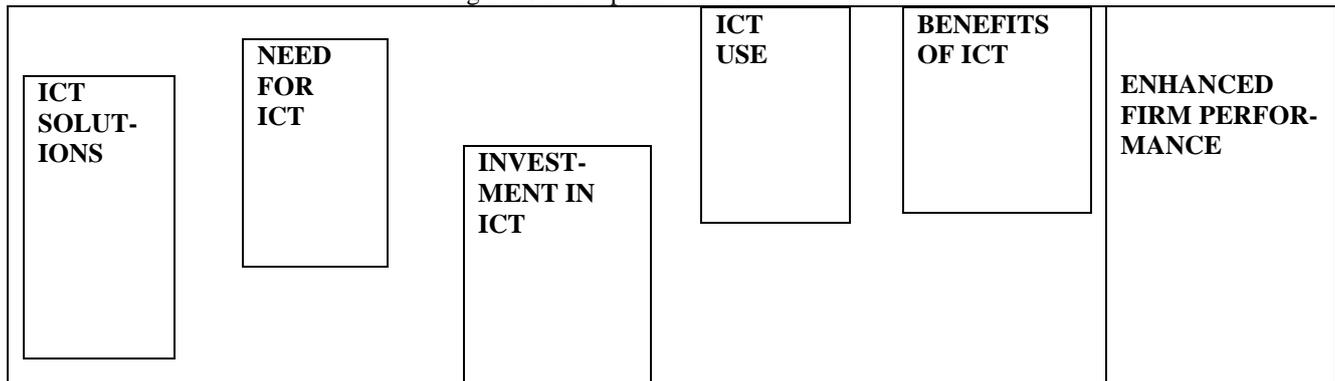
On the other hand, Binuyo and Brevis-Landsberg (2014) posited that ICT contribute to overall growth of firms especially in the long-run. Generally, primary motivation for the SMEs to adopt new technologies (such as the Web) is the anticipated benefits these technologies will bring to the company (Binuyo & Aregbeshola, 2014). Nowadays SMEs have recognized the positive impacts of ICTs such as computer terminals, e-mail and Internet to the organization level as well as their applications on business performance.

According to a study by Agboola (2006) it stresses that ICT implementation in the organization which includes SMEs has the potential to reduce costs and increase productivity level. According to them small firms might find cost-effectiveness as a motivating factor to use Internet-commerce for improving communication with trading partners and consumers.

In the words of Ashford (2002), Information has become the unit of exchange, a source of competitive advantage and a primary wealth-creating asset. Furthermore, Okunoye, Bada and Frolick (2007) describe the Internet as a mediating technology that facilitates information exchange among parties distributed in time and space; a time moderator that allows instant and 24/7 access to information; and an information asymmetry shrinker that increases overall information access. ICT, typically facilitated by an Internet platform, enables faster preparation, transferring, and processing of order management documents, as well as market information. In a case study by Behrens (2000) extranet adoption enhanced customer service through improved access to information that customers need for decision making and planning; decreased lead times and improved operations planning resulted from the extranet.

Research Model and Hypotheses development

Fig.1: ICT Adoption– Performance Model



Source: Field Survey, 2011

From the figure above, performance is seen to be a function of need for ICT intervention, Investment on ICT, proper use of ICT arising from developing the right attitude to ict solution. Functionally, the above model can be presented as:

$$PERF. = f (SOLUTIONS, NEED, INV, USE, BENEFITS)$$

Where:

PERF = Performance (the dependent variable in the model)

NEED = Factors responsible for the adoption of ICT by each of the firms studied

INV = Investment in ICT by the firms studied

USE = Perceived effect of ICT adoption on personnel

The stochastic form of the above model therefore becomes:

$$PERF = \alpha_0 + \alpha_1 NEED + \alpha_2 INV + \alpha_3 USE + \alpha_4 SOLUTIONS + \alpha_5 BENEFITS + U$$

In this paper, the values of the individual explanatory variables as well as their joint significance effect on the explained variable were determined.

Business performance has been measured in many different ways, Syombua (2014). Many authors have used single items to measure it, such as company profitability (return on total asset), Uwaje (2000). Given the wide variety of ways in which ICT may contribute to business performance, and the importance of content validity for such a significant measure, in this study, the overall business performance will be measured through the following six indicators, accepted as a measure of business performance according to Okunoye, Bada and Frolick (2007).

The indicators include:

- Earnings per share (EPS)
- Net profit margin (NPM)
- ICT Cost Efficiency (ICTCE)
- Return on equity (ROE)
- Return on Capital employed (ROCE)
- Net profit after tax (NPAT)

Other performance indicators that could be used to assess manufacturing firms are as follows:

Promptness of service delivery, Error rate reduction, Forecasting accuracy, Improved Service Quality, Competitive strength, High revenue and improved decision making

In the course of this study, the following hypotheses were formulated:

Hypothesis one

H0: Adoption of ICT solutions offers no significant benefits to Manufacturing firms in Lagos State.

Hypothesis two

H0: There is no significant difference between the types of ICT solutions adopted by Manufacturing firms in Lagos State.

Hypothesis three

H0: There is no significant relationship between ICT solutions adoption and Performance of Manufacturing firms in Lagos State.

Methodology

The research design utilized for this study was motivated by the exploratory nature of the research. By survey method of research design used, the fifty-one manufacturing firms in Lagos State were stratified into ten on the basis of their product offering namely: Building (7 nos.), Chemicals & Pharmaceuticals (13 nos.), Paints (5 nos.), Plastics (2 nos.), Textiles (4 nos.), Consumer Products (9 nos.), Non-alcoholic Beverages (3 nos.), Alcoholic Beverages (3 nos.), Tyres (1 no.), and Flour Mills (4 nos.). Thereafter, following the Krejcie and Morgan sample size table (1970), 86% of samples from each of the strata are randomly selected to generate samples that are representative of the defined population giving rise to a total of 44 firms out of 51.

The samples so generated are as follows: Building (6 nos.), Chemicals & Pharmaceuticals (11 nos.), Paints (4 nos.), Plastics (2 nos.), Textiles (3 nos.), Consumer Products (8 nos.), Non-alcoholic Beverages (3 nos.), Alcoholic Beverages (3 nos.), Tyres (1 no.), and Flour Mills (3 nos.). The samples so generated summed up to 44 out of the 51 firms corresponding to 86% of the population. A total of 12 copies of the questionnaires were administered to employees of each of the 44 firms making a total of 528 questionnaires administered. The total number of respondents that filled and returned the questionnaire was 494 which amounted to approximately 94% response rate. The staff sampled for questionnaire administration were categorised as follows:

- a. C.E.O. / M.D
- b. Directors, Deputy Directors and Assistant Directors
- c. Managers
- d. Supervisors
- e. Junior Staff

It turned out that the majority of the C.E.O /M.D. were not available to attend to the questionnaires. Data were collected from the listed respondents. The first three categories of respondents were selected using judgmental sampling method because, officers at those positions are in a better position to assess effectiveness of ICT contribution to performance from record perspective to which they are close. The last two categories of respondents were randomly selected as their assessment from the practical perspective makes the findings of the study balanced. The questionnaire used consisted of four sections, the first section identified the respondents' post and organization represented. The second section elicits benefits of ICT to firms. While the remaining two sections deals with Solutions and Investment in ICT.

Content validity was established by conducting a comprehensive review of relevant literature, in addition to the opinions of experienced researchers, academics and organizational managers. Before the administration of the research instrument, a pre-test of the instrument with a small group of respondents who were not part of the final group of respondents was undertaken to improve the quality of the research instrument. Following the pre-test, a few changes were made, the revised research instrument /questionnaire was then used for the main study. The analysis of the data gathered from completed copies of the research instrument utilized both the one way ANOVA as well as the multiple classifications ANOVA. The Cronbach's α of the research instrument was 0.79. This value opened the way for the administration of the instrument.

Results

The study found out that adoption of ICT solutions offers a wide range of benefits. Descriptive statistics revealed that the following benefits arising from adoption of ICT solution by Manufacturing firms in Lagos State: Simplify work (85%), Increase Patronage (75%), Improve Organizational Image (88%), Improve Service Quality (95%), Enhance Research & Development (80%), Improve Competitive Strength (86%), Enhanced Management Decision (83%), Improve Control measure (96%). In view of these findings, H_0 is rejected.

There is a significant relationship $F(41,452) = 5.919$; $P < 0.05$ between ICT Investment and performance of manufacturing firms in Lagos State. This is considering the corresponding table value of 1.39 being lower than the calculated value. Hence, the H_{01} is rejected.

There is a significant difference $T(493df) = 181.58$; $P < 0.05$ (table value = 1.962) between types of ICT Solutions being used by the Manufacturing Firms in Lagos State. Hence, H_{02} is rejected.

There is also a significant relationship $F(41,452) = 11.269$; $P < 0.05$ between ICT use and performance of manufacturing firms in Lagos State. This is considering the corresponding table value of 1.39 being lower than the calculated value. Hence, the H_{03} is rejected.

Furthermore, a very highly significant relationship $F(41,452) = 14.269$; $P < 0.05$ between ICT solutions and performance of manufacturing firms in Lagos State. This is considering the corresponding table value of 1.39 being lower than the calculated value. Hence, the H03 is rejected.

Table 1. One Way ANOVA of the Predictor Variables' Relationship with the Explained Variable

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
solutions	Between Groups	3516.168	41	85.760	14.269	.000
	Within Groups	2716.666	452	6.010		
	Total	6232.834	493			
Investment	Between Groups	3266.116	41	79.661	5.919	.000
	Within Groups	6083.311	452	13.459		
	Total	9349.427	493			
Effects	Between Groups	1125.749	41	27.457	11.269	.000
	Within Groups	1101.328	452	2.437		
	Total	2227.077	493			

Source: Field Survey, 2010

Above table revealed the individual significance of the relationship between each of the predictor variables and performance of manufacturing firms in Lagos State.

The three predictors put together jointly have a very highly significant relationship $F(3,490) = 808.525$; $P < 0.05$ with performance of manufacturing firms in Lagos State.

Table 2. Coefficients of the Predictors Variables

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.488	1.494		11.702	.000
	solutions	1.149	.046	.525	25.190	.000
	Investment	.837	.034	.469	24.975	.000
	Effects	1.761	.077	.481	22.976	.000

a. Dependent Variable: sum

Source: Field Survey, 2010

The above table indicated the relative contribution of each of the predictors to enhancement of performance. Each of the predictors has a significant relationship with performance with values ranging from 0.837 for ICT Investment, 1.149 for Solution and 1.761 for Effects of ICT representing the variable "use".

Table 3. Regression Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.912 ^a	.832	.831	3.19864

a. Predictors: (Constant), Effects, Investment, solutions

Source: Field Survey, 2010

Table 4: Multiple Classifications ANOVA of the Predictor Variables

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24816.779	3	8272.260	808.525	.000 ^a
	Residual	5013.335	490	10.231		
	Total	29830.113	493			

a. Predictors: (Constant), Effects, Investment, solutions

b. Dependent Variable: sum

Source: Field Survey, 2010

The ANOVA table above specified the joint relationship between the predictors and performance.

Discussion

The positive and statistically significant relationship between Performance and ICT Investment is in tandem with the position of Menor, et al. (2002) who in their paper maintained that the viability of manufacturing concerns is highly dependent on effective application of ICTs. This view was corroborated by Noor, Kamardin and Ahmi (2017) who contended that managers cannot ignore ICTs because they play a critical role in contemporary organisations. This is because ICTs affects how managers decide, how they plan and what products and services are produced. Furthermore, Bresenahan, Brynjolfsson, and Hitt (2002) and Binuyo and Aregbeshola (2015) emphasized the effect of ICTs on business and the effect of business on ICTs. They maintained that in order to succeed (or even to survive) in this dynamic world, companies must take not only traditional actions such as lowering cost, but keep pace with ever changing capabilities of ICTs. These views agreed with the finding of this study that rejected the null hypothesis one that says there is no significant relationship between ICT Investment and Performance of manufacturing firms in Lagos State.

This study revealed that a significant relationship exist between ICT use and Performance. This was also affirmed by the WorldBank (2006), maintaining that firms that use ICT grow faster, invest more, and are more productive and profitable than those that do not. Also, Binuyo and Aregbeshola (2014) contended that judging from the experience of developed countries, it could be established that there is a positive relationship between ICT use and superior performance. Binuyo and Brevis-Landsberg (2014) study found a positive impact on ICT usage in business and it is able to increase business performance.

Limitations of the Study

The researchers believed that the result of this study may be limited in terms of generalization because it focused only on a section of the firms in the country and also in one state of the country. Socio-cultural background, spatial variability cum Economic condition may affect the generalizability of the results obtained from this study. Moreover, the condition of the method and the environmental dynamism may also affect the generalization of the results of the study.

Conclusion

This study concludes that for organizations to remain afloat in today’s dynamic and competitive business environment, ICT should be seamlessly integrated into activities and operations of business concerns. This is considering the fact that customers these days are better informed and more demanding. Only organizations that move with the time can satisfy the ever changing taste and sophistry of customers’ demands. This cannot be done effectively without engaging ICT in the improvement of service quality and speed of delivery. The findings of this paper suggested that ICT Investment is germane to improved organizational performance when properly deployed and diffused properly through an organization. The result specifically suggests that manufacturing firms that acquire and integrate ICT in its operations are likely to improve their performance in a dynamic environment.

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