Product and Technology Innovation and Organizational Performance: Evidence from the Telecommunication Industry.

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ABSTRACT

Products are the main thrust for satisfying consumers' needs and successful product and technology innovation is vital to many organizations. The main objective of this study is to examine the effectiveness of product and technology innovation on performance of firms in the telecommunication industry. Questionnaires were administered to eighty respondents. Regression analysis was adopted to analyze data gathered from the questionnaires. The findings revealed that product and technology innovation affect performance of firm's productivity. The study's findings further revealed that product and technology innovation also gives firm strong competitive advantage and increases customer patronage. Product rebranding also improves organization's image. Product innovation positively affects firm's performance. It was also deduced that customer feedback also influences product innovation of firms and that innovation influences growth of organizations in the industry.

The study concluded that customer patronage and strong competitive advantage are some of the good perks that come along with effective product innovation. For an organization to be perceived and acknowledge as a quality organization, it must invest adequately in product and technology innovation. Management should therefore consider product and technology innovation as necessity and not a luxury that can be used to enhance performance in the telecommunication industry.

(Keywords: product, technology, innovation, quality, organizational performance, telecommunication industry)

INTRODUCTION

A product innovation is the act of bringing something new to the marketplace that improves the range and quality of products on offer. Innovation is considered to be a critical requirement for the growth and profitability of organizations. For private sector organizations operating increasingly is a competitive market the capacity to innovate is ever more viewed as the single most vital factor in developing and supporting competitive advantage.

According to Davila, Epteing, and Shelton (2006), innovation is a necessary ingredient for sustained success and is an integral part of the business. Much weight has been accorded on building innovations and the management of the innovation progression as necessary element of institutional survival. Innovation involves acting on the creative ideals to make some specific and tangible difference in the domain in which the innovation occurs. However, innovation is defined as the successful implementation of creative ideas within an organization.

In the vast majority of business sectors, if firms do not innovate, their competitors will and they will be put out of business. Miozzo and Soete (2001) posited that telecommunication belong to

a group of network service, which are dependent on information technology networks. The development of information has facilitated improvements in the complexity precision and quality of services offered by these providers. The process of innovation has long been argued to be the engine of growth regardless of the condition of the larger economy whilst competitive advantage can come from size or possession of assets, etc.

In today's dynamic global competitive environment, innovation is becoming more pertinent, mainly due to three major trends: concentration in international completion, disjointed and challenging markets, and assorted and swiftly changing technologies. In many countries, the pace of change in telecommunication industry is dramatic and the service providers worldwide are becoming increasingly interrelated. Innovation is about creating something new out of nothing. In the modern world of globalization, innovation is of prime importance to any company or organization for performing well. It has been observed that most organization stop growing in most cases after reaching a certain stage, as their leadership may try to maintain the status quo and discourage innovative thoughts and actions through the corporate strategies they adopt. The availability of the right resources may act as a catalyst but creativity will not flourish if organizations do not have a culture of encouraging and supporting innovation.

The objective of this study is to examine how technology innovation affects performance of firms in the telecommunication industry. The study also investigates how product innovation affects performance of firms in the telecommunication industry. It further assesses the influence of management challenges on innovation in the telecommunication industry with reference to Globacom Nig. Plc.

LITERATURE REVIEW

There are increasing numbers of empirical studies that have examined the relationship between innovation and company performance considering different types of models, estimation methods, measures of corporate performance, and innovation activity (Geroski et al., 1997; Bottazzi et al., 2001; Del Monte and Papagni, 2003; Loof and Hesh matt, 2006). It is often useful to think of service as an intermediate activity, such as transport, that arise because consumers want to separate production, consumption, or contact service such as haircuts, telephone calls, or media service. An important aspect of service is the relationship between production and consumption that can be produced meaningfully without consumers whereas service requires the consumer. Innovation is the successful exploitation of new ideas.

Lopez-Vega (2009) posited that traditionally, studies on national or regional systems of innovation are considered as the drivers of the innovation systems framework. However, recently, research towards more micro-based studies, at the sectoral (Malerba, 2004) and technological level (Bergek, et al. 2008), have emphasized the need for more detailed investigations at lower levels (Carlsson, 2007).

These studies should aim to explore the creation and flow of knowledge, emphasizing the formation of new networks of organizations as well as the dynamic or process study. The literature on technological innovations has advanced on addressing these challenges and become established in the innovation systems literature. Indeed, until 2002, both empirical (43%) and conceptual research (57%) on Technology Innovation Systems represented 19% of the entire publications (750 entries) on innovation systems (Carlsson, 2007), whereas studies on Sectoral Systems of innovation represented only 49 published studies.

According to Davila, Epsting, and Shelton (2006), innovation is a necessary ingredient for sustained success and is an integral part of business for many firms in Nigeria. Information and communication technology is viewed as potentially capable of helping organizations and individuals that are buying mobile phones, computer hardware, and software as well as using the internet for the information and communication in the Nigeria market. The vast opportunities brought by the internet to the telecommunication industry have therefore attracted much attention from researchers whose effort apparently group on certain areas of internet.

With the use of IT, firms can use cross-selling strategies to sell new products through innovation to their existing customers. It can be seen that firm's adoption of technology changes from improving efficiency and also improving the

service quality with the adoption of short messages services. When effectively implemented, this can lead to substantial cost saving in areas of telephone calls and personal time. Aremu and Saka (2014) emphasized that technology will enhance the output of an organization either service or product oriented.

Product innovation provides the most obvious means for generating revenues. It also enables firms to increase their brands or products in the marketplace. Market innovation also enables firms to create new markets and hence increase the competitive advantage, ease the flow of information, and establish fast delivery to the intended customers. It was observed that when compared the innovation systems literature, in innovation management (Von Hippel, 2005; Adner and Levinthal, 2001) and technology (Dosi, 1982; Bresnahan and Greenstein, 2001; Mowery and Rosenberg, 1979) the relevance of users or the 'porous society' has become fundamental during the technological system transitions (Smits, 2002) as they contribute on accelerating the formation of new technologies and industries (Smits, 2008; Edquist and Hommen, 1999).

Innovation is also one of the core successes skill processes for the 21st century and as with other core business processes, innovation needs to be linked to strategy as the business strategy runs the risk to deliver key resources and damage the focus of an organization. The extent and type of innovation should be determined by current business performance and future expectation and by organization's tolerance to risk.

A special issue in the telecom areas is the differentiation between product and process innovation. Product and process cannot consequently be separate, however, not all process innovation become visible to the end user in the shape of new products or services. It is also possible to differentiate between network and service innovation, that end users do not necessarily notice (network).

The implications of competition include the following: the extent of innovation activities; the innovators (who) themselves, and the character of the innovations. The implementation of innovations also includes the following: the market share and the character of competition

In the telecom industry, competition has led to greater innovation activity. Before the liberalization of the sector is compared with the present situation, it is obvious that there are many innovation activities in today's market and this does not imply that the sector formerly lacked innovations. Many of the technologies which at present are implemented were developed in the monopoly period. The present system, however, better in bringing new ideas than before and the degree of variation is considerably higher.

Furthermore, a radical innovation such as the internet, which comes from outside the traditional telecom sector, would not have developed in the same manner and seen such wild diffusion without a liberalization of alternative operators access to the telecom network (Folstad, 2008).

The Implication of Innovation for Competition

It is difficult to unequivocally state that innovation leads to greater market share. Many other factors also play a role. First and foremost, price competition and marketing campaigns are critical. However, the innovative operators in different cases have considerable market share as a consequence of innovation activities. This has also led to the acquisition of considerable market shares.

With respect to whether innovation leads to more competition, this depends on how increasing or diminishing competition is defined. If increasing competition is defined as a growing number of operators and a more balanced distribution of market share; it is inevitable that innovation leads to increasing completion. However, if increasing competition is defined as a greater struggle between operators, it can be confirmed that innovation leads to increasing competition.

In the old telecom structure the operators were the dominating users as well as the main players in development and innovation activities concerning equipment, networks, and services. This structure was decisively changed with the introduction of liberalization and competition, while, at the same time acting as preconditioning for market development.

In summary, the telecommunication industry in Nigeria is currently undergoing rapid change and phenomenal growth. Over the past decade in particular, the Nigerian telecommunications industry has begun to deliver increased services for the residential and business consumer. This

recent development is as a result of the liberalization of the sector and resulting competition by private operators (NCC 2005).

Innovation is often about small incremental changes of products, services, and processes. It also needs the involvement of all managers in all departments from customer service to finance. Innovation should be planned and managed as a core business process covering all parts of a business. More than that, it should be integrated into the business in both strategic and operational levels. Innovation needs to be linked to strategy and the business planning.

Innovation Strategy

In the business environment where innovation provides distinctive and sustainable competitive advantage, innovation strategy involves analysis of a firm's business, market, and technological environments as well as consideration of what resources they have to draw upon. It involves making choices about innovation in uncertain and ambiguous circumstance, with diverse strategies for different levels of uncertainly. It also entails building innovative capabilities.

Firms need to analyze, selected, and deliver innovation to enhance organizational performance. It requires consideration of new initiatives within the firm's existing portfolio. It also concerns integrating all the areas of MTI into a coherent whole (Dodgson, Mathews, Kastelle, and Hu, 2008).

An innovation strategist guides decisions on how resources are used to meet a firm's objectives for innovation and thereby deliver value and build competitive advantages. It entails judgment about which kind of innovation process is most appropriate for the firm's circumstance and ambitions. An innovation strategy identifies the technologies and markets the firm should best develop and exploit to create and capture value. It does so within the limits of the resources available to the firm to support current and future innovation effort and its evolving corporate strategy organization and culture.

Innovation strategy is different than mainstream business strategy because it needs to comprehensively accommodate uncertainly. As such, many common approaches to business strategy are inappropriate for innovation business. Some uncertainly is always present is strategy management of incremental innovation but it is major strategy factor in radical innovation (Dodgson, Mathews, Kastelle, and Hu, 2008).

There are factor interrelated elements involved in innovation strategy, namely: enacted strategy; innovation capacity; resources available for innovation; and innovation processes which are used to deliver result. *The enacted strategy* itself involves its target and "fits" with over company strategy, existing innovation efforts and the context in which it operates. The identified targets are the technologies and market that manger believes will creates and deliver best value for their firms. *The resources available for innovation* are the assets a firm owns and to which it has preferential and secure access. *The innovation capabilities* also guide and enable those resources to be accessed, configured and reconfigured. Lastly, *the innovation process* used to deliver the results are the combinations of management and organization around Research and Development (R&D), new product and service development, operations and commercialization that deliver innovation.

Innovation strategy helps to focus attention on how these resources capabilities and process are best developed and deployed to meet corporate objective (Dodgson, Mathews, Kastelle, and Hu, 2008). There are often more opportunities for innovation than resources available and choice have to be made. The choice made should include attention to issues.

Product Innovation

Drucker (2012) maintained that product innovation is the creation and subsequent introduced of a good or service that is either new, or an improvement on previous goods or services. This is broader than the normally accepted definition of innovation to include invention of new products which, in this context, are still considered innovative. It is defined as the development of new products, changes in design established products, or use of new materials or components is the manufacture of established products. Thus, product innovation can be divided into two categories, innovation development of new products, and improvement of existing products.

METHODOLOGY

This study centers on the conglomerate industry and Globacom Nigeria, Ltd., Ilorin, branch to be precise. The study covers all various product innovations used in the industry.

Globacom Nigeria, Ltd. was selected because of its widespread presence and relevance to the Nigerian market and the economy in general. The time frame for this study is between 2009 and 2014. GLO has an estimate of over 25 million subscribers (June 2009) and it is a 100% Nigerian owned company.

GLO built an $800 million high-capacity fiber-optic cable known as Glo-1, a submarine cable from the United Kingdom to Nigeria. GLO Mobile, a subsidiary of GLO, is GLO's Mobile Network Unit. In the first year of operation, it had one million subscribers in over 87 towns in Nigeria and over 120 billion Naira in revenues. GLO Mobile has now spread its reach to other parts of Africa, namely the Republic of Benin and Ghana.

Sampling Size and Sampling Technique

Research on the whole population is not possible because of conditions such as cost, time, and also duplication of responses. Hence this research was limited to the Globacom office in Ilorin. The total population of the Globacom staff in Ilorin is 120.

The sampling size includes the total of 80 staff respondents. The simple random sample technique was used in order to give all the population an equal chance of being selected. The data obtain from the field of study was presented using descriptive statistics of simple percentage. For statistical analysis of the data gathered, Multiple Regression Analysis with the aid of SPSS (Statistic Package for Social Sciences) was used. The rationale for simple regression analysis is because it is a statistical tool that not only explores the relationship between two variables buts also indicates the direction and magnitude of the effect of the independent variable on the dependent variable.
The multiple regression model is given below as:
$Y = a + bx + bx_1 + bx_2 + bx_n$

where: Y = Performance; X = technology innovation; x_1 = Product innovation; x_2 = management support

Research Hypotheses

i. H_0: Technological innovation does not affect performance of firms in the telecommunication industry.

ii. H_0: Product innovation has significant impact on performance of firms in the telecommunication industry

iii. H_0: Management does not have influence on innovation in the telecommunication industry

Test of Hypotheses

Test of Hypothesis One

Ho: technological innovation does not affect performance of firms in the telecommunication industry

Table 1: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.893[a]	.797	.795	.72636

a. Predictors: (Constant),TECHNOLOGICAL INNOVATION
Source: SPSS Output, 2015

This table shows the summary of fitted model with R-Square value of 0.797. This shows that only 79.7% affect technological innovation on productivity.

Table 2: ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	161.834	1	161.834	306.734	.000[a]
Residual	41.153	78	.528		
Total	202.987	79			

a. Predictors: (Constant), TECHNOLOGICAL INNOVATION
b. Dependent Variable: Productivity
Source: SPSS Output, 2015

The table above shows the result of regression analysis of dependent variable and independent variable. The table shows 0.00 level of significance between technological innovation and productivity, since the value is less than 0.5, we can conclude that there is a statistically significant relationship between technological

innovation and productivity. This means that innovation affect firms productivity. Therefore we accept the alternative hypothesis and reject the null hypothesis.

Table 3: Coefficients[a]

Model	Un-standardized coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Bata		
1. (Constant)	.647	.176		3.667	.000
TECHNOLOGICAL INNOVATION	.983	.056	0.93	17.514	.000

a. Dependent Variable: Productivity
Source: SPSS Output, 2015

The coefficient of the ANOVA Table shows that there is 0.000 level of significance in productivity in respect to technological innovation and there 0.000 level of significance of innovation in respect to productivity. With the level of significance we can conclude that technological innovation affect performance of firms in the telecommunication industry. Hence we accept alternative hypothesis and reject the null hypothesis.

Test of Hypothesis Two

Ho: product innovation has significant impact on performance of firms in telecommunication industry.

Table 4: Model Summary.

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.932[a]	.868	.867	.44778

a. Predictors: (Constant) Performance
Source: Field Survey, 2015

This table shows the summary of fitted model with R-Square value of 0.868. This shows that only 86.8% effect of product innovation on performance.

Table 5: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	103.110	1	103.110	514.246	.000[a]
	Residual	15.640	78	.201		
	Total	118.750	79			

a. Predictors: (Constant), Performance
b. Dependent Variable: Product Innovation
Source: SPSS Output, 2015

The table above shows the result of regression analysis of dependent variable and independent variable. The table shows 0.000 level of significance between product innovation and performance, since the value is less than 0.05, we can conclude that there is a statistically significant relationship between product innovation and performance. This means that innovation affect firms performance. Therefore we accept the alternative hypothesis and reject the null hypothesis.

Table 6: Coefficients[a]

Model	Un-standardized coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Bata		
1. (Constant)	.187	.109		1.722	.049
PERFORMANCE	.785	.035	.932	22.677	.000

a. Dependent Variable: Product Innovation
Source: SPSS Output, 2015

The co-efficient of the ANOVA Table shows that there is 0.000 level of significance in performance in respect to product innovation and there is 0.049 level of significance of innovation in respect performance. With this level of significance we can conclude that product innovation affects performance of firms in the telecommunication industry. Hence we accept the alternative hypothesis and reject the null hypothesis.

Test of Hypothesis Three

Ho: Management does not have influence on product innovation in the telecommunication industry

Table 7: Model Summary.

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.900[a]	.809	.807	.53885

a. Predictors: (Constant), Management Level
Source: SPSS Output, 2015

This table shows the summary of fitted model with R-Square value of 0.809. This shows that only 80.9% effect of management level on product innovation.

Table 8: ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	96.102	1	96.102	330.981	.000[a]
Residual	22.648	78	.290		
Total	118.750	79			

a. Predictors: (Constant), Management Level
b. Dependent Variable: Product Innovation
Source: SPSS Output, 2015

The table above shows the result of regression analysis of dependent variable and independent variable. This table shows 0.000 level of significance between management level and product innovation and since the value is less than 0.05, we can conclude that there is a statistically significant relationship between product innovation and management level. This means that management level affects firm's performance. Therefore we accept the alternative hypothesis and reject the null hypothesis.

Table 9: Coefficients[a]

Model	Un-standardized coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Bata		
1. (Constant)	-	.153		-1.213	.229
MANAGEMENT LEVEL	.186	0.43	.932	18.193	.000
	.779				

a. Dependent Variable: Product Innovation
Source: SPSS Output, 2015

The co-efficient of the ANOVA Table shows that there is 0.229 level of significance in performance in respect to product innovation and there is 0.000 level of significance of innovation in respect performance. With this level of significance we can conclude that product innovation affects performance of firms in the telecommunication industry. Hence we accept the alternative hypothesis and reject the null hypothesis.

DISCUSSION OF RESULTS AND ANALYSIS

The study findings revealed that that 27(33.8%) of the respondents are male while 53(67.2%) are female. The implication of this is that majority of the respondents are female while the majority of the GLO users sampled are male. The age distribution of the respondents shows that 31(32.2%) of the respondents are between the age range 20-29 years. 11(13.8%) between the age range 30-39 years, while (54.0%) are between the age range 40-49 years. The implication of this is that majority of the respondents are between the age 40-49 years. Furthermore, the result also shows the marital status of the respondents. It shows that 44(54.2%) of the respondents are married while 38(43.8%) are single. The implication this is that majority of the respondents are married.

The result also revealed the effect of technological innovation of firm's performance of the respondents. It shows that 48(60%) of the respondents agreed, 8(10%) disagreed, 16(20%) strongly agreed, while 8(10%) strongly disagreed that technological innovation affects firms performance. The Implication of this is that majority of the respondents agreed that technological innovation affects firm's performance.

On the effect of technological innovation of firm's productivity, the findings show that 40(50%) of the respondents agreed. 12(15%) disagreed, 24(30%) strongly agreed, while 4(5%) strongly disagreed that technological innovation affects firms productivity. The implication of this is that majority of the respondents agreed that technological innovation affects firm's productivity.

The investigation further shows the effect of product innovation on customer patronage. It revealed that that 40(50%) of the respondents agreed, 12(15%) disagreed, 20(25%) strongly agreed, while 8(10%) strongly disagreed that product innovation affects customer patronage. The implication of this is that majority of the respondents agreed that product innovation affects customer patronage.

The study findings also show the effect of top management decisions on innovation. It indicates that 7(21.2%) of the respondents agreed, 12(15%) disagreed, 51 (63.8%) strongly agreed that top level management decisions affects firms innovation. The implication of this is that majority of the respondents strongly agreed that top level management decision affects firms innovation. The study also revealed the impact of innovation on profitability of firms in the industry. It shows that 39 (48.8%) of the respondents agreed, 12 (15%) disagreed, 21 (26.2%) strongly agreed, while 8 (10%) strongly disagreed that innovation affects profitability of firms in the industry. This implies that majority of the respondents strongly

agreed that innovation affects profitability of firms in the industry.

In order words, statistical test for hypothesis one, question 1 was adopted for the regression evaluation. The regression analysis result is a linear function which establishes that technological innovation affects performance of firms in the GLO telecommunication industry. This is because the intercept and slope of the coefficient are 0.647 and 0.983 respectively which could be written in model form as y = 0.647 + 0.983x. Where y = "technological innovation" and x = "organizational performance". The positive value of 0.647 and 0.983 posits that there is positive correlation between organizational performance and innovation.

The P-value of the analysis is 0.000 which is less than alpha value (0.05). Since the statistical decision rule of p- value states that the Null hypothesis should be accepted if P – value is greater than alpha value (i.e. level of significant which is 0.05), otherwise it should be rejected, and then the alternative hypothesis is adopted.

In testing statistical relevance of hypothesis two, Questions 1 and 7 were selected from the questionnaire. The regression analysis result is a linear function which establishes that there is a linear or direct relationship between product innovation and organizational performance. This because the intercept and slope of the coefficient are 0.187 and 0.785 respectively which could be written in model form as y = 0.187 + 0.785x. Where y = product innovation and X = organizational performance. The positive value of 0.187 and 0.785 indicate that there is positive correlation between product innovation and organizational performance. The R-square value of the analysis is (86%). This implies that the variability change in organizational performance can be accounted for by 86% of product innovation.

In order to statistically test hypothesis three, Questions 1 and 11 were adopted for the regression evaluation. The regression analysis result is a linear function which establishes that there is a direct relationship between management level and product innovation. This is because the intercept and slope of the coefficient are -0.186 and 0.779 respectively which could be written in model form as y= -0.186 + 0.779x. where X = "product innovation" and Y = "management". The positive value of 0.068 and 0.642 posits that there is positive correlation between customer satisfaction and improved and sustained quality service. The R-square value is .809 (80.9%). This implies that only 80.9% effect of management level on product innovation. This invariably established that a positive relationship exist between management level and product innovation. This implies that for GLO to have a successful product innovation there is need for support from management level. This is because management support is considered to be significant for any organization that wants to achieve meaningful product innovation and enhance its performance.

CONCLUSION AND RECOMMENDATIONS

The conclusion is based on deductions from the research findings, ideas from the review of the literature, and the hypotheses tested, while the recommendations are based on the conclusion of the research study. The study concludes that technological innovation affects performance of a firm's productivity. Product innovation also gives firms a strong competitive advantage and increases customer patronage. Top level management decisions affect a firm's innovation.

There is a statistically significant relationship between technological innovation and productivity. This means that innovation affects firm's productivity. As innovation improves so does firm's productivity increases. Also there is a statistically significant relationship between product innovation and performance and also product innovation and management level. The quality of product innovation offered by a firm has a positive effect on the performance of the organization. The emergence of innovative products or services from a firm is mostly as a result of top level management decision making. Product innovation has a great effect on the overall image and perception of the firm by the consumer which can enhance customer loyalty and patronage. Besides, innovation affects firm productivity and as the quality of innovation improves, firm productivity and performance increases. Morealso, customer patronage and loyalty which enhance strong competitive advantage are some of the good perks that come along with effective product innovation.

The following recommendations may be found useful and if rationally adopted will go a long way in enhancing the effectiveness and usefulness of

product and technology innovation in achieving improved organizational productivity. Organizations should continue to encourage its staff to participate in consistent innovation of product in order to meet change in consumer need and want. As a result of the importance of product innovation, organizations should focus on modern technology that will enable the organization to meet the current needs and demand of customers. Management should see product innovation as a necessity and not a luxury that can be used to enhance performance in the organization.

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