Effect of Information Technology Investment on Organisational Productivity and Growth of Small and Medium Scale Enterprises in Developing Countries: A Case of Sachet and Table Water Industries in Lagos State, Nigeria

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Abstract

The objective of this paper is to determine the effect of information technological investment on employee's output performance. Subject for the study consisted of seventy employees of sachet and table water manufacturing industries, Lagos, Nigeria. Data for the study were collected through a well-structured questionnaire delivered to the workers of the sachet and table water companies. We used F test, T test, regression and correlation to test our hypotheses whether information technology usage in production processes , work environment and management style boost up the output performance of an employees. The findings of the study showed that there exist strong positive relationship and significant effect between aggregate output, technology usage, work environment, and management style and that the technological usage in production processes has the highest contribution to boost aggregate output performance of an employees in sachet and table water manufacturing companies.

Keywords: Information Technology, Output, Performance, Manufacturing Companies, Work Environment, Management Style.

INTRODUCTION

Information technology is an area of managing and employing technology into production activities of an organization in order to achieve high productivity. The role of information technology cannot be out aside because its contribute to economic activities through increase in aggregate productivity which will cause improvement on economic growth and development. IT is the bedrock for organization and national survival and development on a rapidly changing global environment. Adewoye and Akanbi (2012) stated that ICT is a complex and heterogeneous set of goods, application and services used to produce, distribute, process and transform information. The necessity for a national information technology policy became more obvious after the participation of the Nigeria delegation in the first African Development Forum on the challenge to African of Globalization in the information age held in Addis Ababa in October 1999. IT is reliable to human resources and infrastructure which constitute the fundamental tools and means of assessing, planning, managing development and for achieving sustainable economic activities and growth.

Technological development have changed the majority of wealth creating work from physical effort based to knowledge effort based and enable manufacturing organization to know the value of IT to their firms by offering business opportunities over competitors in the market. For a manufacturing organization to survive in the global competition or market, organization must improve and acquired IT skills in the production processes so as to achieve high rate and improvement on workers' productivity.

Productivity is a measure of the efficiency of production. Employing IT into production activities will enhanced increase in workers' and economic productivity, the upward shift of aggregate economic productivity will leads to increase in gross domestic product and export of a nation. Increase in labor productivity per hour worked is the key measure of well utilization of economical resources by manufacturing companies which enable sustainable income, standard of living and consumption in an economy.

Sadun and Reenen (2005) noted that increasing usage of IT per worker hour, increased output per hour tremendously. Manufacturing firms that adopt IT devices have been able to identified different set of problems militating against application of IT, the problems are breaking down and mal-functioning of equipment and machine, poor awareness of IT application, inadequate power supply, huge amount to be invested, lack of technical advisory services, poor access to information on raw materials etc once fun to invest on IT, lack of technical advisory service, poor access to information a raw materials etc. The question on everybody's lip is: Does usage of IT in production processes increase workers' productivity in production processes in the multinational, small and medium enterprises?

Multinational enterprises (MNEs) in general, and USA multinationals in particular appear to have higher productivity and this appears to be linked to a distinct pattern in their use of IT (Sadun and Reenen 2005). IT investment has not had a significant positive impact on the productivity and economic growth of the

developing countries during the period of the 1980s and early 1990s; this was caused in the developing countries as a result of low level of IT investment relative to GDP (as cited in Hawash and Lang, 2010).

Small and medium enterprises (SMEs), play a crucial role in economic activities and development of a nation. The usage of IT in SMEs engine economic performance, and reduce unemployment rate, IT is having a significant impact in sector of small and medium size Enterprises(SMEs), especially where industries are in decline or when unemployment levels are high (Namani,2009).Economic literature shows that IT are important driver of productivity and growth. IT have shown a pick up growth on labour productivity from 1.5 percent to 2.4 percent, which has increased the economic performance and national income (Oliner and sichel,2002)

Polland (2006) claim that SMEs would need high quality IT and must always provide superior value product better than competitor, when it comes to quality, price and service. Using of IT by SMEs enhance expansion and enable small and medium enterprises to compete with multinational enterprises. In a technological environment enterprise (Multinational, and SMEs) make efficiently and effectively utilize economical resources by producing standard technology goods and services, transform human effort and economic resources to produce the market needs.

In a sub-Saharan Africa, IT have not been efficiently utilize in the manufacturing sector in spite of the general census on the importance of productivity over economic performances, many developing countries like Nigeria have not paid serious attention to IT, which cause low in productivity in their economies. In Nigeria total labour productivity declined consecutively from 5.53 percent in 1977 to 3.36 percent in 1983 with the highest rate of decline experienced of -29.53 percent in 1982 (David,2012).

Adeoti (2005) noted that in investment in IT and its application in manufacturing activities can spur substantial productivity increases that would significantly improve the performance of African firms. IT investment has not had a significant positive impact on the productivity and economic growth of the developing countries during the period of the 1980s and early 1990 (Hawash and Lang, 2010).

Nigeria has not fully experienced the positive effect of IT in the manufacturing sector due to low level of IT investment and usage relative to GDP. According to Obadan and Odusola (2000) mention that the introduction of the SAP led to marginal improvement in national productivity during the period fluctuated between 3.84-7.39 percent. As pointed out by David (2012) that inadequate training has been a major productivity future in Nigeria. In developed countries manufacturing firms used IT in production process and well decentralized management structure to achieve higher productivity and market return.

Nigeria government should provide technical environment to support and help multinational enterprises and SMEs to better use of IT and increase the country's productivity, growth and development through investment in IT. There are other factors that caused low productivity to manufacturing companies which are low remuneration, lack of recognition, inadequate staff training, lack of technological support and supervising. Manufacturing companies in Nigeria should employ IT in their production stages in order to increase workers' and organization productivity and returns of the firms.

Research Questions
In order to determine the effect of IT application on labor and firms productivity in the manufacturing sectors in Nigeria, the following research questions were generated.
   i)   What is the impact of IT application on labor productivity in Nigeria
   ii)   Does working environment influence the usage of IT by SMEs in the manufacturing sectors in Nigeria?
   iii)   Does management structure and style affect IT usage in the manufacturing sector?
   iv)   To what extent would application of IT improve profit performance of a manufacturing firms

Objectives of the Study
The main objective of the study was to evaluate the impact of IT application (investment) in manufacturing sector on labour and organizational productivity in Nigeria. The other objectives were to:-
   1) Determine whether working environment influence application of IT by SMEs in the manufacturing firms
   2) Evaluate whether management structure and style affect productivity return from IT usage in the manufacturing sector.

Hypotheses of the Study
Ho: IT application (investment) in production processes is not significant with labour productivity

Ho: Management   structure and style is not significantly affect return from IT usage

 Ho: Working environment is not significantly influence application of IT by SMEs in manufacturing sectors.

Statement of the Problem

Despite the positive contribution of IT to economic productivity and development, developing countries like Nigeria is still lagging behind in using IT in production activities. Nigeria is faced with enormous problems of IT which had continued to nose dive Nigeria economy as a result of challenges in terms of building IT related to production functions. It is evident that Nigeria economy lack innovation, capacities and capabilities in IT management, these have resulted to low economic productivity and performance in Nigeria as a whole. As also posited by Hawash and Lang (2010) that developing countries lack complementary assets necessary in order to benefit from the pay off of IT investments such as the needed infrastructure and the knowledge base which is essential to support the effective use of IT.

Nigerian economy is labor intensive that is using more human resources than capital resources (investment). An economy that is under or optimum populated will used more of capital resources than human resources, but in a country that is over populated, if capital resources are used in the production processes than human resources such economy will experienced high rate of unemployment and criminal act. Nigeria government should be at equal usage of both capital and labour intensive, so as to prevent high unemployment rate.

The organization environment determine return of IT on production activities of a firm, any manufacturing companies that faced the problem of poor awareness of IT application ,inadequate power supply, low remuneration, lack of recognition, inadequate staff training, lack of technological support and supervising will not optimally achieved IT returns.

Sadun and Reenen (2005) noted that old style organization are characterized by large bureaucracies, rigid and centralized hierarchies where decision made by senior managers are cascaded down to people below. These firms have on average, produced much lower returns to IT than more organic flexible firms with flatter hierarchies, less centralized control and more autonomy for lower level employees, i.e. management structure and style could also be a problem to productivity. Reene and Sadun (2005) also mentioned that there are other factors that unable an organization to achieve higher productivity return from IT usage like old style management structure and system in which decisions are centralized, working environment and unskilled or uneducated labor. Hawash and Lang (2010) indicates that developing countries lack complementary assts necessary in order to benefit from the pay off of IT Investments such as the needed infrastructure and the knowledge base which is essential to support the effective use of information technology.

Literature and Empirical Review

Before the application of IT in production activities, manufacturing companies used labor intensive (human resources) or manual system to produce product to the market. The manual system or labor intensive systems slow down the productivity of labor per hour. In the modern market today, a company will only survive and meet up consumer needs, if only company used IT in its production activities. Adewoye and Akanbi (2012) maintained that in order to succeed in this dynamic world, companies must take not only traditional actions such as lowering cost but also keep pace with ever changing capabilities of information and communication technology. They also pointed out that IT can play an important role in bringing about sustainable economic development. Technical skills interact with other factors of production to ensure that resources available to the manufacturing enterprise are efficiently and profitably employed to maintain or improved the firms share of the product market (as cited in Adeoti, 2005). He also stated that investment in IT and its application in manufacturing activities can spur substantial productivity increase that would significantly improve the performance of African firms. Oliner and Sichel (2002) used time serves data and sectoral productivity model form to determined the impact of IT on labor productivity in non-farm business from 1995 to 2000 in US. The study found that output per hour in non-farm business grow at an average annual rate of about 2 ½ percent compared with increases of only about 1½ percent per year from 1973 to 1995, this improved performance can be linked to IT revolution spread through the U.S economy. Stiroh (2002) indicated that IT producing and using sectors account for all of the acceleration in US productivity. The rebound of US productivity growth had been a major economic development over the last decade, this miracle is linked to IT as the productivity acceleration was particularly strong in those sectors that used IT intensively (Sadun and Reenen, 2005). Namani (2009) who study the role of IT in SMEs using kosova SMEs as a case study found that IT application in the manufacturing sectors of a developing country create employment and job opportunities. He also indicate that without using of IT today, SMEs will have serious and total consequences in the future and will imply the risk of lagging behind economically with all the implications that this entails. Labour quality and ICT investment continue to provide a positive contribution to growth (Van Ark, 2010). Hawash and Lang (2010) used panel data regression model for 33 developing countries to study the impact of IT on productivity, there findings show that higher IT investments have resulted in higher economic growth in developing countries. The period of 1995-1999 witnessed the IT revolutions in the Asian Tigers' economy. ICT revolution contributed immensely to the productivity growth of the South East Asian Tigers (South Korea, Singapore, Hongkong and Taiwan) between early 1960s – 1990

(Ezra, 1991 cited in David, 2002).

Adewoye and Akanbi (2012) maintained that the role of IT advancing the growth of national economies through enhanced efficiency, profitability and expanded market reach is both undisputed and irreversible. Gust and Marquez (2004) indicate that ICT production and expenditure are associated with higher productivity growth. IT mainly stimulate the introduction of organizational changes in manufacturing firms (Zand et al., 2010). The increase of ICT in enterprises leads to a substitution of IT equipment for other forms of capital and labour and may generate substantial returns for the enterprises that invest in IT and restructure their organization (as cited in Adewoye and Akanbi, 2012).

Hawash and Lang (2010) posit that investment in technology can equip people with better tools that enhance their productivity and in turn enhance the growth process of the developing countries. Oliver and Sichel (2002) used new growth accounting sectoral productivity model and data from Bureau of Economic Analysis (BEA) and the Bureau of Labour Statistics (BLS) in Atlanta, USA, his findings concluded that output per hour accelerated substantially after 1995 in U.S, driven in large part by greater use of IT capital goods by businesses throughout the economy and by more rapid efficiency gains in the production of IT goods. In the study of Adeoti (2005) who investigated the impact of IT on the competitiveness of firms in a late industrializers, using Nigeria manufacturing sector as a case study, he found that investment in IT by a firms would attract learning effort that stimulate improvement in competitiveness among the manufacturing companies in Nigeria.

Jorgenson and stiroh (2000) observed nine OECD countries up to the year 2000. They found that in the preceding two decades IT contributed between 0.2 and 0.5 percentage points per year to economic growth. During the second half of the 1990s, this contribution rose to 0.3 to 0.9 percentages per year.

Oulton (2002) applies a modified growth accounting approach to the U.K, using U.K producer price indices adjusted for exchange rates to deflate the value of IT investment. He concluded that IT contribution to GDP growth increased from 13.5 percent in 1979-1989 to 20.7 percent in 1989-1998. Bresnahan et al (2002) cited in Reenen and Sadun (2005) examined the impact of IT on productivity in over 300 large US manufacturing companies doubling the IT stock was associated with an increase in productivity of 3.6 percent but this increased to 5.8 percent if a firm became more decentralized in management structure and style. David (2012) show the effect of IT on productivity in both developed and developing countries over the time period of 1993 to 2001. The study employed production function framework and provide IT by foreign direct investment (FDI) and labor productivity by GDP growth, the study shows that FDI (IT) is directly related to productivity and statistically significant in developing countries (stories and papaioannou, 2004).

Dawan et al (2001) opined that IT is positively and meaningfully significant to economic growths when inference data were drawn from 36 developed countries over different continents, but there was no evidence to such a relationship in developing countries, this gap between developed and developing countries is due to low level of investment in IT and lack of complimentary acknowledgement based structure for IT product in developing countries (as cited in David, 2012).

INFORMATION TECHNOLOGY, MANAGEMENT STRUCTURE AND WORK ENVIRONMENT: A CONCEPTUAL FRAMEWORK

The information technology revolution enhanced or provides economic growth and development through aggregate productivity to those nations that have access and ability to use these technologies in the manufacturing sectors. The revolution in IT has enable the manufacturing organization to achieve higher productivity of output by workers' and positively influenced time and space in sending and retrieving of information both within and across diverse organizations and countries. Adeoye and Akanbi, (2012) stated that competitive environment in which firm operates has significant effects on the returns from IT investments. IT has been shown to play important roles in achieving competitiveness among manufacturing companies at various levels (as cited in Adeoti, 2005). He also indicate that IT skill or technical skills interact with other factors of production to ensure that resources available to the manufacturing enterprise are efficiently and profitably employed to maintained or improved the firms share of the product market. In macroeconomics analysis, the so called new growth theory (Romer, 1986 and Lucas 1988) and new trade theory (Grossman and Helpman, 1991) have respectively incorporated technology as an important factor that is endogenous to the economy in explaining growth and trade performances (as cited in Adeoti, 2005). Also Porter (1985) cited in Adeoye and Akanbi, (2005) maintained that in a free market, firms cannot gain sustainable competitive advantages from technologies that are available to every firm, it is only when technology create significant barriers to entry that it becomes profitable to invest in. Nigeria is classify as a late industrializer in which management structure (Style) and working environment can reduce workers' productivity from IT in manufacturing sectors.

Sadun and Reenen (2005) indicated that the reasons why returns to IT differ across firms is that different firms have very different management style and environment into which IT is placed. He also stated that US economy achieved higher productivity return from IT than UK economy because UK economy operate old-style or Tayloristic organization system that are characterized by bureaucracies, rigid and centralized hierarchies where

decisions are made by senior managers.

Link between information technologies, management style and work environment in a late industrializer
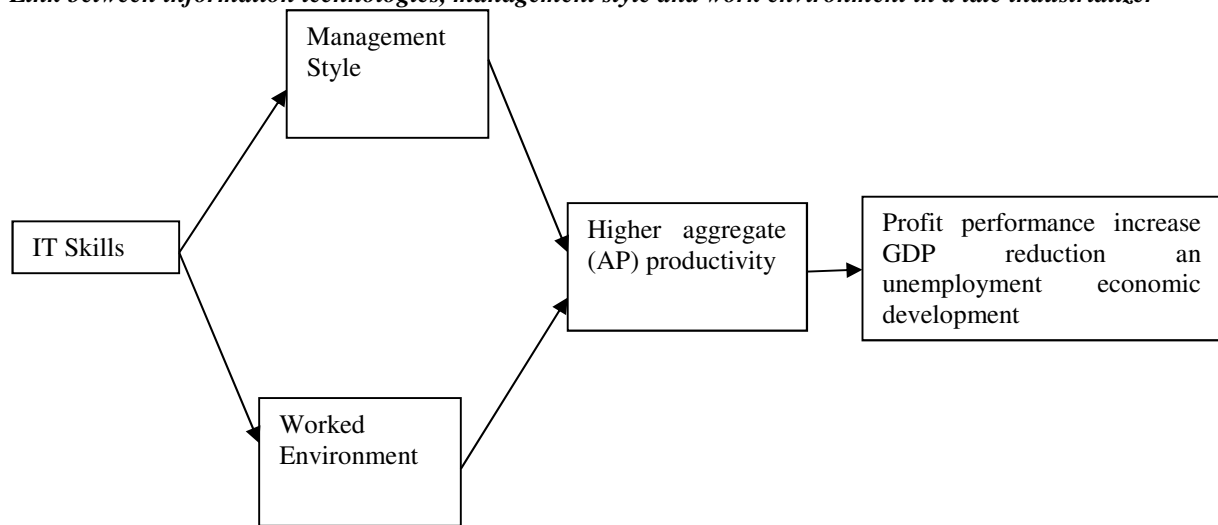
Source: Researcher's Conceptualization, (2013).

The diagram above show how management style and work environment   encourage application of IT and also how IT, management style and worked environment resulted to higher aggregate productivity in order to achieved higher profit performance, GDP and economic development.

Methodology

The study seeks to investigate the impact of IT investment on firms productivity and growth in Nigeria. The research work is based on the study of some selected private owned manufacturing companies, conducted in 2013.According to Abdulsalam and Mawoli (2012) stated that the great strength of a case study method is that it allows the researcher to concentrate on a specific situation and to identify or attempt to identify, the various interactive at work (Bell,2004). The survey research design method was employed in this study. It involves using self-designed questionnaire in collecting data from the respondents. This method is usually adopted in order to generate the required data from the sampled staff for analysis and also because the researcher do not intend to manipulate any of the variables under this study. Primary sourced data was used for analysis, these were collected using a 5- point likert scale questionnaire range from 1 as "strongly disagreed" to 5 as "strongly agreed" which was administered to their technician and workers that used the machines to produce sachet and table water. Oyebisi and Akinlabi (2013) maintained that the used of hand delivery of questionnaire, though expensive, is known to helped obtain from the respondents, confidence in and trust for the researcher and improve substantially the response rate (Ogundele, 2000). Simple regression were run to determine the relationship effect dependent and independent variables.

The technology and productivity scale are made of 14 items . The reliability of the firm productivity and growth   was tested using Cronbach   Alpha. The questionnaire titled technology impact on productivity and growth of the manufacturing companies and was divided into two sections, namely A to B. Section A comprising demographic data and B measured technological impact on productivity. The well structured administered questionnaire   was hand delivered to the targeted respondents, using sachet and table water companies as a case study. The responses of the workers were evaluated and used to generate an index of technological impact and productivity which were used to process inferential statistics. The usage of IT, management style and work environment was used   as the independent variables while the aggregate productivity (output) were used as the dependent variable. Both Pearson correlation and linear `regression statistical techniques were used to test the hypotheses and statistical packages for social sciences version 21.0 were used for data analysis

The Model Specification

$$AP = {}_o + {}_1 IT_{usage} + \text{--------------------equation (1)}$$
$$AP = {}_o + {}_1 MGT_{style} + \text{------equation (2)}$$
$$AP = {}_o + {}_1 WORK_{env} + \text{equation (3)}$$

The model or equation was formulated in order to determined the relationship between aggregate productivity, IT application in the production activities, management style and working environment. Aggregate productivity (AP) is the dependent variable while IT application management style and working environment is independent variables.

Result to the study

The results of the descriptive statistics of the variables that provide answers to the research questions of this study are presented. Thus, the section presents the mean scores and standard deviations of the items in the second section of the questionnaire. The maximum expected mean score is 5 while the minimum is 1 based on the 5 point   Likert Scale that was used to draw the questionnaire.

Descriptive Statistics on Research Questions	Mean	Std. Deviation	N
IT increases output of a manufacturing firms	4.2000	.93203	100
IT usage in the production increases labour productivity	4.2600	.96001	100
Management style determine IT application	3.5500	1.49325	100
Work environment determine return usage of IT	4.1700	1.09226	100

Source: Field Survey, December, 2013.

In Table 1, it is discovered that the variable with the highest mean score is "IT usage in the production increases labor productivity". This variable has a mean score of 4.26 and a standard deviation of 0.96 which indicates that IT application in the production process or activities expands labor out put. As noted by Adeoti (2005) that technical skills interact with other factors of production to ensure that resources available to the manufacturing enterprise are efficiently and profitably employed to improve the firm's share of the product market. The second variable that has the next highest mean score is 'IT increases output of a manufacturing firms ". The variable has a mean score of 4.20 and standard deviation of 0.93, which means that IT usage by firm increase total output of manufacturing firms. The third independent variable is 'work environment determine return usage of IT' with a mean score of 4.17 and standard deviation of 1.09, this means that a poor working environment will not enhance successful application of IT in the production activities.

The least mean score is "management style determine application of IT". The variable has a mean score of 3.55 and a standard deviation of 1.49. Sadun and Reenen, (2005) maintained that USA economy achieve bigger return to IT than UK was due to old style management system of organization which are characterized by large bureaucracies, rigid and centralized hierarchies or decision. Generally, all the variables mean scores are high. The results indicate that there will high level of aggregate productivity if the independent variables can be properly applied in the manufacturing firms.

4.1 Reliability Test

The reliability of the scales was determined using cronbach's alpha method. Analysis revealed that aggregate productivity scale is reliable 96.2%, IT application   by 97%, management style by 91% and work environment by 96.2% (see table 1).Cronbach's alpha measures the average of measurable items and its correlation, and if the result is generally above 50%, it is considered to be reliable(peighambari,2007).

Table 1: Reliability coefficient of the research variables

Factor	Number of items	Cronbach Alpha
Aggregate productivity	**13**	**0.962**
IT application	**2**	**0.97**
Management style	**2**	**0.91**
Work environment	**2**	**0.962**

Source: Researcher's   Computation, December, 2013.

4.2   REGRESSION ANALYSIS AND HYPOTHESES TESTING

The results obtained from the regression analyses are presented below

4.2.1 IT application (investment) in production processes is not significant with labour productivity.
Dependent Variable: Aggregate Productivity

Variable	Coefficient	T-stat	R^2
Constant	**0.334**	**2.196**	
IT usage in the production increases labour productivity	**0.907**	**26.041**	**0.874**

Source: From Author's Computation, December, 2013.
    Significant   at   0.05 percent

AP   =   0.334+0.907IT$_{usage}$ +   ---eqn1

The estimation results as presented   in table above reveal that IT application is a critical factor influencing

aggregate productivity of a manufacturing firms. Specifically, the coefficient and t-statistics indicate that IT application in the production activities have statistically significant positive relationship or impact on aggregate productivity. The constant value is positive which indicate that if the independent variable (IT USAGE) is zero the organization productivity is 33.4% that is without the application of IT in the production processes, labor productivity still in a good condition. With the application of IT in the production activities the labor productivity rise to 91%. The slope value of .907 means that for a unit change in IT application, on the average, the probability of having improved on aggregate productivity by manufacturing firms increases by 91 percent. The T-value also confirmed that the model and hypothesis are significant and 87.4% of the variance in aggregate productivity has been significantly explained by IT application. That is, other factors apart from IT application or usage probably account for 12.6% of the variation in aggregate productivity.

Hypothesis One Test
This section presents the test of the first hypothesis formulated in chapter one of this study. The test are conducted with correlation statistics which indicates whether there is relationship between IT application and aggregate productivity in manufacturing sector in Nigeria, using SMEs as case study. The Pearson correlation coefficient is 0.935(*) while the p value is 0.000.The Ho that there is no significant relationship between IT application and aggregate productivity is rejected since p value (0.000) is less than 0.05.this is further confirmed by the result which was flagged with one star showing that there is significant relationship between IT application and aggregate productivity in SMEs.

Another way of testing the hypothesis for decision whether to accept Ho and reject H1 or vice-versa is the used of F—statistics(value).These yielded the F^{val} of 687.111 and F^{tab} of 4.00 which is significant at *P<0.05* level of significance (F^{val} = 687.111,*P=0.05).*

However, from the statistical analysis the F^{val} is greater than the F^{tab}

which means that the null hypothesis (H_o) is rejected and alternative hypothesis (H_1) accepted. This implies that there is a significant relationship or effect between IT application (usage) and aggregate productivity.

4.2.2 Management structure and style is not significantly influence IT usage in the manufacturing firms in Nigeria.
Dependent Variable: Aggregate Productivity

Variable	Coefficient	T-stat	R^2
Constant	**2.142**	**23.847**	
Management style determine IT application	**0.580**	**24.848**	**0.863**

Source: From Author's Computation, December, 2013.
  Significant at 0.05 percent
AP   =   2.142+ $_1$0.580 +   ----eqn 2
The estimation results as presented in table above reveal that management style is a critical factor influencing aggregate productivity of a manufacturing firms. Specifically, the coefficient and t-statistics indicate that management style determines IT application in the production activities and also have statistically significant positive relationship on aggregate (total labor) productivity. The constant value is positive which indicate that if management style is zero the value of the constant will be 2.142. The slope value of .580 means that for a unit change in the management style, on the average, the probability of having improvement on aggregate productivity by manufacturing firm's increases by 58 percent. Sadun and Reenen (2005) indicate that management style determine returns from usage of IT. He compare U.S economy with U.K economy and stated that U.S economy achieved greater returns from IT application than their counterpart, this was caused as a result of tayloristic or old style management system used in their manufacturing companies .The T-value also confirmed that the model and hypothesis are significant and the equation two shows that 86.3% of the variance in aggregate productivity has been significantly explained by management style. That is, other factors apart from management style probably account for 14.7% of the variation in aggregate productivity.

Hypothesis Two Test
This section presents the test of the first hypothesis formulated in this study. The test are conducted with correlation statistics which indicates whether there is relationship between management style and aggregate productivity in manufacturing sector in Nigeria, using SMEs as case study. The Pearson correlation coefficient is 0.929(**) while the p value is 0.000.**The Ho** that there is no significant relationship between management style and aggregate productivity is rejected since p value (0.000) is less than 0.05.this is further confirmed by the result which was flagged with one star showing that there is significant relationship between management style and *P<0.05 aggregate* productivity in SMEs.

Another way of testing the hypothesis for decision whether to **accept Ho and reject H1 or vice-versa**

is the used of F—statistics(value).These yielded the F^{val} of 617.432 and F^{tab} of 4.00 which is significant at level of significance (F^{val} = 617.432,P=0.05).

However, from the statistical analysis the F^{val} is greater than the F^{tab} which means that the null hypothesis (H_o) is rejected and alternative hypothesis (H_1) accepted. This implies that there is a significant relationship or effect between IT application (usage) and aggregate productivity.

4.2.3 Working environment is not significantly influence application of IT in the SMEs manufacturing companies.

Dependent Variable: Aggregate Productivity

Variable	Coefficient	T-stat	R^2
Constant	0.860	6.713	
Work environment determine usage of IT	0.801	26.941	0.881

Source: From Author's Computation, December, 2013.

Significant at 0.05 percent

AP = 0.860+ $_1$0.801 + ----eqn3

The estimation results as presented in table above show that working environment is a critical factor that also determined aggregate productivity of a manufacturing companies. Specifically, the coefficient and t-statistics indicate that working environment determines the aggregate productivity of an organization and also have statistically significant positive relationship or effect on aggregate (total labor) productivity. The constant value is positive which indicate that if working environmental factors is zero the value of the constant will be 0.860. The slope value of .801 means that for a unit change in the working environment factors, on the average, the probability of having improvement on aggregate productivity by manufacturing firms increases by 80.1 percent. The T-value also confirmed that the model and hypothesis are significant and the equation three shows that 88.1% of the variance in aggregate productivity has been significantly explained by working environmental factors. That is, other factors apart from working environment probably account for 11.9% of the variation in aggregate productivity.

Hypothesis Three Test

This section presents the test of the first hypothesis formulated in this study. The test are conducted with correlation statistics which indicates whether there is relationship between working environment and aggregate productivity in manufacturing sector in Nigeria, using SMEs as case study. The Pearson correlation coefficient is 0.939(***) while the p value is 0.000.The Ho that there is no significant relationship between working environment and aggregate productivity is rejected since p value (0.000) is less than 0.05.This is further confirmed by the result which was flagged with one star showing that there is significant relationship between working environment and aggregate productivity in SMEs.

Another way of testing the hypothesis for decision whether to accept Ho and reject H1 or vice-versa is the used of F—statistics(value).These yielded the F^{val} of 725.828 and F^{tab} of 4.00 which is significant at *P<0.05* level of significance (F^{val} = 725.828,*P=0.05*).

However, from the statistical analysis the F^{val} is greater than the F^{tab} which means that the null hypothesis (H_o) is rejected and alternative hypothesis (H_1) accepted. This implies that there is a significant relationship or effect between working environment and aggregate productivity.

HISTOGRAM ANALYSIS

IT usage in the production increases labour productivity

Mean = 4.26
Std. Dev. = .96
N = 100
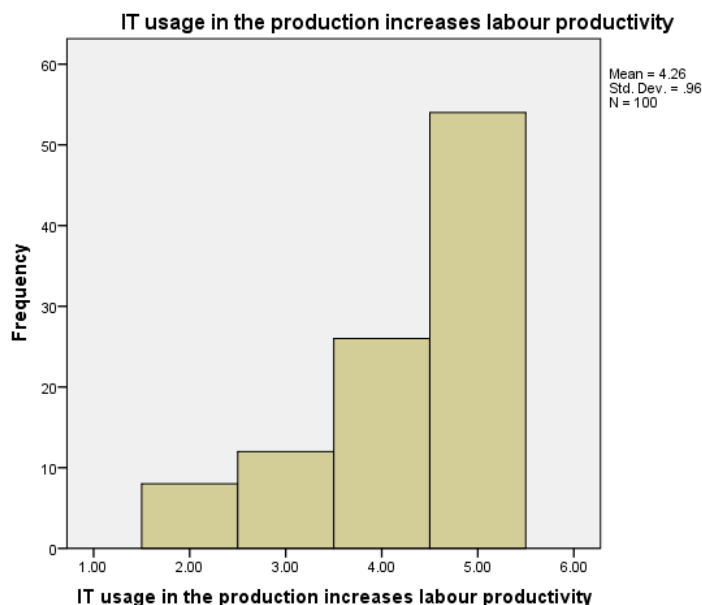
From the graph above, most of the respondents (factory worker that operate the machines that are used to produced sachet and table waters) agreed that IT application in production processes increase labor productivity and also cause expansion in the firms output. Labor productivity means that human resources are effective and efficiently utilize by the firms through IT application by the manufacturing firms. An increase in the firms output will make more products available in the market. Sadun and Reenen (2005) noted that increasing usage of IT per worker hour, increased output per hour tremendously.

IT increases output of a manufacturing firms

Mean = 4.20
Std. Dev. = .932
N = 100
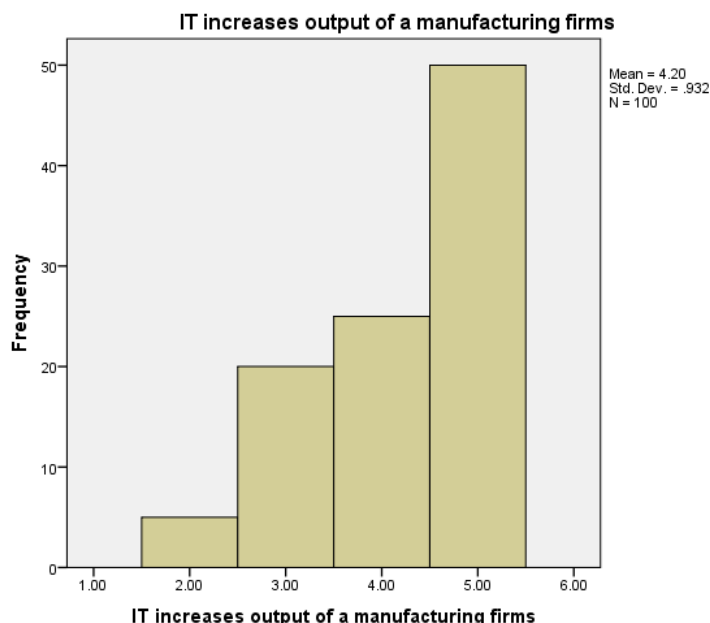
The graph above indicates that most of the respondents (technicians) agreed that IT increases output of the manufacturing firms. This will enable more products available to the customers.

As noted by Namani (2009) who study the role of IT in SMEs using kosova SMEs as a case study found that IT application in the manufacturing sectors of a developing country create employment and job opportunities, which will reduce crime rate in an economy.
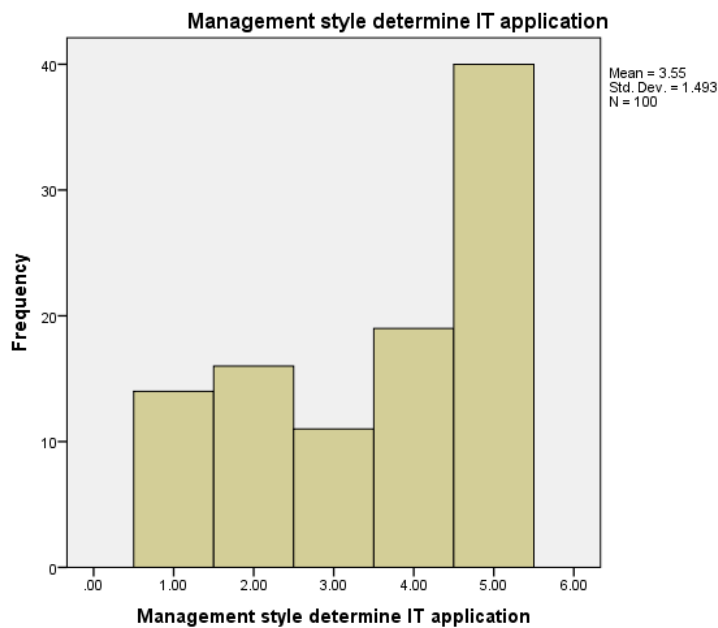
The graph above shows that management style determines the application of IT. Most of the respondents agreed the assertion that old style or tayloristic management style determines returns of the IT usage in the manufacturing firms. Sadun and Reenen (2005) indicated that the reasons why returns to IT differ across firms is that different firms have very different management style and environment into which IT is placed. He also stated that US economy achieved higher productivity return from IT than UK economy because UK economy operate old-style or Tayloristic organization system that are characterized by bureaucracies, rigid and centralized hierarchies where decisions are made by senior managers.
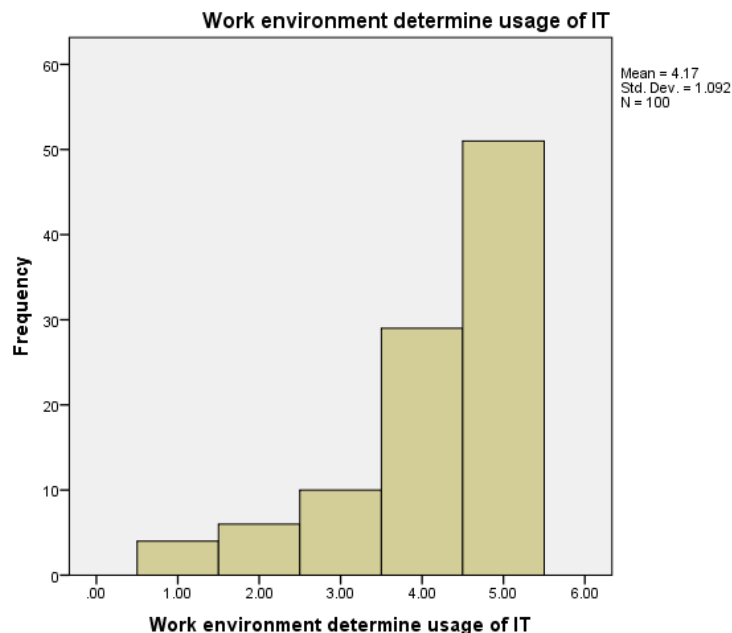
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QUESTIONNAIRE

Dear Sir/Ma,

This questionnaire is forwarded to you for your attention. It is based on a research topic "**Effect of Information Technology on production activities in the manufacturing sector***"* This is required as part of getting data on IT application in manufacturing industry.

Your organization has been chosen as a case study. You are required to answer each of the questions objectively. Any information supplied by you will be treated with utmost confidentiality.

Thanks for your co-operation.

Yours' faithfully

OLABODE IBRAHIM .O

FAKUNMOJU SEGUN .K

QUESTIONNAIRE
SECTION A

Please answer the following questions to the best of your ability from the alternatives in section A ,B and C

1.   Sex: Male [   ]   Female [   ]

4.   Age: Less than 20 -39years [   ] 31-40years [   ] 41-50 [   ]

            51-60 [   ]   Above 60 [   ]

5.   Qualification: Primary School Leaving Certificate [   ] SSCE [ ]

   OND/NCE [   ] B.SC/HND [   ] M.SC [   ]

6.   Working Experience:3 years [   ] 6 years [   ] 9 years [   ] 12 years [   ] 15 years [   ]

SECTION B

S/N		Strongly Agreed	Agreed	Neutral	Disagreed	Strongly Disagreed
1	IT usage in the production increases labour productivity					
2	IT increase output of a manufacturing firms					
3	Management style or behavior determine IT application					
4	Decentralization of decisions improve productivity of firm					
5	IT increases profit performance of a manufacturing firms					
6	IT improve economic performance and development					
7	Work environment determine usage of IT					
8	IT in manufacturing sector increase export					
9	Usage of IT encourage workers to work					
10	IT usage in the production activities increase revenue of a firms					
11	Good working environment enhance usage of IT in production					
13	IT enable manufacturing firm to produce standard goods or quality goods					
14	The firm used machine for production activities					
15	The firm used internet to communicate with customers.					

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