

DISRUPTIVE TECHNOLOGIES AND PRODUCTIVITY OF SOFT DRINKS MANUFACTURING FIRMS IN SOUTH-SOUTH, NIGERIA

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ABSTRACT

The study evaluates how disruptive technologies affect productivity in Soft Drinks Manufacturing Firms in South-South, Nigeria. The study adopted the survey research design with the population of 45 senior managers in the soft drink manufacturing firms that are registered with the Manufacturer Association of Nigeria in the South-South Region of Nigeria also constituting the study sample. Data collected were obtained from the primary source and analyzed using the Pearson Product-Moment Correlation. The findings revealed that all the disruptive technologies have a positive and significant correlation with productivity in the soft drink manufacturing firms in the South-South. The study concluded that efforts should be made to embraced mobile internet technology, additive manufacturing technology in order to enhance productivity within the soft drink sector of the manufacturing industry, which has potentials of increasing the nation's economy. This study recommended among others that the government and the manufacturing firms should see advance and sophisticated technologies such as 3D printing additive manufacturing, mobile internet as a catalyst to improve production process and advertise products to end users in order to stay competitive in the global industrial market and ensure industrial revolution most especially in the soft drink sector to be viable.

Key Words: Disruptive Technologies, Additive Manufacturing (3D Printing), Mobile Internet, Advance Robotics, Productivity.

INTRODUCTION

The growth of particular industry can be by adoption or application of success factors and actions of others, emulation of ways of industrial activities of others or exposure to new technologies of doing things in the industry. Also the degree of success of an industrial revolution is a function to which a sincere hearty actions of strategies and application of relevant modern industrial policies capable of bringing desirable change and the state of the environment with respect to effective utilization of resources to boost the industrial activities in the sector. This is important because their individual and collective productivity in the discharge of their duties especially in the area of quality products delivery is what makes the firms stand out in the midst of other competitors. Raja (2014) stated that efficiency and effectiveness are ingredients of productivity, performance and competitiveness. The potential change in the environment has been identified to be rapid and disruptive with the presence of high disruptive technologies and marketplace dynamics (Aluko, Odugbesan, Gbadamosi & Osuaagwu, 1998). Strategists have been applying one strategy and the other to adapt to the dynamic and unpredictable changes in the Nigeria business environment to survive competitive advantage in the global economy. Disruptive technologies have a transformative impact on industries and economic development, as well as on the ways that technological innovation evolves and spreads through emerging markets, which tend to adopt and adapt technologies developed elsewhere. Also, it is inevitable that some emerging markets will harness disruption more rapidly than others.

Although, it is widely acknowledged that scientific advances and technological changes are important drivers of firms' productivity in many economies of the world today. The ability to create, disrupt existing market and exploit technology know-how is a major source of competitive advantage, wealth creation and improvements in the quality of life of the ordinary citizens in any given nation. Also evidence on the existing literature shows that the rapid advancement in technology, international trade and growth, wealth throughout the globe, and convergence of consumer demands and needs are influencing firms to expand and diversify through disruptive technologies and strategies (Akkrawimut & Ussahawanitchakit, 2011). The term disruptive technologies are linked with destroying or disturbing attribute and commonly used in an envisioned where

companies lost their market dominance and ceased to exist. Therefore, as a catalyst for economic growth, technological progress provides much potential upside, but it can also be a disruptive force for labor markets and established business models.

Disruptive technologies have the potential to impact growth, employment, and inequality by creating new markets and business practices, needs for new product infrastructure, and different labor skills. According to the World Economic Forum (LLC) (2019) state that advance industrial technologies had a significant change in the way people work, live their lives and communicate to each other. It fundamentally represents a new era in human development, enabled by extraordinary technology advances commensurate with those of the first, second and third industrial revolutions. Lagos Chamber of Commerce and Industry (2018) delineates that Nigeria would derive huge economic benefits by keenly introducing more sophisticated and outstanding technological outlets and platforms to their means of operations in the country. Hence, the manufacturing sector of the economy depends so much on diverse advance technologies for manufacturing of suitable economic goods and services (Ayodele and Falokun, 2003). It was further pointed that manufacturing is conscious efforts and sustained application requiring the integration of appropriate technology, management techniques and relevant resources to change an economy from traditional and crude production methods to a more automated and efficient system of large scale production of goods and services.

The growth experienced in some subsectors of the manufacturing industry which is considerably being driven by private sector in Nigeria. But has never satisfactorily played the role of industrial revival expected in relation with most other sectors of the economy, simply because of the inability to properly adapt it in such a way as to absorb sufficient capacity utilization and creating linkages capable of stimulating industry activities in other sectors. The over dependence on industrial revolution especially among the manufacturing sector could lead to repetitive tasks, with the migration of some employees for greener pastures, and automation of the system. This has made most factory staff tend to lose their individuality, feel alienated and have limited job satisfaction (Chete, Adeoti, Adeyinka, and Ogudele, 2015) Apparently, determining whether a technology is disruptive is critical because disruptive technologies can radically unsettle the market status quo by overturning incumbents or creating new markets (Bower & Christensen, 1995). On one hand, the consequences of ignoring a potentially

disruptive technology can be catastrophic: losing market share and net profit or even bankruptcy (Bower and Christensen, 1995; Lucas and Goh, 2009). On the other hand, by embracing disruptive technologies, new firms can seize market share (Christensen, 1997), and incumbents can maintain their positions (Christensen et al., 2015). Despite facing heavy criticisms such as being based on unstable foundation and lacking applicability (King and Baatartogtokh, 2015; Lepore, 2014), the disruptive innovation theory is continuously attracting attention from academics and business practitioners. One common belief is that potential market place disruption can be turned into a real business opportunity, provided that potential disruptiveness can be identified (Nagy, 2016). Therefore, the purpose of this paper is to examine how disruptive technologies affect manufacturing productivity in the soft drink manufacturing firms in South-South, Nigeria.

LITERATURE REVIEW

The Concept of Disruptive Technologies

The term disruptive technology was first introduced by Bower and Christensen (1995) and further elaborated by Christensen (1997) when those authors came to explain why many incumbent firms fail in the face of new technologies. According to them, disruptive technologies introduce a very different package of attributes from the one mainstream customers historically value, and they often perform far worse along one or two dimensions that are particularly important to those customers (Bower & Christensen, 1995) but they have other features that a few fringe (and generally new) customers value (Christensen, 1997). The term disruptive technologies refer to destroying or disturbing attributes and commonly used in an envisioned where companies lost their market dominance and ceased to exist. Furthermore, disruptive technologies are those that result in a significant change in the cost of, or access to, products or services that dramatically changes how we gather information, make products, or interact. They are largely enabled by the dramatic increases in computing capacity and Internet bandwidth that has made their diffusion exponentially faster. The broad and accelerating availability of disruptive technologies to citizens, consumers, and businesses has been a defining feature in recent years, with new services and markets emerging and spreading rapidly across populations and industries. These technology breakthroughs combined with increased connectivity are impacting the way individuals, businesses, and governments generate data and interact to create markets, unlock economic transactions, mobilize activity, and deliver services

Typical characteristics of products based on those technologies are cheaper, simpler, smaller and frequently, more convenient to use at their emergence. As such, those products often start being valued by customers in the low-end segment of the market. However, the performance of those technologies increases quite quickly over time and eventually can meet or exceed the requirement of mainstream market, thus replacing the technology previously valued by mainstream customers. This pattern of attack from below, thus, characterizes disruptive technologies (Utterback & Acee, 2005). The identification of potential demands and the creation of new products and services to obtain a new market is the foundation that disruptive technology is based upon. The advantages of harnessing new ideas and innovations can create a new market of consumers and be a breakthrough point for companies looking to expand into the market. A prime example was the response of Apple's release of their product, the iPod. Apple identified a need for services to accompany the growing technology of digital music. The disruptive innovation occurred when Apple released the iTunes store. The digital marketplace provides consumers direct and instant access to an infinite library of music and audio books formatted to play on all MP3 devices. The new service provided the opportunity for Apple and non-Apple product users to access content and media, which catapulted Apple to the forefront of the digital music industry. Over time, the disruptive technology of online music marketplaces revolutionized how consumers attained music, video and literature, which displaced many media distribution storefronts into conforming to the new standard to meet consumer needs.

Disruptive technologies have enormous potential to enhance the underlying economics of specific business processes, to drive higher productivity, make workflows more efficient, speed up the supply chain and transform the back-office. These advances are especially relevant to tech manufacturers, but software and service-based players can also enjoy a step change in operational performance. The repositioning of economy through disruptive technologies simply describes an era marked by a technological revolution where new and rapidly advancing technologies merge with human, physical, mechanical and biological systems, leading to an extra ordinary transformation of the social, economic, and political status quo. Practically speaking, technology will invade, and disrupt all sectors of the economy, transform them, and then these technologies would then merge, connect most sectors together, and finally infuse them in an intimate level with humans. This revolution is moving at jets speed, it

is time for Nigerians to get to set and catch up and leverage technology before technology leverages Nigerians

Changing Business Model through Disruptive Technology

Raising the technology acumen: Every industry need to improve its technological acumen during the next few years. This is a matter not just of recruiting people with software expertise but of raising the skills of every one at the organization. They need not just the technical training to use digital tools, but insight into the patterns of technology on how to create an operations footprint that can take advantage of the industrial internet.

Adopt innovative financing model: New large-scale technologies inevitable put pressure on the old ways of raising money for them. Large industrial firms will similarly move from financing the ownership of factories and machinery to financing pay-as-you-go system. There will be less interest in replacing old equipment and more interest in continuing to upgrade it using 3D printing and other forms of digital fabrication to manufacturer and customised new components. They should embrace new mechanisms, such as block chain, to ensure that pricing; billing, transfer payments, and subsidies are reliable and free of undue influence (Norbert & Bob, 2017).

Innovate rapidly and openly: Innovation and leadership go hand in hand in the disruptive technological era. Many companies will seek disruptive innovation, but a steady stream of increment innovations can be more profitable. Smaller innovation will be easier to generate and, more important easier to test in the market. With the tools of the industry internet according to Norbert and Bob (2017) you can prototype new products, manufacture them in small batches profitable, distribute them rapidly, and see how the customer responds before rolling them out worldwide.

Building strategy around platforms: Platform creates a plug-and-play technological base on which a wide range of vendors and customers can interact seamlessly with the same collection of hardware, software services and one another. The most successful platforms match customers with vendors, maintain an appealing and effective customer experience, and collect data and rents from people who use the system. Examples of business that controls a popular platform are Microsoft with windows, Facebook with social media. Media and Goggle with its search engine.

Rethink your business model: The business world has become accustomed to disruption. Incumbents that cling to old business models lose ground to upstarts that introduce new products and services at much lower prices. Disruptive technologies according to Norbert and Bob (2017) will accelerate this sequence especially in manufacturing by reducing cost and improving efficiency at a broad scale. Industries that are too slow to change will lose to those that rethink their business models to take advantage of the new platforms and their new opportunities.

Measures of Disruptive Technologies

In recent time organizations are seeing an impact from a wide range of disruptive technologies. The top three are not that surprising (data analytical, cloud and mobile are well-established); but of possibly greater importance is the readiness to embrace emerging and less proven technologies like virtual and augmented reality, robotics and 3D printing. The McKinsey Global Institute (MGI) has identified 12 forms of disruptive technologies which exhibit the greatest economic impact and potential to cause disruption by 2025: mobile Internet, automation of knowledge work (artificial intelligence, AI), the Internet of Things, cloud technology, advanced robotics, autonomous and near autonomous vehicles, next generation genomics, energy storage, 3-D printing, advanced materials, advanced oil and gas explorations, and renewable energy (Manyika, 2013). Therefore, this present study adopts using three criteria such as mobile internet technology, advance robotics technology and additive manufacturing technology (3D Printing).

Firms Productivity

The term productivity is an important factor in every firm (Maarleveld, 2011). Productivity is not everything, but in the long run it is almost everything (Krebs, 2000). In other word, the productivity has been crucial factor to decrease the costs associated, to increase the demand in return by providing more services (Brown & Dev, 2000) and it has been viewed as a long-term strategy, especially for manufacturing industry (Kilic & Okumus, 2005). In industrial context, productivity is defended as a measure of output towards input. Some researchers suggested that the productivity is a measure of utilization, efficiency, effectiveness, quality, predictability and other performance dimensions (Johnston & Johnson, 2004).

Firm productivity is vital for the success of every organization and profitability

in this dynamic environment (Chien, 2004); it is conceptualized as the individual's investment of his complete self into a role. Nwachukwu, (2009) refers to productivity as the extent to which an organization's resources are brought together and effectively utilized for attainment of set goal. Productivity and output are two indispensable elements of an organizational life, because without increased and sustained output on the part of the employees, the organization risk poor performance outcome in general and if not controlled or corrected will lead to extinction of that organization. Based on the fact that productivity is connected with the extent an organization effectively and efficiently converts its input resources to the desired products.

Empirical Review

Adofu (2015) empirically investigated the relationship between manufacturing sector and economic growth in Nigeria from 1990 to 2013 using ordinary least square method. The dependent variable was real gross domestic product while the explanatory variables were manufacturing output, average manufacturing capacity utilization, exchange rate, interest rate, inflation rate and government expenditure. The study found the following among others: output of manufacturing contributed negatively and showed insignificant relationship with real gross domestic product but found a positive and significant relationship between the average manufacturing capacity utilization and real gross domestic product; government spending was seen to significantly impact on the real gross domestic product in spite of improper management. Among the way forward made by the authors includes reduction of interest rate to encourage investment, exchange rate moderation and upgrading of manufacturing technology.

Naude and Szirmai (2012) investigated the importance of manufacturing in economic development in the past, present and future perspectives. They were concerned about structural change of traditional economy dominated by primary activities, moving into modern economy with high-productivity involving manufacturing taking a very significant role in economic development. In their argument, it was asserted that the structural transformation of developing countries needs a type of manufacturing sector development that is capable of delivering high level employment among others and industrial policy is expected to impact significantly if the past lessons and future challenges are adequately given attention. Uma, Eboh, Obidike, and Ogwuru (2013) identified the role of industrial productivity in sustainable growth using the method of ordinary least square and tested for long-run relationship of variables. The study

found absence of long run relationship between outputs of major industries variables with the dependent variable (real domestic product). The output of most industrial sectors did not impact significantly on the real gross domestic product.

Nagy, Oláh, Erdei, Máté & Popp, (2018) studied the role and impact of industry 4.0 and the internet of things on the business strategy of the value chain; a case of Hungary. The main aim of the study was to ascertain how organizations operating within Hungary view industry 4.0 phenomenon, what internet of things tools they use to support their processes and the possible challenges they encounter during adaptation. The study adopted a dual methodology and sent online questionnaire to manufacturing and logistics service companies concerning the research questions. The online response was 43 which were evaluated using inferential statistics. Findings showed that most firms have deeper insights concerning the application of tools as well as encountered some basic challenges at the development phase. The study concludes and recommended that the spread of real-time data across companies given the availability of appropriate analytical tools and methods has a significant impact on the entire company.

Mobile Internet Technology and Manufacturing Firms Productivity

This has enabled more efficient delivery of services and opportunities to increase workforce productivity in the service industry globally. Building businesses around platform means the diverse mediums and outlets to which business transitional operations can be carried out. It also depicts the means and techniques business organizations design to reach their target market and public at large (Interaction Institute for Social Change (IISC), 2018). Networking constitutes of an online service that has focused on building a community of users who share a common interest or activity (Barnes, 2009). Building business around platform involves using social network which include e-marketing, mobile marketing, mass customization and social marketing. E-marketing utilizing the digital environment of the internet has been a major focus for businesses during the past decade. Business platforms tools and techniques include; websites, online public relations, email, blogs, social networks, podcasts and wikis (Dibb, Simkin, Pride, & Ferrell, 2012). Networking typically has brought mobile marketing using mobile devices such as smart phones and tablets can provide customers with time and location sensitive, personalized

information that promote goods and services. Building business around platform is defined as any tool or service that uses the internet to facilitate personal conversations (Hart, Ridley, Taher, Sas, & Dix, 2008). The first hypothesis is thus stated:

HO₁: Mobile internet technology does not significantly affect productivity of soft drink manufacturing sector in the Nigeria economy.

Advance Robotics Technology and Manufacturing Firms Productivity

Advance level of robotic applications have expanded the global manufacturing industry, promoted technological standard and development of the small and medium manufacturers (Chiu-Chi, 1995). The world of business is changing rapidly (Mannan, 2012). Robots have now uncovered all the industries for numerous applications, even in helping humans at home to perform daily chore activities (Bekey, 1998). The largest manufacturers such as Apple firm plan to replace workers with nearly one million robots in recent years (Moran, 2011). Companies and small factories would be able to realize profit by saving costs with the introduction of automated business operations (Bogue, 2009). However, greater attention has been paid towards the production processes, packaging, storing and distribution (Nayik, 2015). In this context, the robots serve for much purpose, mainly in production systems for material handling and packaging operations (Rene, 2010). Advance robots are used in promoting product quality and reducing costs associated with such issues (Chiu-Chi, 1995). Meanwhile, industries are focusing on implementing automation and robotics to help in achieving these goals (Rene, 2010). The prime advantage for the robots is low cost maintenance with high productivity in the business (Zongwei, 2015). Baxter, for example, is a new inexpensive robot which provides user friendly operations and performs various tasks in small manufacturers (Ben, 2012). The second hypothesis is thus stated:

HO₂ Advance robotics technology does not significantly affect productivity of soft drink manufacturing sector in the Nigeria economy.

Additive Manufacturing Technology (3D Printing) and Manufacturing Firms Productivity

Additive manufacturing technology refers to a group of technologies that build

physical objects directly from three dimensional CAD data. Additive manufacturing technologies adds liquid, sheet, wire or powdered materials, layer-by layer, to form component parts with little or no subsequent processing requirements. This approach provides a number of advantages including near 100% material utilization, short lead time and unrivalled geometric freedom of design. The concept which also referred as three dimensional printing technology produces objects layer-by layer (additively), rather than subtracting similar to a two dimensional printer with the only difference that a third dimension (z-axis) is added, which is also called the building direction (Reeves, 2009). Since the onset of layer based processing for creating 3D components, a number of terms have evolved and as such various terminology derivations have arisen. In more recent times, this has resulted in some misunderstanding or misuse of terminology contributing to a weakness in its advancement. The innovative nature of the technology and lack of available standardization have also contributed to this. 'Rapid prototyping' seems to be the earliest descriptor and trends to be deemed layer based processing for creating 3D components in its infancy. However, considerable progress in the field has taken the technology far beyond that of prototyping. 3D printing, a term brought about in the 90s, has been widely used since and has become a wider spread term for creating layered 3D components, more generally known for low-cost 3D home printing and some of the larger commercial 3D printing systems.

The term 'additive manufacturing' was later introduced and seems to have taken the position for describing the technology overall, and more specifically for industrial applications and professional high end equipment and applications. Additive manufacturing technology was used to build conceptual prototypes referring to that process as Rapid Prototyping (RP), a term which is still often used as a synonym to additive manufacturing. Those prototypes were meant only to accelerate the development phase of a product and under no circumstance are comparable to the end product with respect to material, durability and quality (Feenstra, 2002). Rapid manufacturing (RM) has evolved through RP due to technological advancements defined by Rudgley (2001) as the manufacture of end-use products using additive manufacturing techniques (solid imaging). The third hypothesis is thus stated:

HO₃, Additive manufacturing technology does not significantly affect productivity of soft drink manufacturing sector in the Nigeria economy.

METHODOLOGY

The research is a quantitative study that seeks to establish the relationship between disruptive technologies as the predictor variable and productivity as the criterion variable. The study adopted survey research design; the research instrument was a validated structured questionnaire while the 5-point Likert scale was used to measure response rate. The study, which was at the organizational unit of analysis had a total of 45 senior managers in the soft drink manufacturing firms that are registered with the Manufacturer Association of Nigeria in the South-South Region of Nigeria as the population. The census sampling method was adopted thus the population was used as a sample size which is 45 because the population was small. Primary data was collected using personal survey method. Cronbach Alpha Coefficient was used for estimating the reliability of the questionnaire. Favourable reliable scores were obtained from all the items since all values were above the 0.7 exceeding the common threshold of Cronbach Alpha value accepted (Nuanaly, 1976) as shown in the table 1:

Table 1 Reliability Results

Items	Reliability (Cronbach Alpha Values)
Mobile Internet Technology	0.832
Advance Robotics Technology	0.911
Additive Manufacturing (3D Printing)	0.802
Productivity	0.791

Source: SPSS Result, 2020

Respondents from these sets of questionnaire were coded into IBM Statistical Package for Social Science (SPSS version, 22), in order to generate desired results. This software was used due to its flexibility and ease of use. The major analytical techniques employed was Pearson Product-Moment Correlation. the reason of using this tool was to examine the correlation between disruptive technologies and productivity of soft drink manufacturing firms' in Nigeria.

DATA ANALYSIS AND RESULTS

Out of the 45(100%) copies of questionnaire administered, total numbers of

43(95.5%) were retrieved and 2(4.4%) were rejected. Therefore, only 43(95.55) were found usable for the analysis of the study. The hypotheses were tested at 95% level of confidence and a (0.05%) level of significance in order to draw conclusion and make generalization. The SPSS windows output version 22.0 was used to test the stated hypotheses. Decision rule: if the P-value calculated is less than the critical level of significance, the study reject the null hypothesis and accept the alternate hypothesis. Otherwise the study rejects the alternate hypothesis and accepts the null hypothesis.

Hypothesis 1: the result on the relationship between mobile internet technology and productivity which provide the statistical test of significance ($P-v = 0.05\%$) and further generalize the findings to the population of the study.

Table 2 Correlations Result on Mobile Internet Technology and Productivity

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		Mobile Internet Technology	Productivity
Mobile Internet Technology	Pearson Correlation	1	.616**
	Sig. (2-tailed)		.000
	N	43	43
Productivity	Pearson Correlation	.616**	1
	Sig. (2-tailed)	.000	
	N	43	43

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Result, 2020

HO₁ Mobile internet technology does not significantly correlate with productivity of soft drink manufacturing sector in the Nigeria economy.

Table 2 indicates the Pearson Product-Moment Correlation Coefficients result of the extent mobile internet technology correlate with productivity. The result ($r = 0.616$ with $P = 0.000 < 0.05\%$) revealed that mobile internet technology is statistically positive and significantly correlates with productivity; therefore, the null hypothesis is hereby rejected and stated that mobile internet technology for

advertising manufactured products had a moderate positive and significant correlation with manufacturing productivity in the soft drink sector of manufacturing industry in Nigeria.

Hypothesis 2: the result on the relationship between advance robotics technology and productivity which provide the statistical test of significance ($P-v = 0.05\%$) and further generalize the findings to the population of the study.

Table 3 Correlations Result on Advance Robotics Technology and Productivity

		Advance Robotics Technology	Productivity
Advance Robotics Technology	Pearson Correlation	1	.887**
	Sig. (2-tailed)		.000
	N	43	43
Productivity	Pearson Correlation	.887**	1
	Sig. (2-tailed)	.000	
	N	43	43

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Result, 2020

HO2 Advance robotics technology does not significantly correlate with productivity of soft drink manufacturing sector in the Nigeria economy.

Table 3 above indicates the Pearson Product-Moment Correlation Coefficients result of the extent advance robotics technology correlate with productivity. The result ($r = 0.887$ with $P = 0.000 < 0.05\%$) revealed that advance robotics technology is statistically positive and significantly correlates with productivity; therefore, the null hypothesis is hereby rejected and stated that advance robotics technology for sophisticated manufacturing process had a very strong positive and significant correlation with productivity in the soft drink sector of manufacturing industry in Nigeria.

Hypothesis 3: the result on the relationship between additive manufacturing technology (3D printing) and productivity which provide the statistical test of significance ($P-v = 0.05\%$) and further generalize the findings to the population of the study.

Table 4 Correlations Result on Additive Manufacturing Technology and Productivity

		Additive Manufacturing Technology	Productivity
Additive Manufacturing Technology	Pearson Correlation	1	.966**
	Sig. (2-tailed)		.000
	N	43	43
Productivity	Pearson Correlation	.966**	1
	Sig. (2-tailed)	.000	
	N	43	43

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Result, 2020

HO₃ Additive manufacturing technology does not significantly correlates with productivity of soft drink manufacturing sector in the Nigeria economy.

Table 4 above indicates the Pearson Product-Moment Correlation Coefficients result of the extent additive manufacturing technology correlate with productivity. The result ($r = 0.966$ with $P = 0.000 < 0.05\%$) revealed that additive manufacturing technology (3D printing) is statistically positive and significantly correlates with productivity; therefore, the null hypothesis is hereby rejected and stated that additive manufacturing technology (3D printing) for production and operation process had a very strong positive and significant correlation with productivity in the soft drink sector of manufacturing industry in Nigeria.

DISCUSSION OF FINDINGS

The findings showed that mobile internet technology for advertising manufactured products and sales had a positive and significant relationship ($r = 0.616$ with $P = 0.000 < 0.05\%$) on productivity of soft drink manufacturing firms in Nigeria. The findings contradict with the conclusion of Adofu (2015) stated that output of manufacturing contributed negatively and showed insignificant relationship with real gross domestic product but found a positive and significant relationship between the average manufacturing capacity utilization and real gross domestic product; government spending was seen to significantly impact on the real gross domestic product in spite of improper management. The findings indicate that the use of advance robotics technology in manufacturing products had a positive and significant ($r = 0.887$ with $P = 0.000 < 0.05\%$) effect

on manufacturing productivity in the soft drink sector of manufacturing industry in Nigeria. The study in line with the conclusion of Uma, Eboh, Obidike, and Ogwuru (2013) they stated that the output of most industrial sectors did not impact significantly on the productivity of firms in the economy. Their work further agreed that most firms have deeper insights concerning the application of tools as well as encountered some basic challenges at the development phase when using advance technology in the production process. The study observed that additive manufacturing technology (3D printing) for production and operation process had a positive and a very strong significant ($r = 0.966$ with $P = 0.000 < 0.05\%$) effect on manufacturing productivity. From the findings it observed that additive manufacturing technology (3D printing) increase manufacturing productivity in the soft drink sector of manufacturing industry in Nigeria. The result corroborate with findings of Naude and Szirmai (2012) they were concerned about structural change of traditional economy dominated by primary activities, moving into modern economy with high-productivity involving manufacturing taking a very significant role in economic development. In their argument, it was asserted that the structural transformation of developing countries needs a type of manufacturing sector development that is capable of delivering high level employment among others and industrial policy is expected to impact significantly if the past lessons and future challenges are adequately given attention.

CONCLUSION AND RECOMMENDATIONS

The study seeks to establish how disruptive technologies affect productivity level of soft drink manufacturing firms and as such concludes that initiating necessary sophisticated disruptive technologies for manufacturing operation and process would advance the industrialization of the country especially in the soft drink manufacturing sector of the manufacturing industry in Nigeria. Based on the finding, increased use of adaptive technologies: such as (3D printing), mobile internet technologies: internet of things, cloud computing and advance robotics technologies in carrying out manufacturing activities and advertising manufactured products had positively and significantly affects the productivity level of soft drink manufacturing firms. In a nutshell, one of the basic indications of the study is that repositioning Nigeria economy would include more governmental restructuring and change in already existing system of operation in order to achieve disruptive technological advancement and network building especially within the soft drink sector of the manufacturing industry which has potentials of increasing the nation's economy in the post oil economy.

Based on the conclusion, the following recommendations are made:

1. The study recommended among that government of Nigeria should consider restructuring of the manufacturing industry towards industrial revolution so as to encourage new disruptive technologies among various sectors in the country especially in the soft drink sector to be viable.
2. The government and the manufacturing firms should see advance and sophisticated technologies such as 3D printing additive manufacturing, mobile internet as a catalyst to improve production process and advertise products to end users in order to stay competitive in the global industrial market.

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