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Fostering a knowledge-based Economy via Information and Communication Technology (ICT): Panacea to Economic Recession in Nigeria

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Abstract: *This paper takes a critical look at the crucial role of information and Communication Technology (ICT) in the diversification of Nigeria's economy and in particular in ending recession. In the paper, it sought to find out whether knowledge-based economy is a solution to economic recession. Data for the study was gathered from Benue State, Nigeria, a sample size of 1320 respondents, using questionnaire as a means of gathering data. The data collected was analyzed using logit regression. The result reveals that knowledge-based economy is a solution to economic recession. It also reveals that ICT is the gateway to knowledge economy. The paper concludes that ICT is one of the resources in addition to agriculture and solid minerals as a viable sector to overcome the challenges of unemployment and fight against economic recession. A large body of recommendations was also made including the sustenance of the diversification of revenue sources to non-oil sectors, making ICT the hub of school programmers, encouraging investment opportunities through the provision of basic infrastructure, among others.*

Key words: *Economic recession, information and communication technology, knowledge-based economy*

INTRODUCTION

The 21st Century is generally referred to as the knowledge-economy (April, 2009) or knowledge-based economy (RAND, 2012). Other characteristics of the 21st century according to partnership for Global Learning, RAND (2012) are globalization, development of new technologies, migration, international competition, changing markets, and

transnational environmental and political challenges. As a first step, we need to know what a knowledge economy is.

It is a system of consumption and production that is based on intellectual capital. It is an economic system where knowledge- instead of labor, resources or capital- becomes the key asset and a social order where social knowledge-related inequalities pose the greatest challenge (Druker, 1999). OECD (1999) considers a knowledge based economy to represent the type of economy based directly on the knowledge and information production, distribution and utilization. On his part, Nicolas (2006) states that acknowledge economy is characterized by the transformation of the knowledge in base material, capital, products, production factors, essentials for the economy and through economic processes in which the generation, selling, acquisition, learning, stocking, developing, splitting and protection of the knowledge became predominant and decisive for the profit obtaining and the assurance of the economic sustainability on the long term.
Tocan (2012) identified the assumptions of the knowledge based economy (KBE), different from the traditional economy as:

(1) The economic is not of scarcity, but rather of abundance. Unlike most resource that deplete when used, information and knowledge can be shared, and actually grow through application.
(2) The effect of location is diminished. Using appropriate technology and methods, virtual market places and virtual organizations can be created that offer benefits of speed and agility, of round the clock operating and of global reach.
(3) Laws, barriers and taxes are difficult to apply on solely a national basis. Knowledge and information 'leak' to where demand is highest and the barriers are lowest.
(4) Knowledge enhanced products or services can command price premiums over comparable products with low embedded knowledge or knowledge intensity.
(5) Pricing and value depends heavily on context. Thus the same information or knowledge can have vastly different value to different people at different times.
(6) Knowledge when locked into systems or processes has higher inherent value than when it can 'walk out of the door' in people's heads.
(7) Human capital competencies are a key component of value in a knowledge- based company, yet few companies report competency levels in annual reports. In contract, downsizing is often seen as a positive' cost cutting;

Based on Skrzypek's (2011; 279) analysis, a knowledge based economy has the following components and characteristic:

Components	**Characteristics**
Foundations of the knowledge economy	• increased education levels in the developed countries, • growing internationalization of the economies through global trade in services, • advancements in and dissemination of information and communication technologies
Indicators of the knowledge economy	• transition from the industrial economy to the service-based system, • increasing number of professional and technical workers and their growing impact on the economy,

	• information society organized around knowledge and information, • scientific research and development, alongside the merger of science and technology with economy, are the key to the information society, • advancements in intellectual technology.
Pillars of knowledge in the knowledge economy	• ICT, • human capital, • social capital (trust, cooperation and social networks) • knowledge management in organizations.

Source: Skrzypek, 2011

The World Bank (1999) has highlighted the four pillars of the knowledge economy within the knowledge economy framework to include:

(a) An economic incentive and institutional regime that provides good economic policies and situations that permit efficient mobilization and allocation of resources and stimulate creativity and incentives for the efficient creation, dissemination and use of existing knowledge;

(b) Educated and skilled workers who can continuously upgrade and adapt their skills to efficiently create and use knowledge;

(c) An effective innovation system of firms, research centers, universities, consultants and other organization that can keep up with the knowledge revolution, top into the growing stock of global knowledge and assimilate and adapt it to local needs:

(d) Modern and adequate information infrastructure that can facilitate the effective communication, dissemination and processing of information and knowledge.

Statement of the Problem

One could observe that there has been a stunted economic growth and development in our country despite several programmes, economic incentives offered by government. Irrespective of increasing targeted government introduced assistance directed to benefit the economic sector. Apart from the numerous programmes and policies introduced in the past by government, the indices of economic development remain static.

ICT has long been believed to be the catalyst of economic growth and national development both in developed and developing nations. Unfortunately, this has not been proven empirically. Majority of the people have not attest that a given percentage of the Growth Domestic Product that a given percentage of the Growth Domestic Product that was contributed by ICT. For the best of our literature review, we discovered that most of the researchers were unable to identify the impact of ICT as a solution to economic recession. None of the researchers have ever state the relationship between ICT and economic recession in an investigation. It is on the account of the above that we intend to fill the knowledge gap.

In view of the above paper hypothesized as:

H_0: Knowledge – based economy has no solution to the economic recession in Nigeria.

REVIEW OF RELATED LITERATURE

Information and communication technology (ICT)

From the facts and rationalization presented above, ICT is the gateway and key driver to the knowledge economy. An explanation of the key term, ICT is essential in buttressing our position.

According to united states access board (2011), ICT refers to any information technology, equipment, or interconnected system or subsystem of equipment for which the principal function is the creation, conversion, duplication, automatic acquisition, storage, analysis, evaluation, management, movement, control, display, switching, interchange, transmission, reception, or broadcast of data or information.

A similar definition by UNESCO (2007) states:

> The term "*information and communication technologies"* (ICT) refers to form of technology that are used to transmit, process, store, create, display, sheer or exchange information by electronic means. This broad definition of ICT includes such technologies as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellites systems, and computer and network hardware and software, as well as the equipment and services associated with these technologies, such as cell videoconferencing, e-mail and blogs.

In the two definitions above, we see that examples of ICT are electronic inventions, telecommunication, products such as cell phones (global systems for mobile communication, GSM for short), computers and ancillary equipment such as i-pads, i-pods, video conferencing, the internet, software, information kiosks and transaction machines, videos, IT service and multifunction office machines which copy, scan, and fax documents. In fact, it is the ubiquity of ICT that most people prefer to say, we are in a 'computer age' or global village' etc. this is because we are in an age that is characterized by extensive development and application of computer technology which has considerably helped man to solve the problems he encounters daily. In homes, officers, venues of social and corporate meeting, we see people making use of ICT equipment such as digital wrist watches, cell phones, and digital cameras to record and videotape the proceedings.

Economic recession in Nigeria

Nigeria slipped into recession in the second quarter of the year 2016 during the Buhari-led government. Economic analysts have described the recession as the worst since the history of Nigeria. This was confirmed by official sources especially the national bureau of statistics, which stated that the gross domestic product (GDP) declined by cent. In the same report, it was confirmed that annual inflation rose to 17.7 percent in July from 16.5 percent in June, and food inflation rose to 15.8 percent from 15.3. Many causes led to the recession the major being the source of the price of oil in the world market. For many years oil has been the major source of government revenue accounting for 70% of revenue sources. The price of oil has fallen from heights of about $112 a barrel in 2014 to below $50 or even less at the moment. Other causes are poor economic planning depletion of foreign reserves and a poor saving culture under the past regimes. A country is said to be in recession when a decline in gross domestic product (GDP) has been noticed for two or more consecutive quarters.

McKinney (2003) describes recession as a period of general economic decline and is typically accompanied by a drop in the stock market, an increase in unemployment, and a decline in the housing market. The gross domestic product (GDP) is one of the primary

indicators used to measure the status of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period. Economic production and growth are used to measure how strong the economy of a country is at a particular time. If all is not well with the economy, the nation concerned will be witnessing low unemployment and wage increases as businesses demand labour to meet the growing economy. The situation described above, depicts Nigeria's present economic status and global bodies such as the world bank, international monetary fund (IMF) including the central bank of Nigeria have agreed that Nigeria is passing through a period of recession.

President Buhari's policy of economic diversification in the face of recession

Owing to the economic challenges the Buhari government inherited, the APC-led government has introduced the economic diversification policy not to only end the economic recession but increase the pace of economic and human capital development. With the policy, significant emphasis has been placed on exploring other sectors of the economy that have been downplayed namely solid minerals, agriculture, and other non-oil sectors.

As part of the economic plan, the Buhari government also introduced the following:

(i) Implementation of treasury single account (TSA): this is meant to unify the structure of bank accounts enabling consolidation and optimal utilization of government's cash resources.

(ii) Social investment programmes: the government introduced the n-power scheme for graduates, the home grown school feeding programme, the government enterprise and empowerment scheme as well as the conditional cash transfers with the hope of eradicating poverty among Nigerians and providing economic opportunities for youths fend for themselves.

(iii) Introduction of the national economic recovery and growth plan. The objective is to restore economic growth, invest in Nigerians, and to build a globally competitive economic. NERGP is aimed at stabilizing the macroeconomic environment, achieving agriculture and food security, ensuring energy efficiency, improving transportation infrastructure and driving industrialization through small and medium enterprises.

(iv) Introduction/launching of micro, small and medium enterprises clinics with the aim of providing lasting solution problems militating against the speedy growth of micro, small and medium enterprises (MSME) in the country.

(v) The anticorruption crusade. To identify, prosecute and punish all economic saboteurs, treasury looters and corrupt public officials.

(vi) Others are the whistleblower policy, and asset recovery

The role ICT in economic diversification towards ending economic recession in Nigeria

We have already mentioned in this easy that IC T is key driver to the knowledge economy. The same applies to the economic diversification policy of the Buhari-led government. According to Naeffati (2012), in an increasingly globalized economy, information technology is one of the key factors of competitive due to their knowledge, rather than to the natural endowments or the low Labour costs. It is becoming increasingly clear that the role of the traditional sources of comparative advantages (a large labour force and abundant natural resources), in determining international competitive, is diminishing. The competitive and comparative advantages of countries are gradually being determined by the access to information, innovation and evolutional knowledge creation process. The only

comparative advantage that really counts is the man-made-one (education and skills). It is engineered by knowledge through the use of information (Oshikoya & Husain, 2006). The recent advances in economic information are becoming essential in the process of the socio-economic development. Information technology offered new ways of exchanging information and transacting business. It changes the nature of the financial and other service sector and provides efficient means of using the human and institutional capabilities of countries in both the public and private sector. The world is rapidly moving towards knowledge-based economic structures and information societies, for instance network of individuals, firms and countries.

Neffati (2012) has listed out the roles and functions of ICT in a nation's economy.

- First, ICT is the technological area with the highest rate of innovation as measured by the granted patents. Among other things, the high rate of patenting in this area points to the several changes in ICT hardware and software and that are needed to use ICT effectively.
- Second, ICT is enabling many of the changes in and implementation of the policy on diversification of the economy. With the crashing of oil as the major revenue source for Nigeria, and the campaign for diversification of the economy to non-oil sectors, ICT is a ready sector that provides a lot of benefits such as following:
- Enabling government tract down treasury looters, corrupt officials and implementation of the treasury single Account.
- Raising the peoples' knowledge content in the agriculture, manufacturing and services sectors will help in the actualization of the policy on diversification.
- Facilitating forensic audit for greater efficiency in accounting and audit systems and as well as checking sharp practices in public offices.
- The ICT diffusion is increasing the value of information. If we limit ourselves to the internet example, we can say that the use of the internet becoming widespread and affecting the citizens in different ways (Ed Mayo & Tom, Steiberg, 2007).
- Popular internet sites make it easy to create information and to consume it. These tools include: forums and chat rooms that allow people to post question easily and get answers on issues of common concern (e.g. the Thom tree travel forum); social networking tools that allow people to keep track of the interests and activities of their friends (e.g. my space and Facebook);
- Blogging and video sites that help citizens to become writers, publishers and video producers (e.g. YouTube, blogger, twitter …); and wiki-based sites that enable joint creation of large and diverse repositories of user generated information on particular topics (e.g. Wikipedia).
- ICT has helped to break down the natural monopoly character of services such as telecommunication. This has enabled regulatory reform, fostered productivity growth and made these services more tradable, so that investment in innovation has increased and become more innovative.
- ICT is a key technology for speeding up the innovation process and reducing the cycle duration, resulting in a closer link between business strategies and performance.
- ICT has fostered greater networking in the economy, as it has facilitated outsourcing and co-operation beyond the firm. It also appears to be a major driver for the globalization process.-ICT makes possible faster diffusion of codified knowledge and ideas within and cross borders.

- ICT has played an important role in making science more efficient and linking it lightly with business. The roles of innovation and information technology in recent growth performance are closely related. Some recent changes in the innovation process and related impacts on innovation could not have occurred without ICT.
- Building the knowledge manpower base, among others, through a comprehensive review of the education and training system, the implementation/expansion of a system for life-long learning and programmes to attract motivation and retain the skilled talent needed for a high- income economy.
- Expanding the development of information structure to facilitate the development of the knowledge-based economy.
- Financial system which is in line with the development of knowledge–based activities.
- Getting the SMEs to prepare themselves with greater urgency for the knowledge-based economy as well as identify and exploit the opportunities that will be generated.
- Increasing a proficient public sector in acquisition, utilization, dissemination and management of knowledge.
- Ethical utilisation of knowledge; and taking affirmative action to bridge the digital divide between income, ethnic and age groups, urban and rural communities, and across regions. Udu and Shaibu (2015) have identified other areas of wealth creation through the use of ICT. These include:
- Increase in the volume of *e*-services such as *e*-teaching *e*-ticketing, e-banking, e-mailing, interpreting, writing, film acting, entrainment, air and sea travel, assisting key government functionaries etc.
- Wealth creation in small business centre to provide services such as internet browsing, computer typing, graphics design, and photocopy, digital photocopy, scanning of document, and printing. As more and more people show interest in investing in this area, it will go a long way in opening job opportunities for applicants who will get paid for their services thereby improving their standards of living.
- *Telephone calls. Telephone servicing technology and sale of recharge cards.* The invention of global system for mobile communication (GSM) handsets has brought with it large and ambitious business opportunities that have the potentials of alleviating poverty and creating wealth both for the individual and the state. Sale of recharge card is a mouthwatering business since it is constantly on demand in the daytime or at night. Those in the business have reduced the army of jobless youths and are contributing to the growth of the economy of the nation.
- *Generating revenue for the government.* The sale of recharge cards attracts huge percentages that go to the federal government of Nigeria as value added tax. Tax. The owners of the following networks currently in use in Nigeria: *MTN, Airtel, Glo, 9-Moblie,* etc. pay a huge telephone tariffs to the government of the federation. Banks, individuals, and multinationals who are core investors in the ICT business have not only boosted their income base, but have contributed to national and world economy.
- Encouragement of investment and *expansion in the production of ICT facilities both at the local and international markets.* More companies producing computer sets, DVD players, scanners, photocopiers, calculators, television, printers, system discs, printing ink, paper etc have sprung up. This creates job opportunities for interested men and women both locally and internationally.

- Item writing/ programming and web design. Consultants in the field of ICT have made huge profits while selling their services of writing items or programmes for publishing on the internet. Again, since this is a lucrative area, more research is continually being carried out.
- *Import and Export activities.* With the introduction of ICT and its adoption by schools, hospitals, and government owned companies, and individuals, more people have taken to import and export of ICT facilities for supply to the needing agencies such as churches, media houses, hospitals, schools, universities and government establishments. This has increased the business network thereby fostering wealth creation.
- *Publishing of books, journals, leaflets and other educational materials.* This is another very important area in which ICT can and will continue to leave its lasting impact. The volume of books, journals, educational magazines, dictionaries and encyclopedias has increased with the high printing technology brought about by the rapid expansion in the ICT world. In this way, publishing companies get more investors, salesmen, distributors and buyers of their product, a situation which has boosted wealth creation.

METHODOLOGY AND DESIGN

Research design

This section discussed the method used in analyzing data employed for the study and as well as the presentation of the data gathered. Data gathered was obtained from Makurdi Local Government of Benue State, Nigeria. The data gathered is restricted to those specialized in ICT operators. The study adopts simple random and stratified sampling techniques for the selection of respondents. This consists of institutions, those who indulged in small and medium scale enterprises and other ICT users. This consist the population of the study. A sample size of 1320 respondents was determined based on the operators or users of ICT.

Questionnaire was adopted as a means of gathering data. It was organized to cover the demographic characteristics of the respondent and key factors that denote the impact of ICT in the face of economic recession to ascertain the impact of economic lives of the people. Questions in this area are categorized in an order of 5 point likert – type scale denoted by 1 = strongly disagree, 2 = disagree, 3 undecided, 4 = agree, 5 = strongly agree.

Data analysis technique

The data was analyzed using descriptive statistics such as frequency count, percentages, mean and standard deviation. Non – parametic influential statistics was used to answer research influential statistics was used to answer research questions. The instrument which took the form of a continue strongly agree to strongly disagree has the bench mark of influence as:

$5 + 4 + 3 + 2 + 1 = {}^{15}/_{5} = 3.0$. Any item with a mean 3.0 and above will be considered strongly agree, while below 3.0 will be considered strongly disagree. The hypothesis will be tested at a 0.05 level of significance. The decision for the hypothesis was based on p-value and ac-value (0.05) where $p < 0.05$ it will be considered "significant influence" and $p>0.05$ will be considered "no significant influence"

PRESENTATION OF RESULTS AND ANALYSIS

Table 4.1 Socio-economic characteristics of respondent

Characteristics	Variable	Frequency	Percentage
Gender	Male	654	65.4
	Female	346	34.6
Age (years)	21-30	107	10.7
	32-40	229	22.9
	41-50	434	43.4
	51-60	226	22.6
Marital status	Married	648	65
	Single	352	35
Educational Qualification	FSLC	228	22.8
	WAEC/GCE	336	33.6
	OND/NCE	222	22.2
	HND/B.Sc	111	11.1
	Others	103	10.3
Occupation	Dependent	115	11.5
	Unemployed	123	12.3
	Self-employed	420	42
	Farming	120	12
	Artisan	222	22.2

From the table above, one can understand that majority of the respondent are men (65%), most of them are married and majority of them are in the age bracket of 41-50 yrs (43.4%), 33.6% constitute the highest percentage of the qualification of the respondents, which is WAEC/GCE. Majority of the respondents are self-employed (42%) which shows that majority of the respondents survived through the effective application of ICT which is their occupation.

Table 4.2: Logic regression of the ICT on economy

Variable	**Coefficient**	**Odd ratio**	**Std. Error**	**Z**	**P**
Sex	0.1001	0.3442	0.234	0.541	0.524
Age	0.423	0.5411	0.141	0.620	0.234
Occupation	0.682	0.3421	0.166	0.211	0.001
Economic diversification	0.846	1.93293	0.012	0.500	0.000
Employment creation	0.663	1.7454	0.133	0.422	0.021
investment opportunity	0.544	1.9947	0.064	0.334	0.045
Revenue generation	0.383	1.3241	0.026	0.216	0.004
Knowledge creation	0.004	1.07621	0.0146	0.148	0.016
Wealth creation	0.077	1.1324	0.068	0.372	0.022

Number of observations: 1000

Log likelihood	984
LR $x^2(9)$	643
Prob. > x^2	0.000
Pseudo R^2	0.4342

Source: author's computation

Discussion of result

The logit regression of table 4.2 above shows that the coefficient of the respondents as it relates to their ICT application and benefits derived is demonstrated in the variables stated as: economy diversification, employment creation, investment opportunity, revenue generation, knowledge creation, and wealth creation where all the variables have positive sign. This is an indication that knowledge based through ICT can overshadow menace of economic recession. Through effective application of ICT unemployment problem can be minimized, majority of the population which are not employed by public service, can gainfully be engaged through this arrangement. . ICT is tantamount to employment creation, wealth creation so and so forth.

Considering the values of the odd ratios of the logit estimates which state that fostering knowledge based through ICT is a solution of the economic recession. This is demonstrated that effective application of ICT knowledge will help one to be 1.9 times diversified considering other areas or sector of the economy. The same applies to employment creation (1.7 times), investment opportunity (1.9 times), revenue generation (1.3 times), knowledge creation (1.07 times) and also wealth creation (1.1 times).

All the variables subjected under analysis revealed that apart from sex, and age, the rest of them have p-value less than 0.05. This shows that the null hypothesis is rejected and the alternative hypothesis is accepted. The alternative hypothesis read that "knowledge - based economy has solution to the economic recession in Nigeria.

CONCLUSION

ICT is the gateway to the knowledge economy. ICT is also the main driver to the diversification of the nation's economy policy. A month ago, there was an official pronouncement that Nigeria is now out of recession. ICT has been a major contributor in ending the recession. This is in addition to the non-oil sectors such as agriculture and solid minerals. The Federal Government of Nigeria has to encourage and sustain the policy on diversification to improve the nation's economy.

RECOMMENDATIONS

The following recommendations have been made:

1. **Sustenance of the Policy on Diversification of the Economy.** This policy should be sustained even after the administration of President Mohammadu Buhari. The country has relied on crude oil export as the only foreign exchange earner for too long. With the diversification policy of the present government, investment into ICT, agriculture and solid mineral sectors, the country is sure of ending recession permanently and building a strong economy.

2. **Creation of Employment through Entrepreneurship Development.** Government should attract youths to entrepreneurship by granting them more loans to start small and medium scale enterprises. This will greatly reduce the rate of unemployment.
3. **Placing greater emphasis on skill acquisition in schools.** This will make the products of such schools to become self-reliant instead of waiting to get white collar jobs as is often the case. In other words, the curriculum will focus more on students getting skills that will help them create jobs.
4. **Encouraging Investment Opportunities through Formulation of Attractive Economic Policies:** Government should come out with more attractive and functional economic policies that will have direct impact on the common man. The legislative arm of government should be more committed to their work by not only passing the national budget in time but also together with the Federal office of Budget and national planning monitor the smooth implementation of the national budget.
5. **Encouraging Investment Opportunities through Provision of Basic Infrastructure**: Government should make investment opportunities of the nation more attractive by ensuring that basic infrastructure such as roads, electricity and water are available for use at all times. Banks and financial organizations should make lending rates at single digit. This will make investors to take risk of investments.
6. **National security should be paramount.** A country plunged into crises of every kind such as insurgency, kidnapping, hostage taking and religion-ethnic crises will scare away foreign investors.
7. **Stable Political Climate:** Nigeria should aim at a stable political climate that will increase economic growth, national productivity and encourage creativity and national merit. A reward system should be earmarked for those who show patriotism, honesty and hard work in national service. Corrupt practices should be discouraged and the judicial arm of government should promptly punish offenders to serve as a deterrent to others who engage in social vices.

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