Computer Software Industry, A Potential Source of Job and Wealth Creation for Youths in Nigeria

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Abstract
Information Technology (IT) is the fastest growing technology in the world today. The hardware was the major driving force of computer between 1940 and 1979 but things changed dramatically since 1980s when the major driving force of computer is software. This development changed the national resource-based economy to knowledge based economy. The engine of IT as a global agent for societal change in an emerging knowledge economy is computer software. The computer software is a tool for good governance, optimal productivity, transparency and accountability with a proven potential to contribute to national Gross Domestic Product. Software development is the new shift in the history of human development with immense ability to bridge the economic gap between the developed nations and developing nations. The classifications of the nations of the world during the Agricultural, Industrial and IT revolutions are presented and the position of Nigeria at each stage was identified. The desk study of the comparative analysis and evaluation of software industry in India, Israel and Ireland are presented. The study of software industry in Nigeria with emphasis on the vision, missions, objectives, strengths, opportunities, weaknesses and threats are presented. It is argued that Nigeria has the potentials for the emergence as a global competitor in software products, services and markets with ancillary beneficial impact of poverty alleviation, gender equality, job creation and wealth creation of youths in the world at large.

1. Introduction

Information Technology (IT) is the fastest growing technology in the world today. The hardware was the major driving force of computer between 1940 and 1979 but things changed dramatically since 1980s when the major driving force of computer is software. This development changed the national resource-based economy to knowledge-based economy. Up till 1980, information processing, was based on database system, but today emphasis is on data mining, data warehousing, Artificial Intelligence, Internet Connectivity and World Wide Web Technology.

Knowledge Engineering has replaced pure data and information-oriented engineering. The engine of IT as a global agent for societal change in an emerging knowledge economy is computer software. The computer software is a tool for good governance, optimal productivity, transparency and accountability with a proven potential to contribute to national Gross Domestic Product (GDP). Software development is the new shift in the history of human development with immense ability to bridge the economic gap between the developed nations and developing nations [1-30]. The classifications of the nations of the world during the Agricultural, Industrial and IT revolutions are presented and the position of Nigeria at each stage was identified.

The desk study of the comparative analysis and evaluation of software industry in India, Israel and Ireland are presented. The study of software industry in Nigeria with emphasis on the vision, missions, objectives, strengths, opportunities, weaknesses and threats shows that Nigeria has the potentials for the emergence as a global competitor in software products, services and markets with ancillary beneficial impact of poverty alleviation, gender equality, job creation and wealth creation of youths in the world at large. There is evidence that the domestic market for software products and services is huge as exemplified by the increasing penetration of Internet connectivity, world wide web technology, mobile phone usage, neuro-computing technology, development, innovation and deployment of national database, multimodal biometric identification and authentication, knowledge discovery, data mining and data warehousing, emergency response systems and a host of other platforms. The challenge facing Nigeria is how much of the markets opportunities is linked to the emergence of a vibrant local software economy and capability as opposed to net negative capital flight and job losses to international competitors. It is observed that while indigenous software is capable of reducing the existing capital flight through foreign software, it also has the capacity of attracting tremendous foreign earnings desirable for accelerated growth of Nigerian economy and promoting entrepreneurship for Nigerian youths in particular.

2. Classifications of The World Nations During Agricultural, Industrial and It Revolutions

One of the most strategic tools in the adventure of human history during the Agricultural revolution is the Compass. The power of the Compass was critical to the slave trade process and disaster

to the African Continent [31]. During the agricultural revolution, nations were classified into first world nations, second world nations and third world nations. Nigeria at that time was classified as a third world nation. Nigeria became a colony of slave trade, whereby Nigerians were sent to the first and second world nations by force or otherwise to support their economy in agricultural products, markets and services.

During the early period of industrial revolution, Nigeria made substantial economic and industrial development. There was mass production of goods and services and education was viewed as the main fuel for development. The oil boom of the 1970s brought about a change in the attitudes of Nigerians towards taste of goods and services. The middle-class income earners suddenly collapsed, thus leaving a wide gap between the poor and the rich in Nigerian society. Nigeria went into abnormal sleep and the production of goods and services were not followed up by Nigerian policy decision makers. The world nations were classified as developed nations and under developed nations. Nigeria was classified as under developed nation. Many nations that were on the same page with Nigeria during the agricultural revolution such as India, China, Singapore and Malaysia relied on national government, private and local communities to attain and sustain growth and development but Nigerians solely depended on the Federal Government for growth and development.

The new economic order of the 21st century is innovated and spurred by IT. By implication, such economy demanded new policies and new generation of political thinkers. Nigerian political leaders have to clearly understand IT dynamics, implementation policies and strategies that create the capacity to compete. The significant component of the total cost of ownership of IT solution lies in the software and not the hardware. It is noted that developing and sustaining software exports will not be possible without a vibrant domestic market. Market forces alone are incapable of accelerating the development of IT due to its fast pace. Government must bring forth the political will to shore up IT development. Nigeria governments at both Federal, State and Local levels have to consider the benefit of the Internet Technology within the angle view of e-business, open source software, e-education, e-government, cloud computing and so on.

Today, Nigerians use over 65 million mobile phones and manufactured nor assembled none. 99.9 million serial numbers of the mobile phones were not registered into a national software database. Serial numbers registration though, approved but without any backup legislation. The future of mobile phones may be more beneficial and at the same time consciously dangerous than guns. This situation is compounded by the fact that Nigeria currently do not possess the innovation to create mobile phones. The Digital Disaster (DD) that will emanate from whole sale of Digital Consumption (DC) can only lead to a quantum damages with enormous cost in Disaster Recovery (DR). During the IT revolution, Nigeria is yet to show any competitiveness with the developed nations at any global platform such as IT software development; hence Nigeria is considered a developing nation [31].

3. Economy of Nigeria In the Past Decades

The incomes from indirect taxes and agricultural sector of Nigeria economy constituted the most important sources of revenue in Nigeria between 1960 and 1970. At the beginning of the oil boom in the 1970s, the contributions of income tax and agriculture to the revenue of the country fell from 58% in 1970 to 12% in 1980. The oil boom caused a drastic fall in the contributions of agricultural sector to the national economy. The oil boom also brought about the attitude of Nigerians having preference for very high taste of goods and services. The middle class income earners suddenly collapsed, thus leaving a wide gap between the poor and the rich in Nigerian society.

The global recession of the 1980s exposed the structural weakness of the petroleum based economy of Nigeria. As the oil prices dropped, the economy found itself in the throes of chronic disequilibrium. The development compelled the Federal Government to resort into various policies calculated at moderating the deteriorating economic conditions. As part of the government Structural Adjustment Programme (SAP), a move was made to overhaul the system of indirect taxation with a view to making it more effective and efficient. The ultimate goal was to reduce taxation on income while increasing taxation on consumption of some goods and services. The Federal Government introduced Sales Tax in 1986 and the success story of the Sales Tax motivated the Federal Government to set up a study group on indirect taxation in 1991. The study group presented two reports with a strong recommendation for the introduction of Value Added Tax (VAT) to replace the existing Sales Tax. The VAT was introduced in 1994 and it has made tremendous contributions to the national revenue since then [13,14].

In the National Economic Empowerment and Development Strategy (NEEDS) which is widely considered as Nigerian plan for prosperity is legislated as a national road map for economic empowerment and development. NEEDS focused on four key strategies, namely: re-orientating values, reducing poverty, creating wealth and generating employment. Basically, the major goal of NEEDS is the re-engineering of the growth process of Nigeria by exploring the means of diversifying the national product base away from petroleum products, services and markets [32]. Subsequently, there were creation of State Economic, Empowerment and Development Strategy (SEEDS) and Local Economic, Empowerment and Development Strategy (LEEDS) to serve the States and Local Governments respectively.

There was a reoccurrence of the global recession of petroleum products, services and markets in 2015 which exposed the structural weakness of the petroleum based economy of Nigeria once again. The oil prices have continued to drop since 2015 and this development compelled the Federal Government to resort into various policies calculated at moderating the deteriorating economic conditions. Many citizen of Nigerian society have capitalized on the development by setting up Yahoo business, Social Media business, Nollywood business and many terrorist activities which are windows to a lot of corrupt and criminal practice. The computer software development which is one of the components of IT was grossly ignored. It should have been viewed as a critical

element required for the global competitiveness of most industries and effective deployment of government services globally. In practice, the computer software development has become globally a critical part of modern industrial infrastructure and a vehicle for implementing the other key elements of knowledge economy. IT is increasingly becoming a technology embodied in a vast and highly diversified range of products, services and markets.

4. Desk Study of Software Industry in India, Israel And Ireland

The desk study of software industry in India, Israel and Ireland is identified analyzed and evaluated in three stages, namely: foundation stage, growth stage and consolidation stage. During the foundation stage, India and Israel addressed specific IT education to empower their citizen while Ireland addressed the empowerment of its software industry. Basically, the three countries concentrated their efforts on building IT skill and software workforce.

During the growth stage, Ireland started its indigenous software industry, India started its small clusters of special niche software businesses to cater for its growing domestic services and markets, while Israel established some high profiled software companies for global market. Basically, at this stage, the three countries established clusters of small business, targeted at niche markets, mostly situated around technology cities, villages and parks.

The consolidation phase saw the growth of the small clusters of software development firms into the global markets through linkage, collaboration and partnership with multinationals. A lot of advanced research and development work was common during this period which gave rise to the acquisition of advanced knowledge and skills in software engineering. This period saw the emergence of indigenous software firms from the three nations in international stock markets and revenues. For example, it was recorded in that revenue from software export in India rose from 120 million US Dollars in 1988 to 2.5 Billion US Dollars in 1998; 10 Billion US Dollars in 2002 and 50 Billion US Dollars in 2008. The Indian initiative and experience were overwhelmingly designed, promoted, managed and sustained by IT Professionals bodies, practitioners, academia, stakeholders in IT industry, Local Governments, State Governments and National Government [33].

While India took fifty years to consolidate its software industry, Israel and Ireland took forty years and thirty years respectively. The success story of these three nations can serve as a template for Nigeria in its bid to grow and develop its software industry. The strengths and opportunities of software industry in Nigeria that are highlighted below are primary indicators that Nigeria can achieve a greater height than India, Israel and Ireland within ten years. The success story of Global System for Mobile Communications (GSM) in Nigeria is an index for measuring the potential of Nigerian competitive edge in software markets in Africa and the world at large.

5. Study of Software Industry in Nigeria

There are two major schools of thought in the software industry in Nigeria as obtained in the developed world. It is presented in that the first school of thought takes the study of software and uses the

knowledge acquired to build software based systems to enhance the performance of human experts in their problem domains [19]. The second school of thought takes a study of the structure and function of the human being and uses the knowledge acquired to build human like intelligent software system. Today, software is applied in almost every field of human endeavours, such as public administration, urban and regional planning, law and justice, environmental control, transportation, communications, education, health care and delivery, preparation of bible concordances and evangelism, crime investigation, security of life and property, leisure activities and re-creational activities. The current software development emphasizes the second school of thought in Nigeria.

In 2004, the National Software Development Task Force (NSDTF) was set up by the Federal Ministry of Science and Technology while the National Software Development Initiatives (NSDI) was sponsored and organized by the private sector to provide a road map for software development in Nigeria. The 2005 recommendations of NSDTF and NSDI were not backed up with any legislative and regulatory framework. It is imperative that Nigeria develops a software policy in order to align software as a National Critical Infrastructure (NCI) for national goals, aspirations and empowerment. The National Information Technology Development Agency (NITDA) in 2010, set up the National Software Policy Committee (NSPC) with members drawn from a broad spectrum of stakeholders to develop a National Software Policy (NSP) aimed at providing a blueprint to make Nigeria a competitive nation in software industry [34]. The author of this Lecture was the national Chairman of the NSPC.

5.1. Vision, Missions and Objectives of Software Industry in Nigeria

The vision of NSPC is: Innovative nation, creative minds connected and propelled by software capacity and capability. The missions of NSPC are:
• Promoting software as one of the top most Critical National Information Infrastructure (CNII) for the growth of Nigerian economy.
• Promoting and facilitating software industry growth with a view to improving the quality, efficiency and effectiveness of public service delivery, driving transparency and accountability in the governance and increasing the contributions of software industry to the Gross Domestic Product (GDP) of Nigeria.
• Improving the standard of living of the people of Nigeria through the use of software in all sectors as a tool to enhance productivity, efficiency and optimum utilization of resources.
• Establishing National Software infrastructure to cater for the needs of public administration, trade, commerce, industry, finance, entertainment, social media, health care delivery, education, culture, sports, tourism, peace, security and stability.
• Promoting Nigeria as a software hub in Africa for the growth of software industry and facilitating the flow of investments.
• Re-engineering or re-tooling the national human resources as workers for the emerging knowledge economy in Nigeria.

The global trends of the computer awareness, appreciation and use have been widely discussed in [15]. In Nigeria, the computers

are viewed as general support resource for centralizing and integrating the operations of corporate organizations. Emphasis is on the computer model of quantitative variables of the operational data of organizations. In the developed world and some developing countries such as India, Ireland and Israel, the computers are viewed as strategic core resource in corporate organizations and emphasis is on the computer model of both quantitative and qualitative variables of the operational data of organizations.

The process of developing software in Nigeria over the years has not been adequately driven by the basic principles and practice of computer software engineering. The computer programming curriculum in Nigerian tertiary schools has, over the years, emphasized the science and engineering of computing with very little regard for the art, social, economic and political implications of computing in Nigerian society. The software experts and professionals who are products of the curriculum have often presented computers as alternative to human experts rather than as a tool for enhancing the performance of human experts [18]. In it is argued that software is an artificial life which is capable of been born, surviving and dying in an environment characterized by some stakeholders of diverse backgrounds [25]. Thus, software is a subject of the vagaries of group dynamics, interactions, co-ordinations and communications.

The objectives of national software policy are as follows:
• Develop appropriate strategies for software research, innovation, development and deployment.
• Develop strategies that stimulate demand for locally developed software products and services.
• Ensure that the National Software Policy establishes software development, growth and services as a major vehicle for creating national wealth with direct and significant impact on Nigeria economy.
• Provide incentive mechanisms for Nigeria software developers, service providers and investors that will accelerate the growth of software industry.
• Establish modalities and technical guidelines for financing the development of world class software and protection of Nigeria Intellectual Property.
• Establish modalities and technical guidelines for registering, testing, measurement and documenting software products and services in compliance with national operational standards and security.
• Implement a road map for ensuring easy access of Nigerian software products, services and the international market.
• Establish a Ministerial Committee to coordinate and direct the implementation strategies of the National Software Policy to achieve rapid penetration and effective use of software in all sectors and promote the use of software in public administrations.
• Establish a National Institute for software research, innovation, development and deployment.
• Ensure the legislative and implementation of the national software policy.
• Provide Critical National Software Infrastructure for the growth of software industry and the national economy.
• Promote the study of software engineering in education institutions.
• Establish guidelines for the procurement and deployment of basic IT infrastructure to facilitate effective IT driven teaching, learning, research, innovation, development and deployment.
• Develop and deploy e-government priority projects for good governance.

5.2. Strengths of Software Industry In Nigeria
The population of Nigeria is about 240 millions and the population of the youths who can kick start the software industry is about 60% of the 240 million. The youths have extremely strong passion for learning, entrepreneurial culture and drive. The schools in Nigeria are many and the language of instruction in the schools is English Language which gives the Nigerian youths a good advantage in software development. The three arms of government in Nigeria have impressive and commendable passion for enabling and sustainable software industry. There is existence of core local and foreign expertise. There are many Nigerians that are home based software experts, practitioners and professionals and many Nigerians in Diaspora who are software experts, practitioners and professionals as well that are willing to collaborate with the public and private sectors on software development. The public and private sectors in the past years have engaged themselves with the re-tooling or re-engineering their personnel. There is existence of National Information Technology Development Agency (NITDA) Act of 2007 empowering, coordinating and implementing the national software industry.

The public and private sectors are currently engaged in knowledge economy programmes such as e-government, e-business and e-payments. The Federal, State and Local Governments adopted Millennium Development Goals as a strategy for job and wealth creation in the past decades. Many Nigerians are involved in software outsourcing which is considered as preparative ground for collaboration with some developing countries and multinational organizations in software development. There are many capacity building programmes funded by multilateral bodies to support the development and deployment of software solutions in both public and private sectors of Nigeria economy. There are programmes such as e-Government, e-Business initiatives, e-Payment and national personnel and payroll management information system in the public and private sectors. The activities of numerous Non Governments (NGOs) and Civil Society Organizations (CSOs) that have focus on women and youths empowerment are many. There exist institutional capacity that support investment, promotion and regulation in software industry.

5.3. Opportunities of Software Industry in Nigeria
Beginning from the 1980, software has been acting as the major force for driving computer, thus there has been less emphasizes on hardware. It is relatively cheap to start a business in software industry and there is cheap labour in Nigeria which is an incentive for foreign and local investments that would use local labour. There is an emergence of local demand for indigenous software services and products. There is the potentials of software developments as a source of job and wealth creation for the youths in Nigeria. There is an emergence of Nigeria software products, services and markets that are capable of effective and efficient in competing in the global markets. There is an emerging cross cutting impact of software industry in other sectors of national economy. There

is international interest in emerging economy, improvement of quality of life and poverty alleviation. There is the renewal of global focus on human capital development supported by multilateral funds and international development partners.

5.4 Weaknesses of Software Industry in Nigeria

In Nigeria, there are no National Software Policy Institutional Framework for Software Development, Intellectual Property Rights, Law Enforcement Agency approved by the National Executive Council. The fiscal incentives for software inventors, developers and solution providers are poorly managed. There is the absence of standards and equality assurance for software products and services. Software required by the public and private sectors is often procured from abroad with their attendant high cost of maintenance and very high capital flight. The training in Nigerian schools on computer programming emphasizes science and engineering. The trainers subsequently lay emphasizes on the computer as an artificial expert rather than as end users aid to perform better [18]. In many cases, end users are often scared and viewed computer as a potential threat to their job security. The home based software experts, professionals and practitioner who passed through the curriculum of the schools in computer programming have very limited knowledge of the social, political and economic aspects of data. In the absence of national software policy, the appropriate linkage, collaboration and partnership of experts, professionals and practitioners with the public and private sectors are not handled appropriately. The coordination of many capacity building programmes funded by multinational bodies to provide basic software skills are not supported at the public and private sectors. The public and private sectors neglected the abundant promotion programmes that are desirable for the acquisition of domain specific knowledge and skills in software products, services and markets standardization. There is inadequate testing, measurement and certification of software solutions, experts, professionals and practitioners. There is inadequate provision of basic data processing infrastructure, for example the performance of electricity, telecommunications and Internet service providers are not appropriate. There is poor indigenous investment in software development as well.

5.5 Threats of Software Industry in Nigeria

There is inadequate continuity in initiatives such as policy formulation, strategic plans and implementation procedures to nurture local software industry products, services and markets. The indigenous banking environments is characterized by a tendency for high interest rate on loans and absence of venture capital. There are inadequate regulations in importation of software products and services by both public and private sectors of Nigeria economy. There is a culture of weak linkage between policy formulation and implementation plan through a lack of continuity in the process and domain expertise. The experts that are involved in developing a policy are often kept out when the implementation plan of the policy comes to the round table for the selection of the appropriate experts. This brings about the national attitude of excluding individuals or groups that contribute to policy formulation and strategic planning of a problem domain in implementation plan programmes. There is piracy and copyright infringement and protectionist policies in foreign software markets. There is inherent vulnerability of emerging critical national information infrastructure build largely on foreign products and services.

6. Conclusions

The major resources of a country are man, money, methods, materials and time. The man uses money, methods, materials and time to achieve the aims and objectives of a country. The improper procurement, development, deployment and evaluation of the man resource have often led to the improper procurement, development, deployment, evaluation and utilization of the other four resources and poor performance of a country. The rate of growth of the development of a country depends, largely, on the quality of its man resource. Many countries in the world today are yet to develop, appropriately, because of the poor performance of their man resource in the management of the other resources. In the past decades, the economy of all countries has been largely driven by money. Today, there is knowledge economy which is anchored on IT and IT is today, largely, driven by software. In view of the abundant strengths and opportunities of Nigerian software industry, the establishment of software incubation, development and deployment centers in the six geo-political zones of Nigeria is imperative for accelerated job and wealth creation for youths and empowerment of women. The longevity of the attitudes of people towards IT is indeed open to question, especially with the on-going evolution and revolution of Internet. The applications of IT in the workplace and home are currently a subject of serious concern because of its likely effects on labour market and job security. In it is stated that if every instrument could do its own work, if the shuttle should weave of itself and the plectrum should play the harp unaided; then managers would not need workers and masters would not need servants. The experience of the Lecturer in both private and public sectors of Nigeria economy has shown clearly that IT creates jobs whereby domain staff have to be retrained, but a domain staff that fails to be retrained shall be made redundant and consequently obsolete. This is to show that IT does not kill jobs but creates jobs. Any successful new technology, in history, has always created its own set of applications that do not exist at the time it was conceived. For example, at the time electricity, telephone (communications device), automobile (transportation device) and the computer were invented, little did one knows that they could individually or jointly become essential to the way people live and work today [35]. It is believed that, a similar set generating process with considerable job opportunities and wealth creation will follow the introduction of a national policy on software development. Given the existing socio-economic status of Nigeria in the African continent, there is no doubt that the country has the potential for a global competition in the software market with a view to alleviating poverty in Nigerian society. A sizeable domestic market will draw large numbers of multinationals that will be involved in software development into collaboration with local partners in order to serve that market.

There exist many policy documents for each sector policy plans of Nigerian economy, but the document of the implementation plans are practically not available. In many cases, parties that were not involved in taking any initiatives and participating in the formulation of a policy plans were favoured and invited to draw up implementation plans. This lecture has identified software

industry as an emerging source of job and wealth creation in Nigeria. Given the existing socio-economic status of Nigeria in the African continent, there is no doubt that the country has the potentials for a global competition in software industry. Among the success factors are the economic strength, viability, high potential in human capital, existence of a entrepreneurial culture, drive and command of oral/written English language. It is believed that a lot can be gained in IT which drives the global knowledge economy today. The success and sustainability of Nigerian future development is contingent on the mastery of National software vision. While commending the response and the constructive IT interventions already put in place by successive Nigerian Governments, it is believed that the fundamental inclusion of software professionals and practitioners, deployment of critical software infrastructure and building new frontiers constitute strategic imperatives for sustainable solutions to the perennial problems of national leadership, governance and development crisis across the length and breadth of Nigeria, in all the three tiers of Government. The above is derived from the basic principle that today, all successful nations of the world are being governed by the innovative application of IT.

The professional concern and challenge are propelled by the fact that Nigeria is currently deficient in digital e-readiness, with the consequences to nation building, development and sustainability. This concern is further amplified by the fact that it is practically impossible to effectively govern 240 million Nigerians without strategically placing IT experts close to the leadership, governance and national security. In the early 19th century, Nigeria was involved in slave trade to support the agricultural economy of the first nations and second nations of the world. The second coming of the slave trade is now with us whereby Nigerian youths are voluntarily going to overseas in search of greener pastures. It is impressive that the current government in the country is doing its best to minimize the efforts of the youths on this by creating more universities, job opportunities and monthly pay packages for worker. The Lecturer believes there is more to gain in Nigeria than going overseas. If in 1984, I turned down the offer of Lecturer 1 position in the University of Glasgow, System Programmer with IBM United Kingdom and Database Developer with Computer Corporation of United States of America by my PhD Supervisor, I would not know what should take me back to overseas after over forty years [36 -38].

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