Women in Information Technology and Knowledge Based Economy in Nigeria

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Abstract

Knowledge and information are key drivers of growth and key aspects of all stages of business development. Information Technology (IT) women want to influence the decisions that affect the lives of their families and communities as well as their political and economic environments. IT women want to be better informed but they also need to have their own information, experiences and ideas valued and organized into voices for change. Therefore, for women to actively take their place in a knowledge based economy (KBE) in Nigeria, it is essential that they pay attention to raising the knowledge level of members by reducing the knowledge gap and digital divide amongst women in all regions and among various social strata. This paper takes a look at the characteristics of KBE, and x-rays the place of women in a knowledge based economy by statistically showing the level of women involvement in IT. Data was collected from the National Bureau of Statistics with specific emphasis on ICT related jobs, education and employment. A three-KBE indicator model was developed to analyze the place of women in KBE and its threats, and proffers possible solution if the women must be carried along in achieving the KBE society.

Keywords: *Gender, Knowledge based economy, Information Technology, Indicators.*

1. Introduction

There are several definitions for the term Information and Communication Technology (ICT) as contained in [1] but this paper adopts the one from the free online dictionary for computing that simply defines Information and Communication Technology as the technology used to handle information and aid communication. Information is a phenomenon that affects everybody especially as today's economy is information driven. The language of Information and Communication Technology (ICT) coupled with increased knowledge and access to information is now a common paradigm. Hafkins and Taggart in [2] described ICT as a powerful tool for development and a potent force in transforming social, political and economic lifestyle globally. Much of the attention to the gender perspectives of ICT has been focused on women [2, 3, 4, 5, 6, 7] and there has been little explicit attention to women knowing their place in the knowledge based economy. Special needs of women in a knowledge based economy are rarely addressed by the IT Professionals, government and educational institutions.

A KBE is defined as an economy that is capable of knowledge production, dissemination and use, where knowledge is a key factor in growth, wealth creation and

employment and where human capital is the driver of creativity, innovation and generation of new ideas, with reliance on information and communication technology (ICT) as an enabler. A Knowledge based economy is one characterised by knowledge being the predominant factor as source of growth than capital in the transition from industrial to postindustrial era. A knowledge based economy is one void of cultural, social and economic discrimination and barriers against women involvement in the development and sustainability of the economy. Rather KBE is one where organizations and people (male and female) acquire, creates, disseminate and use knowledge more effectively for greater economic and social development [8]. It is the demand for workers who are highly skilled (problem solving capabilities, communication, social skills and computer skills) and well educated in learning and research [9]. Knowledge based economy mainly comprises of labour, capital, raw materials, entrepreneurship and IT. However IT remains the fundamental tool that drives growth and competiveness. Access to internet facilities and networking in acquiring and disseminating knowledge improve other factors that enhance the wide spread of KBE.

In Nigeria women are considered to almost equate the number of men in population. The census of 2006 reveals a population of 71,345,488 for men and 69,086,302 for female in population [10]. The Beijing, China of 1995 stressed the need for women empowerment in skill development, knowledge and above all access and usage of information technology [11]. But women are still considered to be relatively low in access to IT facilities and jobs 20 years post Beijing conference thereby inhibiting the vision 2020 of a KBE environment in Nigeria.

Information Technology Development Agency (NITDA) was inaugurated to drive the nation's IT policies by opening flow of information, enabling tremendous increase in the speed and transfer of all types of information, knowledge, and innovation. Although the agency has achieved some level of success, it still has not yielded much improvement for IT Women and intending ICT career pursuit. Today, women still have unequal access to technologies and IT career related jobs.

This paper takes a look at what knowledge based economy is, x-rays the place of women in a knowledge based economy by statistically showing the level of women involvement in IT, it threats, and proffers possible solution if the women must be carried along in achieving the KBE society.

2. Knowledge Based Economy

2.1 Characteristics of KBE

The knowledge economy increasingly relies on the creation, distribution and use of knowledge assets. The success of enterprises will become more reliant upon their effectiveness in creation, harvesting, absorption and utilization of knowledge. It can be argued that the knowledge economy differs from the traditional economy in several key respects [6, 8, 12, 13]:

- The economics are not of scarcity, but rather of abundance. Unlike most resources that become depleted when used, information and knowledge can be shared, and actually grow through application.
- The effect of location is either;

i. diminished, in some economic activities: using appropriate technology and methods, virtual market places and virtual organizations that offer benefits of speed, agility, round the clock operation and global reach can be created.
ii. or, on the contrary, reinforced in some other economic fields, by the creation of business clusters around centres of knowledge, such as universities and research centres. However, clusters already existed in pre-knowledge economy times.

- Laws, barriers, taxes and ways to measure are difficult to apply solely on a national basis. Knowledge and information "leak" to where demand is highest and the barriers are lowest.
- Knowledge enhanced products or services can command price premiums over comparable products with low embedded knowledge or knowledge intensity [13].
- Pricing and value depends heavily on context. Thus the same information or knowledge can have vastly different value to different people or even to the same person at different times.
- Knowledge when locked into systems or processes has higher inherent value than when it can "walk out of the door" in people's heads.
- Human capital competencies are a key component of value in a knowledge-based company, yet few companies report competency levels in annual reports. In contrast, downsizing is often seen as a positive "cost cutting" measure.
- Communication is increasingly being seen as fundamental to knowledge flows. Social structures, cultural context and other factors influencing social relations are therefore of fundamental importance to knowledge economies.

These characteristics require new ideas and approaches from policy makers, managers and knowledge workers.

2.2. Architecture for developing a KBE

From kindergarten all the way to post-university education, education is the principal means for dissemination of knowledge in society. Education constitutes the foundation for the capacity building required by the drive towards a knowledge based economy. Knowledge is manifested in what is known as knowledge content which is an intangible asset that takes multiple forms in both the economy and society. Hence, indigenization of the knowledge content in knowledge based economy amounts to formation of a national fortune. Production of knowledge is carried out through scientific research, technological development and innovative activities. A KBE is based on utilization of the outputs of the knowledge system to create new products and services through innovation [13]. Dissemination, transfer and production of knowledge requires a favourable environment that provides ICT infrastructure, intellectual properties, regulation and legislation, support services, awareness, enlightenment programs. Figure 1 shows that the key concepts of knowledge management (KM) can be used for education and training purposes, something that in turn can help companies to leverage the skills and expertise of its members and consequently to maintain and enhance their knowledge capital.

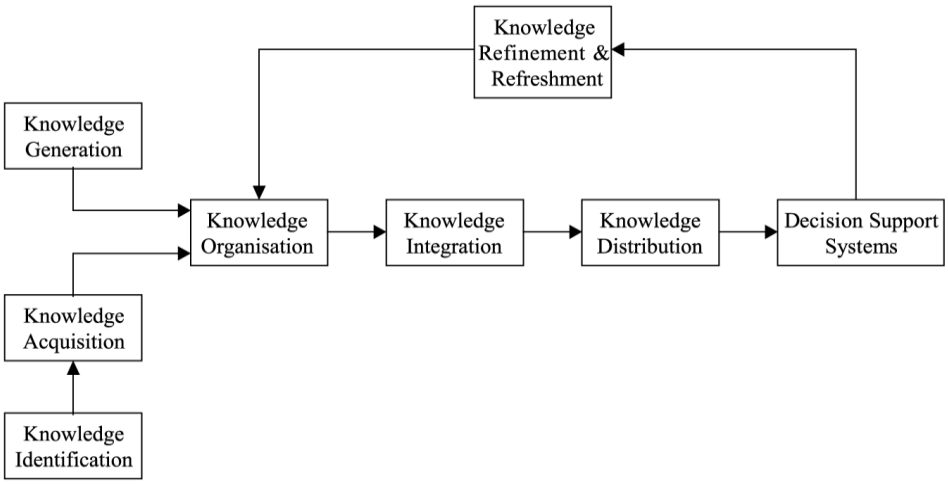

Figure 1. Key concepts of Knowledge Management [12].

2.3. The place of Women in IT Women and KBE in Nigeria

Though women were the programmers of ENIAC, America's first electronic computer [14], today they are dramatically under-represented in Information Technology fields. Many education programs in Computer Science suffer from a clear gender imbalance, often attracting a very low number of female students. Questions on how to recruit, support and retain female students at these study programs are central if we want to obtain a better gender balance within the discipline. The problems are complex, involving many issues. In this section, we discuss the place of IT Women in Nigeria's ever evolving KBE. The study develops a model for determining and analyzing key indicators that affect IT Women in Nigeria.

3. Methodology

Empirical data were obtained from surveys conducted by the National Bureau of Statistics (NBS) on ICT jobs, employments and education in the Nigerian economy. Data collected ranges from 2012 to 2015. Other sources of data collection include; National Population Commission (NPC), Nigeria Communications Commission (NCC) and Internet World Statistics. Microsoft Excel was used for data analysis.

3.1 Results and Discussions

Figure 2 shows the developed model for analyzing and measuring major indicators for IT Women in KBE with key emphasis in Nigeria. The model describes three major indicators which include; employment, education, and socio economic pointers while ICT serves as bedrock for the three indicators in a KBE environment.

(i) Employment Indicator

The employment indicator is sub divided into employment rate and unemployment rate. Employment rate in any economy indicate the growth level of that economy. Table 1 shows the level of employment for the year 2012/2013 between male and female in ICT related jobs. The table is divided into two parts the first part shows statistics of full-time job placement while the other part depicts the part-time job placement.

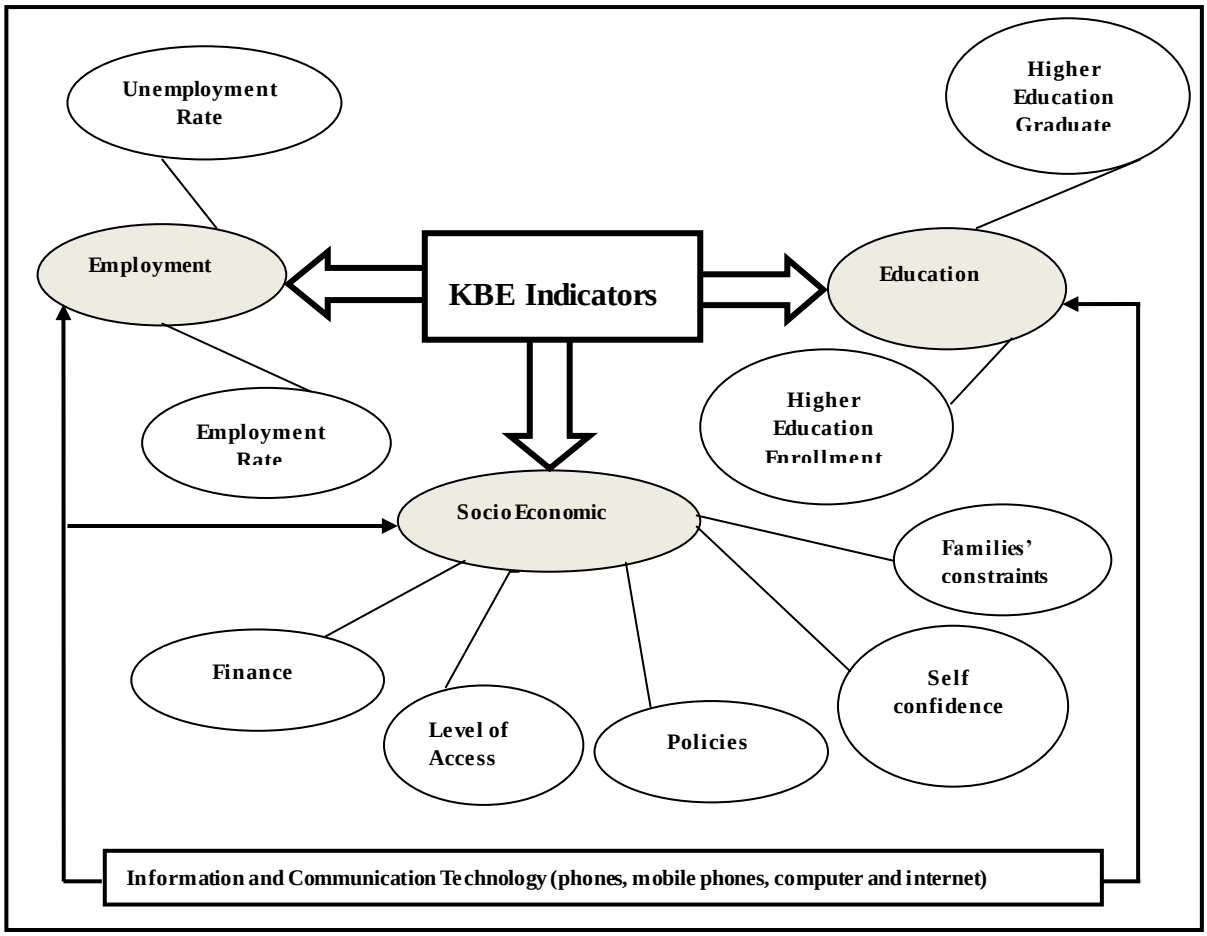

Figure 2. A Model for analyzing IT Women in KBE in Nigeria (Source: Authors' Field Work)

By full-time job placement we mean an employee that is permanently employed by the organization with full benefits that the organization offers. While a part-time job placement is an employee that is on casual placement and may not enjoy the full benefit of the organization. From the table, the percentage of female full-time employees in the different sectors include; ICT managers (17.5%), Computer Engineers (13.30%), System analyst and software developers (19.08%), database administrators (24.05%), Computer operators (36.70%) and Telecommunications (49.70%) with overall employment rate of FCSEGs as 27.30%. While percentage rate of part-time FCSEGs employees comprises of; ICT managers (0.0%), Computer Engineers (89.86%), System analyst and software developers (2.67%), database administrators (7.06%), Computer operators (72.46%) and Telecommunications technicians (0.0%) with overall employment rate as 51.83%.

Also, recent data collected from National Bureau of Statistics [15] for the fourth quarter of 2014 shows new job by occupation created in IT related field (full and part time). Table 2 reveals a very high level of job created for male in the formal sector than that of the female counterpart in the full time jobs sector. In Science and Engineering Professional Sector, new jobs created depicts the male having about 87.2% while the female has 12.7% of a total

number of 488 new jobs occupation created. Information and Communication Technology sector records 75.1% for male as against 24.9% for female new jobs created for full time jobs.

Also, in Science Education/Associate Professional the record reveals 85.6% for male and 24.4% for female for full time. From the table, the number of part-time new job placement is very low for female while the male has few or no placement at all. These data reveals a clear and strong indication that IT women are still far below the benchmark of Nigeria Information Technology Development Agency (NITDA) 35% involvement and placement policy of Nigeria women. World Bank report also reveals the labour force for women as 0.534 per one (1) man.

Table 1. Distribution of FSCEGs in ICT occupation positions in Nigeria

Job Title	Full Time				Part Time			
	Male	Female	Total	Female (%)	Male	Female	Total	Female (%)
ICT managers	146	31	177	17.51	0	0	0	0.0
Computer Engineers	867	133	1000	13.30	7	62	69	89.86
Systems analysts and Software developers	424	100	524	19.08	73	2	75	2.67
Database Administrators	240	76	316	24.05	79	6	85	7.06
Computer operators	924	535	1459	36.70	65	171	236	72.46
Telecommunications	165	163	328	49.70	0	0	0	0.0
Total	2766	1038	3804	27.30	224	241	465	51.83

(Source: National Bureau of Statistics data bank for 2012/2013, Abuja)

Conversely, the low employment rate of IT women in Nigeria reveal in Tables 1 and 2 indicates an obviously high unemployment rate especially in the area of highly placed job (managers and directors). Salami (2013) reveals a total unemployment rate as 16.07% in 2011 as against 7.07% in 2006.

Table 2. Distribution of New Jobs by Occupation (Formal Sector) 4th Quarter of 2014

Sector/ Activity	Full Time					Part Time				
	Male	Female	Total	Male (%)	Female (%)	Male	Female	Total	Male (%)	Female (%)
SEP	426	62	488	87.2	12.7	-	20	20	0	100
ICT	268	89	357	75.1	24.9	0	6	6	0	100
SEAP	522	88	610	85.6	14.4	17	6	23	-	26.0

(SEP= Science and Engineering Professional, SEAP = Science Education associate Professional)
(Source: National Bureau of Statistics data bank for 2015, Abuja)

(ii) ICT Level of Access Indicators

ICT is another force of change in any economy. In Nigeria the total number of mobile phone users (GSM, CDMA) and fixed wired/wireless connected lines is 190,575,684 while active lines stands at 142,589,775[16]. Although the actual figure of phone users on gender basis is not recorded, this figure is relatively considered to be high considering statistical

figure of the last census which registered a total of 140 million Nigeria in 2006. The highest expansion in communication is in the area of mobile phones (GSM) subscribers with 186,410,917 users with Tele-density of 101.85. This is because of low infrastructure for fixed wired lines and the high market demand. The total number of Internet users in Nigeria according to 2014 report stands at 70,300,000 with user growth of 16% and penetration rate of 39.7% [17].

(iii) Education Indicator

Education is a potent tool for self-reliance and development for a knowledge based economy in any nation. The level of education in any economy shows the growth rate of that economy. The National Bureau of Statistics [15] has identified three major challenges faced in the educational sector in Nigeria these include; academic staff shortage especially in science and technology, education quality, and insufficient investment to keep pace with growing school age population. The World Bank reports in [18] reveal percentage of higher education net enrollment as 10%. The Nigeria male students made up a significant portion of the student body increasing its percentage share each year from 77.55% in 2010 to 83.82% in 2012 with a ratio of 4.5:1 against the female student [15]. On the whole, the male students have average of 26.42% as against 4.13% average increase with female students. This low rate with female student conversely affects the level of ICT related courses offered in higher institution of learning.

(iv) Self Confidence

Nwabueze and Ozioko in [19] opined that there is a strong link between IT and socio-economic development in a country. Self confidence is a state of self assurance in what an individual does. Self confidence is a major indicator in pointer in a KBE society. Lack of self confidence and intimidation are two factors that inhibit female student in choosing a career in ICT related courses in higher institutions of learning. In [19], two major factors inhibits female student choosing a career in ICT related fields these include; the attitude towards ICT related courses and career, being a male dominated area and fear of science related field of study and specialization. Other factors as reported in [15, 21] include, Lack of female academic staff shortage in science and technology subjects, education quality and insufficient investment, lack of interest, bias, family responsibility, work place environment, mindset, stereotypes, and spatial skills. Female student and career women should be mentored from the grassroots identifying the benefits inherent in ICT courses and building a career in same. Other ways of improving female interest include training, organizing coaching programmes, enhanced technical knowledge and self-learning approach.

(v) Families' Constraints Indicator

[22] opined that upward mobility of ICT based career would be highly supported or hindered by conflicting family demands. This implies that family constraint such as marriage can inhibit women in pursuing higher degree and possibly picking a career in ICT related field. In Nigeria an average aged young woman primary assignment is to keep the home and the family before any other engagement. Managing the home and career becomes challenging as against the male counterpart who only concentrate on his career while other factors are taken care by the woman who is equally striving to make a career.

(vi) Policies

Government and private organizations policies in job creation and employment also determine the level of IT women in achieving a Knowledge Based Economy. In Nigeria, there is a standing policy of 35% occupation positions that women can occupy. These policies inhibit the rate of growth in ICT occupation even if they exceed the level of acceptance.

(vii) Finances

The high rate of financial involvement in pursuing higher degree programs in ICT related courses can also inhibit the upward mobility of women in IT. Awareness of funding aids such as scholarship, grants, fellowships, assistantships, by federal agencies and private agencies (such as ICT related organizations) that may not necessarily be repaid should focus on helping women attain great career prospect in ICT [23, 24, 25].

4. Conclusion and Recommendation

There is the need to look into the exploitation of women and girls through ICT, as the use of internet to perpetuate violence against women is of increasing concern at global, regional and national levels. Also, increasing women's access to training on and use of new technologies, especially the internet, can help strengthen their ability to combat negative portrayals of women online [26].

It is imperative therefore, for women in IT to identify areas of promoting ICT and gender initiatives in Nigeria so as to lend a voice in the development of a knowledge-based economy. Such initiatives could be:

- To bridge the knowledge gap in rural communities by training women with the vital living skills in order for them to take dynamic roles in their society through integrating ICT into all aspects of life.
- To establish Mentor-Mentee programs as an avenue to show true life experiences and to encourage young girls that with hard work and determination, they too can make it to the top.
- Organize activities that support educational, economic and political developments;
- Initiate programs to facilitate the active involvement of women in the ICT service sector and industry.
- Educate grassroot women entrepreneurs about the cashless platform.
- Ministry of women affairs in the three level governments that is, Local Government, State Government and Federal Government should maintain a database of all female lecturers in Computer Science/ICT related fields, so that they could be assigned leading roles like role models to young girls in the federation.
- Federal Government should establish centres to bring technology training and equipment to women and girls.

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