Empowering Telecommunications Competency and Entrepreneurship Development in Africa: A Nigerian Perspective

Abstract—The rapid growth of Telecommunications and Information Communications Technology (ICT) has impacted every other sector of life – politically, socially and economically. In most countries today, economic development is invariably dependent on the growth of its ICT industry. Example countries where rapid development can be attributed to their Telecoms and IT growth include: Japan, Malaysia, China, South Korea, Singapore, India, etc. Africa unfortunately is playing a catch-up in this revolution. For instance, whilst primary school pupils in certain countries design websites for homework, many in the Nigerian labour market (even graduates of computer science) are yet to acquaint with a computer. The Federal Government of Nigeria has woken up to this and has therefore identified urgent needs to reverse this trend, particularly with the advent of the Internet of Things (IoT), the drive for a Cashless Society, the Social Media, Internet Banking, Smart City and Mobile Television.

This paper reviews the push for technology-skills acquisition and entrepreneurship development, especially for new young graduates, irrespective of their university graduation discipline. The target is to offer training in introductory Telecommunications Engineering, Information Technology, Microelectronics, and Computational Intelligence, as well as in the financial aspects of running their own enterprise. The end-product is to have them fully prepared for placements in specific Telecoms/ICT related industries. Should this fail, then they are also equally empowered as entrepreneurs to launch their own enterprise in the lucrative but capital intensive Telecoms/ICT business

Keywords— Youth Empowerment, Peace Engineering Telecoms/ICT Competency, Technopreneurship, Capacity building

I. INTRODUCTION

Behind the Asian continent, Africa is the world's second largest in both landmass and population. But with only about 30% penetration into a collective land-mass of 30.3 million square kilometers, Africa, and Nigeria in particular, has so far only seen the tip of the iceberg in terms of the utilization and benefits of the potential economic power of Telecoms/ICT [1]. For clarity, in this paper Telecoms/ICT penetration is defined in context of subscriptions to fixed-landline telephony, mobile-cellular telephony and fixed/mobile Internet access.

The United Nation's telecommunications arm – the International Telecommunications Union (ITU) has defined teledensity as the number of active telephone connections per one hundred (100) inhabitants living within an area and this is expressed as a percentage [2]. Consider only a combination of fixed line and mobile cellular penetration, and the teledensity demography of the established five economic regions of Africa. It is clear that only Nigeria (West), Seychelles (East), Egypt and Algeria (North) are the African countries that can boast a teledensity of more than a hundred per 100 inhabitants, Table-1. Ethiopia, considered the second largest by population in Africa, is lagging desperately behind compared to countries of the same size in Europe [3].

Table-1: African Regional Demography and Teledensity
(Selected Countries)

Continent:	Region	Collective Landmass (Km²)	Total Population (2017 Est.)	Average Population Density (2017Est) No./Km²	Mobile Cellular Teledensity per 100 Persons
Africa		30,370,000	1,225,080,510 (2016)	40.34	
Country					
Algeria	N	2,381,741	39,670,000	16.66	120 (2016)[9]
Ethiopia		1,104,300	103,764,000	93.96	15 (2012)[3]
Egypt		1,001,450	89,125,000	89.00	111 (2014)[3]
DR Congo	C	2,344,858	77,267,000	32.95	20 (2012)[10]
Sudan		1,861,484	40,235,000	21.61	78 (2014)[3]
Cote d'Ivoire	W	322,463	*24,974,369*	76.52	80 (2015)[3]
Mali		1,240,192	17,990,000	14.51	70 (2015)[3]
Nigeria		923,768	181,563,000	196.55	116 (2018)[2]
South Africa	S	1,219,090	54,957,000	45.08	70 (2017)[11]
Mozambique		801,590	28,830,000	35.97	35 (2014)[3]
Tanzania	E	947,300	51,046,000	53.89	50 (2014)[3]
Kenya		580,367	45,533,000	78.46	65 (2018)[8]
Seychelles		451	91,650	199.56	170 (2014)[3]

Key: E=East, W=West, N=North, S=South, C=Central

II. NIGERIA EMPLOYMENT DESTINATIONS

A few years ago the destination for non-governmental employment in sub-Saharan Africa was more to the oil and gas sector. In the Nigerian situation, towards the fall of the last century, major employers included foreign companies such as the United States of America-based Chevron, and Europe-based Shell, Total and Agip. Alongside these were the banks and other finance-related operational sectors. It is not surprising therefore, that both these sectors are now thinning out as volume employment destinations for young graduates. By contrast, the Telecommunication Engineering and Information Communication Technology (Telecom/ICT) sector is today emerging as the trending eco-boosting employment destination in Nigeria and indeed Africa. In Nigeria, recent statistics show the youth unemployment at an all-time high (~33% quarterly rate of the population: Figure-1). Only South Africa by continental comparison, is higher at about 53% unemployment [4].

Figure-1: Nigeria Youth Unemployment rate
(National Bureau of Statistics, 2017)

The Nigerian gross domestic product (GDP) has increased exponentially since the government unbundling of the telecommunications industry in the early 2000s. Today the sector's contribution is around 9% to 10%, Figure-2. It is also the fastest growing and best paying industry in Nigeria. This notwithstanding, it shows that Telecoms/ICT remains a relatively untapped sector.
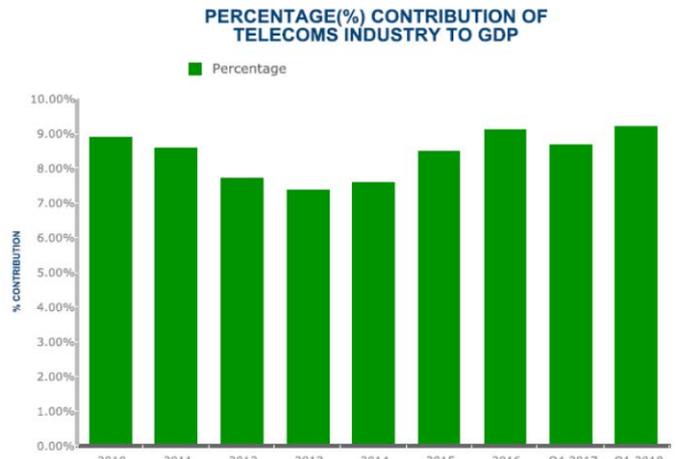

Figure-2: Percentage Contribution to GDP of Telecoms/ICT [NCC]

III. EMPOWERING TECHNOPRENEURSHIP THROUGH THE NATIONAL YOUTH SERVICE CORPS

To facilitate its millennium development goals (MDG), the Nigerian government is fostering new capacity building programmes through public-private partnerships. One of the aims of the MDG is to empower and activate the future potentials of technology and Technopreneurship skills-acquisition in Nigeria [5]. University education is considered not enough to fully acquaint a new graduand with necessary hands-on practical skills preparatory for exposure to the engineering/technology-based industry. Here we define a graduand as someone who is eligible to graduate or to be awarded a degree, but who has not graduated. Technopreneurship skills-acquisition can be defined as the art of empowerment that focusses on how to make money from technology. It is in recognizing the need to boost the future technological growth and capacity of the country that the Nigerian government in 2012 decided to expand the activities of the existing compulsory one-year National Youth Service Corp (NYSC). The expansion encompasses a Skills Acquisition and Entrepreneurship Development scheme; this is colloquially known as NYSC-SAED. The one-year compulsory national youth service in Nigeria literarily brings together new graduates from all universities in the country, irrespective of their various educational disciplines. The NYSC-SAED scheme essentially is founded on the realization that the era has gone in which to relax and approach things 'civil service' style. The mantra has now changed to: 'Think Self-Employment, Acquire the Skills and Make It Count'! The

NYSC churns out about one-hundred thousand graduate Corp Members; passing them out in batches annually to enter an already choked labour market [6]. Currently, there are three batches per year labeled as Batch-A, -B and -C. The batches are about four months apart.

IV. PARTNERSHIPS FOR YOUTH EMPOWERMENT

The governmental drive to empower the youth with technology has led to several bi- and multi-lateral private-public partnerships (PPP). One of such partnerships and perhaps a less well known one, is the public-private-academia partnerships (PPAP). A typical PPAP would consist for example, a private industry that engages a university and the government operated NYSC-SAED scheme. The thrust is to deliver specific skills to new graduates in order to prepare them for employment or to set up their own Telecom/ICT business. The gap was identified to get trainees to learn about the communications engineering world that offers holistic opportunities for economic growth. Hence the objective typically is to get the graduate-youth to understand the essentials of telecommunications hardware and the technology that drives the Internet. Emphasis usually is less on software aspects, such as games and web design. It is also to provide them a comprehensive jargon buster and to equip them with a practical hands-on approach on how to make money from communications technology equipment and installation. By taking the course, Youth Corp members interested in working in the telecoms industry will have the advantage over other national job applicants, by way of possessing prior knowledge of the basic skills required to pass interviews and also to work in the industry.

V. SETTING UP THE NYSC-SAED TRAINING

In general, to setup an NYSC-SAED training partnership in a state, an intending PPAP must first obtain formal written permission from the local governmental NYSC head-office in that state. This acts as the terms-of-reference (ToR) or memorandum of understanding (MoU) for that partnership and it also acts as an endorsement that must be presented at the orientation camp of any new NYSC gathering. The ToR includes permission to approach specified NYSC zonal offices in

order for the PPAP to liaise with the 'youth corper' during their community development gatherings.

At the Orientation Camp:
Upon university graduation, each graduate gets a call-up letter. The letter indicates which local government of one of the thirty-six states of the federation he/she is posted to come service their fatherland. The NYSC orientation camp is a twenty-one day gathering of corps members who have been called-up for the one-year compulsory national youth service. At the Orientation camp, each Corp member who has expressed interest to join the telecoms competency training programme needs to register. This registration captures detail of the candidate's graduation discipline, contact and other personal information.

Figure-3: a) Registering On-Camp for Telecoms Competency Training; b) Acquainting NYSC Corp Members with Telecoms Entrepreneurship Equipment

One week at the orientation camp is devoted to introducing the corps members to various entrepreneurial skills, of which Telecoms is one of them – Figure-3 a) and b). Having registered their intent, the one week (On-Camp) is then used to sensitize and expose them to the content of the course that they are about to undertake, especially how this may change their lives – Table-2. Worldwide, youths show excitement more in practical hands-on sessions than classroom boredom. This fact is used to enthuse and

entice them to fully attend the subsequent 12-week training course after their twenty-one days on camp.

Table-2: Overview Content of the Telecoms Empowerment Course

Introduction to Telecoms, ICT and Radio	Satellite & Microwave: DSTV, VSAT
Radio Frequency Spectrum: How does Radio Work?	Optical Fibre, CCTV
Difference between Analogue and Digital Communications.	PSTN, IP-PBX, Voice-Over IP
Telecommunications Industry Structure and Regulation	The Internet, Converged-Networks and Multimedia Technopreneurship
Digital Networks	Become your Own CEO in Telecoms/ICT
What is Broadband?	How to Set-up and Manage Your Telecoms Business
LAN, MAN, WAN, Bluetooth, WLAN, Wi-Fi, WiMAX	Writing a Business Plan
Mobile Cellular: GSM, 1G/2G/3G/4GLTE	Entrepreneurship Case Study sessions
Circuit & Packet Switching and Signaling	Cashflow Forecasts & Analysis, Profit/Loss & Balance Sheets
Fixed/Mobile Subscriber Lines: DSL, xDSL, MMDS, LMDS	Strategy for Growing a Telecoms/ICT Business
Nigeria Broadband Penetration – The Future Outlook	Available Government Fund/Grant Schemes
Modern Day Communications & Telephony	

Following the orientation camp passing-out parade, the corps members each proceed to their primary place of assignment (or PPA). The PPA more often than not, is a teaching post in a primary (up to 11/12 year olds) or secondary school (up to 16/17 year olds); located in a local government area (LGA) of a state, where they must serve. It may also be a government related office or private enterprise. From their PPA, the corps member must attend the formal NYSC-SAED training course. Because of the dispersed nature of the PPA geographical locations, there is always the logistical limitation of proximity to the training site of the PPAP. To this is added the administrative difficulties of coordinating the zonal inspectors (ZI) who are statutorily responsible for the Community Development Schemes (CDS) of each corps member. Nonetheless, the onus is always on the public-private-academia partnership (PPAP) to ensure full compliance, both in terms of the legal responsibilities and implementation statutes.

VI. TELECOMS ENTREPRENEURSHIP AND EMPOWERMENT COURSE STRUCTURE

Telecommunications competency is quite a complicated field of study. Today, it has even evolved to include intelligent machine learning methods, as shown by *Onyiagha G* [7]. So to simplify things and to encourage non-engineering graduates, the course structure is divided into two: *i)* short theoretical slides-based lecture sessions and *ii)* hands-on practicals laboratory sessions, Figure-4. The lectures are delivered by industry-based experienced engineers who have strong academic exposure. The hands-on practicals are handled by actual young entrepreneurs, who are either chief executive (CEO) or chief technology officer (CTO) of their own private Telecoms enterprise. Referring to Table-2: this shows the overall course content. It is styled to quickly acquaint the new graduate with the entire spectrum of the field of Telecoms technology over a 12-week timeline. Whilst laying less emphasis on the engineering mathematics – that tends to put off non-engineering graduates – the class begins with an introduction to the history of telecommunications, touching on: usable electromagnetic spectrum, how radio works and the difference between wired and wireless communications.
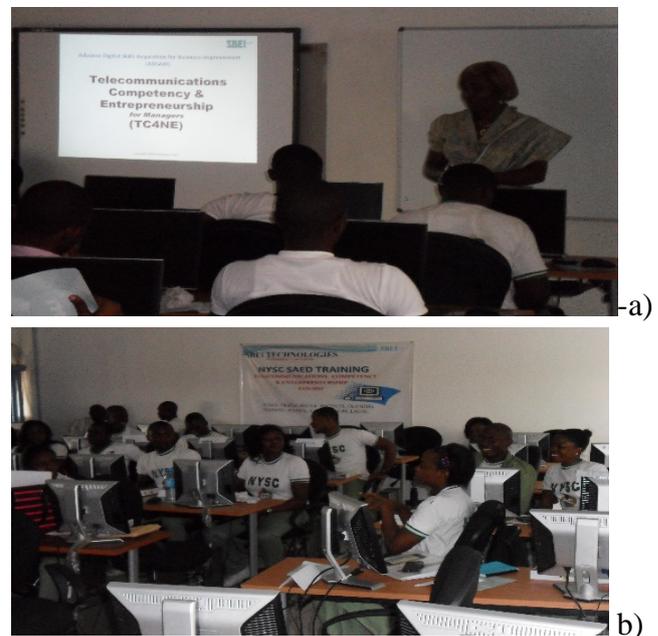

-a)

b)

Figure-4: a) and b) Classroom Slides-based Short Lecture Sessions

The practicals sessions focus strictly on the Telecoms aspects that can be quickly translated as a business in the field. Apart from disciplined hands-on training of how to dig-up earth around a city in order to lay optical fibre-to-the-home (FTTH), each student learns the delicate art of fibre splicing, its connectivity and how to measure power loss along a fibre cable, Figure-5.
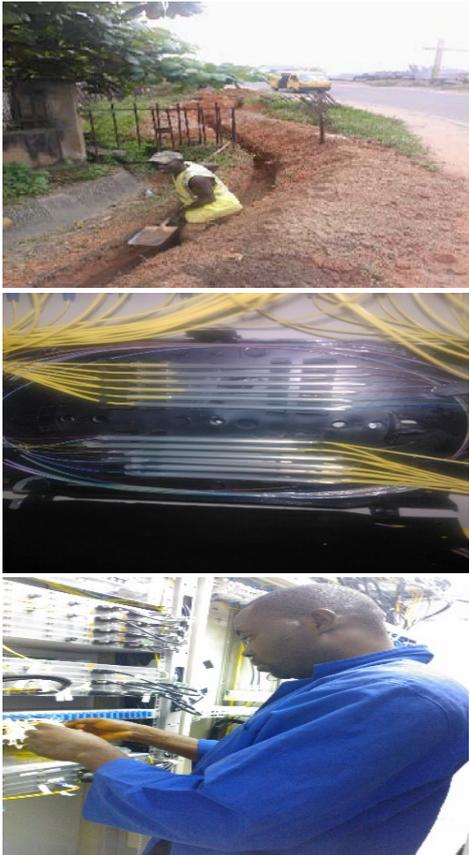
Figure-5: Practical Hands-on for Installing Optical Fiber Broadband to-the-Home

Figure-6: Installing and Tracking Satellite Broadcast Signals

Similarly, course attendees are put through rigorous theoretical and practical aspects of easily establishable telecoms entrepreneurship businesses. For example, they learn the hardware components of mobile cellular smartphones and how to provide basic customer service repairs. They are taught how satellites work and how they are placed in the various orbits. Then alongside, they get hands-on practice of how to install satellite dishes in homes in order to receive satellite broadcast, Figure-6.

Other essential topics, such as understanding how to colour code CAT5e/CAT6e cables and to crimp/krone them onto RJ45 sockets, provide them knowledge of how to install local area networks (LAN). They learn this in the context of cabling out to establish an Internet Café. They also learn how to program an IP-PBX (hybrid IP-private branch exchange) leading up to the ability to wire-up large buildings, e.g. a Hotel for intercom telephony. Entrepreneurship case studies abound in the course. In particular, the corps members get to learn how to setup and register their own business. How to book-keep and prepare the business accounts. They are taught how to write a business plan to target sources of funds. Indeed, each attendee must write a business proposal for their own 'fictitious business', as part of a compulsory assignment. This is a prerequisite before they are eligible to seat a compulsory examination at the end of the 12-week course, Figure-7.

Figure-7: a) Writing End of Course Exams; b), c) Certificates Awarded at End of Course

VII. CONCLUSION

This paper has exposed the telecommunication competency and entrepreneurship empowerment to educate the graduate youth - the Nigerian future. The pedagogic procedures developed here have been fully tested and implemented in practice. This is evidenced in the many Telecoms/ICT related enterprises that have been set by the proud graduate alumni of the course. The certificate they get awarded at the end of this practicals-oriented post-graduate experience has become useful beyond their own imagination. A few graduates of the course have gone on to further their academic career in Telecoms/ICT; having acquired better confidence compared to what they had from their university. This method has proven that the public-private-academia partnership (PPAP) model is quite effective in delivering the sustainable development goals of the government through technology skills acquisition in building capacity for Nigeria. The young graduates of Africa today are crying out for more hands-on practical training, in contrast to theoretical class-based teaching. The modular scalable structure of this model means that it can be easily extrapolated to fit the peace engineering initiatives and the technological skills acquisition drive in other African nations.

References:

[1] Wiki: https://en.wikipedia.org/wiki/Africa accessed 1st September 2018
[2] NCC https://www.ncc.gov.ng/stakeholder/statistics-reports/industry-overview
[3] Economy Watch, (2014), ''Country' Telephone Statistics: Number Fixed Lines, Mobile Phone Penetration Rate', http://www.economywatch.com/economic-statistics/Seychelles/Telephone_Statistics/ accessed 1st September 2018.
[4]Trading Economics, 2018, https://tradingeconomics.com/nigeria/youth-unemployment-rate
[5] Nigeria Millennium Development Goals End-point Report, (2015), http://www.ng.undp.org/content/dam/nigeria/docs/MDGs/Nigeria_MDGs%20Report%202015_Abridged%20version.pdf accessed 3rd September 2018.
[6] National Youth Service Corps, 2016: http://www.nysc.gov.ng/serviceyear.html
[7] Onyiagha, C Godfrey, 'Intelligent Neural Network Access Control of ATM Network', *Pub. University of London Press,* United Kingdom, 2002. OCLC WorldCat No. 59318279; URI: http://hdl.handle.net/10068/624689.
[8]. "Communications: Kenya", *World Factbook*, U.S. Central Intelligence Agency, 11 February 2014. Retrieved 20 February 2014.
[9] Algeria: https://www.indexmundi.com/algeria/telephone_system.html
[10] D R Congo: "Communications: Democratic Republic of the Congo", *World Factbook*, U.S. Central Intelligence Agency, 7 January 2014. Retrieved 24 January 2014. https://en.wikipedia.org/wiki/Telecommunications_in_the_Democratic_Republic_of_the_Congo
[11] MyBroadband, (2017), 'How many unique mobile subscribers South Africa has', https://mybroadband.co.za/news/cellular/219270-how-many-unique-mobile-subscribers-south-africa-has.html accessed 1st September 2018.