

The Impact of Engineering Education and Digital Economy for Sustainable Development in Nigeria

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Abstract

The sustainability and development of a nation depends on the quality of her educational system. A good educational system will greatly have a positive impact on the economy of the nation. The inability of any nation to provide for her citizens, the required standard of education will definitely lead to ill-economic growth. This paper therefore focuses on the impact of Engineering Education and digital economy for sustainable development. Hence, it is a driving tool for technological and intellectual advancement of the nation and her citizens. This paper also discussed the challenges of Engineering Education, digital economic activities, benefits of digital economy, advantages and disadvantages of digital economy and technological skills. Recommendations are made to tackle the challenges bedeviling the Engineering Education and digital economy in Nigeria.

Keywords: Engineering Education, Digital Economy, Technological Skills.

I. Introduction

The process of obtaining or imparting systematic instructions, particularly at a school or university, can be referred to as education, according to the Oxford English Dictionary. A country without a strong educational base would inevitably fail. The cornerstone of contemporary society is still education. As a result, education aims to positively impact both the lives of students and society as a whole (Onebunne & Okoli, 2020). Educational result refers to this improvement. The only way to measure educational goals is in this way.

Engineering Education, according to Azubuike et al. (2019), is the process of disseminating information and ideas about the technical side of engineering. Our current environment is a product of this occupation. The activities are highly varied, spanning a wide range of topics and skill levels. Accordingly, UNESCO report (2010) defined engineering as the field, profession, and act that deals with the advancement, acquisition, and application of scientific and mathematical knowledge regarding the comprehension, design, development, invention, innovation, and use of materials, machines, structures, systems, and processes for particular purposes. In the past, the government did not adequately focus on Engineering Education in a variety of ways. The profession has been degraded to second-class status by the general public. The economy of the country has been negatively impacted as a result. The National University Commission (NUC), the National Board for Technical Education (NBTE), and the Council for the Regulation of Engineering in Nigeria are among the organizations in charge of directly or indirectly

regulating Engineering Education in Nigeria (COREN). The aforementioned organizations are responsible for assessing the Engineering Education program.

II. The Challenges of Engineering Education in Nigeria

A country is said to be backward in Engineering Education when its engineering institutions product(s) fail to produce capital goods such as tractors, lathe machine, Electrical and Electronic devices, drilling machines, cars, iron and steel, train and other earth moving equipment as well as being unable to exploit her natural resources except with the help of foreigners who will normally provide the engineering skills and expertise to undertake the exploitation of her natural resources (Uwaifo, 2019). The following are some of the factors or challenges facing the Engineering Education in Nigeria:

Outdated Curricula

In Nigeria today, the major drawback of the Engineering Education is how the curriculum is being designed. Engineering Education curriculum in Nigerian Universities can said to be obsolete and there is need to reshape Engineering Education curriculum to accommodate the current needs of Nigeria technological advancement (Onwuka, 2009).

Poor Educational Funding

A nation that cannot adequately fund her formal Engineering Education, which drives technology, cannot as well grow technologically. Accordingly, OKoro (2014) stated that the yearly allocation from the Federal Government to the educational sector over the years has far been below average. Ekundayo (2006) submitted that Nigerian government over the years has not been meeting the United Nation Educational Scientific and Cultural Organization (UNESCO) recommendation of the 26% of the total budget.

Inadequate supply of Facilities/Equipment in the Educational Institutions

In the University system, Polytechnic, Technical Colleges that supposed to train the engineers, Technologists and Technicians are poorly supplied with facilities/equipment.

Lack of Manpower in the Institutions (less academic staff)

Currently, most tertiary institutions in Nigeria have limited number of academic staff. This is as a result of government negligence to educational sector.

Students Lack of Exposure to Industrial Practice

Olurunfemi and Ashaolu (2012) opined that the major qualities of a good engineer are technical ability, imagination, good teaching method, industry partnership and solid judgement. They maintained that technical abilities depend on technical knowledge. Unfortunately, the engineering institutions have not gained the cooperation of industries in the students Industrial Work Experience Scheme (SIWES). Industrial attachment position poses a serious threat to students seeking for it.

Inadequate Power Supply in the Institutions

One of the major challenges facing the Engineering Education today in Nigeria is the epileptic power supply. There are several cases of suspension of laboratory or workshop practical due to unannounced power outage or failure. This scenario often promotes inconsistency of research results, time and material wastages, equipment deterioration, damped staff moral and many more. Unstable power voltage is another issue that affects most devices used in engineering training practical (Azubuiké, *et al.*, 2019).

Poor Access to Public Internet Facilities by Students and Instructors

Most times students in the engineering discipline do pay for their internet facilities while in school before assessment. As such, this kind of unhealthy approach does not give room for good performance of the engineering student. Such public facilities will aid the students in no small measures to link them to the global network of engineering innovations that is of great importance (Azubuiké, *et al.*, 2019).

III. Positive Impact of Engineering Education in our Society

Engineering Education has cyclically contributed to the growth of our society in the following areas, as an:

- Engineer
- Inventor
- Entrepreneur

Engineer: “Engineers create a world that has never been”. With the help of engineers, human life is made easy. Through the knowledge of Engineering Education, an individual in the engineering field is awarded the title “Engineer” (Engr.) and many more. In fact, the importance of an “Engineer” in the society cannot be overemphasized.

Inventor: This is a person who creates new inventions, typically technical devices such as Mechanical, Electrical or Software devices or methods (Ekpobodo, 2014). In other words, inventor emanated from, or is a product of engineering.

Entrepreneur: An entrepreneur is someone who launches, manages, and accepts some responsibility risks with a new business or initiative (Ekpobodo, 2014).

The "Professional Education Mode" refers to the current state of entrepreneurship education for international students.

(Chang & Chen, 2014; cited in Yan-Ming *et al.*, 2018) He asserted that the entrepreneurship training model used in American colleges and universities is split into three different categories: the focus mode, the radiation mode, and the magnet mode. Bo (2017) cited this as evidence for the claim that the focus mode is mostly employed to develop students' professional entrepreneurial talents in business institutions and management institutes. The students of the whole school were the aim of the magnet model, which is used

to explore students' entrepreneurial awareness and entrepreneurial spirit. While, the radiation mode is the combination of the focus mode and magnet mode (Yang-Ming *et al.*, 2018).

Economic growth and human capital

The development of human capital requires high quality of human skills. In the productive input of development process of natural wealth, human skills are more important. Since Engineering Education play an active role in both creation and improvement of human capital, its relevance and importance to economic growth and development (Ekpobodo, 2014).

IV. Digital Economy

According to Sharma (2005), a structural movement away from the industrial economy and toward an economy characterized by information, intangibles, and services, together with a change toward new work organizations and institutional forms, are necessary in the new economy. In addition, many new terms have been created for this new economy, including "knowledge-based economy," "borderless economy," "weightless economy," "networked economy," "digital economy," "the information-based economy," and "the networked economy," according to (Woodall, 2000; Sharma *et al.*, 2004). The term "digital economy" refers to the creation, adaptation, marketing, or consumption of goods and services using information technology.

Digital banking, e-commerce, online learning, smartphone apps, and collaborative platforms are examples of novelties in the digital sphere. As a result, according to Gardin (2002), the new economy is primarily about collaboration, creativity, choice, and learning. The combination of networked computing technologies and business models has led to the development of new markets, industries, businesses, and labor habits that make up the digital economy in our society today (Sharma, 2005). The following are crucial components of the digital economy: intense use of information and communication technology (ICT), digitalization, knowledge codification, information commoditization, and innovative work and production organization methods (Sharma, 2005).

Benefits of Digital Economy

The following are the benefits of digital economy:

- i. Digital economy contribute to economic growth
- ii. Its expands business opportunities
- iii. Digital economy creates jobs
- iv. Digital economy improves public services
- v. Digital economy encourage/promotes Transparency
- vi. Digital economy lead to rise in E-commerce
- vii. Digital economy enhances the delivery of goods and services (digitally)

Advantages of Digital Economy

- i. Greater information and choice
- ii. It saves time
- iii. It reduces costs for business
- iv. Greater personalization
- v. Lower barrier to entry
- vi. Greater flexibility in work, enabling people to work from home
- vii. Benefits for developing world

Disadvantages of Digital Economy

- i. Monopoly power of technology giants
- ii. Less community
- iii. There is addictive nature of technology
- iv. Privacy issues
- v. Bypassing of labor laws
- vi. Disruption of traditional economy and jobs
- vii. Potential environmental costs

Though, irrespective of the short-comings/disadvantages of digital economy as mentioned above, its positive impact (benefits and advantages) in our society today, remained incomparable.

Digital Economic Activity

Li and Nuccialleri (2016) stated how digital economy affected the conventional markets for goods and services compete through the transition to the information economy. By innovation, companies optimize a profit function and establish models of search and selection technologies (Gutierrez *et al.*, 2016).

Technological Skill (Knowledge)

This can be characterized as the capacity to carry out various tasks using computer-based technologies. Computer literacy, database administration, digital marketing, project management, website creation, and cybersecurity expertise are some of the most crucial technology skills to possess. According to Vega-Gomez *et al.* (2018), regional technological knowledge aims to change economic structures through innovation, opportunity discovery, and business creation as a foundation for regional growth. This results in the development of knowledge providers, sophisticated demand, skilled labor, educational research activities, and support services, which create competitive advantage (Grillitsch & Tripl, 2018).

Digital economic activity is driven by technological skill. On the other hand, through the development of regional economies based on innovation and knowledge, digital economic activity can produce productivity, economic growth, and well-being (Brynjolfsson *et al.*, 2018; Mendez, 2016). Neffati and

Gouidar (2019) asserted that the adoption of new technologies—which also boost GDP—is essential for maintaining an economy's competitiveness.

Mendez (2016) stated that the promotion of technology transfer through technological knowledge or skill by information technology corporations is necessary to address the issue of developing regional economies based on innovation and knowledge.

V. Recommendations

In building Nigeria through Engineering Education and Digital Economy, the following recommendations should be put into consideration:

1. Upgrading the Polytechnic system: As a system that is meant to produce “Middle Man-Power”, especially in terms of technology, which is the bases of digital economy, should be given adequate attention.
2. National Board for Technical Education (NBTE); as a body should thoroughly checkmate the standard and kind of equipment (whether is obsolete) installed in an engineering workshop or laboratory, before issuing accreditation in an institution.
3. The employment or appointment of an academic staff in the engineering field should be done on merit; to avoid production of quack engineering Technologists or engineers.
4. Budget: Government should pay more attention to technology industry, so as to activate and boost digital economy.
5. Government should endeavor to introduce “Digital Free Trade Zone” (DFTZ™) DFTZ™ is an approach to increases the exponential growth of cross-border e-commerce doings and enables the local business especially Small and Medium Enterprises (SMEs) to operate their trading by exporting their goods to global marketplaces easily (Lasuin, Omar & Ramayah, 2017).

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