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Redefining the Mandate of Polytechnic Education for Economic Diversification and Sustainability in Nigeria

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Abstract

Education is fundamental to economic diversification, development, and sustainability. This paper principally examined the place and importance of the mandate of polytechnic education in the economic diversification and sustainable development of Nigeria. For the purpose of objective and scholarly analysis, the Functionalist Theory or Functionalism as the theoretical framework was adopted. Using three factors, namely relevant provisions of the Federal Polytechnic (Amendment) Act, 2019; experiences and lessons from Germany, China, and the Asian Tigers; and the National Board for Technical Education's (NBTE) Skills Advocacy Slogan "Skills, not Degrees," the paper argued that repositioning and strengthening polytechnic education, specifically through the empowerment and skills development of polytechnic graduates and youths, constitute critical success factors in sustainable national development. The paper made appropriate recommendations to rejig polytechnic education in Nigeria, which should include, but are not limited to, increased funding of the polytechnics, a review of the Tertiary Education Trust Fund (TETFUND) sharing formula in favour of the polytechnics, laying much emphasis on the vocational component of polytechnic education, continuous staff capacity development and upward review of the salaries and improvement of the conditions of service of polytechnic workers; fostering a culture of innovation and applied research and development and inauguration of technology incubation centres in all polytechnics in the country.

Keywords: Education, Polytechnic Education, Economic Diversification, Development, Sustainability, Sustainable Development

1. Introduction

Polytechnic education is a major component of tertiary technology education. One of the principal objects and roles of polytechnic education in Nigeria is to train, produce and mobilise technical and vocational manpower, skills and competencies necessary for economic diversification, development of indigenous technology and facilitation of sustainable development of the people and country. Several years after the introduction of polytechnic education, establishment of many polytechnics, public and private, and allocation of gargantuan financial and other resources to the polytechnic sub-sector, many questions are still being asked with respect to the continued relevance of polytechnic education in the country. Has the mandate of polytechnic education been

fully achieved, especially in the context of economic diversification and sustainable development? What should be done to redefine, refocus or strengthen polytechnic education in order to achieve its avowed mandate? To this end, the thrust of this paper is to re-examine the mandate of polytechnic education for economic diversification and sustainability in Nigeria.

2. Theoretical Framework

The importance of theoretical framework as a tool of analysis in any study or research remains sacrosanct. The principal purpose of this paper is to examine the mandate of polytechnic education vis-à-vis economic diversification and sustainability in Nigeria. To this end, the appropriate theoretical framework of analysis best suited for this paper is the Functional Theory or Functionalism. The Functional Theory is an offshoot of systems analysis aimed at the examination of how socio-economic, political, religious, and educational institutions and structures perform or do not perform or fulfill their purposes or functions to support the whole system. In other words, it implies that institutions discharge certain functions or serve purposes that are indispensable for the long-term survival, or continued existence, stability and development of the system. (Mahajan, 1988; Igwe, 2007; Darity, 2008). In sociology, Emile Durkheim, Auguste Comte, Herbert Spencer, Talcot Parsons and Robert Merton, etc. are associated with the theory, just as Gabriel Almond is the dominant figure in political science.

3. Clarifications of Key Terms and Concepts

3.1. Defining Polytechnic

Science and technology play decisive roles in every development process. Thus, the importance of polytechnics in the technological advancement and overall development of any nation cannot be over-emphasised. The term “polytechnic” has both Greek and French roots or antecedents. Polytechnic (in Greek, “Polytechnique”) implies “skills in many arts and applied sciences or technology”. The Oxford Advanced American Dictionary defines polytechnic as “a school for higher education in technical and other practical subjects”. According to Kazaure (2021),

Polytechnic refers to non-university tertiary technical education training institutions comprising polytechnics, colleges of science and technology offering a wide variety of technological, science and business-oriented educational training leading to the award of ND, HND and post-HND in Nigeria (p. 3).

The National Policy on Education (NPE) (2014) recognizes and classifies polytechnics under both tertiary and technology education in Nigeria. In the United States of America, polytechnics are referred to as institutes of technology.

3.2. Concept of Education

Generally, education is not only a necessity and valuable instrument (Eze, Okujagu, & Sam-Kalagbor, 2022); it has been described as the most important factor and the greatest investment in human capital capable of enhancing the fundamental productive capacities, knowledge, creative abilities, skills, experience of individuals, etc. necessary to propel development at various levels. Undoubtedly, education plays a very prominent role in the production of quality human capital or manpower necessary for national development. Nelson Mandela was once quoted as having stated that “education is the most powerful weapon which you can use to change the world” and that “the collapse of education is the collapse of a nation”. The United Nations Educational, Scientific, and Cultural Organisation (UNESCO) believes that education is not only a human right; it is “the process of facilitating learning or the acquisition of knowledge, skills, values and habits”. UNESCO’s four (4) pillars of education are learning to know, learning to do, learning to live together and learning to be. “It is through education that societal values, norms, culture, needs and aspirations are inculcated and transferred to the people for quality improvement and societal development” (Ivowi, 2022, p. 291).

Education aims at the development of the individual and society. To this end, Section 1(3) of the National Policy on Education (2014) provides that Nigeria's philosophy of education, among others, is anchored on the beliefs that education is an instrument for national development and social change; it is vital for the promotion of a progressive and united Nigeria; and maximises the creative potential and skills of the individual for self-fulfilment and the general development of society. There are three main types of education: formal, informal and non-formal education, while formal education, which is also regarded as formal learning, is education that takes place in an educational institution or a typical school environment, informal education is education that does not take place in a formal setting. For example, teaching a child by his parents or personal studies aimed at self-development. On the other hand, non-formal education includes adult education, nomadic education, distance learning and computer-programmed learning and training.

3.3. Quality Education

Goal Number Four (4) of the Sustainable Development Goal is "Quality Education" (SDG 4). The ultimate ambition of SDG 4, according to the United Nations, is to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". Quality education as an all-inclusive term, focuses primarily on preparing and equipping the learner for life and not necessarily for assessments. Its target is to ensure the learner's social, emotional, mental, physical, and cognitive development, irrespective of gender, race, ethnicity, socio-economic status, or geographical location (Education International, 2023). It is student-centred. In other words, it enables people to develop all their attributes and skills to achieve their potentials as human beings in the society. Such education dwells on the importance of five critical areas: quality learners, quality learning environment, quality content, quality processes, and quality outcomes. Inclusivity and equitability are strong foundations of quality education. The United Nations envisages that by 2030, education will be used for "transformation of the world". This goal strives to ensure that all girls and boys complete primary and secondary schooling by 2030.

3.4. Polytechnic Education

Polytechnic education is an integral part of technical education programmes that enables the acquisition of practical and applied skills and scientific knowledge necessary for the unfolding of autochthonous technological breakthroughs, industrialisation and economic development. Commenting on the subject matter of polytechnic education, Kazaure (2021) notes that it refers to the education that provides full-time courses of instruction and training in technology, applied science, commerce, and management, and other fields of applied learning relevant to the needs of the development of Nigeria in the areas of industrial and agricultural production, distribution, and research in the development and adaptation of technology. To this end, polytechnic education largely involves teaching, training, and research in post-basic institutions of higher learning that specialise in technical, technology-based and applied sciences, leading to the award of the National Diploma (ND) and Higher National Diploma (HND) (the dual certification system). The main purpose of the polytechnic is to provide low, middle, and high levels of manpower required to drive industrial and economic growth and development of society. Semrad & Skrybel (2017) noted that "the purpose of polytechnic education was not only to help students become familiar with the use of various tools and pieces of equipment and the development of practical skills, but also to become acquainted with the world of labour, learn to cooperate and professionally solve problems resulting from working with the latest technologies and new scientific discoveries" (p. 5)

Similarly, providing justifications for polytechnic education in Nigeria, Kalagbor and Harry (2023) strongly argue that being critical for the attainment of sustainable development, polytechnic education guarantees the production of persons with diverse technical and technological skills and competencies in various professions, blends theory and practicals in order to solve real-life challenges, helps to identify industry-related problems and in collaboration with relevant industries and employers proffer functional solutions to them and creates self-employed graduates who, with time, turn out to be employers of labour, thereby reducing the rate of unemployment in the country. For Agi and Akanni (2021), polytechnic education ensures personal development in terms of teamwork, leadership, communication, the evolution of critical thinking, analytical and problem-solving skills. Epelle, Harry and Inokoba (2023) summarized the contributions of polytechnic education in Nigeria to include manpower generation,

equipment fabrication, research and development (R&D), agricultural production and public enlightenment and development. Others are employment generation and wealth creation.

Considering the critical importance of tertiary technology education which is the central focus of polytechnic education in Nigeria, Section 5 (c) (107) of the National Policy on Education (2014) stipulates that the specific goals of technology education at the tertiary level shall be to:

- a) Provide courses of instruction and training in engineering, other technologies, applied sciences, business and management, leading to the production of trained manpower;
- b) Provide the technical knowledge and skills necessary for the agricultural, industrial, commercial and economic development of Nigeria;
- c) give training that imparts the necessary skills for the production of technicians, technologists, and other skilled personnel who shall be enterprising and self-reliant;
- d) train people who can apply scientific knowledge to solve environmental problems for the convenience of man; and
- e) give exposure to professional studies in the technologies.

To further buttress the importance accorded to polytechnic education by the State and Federal Governments of Nigeria as well as individuals, the establishment of polytechnics has continued to increase in the country. At the moment, there are a total of one hundred and seventy-three (173) Federal, state and private-owned polytechnics in Nigeria (NBTE,2023). A breakdown of the above figure shows that there are forty (40) Federal Polytechnics, forty-nine (49) state-owned Polytechnics and eighty-four (84) private polytechnics in the country.

4. Polytechnic Education

4.1. Brief History of Polytechnic Education in Nigeria

Historical studies, memories, knowledge, information, and data enable one to understand, interpret, and analyse the past in order to appreciate and illuminate the present and act as a fundamental basis to plan, guide and project into the future. It is obvious that knowing the past remains the most formidable means of understanding the present and adequately preparing for the future, pleasant or unpleasant. No wonder Winston Churchill recognized that “a nation that forgets its past has no future”. Thus, in order to appreciate the future prospects of polytechnic education in Nigeria, it is germane to locate its historical context. The term “polytechnic” was first used in 1805 in French (“polytechnique”). In 1832, the Royal Cornwall Polytechnic Society was the first British educational institution to adopt the name polytechnic.

The history of the emergence and establishment of polytechnics in Nigeria predates the attainment of nominal political independence in 1960. Whereas Yaba College of Technology, Lagos, which was founded in 1947 and is generally known as YABATECH, is the first polytechnic in the country, the Lagos City Polytechnic, Lagos, is the first private polytechnic in Nigeria. It was established in 1990 but gained formal recognition by the National Board for Technical Education (NBTE) in 1995. Today, all polytechnics in Nigeria are regulated by the National Board for Technical Education (NBTE). Essentially, the NBTE is responsible for the regulation, accreditation and certification of all academic programmes of the polytechnics (Amie-Ogan, Amadi, Osuji, Wey-Amaewhule & Sam-Kalagbor, 2023).

4.2. Determining and Contextualising the Mandate of Polytechnic Education

Within the context of polytechnic education in Nigeria, polytechnics are statutorily charged with clearly defined mandates or objects. Accordingly, the main objective of polytechnic education is to ensure the promotion of technical and vocational education and training, technology transfer as well as skills development to enhance the socio-economic advancement of the country. Section 2 (a) of the Federal Polytechnic (Amendment) Act, 2019, provides that the functions of the polytechnic shall be:

- a) to provide full-time or part-time courses of instruction and training to produce middle- and high-level manpower

- I. in technology, applied science, commerce, and management; and,
 - II. in such other fields of applied learning relevant to the development of Nigeria in the area of industrial and agricultural production and distribution and for research in the development and adaptation of techniques as the Council may from time to time determine;
- b) to arrange conferences, seminars, and study groups relative to the fields of learning specified in paragraph (a) of this section (i);
 - c) to perform such other functions as, in the opinion of the Council, may serve to promote the objectives of the polytechnic.

Similarly, while some state governments have domesticated some provisions of the Federal Polytechnic (Amendment) Act, 2019, it is important to state that in enacting laws establishing state-owned polytechnics, various state governments have reinforced the central mandate of polytechnic education. For instance, the Port Harcourt Polytechnic (now the Captain Elechi Amadi Polytechnic) (Amendment) Law, 2020, provides that the objects of the polytechnic shall be, among others:

- a) to provide courses of instruction and training in science, engineering, technology, environmental sciences, management, communication and such other fields of learning as the polytechnic may from time to time determine, having regard at all times to the technical and scientific manpower needs of the state in particular and the Federation in general.
- b) to encourage and promote scholarship and conduct research in all fields of learning and human endeavour and more particularly in the disciplines and fields of study mentioned in paragraph (a) of this section;
- c) to relate its courses of instruction, activities and services to the social, cultural and economic needs of the people of Nigeria and needs of society in general;
- d) to provide special training courses, including technical education and in-service training, for members of the public service and the private sector;
- e) to encourage, promote and propagate the repair and maintenance culture;
- f) to prepare and groom students in skills and entrepreneurship and university entry requirements; and
- g) to undertake any other activities and programmes that are appropriate to a polytechnic of the highest standard.

In order to achieve the goals of technology education, which is synonymous with polytechnic education, section 5 (c) (103) of the National Policy on Education (2014) provides, that in pursuance of the goals of technology education, the government shall:

- a) adopt measures to develop and encourage the ideas of technology education through students' exposure to practical industrial work experiences;
- b) improve immediate and long-term prospects of graduates of technology institutions and other professionals with respect to their status and remuneration; and,
- c) encourage technology education institutions to conduct applied research relevant to the needs and aspirations of the nation.

Furthermore, Section 5 (c) (105) of the NPE (2014) specifically states that "polytechnics and other specialized institutions shall continue to maintain a two-tier programme of studies, viz, the National Diploma (ND) and the Higher National Diploma (HND) with a one-year period of industrial experience serving as one of the pre-requisites for entry into degree programmes." Considering the place and roles of polytechnic education in the attainment of technological breakthroughs, Section 5 (107) of the NPE stresses that "technology education institutions shall pay particular attention to research into and the promotion of indigenous technology in Nigeria". This, therefore, is a confirmation that polytechnic education also aims at technology transfer.

4.3. Economic Diversification

Nigeria is the largest producer of oil in Africa and the world's ninth-largest oil exporter. Prior to and after the attainment of political independence, Nigeria has largely remained a monocultural economy, depending substantially on oil revenues. This is, however, with regards to her qualitative arable land, population advantages or strengths, other available and untapped mineral resources, and rich cultural heritage, etc. With the present dwindling economic fortunes, high rate of unemployment and inflation, poverty, kidnapping, militancy, Boko

Haram menace, excessive dependence on and importation of virtually all manufactured goods, low pace of industrialization, huge external debt profile, other security challenges and policy inconsistencies and flip-flops by successive governments, more than ever before, economic diversification or the creation of a multifaceted economy has become not only desirable but indispensable. This is particularly against the background that various development plans and policy documents (e.g., NEEDS.) by the Federal Government have unsuccessfully attempted to diversify Nigeria's economy. Economic diversification in the context of Nigeria's development agenda seeks to reduce the country's overdependence on oil and vulnerability to the vagaries and vicissitudes of oil price fluctuations or swings in the international market.

According to Usman (2022) who sees economic diversification as Nigeria's foremost economic challenge:

economic diversification is an expansion of resources of production, employment, trade, revenues and expenditures in an economy. It is characterized by the transition from dependence on one or a few commodities such as crude oil, minerals and agricultural produce or sustained growth and transition of an economy from dependence on primary activity such as oil and mineral extraction and agriculture, to value addition in these activities.

It can also be seen as "an expansion of sources of production, employment, trade, revenues and expenditures and it is associated with the process of structural economic transformation". Usman identified three dimensions of economic diversification, namely, sectoral contributions to employment and production resulting in an increase in the number of sectors, formal and informal, which contribute substantially to the creation of employment and output (Gross Domestic Product, GDP); export diversification is achieved through international trade by way of the exportation of more goods (especially manufactured products) and services for increased revenues. The third dimension is referred to as "fiscal diversification", which is a movement away from one or a few sources to multiple and sustainable domestic sources of revenue mobilization. The author argues that in Africa, including Nigeria, the state (government) has the responsibility to and should drive economic diversification or transformation by creating, guiding, coordinating and regulating markets through any or a combination of the three dimensions identified above. Only a developmental state has the capacity to play this role and further argues that economic diversification in Nigeria is a "political project", which can be achieved by ensuring political stability and an equitable distribution of power as springboards for economic diversification.

In summary, it is reinstating the fact that economic diversification involves the entire process of shifting an economy away from a single income source towards multiple sources from a growing range of sectors and markets. Economic diversification can equally take the form of corporate or product diversification. Corporate diversification has to do with going into new business area(s) and opportunities. For example, if the chief executive of a dine-in restaurant delves into corporate catering, that will be called diversification. This is, nevertheless, different from operating a new dine-in restaurant in another town or state, approximating business expansion. The rationale for diversification is to enhance profitability, and increase sales and services to be provided and more importantly, reduce the risk of being negatively impacted by external factors such as economic or market changes. At the level of business, there are three types of diversification strategies, to wit:

- i. Concentric Diversification: adding or introducing similar products or services to an existing business for the customer's satisfaction (e.g., adding the sale of laptop to a computer business).
- ii. Horizontal Diversification: adding unrelated and new products or services to an existing business in the product mix.
- iii. Conglomerate Diversification: in this case, it involves the addition or inclusion of a completely different product(s) to a business.

Drawing a relationship between economic diversification and national development, Ohunye, Obaze, Omona and Obamen (2019) are of the view that a diversified economy is an economy that has a number of different revenue streams that provide nations with the capacity for sustainable growth due to their non-reliance on one particular type of revenue. Diversification thus provides a country with the security and reliability that it

needs, so that should one economic revenue stream fail, it has several other options for revenue. The Sustainable Development Goals (SDGs) recognise the significance of economic diversification in the process of development. Ipso facto, Goals 8 and 9 capture it to the extent that they are intended to “promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”.

4.4. Sustainability

Sustainability is distilled from the Latin word “Sustinere”, meaning to sustain, maintain, support, uphold or endure. It is the ultimate ambition of most systems. Sustainability implies futurity and the ability to continue, be firmly supported or upheld, especially for a reasonable or long time or indefinitely. It can also be described as a long-term capacity to endure. The organizing principle of sustainability is what is referred to as “Sustainable Development” in development theories and studies.

4.5. Conceptualising Sustainable Development (Global Goals)

Development is a continuous process, a means as well as an end. In terms of definition, it is multidimensional, multifaceted and ramifying. Rodney (1972) posits that development implies increased skills, capacity, greater freedom, creativity, self-discipline, responsibility and material well-being. Desai and Potter (2008) support Rodney’s view of development to the extent that any true meaning of development must reflect three basic components or core values, such as life sustenance (the provision of basic needs like housing, clothing, food and minimum education). Others are self-esteem, suggesting a feeling of self-respect and independence and freedom which is the ability of people to determine their own destiny. Other basic needs that must be realized include security, welfare, identity and freedom needs, health, education; employment, income and economic, social participation, environmental and justice needs (Kalagbor, 2004). To buttress this, Angaye (1995) stresses that:

development should be seen as improvement in the material, physical, mental, spiritual, and real moral quality of life resulting from rising incomes, the reduction or eradication of poverty, unemployment, unjustified inequalities; the provision of better food, shelter, health, education, and protection; high self-esteem or respect, increased freedom of choice and ability to determine one’s destiny. Consequently, development can be social, economic, physical, educational, political, etc.

According to Ake (2001), development is “the process by which the people create and recreate themselves and their life circumstances to realize higher levels of civilization in accordance with their own choices and values.” As a matter of fact, man is the active agent and ultimate beneficiary of every true development. True development begins and ends with man. Every true development must be sustainable. That is, it must “meet the needs of the present generation without compromising the ability of future generations to meet their own need”, as stated in the Brundtland Report of the World Commission on Environment and Development (WCED) (Worika, 2002). It involves development that is devoid of the depletion of natural resources. The four pillars of sustainable development are economic sustainability, which aims at reducing extreme poverty and guaranteeing fair-paid employment opportunities for all; social sustainability, which ensures access to basic resources and services and strengthens social cohesion and stability among social groups, and environmental sustainability which emphasizes protection of the environment and limit the impact of human activities on the environment. To this end, sustainable development is development that is economically efficient, ecologically enduring and socially equitable. The fourth pillar of sustainable development is human sustainability—the ability to maintain and improve human capital in society.

To confirm the indispensability of man as the nexus of development, The Report of the South Commission (1993) provides that:

But a nation is its people. Development has, therefore, to be an effort of, by and for the people. True development has to be people-oriented. It has to be directed at the fulfilment of human potentials and the improvement of the social and economic well-being of the people. And it has to be designed to secure what the people themselves perceive to be their social and economic interests. Its first objective must be to end poverty, provide productive employment and satisfy basic needs of the people... this implies that basic goods and health facilities and clean water must be accessible to all.

Development should also strive for qualitative improvement of physical phenomena and the environment; production, distribution, exchange, administrative, managerial and educational processes, procedures and outputs, etc. In addition, Ogbam-Iyam (2021) submits that the “knowledge of science and technology and their applications are at the base and driving for development. A social production with a low level of knowledge and application of science and technology often produces a weak economy of poverty and primitive politics”.

4.6. Education for Sustainability (EFS) or Education for Sustainable Development (ESD)?

Education for sustainable development constitutes a key element of quality education. Education for sustainability means “a transformative learning process that equips students, teachers and the school system with the new knowledge and ways of thinking we need to achieve economic prosperity and responsible citizenship while reforming the health of the living systems upon which our lives depend”(Cloud, 2014).

Sterling (2001) prefers the term “sustainable education” to mean a change of educational culture, one that develops and embodies the theory and practice of sustainability in a way that is critically aware. It is, therefore, a transformative paradigm which values, sustains and realises human potential in relation to the need to attain and sustain social, economic and ecological wellbeing, recognizing that they must be part of the same dynamic. Sterling further argues that sustainable education must also involve cultural shifts, systematic change in thinking and practice which implies four (4) descriptors:

- Sustaining: sustains people, communities and ecosystems
- Tenable: ethically defensible, works with integrity, justice, respect, and inclusiveness
- Healthy: it is a viable system, embodying and nurturing healthy relationships and emergence at different system levels.
- Durable: it is practicable and enduring.

According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), Education for Sustainable Development (ESD): is a learning process (or approach to teaching) based on the ideals and principles that underlie sustainability and is concerned with all levels and types of learning to provide quality education and foster sustainable human development—learning to know, learning to be, learning to live together, learning to do and learning to transform one’s self and society. For the first time, the Earth Summit held in Rio de Janeiro in 1992 to address issues of sustainable development paid special and specific attention to the educational system. Essentially, Chapter 36 of Agenda 21 of the Rio Declaration on sustainable development in the context of education made reference to four (4) fundamental issues, namely:

1. Improve basic education.
2. Reorient existing education to address sustainable development.
3. Develop public understanding and awareness.
4. Training

Ollor (2010) argues that education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both locally and globally, that will improve quality of life without damaging the planet for the future. He maintains that the fundamental principles of sustainable development not only involve a process with socio-economic, ethical and environmental dimensions, sustainable development aims at optimal realization of a society's diverse socio-economic, environmental objectives at the same time. There is a clear distinction between "education about sustainable development" and "education for sustainable development."

McKeon (2002) has argued that whereas the former is concerned with the theoretical aspects, the latter is seen as an indispensable and practical tool for the realization of sustainability. Education for sustainable development permits every individual access to acquire knowledge, skills, values, attitudinal and behavioural patterns relevant to determining, defining, and shaping a sustainable future intended to accomplish individual and collective interests and aspirations. It promotes competencies like critical thinking, imaging future scenarios and making decisions in a collaborative way. It calls for the inclusion of principal sustainable development issue areas and agenda items into the teaching-learning curricula of the education system at all levels. Prominent among such areas and items are:

- Climate change education
- Poverty reduction measures
- Biodiversity
- Disaster risk reduction
- Sustainable consumption
- Gender Equality
- Peace and Human Security
- Cultural Diversity
- Health Promotion
- Water
- Sustainable Urbanization, etc.

ESD adopts interdisciplinary, effective and participatory teaching and learning methods that not only act as active motivating forces, but also empower pupils and students to radically change their attitudes, imbibe virtues and take positive actions for the actualization of sustainable development goals. Taking into account its importance, The Millennium Development Goals (MDGs) adopted by United Nations from 2000 – 2015 were largely framed to realize education for sustainable development, namely:

- to eradicate extreme poverty and hunger
- to achieve universal primary education
- to promote gender equality and empower women
- to reduce child mortality
- to improve maternal health
- to combat HIV/AIDs, malaria and other diseases
- to ensure environmental sustainability
- to establish a global partnership for development.

Similarly, the Sustainable Development Goals (SDGs), which replaced the MDGs also adopted by the United Nations in September, 2015, have projected another fifteen years (2015-2030). It contains seventeen (17) goals and 169 targets. The 17 goals are:

1. No poverty
2. Zero Hunger
3. Good health and well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy

8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Land
15. Life on Water
16. Peace, Justice and Strong Institutions
17. Partnership for the Goals.

5. Economic Diversification and Sustainable Development (Sustainability): Redefining, Revisiting and Re-examining the Mandate of Polytechnic Education or Repositioning and Strengthening Polytechnic Education?

Fujio Mitarai, the successful Japanese entrepreneur and Chief Executive Officer of Canon Company, is of the view that “diversification and globalization are the keys to the future”. Polytechnic education remains the most viable, reliable, functional and effective channel or route to actualise the goals of economic diversification and sustainable development the world over. Thus, the critical question that comes to the fore at this point is: how can the full realization of the mandate of polytechnic education through the generation and proper utilization of the requisite manpower imbued with relevant knowledge, skills, and competencies facilitate economic diversification and sustainable development in Nigeria? This question will be answered and analysed with reference to the relevant provisions of the Federal Polytechnic (Amendment) Act 2019; experiences and lessons from Germany, China, and the Asian Tigers; and the NBTE advocacy slogan, “Skills, not Degrees”.

5.1. Federal Polytechnic (Amendment) Act, 2019

Without any intention whatsoever to ascribe any form of finality to the need to continuously redefine the mandate of polytechnic education in Nigeria as the need arises, the Federal Polytechnic (Amendment) Act, 2019, which has been domesticated by some states, has not only redefined but reinforced the mandate and relevance of polytechnic education as well as repositioned the capacities of polytechnics to facilitate the development of the people and the country. The most important innovation introduced by the Act that is relevant to this paper can be located in Section 2(a). Accordingly, it provides that the functions of the polytechnic shall be to provide full-time and part-time courses of instruction and training to produce middle- and high-level manpower in technology, applied sciences, commerce, management and other fields of applied learning relevant to the development of Nigeria. This provision has added vigor, more value and impetus to polytechnic education, thereby enhancing its relevance especially in terms of producing the high quality manpower necessary for technological revolution and development. To uphold the relevance of polytechnic education as a major means of diversifying Nigeria’s present ailing economy for economic recovery and transformation, the Federal Government under President Bola Ahmed Tinubu, according to the Executive Secretary of the National Board for Technical Education (NBTE), Prof. Idris Bugaje, has made Technical and Vocational Education and Training (TVET) the fourth pillar in the policy document of the administration. No wonder Onodugo, Amajuri and Nwuba (2015) noted that “diversification is driven by human capital development which is the starting point, driving force and sustaining force”.

5.2. Experiences and Lessons from Germany, China and the Asian Tigers

Experiences and lessons derived from Germany show that Germany has one of the highest concentrations of technical manpower in the world today, primarily because of the special attention and priority given to technology education. Similarly, in 2014, China announced a major education reform through “gradual transition” intended to convert six hundred (600) universities to institutions of applied learning or polytechnics. This was intended to produce more technically trained manpower particularly engineers, senior technicians and other highly skilled workers needed at the production line. Also, the Asian economic miracle of the 1980s to the 1990s was said to have been facilitated by an educated population possessing the right skills set required by the industry. In fact, it

is striking to note that aside from industrialization, agricultural revolution and export, foreign trade and investment, etc; education and technology played very significant roles in the “Asian miracle” characterized by rapid economic development of the “Asian Tigers” – South Korea, Hong Kong, Taiwan and Singapore in less than forty years. The highly skilled and technologically educated population was responsible for the huge success recorded in the production and exportation of high-tech goods, including software and electronics. The emergence of South Korea’s Samsung, LG, Kia, and Hyundai electronics, computers and vehicles, etc; speak volumes. Like South Korea, Taiwan also invested heavily in technology education and used her skilled students to achieve extraordinary technological breakthrough in the production of computer hardware, software and solar power, etc. Singapore also encouraged skills development by establishing many technical schools and engaged the services of international corporations to train and upskill and reskill her unskilled labour in information technology, electronics, etc. In Taiwan, there was also very strong funding and support for technical and vocational education. Agba and Ozor (2018) captures the scenario thus:

... one of the major factors as observed in the development stages of the Tigers was the emergence of the educated class that has a mastery over technology.... Education in particular is cited as playing a major role in the mastery of technology... allowed for high levels of literacy cognitive skills and highly productive labour force.

Another significant provision of the Federal Polytechnic (Amendment) Act, 2019, is the extension of the length of service of both teaching and non-teaching staff of the polytechnics to the statutory retirement age of sixty-five (65) years. In fact, S. 14(4) of the Act provides that “notwithstanding anything to the contrary contained in the Pension Reform Act, the compulsory retirement age of staff of polytechnics shall be 65 years”. The implication of this particular provision is that it allows or enables qualified, competent and experienced staff of the polytechnics more time to meaningfully contribute to teaching, research and community service, with the overall outcome of producing more skilled manpower to drive socio-economic and political development in the country.

Furthermore, S.82(2) (a)(i) of the Act makes provision to the effect that only a Chief Lecturer in the polytechnic system or sector is eligible for appointment into the office of the Rector of a polytechnic. Although some state-owned and private polytechnics are yet to domesticate and adopt the provision, it has gone a great distance to fortify and ensure good corporate management and administration of polytechnics by persons who have the interest, relevant qualifications, knowledge, experience, exposure and passion for polytechnic education, thereby guaranteeing the stability of the institutional leadership of the polytechnics. This provision of the Act was given judicial credence and endorsement by the National Industrial Court of Nigeria (NICN), following the nullification of the appointment of five (5) rectors of federal polytechnics appointed by the former President of the country Muhammadu Buhari, in 2022 in contravention of the provision of the Act.

5.3. NBTE Skills Advocacy Slogan, “Skills, not Degrees”

The adoption of the skills advocacy slogan “Skills, not Degrees” by the National Board for Technical Education (NBTE) marks a fundamental paradigm shift in an attempt to deliberately reawaken the consciousness and awareness of Nigerians in general and participants and stakeholders in the polytechnic sector in particular of the indispensability and centrality of skilled manpower as a core mandate in the provision of polytechnic education in the country. The NBTE, as the supervisor and regulator of polytechnics and polytechnic education in Nigeria, has used the slogan to refocus the attention of the government, managers and operators of the polytechnics to pay greater attention to the promotion and acquisition of problem-solving, business, scientific and technical skills by polytechnic students and graduates. A former Executive Secretary of NBTE, Kazaure (2021), contends that:

as Nigeria aspires to become a major player in the world economy, it is very clear that the most crucial vehicle for attaining such ambitious goal apart from power infrastructure, is a skilled and competent workforce. This is necessary for the effective implementation of national development projects and for attracting necessary international investments especially hi-tech industries (p. 255).

Practical skills have to do with the ability of a person to use one's knowledge to perform a given job, task or activity. They can be acquired and developed through formal education as provided by the polytechnics, especially in terms of on-the-job training, apprenticeships and experience. Skills are generally targeted at solving specific problems. It is important to emphasize that degrees are important only to the extent that they confer academic or theoretical knowledge and problem-solving (practical) skills on the holders. Unlike degrees, skills focus on the practical ability to solve a particular problem(s) or perform specific assignment(s) or task(s). Polytechnic education provides such problem-solving and employability skills, especially the technical variant, that are necessary for creativity, innovation, self-employment, self-reliance and promotion of entrepreneurship, which are imperatives for economic diversification and sustainable development. Essentially, technical skills require the use of tools, instruments and technologies by technicians, technologists and other professionals. They refer to sets of abilities or practical knowledge applied to execute practical tasks chiefly in the applied sciences, engineering, arts, commerce, management and other fields of applied learning aimed at stimulating economic growth and sustainable development.

NICEF, UNICEF and WHO have identified ten (10) life skills, strategies and techniques, to wit:

- Problem-solving skills
- Critical thinking skills
- Effective communication skills
- Decision-making skills
- Creative thinking skills
- Interpersonal relationship skills
- Self-awareness building skills
- Empathy skills – ability to understand, identify and care about other people's needs, problems or concerns
- Stress-coping or management skills; and
- Emotion management skills

According to the current Executive Secretary of the NBTE, Prof. Bugaje, the Board's slogan "Skills, not Degrees" is to encourage Nigerian youths to focus more on acquiring skills than certificates and not discredit university degrees and certificates. He argues that a person who has a skill without even a degree can find a very good job, but a person who has a degree without skills may find it difficult to get a job. He recommends skill acquisition programmes to polytechnics, colleges of education and university graduates to complement their diploma and degree certificates. This is because skills have become the global labour currency of the 21st-century economies and the future of sustainable employment (Bugaje,2021). Over the years, the polytechnics have placed emphasis on the "technical" aspect of their training with respect to TVET and neglected the vocational component.

In order to fill the gap, the NBTE, in a bid to ingrain vocational training in the polytechnic graduates to acquire complete and relevant set skills that will enhance their employability and make them more relevant to society, has directed all polytechnics to establish Skills Development Centres (SDCs) for the purpose of adopting National Skills Qualification (NSQ) training. One major advantage of this innovation is that it will reinforce polytechnic-industry relationship, partnerships and collaborations, especially by way of opening the doors of the polytechnics for training of the informal sector and "offering dual awards of National Diplomas and National Skills Qualifications (NSQ)" (Guidelines and Structure of Skills Development Centre in Polytechnics, 2023). To further boost this effort, the NBTE has approved the integration of the establishment of skills development centres as an integral part of the accreditation of programmes of the polytechnics. The Board has equally given 2023 as the deadline for all polytechnics in the country to establish well-equipped and functional skills development centres and that at the expiration of the deadline, polytechnics that did not comply with the directive will no longer be visited by the Board for accreditation. The Tertiary Education Trust Fund (TETFUND), on its part, beginning from 2023, has incorporated the provision of equipment and other facilities in the beneficiary polytechnics Skills Development Centre by using the yearly zonal interventions.

5.4. Challenges of Polytechnic Education: A Brief

There is an avalanche of literature by many scholars and public commentators on the challenges militating against the actualisation of the full mandate of polytechnic education in the country. Prominent among such challenges are poor funding and inadequate infrastructure, outdated curriculum, discrimination against polytechnic graduates which is popularly referred to as the B.Sc./HND dichotomy and politicization of the appointment of polytechnic rectors. Although the appointment debacle has been very much addressed by the Federal Polytechnic (Amendment) Act 2019. Others are the non-establishment of the National Polytechnics Commission to specifically regulate and supervise the programmes and activities of the polytechnics as is the case with the National Universities Commission (NUC) and the National Colleges of Education Commission (NCCE); weak polytechnic-industry linkages; corruption; shortage of vocational and technical teachers and training resources; incessant strike actions by staff of polytechnics; poor remuneration; and non-payment of arrears of salaries of staff, especially in some state-owned polytechnics. Furthermore, irregular professional/capacity-building training of staff and the obsolete, inadequate or absence of modern workshops, laboratories and laboratory equipment, and library resources to teach and train learners/students in order to fully discharge the mandate of polytechnic education and deliver the associated benefits for economic diversification and sustainable development of Nigeria are common in the polytechnic sector. (Obasi, 2011; Raji, Raji, Salihu, & Lawal, 2015; Epelle, Harry & Inikoba, 2023).

5.5. Contributions of Polytechnic Education to National Development: A Synopsis

Despite the multidimensional, hydra-headed, and daunting challenges confronting polytechnics in particular and polytechnic education in general in the country, there is visible evidence of the significant contributions of polytechnic education to national development. Some of the notable strides achieved will include the generation of human resources or manpower through the graduation of National Diploma (ND) and Higher National Diploma (HND) graduates who are self-employed or are productively engaged either in the public or private sectors of the economy or in the diaspora. Others are fabrication of equipment, especially prototypes; engagement in agricultural support programmes and production; organization of public enlightenment, education and sensitization using advocacy programmes; organisation and facilitation of local, national and international seminars, conferences and workshops. Furthermore, polytechnic education has contributed to the promotion of research, scholarship and community service, skills exhibitions, continuous human capacity development and professional training of staff of polytechnics for increased productivity etc. (Epelle, Harry & Inokoba, 2023; Obasi, 2011).

6. Conclusions

There is no gainsaying the truism that repositioning and strengthening polytechnic education rather than redefining its mandate constitutes a critical success factor in the conscious attempt and process of achieving genuine economic diversification of Nigeria's ailing economy in order to ensure sustainable national development. Whereas it cannot be denied that it may be necessary in the future to redefine the mandate of polytechnic education as the need arises, the Federal Polytechnic (Amendment) Act, 2019, despite its pitfalls and inadequacies, has made far-reaching provisions capable of reengineering economic diversification and enduring transformation of the country, especially with regard to the core mandate of providing full-time or part-time courses of instruction and training to produce middle- and high-level manpower in technology, applied science, commerce and management, among others. What is needed is for all state-owned polytechnics to domesticate the provisions of the Act and for private polytechnics to also adopt the same to guarantee uniformity and standardization of the mandate. What is more, the government requires a determined and committed political leadership and will to address the various challenges plaguing the actualization of the full mandate of polytechnic education in the country. All stakeholders and actors must forge closer and more harmonious synergy to accomplish this inevitable task. This is particularly against the backdrop of the fact that without putting Nigeria's polytechnic education on the path of stability, progress and prosperity, growing the economy through multiple production lines in order to improve the quality and existential conditions of living of Nigerians may be elusive.

This makes the production of individuals with the relevant skills set (skills development), which is one of the major mandates of polytechnic education, a desideratum and indispensable. As Fredrick Harbison aptly noted: "clearly, a country that is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to deliver anything else".

Okoye, Okaro, Egbunike and Obodo (2021) have succinctly summarised and captured the indispensability of polytechnic education vis-à-vis economic diversification and sustainable development as follows:

Polytechnic and colleges of technology need to be refocused to accomplish the task of producing competent technicians and skilled labour upon which manufacturing and industrial activities depend. The current national cacophony which seeks to blur the distinction between polytechnics and universities is definitely in the national interest. Technical and vocational education must be given a pride of place, and a reward system that will attract and retain the interest of young people. An educational system that majors in the production of liberal arts, science and theoretical engineering graduates holds the nation's economy in perpetual subjection to foreign interest (p. 1358).

In the final analysis, skills development through polytechnic education and effective application are the global dictates, contemporary trend, and the pathway that can guarantee holistic diversification of Nigeria's economy for genuine revivification, sustainable development and self-reliance.

7. Recommendations

In light of the foregoing, the ensuing recommendations are considered appropriate and are hereby made:

1. The government should increase the funding of polytechnic education by allocating annual special grants to the polytechnics, especially for the purpose of upgrading and providing modern teaching/learning facilities, workshops, laboratories, etc., and other resources. The indication that the present Federal Government will, with effect from 2024, review upward the budgetary allocation to the education sector to at least 25% of the UNICEF recommended benchmark of 26% of the total annual budget as announced by the Minister of Education, Professor Tahir Mammam is cheering and commendable.
2. There is an urgent need to amend the existing law establishing the Tertiary Education Trust Fund (TETFUND) in order to increase the yearly intervention allocation to the polytechnics. The current sharing formula or ratio of allocation to beneficiary institutions on the basis of 2:1:1, that is, 50% to universities, 25% to polytechnics and 25% to colleges of education needs to be revisited and reviewed in favour of the polytechnics.
3. The organised private sector should be encouraged by government to support the development of polytechnic education through, among others, the provision of research grants and learning/teaching facilities to polytechnics, expansion of polytechnic-industry (Town-Gown) linkages, partnerships and collaboration, especially in terms of skills development. This will bridge the gap between theoretical knowledge and practical application.
4. The Federal Government should, through the President, expeditiously sign into law the bill seeking to remove the dichotomy/discrimination between HND/B.Sc. graduates in employment in order to attract more persons (youths) to enrol in polytechnics.
5. The Federal Polytechnic (Amendment) Act, 2019, should be amended to, inter alia include representatives of the National Board for Technical Education (NBTE) in the Governing Councils of Polytechnics. As the supervisory and regulatory agency of the polytechnics, this will afford the Board an opportunity to provide useful inputs and advice in the management of the polytechnics in particular and the development of polytechnic education in general.
6. More than ever before, the National Polytechnic Commission (NPC) should be inaugurated by the Federal Government to provide the needed impetus and special attention to polytechnic education.
7. The polytechnics should be encouraged and supported to enhance their skills-building capacities by laying much emphasis on the promotion of the vocational component of the polytechnic education which has over the years been neglected.
8. Skills Development Centres (SDCs) should be established in all polytechnics as directed by the National Board for Technical Education (NBTE), adequately equipped and made functional in order to reduce skills shortages in the country, create a more skilled and diverse workforce, enhance their practical

experience, employability and productivity. In other words, this has the potential to increase the skills level of polytechnic graduates, inspire confidence in them and increase their prospects of gaining employment globally (labour mobility). This is paramount because technical, vocational and professional skills are at the core and substructure (foundation) of improving employment opportunities and increasing the chances and success of economic diversification, growth and sustainable development in Nigeria. Moreso, since the focal point of polytechnic education is practical exercises and the acquisition of life-changing skills; the TETFUND has the capacity to and should finance the establishment of the SDCs in the polytechnics.

9. The National Board for Technical Education (NBTE) should continuously review and refocus the curriculum of polytechnic education more on skills development and align the curriculum with the need of the industries and the job market.
10. The NBTE should provide more support for and make entrepreneurship a major component of the curriculum of polytechnic education mandatory for all students to help drive creativity, innovation, productivity, self-employment, self-reliance, economic growth and sustainable development. This will make every polytechnic strive to become an “Entrepreneurship Polytechnic” and cultivate a culture of entrepreneurship among students.
11. Continuous teachers’ capacity development and training should be vigorously pursued to improve polytechnic teacher quality and professional development for effective delivery and performance.
12. Given the parlous state of Nigeria’s economy and the astronomical increase in the prices of goods and services, there is a need for a constant and upward review of the salaries of the polytechnic workers and a general improvement in the terms and conditions of their employment. This will act as a motivation for higher productivity, discourage brain drain and ensure teaching staff retention in the polytechnic system.
13. Aggressive public enlightenment, using various media education and advocacy programmes and platforms on the need for parents to encourage their children/wards and youths to embrace polytechnic education because this is the global trend and the right way to go.
14. Polytechnics should foster a culture of innovation and applied research and development, capable of generating new knowledge, technologies and inventions to address local socio-economic challenges to stimulate economic growth.
15. Technology incubation centres should be established in all polytechnics to encourage entrepreneurship, enable students transform their innovation into viable business propositions, promote technology transfer, commercialize research findings and help start-up businesses effectively take off and stabilize, thereby further diversifying the economy.

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