

The Role of Applied Sciences in Meeting the Challenges of Sustainable National Development Through Polytechnic Education in the 21st Century

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Abstract

While the nation is currently facing crises ranging from national inequality, complex economic turbulence to large-scale migration as a consequence of under development, war and terrorism. The 21st century has also seen strong signs of cooperation and shared responsibility. Sustainable development and the move towards decarbonization both require a transformation agenda. Similarly, in the world of science, concepts such as transdisciplinarity and co-creation are gaining ground. Challenged to provide answers to some of the world's biggest societal problems, the scientific community has consistently delivered exciting and solid information that is often used to assess situation in the nation on possible development scenarios. More science base information is ideally coordinated at the nation scale to inform sustainable development strategies to counter balance these developments. Polytechnic education is considered here both as the process and as the result of mastering the systematized knowledge of the general scientific bases of modern production, development of skills and abilities, required to work with typical labour instruments spread in different branches. Due to its practical focus associated with individual disciplines; scientific knowledge is been transferred into the physical environment in order to help technological progress. This application of existing scientific knowledge has invested using both biological and statistical method.

The nation is faced with challenges in three dimensions of sustainable development-economic, social and environmental. More than 1 billion of people are still living in extreme poverty and income inequality within and among many countries has been rising; at the same time, unsustainable consumption and protection patterns have resulted in huge economic and social costs and may endanger life on the planet. However, sustainable development is a phrase we hear thrown around from time to time in order to underline our ideal vision of the future-rid of all the problem that the inhabitants of the earth tackle to day. It is a long-term solution to how we plan our indefinite progress in the future without causing damage to the environment so as to guarantee a safe habitat for the next generation, who will continue to develop their economies, societies and care for the environment with a similar ideal in mind.

It is important to note that the Nation, Nigeria for example may be developed but that doesn't necessarily imply that they are sustainable and for this, the main goal is to rid societal issues. Lack of financial resources to carry out planned target, natural occurrences such as flood can pose a threat to sustainability, governmental conflict between immediate profit and investment towards sustainable technologies, lack of efforts at a municipal level are all treats or challenges of sustainable development in the Nation.

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While the Nation is currently facing many challenges and crises ranging from National inequality, complex economic turbulence to large-scale migration as a consequence of underdevelopment, war and terrorism, 21st century has also seen strong signs of cooperation and shared responsibility. Sustainable development and the move towards decarbonization both require a transformation agenda [1]. Similarly, in the world of science, concepts and perspectives such as transdisciplarity and co-creation are gaining ground. Challenged to provide answers to some of the world's biggest societal and environmental problems, the scientific community has consistently delivered exciting and solid information that is often used to assess the situation in many different parts of the globe, to document the anthropogenic cause of environmental changes and to provide perspectives on possible development scenarios [2]. The society that faced growing number of challenges which include, finding ways to address climate changes, achieve food security, counteract the scarcity of raw materials and maintain and improve public health [3]. Rapid growth of the Nation's population, increasing affluence and an ageing population are all factors that contribute to these challenges. More science base information is ideally coordinated at the nation scale to inform sustainable development strategies to counter balance these developments especially considering the increasing complexity of decision making related to national and regional agreements [4].

The nation is expected to generate knowledge that will enable societies worldwide to deal effectively with the challenges of nation environment change. In this view, applied science in polytechnic educational system has come to stay.

Polytechnic Education is one out of the three aims of tertiary education in Nigeria charged with the primary responsibility of producing technique manpower needed for industrial growth.

Polytechnic education is considered here both as the process and as the result of mastering the systematized knowledge of the general scientific bases of modern production, development of skills and abilities, required to work with typical (available) labour instruments spread in different branches [5,6]. The aim of establishing polytechnics in the nation is to train technologists, technicians and management skills in courses leading to the awards of certificate, National Diploma (ND), Higher National Diploma (HND) and advanced professional diploma which are relevant to the needs, aspirations and the development of the national diverse economy and industries. The concept of Applied Science in Polytechnic educational system has remained a vision to provide first rate academic, professional and entrepreneurial education to student who are to be empowered to make a positive impact in the technological industrial and socio-economic development of the country. It also further continues to expand and pursue the objectives of technical and vocational education and training in Nigeria [7].

Applied science is an application of existing scientific knowledge that accesses and uses accumulated theories, knowledge, methods and techniques for a particular

driven purpose [8]. Due to its practical focus associated with individual disciplines, scientific knowledge is been transferred into the physical environment in order to help technological progress [9].

As a knowledge society, we necessarily rely on scientific research, depending on the knowledge, the expertise and the reflexivity that the sciences and humanities have to offer. That said, the growing importance of scholarly knowledge in respect to sustainable development has at least two important implications for the scientific and scholarly Endeavour themselves. First, it affects the concepts of the sciences, social sciences and humanities of what they are, of what they ought to do, and of the ways in which they should be organized. This leads to the questions of "what kind of research do we need in order to meet the challenges of climate change and National sustainability? And how should we organize our research systems to be able to live up to those challenges?". This new, unpredictable knowledge creates the real transformative breakthroughs that change the ways of society's thinking and acting bearing in mind that scholarly knowledge can help to formulate, question or criticize competing knowledge claims. Rapid advances in science has best achieved an integrated, cross-sectional and engaging scientific agenda that connects upstream fundamental research with solution-oriented research. Science as a continuous learning process has played pivotal roles in terms of data, analysis and scenario building. Research has helped create a better understanding of the linkages and possible impacts of human development on a regional and National level.

It is clear in this day and age that there is a widespread interest in polytechnics, this is exemplified very clearly by the rapid growth of Polytechnics in the Nation [10]. The goals pursuit by the national policy on education include teaching, research and development giving access to training funds such as those provided by the Industrial Training Fund (ITF), Students Industrial Work Experience Scheme (SIWES). Research conducted are speculative and imaginative and accumulate knowledge and ideas for the benefit of society [11]. The 20th Century was termed the Industrial decade for the Nation because the implications of new technologies which became available and their implementation was expected to have considerable impact in up-grading traditional was expecting to have recently transferred technologies [12]. The role of Technology in industrial and economic development is enormous as it not only prescribes the machines, fabrications, and production processes but is also concerned with the management of the resources and the balancing of the multi-various constraints of the industrial environment.

Sustainable development has become an important concern for scientists and researchers. Around the Nation, they work broadly and intensely on questions of sustainability, for example, developing new crops that enable rural societies to shake off the yoke of famine or exploring new ways to improve energy efficiency. For applied science to be achieved, it is focused on knowledge - Action Networks where Natural scientists collaborate

with social scientists and experts in the law and humanities. Through this collaboration in knowledge–Action Networks, scientific knowledge has been able to produce solutions [13]. There has also been strong knowledge partnership where equal weight is given to academics, decision-makers, practitioners, business leaders, civil society and others to implement effective information and solutions about sustainability. These Networks provide an ideal platform for scientific capacity building and knowledge exchange across regions and international borders. The challenges facing the Nation and its inhabitants are complex and do not respect the boundaries of traditional scientific disciplines. The knowledge action Networks bring together scientists from across disciplines because fostering National sustainability requires an understanding of how human societies function and how behaviors can change. Various branches of Applied sciences include the Engineering fields. Example, thermodynamics, heat transfer, fluid mechanics, earth sciences, electromagnetism, engineering physics, statics, dynamic, mechanics of materials etc, [14]. Medical sciences, for instance medical microbiology and clinical virology are sciences that apply biology towards medical knowledge and inventions but not necessarily medical technology whose development is more specifically biomedicine or biomedical engineering. Those applied sciences imply a suite of vocational science qualifications which examples have been stated above [15]. These courses regularly come under scrutiny, [7] related to formal sciences connecting each other to develop new efficient techniques that can be applied in various domains. For this reason, to achieve and secure steady development, new alternatives and innovations in the technological industry are essential.

The public health system has also benefited by many improvements due to this embrace of science: Healthcare science set on the base of applied science and on natural and formal science. Important information has been discovered and efficient technology has been developed to serve the public. The probability theory considered to be formal science is used in genetic epidemiology which is an applied science. Based on scientific knowledge that has been transferred in to the physical environment, tools for research and development as well as in applied mathematics, applied physics and computer science is a method used by physicians to diagnose and treat illness. Another pathway has been devised that excludes nuclear power and carbon capture and storage (and its bioengineering variants), technologies that face great socio-political and technical challenges [16]. Factor to consider is that production of technological goods has become incredibly difficult. Changes in consumption patterns have driven the creation of new technologies necessary for sustainability and their adoption and diffusion at the desired place in reorienting food consumption towards diets that are less resource intensive and more nutritious [17]. Nutrition and health are inextricable, as a good nutritional status can be achieved only within the context of overall conditions of good health. In the past, access to basic health services is often inadequate owing to an insufficient number of health centers and qualified personnel. Inculcating basic knowledge of good nutrition including family nutrition

practices in primary and secondary schools has helped individuals make informed dietary choices [18].

Without proper development of Technology, the Nation cannot expect to effectively develop its economy, infrastructure or improve the standard of living of its people. Sustainable development of cities entails investment in infrastructure such as roads, waters, sewers, electricity and services such as schools, public transportation and healthcare. Leapfrogging investment in a green industrial transformation has generated youth employment. All this and many more has applied science established in developing the Nation and it has become clear that science and Technology has from the priority of maintaining the economic, social and political crises in the country. This application of existing scientific knowledge has invested using both biological and statistical methods [19].

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