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Science and Technology for Sustainable Development of Nigeria

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Abstract
Science and technology is now an integral part of the different phases of the society. The concepts of science and technology are key variables for sustainable development in the modern society. The paper encapsulates the roles played by both science and technology to the advancement of man and the modern society. It also highlighted the connection between science and technology in societal development. It is therefore concluded that science and technology are integral factors for sustaining development from generations to generations in the modern society. Thus, the researcher recommended Government commitment to promote scientific and technological advancement studies in Nigeria at regular basis.

Keywords*: Science, Technology, Sustainable Development, Scientific knowledge, Technology advancement.*

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I. INTRODUCTION

Science and technology are modernization variables of the current society. It is through scientific and technological knowledge and advancements, Engineers and technologists comprising the skilled manpower of the nation are important links which convert planning into reality. The scientific and technical knowledge has doubled in a very short span of human history and the knowledge is multiplying at much faster rate than ever before. Therefore, for any society to survive it has to keep pace with science with advancing technology and that is possible only through scientific and technical Education and Research, the society becomes more sustainable.

Generally, science and technology education, scientists, technologists and engineers working in both public and private sector and in government organizations may have to replan their priority to meet the demands of the nation's population in the year 2000 A.D till now. The emphasis in 2000 A D was on rural development and fulfilling the social and environmental requirements of urban areas. In the year 2000 A.D, we had the problem of population explosion, shortage of known materials, shortage of non-renewable resources and knowledge explosion. What is up-to-date technology today, will be an obsolete technology in the near future. The present changing social, political, cultural and industrial climate is now advanced with more complex and greater scientific and advanced technological inventions in this 21st century.

With the introduction of science and technology in the modern society, many developed countries including USA, China, Russia, Germany have a lot of scientific and technological advanced inventions which made their nations development more sustainable. To be precise, the developing nations like Nigeria and others should follow suit, so as to have and enjoy sustainable development within their environment more socially, politically, economically, scientifically, technologically and otherwise.

CONCEPTUAL CLARIFICATIONS

Under the heading, the following concepts will be clarified as:

(a) **SCIENCE**

Generally, science could be summarized as a changing body of systematized knowledge, which involves theories, laws, principles, concepts and facts that are discovered by scientific processes and techniques. The contents of science are changing and results obtained from scientific findings should be provisional or tentative until proved to be substantive.

Another school of thought sees science as simply knowledge obtained by observations and testing of facts about the physical world.

(b) **TECHNOLOGY**

The word "Technology" originates from the Greek word technologia-techne which means "craft" and logia which is the study of something or the branch of knowledge of a discipline. As a cultural action, technology has been before Science and Engineering, every of them formalize certain areas of technological work. Technology began in human species, use due to the change of inherent resources to simple tools. The stone age detection of the capacity to regulate fire increased the available resources of food and the invention of the wheel helped humans in travelling in and controlling their environment.

In the recent time, technological developments comprising the printing press, the telephone and the internet, have alleviated physical obstacles to communication and permitted humans to interact freely on a global scene. Technology is otherwise the application of mathematics, science and the arts for the benefit of life as it is known. In technology, the scientific results and conclusions, are used to produce equipments, drugs, electrical appliances, automobiles, missiles etc. Gibbons (1996) as quoted in Owate 1 (1994) "the basis of any technological development is the scientific results and conclusion which are the consequences of the activities of the scientists".

Nevertheless, Clevand Leonard Summarized in a simple form the basic disparity between science and technology as shown in table below;

	Science		**Technology**
*	A field of knowledge, parts of which are unplotted	*	A problem-solving process
*	Not necessary concerned with improving the grade of life or coping with the environment	*	Concerned with helping people cope with their environment and raising /safeguarding the quality of life.
*	Divided into broad areas and specialism, physics, chemistry, biology etc.	*	Multi-disciplinary involving social science and pure science, economics, engineering etc.
*	Needs a high element of convergent thinking even at the frontiers.	*	Flourishes on divergent thinking while still needing convergent skills.
*	Constrained by bounds of the human mind and to some extent, by finance and technological knowledge	*	Constrained by scientific laws, economic policies, management principles, manpower resources etc.

Again, Parker built on their differences by clarifying that;

* Industry may create a range of problems for which basic science may not have an answer.
* Technology tends to be concerned with production problems of practice and not principles, which are highly detailed and specific to particular organizations.
* The procedure of technological development may be seek-feeding in the sense that having found a method that works, this may lead to further developments.
* Discoveries may not occur unless those concerned are conditioned in the particular problems and subjected to pressures to solve them.
* Basic research may not have the sufficient market orientation to perceive the need for commercial developments.

Price saw science and technology as belonging essentially to two separate worlds. He argues that the contact between them is spasmodic and occasional as technology has been feeding on itself for long periods without any major influence from science. He further argues that the "actors" associated with the two activities (science and technology) have different aims, while scientists are concerned with generating scientific knowledge and thereby gaining Kudos amongst their peers, engineers are concerned with patents and blue prints.

(c) **SUSTAINABLE DEVELOPMENT**

The terminology "sustainable development" was bred into general application by the World Commission on Environment and Development (The Brundtland Commission) in its seminar report "our Common World". The concept of keeping up the earth has demonstrated a strong metaphor in awakening public awareness and focusing on the necessity for better environmental stewardship. The Brundtland Commission defines sustainable development as "meeting the necessities of the present generation without compromising the necessities of the future generations" (World Development Report, 1992). Sustainable development is a multi-faceted development strategy that has a number of dimensions. The ultimate objective is to enhance the grade of life on earth while also conserving the vitality and diversity of the planet. The strategy serves as a guide to man's efforts at ensuring life in harmony with fellow man and with nature through a system of sharing with one

another, caring for the environment and seeking to take no more from nature than can be easily replenished (Uche, 1995).

Sustainable development is recognized as an essential requirement for achieving economic goals without degrading the environment, major problems arise in implementing the idea of sustainability. At the ultimate fundamental level, researchers dealing with sustainable development have suggested that the achievement of sustainability requires ecological sustainability, sustainable political and economic systems, organizations and individuals (Starik and Rands, 1995, Costanza and Daly, 1992, Gallup International Institute, 1992).

THE ROLE OF SCIENCE AND TECHNOLOGY IN ENHANCING SUSTAINABLE DEVELOPMENT IN NIGERIA.

The function of science and technology in sustainable development of Nigeria cannot be over emphasized. Science is simply the knowledge obtained by observation and testing the facts about the physical world while technology is the systematic knowledge of techniques of producing goods and services for mankind.

The function of science and technology has exposed health-based industries to apply scientific and technological knowledge to produce equipments, drugs, injections and other medicines for the sustainable health care development of Nigeria. For instance, scientists tested facts through observation and experimented the COVID 2019 vaccines and brought out in large quantities to all nations of the world for ensuring health sustainability.

Secondly, it is through the use of scientific and technological knowledge to practically reduce the heavy tasks in industries by producing robots instead of men for working much hours in one hour which invariably reduces the tension and stress of human labour in manufacturing industries, this virtually promotes humanity safety in the society. It is believed that the achievement of science and technology is measured only with the yardstick for the utility of their discoveries to the society and sustainable development is based on their principles and processes. All industries are firmly rooted in science and technology, hence most developed nations have various manufacturing industries. A nation with many industries of different types such as U.S.A, Japan, China, Germany, South Korea etc, are bound to have more people employed and the standard of living of the people will be relatively higher than those with fewer industries. In fact, current discoveries of scientists and technologists help to create new industries even in Nigeria like the Nigerian and African Richest man, Alhaji Alico Dangote who built the largest finery in Africa has employ almost thirty thousand Nigerian graduates. This has become new technology developed to sustain industrial development in Nigeria.

Science and Technology contacts with industries started efforts of inspired thinkers like Galileo and Newton which sparked off the first industrial Revolution (1750 -1850) which led to many inventions such as the steam engine. The achievement of science and technology in the first industrial revolution encouraged greater technological adaptation during the second Industrial Revolution (1850 -1914). During this period, industries were based on chemicals and electrical machinery. These industries originated from discoveries in chemistry and physics which formed the basis of the current technological industrial progress. Based on Engineering principles, this progress is evident in the manufacturing of Textiles, Agricultural Food Products and advancement in health services. Also, equipment and instruments for tackling the challenge of environmental degradation, exploration of space (star war), heart diseases, cancer and search for new energy sources were designed and produced in engineering industries.

Another area where Science and Technology has made much impact is in Mechanical engineering. A mechanical engineer is concerned with planning, designing and construction of automobiles and other Mechanical crafts to meet both industrial and social needs. Such as cars, space-crafts etc. Traditionally, mechanical engineers are regarded as the builders of modern industrialization.

Again, the Mechanical industry is another area where science and technology have greatly influenced the society. All aspect of mechanic technology can best be defined as the application of modern technologies to produce and control the mechanic explosion and produce mechanic crafts, power and energy for such transportation system sustainable in the society.

Some relevant impacts of science and technology is evidence in telecommunication, electronic, air-craft, industry, medicine, military weapons etc. However, the invention of television and sophisticated video films etc have influenced the present society by ensuring sustainable development.

II. CONCLUSION AND RECOMMENDATIONS.

The development of science and technology so far discussed has impacted the society in sustainable development to great extent. To be precise, the actual application of scientific and technological knowledge into the present society like Nigeria, perhaps has ensured sustainable development in almost all branches of the economy such as the science and the art of directing the great sources of power in nature for the use and convenience of man. In the early sixties, science was believed to have a linear simple relationship with technology with a simplistic model envisaged that successful technological innovation consists of a sequence of related steps; basic science, applied science, invention, economic growth and developed economy. This model is in fact, implemented by scientists and technologists in nations which will certainly ensure sustainable development in both developing and developed nations of the world.

The sustainable development of Nigeria will remain elusive unless the government at all levels are encouraged to steer the wheel of development. If properly harnessed the three tiers of government of Nigeria as well as NGOs can replicate modern science and technological development and advancement because we have the potentials. Then the political will should be provided through the legislative machinery of governments to advance science and technological inventions within Nigeria as well as pass a law to avert scientific and technological crime in Nigeria. Another recommendation is not only attributed to government but individuals and private organizations should encourage and promote science and technological inventions, thereby ensuring sustainable development of our dear Nigeria.

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