

USE OF ELECTRICAL SCIENCE AND TECHNOLOGY IN FOSTERING AGRICULTURAL ENGINEERING FOR ECONOMIC EMPOWERMENT IN POST COVID-19 PANDEMIC ERA IN NIGERIA

¹(Ifeanyichukwu, H.I, Department of Agriculture and Bio-Environmental Engineering Technology, School of Engineering Technology, Federal Polytechnic Oko Anambra State, Nigeria) Corresponding Author: hifeanyichukwu2016@gmail.com

²(Nwosu F. C., Department of Electrical/Electronic Engineering Federal Polytechnic Oko, Anambra State, Nigeria) jirebus@gmail.com

ABSTRACT: COVID-19 is a public health issue concerned with a disease that can retard economic development of a nation. A means for Nigeria to recover and sustain her economy in post COVID-19 pandemic era is fostering of agricultural engineering. Activities in agricultural engineering can be enhanced using electrical science and technology. The paper discussed on economic empowerment in post COVID-19 pandemic era in Nigeria through the use of electrical science and technology in fostering agricultural engineering. The content of the paper were: issue of COVID-19 era, desire for economic empowerment, role of agricultural engineering in economic empowerment in post COVID-19 era, impact of electrical science and technology in human society, value of electrical science and technology in promotion of agricultural engineering. The paper pointed out that electrical science and technology can bring about the utilization of computer, telecommunication, information technology and electrical power supply in provision of information and enhancement of productivity in agricultural engineering. It was pointed out that agricultural engineering is relevant in economic survival in post COVID-19 pandemic era in Nigeria for it can serve as a means for food supply, income generation, and provision of security. Recommendations and conclusion in the paper geared towards the application of electrical science and technology in promotion of agricultural engineering needed in fostering Nigeria economy in post COVID-19 pandemic era.

KEYWORDS: COVID-19 pandemic, electrical science and technology, agricultural engineering, economic empowerment

Date of Submission: 23-01-2021 Date of acceptance: 26-01-2021

I. INTRODUCTION

One remarkable event in the world in the year 2020 is the experiencing of the pandemic, corona virus also known as COVID-19. Pandemic is a public health issue and problem. It is an axiom that without good health, it is difficult or impossible for meaningful human activities to be carried out. Thus, the pandemic era has adverse effect in the economy of human society, especially that of a developing nation such as Nigeria.

Effort to achieve economic survival for national development in post COVID-19 pandemic era should be a major concern in Nigeria society. In a post COVID-19 pandemic era, there is an urgent need for Nigeria, as expected in other nations of the world, to focus and give serious attention on the various means to ensure economic recovery and sustainability. A means for Nigeria to survive the unpleasant nature of pandemic is tapping on the potential and value of agricultural engineering. Activities in agricultural engineering can be enhanced with the use of electrical science and technology.

This paper is a discussion on the utilization of electrical science and technology in promoting agricultural engineering for economic empowerment needed in overcoming the ill effects of COVID-19 in a post pandemic era in Nigeria. The content of the paper includes issue of COVID-19 era, desire for economic empowerment, role of agricultural engineering in economic empowerment, impact of electrical science and technology in human society, value of electrical science and technology in promotion of agricultural engineering, recommendations and conclusion.

II. ISSUE OF COVID-19 ERA

Good health is regarded as wealth because it is needed for effective and efficient carrying out of various activities in human society. Health is not only physical i.e. physiological. There exists mental, emotional, social and spiritual health. Haniya and Samuel (2015) explained that mental health is an integral component of overall health through which one realizes one's own cognitive, affective and rational abilities; it involves finding balance in all aspects of our lives: physically, mentally, emotionally and spiritually.

A situation that can rob human society of good health is pandemic era. Pandemic borders on health and disease. It is well known that disease usually results to illness, thereby retarding human health. Pandemic is an unpleasant health situation in human society whereby there is massive spread of disease, showing that it is a public health issue; examples of pandemic include Ebola and Coronavirus (Nwosu & Nwoye, 2020).

Coronavirus is believed to originate from China in 2019. Thus, its other name is COVID-19. Talking about COVID-19 is talking about Coronavirus, which is taken as human-made (i.e. artificial) virus; virus is usually associated with disease. The mere fact that COVID-19 is linked to a disease clearly reveals its undesirable and unpleasant nature that can adversely affects the economic activities in a nation.

Unfortunately, in the year 2020, COVID-19 becomes the pandemic that cut across the nations in the world, which includes Nigeria, a developing nation. COVID-19 pandemic era in Nigeria resulted to lock-down. During the lock-down, people's movement from one location to another was restricted. The movement restriction resulted to: hunger because a large number of people were no longer going out to engage in their economic/business activities meant for livelihood; a halt to academic activities as students and teachers were not in schools; a decrease to religious worship as a lot of people were not found in some religious places. Nwosu and Nwoye (2020) noted that the lock-down led to criminal and immoral activities due to idleness - it is usually said that idleness is devil's workshop.

It appears that lock down is over in Nigeria and there is free movement. This period of free movement in Nigeria can be regarded as post COVID-19 pandemic era. In the post COVID-19 era, economic empowerment should be desired.

III. DESIRE FOR ECONOMIC EMPOWERMENT

An essential dream in the nations of the world is actualization of national development. That indicates that effort to achieve national development is greatly desired in human society. Ezeilo, Chukwulobe and Jaja (2013) acknowledged that it is the desire of nations to develop in that the history of mankind is a continual search for means to better livelihood. Unfortunately, Nigeria as a developing nation experiences a lot of socio-economic problems such as hunger, poverty, unemployment and insecurity. The unhealthy socio-economic state in Nigeria has gotten worse by emergence of COVID-19. A lot of people in Nigeria are not in good living condition for there is experiencing of poor income earning and threat to life and property.

Based on miserable life existing in the nation, there is an urgent need for Nigerians to focus on economic development in post COVID-19 era. Economic development is concerned with increase in income and reduction of poverty. It should be recalled that vision 2020 was embarked upon in Nigeria to achieve economic development with the target to place Nigeria in the top 20 leading economies of the world by the year 2020. The main policy thrusts of the vision 2020, among other things, include unleashing economic and wealth creation, optimizing the sources of economic growth to increase productivity and fostering accelerated and sustainable

social and economic development in a competitive and environmentally friendly manner (Otu, Charles & Akpabio, 2011).

Desire for economic development is a desire for economic empowerment. Economic empowerment pertains to equipping people for self-reliance and better livelihood and it draws the mind on issue of economic rehabilitation, economic reform, and economic reconstruction. According to Nnabuenyi (2009), economic empowerment is a means of ensuring satisfactory economy for it is the ability and potential in the use of resources in human society in a way that brings about good standard of living. It was pointed out that Nigeria, in this modern time, urgently needs to focus on technological advancement for economic rehabilitation and self reliance realizing that no nation can achieve viable development without economic empowerment. An aspect of science and technology needed for economic empowerment is agricultural engineering.

IV. ROLE OF AGRICULTURAL ENGINEERING IN ECONOMIC EMPOWERMENT IN POST COVID-19 ERA

Agricultural engineering can simply said to be that form of engineering that focused on agriculture. Acquisition of education in agricultural engineering is an exposure in the field of engineering and agriculture. Engineering is a discipline or activity that is between science and technology for it deals with the use of scientific principle in design and production of materials and devices that make man feel more comfortable in his environment (Nwosu, 2010). Agriculture is the science and act of food production through growing crops and raising animals; it is synonymous with farming. Agricultural engineering is scientific design of materials, devices and techniques for carrying out and enhancing farming operation and food processing. The main focus of agricultural engineering is to enhance productivity, quality and yield in crop and animal production. Agricultural engineering exists because agriculture is valuable in human society.

It is difficult or impossible for man to survive without agriculture since it is a means for provision of food. In the past, before the oil boom, agriculture plays a great role in Nigeria economy. Saidu (2015) recalled that in the 1960s, 1970s and early 1980s, agriculture was the main stay of Nigeria's economy, as it contributed over 80% of the country's GDP, over 70% of the GNP. It was further pointed out that agriculture is by far the most important sector of the Nigeria's economy, engaging over 70% of the labour force; agriculture contributes immensely to the Nigeria economy in various ways, namely: in the provision of food for the increasing population, supply of adequate raw materials and labour input to a growing industrial sector, a major source of employment, generation of foreign exchange earnings and provision of a market for the products of the industrial sector.

Despite its value, agriculture being practiced in Nigeria has certain problems which borders on lack of modern equipment, poor finance, and inadequate education. It has been noted that the predominant occupation of Nigerians, especially rural dwellers, still remains farming and most of the Nigerian farmers live from hand to mouth because most of the farming is done on subsistence basis. These farmers experiences the problems of inadequate finance, lack of modern farming equipment, lack of technical know-how, complete absence of research ideas and dissemination of research information (Saidu, 2015).

Agricultural problems should be of great concern in the post COVID-19 era. However, agricultural engineering, as a means for fostering agriculture, is useful in economic empowerment in post COVID-19 era. Agricultural engineering is relevant in economic survival in post COVID-19 pandemic era in Nigeria for it can serve as a means for food supply, income generation, and provision of security.

Supply of food is among the basic needs of man. Food provides health, which empowers one for economic development. Usually, food for man is crop and animal and it is taken into the body in solid or liquid form. The cultivation of crops and rearing of animals as well as processing of food, in whatever form it is consumed, involves the utilization of tools and machineries designed with the knowledge of agricultural engineering. By aiding in food supply, agricultural engineering can play a role in fighting hunger by ensuring food security for

an active healthy and productive life in post COVID-19 era. Bolarin and Bosa (2012) explained that food security consists of food availability, food access, and food adequacy. Food availability is concerned with food sufficiency in terms of quantity, quality and variety. Food access addresses the demand for food; it is the ability to acquire food and it is influenced by economic factor, physical infrastructure and consumer preferences. Food adequacy ensures an adequate consistent and dependable supply of energy and nutrient from food using sources that are affordable and socio-culturally acceptable at all times to households and individuals. They also pointed out that World Bank defined food security as access by all people at all times to enough food for an active and healthy life.

Involvement in agricultural engineering or farming is a means of engaging in job, which can be self-employed or working in private or public organization. Engaging in job is aimed at income generation. The provision of income through agricultural-based job is a resource for survival in post COVID-19 era. Usually, income enables individuals and nation to be economically empowered. In this post COVID-19 era, poverty alleviation can be achieved in Nigeria through effective and efficient agriculture empowered by agricultural engineering. Unfortunately, despite the value of agriculture in economic development, there is a fall in embarking in agriculture as an income-generating job. Saidu (2015) in explaining that there is decline in interest towards agriculture lamented that because petro-dollar has replaced agro-dollar, every average Nigeria citizens today wants to be rich overnight, by any means with the oil boom, regardless of the issue of food security.

Agricultural engineering has the potential of providing security in Nigeria in the post COVID-19 era by serving as a means for entrepreneurship. Security is an essential ingredient in human and national development. It will be difficult to achieve security and peace for development of any nation without human security, which has a bearing that 'freedom from want' and 'freedom from fear' ensured for all persons are the best and shortest route to tackle problem of global security and development (Osondu, 2010). Insecurity can arise in human society due to unemployment. Unemployment is a worrisome situation because it can bring about idleness and emotional disturbances that can lead to illegal and immoral acts like prostitution, duping, kidnapping, robbery and killing which inhibit national development. The unemployment state of Nigeria calls for entrepreneurship. Entrepreneurship is concerned with self-employed job for one to become an entrepreneur, thereby becoming empowered as a 'job creator' instead of 'job-seeker'. In the post COVID-19 era, agricultural engineering by its scientific and technological nature can empower one to be an entrepreneur, leading to provision of jobs that aid in promotion of security. Nwosu, Nnabuenyi and Igwe (2015) were of the view that adequate exposure to technology can make people to be creative and innovative, thereby become equipped for entrepreneurship. Among the prominent aspect of science and technology existing in human society is that concerned with electricity.

V. IMPACT OF ELECTRICAL SCIENCE AND TECHNOLOGY IN HUMAN SOCIETY

Electrical science and technology is simply science and technology that focused on electricity. Electrical science is the study of natural phenomenon concerned with systematic, objective and empirical study for acquisition of knowledge on the properties and effects of electrical charges (Nwosu, 2016). Electrical technology can be said to be practical application of electrical science in making of products connected with electrical charges aimed at making human environment enjoyable or less harsh (Nwosu & Nwoye, 2020). It can be deduced that electrical science and technology can be viewed as the study of natural phenomenon and its application in production of materials, devices and systems concerned with electricity (electrical charge).

Understanding the role of science and technology in development gives insight on the impact of electrical science and technology in human society. Science and technology is a vital resource for reduction of discomfort in human environment; and a nation with high status in science and technology get empowered in achieving a beautiful and strong economy that make people in the nation experience good living condition (Nnabuenyi & Nzekwe, 2019). According to Nwoye, Chukwuebuka-Nwosu, Nwokeabia and Adinu (2017), science aids in national development and so one of the means required in achieving sustainable national development in Nigeria is having high standard in science education for production of high quality science-based graduates needed for

national development. Onwubiko (2013) believed that technology as a systematic organization of knowledge to practical skills is vital in human resource development as can be seen in its application in labour market, agriculture, industries, communication, health, and engineering. Amechi and Nwosu (2017) acknowledged that technology is a great path for man to survive and enjoy his environment.

Electrical science and technology has brought about the existence of electrical devices and systems as part of products of science and technology (such as transport system, communication system, pipe-borne water, and medical facilities) utilized for the comfort of human society. Electrical science is the pillar for electrical/electronic engineering, which in turn provides some pleasure and comfort due to presence of its products such as computer, telephone, television and radio electric motor, generator, electric lamp, refrigerator, (Nwosu, 2016). In this modern era, electrical science and technology greatly tends towards electronics. Electronic systems like computer, telephone, television, radio, digital clock, photocopier, calculator, video machine, and audio amplifier have helped in the development of human society. Based on the developmental value of electrical science and technology, it can be applied in promotion of agricultural engineering for survival in the post pandemic era.

VI. VALUE OF ELECTRICAL SCIENCE AND TECHNOLOGY IN PROMOTION OF AGRICULTURAL ENGINEERING

Electrical science and technology can be valuable in the post COVID-19 pandemic era in Nigeria through its application in agricultural engineering. The value of electrical science and technology in agricultural engineering in the post pandemic era can manifest through the use of electrical-based systems which includes computer, telecommunication, information technology and electrical power supply.

Electrical science and technology has brought about existence and the use of computer. Computer can be used as an educative device by using it to impart and acquire education and useful knowledge pertaining to agricultural engineering as well as enhance productivity in activities in the engineering. Computer has technological values to the extent that a lot of operations in human environment can be carried out with it (Amechi & Nwosu, 2017).

Telecommunication has brought about provision and dissemination of information to people even from a far distance. Onwubiko (2013) believed that technology which brought about communication using radio, televisions and telephones has enabled us see, hear and read right from our houses what is happening in different parts of the world. Information that can directly or indirectly aid activities and operations in agricultural engineering can be communicated through telecommunication means like television and radio broadcast and telephone network. These days mobile phone (ie handset) has facilities, such as WhatsApp, Instagram, Facebook, telegram, twitter, and YouTube used as social media for communication. Nnabuenyi and Nzekwe (2019) acknowledged that information enables meaningful interactions in human activity, thereby fostering development in human society; and telecommunication devices like radio, television and telephone can be used to communicate information pertaining to science and technology to the masses.

Another product of electrical science and technology is information technology, of which the internet is its popular aspect. Information technology includes facilities used as social media - WhatsApp, Facebook, Instagram, YouTube, telegram and twitter. Information technology has facilities such as electronic mail (e-mail), online chatting (as in social media), e-learning, teleconferencing and others. With the use of information technology, educative knowledge for enhancing agricultural engineering can be sent and obtained. The use of information technology for communication can provide security value in the practice of agricultural engineering. Security for fostering development can be achieved by using telephone and Internet for they enable communication without travelling, thereby giving forum for minimization or prevention of transportation hazards like road accidents, damage or lost of vital document and property, and robbery attack (Nnabuenyi & Nzekwe, 2013).

Another value of electrical science and technology in agricultural engineering is in supply of electrical power. Electrical power supply connotes provision of electrical energy. Provision of electrical energy can be from non-renewable source such as fossil fuel or from renewable source such as solar energy. Electrical power supply can be electrical energy provided by: the national grid, electric generator used for domestic or industrial purpose, and solar panel (Nwosu & Nwoye, 2020). Energy is needed to carry out work; and provision of electrical energy, for domestic and industrial activities, from solar energy (energy from the sun) using solar cell or solar panel is safe and non-polluting (Nnabuenyi & Nzekwe, 2019). Electrical power supply is useful in agricultural engineering for it can be utilized to energize electrical-based products of agricultural engineering as well as power electrical and electronic devices employed in enhancing the engineering.

VII. CONCLUSION

COVID-19, as a pandemic, is a public health issue that affected the economic wellbeing of Nigeria people and the nation. Now that Nigeria is in post COVID-19 era, a means to cushion the ill-effect of pandemic and ensure economic empowerment can be through the application of agricultural engineering. This is because the engineering, by focusing on agricultural activities, gears towards food production and supply, income generation, and provision of security.

Agricultural engineering, based on its relevance in economic empowerment in post COVID-19 era, can be enhanced using electrical science and technology. Electrical science and technology can foster operations and productivity in agricultural engineering through the use of computer, telecommunication, information technology, and electrical power supply.

VIII. RECOMMENDATIONS

To appreciate the value of electrical science and technology in fostering agricultural engineering needed for economic empowerment in post pandemic period in Nigeria, it is recommended that:

1. People concerned with provision of electrical power in Nigeria should ensure constant provision of electricity for energizing of electrical-based devices associated with agricultural engineering
2. People involved in agricultural engineering should have sound exposure in the application of electrical science and technology in agricultural activities and operations.
3. Nigerian students and teachers concerned with electrical and agricultural studies should be diligent in the education programme they are engaged in.
4. Government and education administrators should provide enough and adequate facilities and equipment needed in the study of electrical and agricultural courses in academic institutions in Nigeria.

REFERENCES

- Amechi, M.C. & Nwosu, F.C. (2017). Technological value of computer in handling contemporary issues in engineering. *Journal of Resourcefulness and Distinction*, 14 (1), 290 – 298.
- Bolarin, F.C. & Bosa, S.O. (2012). Food processing, preservation and storage: an imperative for ensuring food security in Nigeria. *African Journal of Engineering Research and development*, 5 (2), 27 – 33.
- Ezeilo, C.J., Chukwulobe, E.E. & Jaja, E. (2013). Application of electronic technology for economic development: a means for matching towards vision 2020. *Journal of Research in Engineering*, 10 (1), 131 – 136.

- Haniya, D.E. & Samuel, E.S. (2015). Gender differential in the mental health attitude of secondary school students in Plateau state: implication for teacher education. *Review of Education*, 27 (1), 107-119.
- Nnabuanyi, H.O. (2009) Uplifting chemical technology for economic empowerment in Nigeria. *The Nigerian Academic Forum*, 17 (1), 34 - 38.
- Nnabuanyi, H.O. & Nzekwe, F.N. (2019). The use of semiconductor in electronics in ensuring quality in science and technology. *Knowledge Review*, 38 (1), 57 – 63.
- Nwosu, F.C. (2010). Instilling quality education in science and technology among Nigeria children and youth for sustainable development in engineering. *Journal of Engineering Science and Technology* 5 (1), 58 - 61.
- Nwosu, F.C. (2016). Education on electrical science as a base for electrical/electronic engineering needed for self-reliance and sustainable development. In R. Akpan, D.A. Aboho & G.G. kpee (Eds.). *The dilemma of education: the contending issues*. Onitsha: Global Academic Group Online Academic Resources.
- Nwosu, F. C., Ezeilo, C. J. & Onwughalu, M. K. (2015). Impact of electronic engineering and technology in curbing violent crime for sustainable development. *International Bi-lingual Journal of Anti-Corruption, Law, Humanities, Social Sciences and Development Studies*, 6 (1), 28 – 34.
- Nwosu, F.C. & Nwoye, A.N. (2020). Value of electrical science and technology in fostering education for overcoming pandemic era in Nigeria. Paper written as a chapter contribution sent to sejrds@gmail.com and accepted for publication in a book titled: the role of education in the pandemic period in Nigeria.
- Nwoye, A.N., Chukwuebuka-Nwosu, J.N., Nwokeabia, C.U. & Adinu, C.A. (2017). Application of computer system and information technology in enhancing the productivity of science teachers for sustainable development in Nigeria. *Journal of Science and Technology Research*, 14 (3), 17 – 22.
- Onwubiko, G.C. (2013). The role of technology in human resource development. *Nigerian Journal of Technical Education Review*, 10 (1), 120 – 133.
- Osondu, C. S. (2010). Human security, peace and development in Nigeria. *International Bi-lingual Journal of Anti-Corruption, Law, Humanities, Social Sciences and Development Studies*, 1 (2), 97 – 100.
- Otu, E.S., Charles, J.S. & Akpabio, I.U. (2011) Entrepreneurship and Functional Teacher Education as Means of Achieving the National Objectives of Vision 2020 in Nigeria, *Multidisciplinary Journal of Research Development*, 17 (4), 16 – 23.
- Saidu, A. (2015). Re-engineering the agricultural sector: a panacea for economic growth and industrial development in north-eastern Nigeria. *International Journal of Advanced Studies in Ecology, Development and Sustainability*, 3 (1), 214 – 229.