

Economics of Engineering and Technology for Advanced Agricultural Environment

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Abstract

The stark realities of the huge challenges inherent in the economics of engineering and technology with regards to advanced agricultural environment were brought to the fore. There is need to urgently address the fundamental issues of technological readiness by improving technological capacity as a whole. Products of advanced Agricultural environment demand in the country is on the increase outweighing local food production growth rate decreases population growth rate increases and has over taken food production growth rate. This situation is worrisome and we believe that the sad state of affairs is not unconnected with the fact that engineering and technology for agricultural environment has for a very long time been human muscle based. The consequences of which are human muscles based. The consequences of which are insufficient food productions, high food imports and food insecurity. Engineering and technology approach to challenges and solutions has evolved to dealing with economics of advanced agricultural environment. Simple to complex steps should be taken to rejig various factors so as to actualize this research work. This paper discussed economics of agricultural for sustainability of mankind, the effect of engineering and technology on agricultural environment need for economics of engineering and technology as well as advancement in agriculture in our modern times. The crux of this paper hinges on the way forward for advanced agricultural environment with regards to engineering and technology. Having focused on these recommendations and conclusions were made especially in assimilating policies that gave leeway to better futuristic living in an advanced manner.

Keywords: Economics, Engineering, Technology. Advanced agricultural, Environment.

Introduction

Economics, as the study of a given sphere of human behavior is a social science, dealing with variety of man's activities ranging from production, distribution and consumption of goods. Engineering is the application of science technology, art and economics to the definition and solution of real socio-economic and ecological problems, especially in the areas of conception, design, development, manufacture, selection, testing, adoption, operation, maintenance of machines, implements, equipments, tools, structures and systems. Thereby improving infrastructural technological, economic and mechanization of human activities. Technology refers to the body of organized knowledge, tools, procedures, scientific principles, rules and machines used by man to manipulate his environment to satisfy his basic needs. Advanced agricultural environment is the cultivation of the soil using *hitech* operations. In this research work, the contribution of engineering and technology has been globally accepted and recognized as the force behind globalization in advanced countries. From time immemorial, the advancement in technology has spread across all nations, pushing it to a global recognition in different aspects of life especially in agriculture. The use of technology and engineering has been introduced in agricultural firm seeking to speed up their output rate with heavy equipments used in processing raw materials to finished goods. This has in turn increased the stability of the economy of nations. The agricultural environment with the use of tractors and large farming machines helps in clearing of large farms for planting, tilling, cultivating, harvesting, processing crops and storage of farm products in stabilizing the economy. Indeed, the intervention of engineering and technology in the agricultural sector has made a significant impact on agricultural environment. For the purpose of the topic we will briefly take a dive into various aspects of engineering technology as it relates to the agricultural environment and the economy at large. In the last few decades, economic growth and development in the fields of engineering and technology has been the catalyst. Engineers and economist have been interdependent on one another for various technological know-how. Engineering and technology has developed various technological equipments, machines, gadgets useful for the modern industries as they want to maximize their production efficiency at the same time minimize the cost of production. The increase in economy due to engineering and technology has made the world a global market, not limited to the boundaries of a country. Due to technology advancement in the modern economics, there has been increase

in employment, reduction in poverty and growth of human capital, which have together triggered the economic growth of the modern economics.

Economics of Agriculture

This can be experienced in small peasant holdings, estates and plantations. Agriculture accounts for about 70% of the net domestic product, showing the predominant importance of agriculture (Oluka, 2014). The Economics of Agriculture has these benefits:

1. The Supply of Food: Food materials are provided in surplus and abundant manner. Between 1994 and 2001 for which fairly consistent data are available, Nigeria's domestic food production moved from 86.70 million metric tons (in 1994) to 89.25 million metric tons in 1996 and 1997 respectively before attaining 98.74 million metric tons in 1999, 102.12 metric tons in 2000 and 103. 386 million metric tons in 2001(FOS, Abstract of statistics, various issues 2002).
2. Foreign Reserves: When some of our cash crops are exported to foreign countries, it earns us foreign reserves, which leverage us from poverty and recessions.
3. Savings: This provides savings for buying industrial equipment for the new and existing industries, hence agriculture provides capital for investment purposes and thus our national income increases.
4. Raw Materials: Agriculture supplies most of the raw materials used in industries for example, the textile factories in Ikeja and Kadauna make use of cotton produced in Nigeria, the oil mill at Kona makes use of cotton produced in a country. In as much as they are raw materials, we use them to produce finished products.
5. Finance for Industry: Agriculture provides money used to fund our industries. There are policies that stabilize the growth of reserves recovered from agriculture.
6. Provision of Markets: Agriculture provides a market for its accessories like implements, fertilizers, insecticides, produces etc. this allows exchange of money between traders and buyers.

Engineering and Technology for Agricultural Environment.

Engineering is the idea or theory while technology is the practice of these ideas to solve human problems. One of the basic necessities of life is feeding. It can only be provided for through agriculture. Engineering and technology are the backbone of economic system of a given country. Her increasing population means that there has to be an increased focus

on agriculture, most countries have economy that is dependent on agriculture-either in a small or big way, from employment generation to contribution to national income, agriculture is important. The fast rate of population increase can only be balanced when there is increases supply of agricultural products and this can be achieved with the introduction of Engineering and technology based agriculture with the use of tractors, ploughs, cultivators, planters, threshers and tools used in maintenance such as knapsack sprayer. Engineering and technology has doubled the output rate and increased the supply of agricultural products to the teeming population. This has in turn stabilized the inflation rate of food products and led to a stable economy.

Moreover, we have a profession that handles engineering and technology in an agricultural environment either to enhance it or maximize its dividends ie Agricultural and Bio-Environment Engineering. This is the application of engineering knowledge and services in solving technical and environmental problems in agriculture. This is felt in the business of crop and animal production as well as in the processing, preservation, storage, handling, manufacturing, distribution or marketing of agricultural products. The engineering and technology for agricultural environment's primary mission is to mechanize agro-based industries and to protect the environment of the farmer in all ramifications. The peculiarity of this engineering and technology with regards to agricultural environment is that it deals with living plants and animals. Materials and so add some biological dimension to his engineering training.

Needs for Economics of Engineering and Technology

According to Ajayi (1995), no profession impinges on daily life more than engineering and technology. Technology has been identified as the key to development. The engineering profession is widely regarded as the most extensive and intensive profession covering almost all facets of human endeavor. The role of the engineer cum technologist in society spans across politics, religion, technology, law, medicine, teaching, manufacturing, management, administration, defense, food production and provision of utilities.

1. **Politics:** Earlier engineers or technologists abhorred politics and governance of man. He was so absorbed with planning, designing, cutting or joining metals, indulging in *Whys* and *Hows* of the numerous problems hindering the development of man and his

environment. They took pride in satisfying technical needs of mankind. They forgot that politics and the associated powers of government are the pivot upon which their technical prowess and ingenuity lies. Politics is a system for power consolidation and utilization. When one has power, fame, technology, money, intelligence, freedom etc without political power all of them can be taken away. This means that political power is vital to an engineer and technologists, enabling them create the right environment for the practice of his profession and policy formulation for advancement of engineering and technology.

2. **Religion:** Religious discipline is essential in the everyday co-existence of man and his neighbours as it promotes peace and tolerance. If engineers or technologist do not have the heart of God, that is "LOVE" and "BEAUTY" , the ergonomics will not be perceived in all the creativity for the advancement of humanity.
3. **New Technologies:** Engineers and technologist are trained to proffer solutions to most technical problems of humanity and her environment like in health, automations, food, transportation, telecommunications, electricity, constructions, maintenance etc, be they simple or complex.
4. **Law:** Engineers and technologist have to know and understand laws of scientific discoveries in solving problems of nature, environment and human existence. The contract laws, factory laws and general laws of his country should be understood and be obeyed by him with the strictest discipline. Course on law has been factored into the curriculum of their profession (NUC, 1989).
5. **Medicine:** The engineers or technologist is concerned with design and manufacture of medical tools, equipment and machines especially radiological laboratory and pharmaceutical machines. Engineering and technology are the pivots for advancement of modern diagnosis of health, solving medical problems of humanity, and building hospitals with medical complexes as well as provisions of artificial limbs for orthopedic requirements.
6. **Military Functions:** Engineering and technology determine the level of military power of a nation. They design and produce the

ammunition for execution of wars and maintenance of peace. Military engineering and technology dates back to prehistoric era at the use of certain tools to protect himself from any harm. The construction of military structures like trenches, trucks, tunnels etc for military use.

7. **Administration and Management:** Engineers and technologist are supervisors and managers of human and materials resources. They indulge in personnel recruitment, materials selection, performance, testing and maintenance/repairs, cost and control of engineering analysis etc.
8. **Production of Goods and Services:** Engineers and technologist are involved so much with the production of goods and services in all the business of humanity, they are in the helm of affairs. They build systems that process the good and facilitate the services in the shortest time and minimum cost. Above all, placing the interest of the society above every other interest.

Advancement in Agriculture

The activities of agriculture are multifarious and as broad as one can imagine. Agriculture is perhaps the most important profession or activity. The activity by man has been more of a gradual process from primitive technology of stones and sticks to the present day high technology of computers and space travel. The historical development was captured by William Gunston (Pytlík et al; 1985), when he wrote of man's technology as at first, technology was a few bits of woods, stone and animal skin. He fashioned them into usefulness by mastering fire with which he not only kept warm and cooked food but also hardened materials like wood and used metals. As he learnt to farm lands and domesticate animals from the sharpened tools he improvised agricultural advancement includes stone age, Bronze Age, iron age, industrial revolution, space and computer age. Agricultural tools developed within the period of stone were made of stones, woods, bones etc. these tools were limited in operations. As the need for better provision of one of the basic necessities of life, food increased the need for better tools and advancement also increased. During the Neolithic period of civilization (1000-3500 BC), the following metals were discovered – copper, bronze, iron. The use of metals was a great improvement over the use of stones because they could be shaped into any form and could absorb larger forces. At a time, industrial revolutions occurred with such engines like the electric motor invented in 1821 by Michael Faraday replacing the steam engine as the prime mover and the

internal combustion engine as major power source for transportation of agro-products. With these engines running the heavy industries, many products were developed with better processes. Many advanced high technology revolution came, hence the need for peace, control and monitoring of the new complicated machines. The introduction of the computer and other electronics brought about many technological products and services. This has affected the society in many ways as machines aid every aspect of human existence today (automation and control) (Oluka, 2014).

In Nigeria, the advancement of Agriculture dates back to pre-historic times and pre-colonial times. In order to take the recourses of the hinterland, the colonialists brought their own agricultural practices as well as public utilities like electricity, roads etc. Aside ministry and parastatals for agricultural advancement and extensions, many schools, polytechnics, colleges and universities all over the country teach principles involved in engineering and technology practices for agricultural advancements.

The Way Forward with regards to Agricultural Environment

Nigeria is blessed with abundant agricultural land area of 91.3 million hec. Out of this number, 71.2 million ha or 78% of which is good for farming, but less than half of it is being explored (Agbola, 1979). These arable lands span through the swampy mangrove forest in the coastal and river line areas of the south to the semi-arid Sudan Savannah of the far North. The soils are fertile. The prime mover of agricultural advancement is the tractor. Nations, groups and individuals should work very hard to attain the present level of agricultural advancement in the world today. There is every need to establish clear objectives of this agricultural environment. This requires a through identification and understanding of various problems and viable solutions that can be proffered. Effective strategic plans that are holistic in approach involving both government and private sectors are very much needed. Emphases on profitable considerations and creation of enabling environment as well as clear roles for both public and private sectors should be embraced with these broad points:

- a. Consistency policies: The 1960s were characterized by strong public intervention in agricultural environment with development guidelines and plans established at the Federal level (Grand Val, 2011) and implement in the states. Government boosted domestic production especially cash crops which pushed Nigeria to world's top producer of rubber, groundnuts, palm oil and cocoa. The

presence of oil and gas in so increasing food import. This fluctuation in interests led to avoidable wastage of time, human and material resources. Policy programme continuation, evaluation of policy implementation and relationship of policies with one another will be a leeway for favourable agricultural environment.

- b. **Funding of Agricultural Environment:** This environment suffer a huge set back as far as funding is concerned. This funding can be felt in diverse ways, example building of farm structures, purchasing and hiring of machineries, security programmes etc. so as to position agricultural environment very well.
- c. **Usage of Advanced Technology and Machinery:** Agricultural environment should not depend on human and animal. Power Engineering and Technologies of advanced machinery suitable to our own environment should be imbibed and be used especially for small farm holding (fragmentation). A more appropriate engineering and technology should be embraced so as to increase advanced machinery use. This could be done through phased, selected and well-structured capacity building programmes for local fabricators and equipment manufacture unto censored and control system.
- d. **Development of Centres for Agricultural Environment:** The centres for this development initially can be found in universities, polytechnics, colleges of education, trade centres like National Centre for Agricultural Mechanization (NCAM), National Agency for Science and Infrastructure (NASENI), FIRO, PRODA etc. having the primary mandate to train, develop or generate machineries through research and disseminate information through extension services. The programmes entertained in these centres were meant to enhance the establishment of core capital goods industries for the manufacture of machinery and equipment.
- e. **Engineering and Technological Barriers Removal:** Identifiable barriers are majorly seen in the following; poor access of farmers to agricultural machineries due to high cost, death of skilled tractor operates and mechanics, lack of tractor and equipment spare parts especially I in rural areas, poor entrepreneurial spirit, inaccessibility of large scale farming etc. To overcome these barriers, revitalization, modernization and recapitalization of the aforementioned barriers should be carried out with revamping of the Bank of Agriculture and promotion of the use of advanced agricultural machinery like automations and robotics.

Conclusions

Reassuringly, the topic Economics of Engineering and Technology or Advanced Agricultural Environment is an incentive, generating different stimuli, as are x-rayed in the work. With the application of the justice done in this pieces of work, I see drastic changes in all facets of human endeavours positively. Government, individuals and NGOs should serve to provide plat forms of knowledge sharing and skill transformation. Vision 20:2020 of all is well, should not be a dream washed down the drains but an objective feasible and realizable. We have the human and material resources to perform that feat.

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