

The Role of Engineers in National Economy Development

By

Engr. Dr. M. M. Muhammadu

Department of Mechanical Engineering

Federal University of Technology, Minna, Nigeria

Saturday 19th, June 2021

Email:masin.muhammadu@futminna.edu.ng

Abstract

Introduction

Engineering is the application of science to the optimum conversion of the resources of nature to the uses of humankind (Smith R. J., 1983). In broader definition, Engineering is the creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes or works utilizing them singly or in combination, or to construct or operate the same with full cognizance of their design, or to forecast their behaviour under specific operating conditions, all with regard to an intended function, economics of operation and safety of life and property (Engineers Council for Professional Development, United States).

Engineering: It involved with the design, analysis, testing, manufacturing, control, operation, and maintenance of mechanical systems. Engineering also: deals with all aspects of the conversion of thermal energy into useful work and the machines that make this possible. One who practices engineering is called ENGINEER. Engineers borrow from physics and mathematics to find suitable solutions to the problem at hand.



What do engineers do?

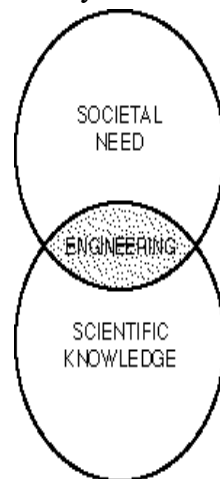
Design, Research, Create, Develop, explore, innovate, Manufacture and Test of device such tools, engines, troubleshoot and machine etc. Engineers receive education and training in many different fields. They work in many different environments; Engineers do things that make the world worthy of living.

Major Roles of Engineers in the Society

Technical, Social, Economic respectively.

Engineering as a Bridge between Science and the Society

Engineering bridges the gap between Society and Scientific Knowledge



What is Economic Development?

- Economics can be defined in many ways; Viz-a-vis .
- Economics is the human Science which studies the relationship between scarce resources and their various uses which compete for these resources.
- Economics is the study of how society decide what to produce, how to produce and whom to produce.
- The economic development process supposes that the legal and institutional adjustments are made to give incentives for innovation and for investments so as to develop an efficient production and distribution for goods and services
- Economic development is a sustainable increase in living standards that implies increased per capita income, better education and health as well as environmental protection

Classification of Economic



PRIMARY SECTOR

- ❑ Simply speaking primary sector refers to that sector of the economy which uses natural resource to produce goods.
- ❑ Natural factors play crucial role in the production process. Agriculture and allied activities like mining, fishery, forestry, diary and poultry are included in this sector.

SECONDARY SECTOR

- ❑ Secondary sector is also called as manufacturing sector or industrial sector.
- ❑ The sector which transforms one physical good into another is called secondary sector. The manufacturing, electricity, gas, water supply etc. are included in this sector.

TERTIARY SECTOR:

The service sector of the economy is called tertiary sector. Services of various kinds like education, health, banking, insurance, trade and transport are included in this sector. In advanced countries

ECONOMY DEVELOPMENT

When economy is developed, we have

- Quality Education
- Clean and efficient energy
- Sophisticated infrastructure
- Improved social Amenities
- Increasing phase in GDP per capita
- Ability of self-production
- Good economic stability

How can we get there?

- Previous efforts have tried to use foreign aid, investment in machines, fostering education at the primary and secondary levels, controlling population growth, and giving loans and debt relief conditional on reforms to stimulate the economic growth that would allow these countries to move toward self-sufficiency - Nigeria

- All of these efforts over the past few decades have failed to lead to the desired economic growth

Popular saying.....

Give a person a fish: you have fed him for that day. Teach a person how to fish: you have fed him for a lifetime.” And: Teach him how to process and package fish for export, and you have stimulated economic development. This is the work of Engineers

THE ROLE OF ENGINEERS IN NATIONAL ECONOMY

- The Engineering profession makes important contributions to the economy, both from the direct addition to economic output from the work they do, and the contribution of the sectors in which they work (Akingbagbohun F. 2019).
- One can also consider the long run return to the economy of improvements in physical infrastructure, in which engineers have played a vital role, and the contributions engineers make to the knowledge economy and to sustainability.

THE ROLE OF ENGINEERS IN NATIONAL ECONOMIC DEVELOPMENT TECHNOLOGY AND INNOVATION

This has played a vital role in:

- Education
- Production
- Construction
- Information and Telecommunication
- Foreign Exchange
- Infrastructure
- Clean, Sustainable Energy

Engineering economics

Engineering economics, previously known as engineering economy, is a subset of economics concerned with the use and "...application of economic principles" in the analysis of engineering decisions.

Get familiar with project management Costing, Accounting and Learn all the rudiment of economic development. you will need this knowledge as you advance in leadership during your career.

Engineers personal Development must include leadership and preparation for participation in National politics. This is where decision makers and policy that affects National economy are made. The Era of Engineers sitting back as advisers and consultants is fading Prepare for the Leadership of your country.

GENERALLY: THE ROLE OF ENGINEERS IN NATIONAL DEVELOPMENT

❖ Engineers and Politics:

Involvement of Engineers in politics afford them the opportunity to be at these policy/decision making bodies. Engineers at these levels, use their professional knowledge to attract and defend important engineering infrastructural development projects. Similarly, Engineers in politics contribute to the enhancement of the welfare of other Engineers thereby motivating them to higher productivity for national economy development.

Engineering is the bedrock for development of any serious Nation. China has 15 high policy makers, 9 are Engineers. You and I know the level where China is today in terms of world power and National Economy Development.

Presidential Executive order 5 – for Development of Local Content in Science, Engineering and Technology.

"Presidential Executive Order for Planning and Execution of Projects, Promotion of Nigerian Content in Contracts and Science, Engineering and Technology," President Muhammadu Buhari, pursuant to the authority vested in him by the Constitution, signed on Friday, February 2, 2018 the Executive Order No. 5 ("EO5") by which all Ministries, Departments and Agencies ("MDAs") of government were directed to engage indigenous professionals in the planning, design and execution of national security projects and maximise in-country capacity in all contracts and transactions with science, engineering and technology components. The Executive Order took effect immediately.

The main objectives of the EO5 are the harnessing of domestic talents and the development of indigenous capacity in science and engineering for the promotion of technological innovation needed to drive national competitiveness, productivity and economic activities which will invariably enhance the achievement of the nation's development goals across all sectors of the economy.

These goals have been previously encapsulated in a number of policy documents, such as the Vision 20:2020; National Science, Technology and Innovation Policy (NSTIP) first approved by the Federal Executive Council ("FEC") in 2012; Economic Recovery and Growth Plan, (ERGP 2017 – 2020); Science, Technology and Innovation Strategy (STISA) 2024 and 2063; and Nigeria's targets under the United Nation's Sustainable Development Goals, (SDG 2030).

The EO5 makes certain specific directives which include the following:

All procuring authorities shall give preference to Nigerian companies and firms in the award of contracts, in line with the Public Procurement Act, 2007;

Where expertise is lacking, procuring entities shall give preference to foreign companies and firms with demonstrable and verifiable plan for indigenous capacity development, prior to the award of such contracts;

MDAs shall engage indigenous professionals in the planning, design and execution of national security projects and consideration shall only be given to a foreign professional, where it is certified by the appropriate authority that such expertise is not available in Nigeria;

Nigerian companies or firms duly registered in accordance with the laws of Nigeria, with current practising licence shall be lead in any consultancy services involving Joint Venture (JV) relationships and agreements, relating to Law, Engineering, ICT, Architecture, Procurement, Quantity Surveying, and etc.;

The Ministry of Interior is prohibited from giving visas to foreign workers whose skills are readily available in Nigeria Etc.

Implications Presidential Executive order 5 – for Development of Local Content in Science, Engineering and Technology

- a. It would promote the application of local content in science, technology and innovation within Nigeria.
- b. It would encourage indigenous experts in diaspora to return to their home for public procurements purposes. This may result to improved standards and healthy competition in all sectors.
- c. Preference would be given to Nigerian companies and firms by procuring authorities in the award of contracts.
- d. Immigration agencies may create a special immigration class for experts in African countries to work and reside in Nigeria so as to share their knowledge with Nigerian experts. This will aid the capacity of the companies and foster inter-Africa relations.
- e. Increased production of local materials for building and construction.
- f. Ministries, Departments and Agencies, MDAs would begin to engage indigenous professionals in the planning, design and execution of national security projects.

Conclusion

Every Section of Economic activity has the roles of engineering and technology. Whether it is Raw material, manufacturing or distribution. The Challenges facing country in Energy, Infrastructures and environment are engineering challenges. Engineers must play a much stronger role in the public policy process to provide the right incentives for industry and others to move on sustainable path so that engineers can be encouraged and supported to design sustainable technology for the purpose of economic development that benefits society in a holistic way now and in future. Therefore, the engineers of 21st century cannot afford to sit back.

RECOMMENDATIONS

- i. Engineers need to develop broad fundamental understanding of their professional responsibilities in the society.
- ii. Students in tertiary Institutions need to begin to see themselves more as potential Engineering ambassadors and prepare for the challenges of participating in the Socio economic activities in the country
- iii. Their activities on campus shouldn't be inclined on activism but on development and innovation. The era of activism to gain power is fading. We are no longer in military era
- iv. The era of Engineers being limited to the workshops and on the field is becoming outdated.
- v. The students have an opportunity to integrate their "professional code" into their daily work as Engineering students.
- vi. Programmes that bring professionals into the academic folds are to be more encouraged.
- Vii. Since it is difficult for every practicing Engineer to participate in the development of national economy, it may be better to localize this experience for professional engineers.
very position you find yourself in the community should be used to showcase the dynamism of engineering leadership in problem solving
- viii. The most effective mechanism is the personal involvement of each Engineer in integrating the topics of safety and the welfare of the public, professional ethics, legal considerations, environmental responsibilities, quality, and communications into the methodologies which all Engineers use to approach and solve problems in the ordinary course of practice
- ix. This could be considered a natural extension of "Concurrent Engineering" in which the elements of design, manufacturing, and other issues are considered concurrently in Engineering methodology.

References

1. Antonelli C (2003) The economics of Innovation, New Technologies and Structural change, London ; RoutledgeInnovation Economics
2. Steil B, Victor DG, Nelson RR (2002) Technological Innovation and Economic Performance, A council of Foreign Relations Book ; Princeton University Press.
3. Farrel CJ (in press) Economics, R & D and growth.
4. The Role of Engineers in Economic Development by Tochukwu Francis Okoye
5. <http://www.me.utexas.edu/~srdesign/paper/>
6. <https://www.bis.org/review/r110617f.pdf>