Innovative Systems Design and Engineering
ISSN 2222-1727 (Paper) ISSN 2222-2871 (Online)
Vol.9, No.5, 2018

Engineers and Infrastructural Development

Olajuyin E. A
Electrical and Electronics Engineering, Crown Polytechnic, Odo, Ado Ekiti, Ekiti State, Nigeria

Olubakinde Eniola
Electrical and Electronics Engineering, Federal Polytechnic, Ile-oluji, Ondo State

Abstract
Engineering activities are those which make the resources of nature available in a form that will benefit man and it also involve the provision of systems which perform economically and optimally. Engineers build infrastructures such as road, power plant and Radio stations e.t.c for the benefits of mankind and this will aid rapid development of any country. If there are no qualified numbers of engineers in any country, the country will suffer some sets back in its quest for development of infrastructures because these set of professionals will implement the developmental plans of such country and its technological advancement. All the engineering sectors are therefore required to contribute their own quotas to the infrastructural development of such nation since they all work hand in hand such as Electrical engineering, Mechanical Engineering and Civil Engineering e.t.c. It is necessary that the Federal Government engage the use of indigenous engineers in facilities and infrastructural development to have a better, a secured, a safe and a sound nation.

1. What is engineering?

There are many definitions of Engineering but we will consider some in this paper: Engineering is the application of science and technology. Engineering brings about the materials utilization and laws of nature for good of human beings. Tregold describes Engineering as the art of directing the great sources of power in nature.

The activities of engineering are those which make the resources of nature available in a form that will benefit man and his environment and also involve in the provision of systems which perform economically and optimally. Engineering is also involved in planning, analysis and application of scientific developments, keeping the man in mind as the measure of technological benefit. The adopted most type of definitions of Engineering is the art or science of utilizing, directing or instructing others in the utilization of the principles, properties forces, and substances of natures in the production, operation, construction, manufacture, and use of things or means, structures methods ,machines and devices by Kiddle(1920).

Engineering is based on the fundamental of science. Science can be defined as systemized knowledge accumulated and established. Engineering demanded and required ingenuity, craftsmanship, and judgment in application of knowledge to practical and experimental purposes. The major functions and works of engineering are: construction, production, operation research, development and design, application and sales and management.

Britain engineering was defined as that of assembly of engines manufacturing, machine parts and machine tools including instrument and associated measuring control device. It also engages in translating scientific laws, fundamentals and principles into software for facilitating production of goods / products for the comfort of the society, nation and individual.

2. Engineering Families

(a) Engineer

An engineer is a man/woman certified by aptitude, education and experience to do and perform engineering functions. Aptitude is capacity to work in a particular field. An engineer should able to proffer solution to abstract problems which involves performance, design, efficiency and cost. Engineer role is to apply science to the economics fulfillment of human needs and desires. He must be it unto technically terms apply available technology to obtain a practical solution and communicate these facts to his fellow men. These procedures can be carried only by a highly-educated, thinking individual working with a well coordinated and cooperating team of technicians who can covert the Engineer's ideas and discoveries into useful products and services. Such a team is made up of the average of one engineer and 7 Technicians (Onipede, 2004). He must have the ability to supervise the work of other and in due time, the maturity to assume responsibility for the direction of important tasks, including profitable management of industrial and commercial enterprises.

An engineer is usually a member of a versatile team encompassing different fields that possess skills and knowledge. The council for the Regulation of Engineering practice in Nigeria (Coren) allows registration under the following cadres.

(b) **Engineering Technologists**:

They are trained at the Higher National Diploma level in Polytechnic. Fundamentally, the nature of posts

occupied by technologists demand a practical approach and a detailed understanding of a particular technology. They require specific and detailed knowledge of the bases and practices of current technology and are concerned with maintaining existing technology efficiently. They must be competent by education and training. He is to exercise technical judgment in and assume duties in the engineering field.

(c) **The Technicians**: They acquire trainings through semi-formal education; products of Technical Secondary Schools, Monotechnics and polytechnics up to the ordinary National Diploma level are trained technicians. They are usually under the guidance of Engineers and Engineering Technologists. They are qualified by virtue of their education to apply proven techniques and procedures to the solutions of practical problems with an element of personal responsibility.

(d) **Craftsman/Artisan**:

A Craftsman /Artisan normally acquires training through practical and informal or formal means ,as an apprentice under a trained craftsman in a specialized workshop or a specialized craft School/Vocation training Centre .Categories of Craftsmen include Blacksmiths, automobile mechanics, Masons etc. His primary role within the profession shall include the responsibility for the execution of specific projects, and also providing the essential support for engineering Technician where appropriate.

3. Engineer's Obligation

If an Engineer discovers that there is likelihood of a possible risk to others from the failure of his client or employer to follow the Engineer's direction, he has a duty to report such an issue to the appropriate authority. Failure to report such an issue could lead to revocation of the Engineer's practicing license. A way around the dilemma is for the engineer to issue advice to the concerned client and/or employer and insist on compliance, failure to which he /she makes the situation public by reporting to the appropriate authorities. COREN regulates the practice of Engineering in Nigeria and such matters should be referred to the body (Wara S.T., 2011).

4. Arms of Engineering

There are various arms of Engineering but I will talk few in this paper:

1. Civil Engineering involved in construction, planning, designing and maintenance of structures and it can also altar the geography to favor the needs of human beings. They also specialize in building high ways. All these bridges fly over and motor able roads around us are the product of the discipline.
2. Chemical engineering engages in design, planning and construction of plants and machinery for making products such as acids, drugs and other pharmaceutical product in large scale production. The product of this discipline can work in food processing industry, textile and all others industries to mention but few. Chemical engineer can also operate all these machineries.
3. Mechanical Engineering deals with designing, developing and manufacturing and also involving in conversion energy to useful form.Mechnaical Engineers deals with internal combustion of an engine such as steam turbine, jet, rocket automobile vehicle, refrigeration, aviation and instrumentation. There are many branches of mechanical Engineering such as Manufacturing Engineering, heating engineering, foundry Engineering etc.
4. Electrical and Electrical Engineering: It is the one of the fastest growing field in Engineering. It deals with production, design, planning and development of electrical and electronics equipment that are use in generation, distribution and transmission of electrical energy. In this computer age it involved in production of electrical, instrument and electronics equipment. It also design electrical and electronics circuits. Others aspects of Electrical and Electronic Engineering includes Telecommunication, control, Radio, instrumentation Engineering e.t.c.
5. Agricultural Engineering: This applied all others branches of engineering to agriculture. Some of the branches of this field are Power and Machinery, soil and water and conservation engineering.
6. Mining Engineering: It deals with location of minerals and exploration of these minerals from the earth. The broad field of mining involves in the design of mining and ore refineries and others systems for converting the physical and chemical characteristics of metals.

5. Engineering Infrastructural Facilities

Some engineering infrastructure facilities will be discussed under this topic as follows:

1. Safety and Security: The manufacturing, design, construction and planning must be of high standard, safe and secured. Security equipment is the function of engineers.
2. Communication System: Now with the discovery of information system it is easy for some to stay at one edge of world and communicate to the other far end of the world. The development of this has made it possible by electronics engineering..Electronics engineering develops communication systems for both rural and urban centers and this has contributed immensely to the development of economics

and industrial development across the globe.

3. Energy supply: The distribution, generation and transmission of electricity cuts across nearly all aspect of engineering. The Civil and Mechanical engineering construct dams, while Mechanical Engineering provides the turbine for generation of power and this is manufactured also by mechanical engineers. The conversion of mechanical energy or others forms of energy is the duty of Electrical Engineering.
4. Transportation: Civil Engineering involves in construction of good road and they also maintain this road network. Mechanical Engineer also responsible for the procurement of the equipment and machines for the construction and maintenance of this road network and all the equipment employing in the system. Civil engineer also constructs bridges and high ways. Civil and mechanical engineers also ensure successful completion of railways. Mechanical engineers fabricate and contrast the trains required on railways. The engineering family is important to development good transportation system in any country.
5. Water supply: The supply of water for both domestic and industrial uses is always the duty and responsibility of engineering. The location of a bore, the drilling of it and the distribution the water from is the duty of civil/geological and mechanical engineering and electrical engineering electrified it. In a situation where large water is needed, Civil and mechanical engineering will construct the dam and electrical engineering will to do the wiring aspect of it.
6. Housing: It has been a problem right from the existence of man and this will continue to be a problem if we do not the right. The business of acquired a formidable accommodation is joint effort of engineering sectors. The culture of people also place limitations on housing availability.

6. Conclusion and Recommendations

Engineers play import role in infrastructural development of any nation. Engineers always ensure that they find solution to any problem at hand by applying knowledge and the experience they have gathered to solve the problem and to build projects that will benefit human beings. The engineers always involve in two kind of project which are: Designing and building of projects that will meet the basic needs of human beings such as housing, sanitation portable water and communication service and they also problems in our environment (environmental problem) by recycling the resources.

The Nigeria Government must encourage indigenous engineers which will turn further to create jobs from ancillary needs arising from infrastructural development.

The National Board for Technical Education, The Council for the Regulation of Engineering in Nigeria and The National Universities Commission should work together and give advice to the Government where necessary and also redesign engineering curriculum in our Institutions to enhance infrastructural development.

Engineers should also involve as the stakeholders at the planning and decision making and any ongoing project should not be neglected by incoming Government they should continuity in project embark upon by a Government since there is no vacuum in Government.

References

The Engineer, Society and Sustainable National Development, Igbinedion University, Okada, Edo State,2011,Public Lecture by Samuel Tita Wara.

Olajuyin E.A. Professional Engineer's Roles and Responsibility in Nigeria, unpublished work

Onipede A.I.M.,2004, The role and practice of Engineering in Society, R.R.R Press(Educational Publishers),Akure.