

TERM PAPER

ON

ENGINEERING LAW AND MANAGERIAL ECONOMICS CHALLENGES AND WAY FORWARD FOR INFRASTRUCTURAL DEVELOPMENT

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**CERTIFICATION**

This is to certify that this work was undertaken by ADEBIYI OLUMUYIWA DANIEL prepared and presented to the department of mechanical and mechatronics engineering on the subject topic on “ENGINEERING LAW AND MANAGERIAL ECONOMICS CHALLENGES AND WAY FORWARD FOR INFRASTRUCTURAL DEVELOPMENT” of Afe babalola university,

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**DEDICATION**

## This report is dedicated to the head of mechanical and mechatronics engineering, lectures of Engineering law and Managerial Economics and to my colleagues in mechanical engineering in the college of engineering ABUAD.

**ABSTRACT**

The study focused on the role of engineers towards achieving sustainable infrastructural development. Critical reviews of the problems facing the development of technology were discussed as well as the way forward. Based on the challenges of our immediate society, the level of our technology can only be improved when our teaching and curriculum is reviewed and improved upon to further benefit students, lecturers, engineers, and other practitioners of the field. Hence, the study suggested that our approach as engineers towards research must change from the basic research concept to applied research concept. This would not only improve the academic sector but hasten the rate at which problems are solved by the engineers in the society, thereby bringing sustainability.

**CHAPTER 1**

WHAT IS ENGINEERING LAW?

Engineering law as a word, is a combination of two words, Engineering and law.

* **Engineering:** Engineering as a scientific course of study and scientific applicable practice is defined as the use of [scientific principles](https://en.wikipedia.org/wiki/Scientific_method) to design and build machines, structures, and other items, including bridges, tunnels, roads, vehicles, and buildings.[[1]](https://en.wikipedia.org/wiki/Engineering#cite_note-1) The discipline of engineering encompasses a broad range of more specialized [fields of engineering](https://en.wikipedia.org/wiki/List_of_engineering_branches), each with a more specific emphasis on particular areas of [applied mathematics](https://en.wikipedia.org/wiki/Applied_mathematics), [applied science](https://en.wikipedia.org/wiki/Applied_science), and types of application
* **Law: Law** is commonly understood as a [system](https://en.wikipedia.org/wiki/System) of rules that are created and [enforced](https://en.wikipedia.org/wiki/Law_enforcement) through social or governmental institutions to regulate conduct,[[2]](https://en.wikipedia.org/wiki/Law#cite_note-ReferenceB-2) although its precise definition is a matter of longstanding debate.[[3]](https://en.wikipedia.org/wiki/Law#cite_note-willis-3)[[4]](https://en.wikipedia.org/wiki/Law#cite_note-jpgibbs-4)[[5]](https://en.wikipedia.org/wiki/Law#cite_note-akers-5) It has been variously described as a [science](https://en.wikipedia.org/wiki/Social_science#Law) and the art of justice.[[8]](https://en.wikipedia.org/wiki/Law#cite_note-mlcohen-8)[[9]](https://en.wikipedia.org/wiki/Law#cite_note-9)[[10]](https://en.wikipedia.org/wiki/Law#cite_note-10) State-enforced laws can be made by a collective [legislature](https://en.wikipedia.org/wiki/Legislature) or by a single legislator, resulting in [statutes](https://en.wikipedia.org/wiki/Statute), by the executive through [decrees](https://en.wikipedia.org/wiki/Decree) and [regulations](https://en.wikipedia.org/wiki/Regulation), or established by judges through [precedent](https://en.wikipedia.org/wiki/Precedent), normally in [common law](https://en.wikipedia.org/wiki/Common_law) jurisdictions.

This brings us to the definition of Engineering law as a whole.

**Engineering law:**

In North America it is common to have four years of engineering education and four years of professional experience before being licensed as an engineer.

Generally, between 16 and 40 hours of training per year are required for an engineer to continue to practice. Training is required to ensure that an engineer keeps up with relevant codes, standards and technology.

**Engineering law** refers to the application of [laws](https://en.wikipedia.org/wiki/Laws) applying to the practice of professional [engineering](https://en.wikipedia.org/wiki/Engineering). Engineering law is the study of how ethics and legal frameworks should be adopted to ensure public safety surrounding the practice of engineering. California law defines engineering as the professional practice of rendering service or creative work requiring education, training and experience in engineering sciences and the application of special knowledge of the mathematical, physical and engineering sciences in such professional or creative work as consultation, investigation, evaluation, planning or design of public or private utilities, structures, machines, processes, circuits, buildings, equipment or projects, and supervision of construction for the purpose of securing compliance with specifications and design for any such work[[1]](https://en.wikipedia.org/wiki/Engineering_law#cite_note-1). By comparison Ontario lists safeguarding of life and public welfare in its definition. Ontario law defines engineering as the act of planning, designing, composing, evaluating, advising, reporting, directing or supervising that requires the application of engineering principles and concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment, or the managing of any such act

The practice of engineering is largely separated from the practice of a natural scientist by engineering law. A semiconductor physicist and an electrical engineer, practicing at a large company are mainly differentiated by the laws they are practicing under and the license they carry. The laws and the license will affect the tasks that can be performed by the engineer compared with the tasks that can be performed by a natural scientist. Engineers are held to a specific legal standard (see below) for ethics and performance while a natural scientist is not. Engineers are subject to disciplinary measures such as fines or loss of license for professional misconduct and negligence.



**Why Do Engineers Need to Study Law?**

Engineers and engineering managers need to have a working knowledge of the laws that affect their work so that they can do the following: Follow regulations. Stay compliant with governmental ordinances.

**CHAPTER 2**

WHAT IS MANAGERIAL ECONOMICS?

**Managerial economics** deals with the application of the economic concepts, theories, tools, and methodologies to solve practical problems in a business. In other words, managerial economics is the combination of economics theory and managerial theory. It helps the manager in decision-making and acts as a link between practice and theory.[[1]](https://en.wikipedia.org/wiki/Managerial_economics#cite_note-1) It is sometimes referred to as [business economics](https://en.wikipedia.org/wiki/Business_economics) and is a branch of [economics](https://en.wikipedia.org/wiki/Economics) that applies [microeconomic](https://en.wikipedia.org/wiki/Microeconomic) analysis to decision methods of businesses or other management units.

As such, it bridges economic theory and economics in practice.[[2]](https://en.wikipedia.org/wiki/Managerial_economics#cite_note-2) It draws heavily from quantitative techniques such as [regression analysis](https://en.wikipedia.org/wiki/Regression_analysis), [correlation](https://en.wikipedia.org/wiki/Correlation) and [calculus](https://en.wikipedia.org/wiki/Calculus).[[3]](https://en.wikipedia.org/wiki/Managerial_economics#cite_note-3) If there is a unifying theme that runs through most of managerial economics, it is the attempt to [optimize](https://en.wikipedia.org/wiki/Optimization_%28mathematics%29) business decisions given the firm's objectives and given constraints imposed by scarcity, for example through the use of [operations research](https://en.wikipedia.org/wiki/Operations_research), [mathematical programming](https://en.wikipedia.org/wiki/Mathematical_programming), [game theory](https://en.wikipedia.org/wiki/Game_theory) for strategic decisions,[[4]](https://en.wikipedia.org/wiki/Managerial_economics#cite_note-4) and other [computational methods](https://en.wikipedia.org/wiki/Computational_economics).[[5]](https://en.wikipedia.org/wiki/Managerial_economics#cite_note-5)



**CHAPTER 3**

 CHALLENGES OF ENGINEERING IN NIGERIA

* In most private and government establishments in Nigeria, engineering personnel are assumed to know all. A mechanical engineer can be employed to do the work of an electrical engineer, computer engineer, civil engineer, e.t.c at the same time instead of seeking out the services of engineering specialists in these other areas or fields of engineering.
* Most engineering establishments ever since they were commissioned have not been upgraded, thereby not able to meet up with the present-day demand.
* Non-engineers carrying out engineering contracts using engineering credentials: most engineering contractors carry out engineering projects using engineering credentials of engineering professionals in order to win or secure engineering contracts.
* Most engineering projects in the country are carried out using the fifty percent rule, thereby eating the capital and not the profit that is, contractors giving even more than fifty percent of the total cost of a project to some corrupt government officials and politicians before actually embarking on a project and in most cases, since the remaining part of the money will not be enough to do the job, the project may not be carried out and if it is carried out at all, it is usually sub-standard or abandoned.
* The attitude of the government towards research and development hinders research opportunities in research institutions and universities. The government considers research and development projects to costly, therefore, universities and other tertiary institution are not given funds for it.

**CHAPTER 4**

WHAT ARE THE WAYS FORWARD FOR INFRASTRUCTURAL DEVELOPMENT?

* Division of labor: Engineering professionals in different fields should be employed in all engineering departments in both public and private sectors, so that jobs can be given to engineers in his/her specific area of study. In summary, there should be division of labor.
* Just as the ministry of health is governed by a medical practitioner and the office of the attorney general is occupied by a lawyer, the offices of the ministers and commissioners of works and housing, energy, transportation, and environment should be run by engineers.
* Existing engineering facilities and infrastructure should be upgraded to the present-day state-of-art facilities in order to meet up with present day demand.
* Routine maintenance work should be carried out regularly after the commission of a project. This will increase the life span of such infrastructure and facilities.
* Engineers should be disciplined and avoid non-engineers using them to achieve their selfish aim.
* The pay package of engineers in Nigeria should be commensurate with their counterparts in Europe and America, so that they will not be tempted to eat the capital of any projects.
* Government should make money available for engineering research and development, in order for the country to advance technologically.

**CONCLUSION**

In conclusion, **Engineers** help to develop the physical infrastructure we all rely on – transport networks, roads, bridges, water and energy supplies, and waste management. ... And by building this infrastructure, **engineering** has had a much wider and more lasting **impact** – it has helped to fuel **economic** growth.