

## The Involvement of Law in Engineering Profession

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**Abstract**—Engineering law explains the interaction of law with industry. Engineering activities have some adverse effects on the environment through industrial wastes, gaseous emission air pollution and other forms of environmental degradation. There is the need to regulate harmful activities to the environment because of their adverse effect even though nature provides regeneration and maintenance of steady state conditions through the existence of a 2.7k background temperature space for heat rejection to close heat balance and the oceans, which accept continental runoffs to close material balances of cyclic process. Environmental control therefore seeks to conserve natural energy and mineral resources by subduing and utilizing nature's ecological cycles to serve the needs of humanity. Environmental control also seeks to replenish depletable fuel supplies with clean and abundant forms of gravitational solar and nuclear energy. In addition, environmental control seeks to conserve land and water runoffs, occurring naturally in the hydrological cycle. Engineering law and related laws contain provision that lead to the realization of the objectives of environmental control. This work discusses in one-swoop environmental control measures and the interaction of law with industry in relation to engineering activities/practices. The greatest engineering progress is achieved through the effective control of environmental/engineering activities to derive optimum benefits for humanity.

**Keywords**—Engineering activities, Engineering law, Environmental control

### 1 Introduction

The purpose of law is to achieve orderliness. Law also bring equity, fairness and decorum to a system. Progress is made in engineering when effective control of environmental activities is achieved by taking maximum advantage at minimum cost of these sumps and nature's cyclic process.

Environmental control therefore seeks to subdue and utilize nature's ecological cycles to serve the needs of humanity thereby conserving natural energy and mineral resources and to replenish desirable flora and fauna population by agriculture and cultivation to provide adequate food, clothing and shelter.

Environmental control also seeks to extend depletable fuel supplies with clean, abundant forms of gravitational solar and nuclear energy (fusion and fission). In addition, environmental control seeks to conserve land and water quality by channelling

into drainage canals concentrated runoffs from irrigation, municipalities, industries and mining so that these non-recyclable, unsalvageable mixtures are ultimately discharged into the oceans where they blend inconsequentially with the vastly larger amount of continental runoffs, occurring naturally as part of the hydrological cycle [1].

The engineering law attempts to explain the interaction of law with industry (industrial environment) while the environmental law regulates the interaction of humanity and the natural environment for the purpose of reducing the impact of human activity.

Increasing concern for the quality of human environment gave rise to Environmental Impact Assessment (EIA). The protection of scenery, clean air and water, relief from congestion, noise and monotonous urban landscapes and open spaces for active outdoor recreation heightened the world concern for proper management of the environment to improve its quality for the benefit of humanity. The first major thrust in dealing with the issue of environmental quality was made in the United State of America (USA) in 1969. Two large oil spillages which led to unprecedented damages to aquatic and marine life necessitated the setting up of an Environmental Policy Organization (EPO) by the government of the United State of America (USA). This was followed by the passage of the National Environmental Policy Act (NEPA) by the US congress in 1969. This in turn led to the global recognition of the need for an intentional synthesis of EIA method and practices. By 1975, many countries and other jurisdictions have adopted EIA process in decision making [2].

Engineering activities sometimes becomes associated with legal matters and thus requires the understanding of legal documents. A contract is perhaps the most important of these documents. The scope of work often referred to as the technical requirement of the contract is perhaps the most critical part of a contract. Disagreement over the scope of work is one of the most frequent causes of disputes. The scope of work is almost always individually crafted and often subject to a great deal of negotiation. The more time and effort spent on defining and understanding the scope of work, the lower the number of dispute over the work scope [3]. Contracts and indeed the scope of work must therefore be carefully worded in order to avoid scope creep, which often leads to cost overruns and litigation.

Most literatures abound with discussion of environmental control on human activities. Others examine the impact of engineering activities on the environment with little or no indication of the relevant laws that relate engineering activities to the industrial environment. Moreover, these issues are yet to be discussed in a single swoop. This missing link is addressed in this text. In other words, the work indicates the need for environmental control, the impact of engineering activities on industrial environment and identifies the relevant laws that relate engineering activities/practices to industry with the aim of harnessing the full potential of nature orderliness and healthy environment.

## **2 Methodology**

The approach adopted in the work identifies the laws that relates engineering activities/practices to the industry and discusses their relevance to environmental control. Efforts are made to internalize some of the laws in the Nigerian context with relevant examples.

### **2.1 Discussion**

Discussion of engineering law includes related laws likes the environmental law, property law, labour law, occupational safety and health as well as the company law and civil law. These laws relate to engineering activities/practices in one form or the other as indicated in the discussion. This fact is buttressed with examples in the discussion.

### **2.2 Engineering Law**

Engineering law (law in engineering) is the empirical study of the application of laws and legal strategy in engineering. The law in engineering attempts to explain the interaction of law and industry. Engineering law is therefore the meeting point for lawyers and engineers who are holders of bachelors of law and engineering respectively and may in addition possess the masters of business administration. Engineers may also obtain specialized training in law and utilize their technical expertise in the practices of environmental engineering. Pragmatic application of engineering law implies the experimental study and adoption of corporate legal framework for engineering activities/practices.

### **2.3 Environmental Law**

This is a collective term describing international treaties (conventions), statutes, regulations and common laws or national legislation that regulates the interaction of humanity and the natural environment for the purposes of reducing the impacts of human activity.

The main focus of the law is centered on two major areas namely [4]:

- Pollution control and remediation
- Resource conservation.

Environmental laws have wide scope and as such comprehensive list of the laws is not readily available. The benefit of environmental protection is unquantifiable. However the implication of environmental control measures imposes a lot of restrictions on commerce. The limitations and expenses that such laws impose on commerce as well as the immeasurable benefit of environmental protection have generated significant controversy [4]. The controversy, notwithstanding, natural environment is fragile and requires special legal protection from human activity. This led to the recognition

of the need to establish some legal structures for environmental protection. About 1960, environmental law evolved from the development of these legal structures for the protection of the environment following increased public concern over the impact on the natural resources and health by man's adventure into the outer space. In a relatively short time, a huge body of environmental law was produced due largely to the emergency and success of environmentalism as a political movement. By the end of the 20th century, environmental law had been established as a legal component in many countries of the worlds [4].

In Nigeria, the Federal Environmental Protection Agency (FEPA) was established in 1988 charged with the responsibility for the protection and development of the Nigerian environment including policy initiation in relation to environmental research and technology. This action was followed by the promulgation in 1992 of the Environmental Impact Assessment (EIA) Decree 86 (Now an Act of National Assembly) to give legal muscle for the enforcement of various policy provisions on the need for studies in the environmental impact of both public and private sector projects at the planning stage[2].

#### **2.4 Property law**

Property refers to an object like car, book and cell phone owned by a person and the relationship the person has on it. We have movable property referred to as personal property and immovable property such as real estate or real property [5]. Property law covers the various forms of ownership and tenancy in real property (land) and the associated rights and obligations. According to Badenhort et al [6] property rights are rights over things enforceable against all other persons while contractual rights are rights enforceable against particular persons. For contractual property rights to be enforceable, the provisions of such rights must be crafted into a contract through the scope of work which involves engineering activities by way of measurement (property valuation) and construction (property development). The scope of work should be properly crafted to avoid disputes that may lead to litigation.

#### **2.5 Labour law**

Labour law otherwise called the employment law deals with the relationship between workers (employees), employers, trade unions and the government. The tripartite relationship between employee, employer and union is covered by the collective labour law while employees' contractual rights at work are the main focus of individual labour law [7].

The emergence of labour movement in the 19th century gave rise to the enactment of labour law which was intended to protect the rights and welfare of workers and simultaneously curb the excesses of employers over the working conditions of workers. The worker's welfare and working conditions include minimum wage, living wage, working time as well as the occupational safety and health of the worker.

## **2.6 Minimum Wage**

There may be law stating the minimum amount that a worker can be paid per period. The minimum wage is usually different from the lowest wage determined by forces of supply and demanded in a free market and therefore acts as threshold wage or benchmark. Each country sets its own minimum wage laws and regulations. While a majority of industrialized countries has a minimum wage, many developing countries have not. Minimum wages are regulated and stipulated in some countries that lack specific laws. In some cases, minimum wages are negotiated between the labour unions and employers through collective agreements that cover non-union workers and non-organized employers [8].

In Nigeria, the Federal government sets 18,000 naira per month as the minimum wage for its employees. The state governments are encouraged to set commensurate minimum wage for their employees. The minimum wage is to be reviewed periodically in consonance with economic exigencies.

## **2.7 Living Wage**

The living wage is higher than the minimum wage. All industrialized countries are discussing living wage while many developing countries are still grappling with minimum wage [8].

## **2.8 Working Time**

The law for working time was necessary as people were sent to work longer than they could without a break. People were not given wages for extra work. To check this trend, the law was established so that workers would need to work only for a particular time (8 hours per day) [8].

## **2.9 Occupational Safety Health**

Other labour laws involve safety concerning workers. The worker's compensation law ensures that the worker injured or disabled in industry is enabled through proper medical treatment, to return to wage-earning capacity as promptly as possible and while incapacitated should receive compensation in lieu of wages regardless of fault. The expense of medical treatment and compensation should properly be borne by industry and become part of the cost of its product [1]. The laws generally provide that the workers injured in industry shall be furnished the necessary medical treatment and in addition compensation based on a percentage of their average weekly or monthly wages are paid periodically. Dependents of employees killed in industry are likewise compensated. In Nigeria the Employees Compensation Act 2010 provides for the payment of compensation to workmen for injuries suffered in the course of their employment.

Labour law relates to engineering practices through work measurement and time study collectively known as work study. Proper work study leads to appropriate eval-

uation of workers` remuneration and compensation in the events of industrial accidents. This translates into reduced downtimes from industrial disputes.

### **2.10 Factory Act Cap F1 LFN 2004**

In Nigeria, the Factory Act Cap F1 LFN 2004 highlights the statutory duties of factory owners or occupiers and makes provisions for breaches of the duties. The Act is supposed to play a preventive role by way of reducing or arresting the numbers of accidents in the industry. The Act should be regarded as a beneficial rather than a penal statute.

### **2.11 Trade Unionism in Nigeria**

The Organized Trade Union Movement in Nigeria dates back to 1912 when the workers in the Civil Service under the then Colonial administration organized themselves into workers representatives. This then became known as the Nigeria Civil Service Union. It became a pivot with which workers in other sectors began agitation for the formation of Trade Unions before and after independence in 1960 [9].

### **2.12 Nigeria Labour Congress (NLC)**

Before 1978, over 1000 unions structured into 42 industrial unions existed. These 42 industrial unions were affiliated to 4 labour centres namely Nigeria Trade Union Congress (NTUC), Labour Unity Front (LUF), Nigeria Workers Council (NWC) and United Labour Congress (ULC).

The emergence of the NLC ended decades of rivalry and rancour involving the four centres and unions affiliated to them. NLC survived two instances of dissolution of its national organs and consequent appointed of state administration under the military regimes of General Ibrahim Babangida (1988) and Sani Abacha (1994) [9].

The mission statement of NLC is to organize, unionize and educate all categories of Nigeria workers; defend and advance the political, economic, social and cultural rights of Nigerian; emancipate and unite Nigerian workers and people from all forms of exploration and discrimination; achieve gender justice in the work place and in NLC; strengthen and deepen the ties and connections between Nigeria workers and the mutual/natural allies in and outside Nigeria and lead the struggle for the transformation of Nigeria into a just, humane and democratic society [9].

Disagreement within the leadership of NLC due to the influence of government, led to the emergence of another labour union known as Trade Union Congress (TUC). Fortunately, current leadership of NLC and TUC are working to ensure that the welfare of workers is not mortgaged/jeopardized.

### **2.13 Companies Law**

The law concerns companies and business organization that performs some forms of economic and charitable activity. The law of business association as it is sometimes called evolved from the common law of England in 20th century and covered the business activities of corporation, partnerships, public limited companies and sole proprietorship [10].

The largest of these corporate entities is known as corporation. It is a separate legal personality and usually publicly listed on stock exchanges around the world. Investments into such business have limited liability for any losses incurred under corporate law. The mandate of most of these business organizations is to maximize profits with little or no extension into charity or social welfare considerations. Some business organizations may be established with the purpose that parallel, supersede or even replace profit maximization mandate of such entities. These business organizations include cooperative societies, credit unions, non-governmental organizations (NGO) and publicly owned enterprises [10, 11].

Clubs and charities are non-commercial business bodies where members make certain payments as guarantee in the event of insolvent liquidation. Other forms of business association include the following [10-12];

Companies limited by guarantee with a share capital are hybrid entities usually formed for non-commercial purposes. The activities of such companies are partly funded by investors who expect returns.

Company limited by shares is a legal entity where people invest in the shares of the business with limited liability for losses incurred by the company.

Unlimited company (with or without share capital) is a hybrid of the limited company where shareholders do not benefit from limited liability in the event of formal liquidation of the company.

Under corporate law, corporations have the authority to make regulations for the management of their interests and affairs. Such regulations must not conflict with the law of the land and government are not also expected to regulate towards the particular circumstances of a given enterprise [12].

In Nigeria, business activities are regulated by the provisions of the company and Allied Act administrated by the Corporate Affairs Commission (CAC). The CAC registers companies and issues business permits among other functions.

### **2.14 Civil Law**

Civil law or civilian law serves as the primary source of law that is codified into a referable system. The civil law is a group of legal ideas and systems that proceeds from abstractions. This is in contrast with the common law systems whose intellectual framework comes from judge-made decisional law which gives precedential authority to prior court based on similarity considerations [13, 14].

Litigation and disputes arising from engineering practices/activities fall under the civil law system.

Engineering practices/activities have one form of involvement or the other with patents, trademarks and copyrights. The discussion of the level of involvement is outside the scope of this work.

### 3 Conclusion

Most significant engineering progresses are made through effective control of environmental/ engineering activities. Strict observance and enforcement of the various laws that relate to engineering practices will engender orderliness and healthy environment for human benefit. The public standard of living is highest when engineering activities/practices are carried out by responsible and cost conscious persons in accordance with engineering best practices to achieve optimum benefits for humanity.

### 4 References

- [1] Avallone EA, Baumeister III T. Marks standard handbook for Mechanical Engineers, 10th ed. McGraw-Hill International Edition, Mechanical Engineering Series. Chapter 18. 1997.
- [2] Umeh LC, Uchegbu SN. Principles and Procedures of Environmental Impact Assessment (EIA). Computer Edge Publishers (Subsidiary of Amazing Grace Printing and Publishing Company). 1997.
- [3] Zack JG (Jr) Contracting for capital projects. American Association of cost Engineers (AACE) international. Chapter 25. 2000.
- [4] Lazarus R, The making of Environmental law, 2004. Cambridge press <https://doi.org/10.7208/chicago/9780226470641.001.0001>
- [5] Waldron J, Property (Movable and Immovable Property), 2004. Stanford Encyclopaedia of philosophy.
- [6] Badenhorst PJ, Pienaar JM, Mostert H. Silberberg and Schoeman's The Law of property, 5TH Ed., Durban, Lexis Nexis/Butterworth's. 2006.
- [7] Selwin N, Selwyn's law of employment, 2008. Oxford University Press.
- [8] Clain. S. How living wage legislation affects US poverty rates. Journal of Labour Research 2008; 29 (3); 205-18 <https://doi.org/10.1007/s12122-007-9028-8>
- [9] History of Trade Union in Nigeria. Nigeria Union of petroleum & Natural Gas workers (NUPENG). ([nupeng.org/id17.html](http://nupeng.org/id17.html)). Accessed October 9, 2013.
- [10] Wilson J, 'Of Corporation'. Lectures on law delivered 1790-91 at the University of Pennsylvania, vol. II, ch. x.
- [11] Kraakman, RH et al. Anatomy of corporate law: A comprehensive and functional approach 2004, Oxford University Press, New York. ISBN 0-19-926063-x
- [12] Lowry J, Dignam A. Company Law, 2006, Oxford University Press, New York ISBN 0-19-928446-6
- [13] Arnold-Baker C, The companion to British History, s.v. 'English Law' (London: Loncross Denham press). 2008, P.484
- [14] Arnold-Baker C. The companion to British History, s.v. 'Civilian' (London Routledge). 2001. P.308

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