



PROFESSIONAL ETHICS AND LOCAL CONTENT – A PANACEA FOR NATIONAL TECHNOLOGICAL ADVANCEMENT

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ABSTRACT

Unemployment, poverty, corruption, stealing, kidnapping, armed robbery, militancy, terrorism, farmers/herdsmen clashes, banditry, and their likes are the hydra headed development challenges attacking the economic, educational and socio - political fibres of the Nigerian economy. Usually not deficit on cerebral policy formulation, the Nigerian government, in April 2010, signed into law, the Local Content Act, otherwise known as the Nigerian Content Development Act anchored on local capacity/capability development of her human resources in the industrial sector, particularly the petroleum industry so as to enhance the financial performance of citizens. The direct consequence of this are domestication of assets and growth of Nigerian entrepreneurship for the realization of her strategic goals of development. The thriving fulcrum of this policy is the technological field where engineers, technologists, technicians, artisans, analysts, programmers, etc. play prominent roles. The boundary conditions upon which sound professional practice (in this case engineering) is activated and often instituted by the regulatory professional bodies or professional associations, coupled with human morality, epitomizes the ethical professional conduct. The resultant effect of ethical professional conduct with the local content policy and its proper implementation, yields technological growth or advancement for the Nation. This would no doubt eliminate or reduce the earlier enumerated development challenges to the barest minimum.

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1.0 PROFESSION, PROFESSIONALS AND PROFESSIONALISM

1.1 PROFESSION

A profession means an occupation or job which enables an individual earn a living. Major considered criteria in a profession are: advanced expertise, self-regulation and public good.

i. Advanced Expertise

Continuing education and updating of knowledge are very vital with a base of both sound technical knowledge and liberal arts knowledge.

ii. Self-Regulation

An organization and/or society that provides a profession has the responsibility of setting standards for admission, preparing ethical codes, enforcing minimum standards of conduct and acting as representative of the profession before the government and general public. In Engineering in Nigeria, we are blessed with not a few. They include the Nigerian Society of Engineers (NSE) and the various divisions, Association for Consulting Engineering in Nigeria (ACEN), and the Council for the Regulation of Engineering in Nigeria (COREN).

iii. Public Good

By maintaining high ethical standards throughout a profession, some public benefits are served. Being that every occupation has the intent to cater for public welfare, professional ethics are set to maintain decency and decorum by practitioners.

1.2 PROFESSIONAL

Some authorities have their own definitions of who a professional is:

a. Mike Martin and Ronald Schinzinger averred:

“Engineers are professionals when they attain standards of achievement in education, job performance or creativity in engineering and accept the most basic moral responsibilities to the public as well as employers, clients, colleagues and subordinates.”

b. Samuel Florman opined, “Professionals have to meet the expectations of clients and employers. Professional restraints are to be imposed by only laws and government regulations and not by personal conscience.”

c. Robert L. Whitelaw said, “Only consulting engineers who are basically independent and have freedom from coercion can be called as professionals.”

Summarily thus:

One who is paid for getting involved in a particular profession to satisfy the laws of the profession and earn a living therein is a professional.

1.2.1 MODELS OF PROFESSIONAL ENGINEERS

A professional engineer acts as one or more of the following in performing his/her tasks.

1. Social Enabler or Catalyst

This engineer brings society to understand its welfare and does all he can for the people’s benefit.

As a company worker, this engineer helps his company and society to understand their needs and supports their decisions in work so as to realize them quickly.

2. Social Servant

An engineer who without any selfish or business interest, works for societal benefit. With hindsight of societal needs he receives a task as part of government’s concern for the society and accomplishes it based on societal expectations. Most often, these are community settlement projects.

3. Game Player

This engineer is neither a servant nor master but provide his work plans and services according to the economic game rules per time. As a worker, he is versed with smartly handling economic conditions of the company.

4. Saviour

This engineer saves a company or a group of persons from technical danger. Saviour engineers solved the Y2K problems of computers and their networks around the world.

5. Bureaucratic Servants

This engineer is loyal and with his skills, solves problems as they occur. As a worker in a company, he is loyal and solves technical problems therein as they occur. The organization in turn relies on him and his decision making for their future growth.

6. Guardian

This engineer knows the direction towards a better future. He is a pacesetter and knows the direction in which there is scope for the technology to develop. He is versed with innovative ideas for technological development.

1.3 PROFESSIONALISM

This implies a certain set of attitudes and comprehensively covers all areas of practice of a particular profession.

Professionalism therefore means doing the right thing irrespective of ones feelings. Professionals therefore commit to conform to specific kind of activity and conduct.

Virtue (desirable feature of character) is specified by moral ideals. Virtue involves attitudes, motives and

emotions. It is/are desirable way(s) of relating to others – be they groups or individuals. Professional ideals and virtues otherwise known as Responsible Professionalism involves:

- ✓ Public spirited virtues
- ✓ Team work virtues
- ✓ Self-governance virtues, and
- ✓ Proficiency virtues

2.0 PROFESSIONAL ETHICS

Business Dictionary defines Professional ethics as:

Professionally accepted standards of personal and business behaviour, values and guiding principles. Codes of professional ethics are often established by professional organizations to help guide members in performing their job functions according to sound and consistent ethical principles (Web Finance Inc., 2020).

Tutorialspoint (2020) opine that: Ethics has its origin in the Greek word “ethos”, which means “character”. Thus ethics are a set of principles or rules generally considered as standards good or bad, right and wrong, usually imposed by a profession, society, regulatory body or even an external group.

Engineering ethics involves the decisions, policies and values that are morally desirable in engineering practice and research.

Aside moral issues, engineering ethics include but not limited to responsibility for safety, confidentiality, balanced outlook on law of the land/international law, global issues, professionalism etc. The word best practices often refer to the standard acceptable in a profession worldwide.

Juxtaposing the above with engineering itself being a process of developing efficient mechanism which eases and quickens the work in regards to limited resources and the help of technology.

Cutting edge technology therefore, permit me to say, enjoys the confidence of professional ethics while the Nigerian Local content act thrives on human capital development (education/training), technology being the principal platform.

2.1 CONFIDENTIALITY

It is very vital to note that an engineer or employee is expected to maintain the employer or organizations confidentiality. Though over the years one has observed that this employers confidence expected of the employee has been highly degraded. It used to be

taken very seriously and employers entered it as a must condition before engaging an employee. His/her interview session must among other things include that. Even management staff in public and private sectors discuss their organizations’ most guarded secrets without considering the grave import of what that meant.

Therefore, the practice which enables the keeping of secret in respect of all information seen as to be kept secret is called confidentiality.

By this, no data concerning an organization’s technical processes and businesses that are not already in the public domain must be revealed. Companies treasure their secrets because that is the thing that makes them to remain competitive.

Note that it is on the platform of confidentiality that multi-national giants such as Coca-Cola and Guinness stout are still thriving on top of their competitors till date. The mixing formulae of the components of these two drinks – beverage and beer respectively remain highly guarded secrets.

Organizations therefore know the individuals and groups that are in possession of or have access to certain privileged information. Tutorialspoint (2020) notes that the responsibility of maintaining confidentiality thus lies on such groups or individuals.



2.1.1 ISSUES CONCERNING CONFIDENTIALITY

The major issue for confidentiality are as follows:

1. Intellectual property: this business concept involves creativity such as designs, symbols, names and images used in commerce, inventions, literary and artistic works, books, journals, music, etc.

To enable people earn recognition for their intelligence and genius, intellectual property (IP) is therefore protected by the law in the form of trademarks, copyrights and patents.

In our society today, people in an attempt to make quick money run foul of this IP law. By this, other people's ideas and inventions are utilized without due diligence of permission. The whole of Alaba International market is notorious for piracy. Designs of infrastructural projects are freely copied and pasted without recourse to the law. A structural engineer for example may replicate same designs already paid for by a client without recourse to taking permission. That is why one can hardly put up even an iconic project today without being copied. It believes on an engineer working in any organization to avoid infringing on anyone's intellectual property. Some major organizations record their confidentiality expectation among other things in the form of guide books (do's and don'ts) for all employee's to maintain. In Sept. 1998 – Sept. 1999, one was privileged to be one of the major engineers that executed the 50,000 capacity seat auditorium for Winners' Chapel which was till late 2018, the world's largest auditorium by Guinness Book of Records. The day to day activities from Sept. 1998 – Sept. 1999 were recorded on video but was never released for circulation.

2.1.2 INFORMATION TYPES

Two types of information make up the confidential information. They are Proprietary Information and Privileged Information.

- a. Proprietary Information – In this case the company involved is the proprietor of the information and owns it. It is a trade secret. Legally therefore, competitors are disallowed from manufacturing and selling the products unless with permission of the patent holder. Note that for cases where there are no legal protection, reverse engineering could be employed for the product analysis so as to estimate its manufacturing for duplication or improving on that without any permission. Presently, I'm consulting for a Paving Stone and Concrete producing company at Owerri. The terms of reference is for me to give them a mix design which would lower their cost of production while having a higher compressive strength. Infact, they want to best other notable concrete and paving producing companies in Nigeria. With conventional materials of Portland cement, fine and coarse aggregates, AL – Consultancy Global Concepts Limited, found out there was no way to lower the production cost and to obtain comprehensive strengths higher than the 25 N/mm² they had attained. However, with the introduction of Axion Engineering Products, tuffcrete in particular, paving stones crushed after just 3 days yielded 21 N/mm² and in 7 days 30 N/mm². By Eurcode standard, compressive strength of 66 percent is obtained after 7 days curing. Therefore, in 28 days, a compressive strength of 45.5 N/mm² would be arrived at. Our mix design is such that with the tuffcrete, the quality of Portland cement reduced while coarse aggregates are totally eliminated. In the final analysis, the company would reveal the compressive strength of their products to the public but never reveal their mix proportions. It's both proprietary and privileged information for the organization. However, the staff of the production team know this since I handed over the new mix design to them for adoption.
- b. Privileged Information – this is available to one on a special privilege, especially on an employee working on a special assignment. Most management and very senior staff are employed on the basis of trust that they would not reveal privileged information at their disposal.

2.1.3 WHEN ONE CHANGES JOBS

The fact that one has left a particular working place does not end his/her obligation to protect confidential information. At least moral rules demand that they must neither reveal nor sell such information to the new employer. Though a job change may be necessitated by desire to earn more income or for a particular desired career growth, the trade secrets of the former company must not be revealed.

The engineers' knowledge base intuitively generates workable and unworkable designs with trade secrets being part of this knowledge base. Hence, the best time to release an employee is at the end of the project to avoid the huge temptation to reveal information. Even employers encourage this revelation by asking the new employee; "how were you doing it in your former company?" They deliberately expect him/her to import secrets from former company to theirs under the cover of experience. This on its own is very unwholesome.

2.1.4 AUTONOMY OF INDIVIDUALS AND CORPORATIONS

Observing the rights and duties of autonomy along with its utilities involves:

1. Respecting the self-determination and freedom of individuals and corporations.
2. Recognizing that individuals and corporations have their legitimate control over some private information concerning themselves.
3. Once confidentiality is properly maintained, trust and trustworthiness can grow.

2.1.5 STRIKING A BALANCE BETWEEN EMPLOYEES AND MANAGEMENT ON CONFIDENTIALITY.

A win-win position between employees and management on confidentiality can be worked out.

While recognizing the rights of employers and protecting the rights of engineers and other employees, employment contracts with few imposed restrictions are resorted to. Such restrictions include – geographical location of future employers, the type of work one can do for future employers and the length of time to engage in certain kinds of work after leaving the present employer. Most often though, courts tend not to recognize such contracts as binding for the fact that they threaten individuals rights to freely pursue their careers.

Alternatively, one or a combination of the following may be adopted

- a. An agreement not to work on similar project for few years.
- b. An agreement not to consult for another company on similar project till the project at hand is completely concluded. This makes for moral abiding by the consultants involved.
- c. Knowledge base of engineers involved in research and development could be lessened allowing them in on trade secrets when and when they are imperative.
- d. Generating and inculcating a life time professional responsibility that transcends the directives of current employers.

2.1.6 CONFLICTS OF INTEREST

This occurs when employees have entrenched interest that prevents the meeting of obligations with employers or clients when pursued.

Tutorialspoint (2020) opines that the meeting point of the understated conditions give rise to conflicts of interest:

- i. The engineer is in a role that equips him to exercise good judgment to protect the interest of a client or an employer.
- ii. The engineer beside his present job, has some other interests that could make him not exercise good judgment in protecting the client or employers' interest.

It must however be noted that an engineer working in an organization but having some side business makes him a potential competitor within or colluding with a competitor. Either way, it is a threat to the business survival of his employers. As soon as this is detected, it is better to fire such an employee or release him to pursue his outside interest.

2.1.7 SOME CONDITIONS THAT CREATE CONFLICTS INTERESTS

1. Gifts, Bribes and Kickbacks

In the day to day running of a business some small gratuities can be offered an engineer as gifts.

Kickbacks are prearranged by contractors to organizations or their representatives with the sole purpose of settling for contracts granted or to be granted.

Bribes are substantial in cash or kind usually offered with the aim of gaining unfair or unethical advantage.

Example – a dealer and supplier once supplied several tons of reinforcement on a project I was managing and executing few years ago for a client at Elele. A simple test proved they were cast iron – very different to bend but also very brittle. That was an easy trap for collapse. When I complained, the supplier kept calling and chasing with the aim of ‘settling’ me so that I keep quiet about it. Trust that I would not fall for such a cheap trap. He was therefore instructed to remove all the supplied reinforcements at short notice.

Substantial amounts offered as gifts actually threaten fairness on projects and turn out to be bribes or ‘Greeks gift’. Therefore, the rule of thumb according to Tutorialspoint (2020)

is: “If the offer or acceptance of a particular gift could have embarrassing consequences for your company if made public, then do not accept the gift.”

2. Moonlighting

The desire for extra income or personal and professional growth makes an engineer working in a company to support another company. He does what is popularly called PP (Private Practice) with them and sometimes it leaves him exhausted thereby harming job performance in his real company.

3. Working for Competitors, Customers or Suppliers

More often this involves leakage of information for some form of benefits. When one goes that morally low, even the beneficiaries stop trusting him further.

2.2 RESPONSIBILITY FOR SAFETY

A famous consultant of yonder years, William W. Lowrence opined: “A thing is safe if its risks re judged to be acceptable.”

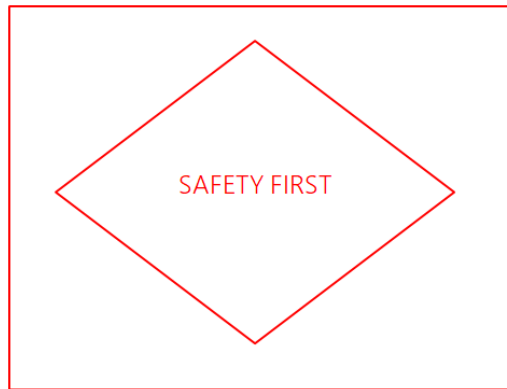
A responsible engineer must assess the rises of his experiments. Accidents and Disasters do occur, but knowing all the possibilities and proactively thinking of mitigation, drastically reduces if not eliminate their chances of occurrence.

The Oil and Aviation industries are known for their top priority to safety. Infact, in the oil industry, it is said that if it is not safe, don't do it.

2.2.1 SAFETY AND RISK

These two terms are inter-related. By reason of perception, what is safe for one may be harmful to another.

William D. Rowe said, “a risk is the potential for the realization of unwanted consequences from impending events.”



2.2.2 RISK MANAGEMENT



Risk can arise from these categories:

- ✓ Technical risks
- ✓ Organizational risks
- ✓ Project Management risks
- ✓ External risks

Wysocki (2009) opined that “effective project managers treat risk management as a dynamic part of every project.” Their plan has four parts as follows:

- ✓ Risk Identification
- ✓ Risk Assessment
- ✓ Risk Mitigation
- ✓ Risk Monitoring

Risks are commonly associated with losses – schedule slippage, cost increase or some catastrophic change. These losses being the mathematical product of the probability that an event will occur with known severity can therefore be estimated. This then is the reason why the project engineer or project manager makes a choice as to what to do to mitigate or reduce the losses.

According to Wysocki (2009), risks properly managed according to the above four phases answers the following questions:

- ☞ What are the risks?
- ☞ What is the probability of loss that results from them?
- ☞ How much are the losses likely to cost?
- ☞ What might the losses be if the worst happens?
- ☞ What are the alternatives?
- ☞ How can the losses be reduced or eliminated?
- ☞ Will the alternatives produce other risks?

2.2.2.1 RISK IDENTIFICATION

A typical risk identified on a project could involve the following

- Schedule is too aggressive
- Overambitious performance
- Too conservative a budget
- Unrealistic expectations
- Misunderstood contract terms
- New/unfamiliar technology
- Inadequate software sizing
- Unsuitable development model
- Unfamiliar new hardware
- Poorly defined requirements
- Frequently change requests
- Poorly defined process
- Volatile business environment
- Inadequately skilled personnel
- Continuous requirements changes
- Inadequate development plan
- Unsuitable organizational structure
- Testing facilities not available
- Poor software engineering methods
- Poor technology support
- Lack of political support for project
- Inconsistent client involvement
- Loss of critical team involvement
- Vendor/contractor relations
- Market/competitor pressures

All possible risks must be noted at first as the Risk drivers.

2.2.2.2 RISK ASSESSMENT

If the cost of avoiding a risk is greater than the expected loss, it can be ignored. An engineer cannot spend ₦1,000,000.00 in solving a ₦50,000.00 problem.

Risks may also be assessed on a Low, Medium and High scale. Risks could equally be assessed on worksheets as shown below.

Project Activity	A	B	C	D	E	F	G	H	I	J	Score
Rqmnts Analysis	2	3	3	2	3	3	2	2	1	1	22
Specifications	2	1	3	2	2	2	1	2	2	3	20
Preliminary Design	1	1	2	2	2	2	1	2	2	2	17
Design	2	1	2	2	2	3	1	2	2	1	18
Implement	1	2	2	3	3	2	1	2	2	1	19
Test	2	2	2	2	2	3	2	2	2	2	21
Integration	3	2	3	3	3	3	2	3	3	2	27
Checkout	1	2	2	3	3	3	2	3	2	2	23
Operation	2	2	3	3	3	3	3	3	1	1	24
Score	16	16	22	22	23	24	15	21	17	15	191
Maximum score is 270. Risk level for this project is 191/270=71%											

2.2.2.3 RISK MITIGATION

Five risk responses are open to the project engineer:

- i. Accept
- ii. Avoid
- iii. Contingency planning
- iv. Mitigate
- v. Transfer

2.2.2.4 RISK MONITORING AND CONTROL

After the risks are identified, probability assessed and made plans of what to do in the event the risk happens, the wise thing to do is to monitor and control the project risks.

A risk log is adopted with the following is adopted:

- ✓ ID number
- ✓ Risk description
- ✓ Risk owner
- ✓ Action to be taken
- ✓ Outcome

The risks are always kept in the front burner so that every project team member will be aware of them and know what is to be done in the event it happens.

2.3.3 THE GOVERNMENT'S POSITION

Risk management is to be viewed in a wider angle in case of disasters necessitated by improper care and assessment. It is the responsibility of government to take care of the people by protecting lives and property. An engineer who by reason of carelessness

Refuses to manage risks well should be aware that government would not look away or forgive.

The engineers in the Synagogue Church of All Nation collapse that claimed several lives are still being prosecuted by the Corona Court in Lagos state.

I'm in the know of an ongoing bill in the Delta state House of Assembly that only registered engineers with current practicing Licenses should engage in construction and maintenance works. Penalties for contravention are clearly spelt out.

2.4BALANCED OUTLOOK ONLAW

Engineers practice is done within human society where there are established laws. Nobody is above the law, not even the nobleness of the engineering profession exonerates them from the law.

Living in harmony in society demands that a balance be maintained between individual and collective needs of people. With the help of laws, the ethical conduct helps in maintaining such balance.

Even in the past, examples of how laws have helped ethical conduct of engineers abound. Some examples are shown below:

2.4.1BABYLON'S BUILDING CODE 1758 BC

Hammurabi, King of Babylon set this code to instil sanity in the builders of this time. It stated, "If a builder has built a house for a man and has not made his work sound, and the house which he has built was fallen down and so caused the death of the householder, that builder shall be put to death. If it causes the death of the house holder's son, they shall put that builder's son to death. If it causes the death of the house holder's slave, he shall give slave to the householder.

If it destroys property, he shall replace anything it has destroyed; and because he has not made the house sound which he has built and it has fallen down, he shall rebuild the house

which has fallen down from his own property. If a builder shall put that wall into sound condition at his own cost".

The above code regulated builders of that time, though applies very little today.

2.4.2THE UNITED STATES STEAMBOAT CODE OF 1852 AD

Very heavy and bulky steam engines were employed for travel in those days. Despite the modifications of scientist like Oliver Evans and Richard Trevithick on James Watt's invented steam engine by removing their condensers to make them compact, they still remained very heavy while boilers explosions remained.

Increased boat speed led to explosion of boilers on steam boats leading to disasters. Engineer Alfred Guthrie of Illinois then inspected 200 steam boats with personal finances and discovered the reasons for the boiler explosion. He prepared a report on that with the care that could avert it as recommendations. An Illinois senator shields incorporated the recommendation in senate documents which were later passed as law. Thus, the American society of Mechanical Engineers (ASME) adopted it in formulating the standards for steam boats manufacture.

2.4.3THE CHALLENGER CASE STUDY

The explosion of the space shuttle known as challenger is among the familiar known accidents. It was purely an ethical issue. It occurred on January 28, 1986. The challenger space shuttle principally consisted of two solid propellant boosters, orbiter and a single liquid-propeller booster designed to be reusable.

All the boosters were ignited as the orbiter took a lift-off the earth. However, the O-rings were eroded due to trouble caused by cold temperature.

Tutorials Point said, "The debacle highlights how lack of responsibility and morality, improper function, and lax performance of duties of the engineers resulted in the failure of the launch," even after Rogers commission was set up by President Reagan.

2.4.4 THE PROHIBITION OF NON-ENGINEERS FROM PRACTICING ENGINEERING AND FOR OTHER MATTERS CONNECTED THEREWITH BILL IN DELTA STATE, NIGERIA.

The welcome development will scare quacks off the practice of Engineering when enacted

into law in Delta state. Sanity would be maintained by practitioners to update their practicing licenses also. The issue of building collapse and infrastructural failure would be eliminated or greatly curbed.

2.5GLOBAL ISSUES

Engineering ethics transcends global issues.

The integration of nations through trade, investment, exchange of ideas and culture, and transfer of technology is increased by the concept of globalization. Multinational companies play crucial roles in enhancing globalization.

2.5.1TRANSNATIONAL (MULTINATIONAL) COMPANIES

International Labour Organization (ILO) defines transnational companies as those with main branch at Home country and other branches in different countries known as Host countries.

Not only do multinationals play vital roles in enhancing international relations and globalization, they equally powerfully influence local and world economies. Because they help in increasing the national GDP, multinationals some benefits in return including: pledges of government assistance, improved infrastructure, lax environmental and labour standards enforcement, and tax benefits.

Government expects high standards of operational efficiency wherever they are. Their safety measures, employee wages and benefits should be top class. Nevertheless areas of confrontation between multinationals and governments include: forcing multinationals to reveal to the public their intellectual property so as to gain technology for local entrepreneurs, threat of nationalization or changes in local business laws. Most often the above leads to withdrawal of investments by multinationals.

2.5.2 BUSINESS ETHICS

The aspects of business dealing with all employees and stakeholders in an ethical manner is called business ethics.

The expectation from organizations is that they abide by certain ethical values in the establishment, operations and functioning, employee welfare, waste management, environmental factors, corporate social responsibility, host community relationship, etc. Note that the reputation of a company which indirectly affect the share values in the global market are determined by the above listed ethical values. Most importantly, admirable business ethics include: open mindedness, meeting obligations, trust worthiness, good accounting control.

2.5.3 ENVIRONMENT ETHICS

The environment have been greatly impacted by globalization and industrialization. The ill effects of pollution and industrial negligence are common place as the aftermath of water and land contamination, acid rains, drying of lakes and canals, drought, foods, earthquakes and tsunamis (from drilling underground wealth), crops and food sources thinning away, cattle getting affected, etc. Thus marine beings are affected, ozone layer is depleted and Snow Mountains melt due to global warming.

Engineers must therefore show responsibility towards the environment.

Their approvals must be ethical so as to find mitigating solutions in protecting and preserving the environment. Environmental protection must therefore be supported in the activities of organizations.

2.5.4 COMPUTER ETHICS

This is actually a new area of applied ethics called computer ethics. Concerned professionals here are programmers, operators, designers, analysts, and users. A host of issues such as basic moral concerns including free speech, privacy, informed consent,

Respect for property and harm are raised by computers with internet, the hate speech bill at the senate currently has its fulcrum keyed in the above issues.

The computer Ethics Institute (1992) adopted what is popularly known as the ten commandments of computer Ethics. They are – That one should never use a computer to do the following:

1. To harm the people (anti-social activities).
2. To interfere with other's work (illegal manipulation).
3. To snoop into other's files (malware).
4. To steal a computer/data (hacking).
5. To bear false witness (manipulation and morphing).
6. To use/copy a software you didn't pay for (like illegal downloads and usages).
7. To use or copy other's software without compensations (illegal pirated versions).
8. To use other's intellectual output inappropriately (violating IPR).
9. Doing without thinking of social consequences of the program being written (libeling).
10. Always use a computer ensuring consideration and respect towards fellow beings.

The unprecedented cybercrime worldwide today is a proof to the fact that the entire world is lax concerning these ethics. Privacy factors are greatly threatened by illegal attackers or hackers despite the huge role of computers in technological advancement.

2.6 GENERAL RESPONSIBILITIES OF ENGINEERS

A few important virtues in engineering professionalism are:

- ☞ Loyalty to organization
- ☞ Respect for authority
- ☞ Collegiality and teamwork

2.6.1 LOYALTY

Loyalty calls for faithful adherence to an employer and organization. Two types of loyalty are:

1. **Agency Loyalty** – Doing one's job and acting to fulfil one's contractual obligation to an employer. One ensures he never steals from his employer.
2. **Altitude Loyalty** – Altitudes, emotions and a sense of personal identity are involved here. Thus, working grudgingly and spitefully despite performing all work responsibilities to manifest agency loyalty is not

loyalty Afterall.

2.6.2 RESPECT FOR AUTHORITY

Organizational goals are met by professionals who have respect for authority. Personal responsibility and accountability can be identified based on the levels of authority maintained by the organization. The major types of authority are:

1. **Executive Authority** – This refers to the institutional, organizational or corporate right accorded in person to exercise power based on available resources of an organization.
2. **Expert Authority** – This implies those equipped with competence, skill or special knowledge to perform a defined task or give sound advice.

An engineering oriented or service oriented organization concentrates on products quality, time and cost. These are decided by engineers who are the subject matter experts in this case.

A customer oriented organization on the other hand primarily focuses on customer satisfaction. Thus, the company goal decides the power between an Engineer or Technical Manager and a General Manager.

2.6.3 COLLEGIALLY

This is a term for a work environment where authority and responsibility are shared among colleagues.



Tutorials Point (2020) opine that “the disloyalty of professionals towards an organization, reflects the altitude they have towards the work environment for the salaries they are paid and the trust the company has for them.

Example – The National Society of Professional Engineers (NSPE) code posit “Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.”

Harmony among members in a workplace is maintained through:

- ✓ Respect
- ✓ Commitment, and
- ✓ Connectedness

In so doing mutual respect for others contribution, the dedication towards the social goods as promoted by the profession; commitment by way of sharing a devotion regarding the intrinsic moral ideas of engineering; and the knowledge of participating in cooperative projects based on coordination amongst team members leads to excellence in output executed on time and to budget.

2.7 PROFESSIONAL ENGINEERING REQUIREMENTS

The services provided by engineers require:

- ✓ Honesty
- ✓ Impartiality
- ✓ Fairness and equity, and
- ✓ Must be dedicated to the protection of public health, safety, and welfare. Security has also become vital.

Engineers must always note the following while fulfilling their professional duties:

- ✓ Perform services only in the area of their competence.
- ✓ Hold paramount the safety, health, welfare and now security of the public.

- ✓ Act for each employer or client as faithful agents or trustees.
- ✓ Avoid deceptive acts.
- ✓ Issue public statements only in a truthful and objective manner
- ✓ Conduct themselves responsibly, honourably, ethically and lawfully so as to enhance the honour, reputation and usefulness of the profession.

It must be noted that societies and associations have the code of ethics to be followed by engineers in their own respective disciplines, in acting responsibly towards the profession while being in ethical limits, thus moral concerns should always accompany professional ethics.

3.0 LOCAL CONTENT

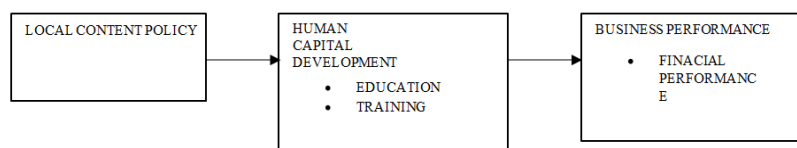
The local content act signed in March 2010 by President Goodluck Ebele Jonathan (GCFR) was targeted at promoting industrialization of the oil and gas industries in Nigeria, thus improving the economic and social wellbeing of citizens engaged in these industries.

Due to the near lack of local capacity/capability industrial sector, especially in the Petroleum Industry, this act among other things is directed at tackling the problem of insufficient value addition to the Nigerian economy (Bello, 2010).

With eyes fixed on domestication of assets and growth of Nigerian entrepreneurship so as to fully realize the nation's strategic development goals. Balonga, 2012; Gbeji and Adebisi, 2013 opined that over 30,000 jobs were to be created between 2015 and 2020 while also increasing the nations domestic share of the \$18billion annual spending on oil and gas from 45% to 70%, plus maximizing the multiplier effects on the economy via refining and petrochemicals.

Also known as the Nigerian content development bill it defines Local content as: "... The quantum of composite value added to or created in the Nigerian economy by a systematic development of capacities and capabilities through the deliberate utilization of Nigerian human, material resources and services in the Nigerian Petroleum Industry."

The conceptual model linking local content policy, human capital and business performance is shown below:



From:<https://www.google.com/search?q=local+content+policy&source=inms&tbm=isc&sa=x&ved=2ahUKewingP2...>
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This act covers the: mining sector, oil and gas industry sector, smes, etc.

In summary, the local content law says that Nigerian Independent operators should be given "first consideration" in the award of Oil and Gas related contracts, whole Nigeria service companies should be given "exclusive consideration" for contracts and service. Experts are of the opinion that the better option is to have Nigerian companies participate along the international oil majors for increased capacity building by the Nigerian companied.

As the world's eight, biggest oil exporter, relying on crude oil as major

Foreign exchange earner, the industry accounts forever 40% of Nigeria's GDP. The marked absence of indigenous players in these transactions where about 90% of the equipment and personnel used in the industry are imported (Temitope, 2015), is what the local content law seeks to address. By this law, a minimum threshold for the use of local services and promoting the employment of Nigerian staff in the industry is addressed. The local content law according to Ayomike and Okeke (2015) is a standard practice most often adopted by resources rich countries either as an economics tool used to create local capacity and capabilities that can favourably compete with foreign companies or as a measure for protecting local technology and services from foreign competition.

3.1 OVERVIEW OF THE NIGERIAN LOCAL CONTENT ACT

Source – Templars (2010)

All operations in the Nigerian Oil and Gas industry including Exploration and Production/Service companies fall within the applicability of the Nigerian Oil and Gas Industry Content Development Act (Local Content Act).

3.1.1 FIRST CONSIDERATION FOR NIGERIAN OPERATORS

Section 3 (1) of the act specifies that Nigerian Independent operators shall be given first consideration in the award of oil field license, oil lifting licenses, oil blocks and all projects requiring award of contracts.

Section 3(2) equally specifies Exclusive consideration to the Nigeria indigenous Service companies provided they show evidence of equipment ownership, Nigerian personnel for the project execution and capacity to

execute the project both on land and swamp operating areas.

3.1.2 EVALUATION OF BIDS WITH NIGERIAN CONTENT IN MIND

Templars (2010) notes the following

1. Where bids are within 1% of each other at commercial stage, the bid with the highest level of Nigerian Content shall be selected if and only if the Nigerian content in the selected bid is a minimum of 5% highest than its closest competitor.
2. Section 16 Contract award shall not only be based on the lowest bidder principle where a Nigerian indigenous company has proved the capacity to execute, thus the company shall not be disqualified on the basis that it is not lowest in financial bidding as long as the value exceeding the lowest bid is not exceeding 10%.

3.1.3 NIGERIAN CONTENT IN LABOUR AND EMPLOYMENT

1. Section 35 of the Act mandates all operators and companies to employ only Nigerians in their junior and intermediate cadre staffing.
2. Nigerians are to be given 1st consideration for employment and training in any project by any operator or project promoter in Nigeria.
3. It is required of each operator to submit to the board a succession plan in respect of any position not held by Nigerians with provision for Nigerians to understudy the incumbent expatriate for a maximum period of 4 years after which the position shall become Nigerianized. The only exception is in cases of retention of a maximum of 5% of management position who take care of investors interests.

3.1.4 IMPORTATION OF WELDED PRODUCTS PROHIBITION IN NIGERIAN CONTENT

Section 53 mandates all operators, contractors, project promoters and all entities engaged in the Nigerian Oil and Gas industry to carry out all fabrication and welding activities in-country. The only exceptions are cases where it can be proven before the Petroleum Resources Minister that there are no in-country capacity to execute the job. Section 11 therefore empowers the Minister to approve the importation of welded products for a maximum period of 3 years.

3.1.5 THE NIGERIAN CONTENT MONITORING BOARD (NCMB)

- The Act establishes a regulatory agency charged with the responsibility of regulating local content. It is called the Nigerian Content Ministry Board (NCMB).
- The implementation of all the provisions of the Act to ensure continuous and measurable growth of Nigerian content in oil and gas arrangements, operations, projects, activities and transactions in the Nigerian oil and gas industry is the responsibility of the Board.

3.1.5.1 SOME FUNCTIONS OF THE BOARD

The function of the board include but not limited to:

- Approval of Nigerian content plan
- Issuing Certificate of Authorization
- Determination of the minimum Nigerian content level in all projects not included in schedule A of the Act.
- Determining the adequacy or otherwise of the capacity of Nigerian indigenous contractors to perform the services listed in the schedule of services
- Issuance of local content Regulations for the industry.

3.1.6 NIGERIAN CONTENT DEVELOPMENT FUND

Also established by the Act is the Nigerian Content Development Fund under the purview of the Board. This fund is funded through a 1% deduction at sources of every contract awarded in the upstream sector of the industry to any contractor, sub-contractor, operator, alliance partner or any other entity in any such project.

3.1.7 FINANCIAL SERVICES

- Except in cases where the Board is satisfied it is impracticable, only the services of Nigerian financial institutions shall be retained by all operators, contractors and any other entity requiring financial services.
- Schedule A also provides lower thresholds. Examples are: credit granting services (50%); Financial Management consultancy Services (70%), etc.
- Also in the Act is the provision of 10% of total revenue from Nigerian operations to be retained in a Nigerian bank account. This is to minimize the effects in payment obligations concerning rents, supplies, salaries, etc, if quantum required to be retained in Nigerian banks is equal or less than Nigerian payment obligations.

3.1.8 LEGAL SERVICES

- Section 51 mandates contractors, operators, sub-contractors and all entities engaged in the oil and gas industry to maintain only the services of Nigerian Legal Practitioners or Nigerian Legal Practitioners firms whose offices are located in any part of Nigeria while also submitting to the Board, a legal services plan (LSP).
- A provision of 50% threshold of Nigerian Content is to be provided in its schedule for legal services in respect of consulting services and project management.

3.1.9 OFFENCES AND PENALTIES

Section 68 of the Act states that an operator, contractor or subcontractor who executes any project contrary to the

provisions of the Bill, commits an offence and upon conviction is liable to pay a fine amounting to 5% of the project sum in which the offence is committed. Alternatively, the project may be cancelled.

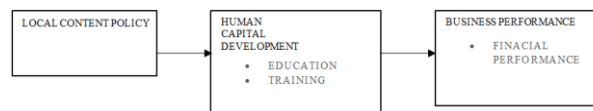
4.0 HOW PROFESSIONAL ETHICS AND LOCAL CONTENT ACT ADVANCES NIGERIA'S TECHNOLOGY.

One of the major functions of government is the provision of enabling environment for businesses and industries to thrive.

The Local Content Policy is a well thought out one directed at making Nigeria to compete favourably in the global economy with hindsight on globalization and Industrialization.

Looking at the conceptual model of the Local Content Policy again, the intent of government is clear. To develop human capacity and capabilities by training and education so as to boost local business performance by increasing the hitherto available reach of entrepreneurs (45%) to a higher level of (75%).

This is actually a wakeup call by government to our professional associations in technology related fields to up their games with their members so as to tap into this unprecedented opportunity. Engineering is a major plank of the technology available to this country. We are therefore where we are in terms of technology because we engineers are at the level we are. If government is this magnanimous to provide and protect these said jobs for us, then we must hold ourselves accountable to rise to the challenges through our own ethical conduct. The continuous education and trainings available in the Nigerian Society of Engineers (NSE) and her subordinate institutions, the Association for Consulting Engineering in Nigeria (ACEN) and the council for the Regulation Engineering in Nigeria (COREN) with their yearly international conferences are immeasurable opportunities for putting our engineers, technologies and technicians in the front burner of technological breakthroughs and innovations.



4.1 PROFESSIONAL ETHICS, LOCAL CONTENT, TECHNICAL/VOCATIONAL TRAINING AND OIL AND GAS ENGINEERING RELATED COURSES/PROFESSION

Ayomike and Okeke (2015) alluded to the fact that “technical and vocational education and training has a symbiotic relationship with the local content because of its value to the Nigerian economy. Certain key capacities and capabilities within the Nigerian economy makes this value derivable. Targeting the local content alone, an avalanche of technical competence and skills which transcends the oil and gas industry to other sectors of the economy can be developed. For example, section 53 of the Act stipulates that all welding and fabrication works related to the oil and gas industry must be 100% executed in- country, except for occasions when and where the capacity/capabilities are non-existent as would be confirmed by the Petroleum Resources Minister.

Gaius – Obaseki (2010) noted that “Welding and fabrication which are part of Technical and Vocational Education Training cut across the building; construction, automotive, shipping, telecommunications, aviation and rail industries and the impact of this provision on local and foreign investment in capacity development in these activities is expected to produce an exponential increase in size but also in specialization of the industry.

Next on broad value application is the domiciliation by the international oil companies of a minimum percentage of profits made in their Nigerian bank accounts. Aside injecting liquidity into the local economy, it significantly affects the availability of long term funding for development of the country’s industrial base and technical capacities.

Thirdly, with local content, the contribution of local human capacities to the development of moral communities and the informal section of the economy.

Therefore, apart from human capacity and capabilities, the infrastructure that supports business development in the local economy are also developed. Examples include road construction and rehabilitation to open up trade lines between rural communities, sponsoring of skill acquisition programmes both in the petroleum and non-petroleum industries, supporting local farming with advanced techniques in agriculture.

Though the local content policy is a bottom up approach to technological advancement. Its core targets are artisans, technicians and technologists for skills development through technical and vocational training, I see engineers as end beneficiaries. These professionals below the engineering cadre work for us. A trained work force is progress for the engineer at the top. Nevertheless, the petroleum Technology Development Fund (PTDF), another brilliant policy of government is also doing a complementary job of top-down approach by giving scholarships to engineers and other professionals in oil and gas related fields.

Our professional engineering ethics which involves – confidentiality, safety, balanced approach to law, global issues, and Engineering responsibilities must be a plank on which we position ourselves for the harvest of local content opportunities.

4.2 THE LOCAL CONTENT PROVISIONS AND THE INHERENT BENEFITS FOR TECHNOLOGICAL ADVANCEMENT

This calls for the specific examination of the provisions of the Act and their effects on the development of Technical capacity and capabilities.

- Sections 3(1) and 3(2) provides for first consideration and Exclusive consideration respectively for Nigerian Independent Operators and Indigenous Service Companies. Therefore, “Nigerian Service Companies can optimally participate in the local content value chain through the less attractive regimes of swamp and land and that such participation should be encourage by reserving these areas for them” (Okiti, 2011). No doubt that this provision will stimulate indigenous technical and vocational skills via: establishing new service companies to use the locally available technical and vocational skills, capacity development for practical technical skills required and strengthening existing service companies.
- Section 11(1) provides for minimum level of Nigerian content in any project executed within the oil and gas industry. Whether the project is onshore, offshore or deep offshore, this minimum content must hold, whether the project promoter is indigenous or foreign and irrespective of the project costs. These minimum content requirement are set for engineering services, fabrication and construction services, materials procurement, well and drilling services, seismic services, research and development services, logistics, information technology and transportation. Aside numbers, this minimum requirements for above services include percentages of man hours, expenditure, tonnage, volumes. This also provide significant stimulus for local technical and vocational skills development.
- Section 25 provides for the establishment of project offices by project operators and promoters in the catchment areas where the projects are to be carried out. Prior to commencement of the projects, these offices are to be established and without which authority would not be granted for project procurement and management. By this, the contractors are compelled to use local skills which in turn develops local technical and vocations skills. Rural development is also enhanced the smooth running of the project and service the personnel who are to stay for the projects.
- Section 43 – 45 require operators to fashion out programmes that will lead to the actualization of capacity Development in the Nigerian Supply and service industry beside supporting technology transfer through the establishment of joint ventures, alliances/partnership and execution of licensing agreements. The gradual transfer of capacity and capabilities through their international parties is enhanced.
- Section 47 – 48 requires the Minister of petroleum Resources to make regulations that will compel operators to invest in, or establish production, manufacturing or service capacity which is currently being imported into Nigeria while they seek tax

incentives with appropriate fiscal framework. This generates employment and boosts industrial capacity.

- Section 49 – 53 exclusively domiciles insurances, financial, legal and fabrication/welding businesses to Nigerian Service providers. The relevant industry technical and vocational skills are developed while increasing her exportable expertise in these areas. Also, according to Umeagudosi (2012) Nigeria is positioned as a regional hub for the provision of these Services.

4.3 FACTORS MILITATING AGAINST VALUE ADDING POTENTIAL OF LOCAL CONTENT IN NIGERIA.

The performance of Local content is based on the existence of certain underlying conditions. Many of these conditions are far from being attained.

- ❖ Undeveloped local skills and capacity despite the huge opportunities in welding and fabrication, the local skills and capacity in this area is far from being developed.
- ❖ Non patronage of trained personnel – even the few that are reasonably trained are not fully patronized by relevant authorities.
- ❖ High tariffs on important steel, steel plates and other materials – in other words high tariffs makes local content cost the economy more. Money supposed by to be available for taxation or used in other industrial sectors are expended in the sport of local supplies and services.
- ❖ Non access to long term commercial funding
- ❖ High interest rates
- ❖ Rising exchange rates
- ❖ Adoption of global framework agreements such as centralized procurement systems by the oil and gas major companies
- ❖ Difficult prequalification and biding requirements for contract awards.

5.0 CONCLUSION

How developed Nigeria is today calls to question how skillful and ethical we are individually and collectively in our various engineering fields and practices.

Professional ethics guarantee professional order discipline and virtue. While order is life, virtue dictates

superiority. Without Professional decency, decorum and order, lawlessness and anarchy sets into the detriment of all round advancement.

Nigeria's Human Development Index (HDI) in 2010 and 2019 are just marginally different (0.5)

Countries with higher HDI are obviously more technologically advanced. If Nigeria must advance higher technologically, engineers, technologists, technicians and artisans must latch on germane policies of government such as local content on the foundation of a well oiled and soundly oriented ethical professional practices.

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