

## WORK ETHICS OF ENGINEERING EDUCATION AND PROFESSION IN A DEVELOPING NATION

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**ABSTRACT:** Ethics was associated with royalty. Professional ethics provide the guiding rules for the practice of any profession. This has three broad objectives; (a) to protect clients who make use of professional services (b) to protect the practitioner and (c) to protect the reputation of the profession. Ethics is the soul of the profession; if the soul is allowed to die, the profession also dies automatically. This paper has extensively X-rayed the approach from socio-ethical perception with specific emphasis on our understanding of work ethics, ethics in Engineering profession and education, the general direction, challenges, forecasts and the way forward of Engineering work ethics, the relationship between Engineering profession, work ethics and developing nation. The conclusions and recommendations based on ethical guidelines are preferred and emphases made on reorientation of the mindset of professionals in Engineering for better performance.

**KEYWORDS:** Ethics, Engineering, Profession, Education, Developing, Nation

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### I. INTRODUCTION

According to chambers dictionary new edition, work is a physical or mental effort made in order to achieve or make something; it can be employment or task. Ethics refer to the branch of study concerned with character and conduct, morals, standard of behavior or professional standards of conducts. Ethics, if simply put are standards set up by a profession so as to regulate members professional behavior, curbing any misconduct in the discharge of their professional duties towards clients, public, fellow professionals or professional statutes. According to Nnadi and Udabah (2008) in Ezeugwu (2008), Ethics comes from the Greek word "ethos" meaning customs, habit or convention, moral philosophy or simply put, the study of human customs. Work ethics include simple how one feels about his or her job, career and vocation. This shows how one goes about his or her responsibilities which involves attitude, behavior, respect, communication and interaction, how one gets along with others, having such characteristics as honesty, sincerity, morality etc. For a developing nation, engineering work ethics must be embedded in values and beliefs that lead to care, positive relationship, grounded in trust and high standard. We are ethical when we foster and demonstrate excellence. Integrity (ethical value) is the most important capital of a person and of an institution. It is closely linked to financial capital. So we can posit that work ethics of engineering education and profession refers to those moral guidelines that should moderate our conducts accordingly or every personnel in engineering family/profession strives to obey. Without such ethics, professionals can be careless with their works accompanied with concomitant disastrous consequences. In other words, this view upholds that there is but one eternally true and valid moral code which should be applied rigidly with impartiality to all men and in all frontiers of human endeavors.

There are well-structured aims of these ethics with regards to various engineering professional societies or disciples which are (1) to enable the upholdment and advancing the honor and dignity in keeping with higher standards of ethical conducts (2) to guide and promote honest, impartial and devout services of engineer to his

client, employer and the public (3) to elevate the competence and prestige of engineering profession (4) being a clarion call for the engineer to use his skills and knowledge for the advancement of mankind.

Engineering being an important and learned profession, has a direct and vital impact on the quality of life for all people in any society, guaranting protection of the public health, safety and welfare. We are expected in our general conduct to uphold and enhance the honour and dignity of the engineering profession and the reputation of the Nigerian society of Engineers and act always in the public interest and honest enterprise. It should be of great note that when engineering skill and knowledge are needed, they shall be delivered without reservation ethically. From special capacity springs the obligation to use it well in the service of humanity and accepting the challenge that this implies. Engineering profession ethically in a developing nation demands that an engineer should protect the interest of a deserving fellow engineer but will not shrink in disclosing any unscrupulous act by him unworthy of the profession. Ethical values-driven behavior is needed in our developing nations and even globally to achieve justice, fairness and peace which are dividends of work ethics especially in the engineering profession which helps in changing the face of the world and humanity. There are some conducts that are not within the ambient of engineering education and professional work ethics in a developing nation example immoral behavior, unruly behavior, drunkenness, foul language, assault, battery, habitual lateness to work, deliberate delay in treating official documents, dishonesty, negligence, improper dressing while on duty, malingering, disclosure of official information and the list can go on.

## **II. UNDERSTANDING ENGINEERING WORK ETHICAL VALUES**

Work ethics in engineering profession is about professional responsibilities of engineers in order to safeguard lives, health, properties and promote public welfare. Ethical values have been recognized as a fundamental practice in engineering especially in developing nations. It is the basis for engineering licensure. This is X-rayed in the light of the relationship between work, ethics and its accompanying wellness or health. Ethical values are carried out in a working environment. The engineer must be well enough with engineering activities not affecting the environment negatively. A health hazard condition or situation has potentials to cause harm to health. They are inherent in every work. Therefore, work ethics are very paramount. A health hazard may be biological example exposure to communicable disease etc; chemical through inhalation, absorption, injection etc; physical example noise, vibration, heat, radiation; ergonomic example discomfort, stress from man-machine interaction or psychological in nature. Hazards are associated with degrees of danger and it is quantifiable but with understanding work ethics and practicing or putting them in place, these dangers and hazards can be reduced to the bearest minimum. Violations of such ethical codes have led to many well-known tragic engineering failures that endangered human life and jeopardize public welfare. In response, professional ethics in different disciplines emerged, example medical ethics, business ethics, legal ethics etc, here it is called engineering ethics, having her own curricula. An understanding of profession and ethical responsibility embraces one who can function ethically. This will require a greater effort on the part of engineering practitioners, engineering educators and engineering students. When an engineer is properly molded and informed ethically, he or she is empowered to effectively participate in the process of developing a nation.

Work ethics refers to the form of attitudes, behaviors or conducts exhibited in our different places of work socially acceptable. It can be understood to mean the science and art of proper behavior. It studies human actions in the light of being right or wrong. It is the science of good and evil, the good is what is not to be done or what is to be avoided in carrying out our physical activities. Common sense and good judgment must be present as they are appropriate to our work, general safety rules and regulations put into action as we need to work safely. To help keep you free from injury, work ethics is critical so as to avoid work related hazards, failures and misfortune. Work ethics helps assure safety and healthy work conditions allowing safer place of work being your responsibility to learn and understand those work ethics as an engineer. When we understand work ethnics, it will help us keep a safety-sense and socially accepted attitude. To understand work ethics very well, unsafe attitude, lack of knowledge or skill, bodily defects example faulty vision, poor hearing etc, mental state example nervousness, fatigue etc, should be factored in consistency with a developing nation, should have a systematic approach to health, safety and environmental managements in order to achieve continuous performance improvements. We need to map out strategies that will prevent hazards/risks associated with work and working environment as well as promote engineers' health status quo. It is important to realize these objectives for ethical reasons and for our developing nation. The knowledge of work environment and ethics should address the hazards, identify the key issues and react accordingly, abhorring corrupt practices when dealing with employers and clients. Engineering works should be done incorruptibly and never in a shady or derogatory manner, working in consonant with uplifting and encouraging the engineering profession to help our

developing nation. When it is to do with contract, he or she shall see that every provision which he or she considers necessary to protect the interest of owner, engineer, contractor or the public is incorporated in the contract. Work ethics of an engineer demands that he or she shall ensure that fairness and honour shall govern the use of every bid over which he or she is to adjudicate.

#### **A. ETHICS IN ENGINEERING EDUCATION AND PROFESSION**

The basic needs of society in terms of food, shelter and defence provided the stimuli for the emergence of ENGINEERING. Applying well established conduct in the training and education of personnel in the practice of engineering determines her professionalism (Ifeanyichukwu, 2020). The education of engineering professional is really broad. Aside the university trainings, we have the training acquired by experience and writing of professional examinations. Engineers must have satisfied the set down rules by the statutory regulatory bodies like the (NUC) Nigerian University Commission before acknowledgement. Ethics here involves the encouragement of advancement in learning and allowing acquisition of higher education in engineering. The development and offering of academic/professional programmes emphasizing on technical, planning, maintenance, adaptive, developmental and productive skills with the aim of producing socially mature men and women with capability to use, adapt to existing technology, improving on them and developing new ones. These ethics acts as agents and catalysts through training, research and innovations for effective and economic utilization, exploitation and conservation of the country's natural, economic and human resources. In engineering education and profession we have various branches of engineering discipline examples Agricultural engineering, chemical, civil, electrical and electronics, mechanical, mining and metallurgical, computer, petroleum etc. which aid in the development of a nation if ethical values are well articulated. The choice for any branch of engineering depends on ability, interest and circumstance that needs improvement. Due to Global dynamic nature of national development, we need to help augment areas lacking behind.

Ethics in Engineering education and profession is a significant innate qualities that should be imbibed and displayed in conveying the perceptions that when manufactured tangibly, our ingenuity and realities are expanded-. The truthful importance of ethics through engineering education and profession for national development is universally recognized. Values addition through ethics do play a pivotal role in sustaining the growth of both manufacturing and service industries which is the core of any national development economy. Godwin (2007) citing (lowenfeld and Brittian, 1995) said, this is a means of formulating our emotion and giving them tangible expression .The overwhelming importance of engineering education and profession with regards to work ethnics to the development of any nation cannot be over emphasized. This being that education as light means understanding, awareness creation, enlightenment, control, altering and redesigning human destiny and environment with a view to achieving and sustaining a better quality of life. Adesina (1985) affirms education as a tool for the integration of the individual effectively into a society so that the individual can achieve self realization, developmental consciousness, promote unity and strive for social, economic, political, scientific, cultural and technological processes. Through education, people are equipped to develop their knowledge and skills, adopt new behaviors and become able to survive in that developed society. The position of education in the development of a nation has never been doubted. According to Baikie (2002), education is the biggest industry cutting across all spheres of human endeavors. Ethics of engineering education and profession prepares an individual for future membership of the society. Ethics, indisputably is recognized as the bedrock of life and any meaningful education which contribute to the development of a nation. This section posits that personnel's whose standards are anchored on the fulfillment of the aims and objectives stated ab initio on this paper, ethics of engineering education and profession in a developing nation should uphold these indicators and standards for her programmes:

- a. Curriculum stimulating adequacy and relevance.
- b. Availability and quality of teaching personnel
- c. Efficient infrastructure and conducive physical environment
- d. Consideration of required class size, teacher-student ratio
- e. Encouragement of indigenous ethical values among students of engineering.

The well being of those impacting the etiquettes and knowledge is very paramount. The essence highlights on how developed, impacted, nurtured and value generating it has served as a response alternatives for job creation which in turn develop a nation. Our curriculum development will bring forth a dynamic system of producing

competent individuals with the right intellectual perspective for national development. Our students can be trained in the context of being entrepreneurs and entrepreneur trainers for national development (This Day Newspaper, 2007). It is observed that engineering education and profession oiled by ethical values at work has uplifted and facilitated the advancement of man in different spheres of life and so plays very vital role in the development of any nation. Ethics in engineering education and profession should be seen as an aspect of life that encourages responsibility for a better developed nation.

## **B. RELATIONSHIP BETWEEN ENGINEERING PROFESSION, WORK ETHICS AND DEVELOPING NATION**

This section is to set the path of political, economic, social, environment, technological, educational, physical and cultural greatness rolling. National development connotes ethical values like unity, precision, equity, trust, fairness and standards inculcated in the lives of people. National development cannot be correlated with engineering profession due to decline in the level of work ethics experienced or displayed. This has led to poverty, conflict, corruption, weak institutions, political, misbehavior, infrastructural weakness and general indiscipline. The very slow progress experienced in our national development due to lack of ethics can be related to factors like corruption, indiscipline and various other vices section 11, sub section 23 of the national constitution provides that the national ethics shall be discipline, integrity, dignity of labour, social justice, religious tolerance, self reliance and patriotism. For the sake of national development, most of our professional regulatory bodies and institutions have very strict ethical codes that are supposedly being enforced to ensure that we have a sane nation. This section posits its characteristics in utilization of available resources of a nation to restore the dignity of man through ethical values by improving the comfort, timeliness of operations and removing the drudgery associated with performance of stannous jobs, time consuming activities putting technology to work, that is engineering. Engineering is multifaceted as the achievements and products of engineering cut across all spheres of human endeavours examples are shelter, engineers are involved in the construction of roads, railways, houses, bridges, dams. In transportation, engineers design and develop ships, trucks, rockets, cars. For human communications and comforts, telephones, satellite, electricity transformers are used, with missiles, ammunition etc for defence. The level of engineering practice in a nation is the major index of that nation's level of development. Engineering advancement also advances technological, military, economic, and infrastructural developments of a nation (Oluka et al, 1999).

In the world today, groupings of nations into first world countries, second world counties and third world countries are done in accordance with the level of practical ethical values like abhorring corruption and other vices, the level of engineering development both facility wise and personnel-wise. When we uphold and inculcate in ourselves the constitutional provisions of national ethics in our character, a high level of discipline will mark our personal and official conducts. Indiscipline means the act of showing inappropriate and unethical behavior and conducts intentionally targeted at subverting, under cutting and under mining proper and acceptable behaviours. Unethical conducts breed immorality, impatience, deception, fake news, hate speech, corruption, criminal tendency acts etc. we should recognize that the synergy among engineering profession, work ethics and nation development have same motivational driving force towards comfort and perfection. The real consciousness of developing a nation most especially through engineering profession lies in work ethics (Ifenychukwu, 2020).; the policies of ethical values should be very much emphasized on national development which to most people requires largely engineering professional activities. This will go a long way in alleviating the burden and drudgery associated with human environment.

## **C. THE TREND CHALLENGES AND PROGNOSIS**

Policy makers in the engineering sphere should collaborate with government to ensure economic, political, and social development of any nation is a direct reward of the value system, attitudinal orientation and behavioral pattern of her citizens. Work ethics pertaining to the education of engineering profession has become the benchmark of which progressive development is measured. Education being paramount to development, has become imperative that platform be created on which development is brought to the limelight through engineering practices. It is a fundamental socio-human behaviour that resulted to socio-economic development due to the pro-action pragmatism and adaptive attitudes cum approaches of individuals to challenges. Lack of work ethics in engineering education and profession in our developing nation steadily affect the steady development at all levels and sectors. This posit that to sustain development in nations, this topic has to be taken seriously, requiring a working systematic approach that is holistic. On this rationale, we ask ourselves this

pertinent question, “why do we indulge in unethical behavior and conduct despite their obvious demerits and challenges?”. These challenges can be rolled out here, examples are:

- a. Derailed leadership and poor governance as shown in all levels of governance. The deregulation and liberalization seen in our economy have affected characters and standards of behaviours. Leaders and the lead engage in unethical and lawless behaviors contradicting constitutional provisions of national ethics. With this, there is no how engineering education and profession will thrive in a developing nation because many things will be wrong. Vices like bribery, corruption, falsification, nepotism, negligence and numerous other misconducts will be the order of the day. Governance will lack the moral courage and spine to enact policies and enforce laws for upholding the vital work ethics with engineering practices
- b. Poverty, which is capable of making one break rules and cut corners. A person having poverty mentality will care less about etiquettes and worriless about integrity. They may not attain the heights of obtaining that level of education for engineering profession to exhibit the necessary work ethics needed for a developing nation.
- c. The quality of our institutions is another angle to it. If we have quacks and weak professionals or personnel's who?, will monitor, detect, prevent, apprehend and prosecuted any perpetrator. Superior necessary knowledge can never be handed over to posterity. Regulatory societal institutions should painstakingly fight unethical attitude to avoid lawlessness at the cultural or national level.
- d. Globalization, which paves way for diverse cultures and their concomitant influences. World acceptable standards should be imbibed so that professionalism will be well embraced in the light of discipline, hard work and accountability. Despite the above facts there are other sources of ethical challenges example individual finance not being enough, pressure, technological incompetency, privatization, prevailing normative environment, abuse of executive privileges, double standards, crookedness, nepotism etc. all these are very dangerous social evil, damaging and leading to a failed nation because of losses and wastages. Unethical behaviours are inimical to our national development, having very serious economic implications. Lack of work ethics in the education of engineering profession is recognized as major cause of poverty and under-development of a nation. It can be observed that the fight against poverty in a developing nation cannot be achieved due to the endemic corruption and indiscipline. Lack of work ethics with regards to engineering education and profession can lead to death of an individual with improper operations and applications of certain systems. The tenets of education of engineering professionals work ethics emasculates and physically strangles all forms of unethical behaviours. Equally, we experience mental laziness and no scientific knowledge due to lack of integrity. With all these above, unbelief and suspicion will be the lot of such a nation. Most of her products will be substandard having posited that the value system, attitudinal orientation and behavioral pattern in our workplaces are directly proportional to the economic and social development of that nation. To enthrone these work ethics effectively and efficiently, all the points reeled out as challenges should be looked into correctionally examples; pressure from workplaces increasing temptation for unethical conducts should be eased by given out commensurate remunerations. This will root finance not being enough. Logical competency trained into our engineering personnel's, accountable and transparent running of our industries to avoid privatization. When engineering personnel derails, commendable punishment should be meted to them, so as to discourage others and serve as a deterrent. Ogun dele et al; (2010) had suggested three-approach to ethical challenges confronting a nation and they are (1) strict sanctions (2) moral sensitization (3) reward for excellent/outstanding ethical behavior.

### **III. CONCLUSION AND RECOMMENDATION**

Ethical work values are mandatory in a developing nation if the expectations of an engineering profession and education are to be met. In the course of education and practice of engineering profession, it is important to know the work ethics. Having known the basic, it will enable one practice effectively but must look forward to a lifetime of ceaseless learning as part of our profession. The guideline therein enjoins the court to be more effective in handling unethical conducts. Ethical education should start very early in one's life before exposure to amoral of the profession or that of the society.

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