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Ethical Issues in the Construction Industry in Kenya: A Critical Analysis of the Professional Conduct in Engineering Technology Management

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Abstract

This research paper addresses the ethical issues facing the construction industry in Kenya. It forms a framework for ethical standards in the construction industry by recommending concrete measures on the cases of collapsing buildings such as Nyamakima building in Nairobi in 2006, sunbeam building and another building at Nyamakima unfinished and poorly constructed roads in 2012 as well as corruption. These have been based on the identification of ethical issues from the results of comprehensive and in depth research carried out through questionnaire survey, interviews and telephonic survey of various stakeholders in sample projects, employees of each of them and also study of related engineering journals. Many Institutes, Societies and Boards of Engineers globally provide guidelines for engineers. In Kenya, the Engineers Registration Board (ERB) has likewise issued strict and professional stipulations for engineers, consultants, contractors and other stakeholders in this field, but in practice these are rarely followed to the letter. The existing standards in this paper have been compared with our socio cultural traditions and with ethical standards and practices of developed countries. Finally, a mechanism has been recommended which can deal with most of the ethical issues confronting construction industry in Kenya.

***Purpose*:** The main purpose of this paper is to find out ethical issues facing construction industry in Kenya with a greater emphasis being placed on knowledge of ethical codes of conduct, corruption and bribery, favoritism, unfair conduct, strict rules and overriding of the audit process.

***Methodology*:** The paper employed a survey research design. A survey of the selected study population in Kenya was carried out by use of questionnaires, interviews and focus group discussions (Engineers). The sample size of this research was estimated at 600 participants.

***Findings*:** - A major finding was found to be the weakening influence of the engineering institutions to instill ethical concerns on the engineers and other members of the profession on ethical consideration construction industry in Kenya.

***Conclusion*:** This study is focused on the ethical considerations in construction industry in Kenya. Taken as a whole, our findings suggest that, there are some shortcomings associated with the current construction and engineering process and thus ethical consideration could help revamp the whole system.

Keywords: *Construction industry, Professional conduct*, *engineering, ethical issues*

1. Introduction

For building and designing professions, the incalculable value of human life demands nothing less than the highest moral considerations from those who might risk it otherwise (Bowen et al, 2007). Since the engineering profession has direct effect on the lives of people, these professionals owe special moral responsibility. However, it has been suggested that professionals in general tend to believe that their obligations to their clients far outweigh their responsibility to others, such as public (Fan et al., 2001). Because of their knowledge and importance in society, engineers should have standard of conduct to answer ethical questions (Githui, 2011).

In Kenya, the Engineering Bill of 2011 defines an engineer as a person registered under this Act, that is; a professional engineer, graduate engineer or consulting engineer and who holds a valid license. According to the same Act, Engineering means "the creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination or to construct or operate the same with full cognizance of their

design or to forecast their behavior under specific operating conditions or aspects of intended functions, economics of operation and safety to life and property" (GOK, 2011). This definition like many other definitions given by Institutions, Societies and Boards in other parts of the world gives a greater emphasis for the professionals Engineers to be ethical in the engineering processes so as to ensure that all parties in the process are safeguarded (Hinze, 2011). Hence the field examines and sets the obligations by engineers to society, to their clients, and to the profession. Engineering ethics are the rules that spell out the professional responsibilities of engineers, which have been regarded as fundamental principles for engineers (ASCE, 2000). Some of the fundamental principles that Engineers uphold and advance through the integrity, honor and dignity of the engineering profession as spelt out the code of conduct include:

(i) Using their knowledge and skill for the enhancement of human welfare and the environment;

(ii) Being honest and impartial and serving with fidelity the public, their employers and clients;

(iii) Striving to increase the competence and prestige of the engineering profession; and

(iv) Supporting the professional and technical societies of their disciplines.

Government regulations, environmental permits, and other bureaucratic controls continue to grow. Projects also continue to get larger and more technical, requiring more specialized people, high-tech equipment, and better project control systems. This trend requires that project managers have technical, business, organizational, ethical, and leadership savvy. Many engineers elect to pursue careers in construction engineering. They may be graduates of construction engineering, civil engineering, mechanical engineering, or other engineering degree programs. Many new regulations and specifications for example, The American Society of Civil Engineers (ASCE) requires construction engineers to design systems for execution of the construction process (Hinze, 2001b). For example, the design-build process requires a construction professional within the construction organization to monitor and coordinate the construction work (Hinze 2001). Despite the existing of ethical codes and Engineering Registration Board, the Kenyan Public domain continues to observe clear cases of collapsing buildings, unfinished and substandard constructed roads, uninspected houses by those trained and entrusted in this noble profession. As a result, lives has been lost and resources gone to waste in a country which has an ambitious vision which aims to make the nation a medium level industrial country by the year 2030. Some may validly argue that these are only isolated cases and the excellent constructions works done within our borders speak volumes. Yet other schools of thought may tell us that we have only the tip of iceberg and the real work is yet to come. This study highlights the ethical dimension of engineering and shows how values and responsibility relate to everyday practices in Kenyan Construction industry.

1.1 Problem statement

The growth of engineering professionals in Kenya has given the rise to a number of unethical practices that violates codes of conduct in the construction industry. For instance when construction processes involving finances are not executed in a professional and ethical manner, then parties involved in the process may have away to practice unethical and unprofessional acts, that hurts their profession. In Kenya, we have witnessed a surging number of collapsing houses for instance Sunbeam building in Nairobi and another building at Nyamakima in 2006 which have claimed innocent lives. Similarly there have been cases of poorly and substandard constructed roads in most parts of the country. These cases raise issues regarding professionalism and ethics in the construction industry. Despite there being an Engineering code of conduct which comes from the Engineering Bill (2011) and highly respected Engineers' Registration Board (ERB), Kenyans continue to experience unethical conduct caused by their engineers and contractors. According to Bowen et al (2007), ethical codes of conduct, corruption and bribery, favoritism, unfair conduct, strict rules and overriding of the audit process have a negative implication on engineering processes in any organization/profession and could thus result into decreased performance and service delivery. This can only be reduced by employing professional ethics (Githui, 2011) which form the basis and foundations of ethical organizations. The research will have implications for effective and efficient engineering management in Kenya and other countries thus fostering dedication and freewill drives between organizations, stakeholders and

customers.

1.2. Objectives

General objectives

The main objective of this research was to find out the current status and practices of ethics in construction industry in Kenya.

1.2.1 Specific objectives

The research was guided by the following specific objectives:

(i) To ascertain the level of knowledge of codes of ethical codes in construction industry of Kenya.

(ii) To investigate if unfair conduct is practiced in the construction industry in Kenya.

(iii) To determine effects of the nature of rules on the performance of engineering professional.

1.3. Literature review

This section reviews the past literature on engineering ethics, professional ethics as well as engineers' responsibility.

1.3.1 Engineering and Ethics

Engineering, as a profession and also a business, is at the sharp end of ethical practice and application. Far from being a bolt on extra to the 'real work' of an engineer, it is at the heart of how he relates to many different stakeholders in engineering projects. Engineers confront dozens of issues, many of which have substantial impact on their own self or organization, as well as others involved in the project. Many decisions have a straight forward answer determined by contract language or budget. Some, however, require entering an indistinct gray zone where the engineer must use best judgment to devise a course of action (Bowen et al, 2007).

Gichure, (1997) defines ethics as 'the systematic study of human actions from the point of view of their rightness or wrongness as a means for the achievement of man's ultimate happiness'. Ethics so understood embraces universal core values such as; integrity, honest, truthfulness, accountability and transparency, fairness, justice, tolerance, citizenship which every human being is expected to have and practice.

The construction process involves conceptualizing, designing, managing, organizing and coordinating project requirements including time, money resources, technology and methods; these must be integrated in the most efficient manner possible to complete construction projects on schedule, within the budget, and according to the standards of quality and performance specified by the project owner or designer. This demand from professional engineers to possess strong fundamental knowledge of engineering design and management principles, besides knowledge of business procedures, economics, and human behavior is realistic (Cywinski, 2001).

Ethical questions raised include: what happens when professional codes and regulations lag behind technological innovations; what precautions must engineers take when trying to balance the benefits, new technologies bring against risks to public safety, often associated with engineering innovation and what are engineering and corporate responsibilities to the public for failed innovation; and should he hold the payments for the benefit of his organization (*Vee and Skitmore, (2003), Bowen et al., (2007)*. Often these challenges are managed with little or no preparation or formal guidelines and sometimes with negative results. Engineering ethics is attracting interest in colleges of engineering throughout the world. Therefore, the new technology must address the human being as its central subject and has to be introduced by ethics (Johnson, 1991).

Ethics criterion for the engineer group is necessary (Vee et al., 2003). Many American engineering professional societies have prepared codes of ethics; some go back to the early decades of the twentieth century. These have been incorporated to a greater or lesser degree into the regulatory laws of various countries. The Institution of Civil Engineers (ICE) in the UK

has a code of ethics incorporated into its standards of conduct. The Canadian societies of professional engineers likewise have such codes of conduct as well. In Kenya, the code of conduct is guided by the Engineering Registration Board of Kenya (ERB). These codes of ethics share many similarities. Engineering, however, does not have a single uniform system or standard of ethical conduct across the entire professional fields.

In the United States, Pilvang and Sutherland, 1998 have expressed their concerns in this area of professionalism and the dangers that may occur due to an ethical conduct and behaviour. According to them; construction contractors in contrast with architects, have a reputation for unethical behaviour, the main problem being (Pilvang and Sutherland, 1998), the high level of disputes between proprietors and builders. Their generally poor behavior has been said to have originated from the influx of new construction companies with new people who lack building construction ethics, with greed being one of the main factors leading to unethical conduct (Ritchey, 1990).

1.3.2 Professional Ethics

Professional ethics is a set of standards adopted by a professional community. Professional ethics are regulated by standards, which are often referred to as codes of ethics. The code of ethics is very important because it gives us boundaries that we have to stay within in our professional careers (*Vee and Skitmore, 2003)*. Engineering as a career and a profession is closely executed in line with engineering ethics, which falls within the broad scopes of ethics. Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering (ASCE, 2005). The American National Society of Professional Engineers (NSPE) (2009) say of engineers as "Engineers, in the fulfillment of their professional duties, shall hold paramount the safety, health, and welfare of the public".

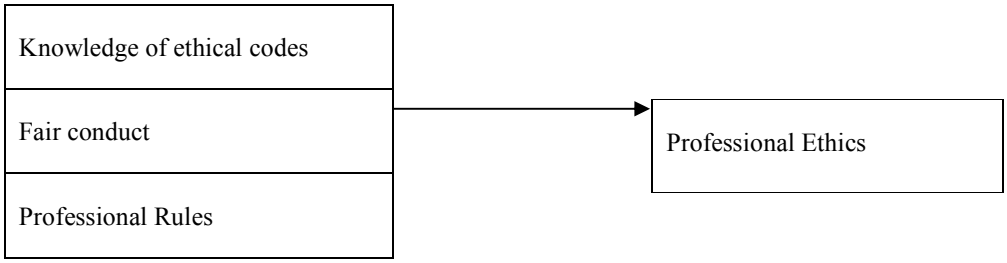
In professional ethics, professional obligations are usually summed up in a professional code of ethics. The task of a code of ethics is not to derive obligations from first principles, but *to spell out what the public expects from the profession*. A profession is defined primarily by its reputation, because it exists precisely to create a reputation (*Vee and Skitmore, (2003), Bowen et al., (2007)*. Professional status normally develops around occupations in which it is hard to know that a person is incompetent until it is too late. If incompetence is immediately apparent, one can dismiss the employee before much damage is done. Engineering clearly calls for professionalism, because serious defects in an engineer's work may not become evident until years after the work is completed. For instance in Kenyan setting and background, there have been cases of buildings collapsing while being constructed and these incidences have claimed lives of many persons. Projects involving construction of roads rarely come to a successful end (*Vee and Skitmore, 2003)*.

Professionals are not exempt from the common ethical behaviours - such as obligations, duties and responsibilities - that are binding on ordinary people (Johnson, 1991) and are usually bound by a set of principles, attitudes or types of character dispositions that control the way the profession is practiced. This has been termed Professional Ethics (McDowell, 1991), and concerns potential problems confronting members of a profession or group and their impact on society (Johnson, 1991), with the implication that fairness should be attributed not only to clients but also colleagues and the public (Johnson, 1991).

1.3.4 Engineers' Responsibility

The engineer recognizes that the greatest merit is the work, so exercise their profession committed to serving society, attending to the welfare and progress of the majority. By transforming nature for the benefit of mankind, the engineers must increase their awareness of the world is the abode of man and his interest in the universe is a guarantee of overcoming their spirit and knowledge of reality to make it fairer and happier (Fan *et al*., 2001). The engineer should reject papers that are intended to harm the general interest, in this way avoid situations involving hazards or constitute a threat to the environment, life, health and other rights of human beings. It is an inescapable duty of the engineer to hold the prestige of the profession and ensure its proper discharge; also maintain a professional demeanor rooted in the ability, honesty, fortitude, temperance, magnanimity, modesty, honesty and justice, with the consciousness of individual well-being subordinate to the good social (Vee et al, 2003). The engineer must ensure the continuous improvement of their knowledge, particularly of their profession, disseminate their knowledge, share experience, provide opportunities for education and training of workers, provide recognition, moral and material support to the school where he studied, in this way revert to the opportunities the company has received (Belis & Impe, 2001).

Fig 1: Conceptual Framework



Source: author (2012)

The model explains key variables that the guided the research process.

1.4 METHODOLOGY

The objective of the present study was to investigate into the current status and practices of ethics in construction industry of Kenya by administering a predesigned survey questionnaire, from the feedback of contractors, engineers and consultants in Kenya. Project managers/ contractors/ engineers/ consultants/ architects were sampled from different locations of Kenya as the population of the study. A questionnaire consisting of twenty questions was distributed among the sampled population (Table 1). Three options were given to the respondents i.e., Yes, No and Sometimes. The feedback was analyzed and tabulated using simple computer applications like MS Excel and standard software.

The pre-designed questionnaire was administered among the sampled population of 600 in total either by personally visiting the consultancy firms, engineers or by collecting information through telephone. A total of 597 questionnaires were returned, netting a response rate of 98.8 percent. An attempt was made to include all the participants in the sample, and all of the returned questionnaires were usable in the final data analysis. The collected data was then analyzed and tabulated in the form of data tables with the aid of Statistical Package for Social Sciences (SPSS). Based on the information collected through the questionnaire, the problems related to ethics in the construction industry of Kenya were identified and the probable solutions were suggested to improve the practices of engineers in line with the ethical concerns.(note 1)

1.5 RESULT AND DISCUSSION

Everyone involved in construction has a personal code of professional behavior (ASCE, 2005). Faculty of Engineering does not have a single uniform system or standard of ethical conduct across the entire profession. The information collected from the questionnaire revealed that although all (100%) the engineers, constructors and consultants are members of (Engineering Registration Board of Kenya (ERB) but many (65%) did not know about the existence of code of ethics and code of conduct of ERB. Out of those who knew about it (35%), about 50% had never read these codes. Almost all the respondents (90%) admitted the importance of code of ethics in organization, the industry and the project itself.

Good ethical practice is considered to be an important organizational goal (Githui, 2011). Few (15%) experienced the cases of employers forcing them for unethical conduct. Majority of the surveyed individuals (75%) stated faulty systems besides unrealistic estimates/targets to be the main cause of unethical behavior of the organizations or individuals. At the same time there was not a single person related to the construction industry who had not experienced some degree of unethical conduct in the form of undertaking work beyond capability (15%), bribery (20%), favoritism (30%), unfair conduct (30%), strict rules (18%) and overriding of audit process over contracting process (35%).

1.5.1 Respondent's Frequency based on variables of engineering technology management drivers

The frequency demographic and respondents characteristics are summarized in table 2 in the appendices section below. The analysis of the data involved a purely descriptive analysis, which had frequency, percentage, cumulative percentage and the means of central tendencies which included mean, median and standard deviation (Table 2). Below is a description of the data gathered from the survey regarding each of the variables of the research driver.

1.5.2 Knowledge of engineering ethics

The driver had variables labeled V_1 to V_4. With regards to V_1 .it was noted to have mean score 3.57, median of 4.00 and standard deviation 1.108. V_2: noted a mean score 3.73 median of 4.00, and standard deviation 1.155. V_3: the variable came out with a mean score 3.43, median 3.00 and standard deviation 0.934. V_4: had noted mean score 3.13, median of 3.00 and standard deviation 1.207.The driver of knowledge of ethics remains to be a significant dimension in the engineering.

1.5.3 Code of conduct

The driver had its variables labeled as V_5 to V_7. V_5: had a mean score: 3.85 and, median of 4.00 and, standard deviation: 0.857. V_6: noted to have a mean score 3.65, median of 4.00 and standard deviation 0.999. V_7: was observed to have a mean score 3.57, median of 4.00 and standard deviation 1.006. V_8: was observed to have a mean score 3.43, median of 4.00 and standard deviation 1.230. In order to have efficiency and effectiveness in an organization, there should be accountability for actions among the concerned parties in the engineering processes.

1.5.4 Nature of rules

The driver had important variables labeled v_9 to V_{12}. V_9: For this variable the median score is 3.55, median of 4.00 and the standard deviation is 1.101. $V_{10;}$ noticed a mean score 3.03, median of 3.00 and standard deviation 1.133. V_{11} had a mean score 3.86, median of 4.00 and standard deviation 0.956. $V_{12;}$ noticed a mean score 3.02, median of 3.00 and standard deviation 1.213. The result of the study shows that the nature of rules has a crucial impact on facilitating effectiveness in engineering management. ***(note 2)***

1.6 Discussion and Recommendations

1.6.1 Discussion

Current literature has highlighted the growing demand for good ethical practice and professional behavior in construction industry and engineering technology management.

The objective of the survey was to provide an indication of the current trends in the industry though a questionnaire survey of a sample of professionals in Kenya with special focus to the construction industry.

Ethics as a subject is not taught in the elementary /undergraduate / graduate studies in spite of the importance of this subject for the profession. To put the system right, most of the respondents termed teaching of ethics an important foundation stone. Response of all respondents was an overwhelming “Yes” that ethics as subject may be included in basic education and in undergraduate and graduate level. Concepts and perceptions of professional ethics results from the prolonged professional socialization process during both college/university and industry training (ASCE, 2005).

The professional responsibilities and obligations of members towards their peers, their clients and the general public are usually delineated within these codes of conduct (Rooley, 2001). Ethical approaches vary somewhat by discipline and jurisdiction, but are most influenced by whether the engineers are independently providing professional services to clients or the public if employed in government service; or if they are employees of an enterprise creating products for sale. Codes of ethics are developed mainly for practical and professional use, supplementing the building codes and other acts of law. These ethical aspects were considered based on man’s natural morals and in term of their practical implications in form of applied ethics.

Bribery and political corruption is being addressed very directly by several professional societies and business groups around the world (Bowen et al., 2007). It can be noted that political systems play a critical role in fueling bribery and corruption. For instance in Kenya, many projects have failed to achieve the designed course due to bribery, favoritism and political corruption.

As noted in the introduction and the research findings, achieving professionalism in the engineering system in Kenya lies squarely on the moral and ethical nature of the participants (engineers). The construction processes should solely focus on espousing the moral (and sometimes legal) connotations of the concept of responsibility, and fair conduct in service delivery

(Polo 2008) and what it means to be held responsible while relating these to construction (engineering) practices.

From the responses of the sampled focus groups, it was stressed that audit staff dealing with construction industry should have construction know how as they concentrate only on the financial aspects of the project neglecting the most important aspect i.e., the technical part. This results in adoption of unethical means by concerned people, which can be avoided if they are not penalized on account of given preference to technical aspect on financial aspect.

Engineering professional institutions such as ERB can help all engineers understand ethical dilemmas using behavioural role modelling, ethical games, personal reflection, and moral dilemma discussions (Frankel 1989). These institutions can provide employee training on how to diagnose potentially problematic situations. This type of training could be Code of ethics and provide clear definitions of wrong-doing (Harrington & Moussalli 2005). These institutions can provide general training (employee growth) on how to apply ethical frameworks to resolve problems (Polo 2008). For example, engineers and project managers could be taught how to apply universal moral principles to ethical problems at work (Githui, 2011). Whatever the case may be, it is rational to think that there is a lot at stake before a ship wreck is experienced in Kenya and something transformative should be proposed to other professional engineers and contractors and the expert personnel in line ministries within the government.

1.6.2 Recommendations

Ethics is a very important issue of the engineering profession. From the findings of the responses of the focus groups and the discussion of the research, the following recommendations were formulated The suggested recommendations have been geared towards ensuring that radical changes take place in the construction industry in Kenya by ensuring that professional ethics is taken as key driver, besides having professional codes of conduct. These include:

(i) Ombudsmen system in all departments should be enforced to receive, discuss and minute complains in the construction Industry in Kenya. The same may then be addressed at ERB's forum. Effective punishments such as penalties or even cancellation of license on repetitive violations may be enhanced. This will help curb cases of bribery, unfair conduct and effect of political corruption on the effectiveness of engineering ethics.

(ii) Indigenous quality assurance group should be part of every project team to ensure quality along with ethical practices. Their performance should be monitored by ERB. Consultant and architect organizations need to be regularized through laws.

(iii) Internship should be made obligatory for young engineers for a period of six months with the organizations approved by the ERB, grooming them on professional matters including the ethical aspects. For instance, Massachusetts institute of technology (MIT) reported that only about one-third of the nation's engineering schools require all students to take any courses in engineering ethics. Therefore ERB should come up with modalities of integrating ethics into engineering courses. The teaching methodology in Kenya should ensure that engineering ethics is taught as a distinct subject and most of the presentation should be based on case studies reflecting real life situations.

(iv) Indigenous construction materials/ products of international standards and quality can be developed with reduced costs and used in construction to support the local industry to reduce the overall cost of the projects. The practice of cost effective risk management and the integration of environment and economics in engineering decisions have been recognized (Jun, 2000). Government bodies under the guidelines of ERB should take on the research and development of new and innovative products relating to construction industry.

(v) The role of independent judiciary in the implementation of law cannot be overemphasized. ERB's code of conduct is comprehensive and covers most of relevant aspects of ethics. Unfortunately, the implementation of the code is not very effective. In order to make it more effective these should be made part of ERB by-laws. At present the scope of ERB as compared to the responsibility it has, being the only governmental body for enforcing engineering regulations is restricted and needs to be broadened to an extent that effective checks are imposed on all the stakeholders for best interest of projects and the profession itself. These processes of implementation of law and codes should include comparison of ERB's implementation procedures with the best practices in the world.

(vi) Research and development should be organized in private sector and the government to take on this important issue to effectively address the matter. This is because research, science, technology and innovations are key to economic development of any nation.

(vii) Civic bodies should be headed by people with ethical training as they are more likely to ensure ethical practices in the institutions as well as the environment surrounding them. Especially at this time when Kenya promulgated a new constitution dispensation in 2010 with special emphasis to a devolved government and revenue allocation in its new 47 counties. This will enable professionals and trusted in the construction work to adhere to professional ethics and gradually remove Kenya from the high corruption index block of counties.

(viii) Universities and tertiary colleges should ensure that engineers of all sectors should be accredited nationally by ERB. They should also seek regional and international accreditation because this will enable them to practice within the framework of law and professional ethics in all parts of the world including the multinationals which are investing in Kenya.

(ix) Tradesmen/technical manpower should not be allowed to work till the time they get proper training through recognized training institution. ERB should identify the requirement of technical know-how required by various tradesmen and then correspondingly pursue establishment of technical institutions through TIVET etc.

1.6.3 Research Limitations

This research was carried out following a Kenyan perspective and only applicable to its culture and way of life of her citizens. Therefore a major limitation is that it may not be applicable to other countries due to cultural differences and background.

1.6.4 Future work

This research was carried out based on the construction industry in Kenya while focusing on the ethical programs likely to improve the performance and delivery of engineers in Kenya. Future work may be carried out to investigate the effects of construction industry on economic growth, society-engineer integration and overall, the effects of construction industry on future population.

1.6.5 Practical and Theoretical Implications of the research

Our research has implication for the engineering by engineers. It shows that a specific focus should be made regarding the challenges of construction practices that engineers have had to deal with. Even if this study emphasized many challenges, it did found the reason why engineers have had to increase their low performance. This has been caused by unethical professionalism leading to unethical conduct, corruption and bribery, favoritism, unfair conduct, lack of strict rules and overriding of the audit process. Consequently, the case of engineers, a specific focus should be put on ensuring that ethical considerations are adopted in the engineering approaches. The research has implications for social action in relation to the subject matter of engineering quality, effectiveness and efficiency.

1.7 Conclusion

Construction Industry plays an important role in the economy of any country as the major part of development is contributed by this industry. For obtaining optimal benefits from this field and for the smooth functioning of this industry itself, professional ethics play a vital role. Although, a lot of modernization in the form of techniques and advanced technology has made its place quite effectively, but at the same time, it can very safely be commented that inculcation of professional ethics in the culture of this industry is crucial for its growth and effective performance.

All the stakeholders in the construction industry, regardless of professional allegiance, require a common understanding of ethical and professional values. As long as the lack of professionalism and ethics exist, even the ethically good will have difficulty maintaining professional ethical standards (Vee, C. & Skitmore, C., (2003).

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Rev. Fr Mathenge is a priest of the Catholic Archdiocese of Nyeri, Kenya.

Notes;

Table 1: Research items

Research drivers and their variables

Table 1: Developed drivers for effective engineering technology management

Research driver	Research variable	Measurement
	V_1	Are you aware of ERB code of ethics
Knowledge	V_2	Have you ever read them
	V_3	Are code of ethics important in your profession
	V_4	Can ethical codes help create professionalism in your profession
Code of Conduct	V_5	Corruption has been witnessed in my industry
	V_6	Bribery is often practiced
	V_7	Favoritism is the order of the day
	V_8	Compromise on quality cannot be prevented
Nature of rules	V_9	My industry has strict rules

	V_{10}	The rules create a weak system in my industry
	V_{11}	Weak rules leads to low accountability
	V_{12}	Inflexible government rules create loopholes in my industry

Table 2: Summary of descriptive analysis of Respondent's Frequency based on variables of engineering technology management drivers.

Driver	Variable	Frequency	Percentage	Measures of Central Tendency		
				Mean	Median	STD Deviation
Knowledge of code of ethics	V_1	248	99.3	3.57	4.00	1.108
	V_2	247	98.7	3.73	4.00	1.155
	V_3	245	97.3	3.43	3.00	0.934
	V4	242	94.6	3.52	3.00	1.002
Code of conduct	V_5	237	91.9	3.85	4.00	0.857
	V_6	236	91.3	3.65	4.00	0.999
	V_7	237	91.9	3.57	4.00	1.006
	V8	235	90.0	3.45	4.00	1.230
Nature of rules	V_9	238	92.6	3.55	4.00	1.101
	V_{10}	238	92.6	3.03	3.00	1.133
	V_{11}	237	91.9	3.86	4.00	0.956
	V12	238	92.6	3.02	3.00	1.213