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Title

Towards improved compliance with Environmental Regulations: A case of the Industrial area in Nairobi, Kenya

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Summary

Right to clean and health environmental is protected within national and international laws. One of the ways of promoting this right is by having in place environmental regulations. The major tools on environmental regulations are environmental impact assessment and environment audit by National environmental management authority as an agency empowered to oversee environmental protection and conservation in Kenya. The objective of this study was to determine factors that influence compliance of environmental regulations in industrial area in Kenya. The study was guided by three specific objectives being determining the social, technical and institutional factors impacting compliance or non-compliance with environmental regulations. The study reviewed literature related to environmental regulations, environmental governance and factors that affect non-compliance to the environmental regulations. Factors that contribute to non-compliance were also analyzed from relevant theoretical literature and empirical situations. The study primarily applied desk research strategy with focus on secondary quantitative data. This strategy was suitable for this kind of research as it was covering an industrial area and since the factors are known from the literature review, the research has explained these factors from the empirical situation. The research was exploratory in nature and used quantitative secondary data to analyse the relationship between dependent (Y) variable and the independent (X) variable. The secondary data was collected from both NEMA and Nairobi City County government. The study collected information of 138 firms from nine sectors. The data that was collected from the secondary sources was cleaned, tested for errors and coded in a code book and then imported to SPSS for analysis. The analyzed data was presented descriptively and quantitatively by use of percentages and frequencies generated in tables and charts. Descriptive analysis was to elaborate on the characteristics of variables and the relationship that existed between independent and dependent variables and logistic regression analysis was toexplain the relationship between independent and dependent variables. Study findings revealed that majority of the firms representing 58.7% in industrial area are non-compliant to environmental regulations. Further it revealed that social factors being the *number of awareness campaigns attended* and *consultation when introducing new or amending regulations* can contribute significantly to the firms complying with the environmental regulations. The institutional factors that contribute significantly on non-compliance are *budget of compliance*, *staff training on environmental compliance*, *establishment of an environmental department* and *the level of operation*. On technical factors that influences compliance are *inspection*, *experience in penalty/sanction* and *location of a firm* though it has a negative coefficient. The study concluded that majority of the firms do not comply because stakeholders do not have knowledge or awareness on environmental regulations, weak enforcement mechanisms, the cost of compliance is assumed to be high among other reasons. Study recommends that government officials must take the initiative of routine monitoring and inspecting all regulated firms. Parliament should enact and amend laws and as well formulate programs on environmental compliance including providing stringent measures and fines. Creation of enforcement mechanism and framework to enable all stakeholders participates enhances compliance to environmental regulations. It further recommends good environmental governance and adoption of best practices for compliance.

Keywords

Environmental regulations, Industrial sector, Compliance, environmental protection and degradation, environmental governance, social, technical and social factors

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Above all to the Almighty, for been with me throughout my entire stay in Europe and for being a constant in my life. Thank you.

Dedication

I dedicate this research to my family; my dad, my sisters and my brothers for their unending love, motivation and support in my life. Family is where life begins and always stays….)

In honour of my mum, Mrs. Mary W Njihia.

Abbreviations

ER	Environmental Regulation
SD	Sustainable Development
UN	United Nations
EIA/EA	Environmental Impact Assessment/ Environmental Audit
NEPA	National Environmental Policy Act
EMCA	Environmental Management and Coordination Act
NEMA	National Environment Management Authority
MEA	Multi-Lateral Environmental Agreements
UNDP	United Nations Development Program
VEP	Voluntary Environmental Performance
NGO	Non-Governmental Organisations
SME	Small and Medium Enterprises
GHG	Green House Gas
GDP	Gross Domestic Product
KAM	Kenya association of manufacturers
NCC	Nairobi City County Government
SPSS	Statistical Package for Social Sciences
KSH	Kenya Shillings

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Chapter 1: Introduction

This chapter offers a general idea of the study research by providing the background and the problem statement. Further, it outlines the research objectives, questions and concludes by laying out the study area, scope, and the limitation of the study.

1.1 Background

Sustainable Development has three pillars: Economic, Environmental and Social. One of the key characteristics of sustainable development is maintaining the overall quality of life by reducing environmental damage which is achieved by having sound environmental regulations. Thus, environmental regulations are crucial to achieving sustainability (Dernbach and Mintz, 2011). With rapid urbanisation and industrialisation, there is a global concern to safe guard the environment from degradation. Many countries are experiencing rapid economic growth through industrialisation which is coupled with environmental destruction. This is done through sound environmental regulations and having an institution responsible for the environmental matters. Environmental compliance has recently become a subject of discussion both at local and international level. This is enhanced by the fact that an effective and successful environmental compliance leads to a sustainable environmental development (Betey and Essel, 2013).

The first international environmental law was adopted in 1972 by the United Nations conference on human environment in Stockholm which aimed to recognize the right to a clean and healthy environment through consideration of common principles to inspire and guide people on environmental challenges. The conference emphasized on the necessity to put environmental consideration, especially in low-income countries as they experience rapid growth. Later the Brundtland Commission elaborated on environment and development as inseparable spheres and stated they should be both considered for a sustainable development (Glasson, Therivel, et al., 2013).

One of the mechanisms to safeguard the environment against degradation is through conducting an Environmental Impact Assessment (E.I.A) and environmental Audit (E.A) which are some of the environmental regulations. Principle 17 of the Rio Summit declaration states that; "Environmental Impact Assessment (EIA), as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority". The process of EIA involves logical evaluation of a proposed project to identify its impact on the environment through public consultation. The impacts can include; the aspect of the natural, economic, social and human environment (Ogola and Pacifica, 2007). This is done during the planning, designing, in decision-making and implementation stages of a project. On the other hand, E.A is done on an existing project to assess to which extent it adheres to environmental principles that minimize negative impacts on the environment. The purpose of both regulations is to protect the environment and ensure all citizens have access to a clean and healthy environment.

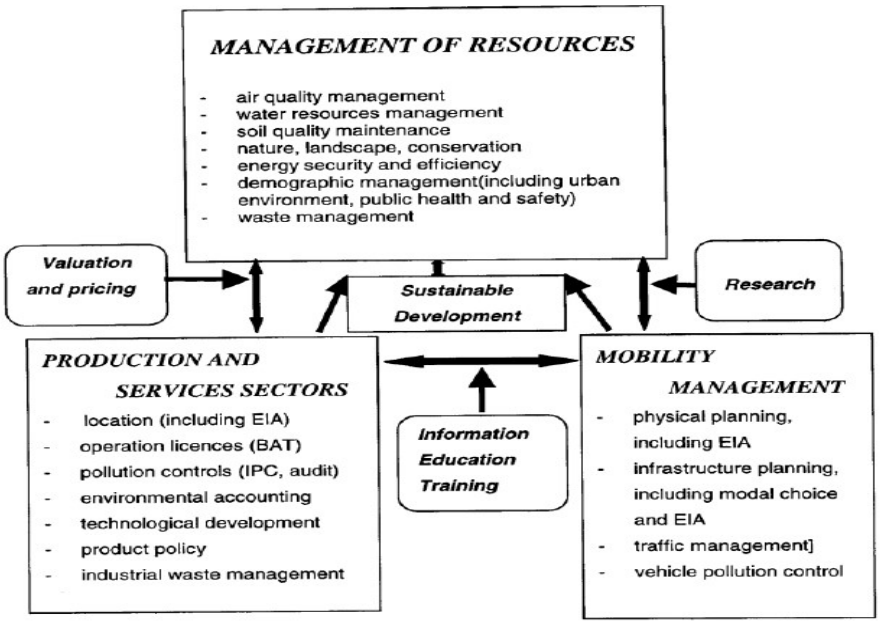
E.I.A was first used in the United States of America (USA) in the 1960's as part of a process of decision making that is rational. Later in the year 1969, it was accepted as a legislation in the National Environmental Policy Act (NEPA) in the USA. Currently, it has been adopted immensely by many countries, especially developed countries. Nevertheless, many developing countries are also appreciating that it is essential for environmental planning and are thus catching up (Glasson, Therivel, et al., 2013).

Until the year 1999, there did not exist framework for environmental legislation in Kenya. The environmental matters were incorporated in Statues such as land tenure and land use,

agriculture, forestry and wildlife legislation among others. With time there was the observation of the speedy rise of development and emerging of industrial activities that pose danger to the environment, which bore the need to have an environmental framework. To address this weakness, the parliament enacted the Environmental Management and Coordination Act of 1999 No. 8 (EMCA) that received the presidential assent on the year 2000. EMCA framework deals with various aspects of the environment enabling its protection and conservation through E.I.A, E.A and environmental restoration orders. The act has listed on the schedule all the projects that are mandated to undertake E.I.A and E.A (Kibutu and Mwenda).

In addition, National Environment Management Authority (NEMA) is the institution mandated by EMCA to administer all environmental regulations including but not limited to E.I.A and E.A as a legal requirement in reducing negative environmental impacts (Kibutu and Mwenda). Since its operational, it has issued licences and compliance letters to various projects and facilities. However, despite this, there has been low compliance level with the regulation, especially among the industrial sector leading to deteriorating environmental conditions.

Figure 1:An illustration of how environmental management is key to Sustainable Development



Source:http://www.financialexpress.com/news/moef-seeking-to-centralise-clearance-of-projects/159140/

1.2 Problem statement

The main purpose of EIA as a decision-making tool is to incorporate environmental considerations in order to establish the impacts of a proposed project. In addition, it expresses how to mitigate against the potential negative impacts to the environment. EIA and EA go hand in hand, however, the latter is conducted during the operation phase. Their main purpose is to protect the environment through proposing appropriate mitigating measures. Largely, they both promote the components of sustainable development through promotion of sound environment to business (economic) and to work (social) (Wahaab, 2003). (Wahaab, 2003)also laments that in order to attain the goals of sustainable development, there is need to incorporate environment and development.

Kenya is among the developing countries that its government has put strong measures in EIA/EA regulations. This is attributed by the rapid urbanisation that it experiences which result

in numerous activities that put pressure on the environment. Therefore, it is essential for the government to strictly act by enforcing the regulations to protect the environment for its citizens and for the future generation. Ironically, despite sound environmental regulations and an institution mandated to administer the regulation, Kenya has continued to experience deterioration of the environment at an alarming alert confirming that the levels of compliance are low. The environmental degradation experienced include deforestation, soil erosion, degraded water quality, flooding, industrial pollution et cetera.

There are a number of research which have been conducted on EIA/EA practices in Kenya which suggest a lot needs to be done to fulfil its purpose. Mostly they suggest awareness creation among citizens and developers. According to (Muigua, 2012), he laments that the main hindrance for effective implementation is lack of monitoring and suggest that monitoring should be conducted to projects/facilities to determine their compliance status. However, little has been researched on establishing environmental regulation compliance on industrial sector being the sector that pollutes the environment most. Most of the industrial facilities continue to pollute the environment despite having in place environmental systems raising the question why?

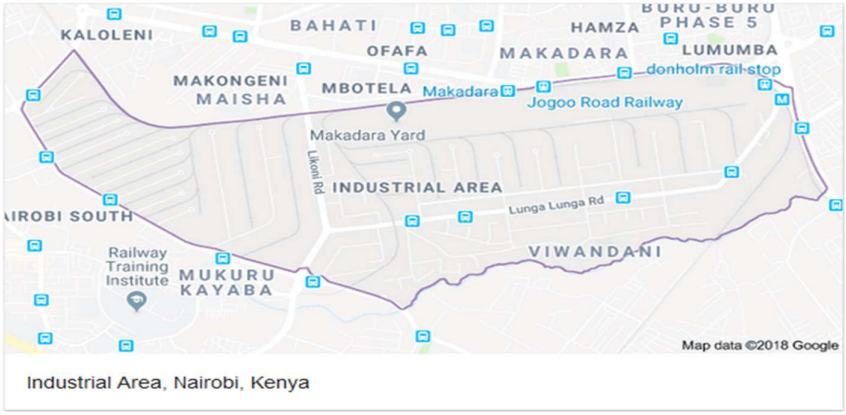
Looking from the above scenarios, this study sought to explore the compliance status with environmental regulations by establishing the key driving factors behind non-compliance within facilities in the Industrial area of Nairobi, Kenya.

1.2.1 Study Area

The study focussed on the Industrial area of Nairobi in Kenya. Nairobi is the capital City and largest city of Kenya and leading industrial nation in East Africa (Ogendo, 1978). The industrial area is located on the south and south-west on Nairobi and occupies a large area which is dense. It comprises of many industries and manufacturing facilities hence it attracts a large percentage of the population.

The area was chosen for the research because industrial facilities if not well managed can contribute highly to environmental pollution. Thus these facilities are required by law to be compliant with Environmental regulations.

Figure 2: Map showing the location of the Industrial area



(Source; Google)

1.3 Research Objectives

The objective of this research is to create an understanding of the compliance status with Environmental regulation within the Industrial area of Nairobi, Kenya. This is specifically guided by the following sub research objective.

1.3.1 Sub - Research Objectives

1. To identify some of the environmental regulations, their process and role.
2. To identify the environmental impacts caused by industrial activities.
3. To establish the role of environmental governance in compliance to Environmental Regulations.
4. To identify the driving forces affecting effective environmental compliance.

1.4 Preliminary Research Questions

Main question
The main question that the study aims to answer is:

- What is the status of compliance with environmental regulations within facilities in the Industrial area of Nairobi, Kenya?

Moreover, to answer the main research question, the following research sub-questions were considered:

1. What are some of the environmental regulations, their process and role in the environment?
2. How does the industrial sector impact the environment?
3. What is the role of environmental governance in complianceto Environmental Regulations?
4. Which factors influence effective compliance with Environmental regulations?

1.5 Significance of the Study

The significance of this research study is to provide an insightful analysis of the compliance status of industrial facilities to environmental regulations (EIA/EA). The study also sought to know how well the personnel of the facilities are aware of these regulations and to establish which factors influence them not to adhere to the regulations hence is important as it will assist in addressing the factors that hinder compliance. While there are researches done on environmental compliance, it is worth noting that most focus on the commercial buildings and facilities thus it is important to understand on the side of industrial facilities.

Furthermore, it will elaborate on the role of government institutions mandated to administer the regulations by advising on the best approach which they can apply to ensure the facilities are compliant. This is beneficial because it is mandatory for them to enforce the regulations and ensure they are adhered to the latter. Developers and owners of industrial firms/projects could also benefit from the findings of this study in establishing the factors that can hinder them to comply with regulations and the solutions to these factors.

The findings of this research adds to the existing knowledge on environmental regulations compliance which is vital for achieving a sustainable environment and hence sustainable development. In addition, it raises awareness on the importance of environmental regulation and why it's essential to adhere to them and filling the gaps in the effective implementation of regulations.
Lastly, this research was stimulated by the fact Environmental regulations main aim is to protect the environment, thus non- compliance to them leads to environmental pollution and degradation which results to climate change which is a global concern.

1.6 Scope and Limitations

The research study focussed on creating an understanding of the compliance status of industrial facilities on Environmental regulation by analysis the major factors the hinder them from complying and assessing their knowledge capacity to environmental regulations. It also focussed on government's contribution to ensuring that facilities do comply. For the purpose of this research, the environmental regulation under study is Environmental Impact Assessment and Environmental Audit.

The main limitation of the study was time constraint, especially during data collection since the source of data from a government institution whose records are not in digitized. The source f data being from a government institution, it reduces the reliability because, these data are primarily for their use and have not been tested by any other organisation. However, the researcher overcame this challenge by putting more hours into the research. Equally, the research was to have an observation of 277 firms, however, due to the difficulty in gathering the data, 138 firms from nine sectors were observed.

The research focussed on facilities located in industrial area of Nairobi despite having many industries in Kenya and thus the findings cannot be generalized to other industrial facilities in a different geographical area since it is case specific with distinctive character.

Chapter 2: Literature Review / Theory

2.1 Introduction

This chapter presents an overview of theoretical understanding of environmental regulation from existing literature. It brings an understanding of environmental regulation while focusing on in EIA and its entire process. Industrialization which is a major polluter of the environment is discussed by mentioning there is need to enforce compliance in this sector. Governance is a key aspect of environmental compliance is also deliberated by identifying the various concepts of governance and their role in compliance. Additional the linkage between governance and environmental compliance is considered to establish how they relate to each other. The six main factors that contribute to non-compliance are analyzed from relevant theoretical literature and empirical situations. In this regard, five case studies are identified that have outlined these factors on a case-based situation. Lastly, it presents a conceptual framework that links different concepts identified from the literature.

2.2 Environmental Regulations

Environmental regulation is defined as state directives, standards or laws that aim to reduce environmental damages, resource consumption and protect human health (Rennings and Rammer, 2011). They often relate to environmental matters such as global warming, pollution of air, soil or water and depletion of natural resources. In many countries, they are administered by an environmental protection Agency. (Ahmed, 2012) combines environmental regulations and standards and refers to them as policy tools that set specific limits and rules that control ongoing activities of firms to enable them to operate within the legally required parameters. They usually are adopted from functioning permits set by agencies in charge of environmental matters. According to (Wahaab, 2003), it is very vital to have a sustainable linkage between the environmental sectors and the country's national economy. This will enable businesses to flourish thus improving the Gross Domestic Product (GDP) of a country while safeguarding the environment. (Gray, 2015) adds that environmental regulations have great benefits to health particular through reduction of water and air pollution especially in developing countries since their pollution levels are high. He also notes that environmental regulations have large benefits to the society than the cost of compliance.

Environmental regulation should be effective and should serve its purpose which is safeguarding the environment by reducing pollution. Consequently, for this to be achieved, the action of the regulated firms and government authority who are the main two agents is necessary. The government authority who is the regulator enact the regulations and enforce them. On the other hand, the regulated firms are to comply once they are informed of the regulations (Botelho, Pinto, et al., 2005).

Environmental management began in 1960 when the world became conscious of the massive environmental degradation due to the mega-developments as a result of urbanization. Before that people focused more on economic value without paying attention to the consequences of environmental damage. Later in the 1980's, many countries incorporated environmental guidelines within their law (Wahaab, 2003).

2.2.1 Environmental Impact Assessment/ Environmental Audit (EIA/EA)

EIA/EA are some of the examples of environmental regulations adopted by many countries to protect the environment. EIA is a key aspect of the planning process mainly because it identifies the potential environmental impacts of proposed developments. It is defined as an exercise done by developers which gathers information that enables an environmental agency to decide

whether a project should be implemented or not depending on the environmental effects mentioned in the assessment report. It uses information that is objective and is carried out in a participatory approach by allowing the society to understand what impacts a project will have (Carroll and Turpin, 2002). It has now over 35 years since its first usage in the USA and its basic concept is widely agreed among nations practising it (Jay, Jones, et al., 2007).

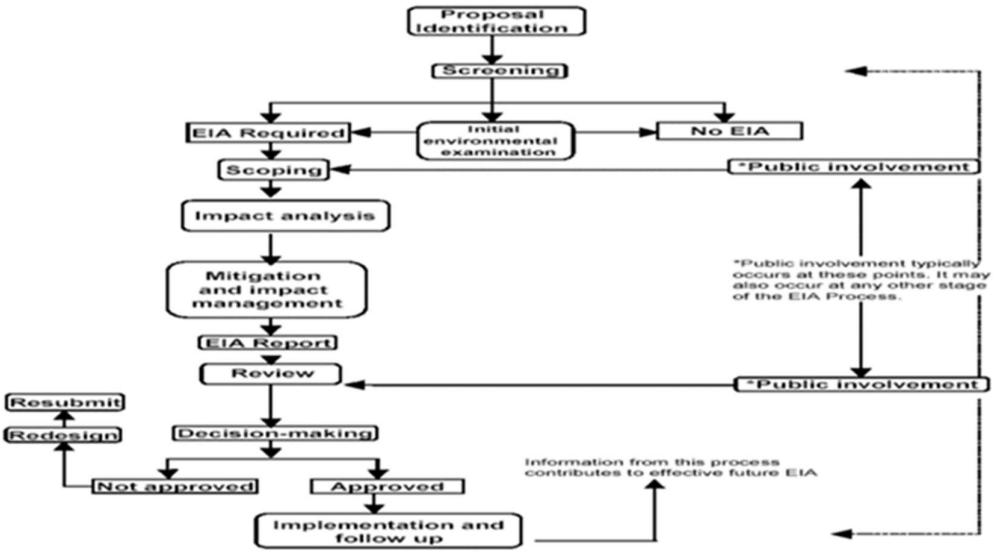
(Wahaab, 2003) sees it as a management tool that contributes to environmentally sound development in urban environmental management. He defines it as "a process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of proposed projects prior to major decisions and commitments being made" (Wahaab, 2003, P.11). EIA provides measures to mitigate against the negative impacts of a proposed development. This definition is anchored by other authors such (Muigua, 2012), (Glasson, Therivel, et al., 2013)and (Mekuriaw and Teffera, 2013)who have the same sentiments by pointing out it is important in decision making process.

Environmental Audit (EA) is defined as a systematic check, assessment, test or verification on environmental management aspects by examining compliance or by doing monitoring on existing projects. They mainly check how well environmental laws have worked. Recently, there has been a rise in global concern over environmental issues hence EA do assist to evaluate and improve on the existing environmental frameworks (Buckley, 1991). It also defined by (Maltby, 1995) as a management instrument that is organized periodically and is documented to evaluate objectively how well firms are performing on adhering to regulatory requirements with the purpose of protecting the environment by enabling sound environmental practices.

2.2.1 EIA process

EIA is a procedure for identifying environmental impacts of proposed developments and is mainly based on predictions. Therefore, it involves multi-disciplinary approach and each step is essential in the project design. EIA is part of the project planning cycle. It aims to ensure adverse effects on the environment are foreseen and are mitigated against at an early phase of the planning cycle (Ogola and Pacifica, 2007). The stages of the EIA process are illustrated in the figure below:

Figure 3: Generalized EIA process



Source: (Sadler and McCabe, 2002, P.177) *and* (Ogola and Pacifica, 2007)

2.2.1.1 Screening

Screening is an important part of the EIA process and is done to determine if the project proposal is to be subjected to an EIA or not. A number of characteristics are observed during screening process such as the location of the project, development characteristic and the potential impacts (Weston, 2000) and (Corner, Siriwardena, et al., 2013).

2.2.1.2 Scooping

This is done once a decision from the screening stage is done. It is necessary because it establishes which factors of the project will have significant impact. Herein, key issues and concerns are identified, investigated and the methods to be used for impact assessment is also covered. This process is continuous and is done throughout the project cycle (Snell and Cowell, 2006).

2.2.1.3 Baseline Data Collection

This is the background information on the proposed project area in terms of social, economic and biophysical setting. It helps to understand the current condition of the project area and to predict the potential environmental change that can occur. Information is gathered from secondary data and site visits (Shepard, 2006).

2.2.1.4 Impact Analysis

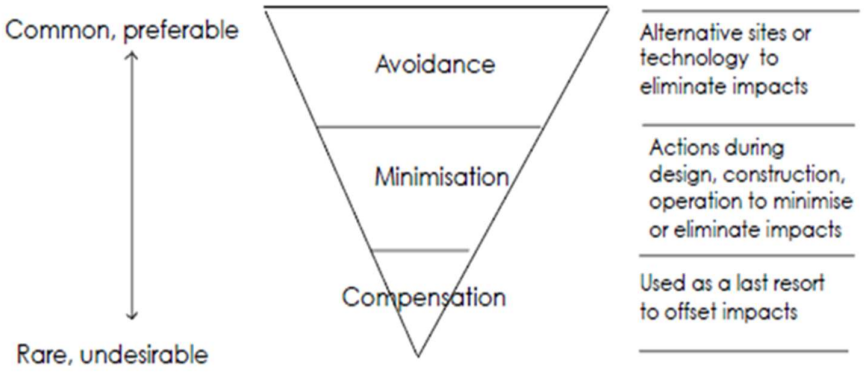
Here, prediction of the magnitude of the impact and evaluating their importance is done at this stage. They can be described in qualitative or quantitative terms based on the baseline information on the environment of the project area (Morris and Therivel, 2001).

2.2.1.5 Mitigation and impact management

Mitigation is useful because it minimizes the predicted negative impacts and incorporates them into an Environmental Management Plan (EMP). In addition, they help to identify alternatives to reduce environmental damage and enhance economic, social and environmental benefits (Ogola and Pacifica, 2007). EMP is a plan which is detailed with measures to mitigate and reduce any adverse environmental effect. It outlines responsible institutions in charge of undertaking both mitigation and monitoring measures. Thus, it forms a more standard and unambiguous document that makes it easy when formulating conditions if the project is to be implemented (Tinker, Cobb, et al., 2005).

This stage has a 3-element process which can be applied. As a project becomes more intense, the opportunities for avoidance also becomes less thus the options of minimizing or compensations can be considered. Compensations is the least preferred element because it involves displacement of people, property and can be very costly (Sadler and McCabe, 2002).

Figure 4: An illustration of a framework for impact mitigation



Source: (Sadler and McCabe, 2002, P.308)

2.2.1.6 Decision Making

This is the final stage of the process, however, at every stage provisional decisions are made which influences the final decision. It provides input whether the project is accepted and establishes environmental conditions for project implementation. Monitoring is later done to ensure there is compliance with the conditions of the decision (Weston, 2000).

EIA is guided by some principles according to (Muigua, 2012) and (Wahaab, 2003). Although they have been developed differently in developed and developing countries, they share common values which include:

- Should allow for public participation and use a multi-disciplinary approach
- Should incorporate economic, environmental, biophysical and social aspects
- Should be administered on all actions that could have an adverse effect on the environment
- A tool for achieving sustainability goals and for environmental management
- Should give reasonable alternatives design and mitigation measures

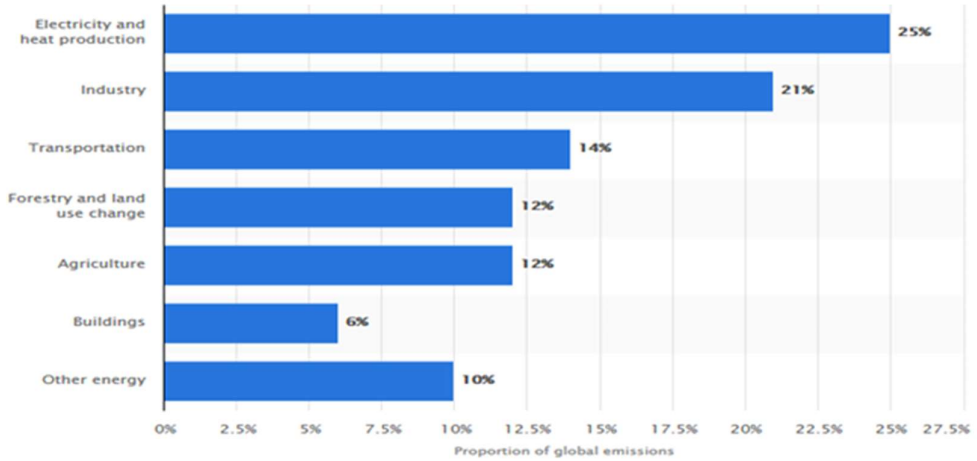
Once the impacts are identified, they are weighed according to criteria by assessing whether they are long term or short term, local or regional, direct, indirect or reversible and lastly whether they affect human, animal or plants (Glasson, Therivel, et al., 2013).

2.2 Industrialization and environmental pollution

Industrialization is defined as a process of economic change from agriculture production to the manufacturing of goods. It is characterized by mass production, economic growth, wealth and use of technological innovation rather than human capital. It also influences rapid population shift from rural area to urban centres (Naudé, Szirmai, et al., 2013).

Industrialization has risen to become the dominant mode of social-economic development worldwide. It is the pillar of economic development of any country. As more industries emerge and function, they result in accumulation and discharge of both solid and liquid waste into the environment. Consequently leading to environmental degradation affecting the well-being on earth (Nath, 2009). Rapid industrial growth especially in developing and transition countries have generated hazardous waste and they lack proper ways of disposing of the waste leading to pollution. This requires strong legislation, strict enforcement and careful management of that type of waste. In Vietnam, it is estimated that 77 % of hazardous waste is from industrial activities. Sadly, this is expected to rise significantly by the year 2050 as the country struggles to become a strong industrialized economy (Wingqvist and Slunge, 2013). Noise and smell pollution emanating from the massive industrial activities is considered as an environmental nuisance. Industrial emissions also contribute to increasing of Green House Gas (GHG) emissions causing global warming leading to climate change. According to (Pachauri, Allen, et al., 2014) industry sector is the second largest contributor to GHG after electricity and heat production worldwide.

Figure 5: Global GHG emission by sector



Source: (Pachauri, Allen, et al., 2014)

It is clear that industrial pollution is worsening and is considered a major environmental threat (Magsi). There is a strong need to have a balance between industrialization and environment so as to reduce the magnitude of pollution. If managed properly, it will have economic value thus uplifting social status in the society and also enable them to manage the environment sustainably (Shailender, Puja, et al., 2009).According to (World Health Organization, 1997), there are three major industrial effects on the environment. The first being pollution from industrial waste which pollutes, water, air and soil, secondly, urbanization effect in that industrialization attracts large population as they are a source of employment for the urban population. This large population exerts pressure on the environment. Thirdly, extraction, whereby industries mainly use raw materials in their production. The raw materials are extracted from plants, fossil fuels, wood, water land et cetera making the resources scarce.

From the preceding paragraphs, it is important for countries to understand the harm caused on the environment due to socio-economic development. This will enable them to set and enforce environmental regulations in order to reduce effects on the environment and to achieve sustainability. (Nath, 2009), states once environmental standards are set, enforcement should be done to ensure all facilities comply with the standards required. This entails a good working relationship between environmental regulators and the industrial community. Good management of the environment and natural resources promotes poverty reduction and sustainable development. In developing and transitioning countries, however, implementation and compliance with environmental regulations is commonly quite weak (Wingqvist, Drakenberg, et al., 2012). These countries are limited with resources, human capital and technology advancement thus they prefer economic growth over environmental protection.

2.3 Role of governance for improved environmental compliance

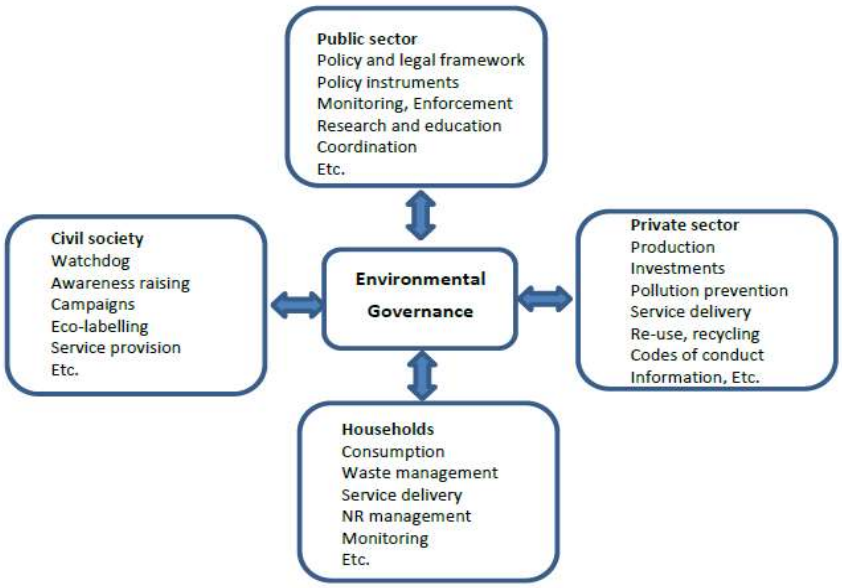
Role of governance in policy making is crucial in the conservation of environmental management; weak governance contributes to environmental degradation. A number of Multilateral Environmental Agreements (MEA's) have acknowledged the necessity of good governance for good environmental management. They advocate for implementation of environmental regulations and mainstreaming environment in various development plans (Wingqvist, Drakenberg, et al., 2012). United Nations Development Program (UNDP) has initiated an environmental governance that promotes policy advise that improves a nation's capacity to protect the environment and promote equal access to resources which has been adopted by many countries (Harman, 2005).

2.3.1 What is governance?

Governance is a concept with multiple definitions depending on the context and its purpose at that particular forum (economic, environmental, social, or political). With regard to that, for the purpose of this research, we will define it according to (Fukuyama, 2013)and (Kjaer, 2004)as the ability of a government to set and enforce rules, laws or norms. The process is designed to enable a country manage its resources, economic status, political and administrative aspects and also facilitate it to fulfil its vision and agenda. Good governance is emphasized in the UN system as the center of sustainable development and refers to the inclusion of allowing participation, promoting equity, accountability, transparency and rule of law in an approach that is sustainable, efficient and effective (de Coninck, 2009). (Wingqvist and Slunge, 2013)advocates for the active involvement of multiple stakeholders and especially the public sector in the formulation and operation of sustainable governance systems.

Environmental governance refers to the organizations and procedures by which a nation makes concrete decisions control and management of the environment and natural resources. There are principles which govern it including coherent, effective, participation and open to information access. These basic principles were endorsed by 178 countries in 1992 during the Rio Summit and later re-emphasized in 2005 during the World Summit on Sustainable development (Harman, 2005). Moreover, it incorporates decisions and outcomes on environmental goals and advocates for multiple stakeholder's participation in effective environmental governance (Wingqvist, Drakenberg, et al., 2012)as illustrated in the figure below.

Figure 6: A good environmental governance with multiple stakeholders



Source: (Wingqvist and Slunge, 2013)

Environmental governance is affected by internal aspects (authorities) and external aspects (Enabling environment). There is a strong urge to balance between the two aspects in order to identify measures which are a priority for effective environmental management. Internal and external aspects to strengthen environmental governance is illustrated in the table below:

Table 1: Internal and external aspects of environmental governance

Environmental authorities (internal aspects)	Enabling environment (external aspects)
Policy development (policies, laws, regulations, policy instrument) Policy implementation (inspection, compliance and enforcement) Research and assessment (research, evaluation, environmental information systems) Environmental integration (sector responsibility, producer responsibility) Operational support (organisational development, human resources, finance and accounting)	Knowledge and information about the importance of environment and climate change Environmental management is a prioritised policy issue Environmental regulations with clearly defined responsibilities Horizontal and vertical communication Rule of Law, low corruption Access to information, public participation, accountability Environmental constituencies demanding improved environmental management

Source: (Wingqvist, Drakenberg, et al., 2012)

It is worth noting that governance is not government only but involves many stakeholders and is fundamentally complicated and is multi-sectoral in nature. In practice, for instance, the public sector will formulate and enforce regulation while the private sector has the role of ensuring environmental governance.

2.3.2 Linkage between governance and environmental compliance

Compliance is when a regulated facility is able to achieve environmental laws, regulations and standards by meeting the expected objectives and goals. In the past, compliance was based on control and command approach where rules set by the government were to be met. Regulations in this traditional approach are given a legal entity and the government has the power and control. This allowed the government to have a smooth time when determining whether the requirements are met; this is done through routine inspections (Harman, 2005). This approach as noted by (Harman, 2005, P.7) brought remarkable progress on environmental conditions. "For example in the UK, Sulphur dioxide emission have fallen by 75% since 1990, nitrogen oxides by 52%, water pollution fell by 65% in 5 years". The control and command compliance approach is not widely accepted especially by the business community and therefore it is being replaced by other approaches such as voluntary environmental performance and self-regulation. Self-regulation is the ability of a firm to manage their environment by controlling and reducing the effects of their operation on the environment so as to have a good stature for environmental management. They do so by adopting various national and international environmental standards in their activities (Christmann and Taylor, 2003). Voluntary Environmental Performance (VEP) is a tool that enables a firm to be flexible to adapt to regulations by having incentives that help reduce the emission to the required level (Shetty and Kumar, 2017).

These two governance approaches help to improve the effectiveness of compliance through guidance from three principles as discussed below:

Coherence; regulations are meant to solve environmental issues and need to be appropriate in order to fulfil their purpose. Compliance creates good governance by considering communication between stakeholders in a coherent manner. This increases smooth

implementation of regulation motivating high compliance level (Stilwell and Tarasofsky, 2001).

Openness; the Rio Summit declared that a good environmental governance mainly relies on providing information to actors including the minority groups in the decision making process. Public participation allows the interest of the community to be considered when environmental decisions are made. Openness encourages the society to adhere to the regulation thus safeguarding the environment (Harman, 2005).

Participatory- globally, participation is acknowledged to be crucial for good governance because it seeks to understand stakeholder's opinion and incorporate them into environmental regulations. Moreover, it encourages society, businesses and industrial sector to maximize compliance in their operation and take full responsibility for their own actions. It has three functional categories education, review and dialogue (de Coninck, 2009).

In conclusion, compliance is a way of awareness creation to the society to be more aware of the environment by educating them on how their actions could affect the environment and what can be done to reduce environmental impacts. Thus compliance is a powerful tool for environmental governance in that it enables an environmental regulation to meet its objectives and desired goals. It is a key focal point for good environmental governance and brings benefits to a nation (Harman, 2005).

2.3.3 Governance models and concepts in environmental regulations

The modes of governance are prepared on standards and objectives that guide how a society should be structured by addressing how problems should be solved and by whom. In the environment sector, there are 5 main governance models which all tend to protect the environment through the collaboration of state and non-state actors (markets, civil society).

Table 2: An environmental governance model

Model	Orientation	Key Characteristics	Assumptions	Strengths	Weaknesses
Regulatory	Law	• Governments are the regulators • Change occurs through the alteration of rules and policies • Starting model for environmental policy	• Society is manageable (people will follow rules and regulations)	• Clear rules for action • Basis for retribution • Adherence can lead to improvements • Standardized policies and mechanisms applicable to a broad geographic area	• Reactive in nature • Unclear ability to address uncertainty and complexity • Requires monitoring and enforcement • Cost effectiveness is uncertain • Economic growth may be restricted
Market Regulation	Economics	• Price mechanisms provide control and are facilitated by governments • Change occurs by reconfiguring price mechanisms	• Markets can resolve environmental problems through price signals • Aggregating individual preferences in a market leads to socially optimum outcomes	• Integration of ecosystem services into markets • Recognition of the full cost of production • Behaviour is altered by making choices with negative impacts less financially attractive	• Price mechanism may not be able to accurately incorporate environmental externalities • Relatively few examples in practice • Form of regulation • Accountability concerns
Civil Society	Political Science	• Engaged citizens play a dynamic role in civil society • Change occurs through dialogue and debate	• An informed and engaged citizenry exists and is willing and able to play a role • Critiquing governments can induce strong environmental policy	• Public participation enhances legitimacy • The connection between personal actions and environmental impacts is highlighted	• The assumption that public debate will result in positive policy improvements is questionable • Potential for "productive conflict", where ideas are exchanged and debated openly, is ignored

Model	Orientation	Key Characteristics	Assumptions	Strengths	Weaknesses
Co-operative Management	Political Science	• An array of actors (e.g., government, non-governmental organizations, private) interact in a collaborative manner • Communication and dialogue is the basis for the voluntary agreements • Focus is on organized interests, rather than on individual citizen participation	• Actors are willing and able to act in a collaborative manner • The world is complex and uncertainty is high	• Encourages pluralistic inputs and can lead to effective and efficient processes • Strives to make mutual dependencies productive, incorporate multiple knowledge systems and is a mechanism for building consensus • Coordinated and complementary effort to assert change • Stresses flexibility and learning, which is well suited to complexity and uncertainty	• Power differentials between actors and what the actors represent • No guarantee for efficiency gains • Negotiated and deliberative process take considerable time and resources • Incompatible with some political cultures • Insufficient capacity undermines effective participation
Contextual Control and Self-Regulation	Law and Political Science	• Sub-systems or actor networks form and address environmental issues • Network formation is an outcome of self-reflection regarding appropriate actions for the social context and the environmental challenges	• Actor networks will form and engage in appropriate self-regulatory behaviour	• Resistance to government driven policy is mitigated • Highly democratic and fosters engagement	• Blatant protection of self-interests is possible • Government may be required to take corrective action • Ideal of self-regulation may be illusionary in light of extensive legal preconditions

Source; (de Coninck, 2009, P.15,16)

Environmental governance concepts recognise five disciplines; Recognising the importance of fit and scale where collaboration between actors and multiple stakeholders offers greater abilities for implementation, monitoring and encouraging provision of incentives through economic benefits and sharing of power. Furthermore, it allows for both horizontal and vertical integration among actors creating a channel for passage of information, accountability and ideas sharing (Armitage, de Loë, et al., 2012). Secondly, through fostering adaptiveness flexibility and learning; adaptive capacity is the ability of a system to be able to withstand disturbances and be able to bounce back in case of a shock. Environmental governance is required to have adaptive to be able to deal with current and future calamities. Decision making process, on the other hand, should be flexible to allow for learning aspect of environmental change and how to cope with the change. Thirdly, co-producing of knowledge from diverse source encourages policy makers, managers and environmentalists to engage in building understanding on environmental matters to achieve desirable outcomes. It a mechanism for encouraging knowledge sharing among actors since there is no single actor with full knowledge on how to manage the environment effectively. Knowledge co-production also empathizes on paying attention to local knowledge because they emerge from long-time observation of environmental systems and are therefore useful.

Fourthly, governance necessitates participation of various stakeholders and defining their roles and responsibilities. Inclusive participation of non-state actors contributes to the equitable allocation of resources, equal sharing of benefits, effective, legitimate and agreed on procedures in decision making process. It is important for all actors to understand their roles. Last but not least, accountability and legitimacy concepts are usually determined by regulations and the mandated agencies. Legitimacy demands for a partnership that is balanced by having stakeholders' representation from different groups and also how effective the partnership is in meeting their goals. Accountability is enhanced when stakeholders have open access to information and decision making. This can be achieved through the adoption of a mechanism that accounts for power sharing of civil society or appropriate representation of actors (Bäckstrand, 2005).

2.4 Factors affecting the non-compliance with environmental regulation

Environmental regulations are aimed at improving the general environmental conditions through conservation of raw materials for sustainable development. A successful regulation reform is measured by assessing whether its system has accomplished its objectives. The industrial sector has both positive and negative implications. While it is important for a country's economic growth and provision of employment, on the other hand, it has negative impacts e.g. environmental effects. Therefore it is vital for regulated facilities to comply with requirements of a regulation to protect the environment (Montabon, Melnyk, et al., 2000).

Compliance is the Compliance with environmental regulations is a major challenge not only on developing countries but also in developed countries like European countries. There are many factors affecting compliance that is economic, political, technological, social and institutional factors as described below:

2.4.1 Lack of adequate knowledge on environmental regulation

Knowledge of environmental regulations is a crucial determinant in promoting environmental compliance. Awareness of what is required in a regulation is necessary for compliance, if society is not aware of a regulation, adhering to it will be low. Consequently. There is need to publicize regulations whether new or old because a regulation may be known but the requirements in it may not be well articulated to everyone. Regulations requirements can be complex to be understood by regulated facilities thus affecting the compliance (Winter and May, 2001). When the expected outcomes are clear, they overcome factors that encourage non-compliance and creates awareness on the benefits of adhering to regulations and the possible repercussion of failing to comply. Environmental regulations are normally written in complex language that makes it difficult to be understood hence education on their requirement is important for compliance and also to make the public feel engaged. Creation of awareness can be done through education programs, campaigns, advise (formal or informal), television and radio programs, leaflets, business journals, inspections among others. Agencies responsible for environmental issues should collaborate with other government departments, local council, community and Non-Governmental Organizations (NGO's) to enable smooth access to environmental protection information (Bruch and Mrema, 2006). The information empowers citizens to ensure are well adhered to and enforced following the correct procedure. The lack of knowledge on environmental compliance as explained by (Winter and May, 2001)is also associated by non-consultation of key environmental stakeholders when new environmental laws are regulated. He further questions how can a facility comply yet they have no idea what a regulation entails.

2.4.2 Costs of compliance

Compliance costs is the cost that is subjected to facilities in their actions/activities they undertake to comply with regulations requirements. Also, it is the cost incurred by a government during enforcement of regulations to ensure compliance. Facilities mainly incur the costs in several ways such as when familiarizing themselves on requirements of a regulation in order to comply as well as when allocating roles and during developing strategies that enable them to achieve the regulatory objectives. This costs when combined, they become a lot for facilities to endure especially the Small and Medium Enterprises (SME's) which hinder them to comply. Besides, these facilities will be required to purchase equipment like machinery that reduces emissions to comply with the standards set and also some may need to renovate their building to fit the required environmental standards. Equally, external service costs usually incurred as well as there is need to hire experts to advise on mechanisms that will enable them to achieve compliance.

Government agencies are obligated to allocate adequate budget in order to be able to enforce of regulations effectively which then improves compliance. In most developing countries due to the shortage of finances, environment sector is allocated less funds compared to other sectors which then hinder the mandated agencies from carrying out their responsibilities efficiently affecting compliance. To this point, both costs incurred by regulated facilities and government in order to ensure compliance is a challenge in achieving maximum compliance (OECD, 2014).

2.4.3 Weak enforcement

Enforcement is done to ensure environmental regulations, laws, rules and standards are adhered to and also to protect the rights of citizens. It also plays a role in raising people's awareness on environmental matters, however, it is usually weak leading to non-compliance. In China as noted by (Van Rooij, 2006, P.58) "it has great progress in building a system of environmental law and enforcing environmental regulations; nevertheless, problems of non-compliance and imperfect enforcement of these laws and regulations remain". When enforcement is not done on regular basis, facilities tend to continue operating in activities that damage the environment due to lack of follow-up.

Weak enforcement occurs because most environmental regulations are vague making the regulating agencies not to have mandatory powers in exercising their duties providing room for corruption thus low compliance. Additionally, lack of alternative livelihoods contributes to weak enforcement since regulations that do not provide other sources of income to the society are likely to lack local legitimacy. Inadequate funding to environmental institutions that enforce environmental laws contributes to weak enforcement since it causes the institutions not to carry out inspections regularly. Consequently, these institutions are understaffed causing a burden to the few staffs and thus are not able to enforce effectively. Also, they lack the necessary and adequate materials such as vehicles and safety protective equipment which are useful when conducting enforcement.

A successful enforcement of environmental regulations requires monitoring, balancing of various interest of stakeholders and also the incorporation of sustainable development theory which emphasizes on balance between social, environmental and economic aspects while featuring present and future generations (World Health Organization, 2003). Monitoring goes hand in hand with penalty in that when an inspection is done there are chances of a firm been penalized due to non-compliance.

2.4.4 Capacity building/staff training

Capacity building is the development done to enhance skills and knowledge relevant to the management process and institution operations while focusing on human resource development, education and training. It takes place in three levels individual, institutional and societal level (Yamoah and Maiyo, 2013). According to (Matata, 2013), professionalism in the environmental sector does not rely only on the level of education but also on training on what environmental laws and regulations entail and their related procedures. Capacity building applies to both government sector and also in facilities that are required to comply with regulations. It is important to strengthen efforts to build capacity to the regulated firms and to the regulators.

The mission of capacity building is to have qualified and skilled staff who will have a high understanding of environmental regulations requirements and imply them on the institution activities which increases compliance status. It initiatives need to be all-inclusive in order to achieve the desired outcomes and in this case, is the improvement of compliance. Furthermore, it requires a strong mechanism, a fundamental administration and a sound organization for it to be effective. Effectiveness in a workplace is determined by the efficient performance of its workforce which is a result of abundance education and skills acquired from staff training.

Capacity training programs are constrained by inadequate funding and failures of organization management to determine the relevant training. The necessity to educate and equip environmental professions with new and higher skills to match the regulations should become an urgent agenda so as to achieve compliance (Salihu, Nabegu, et al., 2016).

2.4.5 Political interference

Political interference mainly from Politicians and senior government officials influences compliance when they use their power to grant facilities or developments compliance certificates to proponents without following due diligence on regulatory requirements. This makes Environmental Systems lack credibility thus not able to achieve the desired goals. Proponents use their wealth to obtain environmental licenses or influence enforcement reports from their facilities. Moreover, politicians influence environmental decisions by considering economic benefits and ignoring sustainable development or environmental protection. This has an effect on compliance outcome because massive developments are allowed to be implemented yet they have adverse effect on the environment or facilities obtain compliance certificates they operations have negative impacts to the environment (Ross, 1994).

2.4.6 Firm sector

Firm sector is a factor that can influence a firm on its complying to environmental regulations. According (Wilson John S., Tsunehiro Otsuki, 2004), they categorizes sectors such as food and beverages, pharmaceutical, medicine and chemicals to be more sensitive than sectors such as construction and therefore their compliance level are high than other sectors. This is because of the health issues such a sector poses to the population hence these sensitive sectors will comply more because people will tend to trust their products if they are compliant with the required regulations and have a compliance certificate. Additionally, most of the sensitive sectors are required by their authorities' board to be fully compliant with all laws in order to be issued with a practising licence.

2.4.7 Institutional theory

According to (Zyglidopoulos, 2002) and (Samairat, 2008), institutional theory explains how organizations are affected and shaped by forces (internal and external) that are over above their control. Institutional aspects such as firm size, age of the firm and the characteristic is a factor that contributes to high or low compliance level of a facility. Facilities associated with multi-international co-operation tend to keep high environmental standards than local associated facilities. This is because at international level, they have a reputation to protect on their international stakeholders and associates thus have pressure to conform to regulations requirements. They also have to adhere not only to the local regulation but international regulations as well. The theory notes that smaller firms are less compliant since they do not face major pressure from their stakeholders and actors unlike the large firms. These pressures mandate large firms to be compliant. Moreover, firms assets on return, where (Klassen D . Robert , McLaughlin P. Curtis, 1996) state that firms compliance level can be influenced by its turnover. Majority of firms which makes profit tend to be compliant than those that make loss. This is because the facilities that make loss will work more on improving their return of assets rather than complying since compliance is costly therefore they would rather maximise on return of assets.

Additionally, location determines compliance level of firms. Firms near major road tends to be compliant since government official visit them regularly than facilities far away from the major roads.(Zin and Ismail, 2012) mentions that in order for facilities to improve compliance, they should establish an environmental department. Consequently, the advantage of the departments is that responsibility of ensuring compliance will be upon them therefore they will ensure the firm is fully compliant with the requirements.

(Bing Zhanga, Jun Bi, Zengwei Yuan, Junjie Ge, Beibei Liu, MaoliangBu, 2007), elaborated on why firms engage in environmental management by stating that age and legal status are some of the factors. Newer firms tend to be more compliant than older firms because their attention is on attracting customers since they focus on establishing whether the facilities are compliant with the required law. Likewise, when a facility is registered it becomes a formal business and thus chances of adhering with the required law is high.

2.5 Case studies done on Environmental regulation compliance

Several studies have been done in different parts of the world both in developed and developing countries on why compliance level with environmental regulation within industrial facilities is normally low. Many of these studies stating that the major reason for the adverse environmental degration currently been experienced world-wide is due to low compliance to environmental standards.

2.5.1 Malaysia

Malaysia is facing environmental degradation problems as a consequence of the rapid growth of the industrial and manufacturing sector which have taken over from the predominant agriculture sector. These two sectors are the main contributors to economic growth and also the main drivers of environmental pollution which is estimated to be 44.57% and has become a serious concern (Nawawi and Yacob). On other research done in Malaysia, it was concluded that weak enforcement was the major factor leading to non-compliance and that if enforcement sector is improved through routine inspections, the compliance status would significantly improve. Low level of awareness of environmental regulation among industrial players and the public at large also plays a role in non- compliance practices. To this effect, the government of Malaysia has been holding seminars and promoting awareness programs to increase awareness to the industrial players and the public respectively. Inadequate staff training on environmental regulation requirements likewise affects compliance.

2.5.2 Australia

(Gunningham, 2002), noted that facilities in Australia become non-compliant due to lack of resources which is aggravated by higher compliance costs. He also adds that inadequacy in environmental awareness and expertise is also a contributing factor. This is due to the fact that industries are ignorant of their regulatory obligations and thus negative environmental impacts are experienced emanating from their activities. Lack of capability (training) is another factors that explains the poor environmental performance experienced in industrial sector. Many of the workers lack adequate knowledge on environmental matters and regulations as well.

2.5.3 The Philippines

A research in the Philippines done by (Ross, 1994) points that one of the major factors that lead to non-compliance with Environmental regulation is political interference for the reason that they determine and control outcomes of some projects that require environmental reviews and which could have negative impact on the environment. She states three types of political interference; first, where a proponent is a close friend to a Politian that may lead to them obtaining an environmental approval/permit. secondly, environmental reviews may make decisions on certain projects that may be revoked by politicians and thirdly, a proponent may be very powerful and so a decision is made regardless of the impact it will have on the environment to avoid confrontations.

2.5.4 Uganda

Uganda been a developing country is faced with adverse environmental degration despite having standard environmental framework in place. (Akello, 2007) mentions that weak enforcement due to lack of monitoring hinders effective compliance. He adds by stating that

most industries have environmental compliance letters however, due to low monitoring rate they tend to resume to practicing activities that affect the environment in a negative way. Also, insufficient number of staff in the regulatory agencies contribute to low enforcement.

2.5.5 South Africa

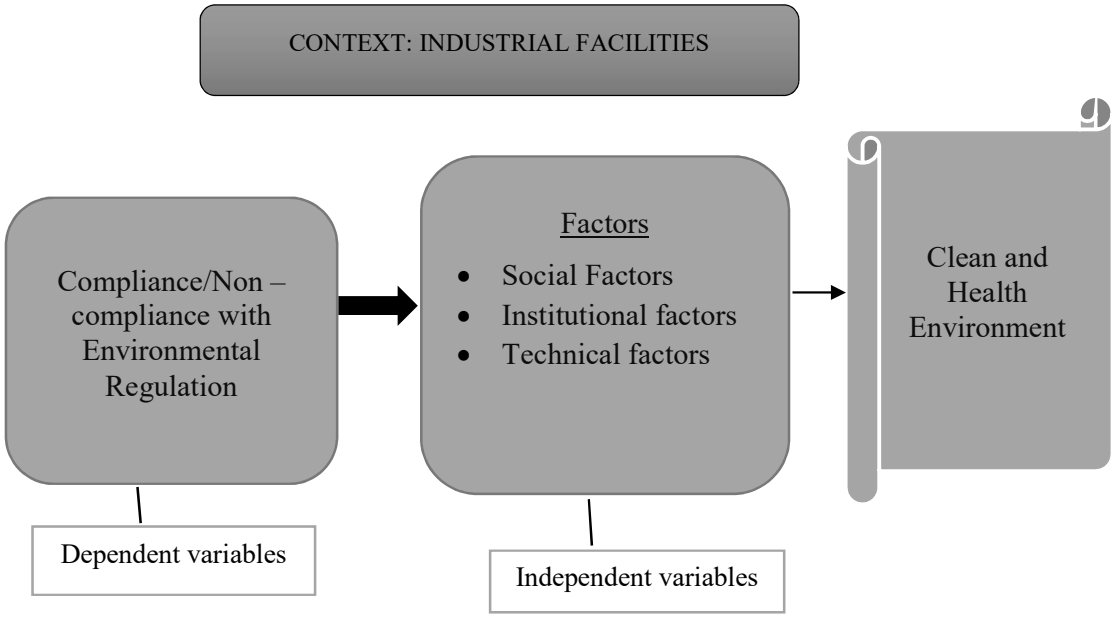
In the south African content,(Windapo and Oladapo, 2012)notes that lack of adequate knowledge and training is one of the causes of non-compliance by facilities and also the cost of compliance. Facilities sees regulations as extra responsibilities which that have to adhere to and this contributes to increase in unnecessary costs hence most prefer not to comply.

2.6 Conceptual framework

The conceptual framework illustrated below represents the interconnection and relation between the concepts discussed in the literature review. Industrial facilities are required to comply with the requirements of environmental regulations which are strengthened by having a good environmental governance in place. However, there are factors that influence the facilities to adhere to the regulations which result in low compliance level leading to environmental degradation instead of a clean and healthy environment. These factors can be classified into 3 categories namely;

- ***Social Factors***-Awareness, consultation during introduction of new regulations
- ***Technical factors***-firm sector, penalty due to non-compliance, location, number of inspections done on a facility
- ***Institutional Factors***– number of employees, level of operation, training of staff, establishment of environmental department, cost on compliance, return of assets, firm age, legal status of firm, ownership status

Figure 7: Conceptual framework



Source: Author's, 2018

Chapter 3: Research Design and Method

3.1 Introduction

This chapter outlines the strategies, methods and techniques that the study employed. Firstly, as a result of reviewing numerous literatures relevant to the research and consequently framing the conceptual framework, the research questions and sub-questions have been revised. Secondly, the chapter also provides the operationalization of variables and indicators which elaborate the various definitions of concepts in the context of the study. Additionally, the research strategy applied in the research is also described which will include data collection methods and analysis techniques. Validity and reliability of the research is also explained here in.

3.1.1 Revised Research Question

The main research question that the study aimed to answer is:

- Which factors influence the compliance of Environmental regulations (EIA/EA) in Industrial area of Nairobi, Kenya?

To answer this main question, the following sub-questions were considered:

1) Which social factors impact compliance with Environmental regulations?
2) Which are the technical factors that influences compliance with Environmental regulations?
3) Which institutional factors have considerable impact on compliance with Environmental Regulation?

3.1.2 Revised Research objectives

The main research objective of the research is:

- To have an understanding of the factors that influence compliance of Environmental regulations (EIA/EA) in the Industrial area of Nairobi, Kenya.

This objective is guided by the following sub-objectives:

1) To identify which social factors impact compliance with Environmental regulations.
2) To institute the technical factors that influence compliance with Environmental regulations.
3) To establish which institutional factors have considerable impact on compliance with Environmental Regulations.

3.2 Operationalization of variables and indicators

Operationalization in a research study is defined as a narration that is comprehensive which allocates units of analysis to the identified variables so as to give the concepts a measurable indicator. It allows concepts to be measured empirically and quantitatively(Singleton Jr, Straits, et al., 1988). It also gives definition of the concepts that the research intends applied.

3.2.1. Definition of concepts

*Compliance*is when a regulated facility is able to achieve environmental laws, regulations and standards by meeting the expected objectives and goals. Compliance is usually done by the regulated facilities while the government officials are in charge of ensuring that these facilities comply as required by the set standards. The study will define compliance by stating whether

a firm has environmental compliance letter. Usually, a compliance letter states that a facility is compliant with the set environmental standards.

*Environmental Regulations*refers state directives, standards or laws that aim to reduce environmental damages, resource consumption and protect human health. *EIA*/*EA* is the environmental regulation that this study will focus on. EIA is defined as according to (Wahaab, 2003, P.11)"a process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of proposed projects prior to major decisions and commitments being made". EA refers to a systematic check, assessment, test or verification on environmental management aspects by examining compliance or by doing monitoring on existing projects. They mainly check how well environmental laws have worked.

3.2.2 Dependent variable

Compliance and non-compliance with Environmental regulations are the (Y) variable representing the dependent variable for this study. This has been operationalized by giving the value of 1 for compliance and 0 for non-compliance. The concept of compliance will be based by identifying and assessing whether firms have obtained an environmental compliance letter from the regulating agency. This information will be obtained from NEMA which is the national environmental agency in charge of environmental matters in Kenya.

Table 3: Operationalization of dependent variable

Concept	Variable	Indicator	Measurement	Data collection method & source
Environmental Regulation	Compliance Non- compliance	Presence of an environmental compliance letter	Nominal	Secondary NEMA official records

Source, Author's 2018

3.2.3 Independent variable

In this study, independent variables are the factors that hinders or make a firm to comply with Environmental regulations. These factors have been identified from relevant literatures and have been categorised into three sub variables; social, technical and institutional factors and are represented by the (X) variable. They explain the correlation within firms by determining if they influence their ability to comply with environmental regulation or not.

Table 4: Operationalization of Independent variables

Research Questions	Concept	Variable	Sub- variable	Indicator	Data collection method & instrument
Which social factors impact compliance of Environmental regulations?	Compliance with Environmental Regulation	Social factor	• Awareness on Environmental compliance • Consultation during introduction of new environmental regulations	No. of awareness campaigns attended Establish if firms are consulted during introduction of new environmental regulations	Secondary data Source- NEMA

Which are the technical factors that influence compliance with Environmental regulations?		Technical factor	• Categories of operation • Penalties/sanctions • Location • Monitoring	Firm sector Whether a firm has been penalised due to non-compliance How close is the facility to the major roads Whether a facility has been inspected by government official	Secondary data Source- NEMA & NCC
Which institutional factors have considerable impacts on compliance with Environmental Regulation?		Institutional factors	Size of firm Level of operation Capacity of firm Cost of compliance Returns of Assets Age of the firm Legal status Status of ownership	No. of employees National or international No. of staff trained of Environmental compliance Establishment of an environmental department Budget of compliance/Amount of money used for environmental compliance (KSH) Amount of money the facility makes (profit or loss) (KSH) Number of years the firm has been in operation. Registered or not registered. Single owner or more than one owner	Secondary data Source- NEMA & NCC

3.3 Research strategy

Research strategy according to (Van Thiel, 2014) is defined as logical steps and techniques that is followed when carrying out a research. She also notes that the research strategy method to be applied on a research is determined by the type of the research question, number of available variables and also the number of research units. Further, she adds that it is an essential tool for undertaking a study research because it guides the understating and also in answering the main question of the research in the mist valid manner. This in turn helps to achieve the objective of the study.

The study primarily applied desk research strategy with focus on secondary quantitative data. This strategy is suitable for this kind of research due to its scope (cover an industrial area with many firms) and also has large number of indicators therefore allows for generalization. The use of quantitative data is associated with objectivity and higher reliability. The research is exploratory and will use quantitative secondary data to analyse the relationship between dependent (Y) variable and the independent (X) variable). (Van Thiel, 2014)defines desk research as a strategy that uses information and data in its primary or secondary form obtained from existing and available materials such as policy documents, newsletters, reports, minutes, speeches among others. She also mentions that primary data in this strategy is that information that is not developed for the purpose of research; secondary existing data on the other hand, is information gathered from findings of a research that has been conducted and analysed by others.

Desk research is one of the strategies that is efficient in nature and also cost effective. Moreover, secondary data involves obtaining data and information from various datasets developed by researchers and this is advantageous because it allows a researcher to compare their findings against the findings from previous studies. This is known as replicable in research and it enhances validity and reliability of a research. The study been an inductive research which is exploratory in nature, it therefore, builds on the pre-existing knowledge on the subject of study done by other researchers.

3.4 Data collection methods

The study relied on secondary data which was quantitative. (Van Thiel, 2014) explains that quantitative data are always numeric and can be quantified. Both dependent and independent variables will be obtained through secondary data. The secondary data will be collected from two government institutions records namely NEMA which is the agency in charge of environmental regulation and compliance in Kenya and also Nairobi City County government (NCC) because firms in Nairobi are required to be registered with the local government. Obtaining information and data from the government agencies will require a lot of time because not all information is digitized, however, it is cost effective and equally from a trusted source. NEMA was the most reliable source because it is the institution that gives compliance letter to facilities and also monitor their compliance level as mandated by EMCA, 1999.

3.5 Sample size and selection

According to (Were, 2016), the industrial area of Nairobi covers a wide area with many industrial facilities, therefore to cover a substantial number of industries, the research will apply sampling to determine the sample size. He also mentions that the number of industrial facilities registered with Kenya Manufacturers Association (KAM) is 853 in total. Thus the sample size of the research was drawn from these facilities. The research was able to observe 138 firms from 9 sectors as represented in the table below.

Table 5: Number of firms observed per sector

Sector	No. of firms observed
Food & Beverages	20
Pharmaceutical & Medical Equipment	16
Plastic and rubber	17
Building, Mining & Construction	15
Chemical & Allied Sectors	15
Energy, Electrical & Electronics	13
Timber, wood & furniture	15
Motor Vehicle & Accessories	14
Others	13
Total	**138**

Source: (Author's 2018)

3.6 Validity and Reliability

Validity and reliability in a research are important elements for the results and conclusion to be scientifically accepted.

Validity according to (Van Thiel, 2014)is categorized into two namely internal and external validity. Internal validity is the ability of data collection tools to measure what is intended to measure while external validity defines the extent to which a study can be generalized. Consequently, to achieve validity, accuracy of measurement will be considered while carrying out the research. Likewise, the use of secondary data allows for generalization of the findings based on results from large data set thus increasing validity,

Reliability is an indication of consistency or uniformity between two or more variables of the same concept (Black, 1993). Reliability in the research will be achieved by obtaining data from official database (government records) thus is truthful and reliable source of information. The use of reliable software calculation will be applied so that all errors that can be generated during calculation are removed. Likewise, to increase reliability, multi-collinearity and outliners were tested to avoid distortion of the findings and to help achieve reliable and valid results on the regression analysis. Outliners are those data that have a large distance from other numerical value and can have an impact on the results. Multi-collinearity occurs when there is a correlation between variables making it difficult to do estimates in a realistic way (Singleton Jr, Straits, et al., 1988).

3.7 Data Analysis

The study used quantitative data and thus required to use an analysis technique of quantitative data. The data that was collected from the secondary sources was cleaned, tested for errors and coded in a code book and then imported to SPSS for analysis. This code book will have a summary of the research variables and their values which are useful for analysis. SPSS is a computer program which is menu driven that offers an arrangement of statistics techniques analysis (Van Thiel, 2014). The program will process the data for analysis into percentages and frequencies that will analyze the findings to generate tables and graphs.

3.7.1 Descriptive analysis

Descriptive statistical technique was used to elaborate on the characteristics of variables and the relationship that exists between independent and dependent variables. This is presented in

form of tables, charts and figures by showing their frequency, mean, medium and standard deviation.

3.7.2 Regression

To describe and explain the relationship between independent and dependent variables, regression technique will be applied, According to (Van Thiel, 2014, P.130), "regression analysis tests whether the relation between two variables (dependent and independent) is linear; the analysis results in a mathematical expression of that relation". Further, positive linear relationship usually explains that when independent variable increases, it leads to increase in the dependent variable as well.

There are many types of regression methods, however, for this study, logistic regression was applied because the depedent variable is binary in nature (assigned a value of 0 and 1). According to (Peng, Lee, et al., 2002), logistic regression maily studies the relationship between a depedent variable which is categorical and a set of independent variables. It allows a researcher to predict an individually separate and distint outcome from a set of variables which may be binary, continuos or a mix of both. More over, logistic regression allows the independent vriables to take any form and normally does not make assumption on their distrobution. Equally, the relationship between depedent and independent variables is not linear. (Park, 2013, P. 155), adds that Logistic regression "… is used to analyze the relationship beween multiple independent variables and a categorical variable by estimating the propability of ocurance of an event by fitting data to a logistic curve".

The equation for logistic regression is:

$$\mathbf{log(p/1-p) = b0 + b1*x1 + b2*x2 + b3*x3 + b3*x3+b4*x4}$$

Where **p** is the probability of the presence of characterist of interest. In this case is the probability of a firm being compliant or not. While **b** is the value of the logistic rgression equation for predicting the dependent variable (Compliant/non-compliant) from the independent variables (social, technical and institutional factors). **x1…x4** are the independent variables.

3.8 Research Strategy and methods Limitations

The main challenge of using secondary data is classification problem experienced during operationalization of concepts. (Singleton Jr, Straits, et al., 1988)mentions that during research analysis, a concept may be measured incorrectly because of the errors made during operationalization. Furthermore, this strategy is time consuming and labor intensive especially during the stage of analyzing data from existing datasets since it requires a lot of time for a researcher to decide on which data set to work with after thoroughly going through a number of datasets. To overcome these challenges. (Van Thiel, 2014), encourages the use of mixed method approach which she refers to as triangulation so as to increase reliability and validity of a research. Consequently, this study ensured various test were carried out to ensure reliability i.e multi-collinearity and normality. These ensured that the results are valid and match the required measurements.

3.9 Ethical consideration

The research obtained an introductory letter from the University that enabled the researcher to produce it and seek permission from the government agencies that provided the information and data used in the research. The research also ensured that the organizations are fully aware of the objective and purpose of the study by emphasizing it was intended for academic purpose only. Equally, confidentiality of all the information and data was done by observing the organization rules, values and rights.

Chapter 4: Research Findings

4.1 Introduction

This chapter interprets and discusses the outcome and findings of the data collected in details. The research findings are divided in to two subsections; firstly, the descriptive analysis which presents the nature of the data of both the dependent and independent variables. The second section covers the inferential analysis (logistic regression) to test the statistical relation of dependent and independent variables and links the outcome with the existing theories from literature. These findings of the research are presented using charts, tables and graphs. The data presentation and analysis has been presented according to the research sub questions;

1. Which social factors impact compliance of Environmental regulations?
2. Which are the technical factors that influences compliance with Environmental regulations?
3. Which institutional factors have considerable impacts on compliance with Environmental Regulation?

The analysis is composed of quantitative data. The research uses the logistic regression technique to explore the factors that affect compliance with environmental regulation. The indicators of this study are derived from the variables generated during operationalization of concepts. Most of the indicators are nominal in nature, but some have the scale measurement. The values of the indicators are recoded as in the table below to guide on making the analysis.

Table 6: Indicators and their values

Indicator	Type of variable	Value	Measure
Compliance status	Dependent	0-non compliant 1-compliant	Nominal
Social Factors			
Number of awareness campaign attended	Independent	1-not attended at all 3-attended less than 10 5-attended more than 10	Scale
Consultation during introduction of new regulations	Independent	0-No 1-Yes	Nominal
Institutional factors			
Number of employees	Independent	1-between 1-100 3-between 101-500 5-above 500	scale
Level of operation	Independent	1-National 3-Interational 5-both National and International	Scale
Staff training on environmental compliance	Independent	0-No 1-Yes	Nominal
Establishment of an environmental department	Independent	0-No 1-Yes	Nominal

Budget on compliance Amount of money used for environmental compliance	Independent Independent	0-No 1-Yes 1-ksh 0 (nothing spent) 3-between ksh5,000-50000 5-Above khs50,000	Nominal Scale
Firm turnover (profit/loss)	Independent	0-Loss 1-profit	Nominal
Age of the firm	Independent	1-less than 5years 3-between 5-15years 5-above 15years	Scale
Legal status	Independent	0-not registered 1-registered	Nominal
Status of ownership	Independent	0-single owner 1-more than one owner	Nominal
Technical factors			
Experience penalty/sanction	Independent	0-No 1-Yes	Nominal
Inspection of the firm by government officials	Independent	0-No 1-Yes	Nominal
Closeness of a facility a major roads	Independent	1-close (less than 2km) 3-average (btn 2-5km) 5-far (more than 5km)	Scale
Firm sector	Independent	1-food & beverage 2-Pharmacuetical & medical equipment 3-plastic& rubber 4-Timber, wood & furniture 5-building, mining & construction 6-Chemical & allied sectors 7-Motor vehicle & accessories 8-energy, electric and electronics 9-other	Nominal
Source, Author, 2018			

4.2 Description of the case

The research is based on finding the factors (social, technical, institutional) that lead to non-compliance with environmental regulations within the industrial facilities. Whereas these factors have been explained in literatures, the study seeks to establish the relationship between these factors as independent variables and compliance/non-compliance with environmental regulations as dependent variables. The government agency in charge of regulating these regulations in Kenya is NEMA and therefore is best fit for source of data. The Agency issues

compliant letters to the facilities that have complaint and issues improvement notices to those that are yet to be fully complaint.

4.3 Descriptive Analysis

According to (Van Thiel, 2014), descriptive analysis gives summaries of the data collected. Moreover, it provides the characteristics and qualities of variables as well as the relationship that exists between them. For this research, the descriptive analysis will be done on the factors as independent variables and also on compliance and non-compliance as dependent variable.

4.3.1 Sample size and characteristics

The analysis included observing data from 138 firms from nine sectors, one dependent variable which is binary in nature and 3 independent variables with 15 indicators. The study therefore sought to know the compliance status of firms in industrial area and which factors influence them. The table below gives a descriptive statistic summary of the data showing the frequency, mean, median, std. deviation, minimum and maximum of the variables.

Table 7: Summary of Descriptive statistics

	Frequency	Mean	Median	Std. Deviation	Minimum	Maximum
Firm compliance status	138	.4130	.0000	.49417	.00	1.00
No. of awareness campaigns attended	138	2.5797	3.0000	1.51783	1.00	5.00
Whether a firm is consulted during introduction of new regulation	138	.3623	.0000	.48242	.00	1.00
Firm Sector	138	4.6884	5.0000	2.60488	1.00	9.00
Penalty	138	.2174	.0000	.41397	.00	1.00
Closeness to major roads	138	2.8261	3.0000	1.59339	1.00	5.00
Inspection	138	.6739	1.0000	.47049	.00	1.00
No. of employees	138	2.8116	3.0000	1.60087	1.00	5.00
Level of operation	138	2.1449	1.0000	1.77390	1.00	5.00
Staff training	138	.4565	.0000	.49992	.00	1.00
Establishment of an environmental Department	138	.5362	1.0000	.50050	.00	1.00
Cost of compliance	138	3.3333	3.0000	1.17351	1.00	5.00
Firm turn over	138	.8188	1.0000	.38655	.00	1.00
Age of firm	138	3.1594	3.0000	1.28009	1.00	5.00
Legal status of the firm	138	.8623	1.0000	.34582	.00	1.00
Ownership status	138	.6522	1.0000	.47802	.00	1.00

a) Firm Compliance Status

Table 8: A table showing compliance status of firms

Indicator-compliance	Frequency	Percent
Non-compliant firms	81	58.7
Compliant Firms	57	41.3
Total	**138**	**100.0**

A frequency table on the status of compliance among the 138 cases studied shows that 81 firms representing 58.7% are non-compliant while 57 firms representing 41.3% are compliant. This is a worrying number considering that industrial area is one of the major pollutants of environment. This gives a clear indication that most of the firms in industrial area are non-compliant with the environmental regulations. Non-compliance with environmental regulations is an indicator and a contributor of environmental pollution and degradation as mentioned by (Wingqvist, Drakenberg, et al., 2012). According to (Dernbach and Mintz, 2011) environmental regulations are important in realizing one of the pillars of sustainable development that is the environment.

4.3.2 Descriptive analysis on the social factors

a) The number of awareness campaigns attended

The research sought to know the awareness campaign attended by firms on environment compliance. This information was presented in the frequency table below:

Table 9: A table showing number of awareness campaigns attended by firms

Indicator-awareness campaigns	**Number**	**Percent**
Firms not attended awareness campaigns at all	57	41.3
Firms that have attended less than 10 campaigns	53	38.4
Firms that have attended more than 10 campaigns	28	20.3
Total	138	100

The study findings as presented in table 8 above reveals that 57 of the firms representing 41.3% and being the majority had not attended any awareness campaigns at all, 53 firms representing 38.4% have attended less than 10 awareness campaigns and the least of the firms (28) 20.3% have attended more than 10 awareness campaigns.

The findings in regard to awareness campaigns, reveals that greater number of firms had not attended any awareness campaign. This may be interpreted to mean that if personnel in industrial facilities are not aware about environmental regulations as a result of not attending awareness campaigns, then they are likely to influence them not to adhere to regulations. (Winter and May, 2001) found that lack of knowledge on environmental regulation which can be achieved with awareness campaigns is a major factor impacting non-compliance with

environmental regulation. It is important that government empowers industrial facilities with knowledge capacity to environmental regulations.

b) Whether a firm is consulted during the introduction of new/amendment regulations

The research sought to know whether firms are usually consulted during the introduction of new regulations on environment protection. The findings of the study are presented in the table below:

Table 10: Frequency table showing whether firms have been consulted during introduction of new regulation

Indicator-consultation	Frequency	Percent
No, firm has never been consulted during introduction of new regulation	88	63.8
Yes, firm has been consulted during introduction of new regulation	50	36.2
Total	138	100

From the frequency table above, majority of the firms represented by 63.8% (88) have not been consulted during the introduction of new regulations on environment. The other 50 firms represented by 36.2% were consulted during introduction of new regulations. These findings reveal that the government does not fully engage stakeholders when making decisions on environmental issues and especially when introducing or amending regulations. According to (de Coninck, 2009), participatory governance maximizes compliance through education, review and dialogue. Additionally, (Harman, 2005) describes openness as one of the principles that can be used to improve effectiveness of compliance. Involvement of stakeholders in decision making can enhance acceptability and legitimacy of regulations thereby increasing the level of compliance. Environmental regulation authorities should strengthen structures and processes that will ensure engagement of stakeholders in decision making.

4.3.3 Descriptive findings on Technical Factors

The study also sought to know the technical factors that lead to non-compliance with environmental regulations. The variables under examination in this category are inspection of the firm by government officials, firm sector, closeness to major roads and whether firms had experienced penalty or sanction in regard to environmental regulations.

a) Whether a firm is monitored or inspected

The study researched on the aspect of whether firms are inspected or monitored by government officials to check their compliance. According to the Environmental Management and Coordination Act of 1999, NEMA is the agency mandated to oversee the protection and conservation and all matters of the environment. The findings of this variable are presented in the bar chart below:

Table 11: A table showing the number of firms inspected

Indicator-inspection	Frequency	Percentage
No, firm not inspected/monitored	45	32.6
Yes, firm has been inspected/monitored	93	67.4
Total	138	100

Source: Author,2018

The study reveals that majority of the firms with a frequency of 93 at 67.4% have been monitored and inspected by government officials while 45 firms at 32% have not been inspected. These findings reveal that inspection level done by government official to check compliance status is quite high. According to (Van Rooij, 2006) enforcement should be done on regular basis, if not, facilities tend to continue operating in activities that damage the environment due to lack of follow-up. Therefore, regular inspection and monitoring on environmental regulations should be conducted to improve the level of compliance.

b) Firm sector

The research sought to know the sector of the firms studied. From the below chart, the sector that was mostly covered in study area is food and beverages at frequency 20 while the least are from energy, electrical and electronics sector as well as in other categories. However, there is minimal difference in frequencies between the various sectors. The summary of firm sector is presented in table 5 of chapter 3.

c) **Firm closeness to a major road**

The findings on location of firm reveal that firms that are very close (less than 2km) and average (between 2-5kms) from the major roads has the same frequencies. The rest of the firms were very far from the major road (more than 5 kms). The mean is 2.8 and standard deviation is 1.6. The table below shows that equal number of 50 firms representing 36.2% of the firms each are less than 2 km from the major roads and also between 2-5km away from the major roads while 38 firms representing 27.5% are very far from the main road. These findings are in agreement with (Samairat, 2008) that the location of a firm determines whether a firm is compliant. As (Samairat, 2008) asserts firms and those located near major roads are more likely to be inspected or visited by government officials which in turn increases their chance of been compliant. To improve the level of compliance government officials should strive to visit all firms notwithstanding their location or distance from major roads.

d) **Firm experience on penalty or sanctions**

The research sought to know whether firms in the study had experienced penalty for non-compliance with environmental regulations. From, the literature, firms that have experienced penalty tend to comply to avoid experiencing more penalties.

Table 12: showing frequency on firm experience on penalty

Indicator-experience on penalty	Frequency	Percent
No, firm has never been penalized	108	78.3
Yes, firm has been penalized	30	21.7
Total	138	100

From the table above, we can state that most of the firms at 108 representing 78.3% have not had an experience on penalties. The study also reveals that it is only few firms at 30 representing 21.7% that had experienced penalties. According to (Akello, 2007) he laments that environmental regulations enforcement mechanism is usually weak leading to environmental degradation. He further states that inspections lead to sanctions when firms are found to be non-compliant thus encouraging firms to comply to avoid penalties. This means that if firms are not penalized or have not been sanctioned for non-compliance they are likely not to comply.

4.3.4 Descriptive analysis on the institutional factors

The study sought to know which institutional factors have considerable impacts on compliance with environmental regulations. The factors under consideration were budget compliance, firm turnover, age of the firm, legal status, ownership status, staff in a firm, staff training on environmental compliance, establishment of an environmental department within firms and their level of operation. These findings are presented and discussed below.

a) Level of operation of firms

The study explored the various levels of operation of firms in industrial area. The levels were categorised into three categories namely National level meaning they operate within Kenya, International level meaning they operate exclusively outside Kenya and both national and international level in that their operations are done within and also outside Kenya. The findings indicate that most of the firms are in the category of national level with a frequency of 96 at 69.9%. The least represented by 3.6% at a frequency of only 5 were international while the rest at 37 were operating at both national and international level at 26.6%. From the findings, most firms in the industrial area operate at the National level.

b) Staff training on environmental regulations

According to (Matata, 2013), training of staff at both within the regulated firm and the regulator can increase compliance with environmental regulations. The study therefore tried to know whether staffs of the regulated firms are trained on environmental regulations and the findings are presented in the table below.

Table 13: Showing staff training on environmental compliance within regulated firms

Indicator-staff training	Frequency	Percent
No, staff have not been trained on environmental compliance	75	54.3
Yes, staff have been trained on environmental compliance	63	45.7
	138	100

54.3% of the firms' staff has not been trained on environmental regulations while 45.7% have been trained. This means that staffs in most firms are not well equipped with knowledge to enable them comply with environmental regulations that leads to environmental protection and conservation. This is contrary to (Matata, 2013) proposition who recommends that all the staffs in firms should be equipped with training to improve effectiveness of compliance to environmental regulations. This initiative should come from the government through establishing structures and processes that will enhance knowledge capacity channelling in industrial facilities.

c) Amount of money used for environmental compliance

The cost of compliance was examined to determine whether it has considerable impact on the compliance with environmental regulations within facilities. Herein, two types of categories were observed; whether firms set aside budget for compliance and if they do how much do they spend on compliance. The findings are presented in the table below.

Table 14: Table showing amount of money firms used on environmental compliance

Indicator-Money spent on compliance	Frequency	Percent
0 Ksh	14	10.1
Ksh 5,000-Ksh 50,000	87	63.1
Above KSh 50,000	37	26.8
	138	100

The study revealed that most firms at 61% do set aside some budget for compliance while 39% did not have compliance budget. Equally, 10.1% of the firms have not spent any money of compliance, a greater percentage of 63.0% have between Ksh 5000-50000 on compliance and only 26.8% have spent above ksh 50000 on environmental compliance. From these findings, the cost of compliance experienced by firms is high with majority of firms spending a lot of money in order to be compliant. (OECD, 2014), mentions that the cost incurred by facilities in order to ensure compliance is high therefore posing a challenge to achieving maximum compliance. On the other hand (Gray, 2015) indicates that benefits of environmental regulations are more than the cost of compliance. He further cautions that cost of restoring a degraded environment is much more than the cost of conserving it, therefore encouraging facilities to comply in order to protect the environment.

d) Firm turnover

The research sought to know whether the firms in the study are making loss or profit. The findings are shown in the table below:

Table 15: Showing return of assets for firms

Indicator-Firm turn over	Frequency	Percent
Firm makes loss	25	18.1
Firm makes profit	113	81.9
	138	100

The findings revealed that 113 firms representing 81.9% of the firms make profits while 18.1% run at a loss. The firm turnover is important for firm's compliance status. From the literature, researchers such as (Klassen D . Robert , McLaughlin P. Curtis, 1996)state that firms which makes profit tend to be compliant than those that make loss. This is because the facilities that make loss will work more on improving their return of assets rather than complying since compliance is costly.

e) Age of the firm

The study also examined duration in terms of time from the time firm was established. From the findings, most of the firms are aged between 5-15 years representing 58.7%, 24.6% are above 15 years and 16.7% are less than 5 years old as represented in the bar graph below. Majority of firms are between the age of 5 to 15 years meaning they are neither too new nor old.

f) Legal status of firms

The researcher sought to know whether the firms studied were registered or not. The findings are presented by the table below.

Table 16: Table showing legal status of firms

Indicator-Legal status of the firm	Frequency	Percent
Not Registered	19	13.8
Registered	119	86.2
	138	100

The study findings on legal status shows that 86.2% (119) of the firms are registered; the other 19 firms representing 13.8% are not registered. This means that majority of the firms are legally registered and therefore expected to be aware and complying with all the legal requirements such as adhering to environmental regulations. However, registration status of a firm should not be a determinant on whether to comply with environmental regulations or not. Compliance is meant to safeguard the environment from degradation and pollution to enhance clean and health environment.

g) Ownership of firms

The research study sought to know the ownership of the firms in industrial area. This was in regard to whether they were owned by one person or by more than one person. Status of ownership can influence compliance in that firms that are owned by a group of people tend to be more compliant than those owned by a single owner. The findings indicate that 65.2% of the businesses in industrial area are owned by more than one owner while 34.8% belong to a single owner.

h) Number of employees in a firm

The study also examined the number of employees in a firm. The findings of the study are presented in the table below.

Table 17: showing the number of employees in firms

Indicator-No of employees in a firm	Frequency	Percent
Between 1-100	51	37.0
Between 101-500	49	35.5
Above 500	38	27.5
	138	100

Source: Author's 2018

The information shown by the table above shows that 37% (51) of the firms have between 1-100 employees, 35.5% (49) have between 101-500 employees and 27.5% (38) have above 500 employees.

i) Establishment of environmental department

For institutional factors, the study also observed to seek to find out whether firms have established an environmental department which will be in charge of environmental issues

including compliance with environmental regulations. The findings reveal that out of the 138 observed firms, 74 of them at 53.6% have established an environmental department within their facility whereas the rest (64) at 46.4% do not have an environmental department. Establishment of an environmental department should be a core priority for facilities because they contribute to a firm's compliance by ensuring that they are up to date with adhering to the required regulations as a result improving compliance (Zin and Ismail, 2012).

Table 18: Showing number of firms that have establishment an environmental department within their facility

Establishment of an environmnetal departmnet	**Frequency**	**Percent**
No, environmnetal departmnet	64	46.4
Yes, presence of an environmnetal depatmnet	74	53.6
	138	100

Source; Author's, 2018

4.4 Inferential Analysis

The study adopted the logistic regression technique which is appropriate when the dependent variable is dichotomous in nature (binary) with one or more independent variables. The study's dependent variable was binary in nature and thus compliance was assigned the value of (1) and non-compliance was assigned the value of (0) against a set of independent variables which were categorized into three namely; social, technical and institutional factors.

A positive correlation implies that the relationship of the independent and dependent variable is positive, therefore, if one variable increased the other variable will be increased too. Whereas a negative coefficient means that the odds ratios is smaller than 1 thus the odds of the test group are lower than the odds of the reference. Therefore, dependent variable decreases as the value of independent variable increases.

4.4.1 Analysis of social factors that are significant or impact the compliance of the firms to Environmental Regulations

In understanding the social factors that are significant in the compliance of firms to environmental regulations, this study considered the number of awareness campaign on compliance attended by firms and determined if consultations were carried out during introduction of new environmental regulations to the regulated firms. The results are presented in Table 20 below.

Table 19: A table showing results from logistic regression for social factors

Social Factors that are significant to compliance	**Outcome**
Awareness on environmental compliance	1.391 (.240) 0.000***
Consultation before introduction /amendment of new regulation	1.798 (.547) 0.001***
R^2	.607
No. of observations	138

From the table above, a positive coefficient with a strong significant p value of was found between number of awareness campaigns attended by a firm and the likelihood of firm's compliance with the environmental regulations. This signifies that a unit increase in awareness campaign is associated to an increase in the likelihood of complying with environmental regulations by a factor of 1.391. Therefore, the firms whose employees have attended more environmental awareness campaigns are more likely to comply. This is because they become more aware of what is required from them and also the importance of been compliant.
Further, the coefficient for consultations when new regulations are being introduced or amended is positive and is equally significant. This means that a unit increase in consultations will increase compliance with environment regulations by a factor of 1.798. Thus, if the firms are consulted during the introduction of new regulations or during amendment on regulations, then they are more likely to comply. According to (Matata, 2013), the government should enhance capacity building and training both on the regulators and regulated firms to improve compliance. This assertion is also supported by (Winter and May, 2001) who claims that lack of adequate knowledge on environmental regulation contributes to non-compliance. Therefore, the two social factors are very significant for increasing the compliance to environmental regulations. The regulator should ensure they conduct many awareness campaign on environmental awareness to improve the awareness, equally, they ought to consult the regulated facilities whenever they introduce or amend regulations as this encourage them to express their views and feel part of the process. This will then increase the compliance level within these regulated facilities.

4.4.2 Analysis of the technical factors that lead to the compliance with Environmental Regulations

The study also sought to know which technical factors contribute significantly to the compliance of the firms to environmental regulations. The technical factors that were considered are inspection of the firm by government officers, firm sector, closeness to major roads and experience on penalty or sanction. The results of the study are shown in the Table 21 below.

Table 20: Table showing regression results for technical factors

Technical Factors that are significant to compliance	**Outcome**
Firm sector	-.181 (.076) .403
Firm experience on penalty	.263 (.480) 0.028***
Firm location	-.535 (.184) 0.004**
Inspection/ monitoring	.517 (.657) 0.017***
R^2	.554

No. of observations	138

From the findings in Table above, the technical factors that lead to compliance with the environmental regulations are inspection, experience in penalty and location of the firm. Inspection had a positive and significant coefficient with a significant p-value. This denotes that a unit increase in inspection will increase compliance with the environmental regulations by a factor of .517. In addition, experience of a firm on penalty had a positive coefficient with a strong significant value. This means that a unit increase in penalty will increase compliance with environmental regulations by a factor of .263. Therefore, if a firm has been inspected by any government official or if it has experience penalties, then it is more likely to comply with the environmental regulations. Thus, the government should give penalties to the firms that do not comply and it should also ensure that all the firms are inspected by a government official.

In addition, location of a firm with closeness to a major road had a negative coefficient but has a strong significant effect. These findings indicate that location of a firm is significant to compliance, however, it has a negative prediction, meaning it does not predict whether a firm is compliant or not. In regard to the study findings on location of a firm is to a major road and its compliance status is supported by (Samairat, 2008) who stated that the location of a firm like nearness to a major road is a significant factor in complying with environmental regulations since they are easily reachable and therefore are inspected regularly.
Firm sector does not influence the compliance with environmental regulation of a firm. From the analysis, it has a negative coefficient and a p value that is not significant. The result on farm sector does not match with what is reported in the literature by (Wilson John S., Tsunehiro Otsuki, 2004)where it is stated that some of the sectors such as food and beverage tend to be compliant than other sectors because of the health issues such a sector poses to the population hence food and beverages will comply more because people will tend to trust their products if they are compliant with the required regulations.

These findings are in agreement with (Harman, 2005) who recommends routine inspections as a way of ensuring that environmental regulations are being complied with. Similarly, (Van Rooij, 2006), provides that inspection should be done on regular basis without bias as a measure of enhancing compliance. Such assertion is also made by (Weston, 2000)who recommends monitoring of projects and facilities to ensure maximum compliance.

4.4.3 Analysis on which Institutional factors are significant or lead to the compliance of the firms to Environmental Regulations

The study also sought to know the institutional factors that are significant to compliance of firms to environmental regulations. Institutional factors considered in this study are on budget set for compliance, amount of money used for environmental compliance, firm turnover, age of the firm, legal status in regard to registration, ownership status, number of staff in a firm, staff training on environmental compliance, establishment of an environmental department and level of operation. The results of the findings are presented in the Table 22 below.

Table 21: Showing regression results for institutional factors

Institutional Factors that are significant to compliance	**Outcome**
No. of staff in a firm	-.144 (.275) .601
Level of operation	.896

	(.294) 0.002***
Establishment of environmental department	2.984 (1.003) 0.003***
Firm turnover	2.278 (1.269) 0.073
Budget on compliance	1.766 (.600) 0.003***
Staff training on environmental compliance	3.322 (1.114) 0.003***
Age of the firm	-.136 (.355) .702
Legal status of the firm	.300 (.893) .737
Ownership status.	-2.083 (2.595) .422
R^2	.880
No. of observations	138

Source: Author's 2018

The institutional factors that contribute significantly or rather have considerable impacts on the compliance are establishment of *environmental department, budget of compliance*, *staff training* on environmental compliance and *the level of operation*. From the findings in the table above, establishment of environmental department has positive coefficient and is also very significant for enhancing compliance with environmental regulations. This means that a unit increase in establishment of environmental department within a facility will increase compliance by a factor of 2.984. The findings concurs with (Zin and Ismail, 2012) in their literature which proves the advantages a firm gets in having a functional environmental department as they contribute to the increase of a firm been compliant with environmental regulations and other laws. They further states that this is the case because the department only has the mandate of ensuring the facility in in compliant with environmental standards in their operation. Therefore, it is important for firms to be encouraged to establish environmental departments in their operations

The level of operation for a firm has a positive coefficient and has a strong significance in influencing firm's compliance status. The results confirm that firms that operate internationally may be more compliant than those that operate locally. (Zyglidopoulos, 2002) expressed in his views that multi-international firms adhere to environmental standards than the local associated facilities therefore they are more likely to be compliant that the local ones. The reason when a facility operates internationally but is based locally, they have a reputation to protect on their international stakeholders and associates thus have pressure to conform to regulations requirements. They also have to adhere not only to the local regulation but international regulations as well therefore increase their chances of been compliant.

In addition, staff training on environmental compliance is equally significant and contributes positively to influencing compliance. This denotes that a unit increase in staff training on environmental compliance increases compliance by a factor of 3.322. (Winter and May, 2001), found that lack of adequate knowledge on environmental regulations is another factor that contributes to non-compliance by firms and advocated for frequent training of staff on matters of compliance. This means that government needs to be concerned in educating and training stakeholders on environmental regulations and also firm owners should allow their staff to be trained. (de Coninck, 2009) advocates for participatory engagements through education, review and dialogue in order to achieve maximum compliance.

Further, budget on compliance contributes significantly and positively to compliance. this states that if a firm set aside some budget on compliance it is more likely to comply than those that do not side aside funds to cater for compliance. According to (OECD, 2014), cost of compliance to facilitate compliance may be a hindrance to comply with environmental regulations. This is because the process of obtaining compliance is costly and most firms will not be willing to allocate a lot of money for that therefore this may hinder their compliance. Therefore, it is vital for firms to plan ahead and sets some budget to help them in obtaining compliance.

Other institutional factors like number of staff in a firm, ownership status, legal status of a firm, age of firm and firm turnover did not have significance contribution to compliance with environmental regulations. However, this is in contrary to the literature where these factors are listed to be significant to compliance as elaborated in chapter two. Although legal status of firm i.e whether a firm is registered or not and a firm turn over are not significant in influencing compliance, they both have a positive coefficient meaning they can predict the ability of a firm to compliant with regulations as mentioned in the literatures by (Bing Zhanga, Jun Bi, Zengwei Yuan, Junjie Ge, Beibei Liu, MaoliangBu, 2007) and (Klassen D . Robert , McLaughlin P. Curtis, 1996) respectively.

Though (Ross, 1994) found political interference as a factor that affects non-compliance by firms, it was not one of the variables being measured in this study. His findings were that some politicians and senior government officials use their power to seek compliance certificates for firm or projects.

Chapter 5: Conclusions and recommendations

5.1 Introduction

This chapter deals with conclusions drawn from the study findings and lessons. It further offers necessary recommendations to enhance environmental compliance that is driven by good environmental governance. The researcher acknowledges that this study may not have exhausted all concerns in regard to environmental compliance and therefore offers areas for further study in future.

5.2 Conclusions

Conclusions of the study are made in line with the objective of the study and based on the study findings. Clean and health environment is not only a right but also a concern of every person and state in the globalisation era. Environmental regulations are found to be important in realising the environmental pillar of sustainable development. The government, developers and all stakeholders have an important role to play in administering and enforcing environmental regulations. Non-compliance leads to environmental pollution and degradation.

The study was carried out with the aim of determining the factors that influence the compliance of Environmental regulations (EIA/EA) in Industrial area of Nairobi, Kenya. The study findings indicated that there are significant numbers of factors that affect this compliance. These factors cut across social, technical and institutional determinants. Some of the factors noted are costs of compliance, weak enforcement, location of firm, lack of adequate knowledge on environmental regulation, level of operation, having an environmental department within a facility among others. This study therefore took into account these factors and the steps that need to be taken to address non-compliance in industrial facilities.

Considering that 58.7% of the firms studied were non-compliant indicates environment regulations are not adhered to by majority of the firms in industrial area. This is a worrying number bearing in mind that the Rio Summit acknowledges that environmental regulations as the safeguard mechanism on environment against degradation. The probable explanation is that the environmental regulations in place are not adequate or are not known to stakeholders as the study revealed. The study found that 40.6% have not attended awareness campaign on environmental regulations and 63.8% stated that they have not been consulted during the introduction or amendment of new regulations on environment. Further 54.3% of staff in the regulated firms indicated that they have not been trained on environmental compliance. These findings indicate that the majority of the firms do not have adequate knowledge or awareness on environmental regulations. The study also found that awareness campaigns and consultation before introduction of new regulations are significance in influencing compliance as revealed by logistic regression. This was interpreted to mean that the number of awareness campaigns attended by a firm can contribute significantly to the firms complying with the environmental regulations as this is a mechanism to educate them by providing knowledge on the importance of compliance and what is to be done.

The study equally revealed that some personnel in facilities within the industrial area are not aware of environmental regulations and thus a factor influencing them not to adhere to regulations. This means that the importance and purpose of environmental regulations is not known by the majority of the stakeholders. This is a drawback to the role of environmental compliance in safeguarding environment from degrading brought about majorly by industrialization activities. This is in agreement with (Gunningham, 2002) who states that lack of awareness and expertise as well as workers lack of knowledge in Australia affects

environmental compliance. The government should ensure environmental knowledge is passed to every citizen through awareness campaigns or trainings

The study revealed that some environmental regulations do not serve the purpose of environmental protection. As stated earlier despite existence of environmental regulations and indication that some firms are not complying with them, study revealed that most firms have not been penalized or sanctioned for non-compliance. The study revealed that most of the firms studied representing 78.3% had never been sanctioned or penalised for contravening environmental regulations. On the other hand, only few firms representing 21.7% had experienced penalties on environmental regulations related sanctions. Accordingly, those not penalised are more probable that they won't comply which then increases non-compliancy level. It is evident that if a firm is penalised for non-compliance, it will then comply to avoid further penalty as it is expensive and loss to a firm. This is a failure on the part of the government in ensuring that facilities comply. According to (Nath, 2009) and (Wingqvist and Slunge, 2013), environmental conservation and protection requires strong legislation, strict enforcement and careful management. Therefore, the government should put in place mechanism to ensure that firms that are not compliant are penalised according to the law, this will make most firms to comply thus increasing compliance

This research revealed that location of a firm in regards to closeness to major roads is a significant factor that determines on whether a firm is compliant, however it has a negative coefficient. This is due to the fact that government officials tend to inspect more facilities that are near to the major roads since they are easily accessible therefore making them compliant. Findings such as locality and size of the firm should not be a determinant on whether a firm should comply or not. Government officials must take the initiative of visiting and inspecting all firms notwithstanding their sizes or location to ensure maximum compliance.

The research concludes that Environmental Impact Assessment and environmental audit are important tools to protect and conserve environment. However, these regulations and their guidelines are not followed as provided within the law. The fact that 58.7% of firms are non-compliant and only 21.7% had experienced penalties indicates that enforcement mechanism is very low. Therefore, EIA and EA should not be carried out for formality purposes but to fulfil the objective of its intended purpose. As Rio Summit provided, the main purpose of these EIA and EA is to safeguard environment against degradation and thus contribute to a clean and healthy environment. Having similar thoughts is (Botelho, Pinto, et al., 2005) who states that environmental regulations should be effective and should serve its purpose which is safeguarding the environment by reducing pollution.

The study found that NEMA as the government agency administering environmental regulations has not performed its role effectively. The agency has not enhanced environmental regulations awareness and training on the stakeholders especially the regulated firms. Study findings revealed that routine inspections are not followed appropriately in majority of firms in industrial area. Only 67.4% of the firms indicated that they had been monitored or inspected by government officials. This was interpreted to mean that those firms not monitored or inspected by government officials regularly are more likely that they will not comply.

Further study revealed that amount of money required to be used in environmental compliance is high, therefore costly. Majority of the firms observed at 63.0% spent between Ksh 5000 to 50,000 on environmental which is relatively high and may hinder most firms to comply. This can be explained by the fact that most firms are in business and they would rather maximise on profit rather than spending money on compliance. From the study findings the researcher concludes that most firms in industrial area have allocated funds for environmental compliance, however, they are not still not compliant which can suggest that the funds are used for other

operations within the firms and not for compliance. Since the financial situations in developing countries are a challenge, the governments should aim to reduce the compliance charges to encourage facilities to comply. Environmental compliance should not be seen as a mechanism to boost economy rather than a way of conserving the environment for beneficial of all and thus sustainable development.

Equally, adequate funds should be allocated to agencies that are in charge of environment matters to enable them carry out their responsibilities effectively and efficiently. The fact that only 67.4% of the firms reported to have been monitored and inspected by government officials shows that there is a big margin of firms that have not been inspection or monitored on compliance. It is evident that budgetary allocation given to NEMA is not enough to carry out the role of monitoring effectively in all the industries especially when projects and operations are in place. This is in agreement with (Wingqvist, Drakenberg, et al., 2012) who argues that implementation and enforcement with environmental regulations is very low and weak in developing countries. For example, (Akello, 2007) found out that despite Uganda having a good environmental framework there is a challenge of weak enforcement due to lack of monitoring after a compliance certificate has been issued. As the study revealed and as stated by (Wingqvist, Drakenberg, et al., 2012) these states prefer economic growth at the expense of environmental protection. According to (Gray, 2015) benefits of environmental regulations are more than the cost of compliance, thus it is vital for facilities to be compliant as they protect the environment and save on the cost of restoring it. This requires the government through its responsible agencies to develop regulations and ensure that firms are informed and comply with the required rules.

Sadly, the study revealed that most facilities in industrial area do not take environmental concerns voluntarily and are highly mismanaged. Study findings were that those firms that had not been fined or subjected to sanctions despite most been non-compliant. This can contribute to such firms to not find it important to comply with environmental regulations. This means that most officers within the regulatory body have not carried out their responsibilities effectively because they are not charging the firms that have not complied with regulations. This therefore means that increase in non-compliance due to firm not being penalised can lead to environmental pollution and degradation which in turn affects climate change.

The government through the National Environmental Management Authority, the regulatory agency mandated in enhancing environmental sustainability and compliance should not shy away from its responsibility of enhancing clean and health environmental for all. This must take into account for the current and future generation. Equally, involving the members of the public in environment issues is important because they can report any environmental issue observed to the agency. As (Wingqvist, Drakenberg, et al., 2012) proposes, environmental governance requires multiple involvement of stakeholders especially the members of the public. This will enhance cooperation and collaboration in decision making and outcomes on environmental goals.

5.3 Recommendations

Basing on the findings of the study, the study recommends that there is a high need to come up with workable measures and mechanism for enhancing environmental compliance in industrial area. Recommendations of this study are drawn from study findings and cut across laws, policies, measures, mechanism and actions to be taken. Currently Environmental Impact Assessment and the Environmental audit which forms the base of this study remains the best processes of enhancing compliance to environmental regulations.

Based on the findings of the study, the following recommendations are made:

Parliament should enact and amend laws and formulate programs on environmental compliance. Parliament should not shirk from its responsibility of amending the Environmental Management and Coordination Act to put in place stringent penalties and fines on environmental related offences. Environmental related offences should be dealt with as other criminal cases and in view of the prevalence of environmental offences in present day societies. Similarly, creative initiatives should be devised to aid in investigations and prosecution of offenders. In addition, procedures should be simplified so as to enable, the regulated firms to obtain the compliance certificate within a short time with less funds as this will encourage them to be compliant. The government should allocate adequate funds to the agency in charge of environment to enable them carry out their duties effectively and efficiently which can help achieve maximum compliance.

Legislations should also be made requiring firms especially those operating in large scale to establish environmental compliance departments. The government should also establish mechanism to assess the knowledge capacity to environmental regulations of such departments. As the study revealed an environmental department significantly determines the compliance level of a firm because they are purely engaged with environment matters. Therefore, it is the responsibility of the environment department to ensure they a firm is fully compliant with the required standards. Awareness of existing laws and policies has to be encouraged to all especially to the environment enforcement agencies, firm workers and the public at large. Creation of enforcement mechanism and framework to enable the members of the public participates in environmental problem identification, implementation and enforcement. This is by removing educational barriers and develops programs that enable integrated development and awareness. Training programs should be aimed at enforcement officers, firms' employees and the public. As the case is in Malaysia, the Kenyan government should hold seminars and awareness programs to promote environmental compliance.

Good environmental governance and responsible leadership is the prerequisite for environmental protection and conservation. The government, non-governmental organizations and other stakeholders should start environmental restoration and rebuilding initiatives. Protecting environment is a concerted effort of all stakeholders, not just the government. Politicians and senior government officers should demonstrate leadership qualities by not interfering with the proper procedures in issuance of compliance certificates. This is by ensuring that only those facilities or projects that have met environmental standards and regulations as stated within the law are certified.

The study recommends concrete measures to improve environmental performance and accountability of environmental agencies and coordination. Research and assessment are inevitable for balancing internal and external factors that can ensure appropriate environmental management. This may be done by strengthening joint operational arrangements and developing comprehensive operational review processes. As recommended by (Shetty and Kumar, 2017), voluntary environmental performance and economic incentives should be considered. This may encourage more firms to be establish activities within their operations that are environmental friendly thus avoid environmental pollution

The research recommends incorporation of international best practices and principles in addition to the local laws. As the case in Malaysia, routine inspection without biasness is an appropriate method to address issues of non-compliance by also encouraging adopting to other international environmental standards. Further the government should comply with its obligation in international environmental law and enforcement. Such move should be complemented by a mechanism for creating knowledge and awareness on such laws to encourage the acceptability and thus contributes to compliance.

These recommendations are in no way exhaustive but are a starting point towards achieving compliance with environmental regulations.

5.3 Recommendation for Further Studies

Results suggest that there are other factors that may hinder environmental compliance. In future studies the individual factors should be examined separately in order to gain a better understanding of individual factors that hinder environmental compliance by researching what causes them and how they can be avoided to ensure maximum compliance thus achieving a clean and healthy environment for all.

Additionally, since the research focussed on EIA/EA regulations, it would be interesting for more research to be done on factors that cause non-compliance with other environmental regulations apart from these two. This can form a base for comparison to determine with these factors established in this research cut across for other environmental regulations.

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Annex 1:

Table 22: Table showing the list of firms/facilities observed

Abcos Industrial Co. Ltd	Acorn Group
Adavanta Africa Ltd	Adhesive Solutions Africa Ltd
Africa Oil Kenya B.V	African Cotton Industries Ltd
Agni Enterprises Ltd	Ali Glaziers Ltd
Alpha Dairy Products Ltd	Alpha Fine Foods Ltd
Ango Danish foods Ltd	Apex Steel Ltd
AquaSan Tec	Aquva Agencies Ltd -Nairobi
Ashut Quality Products	ASL Ltd – HFD
Astool Radiators Factory	Atlas Copco Eastern Africa Ltd
Azuri technologies	Beta HealthCare
Bilco Engineering	Biodeal laboratories ltd
Blow plast Limited	Blue Ring Products Ltd
Bobmil Industries Limited	Bogani Industries Ltd
Bosky Industries Ltd	Century Apparels LTD
Ceramics & carpets center	Chemplus Holdings LTD
Chevron Kenya Ltd	Chloride Exide Kenya Limited
Climacento Green Tech Ltd	Coca-Cola
Colgate-Palmolive (East Africa) Ltd	Cosmos Limited
Creative Fabric World Co Ltd	Cross boundary energy
Crown-Berger (K) Ltd.	Cuma Refrigeration EA Limited
Dawa Ltd	Doshi Group of Companies
East Africa Glassware Mart Ltd	East African Cables Ltd.
Eastern Chemical Industries Ltd	Ecolab East Africa (K) Ltd
Ecotech Ltd	Endeavour Instrument Africa Limited
Energy Pak (K) Ltd	Equatorial Tea Ltd
Evapen Agencies	Excel Chemical Ltd.
Fairdeal Upvc, Aluminium and Glass Ltd	Famiar Generating Systems Ltd
Farmers choice	Flexoworld Ltd
Furmart furnishers	Future Pump Kenya Ltd
Gahir Engineering Works Ltd	Golden Gulf International Ltd
Goldrock international enterprises	Goods Chemistry Practise & Allied L.T.D
Guan Candle Making Machine Co. Ltd.	Heluk International Limited
Hills Converters [K] Ltd	Hydraulic Hose & Pipe Manufacturers Ltd
Industrial Boiler Products Co ltd	Ingredion Holdings Limited
JET Chemicals (Kenya) Ltd	Joeliz bone meal Ltd
Kenbro Industries	Kenchic limited
Kenmot Spares Limited	Kenya Grange Vehicle Industries Ltd
Kenya Solar	Keutaz Industries Ltd
Kiesta Industrial Technical Services Ltd	Kim-Fay E.A Limited
Makiga Engineering Service Limited	Manji food industries
Manzil Glass & Hardware Ltd	Mather & Platt Kenya Ltd
Maweni Limestone Ltd	Mellech Engineering & Construction Ltd.
Metal Crown Ltd	Metsec Ltd.
Mimosa furniture	Mohajan Trade International

Nairobi flour millers Ltd	Apauel industries Ltd
Ndigo T Co Ltd	Nestle ltd
New Market Leather Factory Ltd	New World Stainless Steel Ltd
Novaster Kenya	One degree solar porini Ltd
Orpower 4, Inc	Osho Grain Millers Limited
Packaging Industries Ltd	Patch Industries Ltd
Patco Industries Ltd	Pembe flour mills Ltd
Petmix Feed	Platinum Packaging Limited
Print Fast Kenya Ltd.	Propak Kenya Ltd
Raghad Enterprises	Ramco Printing Works Limited
Redavia Energy Co.	Reliable Concrete Works Ltd
Shamas Motor Spares	Shankan Enterprises Ltd
Sigma Engineering Co. Ltd	Simco Auto Parts Ltd
Slumberland Kenya Ltd	Solarworks East Africa
Stainless Steel Products Ltd	Stamet Products (K) Ltd
Statpack Industries Limited	Steel Structures Limited
Sudi Chemical Industries Limited	Sunrays Solar Ltd
Superfit Steelcon Ltd	Tamoil Africa Holdings Limited
Tenacity Locks Ltd	Texlabmega
Thames electricals limited	The Kensta Group
Tianjin Haopu Chemical Co. Ltd	Tripac Chemical Industries Ltd
Unga Farm Care (EA) Ltd	Unga Group Ltd.
Village Industroal power	Warren Concrete Ltd
Wartsila Eastern Africa Ltd	Welfast Kenya Ltd
Williamson Power Ltd	Wines of The World Limited

Annex 2

Table 23: Logistic regression for social factors

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Awareness	1.391	.240	33.696	1	.000	4.019
	Consultation(1)	1.798	.547	10.806	1	.001	.166
	Constant	2.949	.671	19.315	1	.000	.052

a. Variable(s) entered on step 1: Awareness, Consultation.

Annex 3

Table 24: R squared for social factors

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	104.494[a]	.450	.607

Annex 4

Table 25: Logistic regression for technical factors

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Sector	-.181	.076	5.677	1	.403	.835
	Penalty(1)	.263	.480	.300	1	.028	.769
	Location	-.535	.184	8.470	1	.004	.586
	Inspection(1)	.517	.657	.621	1	.017	1.678
	Constant	1.977	.652	9.200	1	.002	7.225

a. Variable(s) entered on step 1: Sector, Penalty, location, Inspection.

Annex 5

Table 26: R squared for technical factors

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	114.092[a]	.411	.554

Annex 6

Table 27: Logistic regression for institutional factors

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Staff_firm	-.144	.275	.273	1	.601	.866
	Level_operation	.896	.294	9.306	1	.002	2.450
	Staff_training(1)	3.322	1.114	8.887	1	.003	.036
	Environmnetal_department(1)	2.984	1.003	8.857	1	.003	.051
	Budget_compliance	1.766	.600	8.663	1	.003	5.846
	Firm_turnover(1)	2.278	1.269	3.224	1	.073	.102
	Age	-.136	.355	.147	1	.702	1.146
	Legal_status(1)	.300	.893	.113	1	.737	1.350
	Ownership_status(1)	-2.083	2.595	.644	1	.422	.125
	Constant	-5.347	2.420	4.882	1	.027	.005

a. Variable(s) entered on step 1: Staff_firm, Level_operation, Staff_training, Environmnetal_department, Budget_compliance, Firm_turnover, Age, Legal_status, Ownership_status.

Annex 7

Table 28: R squared for institutional factors

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	40.899[a]	.653	.880

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than .001.

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