



**UNIVERSITY OF NAIROBI
FACULTY OF LAW**

**INTEGRATION OF CORPORATE ENVIRONMENTAL RESPONSIBILITY IN
CEMENT PRODUCTION PROCESSES: A CASE OF ATHI RIVER CEMENT MINING
IN KILIFI COUNTY**

BY

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Z50/83006/2015

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**A Thesis Submitted in Partial Fulfillment of The Requirements of a Master of Arts Degree
in Environmental Policy , University Of Nairobi**

2021

DECLARATION

I **Valentine Cheruiyot** hereby declare that this research thesis is my original work and has not been submitted for examination nor is it currently under consideration for purposes of the award of any degree in any other institution of higher learning.



Signature

01.12.2021

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Supervisor's approval

This Thesis has been submitted for examination with our approval as University supervisors



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DEDICATION

I dedicate this thesis to my beloved husband Ben Kipsanai and my daughter Shanna Jeruto who have been a source of inspiration to complete my master degree journey. Special gratitude goes to my loving parents, Stephen Kiplagat and Hellen Cheboi whose words of encouragement and love has enabled me to be the person I am today. My siblings Titus, Joyline, Abraham and Gladys have always been on my side and are very dear to me. I also to my friends and relatives who gave me supported throughout this journey. They will always remain dear in my life.

ACKNOWLEDGEMENTS

The successful completion of this thesis would not have been a success without the help of a number of individuals and institutions. I want to accord my sincerest gratitude to the Staff of the Centre for Advanced Studies in Environmental law and Policy (CASELAP) for their fulltime support. My Supervisors Prof. Richard Mulwa and Dr. Collins Odote for making my Thesis journey worthwhile and fulfilling. I would like also to acknowledge my MA Environmental policy 2015 classmates for the moral support and peer reviews.

Last but not the least, I convey my sincere gratefulness to my key informants from the National Environment Management Authority, Athi River Mining-Kaloleni and County government of Kilifi. Their collaboration and support during data collection played a key role in completion of my thesis. I wish them good health and God's blessings always.

LIST OF ABBREVIATIONS

ARM	Athi River Mining
BSR	Business for Social Responsibility
CASELAP	Centre for Advanced Studies in Environmental Law and Policy
CER	Corporate Environmental Responsibility
EAPC	East Africa Portland Cement
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMS	Environmental Management System
ERAS	Environmental Risk Assessment Survey
FCA	Full Cost Accounting
FDG	Focus Group Discussion
GDP	Gross Domestic Product
IFC	International Finance Corporation
ISO	International organization for Standards
NEMA	National Environment Management Authority
NPV	Net Present Value
PES	Payment for Ecosystem Services
RITE	Research Institute for Innovative Technology for the Earth
ROI	Return on Investment
TBL	Triple Bottom Line
TQM	Total Quality Management
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	United Nations Global Compact
WB	World Bank
WCED	World Commission on Environment and Development

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ABSTRACT

Athi River Mining (ARM) Cement Ltd is a limited liability company whose core activity is the mining of locally found minerals, processing and producing fertilizers, lime and cement which are used by other industries as primary raw materials. ARM subscribed to UN Global Compact (UNGC) Code of Ethics in 2011 and adopted measures to increase its environmental responsibility. These include; ensuring that amenities are managed, sustained and, if required, adjusted to guarantee compliance to various regulations relating to environmental management, thus ensuring that their processes and products will not pose harmful effects to individuals and the environment. However, a report by the Kilifi County Joint Parliamentary Committee on Health, Agricultural, Environmental and Natural Resource Services on the Environmental Dangers of the ARM presented to the Kilifi County Assembly in 2015 established that ARM activities were causing air pollution affecting soil, vegetation and human health negatively. On the basis of the above reported negative impacts of air pollution, this study sought to determine how ARM has integrated environmental responsibility in its day to day activities so as to address negative environmental impacts on the environment arising from those activities as well as to synthesize additional initiatives that the company could implement; and lastly to examine how current policies and regulatory frameworks could enhance integration of Corporate Environmental Responsibility (CER). To achieve these objectives, Focus Group Discussions (FGD), key informant interviews, and literature review were applied in collecting both primary and secondary data. Three FGDs conducted targeting 30 community members living around ARM; and 14 key informant interviews targeted from ARM, Kilifi County Government, National Environment Management Authority, UN Global Compact, Kenya Association of Manufacturers and Kenya Private Sector Alliance. Results from collected data showed that ARM has put in place a number of measures to protect environment and human health from the effects caused by their activities. These measures include; a) waste disposal in line with NEMA requirements, b) conducting the statutory annual environmental audits, c) installing dust precipitators, d) sprinkling the road between the factory and quarries to minimise on dust emissions, e) provision of tree seedlings to members of community, and, f) building of community health centres. Despite these measures the assessment noted that noise and vibration pollution, fugitive dust emissions, lack of regular monitoring by NEMA to assess compliance, over dependence on coal and oil to power the plant as well as regular engagement of community members and few social initiatives in the area. To address these gaps

the study recommends that; a) enforcement of the existing national policies through regulations. b) Government to put in place policy instruments such tax exemptions for social or philanthropic investments and award schemes to increase uptake of CER, training and capacity building for all enterprises, and providing funding for research on CER. c) Government through its legislative arm, parliament to legislate bills geared towards promotion of corporate environmental responsibility. d) Finally, this study recommends the need for UN global compact to undertake compliance audit of its members to establish if the members are implementing what they signed up for and also provide support where need. UNGC should also establish an award scheme to go to members who display exemplary work in CER. This will encourage members to put more effort in their commitment as well as attract more members into the network.

CHAPTER ONE: INTRODUCTION

1.1 Background

The cement industry has progressively performed a major role in the socio-economic development in various countries. To greater extent the industries have resulted to job creation opportunities, increased prosperity, as well as opportunities for livelihood (Madlool et al., 2010). The cement companies have however, been accused of speeding up the utilization of scant non-renewable energy sources and polluting the environment local and regional environment, but also international environment pollution by creating solid, fluid and vaporous toxins to their surroundings (Wang et al., 2011). Various emissions associated with cement production led to air pollution and also degrading human wellbeing through negative environmental impacts that translate into global warming, ozone emissions, acid rains, loss of diversity, reduction of production, etc. (Parody, 2013). Research evidence shows that contaminated air caused by the burning of the fossils fuels causes health impairment due to severe allergic reactions. The results of many studies have also shown that poisons negatively affect human health in a number of ways, including eye problems, respiratory illness such as tuberculosis, chest pain, asthmatic attacks, heart disease, and even death (Mehraj et al., 2013).

Nitrogen oxide from cement production process, for example, leads to a wide range of effects on health and degrades the environment through several pollutants of the nitrogen oxide compounds that include: nitric acid, nitrogen dioxide nitrous oxide and nitrates. As with sulfur dioxide, NOx mixes to water and other compounds and make a variety of chemicals. When acid compounds are placed on the surface of the earth, they can damage the water quality in various waterways and acidify lakes and other water bodies. Acidification and chemical changes of the water bodies make it hard for some fish and other types of water organisms to survive and grow. Acid rain can also damage plants by affecting the cells of the plant (EPA Report, 2014). Nitrous oxide is also greenhouse gas, and together with other greenhouse gases gradually increases the temperature of the earth. This will generate global warming and climate change.

Quarrying of limestone for cement manufacturing perhaps has the most significant impact on the environment. Besides destruction of the landscape, it can lead to change of water courses, pollution of ground water, receding of water table, loss of vegetation and soil erosion among others. Quarrying has also numerous safety and health impacts including creation of deep dangerous

gullies, exposure of workers to hazardous materials, generation of noise and vibration and other adverse effects. According to Afolabi et al (2012), limestone mining for cement manufacturing results in conversion of farmlands into quarry sites, which impact on food security. Limestone quarrying also quarry causes deforestation and displacement of settlements.

Cement factories also affect water sources negatively. A study conducted by Akeem (2008), at Ewekoro Cement Factory in Nigeria found that there were two major sources of water pollution from the cement factory. These were disposal of chemical waste from the factory on the surface of the water, and the constant settling of dust from the factory on the surface of the water. According to Mishra (1991), the natural water alkalinity is impaired when the cement dusts come into contact with water and form hydroxides. As stated by Gartner (2004), in line with the increased environmental problems, it is a requirement that the cement manufacturing technology development be aligned with the twenty-first century requirement of natural resources and environment. Therefore, cutting down consumption of resources and environmental pollution in manufacturing is a key concern for manufacturing science.

Li et al. (2014), indicate that sustainability of cement manufacturing implies utilization of fewer natural resources, not excluding of water and energy, utilizing more renewable resources and reducing pollution in production of cement. The product is a full grown essential material and is one of the most ecologically benevolent mass items because of its high reusing rate and relatively low amounts of energy needed for its creation. Nevertheless, the energy utilized to produce the required cement output leads to productions of harmful emissions that consequently affect the local global environments (Mandal and Madheswaran, 2010).

To meet the ever-growing demand for cement, a number of cement plants have been built in Kenya. These factories are; Mombasa Cement, Athi River mining, National Cement and savanna cement, Bamburi Limited a multinational corporation owned by Lafarge, and East Africa Portland Cement, which is largely controlled by the Government of Kenya (Sustainability report, 2011). Kenyan cement output has increased in recent years, with 5.88 million tonnes produced in 2019. (KNBS, 2020). To meet the housing shortage, the national housing policy calls for the construction of 15,000 units per year, which will raise cement demand. Constituency Development Funds (CDF) projects, county government projects, and the rising real estate industry are all driving up cement demand and consumption.

Athi River Mining Company, is the focal point of this examination because the negative impact resulting from its activities on human health and environment as recorded in 2015 report by Kilifi county assembly, has plants in Kenya, Tanzania and Zambia. The company main purpose is manufacturing of cement, industrial minerals, hydrates lime, special building materials and sodium silicate. Its operations emit dust, air emissions, waste generation and intensive energy use. Article 42 of the 2010 Kenyan Constitution unfolds that Kenyan people have right to clean environment. This takes into account the right to having the environment protected through legislation as well as other measures to in the benefit of today's generation and future generation as envisioned in Article 69. In the effort of protecting the environment from negative effects of cement production processes, the Government of Kenya has implemented policy and regulatory framework to regulate matters relating to environmental pollution. These include the, Environmental Impact Assessment and Audit regulation of 2003, which requires all Cement Companies to undertake the Environmental Impact Assessment (EIA) construction with the aim of identifying the project impacts and coming up with Environmental Management Plan to address the identified project adverse effects on the environment. Subsequent to the licensing of the Environmental Impact Assessment report by the National Environment Management Authority (NEMA), the project proponent is required to undertake the Environmental Audit on annual basis with the aim of assessing how the project proponent has implemented the Environmental Management Plan as contained in the EIA.

The Air Quality Regulation of 2014, requires cement companies to ensure the emissions from production process are within the regulation recommended levels. For instance, where the emissions are above the recommended limits, a company is required to put in place measures to bring the emissions to the acceptable levels. Further, noise and excessive vibration pollution control regulation of 2009, requires cement companies to ensure their operations comply with the established noise levels so as not to cause nuisance to the environment and people, while the Mining Policy and Act of 2015 appreciates the environmental law and prioritizes safety, health and environment. Further, the cement companies are required to ensure that land be utilized as per the provided terms and conditions in the permit/license. It also requires the cement companies make sure that land is used in a sustainable way by restoring quarries and mains which previously were abandoned; maintain a strategic distance from leakage of poisonous waste into waterways,

wetlands and streams and that the harmful waste ought to be disposed in approved areas. On matters climate change, the Kenyan Government has an unwavering commitment to emissions reduction under the Paris Agreement as stated in the Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC). The NDC states that adaptation is a priority of Kenya response to climate change, and this NAP is the basis of the contribution of Kenya on adaptation. The commitment of Kenya to the Paris Agreement is shown by the NAP and will aid in bringing to life the Kenya's critical reactions to the climate change effects. Coming up with climate resilience in as low carbon as possible will make sure that Kenya helps in attainment of the SDGs 2030 and also the goals of the Paris Agreement.

In addition to the stated policy and regulatory framework companies are beginning to embrace the critical role of corporate environmental responsibility in addressing environmental challenges. According to Hart (2000), a large number of businesses as well as governments are appreciating the fact that economic growth and environmental protection are not generally conflicting. Ever since the publishing of Brundtland Report in 1987 arising out of the work of World Commission on Environment and Development, scholars in business and management have been wrestling with the subject of how and why organizations need to include the environmental concerns into their strategies. As at now, many organizations have taken it as their responsibility to protect the environment. According to Mazurkiewicz (2004), strict governments' guidelines have ceded ground to self-regulation by corporates through voluntary initiatives and consequently embracing of the concept of Corporate Environmental Responsibility (CER). These concepts allude to the obligation to shield the environmental implication of the organization's activities, products and facilities; wipe out waste and discharges; augment the productivity and efficiency of its resources; and limit activities that may unfavorably influence the enjoyment in the nation's resources by future generation (Jamison et al., 2005)

In the past, corporate managers were majorly concerned with activities that would maximize wealth of shareholder's, though this has changed in the recent past. However, in the recent past there has been a lot of public concern by organizations' leaders pertaining corporate social responsibility and sustainability of their business model. For instance, organizations have seen an increased demand by the public to minimize the pollutants they generate and increase the extent

of their participation in activities of environmental responsibility. In this breadth, corporate environmental responsibility (CER) has progressively been recognized to being among the most important aspects in organization sustainability and long-term value. For instance, Accenture and the United Nations Global Compact (UNGC) in 2010 released a survey that established that 90% of managers believed that CER is a major factor that is required by organizations for survival and value in the long-term. Furthermore, numerous corporate managers opined that in order to attain environmental sustainability within 5 years they needed to invest in new technologies. These managers in the same way realized that through taking part in social responsible activities, they will more likely create a better perception about their organization and create customer loyalty and also increasing their sales (Mohr et al., 2001).

In Kenya, CER can be best seen through the lenses of UNGC, which is a non-binding UN agreement that inspires organizations across the world to embrace social responsible and sustainable policies by signing with them a Code of Ethics. The code of ethics adopted by Kenya business community aims to motivate and improve the ethics of doing business in signatory companies, including those in Kenya. This is in line with UNGC ten principles in matters concerning environment, human rights, labour standards and anticorruption. The signatory company is expected to participate in initiatives of promoting greater environmental responsibility, back a preventative tactic to challenges of environment, and promote the development and diffusion of technologies that are environmental friendly.

According to UNGC, an organization pledges to the Code of Ethics through signing an agreement letter. During the first year upon pledging to the Code of Ethics, it is not expected of organization to report on their compliance to the code, though they need to: a) comply to the code, b) make it open tier commitment to the code of ethics by publishing it on their website and on the annual account or even on the annual communication of progress report, and c) participate in meetings and workshops organized by Global Compact Network Kenya (GCNK). In the second year upon pledging to the code, an organization is expected to openly report on how it is progressing in the code implementation. In addition, the organization will avail its report to the Secretariat of GCNK. Should a signatory company fail to adhere to the code; the UNGC will institute three steps. One, examine the offense with the culpable organization at the most significant level (Board of

Directors, CEO) to guarantee steps are set up to ensure repeating of the offense. Two, issue a public statement stating the moral disapproval of the offense, and thirdly, openly remove the culpable organization from the code pending satisfactory correction of the offense. In 2011, ARM committed to the code of ethics and made this commitment public in their 2011 annual financial report. The ARM commitment as per Vision 2030 is dedicated to playing a constructive role in constructing a globally competitive and successful nation with a high quality of life. As a responsible corporate citizen, it's pledge to treat all stakeholders with respect, conduct operations responsibly, follow all applicable laws, and participate actively in the fight against corruption. Their adherence to these ethical principles governs interactions with stakeholders, which include company, shareholders and investors, product and service customers, suppliers, contractors, and agents, society, and state and government, as well as the environment.

1.2 Statement of the Research Problem

Kaloleni Lime and Cement Works is a subsidiary unit of ARM Cement Ltd Company situated in Kilifi County. It has three quarries in the same locality, that is the Chauringo, pangani and Chingagoni quarries. The quarries are in the radius of approximately 8kms from the manufacturing plant. The quarries are areas where the company extracts raw materials for the process that takes place in the factory (ARM website). To ensure the company mitigates on the adverse effects of their operations on the environment, it has undertaken a number of environmental compliance initiatives for example Environmental Impact Assessment and annual Environmental Audits as required by the NEMA; and annual energy management audits as required by the petroleum and energy commission. In addition, they have in place a modern explosive for blasting at the quarry to minimize on noise pollution and vibration, water sprinkling on the all-weather roads between the factory and the three quarries, and used reverse air fabric filters to trap dust cement dust during cement production process (ARM annual report, 2017).

In a bid to go beyond compliance to environmental regulations, ARM signed the UNGC code of ethics. The code of ethics expects ARM to participate in initiatives of promoting greater environmental responsibility, back a defensive tactic to environmental challenges; and promote the development and diffusion of technologies that are environmental friendly. This commitment does not however, seem to be consistently adhered to going by the report of Kilifi County Joint Parliamentary Committee on Health, Agricultural, Environmental and Natural Resource Services

which conducted an investigation on the environmental dangers of ARM activities in 2015. This follows the complaint that the community members raised. After the investigation the said joint committee tabled a report at Kilifi county assembly on Tuesday 5th May 2015 (www.kilifiassembly.go.ke) which reads: "... most of the households have been hit by dust and, consequently, citizens have suffered from respirational complications, residents have been unable to collect rainwater, quarry explosions mainly affect pregnant women, children, flora around the factory, animals could be affected due to the polluted vegetation and the inhabitants cannot consume vegetables and majority of the inhabitants of the area are distressed by the way the factory attends the ecological healthiness complications that arise from the problems faced by local residents."

In light of the ARM Commitments under UNGC and the policy stipulations, it is not clear why pollution from the ARM cement manufacturing continues. This study therefore sought to assess how ARM has integrated CER in their day-to-day operations in abid to identity additional measures that the company could deploy as well as gaps in the current policy and regulatory framework and make recommendation.

1.3 Research questions

This following question guided this study: In what ways has Athi River Mining Company integrated UNGC commitments on corporate environmental responsibility and other initiatives in its cement production processes to mitigate the negative impacts of pollution?

This is further broken down into the following specific questions:

1. How has ARM cement integrated environmental responsibility in its day-to-day operations given the current policy and regulatory framework?
2. What challenges does ARM face in implementing the UNGC in its day to day activities?
3. What additional initiatives can ARM implement to enhance environmental responsibility so as to reduce the adverse impacts of its processes to the community?
4. How can the current policy and regulatory framework be enhanced to ensure ARM fully implements CER?

1.4 Research objectives

The general objective was to assess the extent of integration of UNGC commitments on corporate environmental responsibility and other initiatives at Athi River Mining Company processes and its effect on the environment in Kilifi County.

Specific objectives

1. Appraise how ARM has integrated environmental responsibility in its day to day operations given the current policy and regulatory framework.
2. Assess the challenges faced by ARM in implementing the UNGC commitments in its day to day activities
3. Synthesize additional initiatives that ARM can implement to enhance environmental responsibility and reduce the adverse impacts of its processes to the community?
4. Examine how the current policy and regulatory framework could be enhanced to ensure ARM fully implements CER.

1.5 Significance of the study

The results from this study will be of significance to many stakeholders who will stand to benefit in various ways. For instance, the study will highlight to the management of ARM the gaps and existing best practices that the company can leverage on to be the best company in integration of environmental responsibility in its day-to-day operations. The findings are instrumental to the Kilifi County and National government in enacting policies and regulations that this study has highlighted as well as the National Environment Management Authority (NEMA) in formulating policies that would enhance integration of corporate environmental responsibility in other firms. The study is also vital to researchers who may be researching on CER as a point of reference for further studies and scholars who are looking for areas to research on as proposed in this study. Findings and recommendations of this study will assist other companies interested in integrating environmental responsibility into their day to day company operations. If ARM implement the best practices highlighted in this study, they will stand a chance to attract more customers, attract and retain employees as well as improved relationship with the neighbouring community. The community and public will benefit from clean environment and more CSR initiatives in the area implemented by ARM. Finally, UNGC whose main role is to help organizations entrench CER

and sustainability in their companies will be able to appreciate the challenges facing companies in implementing CER and sustainability.

1.6 Study Limitations

In executing this study, the researcher experienced a number of challenges at different stages of the research. During data collection some challenges were experienced. For example, some respondents refused to cooperate with the researcher in the subject at hand and as a result the researcher took longer to complete the thesis than planned. In addition, data collection happened at the time when the community chiefs were busy planning for the census; hence, it was difficult for them to organize for focus group discussions. To overcome this, the researcher had to postpone the discussion to the agreed date where the FGD members were available for discussion. There was also a challenge in getting access to the data collection site, that is ARM factory at Kilifi. The research was informed to secure permission from the ARM head office in Nairobi. This resulted in some delays in data collection and completion of the thesis. There was also the challenge of getting some key informants such as Director, NEMA at the time of data collection, which resulted into phone interview as opposed to the planned face to face interviews. Further, the concept of integrated corporate environmental responsibility was new to some respondents and therefore the researcher took time to explain the concept to the respondents for the purpose of ensuring that the concept was understood and hence accurate data collection.

CHAPTER TWO: LITERATURE REVIEW

In this section, the relevant literature to the study is reviewed. The chapter organizes the literature around the objectives of the study. The literature review covers the theoretical and empirical review on previous studies, results and recommendations that show the research gap that needs to be filled. Lastly, the chapter provides the conceptual model of the research and the summary.

2.1. Corporate Environmental Responsibility

Corporate environmental responsibility (CER) is a subset of CSR that denotes to an entity's obligation to consciously participate in reducing and mitigating active behaviors that lead to environmental degradation and engaging in beneficial environmental friendly operations (Li et al., 2017, Wong et al., 2017). For the past 100 years, human beings have been engaging in economic development activities that have been destructive to the environment in pursuit of needs thus resulting to global warming (Cai et al 2015). Environmental degradation has pushed society to be more attentive to the long-term sustenance of the natural environment (Kardos et al., 2019).

Governments have over the years enacted polices laws and regulations to mitigate and stop the uncontrolled degradation of the environment. For example, China's first environmental law, the People's Republic of China Environmental Protection Law, was enacted in 1979. (trial). Furthermore, many jurisdictions have criminalized activities that lead to environmental degradation and pollution. China's 2014 environmental protection law has been perceived as the "toughest" in the country's history (Li et al., 2017).

Furthermore, as a mandatory part of economic society, firms are compelled by the general public to legally commit to environmental Preservation responsibility. According to stakeholder theory [Wong et al., 2016; Benlemlih et al., 2016; Dong et al., 2013 and Sarfmen et al., 2008], taking on environmental responsibilities is in line with stakeholders' expectations in order to secure support and grow financial performance, leading to improved investment efficiency. Conversely, the trade-off and management opportunism hypothesis asserts that CSR (including CER) will diminish an entity's resource thus affecting its competitive disadvantage. Managers may also be attracting much private support when they practice environmentally friendly reinvestment decisions, which could lead to misuses of firm resources leading to losses. As a result, researchers are focusing on the impact of CER on business entities performance

Studies on the impact of CER on company financial results or income, as well as the impact of CSR on investment efficiency, are actively being conducted (Li et al., 2017; Wong et al., 2016; Sharfmen et al., 2008 and Samet et al., 2017). CER can assist businesses through improving the natural environment and creating positive externalities, as well as increasing accessibility to external capital, enhancing corporate financial transparency, and minimizing the abuse of corporate free cash flow to some level. Enterprises that manage environmental risk have better access to project funding than non-environmentally friendly businesses (Safras et al., 2008). Companies who invest in environmental programs might profit more from the competition (Sim, 2019).

Although studies have shown that CSR can help businesses investment to be more profitable, CSR is not the same as CER. Businesses will willingly embrace additional environmental obligations in a market framework with strong environmental legislation and significant environmental conservation advocacy, according to Aguado and Holl (2018). To put it differently, regions with better institutional governance have lower levels of corruption, less state intervention (for example, officials trying to meddle in corporate allocation of resources for personal gain), and more advanced financial markets, all of which are crucial to enhance enterprise environmental practices and fully exploiting the CER effect. Furthermore, as customer awareness of the environment grows, environmentally friendly businesses become more popular (Ting et al 2019, Zhang et al 2019).

2.2 Drivers of Corporate Environmental Responsibility

A number of various drivers for the integration of CER have been discussed profusely in literature and some of them as discussed in this study include enterprise image, public support, enterprise core values, competitive edge, business opportunities, compliance with environmental regulations, tax incentives and structural characteristics of the enterprise.

2.2.1 Enterprise image

Sáez-Martnez et al. (2006) found that, alongside subsidies, commercial possibilities, and enterprise values and objectives, one of the factors defining whether organizations embrace responsible environmental behavior is corporate image. One of the factors driving a high level of corporate responsibility is an organization's knowledge of the value of its image and reputation (Marlin,

2003). The way in which external entities evaluate a company's environmental performance can have an impact. One of the external environment's stakeholders, the investor community, has recently been increasingly interested in environmentally friendly goods and services (Jeniffer, et al.2008, Bazillier, et al.2017). As a result, businesses recognize the need of environmental protection while developing products and services, even if they are not required to do so by law. These businesses consciously take steps to ensure their long-term viability and, implicitly, a better image and reputation (Ganescu, 2014, Sekulic, 2018). Intangible gains, such as reputation, are becoming increasingly important when dealing with environmental activities, according to Holtbrügge and Dögl [17]. Outside of financial success, businesses want to project a specific image that is in line with current external regulatory demands.

2.2.2 Public Support

Another motivator for businesses to embrace environmentally friendly practices is public backing. Government action may offer public assistance to businesses in the form of subsidies and tax reductions (Marlin 2003). Companies' incentive to implement responsible environmental measures is favorably impacted by the pressure applied by governmental legislation and customers, according to a study done by Henriques and Sadorsky (Hong, B et al. 2016). Similarly, the support of loyal consumers and recognition from other groups may influence businesses' environmental stewardship (Schaefer, 2004, Bansal, 2000). Holtbrügge and Dögl (2012] found that external regulatory pressures, such as policy regulations, appear to be the most effective method in driving companies to implement CER practices that are best for the environment rather than just the firm's financial performance, based on a review of several studies on CER. Furthermore, external regulatory constraints may be the answer to a greener world, which has substantial implications for policymakers (Holtbrügge, 2012). This is relevant for both developed and developing nations to improve competitiveness and attract foreign direct investments (FDI) of environmentally responsible firms, as evidenced in multi-country research on CER (Holtbrügge, 2012).

2.2.3 Enterprise Core Values

Enterprise values, together with goal and vision, form the bedrock of business culture. Community, innovation, diversity, honesty, empowerment, and ownership are among the basic principles. The culture of a company determines who its important customers, suppliers, rivals, and workers are. Nonetheless, it has an impact on how it interacts with these crucial players. Bansal and Roth

(Annandala, D et al; 2003) found that incorporating environmental stewardship into company values offers long-term advantages, such as avoiding financial punishments, reducing risks, and increasing employee happiness.

Annandale and Taplin (Bichta, 2003) assessed factors determining whether firms adopted responsible environmental behavior in a research including 26 Australian enterprises. In that survey, corporate culture is ranked #1, followed by customer impact and the influence of other organizations. Bichta (2003) looked at Greek organizations and came to the conclusion that organizational culture may generate norms that allow members of the company to act in a certain way. Nonetheless, in general, member values are those that may affect a company's proclivity toward environmentally responsible behavior.

2.2.4 Business Opportunities

Business prospects exemplify one of the driving forces for a company's decision to engage in environmentally responsible behavior. According to Nikolau and Evangelinos (2018), there appear to be tangible commercial potential in enterprises with a high level of environmental responsibility, as evidenced by the emergence of new marketplaces on which these companies may dispense their products and, indirectly, new consumers. Enterprises have a competitive edge in new markets when compared to other environmentally responsible companies or companies that do not employ responsible environmental standards. Recent research has found that economic prospects in environmentally friendly organizations have a favorable impact (Marlin, 2003, Doran, J et al; 2016).

2.2.5 Competitive edge

Companies are also motivated by competition to develop a strategy that includes environmental responsibility. In a study of a sample of Irish enterprises, Doran and Ryan (2016) discovered that in order to flourish, businesses need go beyond the advantages of competition by giving greater benefits to third parties (consumers, investors, etc.). When it comes to environmental stewardship, certain businesses may gain a competitive advantage by distinguishing the goods and services they supply from those provided by businesses with a lower level of environmental stewardship (Li,Z 2019, Aguado,E, et al. 2018).

2.2.6 Compliance with Environmental regulations

Government legislative initiatives, according to academics and industry leaders, are the primary engine for CER implementation (Dummet, K; 2006). Governments are under pressure to develop solutions to prevent environmental damage while reducing impact to economic growth as a result of environmental concerns. Regulations, information programs, innovation policies, environmental subsidies, and environmental levies are among the measures available to governments to safeguard the environment. Environmental rules urge businesses to consider the extent to which they are responsible for the environment. According to the study by Li et al. (2019), strong environmental protection requirements may force businesses to adopt techniques for the production of green goods and services. According to Li et al. 2019, a research of a sample of Chinese enterprises found that the Chinese government compelled a considerable number of companies to become more environmentally responsible owing to excessive pollution.

Another research found that, in the face of stringent government environmental protection policies, businesses have grown more environmentally conscious, citing the threat of consequences for non-compliance (Demirrel,P et al.2017).

Tax incentives

The literature study yields a variety of conclusions about the impact of tax incentives on corporate social responsibility (Core,J et al.1999). A tax incentive, for example, might indirectly encourage and inspire taxpayers. The provision of tax incentives may also make it simpler for taxpayers to meet their tax responsibilities. Business executives expressed their desire for national governments to take a more proactive role in encouraging, if not forcing, greater environmental stewardship. Furthermore, researchers believe that government incentives are a crucial driver for CER (Dummer,K 2006). A model of the dependent variable CER in connection to incentives for engaging in environmental practices was identified in an empirical investigation on CER drivers in SMEs (Marlin,2003). The major findings supported the concept that environmental regulation (regulatory push/pull, subsidies, and fiscal incentives) encourages the growth of CER in SMEs to some extent (Marlin,2003). Hence, We recognize that tax incentives, in conjunction with other government tools, may play a significant role in the development of CER.

Structural characteristics of companies

Finally, the structural qualities of businesses have an impact on their environmental behavior. According to studies on SMEs' CER, an enterprise's size, age, and sector may indicate its attitude toward CER (Marlin, 2003, Aguodo, et al.2018) The European Commission emphasizes that SMEs, particularly micro-enterprises, may be at danger of their social and environmental responsibilities being unwritten and intuitive (European Commission, 2019).

2.3 Barriers to Corporate Environmental Responsibility

Regardless of their size or industrial area, businesses confront a variety of challenges in adopting green practices into their operations, which may be sluggish and difficult (Teh et al. 2020). According to Rao et al. (2009), businesses frequently stated their desire to participate in voluntary environmental efforts if the procedure was not too costly or difficult (Wu 2017). However, these businesses are frequently unaware that there are several financially appealing alternatives for environmental improvement, including tax credits and government subsidies (Organisation for Economic Co-Operation and Development 2018). Frequently, these businesses are preoccupied with boosting their production and concentrating solely on the outcomes of their products (Rao et al. 2009).

Even when businesses are aware of the potential for enhancing competitiveness, a lack of critical skills and knowledge prohibits them from seizing new possibilities (Organisation for Economic Co-Operation and Development, 2018). In a research by Gupta and Barua, the problems of implementing green business practices were investigated (2018). These authors discussed how to overcome impediments to green innovation and divided them into seven groups including: organizational or managerial; technological; financial and economic; external partnership and stakeholder engagement; government support; market and customer barriers; and knowledge and information-related barriers. They asserted that organizational or managerial impediments are typically caused by management's lack of commitment to green practices, as they want to operate a firm in a traditional manner and seek to avoid unforeseen risk from innovation. Additionally, they stated that the majority of technology, knowledge, and information-related hurdles exist as a result of resource restrictions that are common in businesses. Other types of businesses, unlike multinational corporations that may support technological innovation through their research and development operations, rely on freely available technology on the market (Chang and Slaubaugh

2017). Financial and economic factors may both promote and stymie the adoption of environmentally friendly corporate practices. While financial incentives such as cost savings might motivate some businesses to embrace green practices, the high cost of investing in green technologies typically prevents them from doing so, according to Gupta and Barua (2018). Given the unpredictability of payback times, the financial barrier of adopting green innovation is reasonable, and has been observed in previous research (e.g., Ormazabal et al. 2018). External stakeholders such as governments, business partners along the supply chain (Kumar et al. 2019), and customers, according to Gupta and Barua (2018), are additional impediments for businesses in their drive to become green.

According to a survey conducted by Kenya climate innovation centre (KCIC) and Kenya association of manufactures (KAM) in 2019 on the environmental management practices in Kenya,, three factors were identified as key barriers in preventing firms from implementing environmental management practices in there day to day activities. These factors are lack of support services, limited returns and financial constraints. According to the report, the gravest impediment is limited support services from appropriate organizations for businesses to establish adequate management of environmental practices. About 36 per cent of the companies, their investment in environmental management yielded extremely low returns, implying a weak involvement by businesses. Furthermore, 35 per cent of businesses were unable to adopt friendly environmental practices due to a lack of financial resources. Most of businesses have not figured out how to be more sustainable while lowering their input costs. Although there is institutional support for adoption of green technology, there are no compelling reasons for these businesses to utilize their services. It is reasonable to conclude that any effort to encourage environmental management practice adoption and implementation should focus on building strong networks with relevant support groups and providing assistance.

2.4 Benefits of Corporate Environmental Responsibility

The advantages of corporate environmental responsibility are growing, making it necessary for businesses to incorporate it into their day-to-day operations in order to stay in business (Welford & Frost, 2006; Engle, 2006). Corporate environmental responsibility may be strategic in that it can be used as a plan to improve a company's brand image and enhance its profile in the minds of customers. To be effective, the activity must be tightly aligned with the company's core capabilities

and values (Van Haastrecht, & Amiabel, 2010). Environmental policies are also considered as part of the CER process. This implies that by conducting green operations in their businesses, these companies help to save and preserve the environment (Ioan, 2011).

Another advantage of CER is that it improves the relationship between the organization and its consumers. According to recent study, there are favorable correlations between a company's CER activities and customer views regarding that company and its goods (Brown & Dacin, 1997; Creyer & Ross, 1997; Ellen, Mohr, & Webb, 2000). Firms gain from CER efforts in a variety of ways (Hillman & Keim, 2001; McWilliams & Siegel, 2001). These advantages extend beyond the reputation-building stage, since CER efforts may help organizations create significant organizational capacities (Sharma & Vredenburg, 1998). First and foremost, CER strengthens consumers' identification with the company, a process known as customer-corporate (C-C) identification. The degree of overlap between a consumer's self-concept and his view of the company is referred to as C-C identification (Dutton, Dukerich, & Harquail, 1994). Another CER initiative is cause-related initiatives, which allow businesses to profit while also doing good for society. This may be accomplished by constantly launching cause-related projects, which in turn foster long-term consumer connections such as customer loyalty, brand equity, and trust (Piercy & Lane, 2009).

CER helps companies create trust connections and social linkages that will be valuable assets in the future, and the greater focus on CER will decide a company's market performance. This is because the more people know about CER, the better the firm's reputation will be, and this will lead to increased economic growth (Jo & Harjoto, 2011). Many studies have examined the relationship between economic growth and social capital (Knack and Keefer, 1997), trust building and social capital (La Porta, Shleifer, & Vishny, 1997a, b), government performance and social capital (La Porta & Shleifer, 1999; Putnam, 1993), and financial development and social capital (La Porta & Shleifer, 1999; Putnam, 1993). (Guiso, Sapienza, & Zingales, 2004). This shows that there is a rising demand for CER activities, and businesses will gain from them as a result (Jo, & Harjoto, 2011).

CER provides a competitive advantage to a company since it may be utilized as a differentiating strategy, such as offering recycled items or organic pest treatment (McWilliams, & Siegel, 2001). Firms' market positions are also protected, and new business prospects are created as a result of

CER (Maignan, Ferrell, & Hult, 1999). CER is linked to moral principles, and proponents of CER programs today use four justifications to make decisions about the resources required to support CER initiatives. Moral responsibility, sustainability, permission to operate, and company operations are the four reasons (Porter & Kramer, 2006).

A report on sustainable investment published by International trade Centre in partnership with KenInvest in 2019 acknowledges that,

“Environmentally responsible business practices may help a company's financial line, build its reputation, reduce its environmental imprint, and create a better local ecology that benefits and attracts personnel. Indeed, many enterprises that export their goods to worldwide markets have made environmental stewardship a necessity. Buyers are increasingly requiring their suppliers to conform with environmental and social responsibility standards of conduct, as well as third-party certification processes. Environmental stewardship may improve a company's reputation among its consumers. Implementing resource-efficient waste management, as well as water and energy consumption, may result in cost savings by lowering the quantity of inputs required for production while simultaneously increasing corporate productivity.”

2.5 Corporate Social Responsibility (CSR) in Kenya

In the face of dwindling natural endowments and unequal society, the obligations of commercial entities in promoting sustainable development is being scrutinized more than ever before. Corporate Social Responsibility (CSR) was the first way for businesses to get involved with sustainability. CSR does not have a broadly acknowledged definition. According to the German Ministry of Economic Cooperation and Development (GTZ) 2009 publication on CSR in Sub-Saharan Africa, "CSR refers to corporate accountability to investors, stakeholders and the society for resource utilization, extent to which their production is environmentally friendly, employee working conditions and consumers, and the impact of their activities on ecological environment in Sub-Saharan Africa. Cheruiyot and Tarus (2016) described CSR in Kenya as an entity's long term pursuit of beneficial societal, economic, legal, and environmental rights, as well as acceptable practice for humanity's long-term sustainability.

In Kenya there are four approaches to CSR which are, ethical, political, altruistic, and philanthropic CSR. Political CSR (Garriga & Mele, 2004). Political CSR highlights corporations' power over the other players within society, as well as their political obligations. As a result, it expresses enterprises' existence in relation to the political class, civil society, community leadership and the public. Corporate donations and job opportunities are used by large local and multinational firms to affect the political climate of the country. Furthermore, the actions of several Kenyan enterprises indicate a commitment to CSR for sustainable development, common good and the attainment of human rights (Ethical CSR). Ethical CSR investigates the uniqueness and morality of CSR in its normative sense.

Community investments, for example sponsoring or fully funding health and education, are a common type of CSR in Kenya (philanthropic CSR). By participating in the community, the company reinforces its own support scheme, enhances employee loyalty, and communicates to customers that it is a part of the social fabric. The Equity Bank's scholarship of "Wings to Fly", that is offered to bright but disadvantaged Kenyan students (Cheruiyot & Tarus), is one example (2016).

Altruistic CSR has also been observed in Kenya. This is a type of CSR that has been performed in many Kenyan communities as a conventional virtue, and it is a fundamental component of religious practices like almsgiving to the poor. Altruism is a selfless concern for other people's happiness, welfare, and well-being. As a result, altruism is defined as the foregoing of self-interest in favor of a singular concern for the good of others (Cheruiyot & Tarus) (2016).

Kenya's CSR has historically been defined by altruistic volunteer acts, with a focus on persisting poverty, limited access to education, health care, water and sanitation, and food insecurity. However, as seen by worldwide trends, there has been a sluggish movement toward addressing employee and environmental concerns in the quest of sustainability (Cheruiyot, & Tarus, 2016).

A recent study revealed that sustainability efforts and practices are attributed by most corporate managers to the necessity to offset their company's social and environmental repercussions, while others utilize them to boost brand image, establish trust, and reputation (KCIC Research, 2018). The importance of international mechanisms and networks aimed at coordinating company efforts to embrace sustainability is becoming more widely recognized. For example, the UN Global The

GNCK encourages businesses to operate responsibly by aligning their strategy and processes with the Ten Principles on human rights, labor, the environment, and anti-corruption; and it encourages businesses to take strategic actions to advance broader societal goals, such as the UN SDGs, with a level of cooperation and accountability (2015) (GRI, UNGC, and WBCSD, 2015).

The Global Compact Network Kenya (GNCK) was established in 2005 with the strategic goal of pioneering and catalyzing efforts aimed at promoting good business practices by increasing capacity and knowledge of ethics, integrity, and CSR in line with the UN Global Compact's Ten Principles. Only 140 companies have signed up for the GCNK, demonstrating a gap in Kenyan corporations' understanding and adoption of corporate sustainability.

Over the previous decades, a modern practice of CSR has emerged around the world, with businesses recognizing that reducing their own impacts while also addressing larger social and environmental issues is critical to their long-term success. All businesses are encouraged to put to use their innovation and creativity to tackle long-term development concerns by the SDGs. As the global agenda for society's progress, the SDGs enable businesses to show how their activities achieve sustainable growth by minimizing negative impacts and increasing beneficial impact on people and the environment. (GRI, UN Global Compact & WBCSD, 2015).

CSR techniques such as commitment to standards, community investment, continuous improvement, stakeholder contact, and corporate reporting on social and environmental performance are increasingly being implemented by high-profile firms. As a result, several firms' initiatives have been consolidated under the banner of Corporate Shared Value (CSV). This is defined as *"Policies and operational procedures that improve a company's competitiveness while also improving the economic and social circumstances in the areas where it works."* 2011 (Porter & Kramer). *Reinventing goods and markets, reinventing productivity in the value chain, and supporting local cluster growth are three critical tactics for enterprises to generate shared value possibilities (Porter & Kramer 2011.)"*

Safaricom is an example of a Kenyan company that has embraced the concept of CSV. Safaricom is the biggest telecommunications company in the country providing voice, text, data and mobile

money transfer services. The company leverages cellular technology to produce shared value services that annihilate inefficiencies and improve people's lives through improvement in health, agriculture, and educational sectors (Safaricom, 2019). Digi Farm, the company's integrated agriculture interface that enables agri-businesses and small scale farmers' exchange information and trade, won the Shared Value Award at the Loeries Awards in South Africa in August 2018. Safaricom began integrating nine of the 17 Sustainable Development Goals into their core business plan in 2016.

The nine core goals are health care, education, clean affordable energy, decent work and economic prosperity, innovation and infrastructure, lowering societal disparities, responsible consumption and manufacturing processes, climate control, peace and justice, and partnerships. In May 2019, the company held the Africa Shared Value Summit in Nairobi, which drew attendees from 18 nations.

Therefore as the corporate sustainability landscape changes, it is important to recognise the need for awareness creation and education on the important role business has to play in sustainable development, not only for society, but also for itself. This will help empower the sector in Kenya to embrace sustainability in a more holistic manner.

2.6 Drivers and challenges of Corporate Social Responsibility (CSR) in Kenya

2.6.1 Drivers of Corporate Social Responsibility (CSR)

Constitutional Drivers: These constitute adherence to the constitution, civility, equity, justice, social and political order within the confines of the country. These entails the Constitution of Kenya 2010, Independent Constitutional Commissions, and resource and power devolution. It is the most crucial as it is the foundation for all other forms of social responsibility. Kenya's constitution, for example, contains specific articles and sub articles on the bill of rights as well as leadership and integrity. Article 43 of the Bill of Rights stipulates that everyone has a right to health care, proper housing, access to safe water and sanitation, food security, water, social

security, and education. Consumers' rights are outlined in Article 46, which include the right to quality goods and services, the information needed to fully comprehend products and services, compensation for loss or injury caused by flaws in goods and services, and fair and honest advertising. The constitution also establishes legislation for the establishment of an Ethics and Anti-Corruption Commission, as well as the conduct and financial probity of state officers. Kenya's constitution extensively protects and guarantees human, social, political, and economic rights (Cheruiyot and Tarus, 2016).

Institutional Drivers: These are pre-existing structures that make corporate social responsibility (CSR) more manageable at both the macro (national) and micro (firm) levels. Market and governmental mechanisms are the two most frequent types of mechanisms that provide a governance structure for organizations that engage in CSR. Kenya's business climate is supported by a strong institutional structure that allows the government and the market to regulate and promote ethical business practice. Some of these institutions are the Capital Market Authority, Competition Authority of Kenya and the Consumers Federations of Kenya, Independent Commission which include the ethics and anti-corruption and the Consumer Protection Act.

Regulatory Drivers: These are mechanism that promote self-regulation and other modes of ethical corporate behavior regulation. Regulatory drivers like code of conduct and regulatory bodies are examples of regulatory drivers. Kenya has the most varied codification of industries such as horticulture. Regulatory agencies such as the NEMA, KEBS, and Kenya Competition Authority handle environmental regulatory, quality inspection and control. Although Kenya has a number of norms of behavior, however there is no much evidence on the extent these codes and standards are enforced. Among the codes and standards include the Kenyan Code of Ethics for Business, the Kenya Flower Council Code of Practice for local exporters, and norms of conduct such as the BASE code (Cheruiyot, & Tarus, 2016).

Civil Society and Advocacy Groups: Kenya has a robust civil society, free and independent media that promotes civility, democracy, justice, and human rights. There are hundreds of civil society entities, NGO/CBOs, faith-based organizations, as well as local and international media. The following are some examples of organizations and individuals in East Africa who advocate CSR for a just and equitable society: a) Horticultural Ethics and Business Integrity (HEBI), an independent non-profit organization promoting ethical social behavior in the horticultural

business. b) The Ufadhili Trust, a non-profit support organization that was established in 2001 under the Public Trustee Act (Cap 168, Laws of Kenya). Through capacity building, lobbying, networking, research, and technical support, this groups works to monitor the social responsibility obligations of governments, commercial entities, organizations, and individuals in East Africa for a just and equitable society. c) The Center for Corporate Governance (CCG) is a non-profit organization that was founded in 1999 to promote corporate governance in Africa through training, learning, awareness, and research (Cheruiyot, & Tarus, (2016).

Stakeholder Activism: Most industries have investor associations and trade unions that seek to advance the interests of various stakeholders. Workers' unions (e.g., the COTU and the KNUT, employer organizations (e.g., t FKE, and consumer societies and organizations (e.g., the Consumers Federation of Kenya (Cofek) and the Kenya Consumers Organization (KCO)) among others (Cheruiyot, & Tarus, 2016).

Socio-cultural drivers: CSR is ingrained in Kenyan communities' social and cultural fabric, with ideals expressed in a variety of ways, including proverbs, songs, and metaphors.

Economic Drivers: The necessity for an economic basis for pursuing CSR in the country is heightened by economic inequality underdevelopment and higher poverty levels. The responsibility for CSR will be shifted to counties as financial resources and power are devolved, with the goal of alleviating social and economic inequities, poverty, and underdevelopment, as well as advocating policies for resource sustainability and environmental preservation.

2.6.2 Barriers and challenges to effective CSR in Kenya

CSR is a nebulous notion that has been described in a variety of ways. As a result, there is no uniform national definition, resulting in its underdevelopment. Furthermore, the scope of CSR is too restricted, with philanthropy and social kindness generally being associated with it, when CSR should be expanded to cover governance, human rights, environmental, and economic concerns. In Kenya, there is also no clear and distinct CSR framework, and no attempt has been made to develop CSR policies. CSR, on the other hand, has largely been regarded as a voluntary activity. As a result, certain actors have misused the concept of CSR, either as a public relations stunt or to get financing under the premise of promoting CSR, as in the case of some unscrupulous NGOs and civil societies. There is no discernible CSR education in Kenya because CSR is a voluntary

activity. It is not regarded as a key subject in Kenyan universities and other training institutions. This adds to the concept's underdevelopment (Cheruiyot, T. K., & Tarus, D. K.) (2016)..

Indeed, CSR is still a relatively new idea in Kenya, and attaining effective CSR implementation is fraught with difficulties. For the majority of organizations, the cost of CSR efforts is a significant problem. This is explained by Kenya's economic environment, which, while beneficial to some industries such as mobile service providers and financial services, is characterized by high production costs due to high taxation and energy and transportation costs. The level of competition among enterprises at a period of diminishing earnings exacerbates this. The lack of a direct link between CSR and success in profitability has lowered CSR's popularity in Kenya (Cheruiyot & Tarus, 2016). ..

A business culture that is focused on short-term and quick results is also a major impediment. While CSR is a strategic issue with no immediate visible effects, the benefits are likely to surpass the expenses in the long run. Management focuses on actions that promote immediate shareholder returns while lowering the possibility of CSR programs being implemented. Other roadblocks include managerial and employee opposition to new techniques like accountability, openness, and stakeholder responsibility. New governance models that improve CSR in Kenyan businesses face stiff opposition (Cheruiyot, & Tarus, 2016). .

The lack of defined government standards and involvement in CSR, as well as its voluntary character, limit its use by Kenyan businesses. This includes, but is not limited to, a lack of government policy and legislation on corporate social responsibility and how it should be mainstreamed.

Other issues include Kenya's lack of a foundations law, which has had an impact on policy and tax relief for philanthropic organizations, a lack of motivation on the part of foundations and other charitable institutions as a result of the government's inattention to community needs, and finally, a poor document handling on philanthropy which has resulted in a lack of public accountability (2016).

2.7 Cement industry initiatives

Research much recently has been conducted to investigate the reducing of the cement industry greenhouse gas (GHG) emissions potential. To replace the maximum amount of cement used in

concrete production most of it has focused on using alternative materials, which would create a more sustainable process and product. Waste products from industrial processes are the most commonly used alternatives, such as a by-product of coal-fired power plants, fly ash; cement-kiln dust; ground, granulated blast-furnace slag; volcanic ash; silica fume; and rice-husk ash. As studies have shown, employing materials that are supplemental cementing can minimize emissions, resource consumption, and energy usage while still generating cement with performance and robust strength when mixed in the optimum proportions and properly activated.

Another technique that is promising to reduce the GHG emissions of the industry involves capturing the CO₂ used to make other products in the cement-making process, such as bicarbonates, carbonates, liquids and solids that capture the CO₂ molecule. Sending the CO₂ emissions to form a carbonate material which can be utilized in making concrete through seawater is one example, hence inside the building material the gas is permanently secured (securing the gas permanently inside the building material is through Emerging technologies (Biello 2007). There is waste reduction which is an environmental benefit (Shah and others 2004). To give the product other benefits there is the addition of such alternative materials to concrete: they are durable, recyclable and less maintenance is needed and the product is often more economical and has increased strength and reduced permeability. Both international and local cement companies are already using these techniques and alternatives to address environmental impacts of cement production process. For example

Heidelberg cement environment policy is the core element in protection of the climate. As a company that is energy intensive, a substantial effort has been made for many years now to minimize their carbon emissions. As from 1990 to 2019, their specific net carbon emissions have reduced by 22% to 589.8kg CO₂ per tonne of cement. For 2030, their aim being to reduce further the emissions by 30% compares with the level of 1990. The measures taken to lower carbon emissions include continuous production processes and technologies, composite cements promotion through which the entire cement production clinker content has been reduced to 74.5% and increased use of alternative fuels including biomass (Heidelberg sustainability report 2019)

At Dangote Cement, dust emissions which have significant reduction are feasible both economically and technically. For its achievement the company has provided and designed with equipment of state-of-the-art dust abatement, including electrostatic precipitators and bag house

filters. To ensure that as specified by the suppliers the abatement systems operate, Site employees who have been trained maintain constant control of operational parameters and perform normal maintenance tasks. An array of best practices that the company has implemented to alleviate the potential effect from dust emissions which are fugitive. they include (i) the raw materials storage in silos and/or warehouses , ii) handling raw materials, intermediates, and final products on entirely closed conveyors having bag house filters at transfer points, and (iii) dust suppression on roadways, both at quarries and plants, by spraying water and using binding material. Their plants' state-of-the-art design, together with the established management and maintenance techniques, allow them to achieve typical dust emissions of 20 to 30 mg/Nm³. This is way below the international best standards and the typical regulatory threshold limits and (50 mg/Nm³) (Dangote cement sustainability report 2018).

One of Kenya's leading cement manufacturers which is Savannah Cement, through various initiatives has been on the lead of preservation of the environment. In order to ensure sustainability which is eco-friendly within the factory and the community the company continues to implement various initiatives. Tree planting initiative is one such initiative, that was launched the purpose of launching it is ensuring management of emissions of Carbon Dioxide from the machinery in the industry, creating an environment which is healthier and safer for the employees and community surrounding it. Along with tree planting, re-vegetation scheme plans have been put in place by Savannah Cement that aims to restore the facilities site to its original form. Any adverse effects on the environment after any deterioration brought about by the processes of the industry will be reversed by the cement manufacturer's scheme (Impacthub media).

According to Andrew Bilki, 2018, in 2017 plans to switch to solar power were suspended by Bamburi cement suspended because of the project's high cost. With the help of recycling company Geocycle, the company chose to use scrap tires, a project that has been put into the cement industry's sustainability plan to protect the environment. In addition to waste tires, the company used agricultural byproducts such as coffee and rice husks. To date, the company has recycled around 40,000 tonnes of tires to generate electricity in its operations.

2.8 Summary and literature gaps

Corporate environmental responsibility is an undertaking by organizations to minimise its adverse effects on the environment by use of various strategies. These strategies act also as drivers

leveraged by the organizations to address environmental problems. The drivers include stringent environmental regulations that spur organizations to innovate and be competitive, self-regulations and incentives on environmental innovation. Market pressure on entrepreneurs to protect environment so as to be competitive on the global space as well as pressure from the stakeholders such as employees and local community demanding that the organization to protect the environment from adverse effect of their activities have also been recognised to play a key role in the driving CER integration .

Notwithstanding, these drivers, there are a number of barriers that have been noted to impede CER integration. They include resistance by organizations to change as well as rejection of new policies by these organizations. In addition, cost, risks and disadvantages of new technologies, lack of support services, limited returns and financial constraints have been noted to impede the integration of CER. CER integration depend on the mitigation cost, the legal integrity pf the company level of development and the industry ability to detect mitigation measures.

In Kenya, corporate social responsibility has traditionally been defined by charitable volunteer acts, notably in response to chronic poverty, limited access to education, health care, water and sanitation, and food insecurity. However, as seen by worldwide trends, there has been a slow movement toward addressing employee and environmental challenges in the quest of sustainability. According to a 2018 poll by Kenya Climate Innovation Centre, most business managers attribute their sustainability programs and practices to the need to lessen their company's social and environmental consequences, while others utilize them to promote brand image, develop trust, and reputation.

To tackle environmental impacts of cement production process, a number of cement companies in Kenya has implemented a number of initiatives. These initiatives include the use of waste products from industrial processes for example cement kiln dust, fly ash, silica fume, rice husks and volcanic ash. These initiative help in replacing the maximum amount of cement utilized in the production of concrete. Other initiatives include techniques for reducing carbon emissions through capturing carbon dioxide used in the process of making cement and utilizing it in making other products for example as carbonates and bicarbonates. These initiatives have environmental benefit, as they are durable, recyclable, economical, and need less maintenance.

Some for the international and local cement companies that have implemented initiatives carbon emissions, dust and waste management include Heidelberg Cement, Dangote Cement Company, savanna cement and Bamburi cement. Heidelberg has invested in carbon emission reduction through use of alternative fuels such as biomass. As for the Dangote, they have reduced on dust emission through installation of state of the art dust abatement equipment, suppression of dust by water spray as well as use of binding materials on the plant and quarry roads. Savanna cement engages in tree planting initiative to manage carbon emissions from its production processes as well as restoration of old quarries to their original form. On the other hand, Bamburi cement is using waste tires as alternative source of energy to power its production process. The company has managed to recycle 40,000 tonnes of tyres to produce energy.

To this end it is evidently clear that there is no study in kenya that has been done to assess the integration of UNGC commitments on corporate environmental responsibility and other initiatives at Athi River Mining Company processes and its effect on the environment in Kilifi county.

2.9 Analytical Framework

2.9.1 Theoretical framework

This study is anchored on the triple bottom line theory (TBL) which gives recommendation that organization should commit in concentrating on environmental and social affairs the same way as they do on profits. The TBL goes further and suggest that instead of having one bottom line, there ought to be three which are; planet, people and profit. TBL aims on measuring the commitment level of an organization to CSR and its effect over time on environment. In 1994, John Elkington, a British, who is also recognized as a management consultant and sustainability guru coined the term “triple bottom line” as a tool of evaluating corporates performance in America. He was of opinion that organizations can be ran in such a way that they do not only yield financial profits for themselves but they can improve the planet and people’s live . As indicated by the TBL theory, organization ought to work altogether on the three bottom line: **Profit** which is the conventional way of measuring corporate performance- the profit and loss account. **People** which gauges the degree at which an organization is socially responsible in its actives. **The Planet** gauges the organization environmental responsibility. Commonly and also in the traditional business financial

reporting the term “bottom line” is used in reference to either “profit” or “loss”, that is mainly in the last bottom line on the statement of income.

In the course of the last five decades, social justice and environmentalists’ advocates have made attempt of brining a more extensive meaning of the term bottom line into the cognizance of the public by presenting full cost accounting. For instance, if a company reports financial profits, though their asbestos mines lead to loss of huge number of lives, and their copper mines leads to pollution of a river, and the government consequently spends large amount of taxpayer money on up rivers and healthcare, how can comprehensive cost benefit analysis for the society be carried out? This point is when the TBL theory adds two more “bottom lines”: environment and social concerns. The economic premise of TBL theory denotes the effect of an entity’s commercial practices on the economic system (Elkington, 1997). It evaluates the ability of the economy as one of the determinants of sustainability to endure and develop into the future so as to benefit future generations (Spangenberg, 2005). The growth of the economy is tied to that of the organization by economic line and how it contributes well in supporting it. Otherwise, it focuses on economic value that the organization gives to the neighboring environment in a way that fosters prosperity and ability of supporting the future generations. The social line on the other hand refers to undertaking activities that are beneficial and encourage good business practice in so far as human resource, labor and the community are concerned (Elkington, 1997). The notion is, the society is offered value and the community is derives various benefits. These benefits may include reasonable wages and medical services. Beside the ethical obligation of being "good" to the public, dismissing social duty can influence the sustainability and performance of the commercial entity. According to some recent examples in the industries it has been determined that there are economic costs that are arise from with declining social responsibility. Simply put, the social performance centers around the association amongst the organization and the community and addressing issues concerning community participation, fair wages and employee relations (Goel, 2010). Lastly the environmental lines talk about participating in practices which do not cause harm to future generations’ rightful share of the environment and natural resources. Sustainable development is regarded as the development that enables meeting of present needs without affecting future generations’ ability to their satisfy needs (Brundtland Report, 1987). It relates to using of energy resources efficiently, minimizing harmful gas emissions by greenhouse and minimizing the ecological damage etc. (Goel, 2010).

TBL is a CSR paradigm that covers three performance dimensions: economic, social, and environmental. The three dimensions of TBL, as defined by John Elkington, must produce long-term outcomes. The TBL concept's fundamental objective is to ensure sustainability. TBL must be used by commercial entities in order to produce earnings that are not detrimental to long-term social and environmental sustainability. A number of charitable organizations and many enterprises have applied the TBL sustainability framework in carrying out the CSR operations.

For the purposes of this study, the research looked at the ARM performance on their commitment to environmental and social affairs.

2.9.2 Conceptual Framework

Below is a conceptual framework . The status quo is that the environmental pollution is there hence the reason of complaints received and investigated by the Kilifi county assembly joint parliamentary on Environmental natural resources. The triggers of the environmental pollution are corruption, lack of incentives, limited or no financial return for investing in CER as well as financial constraint by the company to venture into CER. As result of environmental pollution from cement processing activities, there is global warming, respiratory diseases and loss of biodiversity and this leads to human and biodiversity deaths, high cost of doing business as well as closure of business. To halt this there is need for integration of Corporate Environmental responsibility in cement production process. This can be triggered by internal strategy, external pressures such as regulations and shareholders. This will call for CER policy to be developed and implemented. Once the CER is implemented, the company will be able to see good relationship

with their stakeholders including community, increased profit and good reputation and this will lead to a sustainable business.

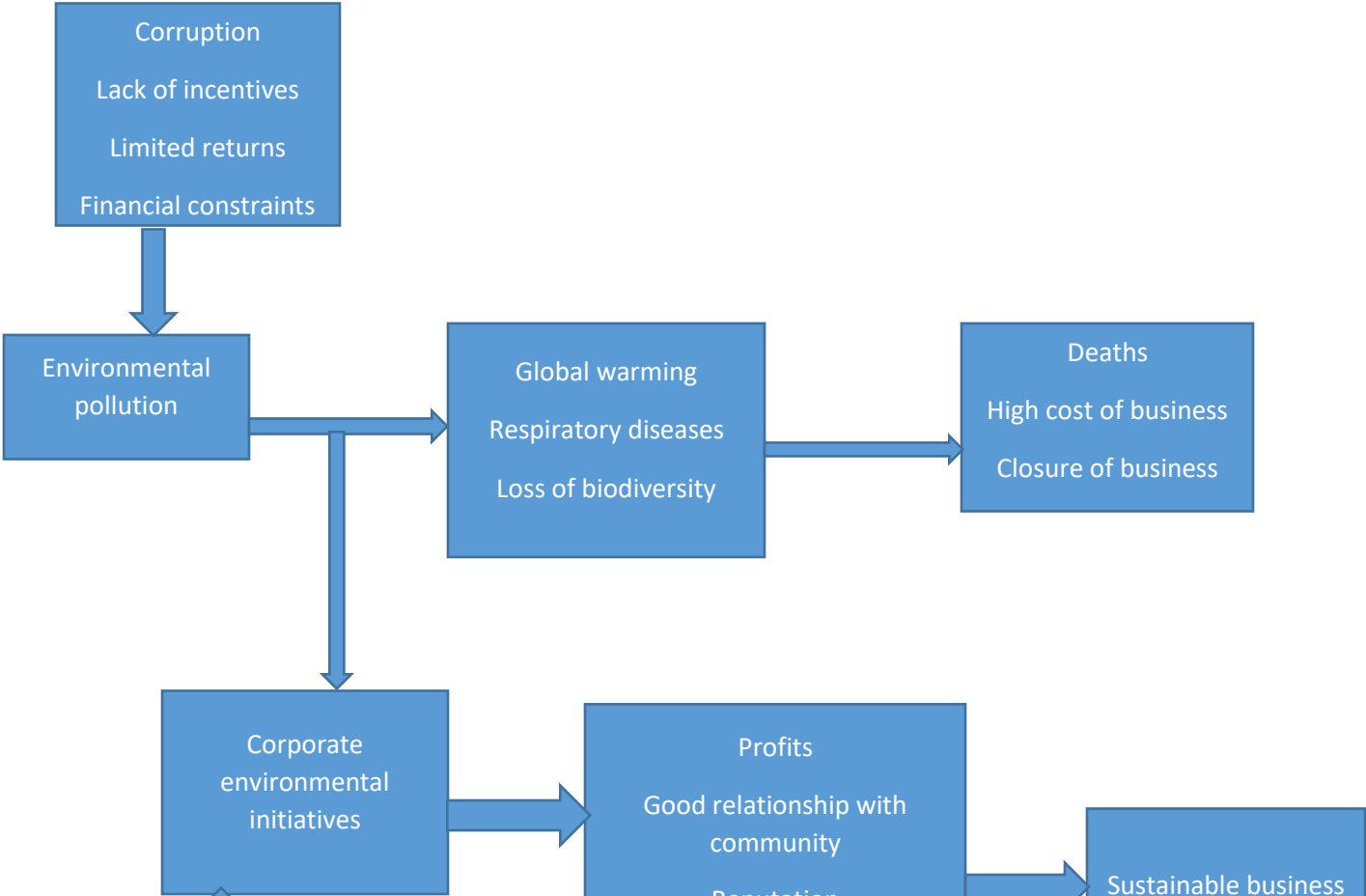


Figure 1: Source Author 2020

CHAPTER THREE: METHODOLOGY

This chapter presents information on the area where the study took place, the study design used, the data needs, types and sources, method of sampling used and finally data collection and analysis by the researcher.

3.1 Study site

Kilifi county is county number 3 of the 47 Kenyan counties and is among the six coastal counties in Kenya. It lies longitudinally between 39°05' and 40°14' on the East and latitudinal 2°02' and 4°00' to the South. The county is bordering Kwale County to South West, Tana River to the North, Taita Taveta to the West, Mombasa County in the South and Indian Ocean to the East. Kilifi covers a distance of 12,370.8 KM² with an estimate population of 1,498,647 in 2018 from the projection of 2009 Kenyan Population and Housing Census, the population is composed of 775,443 females and 723,204 males. The further projection indicates that the population will rise to 1,591,901 (which is 45% male and 55% female) in 2020 and 1,841,958 (47.8% males and 52.2% females by 2025) at an inter-censal yearly average growth of 3.05% (Kilifi County IDP 2018-2022)

Half of the county land or even more is arable with the majority of the farming being Subsistence. The crops that are commonly grown include maize, cassava, cowpeas, green grams, rice and bananas. Horticultural farming is also a key player in improving the socio-economic welfare of the communities within the county. The major one being cashew nuts, coconuts and mangoes. Other crops in this category include pineapples, lemons, passion fruits, lime, watermelons, pawpaw and vegetables (Kilifi County Annual Development Plan 2017 Annual Report).

Kilifi County also has vast mineral resources that have attracted a number of mining and extraction investors. Minerals and rocks very common within the county include Iron ore, corals and salt. As a result quarrying, rock harvesting, ballast and salt harvesting are very common within Kilifi. The cement companies within the county are Athi River Cement in Kaloleni and Mombasa Cement in Takaungu. There are also notable Salt harvesters in Magarini Sub County. (Kilifi County IDP 2018-2022)

This study was done at the Athi River Mining (ARM) limited which is located at Kilifi county , 60 km from the Mombasa Township, off the Mombasa – Nairobi highway, at Mazeras, within the Coast region of Kenya, and about 110 km from Kilifi county headquarters. The whole facility,

including plant and the raw material mines is approximately on 300 Ha land. The neighbouring plots are private holdings with agricultural residential activities.

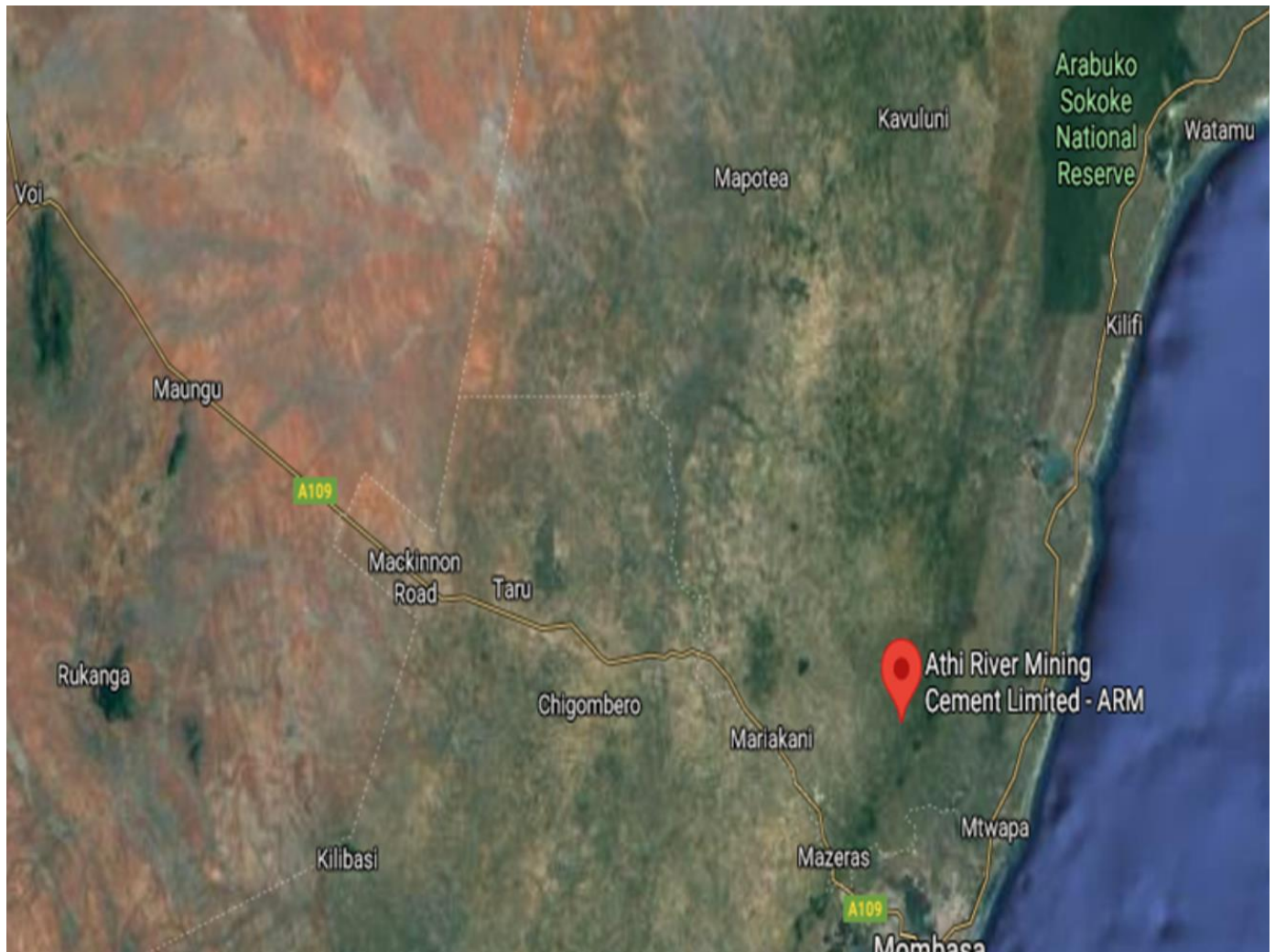


Figure 2: Google map location of ARM Kaloleni

3.2 Research Methods and Study Design

3.2.1 The study design

For this study, the researcher used a qualitative research design. Quantitative research, according to Van der Merwe (1996), is a tool for evaluating theories, establishing facts, uncovering relationships between variables, and forecasting outcomes. Natural science approaches are used in quantitative research to assure objectivity, generalizability, and reliability (Weinreich, 2009)

Qualitative approaches include observing, document analysis and summary, participant observation, and open-ended unstructured interviewing. These methods help academics analyze people's interpretations of social events and understand the mental processes that govern human action. Qualitative inquiry, according to Worthen and Sanders (1987:50), is "a research approach that is undertaken in natural settings, with the researcher as the primary instrument in both data gathering and analysis."

The researcher used qualitative research design to collect and analyse data on the integration of CER at ARM, challenges of integrating CER as well as in analyzing and identifying policy gaps.

3.2.2. Data needs, types and sources

The data needed to accomplish this study include data on how ARM has integrated corporate environmental responsibility in their day-to-day activities. This primary data was obtained from key informants. These informants included Athi river cement mining staff who are responsible for the implementation of CER within the company, National Environment Management Authority (NEMA) staff who oversee the environmental compliance of companies at Kilifi County, the environment staff at Kilifi county assembly who also oversees environmental management at the county level as well as Kenya association of manufacturers (KAM) and Kenya private sector alliance (KEPSA) who ARM is a member.. The second data needed in this study was the data on the challenges encountered by ARM in the implementation of the UNGC Code of ethics. This primary data was obtained through interviewing ARM, KAM, KEPSA, NEMA as the key informant and community members through focus group discussion. Thirdly was the data on the additional measures that ARM can implement. On this, the Primary data was collected through focus group discussion with the local community members, key informants from ARM, NEMA, KEPSA, KAM and County Government of Kilifi and the secondary data through literature review. Lastly was data on policies and regulatory framework that support the implementation of CER is needed. This data was obtained through the informants such as NEMA, ARM, and Kilifi County as primary source of data as well as literature review as our secondary source of data.

Data needs	Types	Sources
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How ARM has integrated CER in their day to day operations	Primary	Key informant interviews
challenges encountered by ARM in the implementation of the UNGC Code of ethics	Primary	Key informants Focus group discussions
the additional measures that ARM can implement	Primary Secondary	Key informants Focus group discussion Literature review
policies and regulatory framework that support the implementation of CER	Primary Secondary	Key informants Literature review

Source: Author 2021

3.2.3 Data collection

For this research, data was obtained from key informant interviews, focus group discussions as well as secondary sources. Data from key informants were collected through one on one interviews. The answers were recorded on the questionnaires as well as video recording. The key informants included three staff from National Environment Management Authority in Kilifi who are responsible for day-to-day environmental enforcement in the region, three staff from the ARM, two staff from department of environment, Kilifi county government and one staff from KAM and one staff from KEPSA. ARM has signed code of ethics with UNGC and are members of KEPSA and KAM .

Discussions within the focus groups were held among the members of the community who reside next to ARM factory and quarries. Three focus group discussions were conducted. This involved having different genders from community living around ARM invited to participate and contribute

to discussion. The subdivision was done with the help of the local administrators such as area chiefs. The participants were composed of male and females members of the community. The purpose of the FDG was for the researcher to gain a deeper understanding of how the ARM activities have affected the community living around ARM. To achieve this, the researcher developed a set of questions for the community. Each participant was given a chance to respond to those set of questions and the researcher noted the responses down.

As for the secondary data, the researcher relied on books, journals and repositories to obtain data on how ARM and other corporates are integrating CER in their day-to-day activities. Secondly, to understand some of the best practices on environmental responsibility that ARM could borrow a leave from as well mine information on Kenya's policies and regulations that are related to CER.

NO	Target population	Target number	No of responses
1	NEMA Staff	3	3
2	ARM Staff	4	4
3	Department of Environment, Kilifi County government	3	2
4	UNGC	1	1
5	KAM	1	1
6	KEPSA	1	1
7	HURIA	1	0

Table 1: Source Author 2020

On the community members' front, the researcher organized three focus discussion groups with the target of 10 members in each discussion. To ensure fair representation of all community members, the entire region surrounding ARM was divided into three with the help of the local administrations. Such that researcher had three focus groups discussions that happened in different dates. The 1st focus group was composed of men, the second group was made of women and the 3rd last group was composed of youth. All these participants were selected randomly as so to

eliminate the aspect of discrimination and ensure fairness in the process. These participants were chosen solely they live next to ARM plant and quarries hence they interact on a day-to-day basis with the activities of ARM. Their role in the research was for them to share with the researcher their experiences and opinions with respect to the impacts of ARM activities on their health and environment as well as understand what initiatives ARM has put in place to address those impacts. The composition of the participants in all the three tiers were males and females

NO	Target population	Target number	No of responses
1	1 st focus group	10 men	9
2	2 nd focus group	10 women	10
3	3 rd focus group	10 youths	7

Table 2: Source Author 2019

In total only 26 community members out of the targeted 30 attended the group discussions.

3.3 Data Analysis

Given that the data collected in this study was qualitative data, the researcher analyzed the data through content analysis. Content analysis is a qualitative process in which communicative messages are analyzed in a specific process. Scholars in communication studies try to describe and explain communicative using the frequency of specific ideas, concepts, terms and other messages characteristics (Allen 2017). In this study, the researcher followed below steps in performing content analysis.

- i. Thinking back on thesis objectives so as to identify the most important and relevant information that the key informants and focus groups shared with me as well as what the researcher was able to gather through literature review.
- ii. Gathering handwritten notes and audio recordings from the interviews and typing them on Microsoft word.
- iii. Reading back through all the typed data , identifying common themes and categorizing each informant's responses by theme.
- iv. Presenting data through narration.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 Overview

This section presents the study's findings on the integration of CER in the ARM cement production process based on the focus discussion groups held with community members, and key informants

interviewed with staff from UNGC, ARM, NEMA and Kilifi County government, respectively. From the data collected, ARM has put in place a number of measures to address environmental issues emanating from their day-to-day activities. On matters of dust and noise from quarrying activities, the company has installed a modern explosive and micro time delay explosives, which fracture the stone with minimal dust and noise. The dust from ARM vehicles moving between the plant and the quarry is minimized through watering whereas the particulate matter from the stack is trapped by use of electroplastic precipitators and cyclones. The waste generated from the offices and the waste handlers licensed by NEMA dispose off plant. On social responsibility, the company provides tree seedlings to the neighboring primary schools to help in trapping dust generated in the area. The company has constructed a police post as well as distributed fertilizers to the farmers in the region.

In addition, a number of initiatives are in the study findings to help ARM to adequately address environmental issues from their cement production processes. These measures include; implementation of Environmental Management System, installation of conveyor belt between the plant and the quarry to transport raw materials, use of alternative materials such as waste tyres as a source of energy to power the plant, installation of high technologies to combat dust and noise pollution at the plant and quarries, partnership with NEMA, county government and UNGC on compliance assistance program as well as acquisition of buffer zone between the community and the quarries .

The study did also note the challenges faced by ARM in implementing CER. The challenges are ;high energy prices, low uptake of cement, cement production intensity resource , inadequacy in buffer zone between the plant and the community, stringent regulatory requirements by NEMA, financial constraints and pressure from activists and local communities..

4.2 Integration of Environmental Responsibility by ARM

All the key informants from ARM, NEMA, and the Kilifi county department of environment attested that ARM has an environmental policy. The policy commits to include: protection of human and environmental health through improving and maintaining the quality of environment in partnership with the communities; adoption of an environmental management system; adopt air pollution prevention approach to all its operation; minimize waste generation as well as

communicate to its workers and all stakeholders about its environmental performance. Below is the detailed information on how ARM has integrated CER in its day to day operations

4.2.1 Management of Mining and Transportation of Raw Materials

ARM Cement Ltd operates 3 quarries. These are Chauringo, pangani and Chingagoni that are located approximately 6 km from the Kaloleni cement plant site, and therefore requires transporting the raw materials using trucks, on an unpaved road. This road is classified under Kenya rural roads authority. In dry seasons, vehicles moving on unpaved roads cause dust emissions from tires and wake. During these seasons, ARM management at Kaloleni uses a water browser to drench the road to suppress the dust emissions, as a social responsibility. The number of times the road is watered is dependent on the weather conditions. Another factor determining the dust levels on unpaved roads is the vehicle speed. Drivers are continually trained on performance and efficiency at work. ARM management has also established and maintains a tree nursery, which has seedlings which are provided to the community members and schools along the road on the afforestation programme. The trees assist in trapping the dust from the road transportation wake, act as wind breakers, and beautify the environment among other benefits. These trees are supplied at no cost to the schools and individuals.

During blasting at the 3 quarries, dust is generated. The dust level is controlled by use of modern explosives and micro time delay explosives, which fracture the stone with minimal dust and noise. The level of dust, the wind velocity and vibration are regularly monitored using in-house instruments, which are regularly serviced. Mining involves use of explosives for blasting and further breaking the rocks using rock breakers and excavators. The blasting activities are regulated by Mining Act and enforced by the department of mines and geology. All the relevant licenses have been obtained. The mining activities generate air and ground vibrations. Standard procedures are employed in warning workers and nearby persons before. The level of noise/vibration will vary with the distance of measurement from mines blast holes, the number of blasting holes, the amount of explosive used, and the nature of the rock. The range of noise within the working environment is above 85 dB which requires workers to wear ear protection against noise. The community members through FGDs complained of excessive noise and vibration which cause great disturbance to children and pregnant mothers during the day and night . The company, NEMA and county government of Kilifi are aware of these issues, and NEMA, the regulator has closed the

factor until proper measures are put in place to address the noise and dust emissions. The ARM is working on acquiring the latest technology to address the two issues.

Noise surveys results for Kaloleni plant

Below is a table of noise surveys results for Kaloleni plant as per the report published Safetec solutions in 2019. Areas that were found to have high levels of noise were convey belt area, material sampling plant, silo ground, laboratory sample separation area and Rotary Kiln. The other areas of the plant were found to have noise levels below the recommended limits.

S/N	Location/position	Measured levels dB (A)	Recommended Exposure Levels	Remarks
1	Main store	60.5	90	<i>Below the recommended limit</i>
2	Project store	66.6	90	<i>Below the recommended limit</i>
3	Garage	65.0	90	<i>Below the recommended limit</i>
4	Mechanic workshop	78.5	90	<i>Below the recommended limit</i>
5	Electrical workshop	60.2	90	<i>Below the recommended limit</i>
6.	Compressor room	87.4	90	<i>Below the recommended limit</i>
7	Limestone crusher (not running)	75.8	90	<i>Below the recommended limit</i>
8.	Conveyer belt area: raw mill II	92.6	90	<i>Above the recommended Limit</i>
9.	Material sampling plant – Raw mill II	107.5	90	<i>Above the recommended Limit</i>

10.	Bag house 2 fan	87.9	90	<i>Below the recommended limit</i>
11.	Silo (raw mill) ground	97.9	90	<i>Above the recommended Limit</i>
12.	Electrical Panel area (Energy office upstairs)	65.8	90	<i>Below the recommended limit</i>
13.	Electrical Panel area upstairs	67.9	90	<i>Below the recommended limit</i>
14.	Laboratory - sample separation area	95.5	90	<i>Above the recommended Limit</i>
15.	Physical lab – jolting machine running	81.9	90	<i>Below the recommended limit</i>
16.	Central control room	63.8	90	<i>Below the recommended limit</i>
17.	Center of office in at control room	59.0	90	<i>Below the recommended limit</i>
18.	Coal mill	87.9	90	<i>Below the recommended limit</i>
19.	Kiln coal Bin area	83.6	90	<i>Below the recommended limit</i>
20.	Rotary kiln burner area/platform	90.6	90	<i>Slightly above the recommended Limit</i>
21.	Coal mill fan	87.0	90	<i>Below the recommended limit</i>
22.	Kiln control room	83.2	90	<i>Below the recommended limit</i>
23.	ESP II	79.8	90	<i>Below the recommended limit</i>
24.	DBC II	95.0	90	<i>Above the recommended Limit</i>

25.	ESP I	83.2	90	<i>Below the recommended limit</i>
26.	DBC I – hopper	91.5	90	<i>Slightly above the recommended Limit</i>
27.	Compressor room kiln	88.6	90	<i>Below the recommended limit</i>
28.	Packing III	79.8	90	<i>Below the recommended limit</i>

Source: Safetec Solutions LTD 2019

Noise Survey Results Chauringa quarry

Safetec did another noise survey in 2019 targeting the ARM Charuringa quarry. Below are the noise results. As it is evident in the table below the areas established to have noise levels above the recommended limits were operator position, compressor, driller position and driller pressure releasing.

S/N	Location/position	Measured levels dB (A)	Recommended Exposure Levels	Remarks	
1	Mine offices	54.0	60	<i>Below the recommended limit</i>	
2	Workshop (minimum operations)	59.8	90	<i>Below the recommended limit</i>	
3	Operator position – breaker KHMA 376E	102.0	90	<i>Above the recommended Limit</i>	

4	Compressor	94.1	90	<i>Above recommended limit</i>	
5	Driller position – drilling ongoing	113.0	90	<i>Above recommended limit</i>	
6	Driller pressure releasing	130.0	90	<i>Above recommended Limit</i>	

Source: Safetec Solutions LTD 2019

4.2.3 Installation of technologies filter bags and dust stack collectors

From the interviews conducted among the 4 ARM staff it was established that ARM has three stacks that emit gases and particulate emissions. These stacks, coal mill, baghouse 1 and baghouse 2, are at height above ground of 33, 60 and 92 metres respectively. Dust from stacks originate from clinker cooler and cement mill stacks exit. For stack emissions, the parameters that determine the dispersion of particulates are stack gas temperature, exit velocity and inside stack diameter

The meteorological conditions that determine dispersion of the particulates plume after exit from the stack are wind speed and direction, atmospheric stability and mixing depth. To mitigate these, dust is trapped using reverse-air fabric filters before venting for stacks Baghouse 1 & 2. The coal mill stack uses electrostatic precipitators (ESPs) and cyclone to trap particulates, while measurement of exhaust gases, velocity through the duct, SPM values are continuously measured and data stored within the ARM systems. Despite having filters and electrostatic precipitators in place for trapping particulate matter, the NEMA officer reported that these technologies are worn out and hence there was need for the company to do replacement. This was one of the reasons for closure of the factory by NEMA in September 2019.

4.2.4 Solid waste management

By providing procedures for managing solid waste, the Waste Management Regulation of 2006 aims to prevent and reverse environmental damage caused by solid waste. Promotion of cleaner industrial processes, source segregation, recycling, and reuse are examples of such mechanisms.” The regulation require that a generator of waste separates the waste and disposes of the waste in the appropriate manner as given in the regulations. Part IV, No. 19 states; the generator of hazardous waste should treat or cause to be treated in an incinerator. Factory waste such as metal and removed spares is disposed through onsite incineration on daily basis except scrap metal, which is recycled through steel melters. Garage and workshop waste such as waste oils, removed spares and removed tires is disposed through onsite incineration. Electronic waste such as end of life computers, printers and florescent tubes is kept at ARM stores. Finally, the domestic general waste from residential workers estate is decomposed to make manure used for landscaping. The company policy embraces the reuse policy in its operations for waste reduction and raw material efficiency maximization.

Table 5: Waste generated by the facility and disposal Methods

Waste	Source (s)	Disposal methods
Hazardous wastes		
Used Oil, spares, metals	Servicing/routine maintenance machinery/equipment generator of -	Collected and returned to the suppliers for treatment
Dust	Point source dust from grinding mills,	Trapped in the bag filters and returned back to processing
Electronics/Electricals	Computers, printers and florescent tubes	Stored in ARM stores
Non Hazardous Waste		
Industrial waste – Torn cement bags	Cement bag filling process	Collected by the NEMA waste handler for recycling
<i>Domestic waste –Liquid and solid(plastic and paper)</i>	Kitchen Staff canteen offices	Liquid waste discharged into the septic tank; Organic waste decomposed into manure Solid waste are collected by outsourced NEMA waste handler for proper disposal /treatment

4.2.5 Engagement of local community through CSR Projects

ARM has a CSR arm of the business called Rhino Cement Foundation. The foundation has three main pillars, which are health, education and environment . On health, the main objective is to provide affordable health care to the neighboring communities, charging a nominal fee of 150 Kenya shillings. The company has a functional clinic in Kaloleni with a registered clinical officer, nurses, lab technicians and pharmacist. It has a turnover of 2000 patients. In Education, the foundation offers an annual full sponsorship to both high school and university students, totaling to 50 students. These are the less privileged but with promising academic prowess. The 20 university students are doing a diverse range of courses ranging from medicine, accounting and engineering. The company's staff offer various mentorship programs to these students. The company offers internship and graduate training to various University students both within the county and outside the county. Every year, the company distributes more than a quarter-million tree seedlings for free to schools and various community organisations in the country as CSR in the environmental front.

ARM regularly meets with local community and community leaders on matters concerning good neighborhood and environmental matters. The factory zone has a local residence association. The company introduced a social economic project in the sub-county of Rabai for soil sampling and distributing non-acidic fertilizers and seeds to boost the harvest. This is done in collaboration with the county agriculture office.

4.3 Challenges facing ARM in implementing UNGC code of ethics on environment

The research sought to understand challenges facing ARM in the implementation of CER in line with their commitment to the UNGC code of ethics. In the data collected, the researcher established the following challenges.

4.3.1 Regulatory policies

Governments all over the world have been increasing restrictions on industrial emissions, operation practices, health and safety through policies and regulations. ARM like any other cement company in Kenya is expected to comply with government regulations governing its operations

failure to which sanctions or penalties will be imposed on them. Some of the regulations that the company has been struggling to comply with is the regulation on the air quality and noise pollution as provided for by NEMA. These two regulations has seen the company closed many times by the regulator for failure to meet these regulations. Frequent company closure by the county government and NEMA following community complaints with respect to dust and noise emissions from the cement company has seen the company loss out on revenue generation. There is a need for the company to keep on improving and use the technologies on emission. Play a role in environmental regulations enforcement, make use of best technological practices for pollution control and efficiency in energy, participate in developing virtual technologies in eliminating emissions and as well as making use of the existing environmental management systems, all this can be achieved via engaging policymakers.

4.3.2 Use of modern technology

According to UKaid report on manufacturing in Kenya, 2016. Most of the manufacturing Companies are constrained by cost to effectively leverage on technology. As a result, many manufacturers are still using old technology, operating old systems, and machines. According to a 2010 KNBS census, the use of outmoded technology was a major factor leading to high production costs due to low energy efficiency. As a result, even when the government lowers the electricity costs, businesses' continued use of energy-inefficient technologies ensures that the savings are not fully realized.

The growth of technology items in Kenya's manufacturing industry is the second reason. Kenya has a thriving technology sector and is widely regarded as Africa's premier technology and innovation powerhouse.

The sector has created domestic technology solutions like KioKit, and the country has the potential to become a major player in the continent's technology manufacturing.

Although there is more capability in software development, there aren't enough human resource for development of firmware and hardware.

Furthermore, there are challenges with the value chain: there is no technical ecosystem to generate the many components needed to make electronic items. Local tech companies must import the components that make up the final product, and the customs duties on key technological components needed to construct items locally is so exorbitant that it is easier to manufacture the product overseas and export to Kenya. The product might be assembled in Kenya in the best-case scenario. Furthermore, the low number of Kenyans trained in the necessary abilities for technology production is a problem. Expat tech workers are needed to boost the sector's capacity, but the government's permit requirements make it impossible for them to enter and stay.

The third question is how well the Kenyan technology sector can handle the challenges that manufacturers experience when doing business in the country. For example, inconsistent power supply is a common complaint among manufacturers, and it has a detrimental impact on machine operations and life lifetime. The manufacturing sector should look up to the local technology sector first to address this issue, employing indigenous technologies that address the challenges of running a manufacturing business in Kenya. The interaction between local technological and industrial sectors, on the other hand, is poor. The manufacturing sector does not convey its technology requirements to the technology sector, and it does not aggressively seek advice from local technology firms in order to solve its difficulties. This could be due to a variety of factors, including a general lack of information among manufacturers of how advanced the local technological environment is. It could also be influenced by a stubborn belief that local IT firms aren't as competent as international firms and can't come up with efficient answers to local manufacturing challenges; the tendency is to hire a foreigner to solve the issue. Finally, due to a lack of communication between the two sectors, the IT community is unaware of the challenges that manufacturers face and hence is unable to provide solutions.

4.3.3 Electricity transmission and distribution

As indicated by the World Bank, access to electricity has only been able to reach only 23% of the population in Kenya. Nevertheless, according to ARM's interviews, the problem isn't so much with volume of electrical supply as it is with distribution and transmission. Kenya's population and industrial activity have grown, but the country's transmission and distribution infrastructure has lagged behind. Even when power is available, irregular power supply and outages result from poor transmission and distribution infrastructure. Another issue raised by ARM and KAM with regards

to electricity was excessive tariffs, which raise the cost of manufacturing items, resulting in a higher end product price. Another constraint associated with electricity is power interruptions, which are costly to manufacturers since they result in idle time. Furthermore, power interruptions force manufacturers to acquire generators, which adds to the unnecessary capital expenditure and operational costs. The quality of the electricity supply is also a concern: power fluctuations and interruptions reduce production since machines must be restarted and their lifespan is reduced. Because of the sensitivity of the machinery utilized in production, early malfunction is possible.

4.3.4 Substantial Capital Outlay

The amount of initial financial investment required in exploration and commercial mining of precious and semiprecious minerals is prohibitive, according to a UKaid assessment on manufacturing in Kenya published in 2016. Furthermore, a lack of experience in this field is a major deterrent. Financing that is both affordable and long-term is still difficult to come by; commercial banks' average lending period is often 5 to 8 years, which is considered quite short in the sector. Due to high expenditure arising from costly short-term borrowing, Athi River Mining reported a full-year net loss of KES 2.9 billion for the 12 months ending in December.

Although there is a desire to lend to the manufacturing sector, the terms of the loan are undesirable, constraining acceptance. Interest rates are extremely high, frequently in the 18% range, and while smaller loans are accessible through microfinance institutions, they are at even higher rates. Second, banks' limited tenure is motivated in part by a desire to limit their exposure to risks associated with doing business in Kenya.

The issue of lending rates is particularly worrying, as it puts Kenya's manufacturing sector at a disadvantage because it competes with multinational firms that can acquire financing at interest rates as low as 2%–3%. As a result, overseas manufacturing companies can not only obtain such financing, but they also do not have to pursue huge profit margins in order to meet debt servicing commitments. They can still service the loan while making a 10% profit margin. If a company wants to service a loan in Kenya, the margin must be much bigger.

4.3.5 Resource intensity

Large amounts of energy and raw materials are required for cement production. The already existing processes, the amount of limestone and energy used is very high to produce a unit of portland cement leading to faster depletion of natural resources. There is demand or shift for the usage of higher strength cement for applications that seem to be non-critical like plastering and flooring all over the country. To curb the resources depletion, the companies need to research on the alternative energy and raw materials as well as recycle wastes.

4.3.6 Effects of politics on manufacturing

Political uncertainty, according to the Kenya Association of Manufacturers, discourages investment in the country and has a negative impact on the manufacturing sector. During election seasons, when ethnic tensions are at their highest, areas prone to politically sponsored ethnic violence are most unstable. In addition, political volatility makes it impossible for the government to regularly address manufacturing problems and issues.

Political instability leads to an inconsistent focus on manufacturing. Government and opposition parties are more inclined to engage the manufacturing sector during campaign season, and promises are made. However, once the elections are concluded, the implementation of these promises are placed on hold. As a result, every five years, promises are made, but they are not followed through. It might be claimed that the government's Go East Policy is problematic because it has led to Kenya's local market being opened up to low-priced manufactured goods from India and China. Political pressure on counties to raise money has resulted in the imposition of new levies, which have a severe impact on company activity, particularly in the industrial sector. Nairobi county, for example, increased levies for different business operations payable to the county government in 2013. According to accounts in the media, these include: • Operating license fees for large transport businesses with more than 50 vehicles have raised to KES 100,000 from KES 80,000. Manufacturers' transportation expenses rose as a result of this. The cost of building billboards increased by KES 10,000 to KES 36,000 for the first 3 m² of a 12x6 m display, affecting marketing budgets and KES 5,733 for each additional 1 m². Manufacturers' advertising costs drastically rose as a result of this.

4.4 What more can ARM can implement to enhance integration of CER?

There are an array of additional measures that ARM could implement to help them enhance CER integration. The proposed measures are hinged on the gaps identified through interview of the key stakeholders such as NEMA, ARM, County government of Kilifi and local community members.

4.4.1. Emission reduction Measures

As mentioned under challenges, the company over dependent on coal and oil to power the plant due to instability of the electricity power in the region. According to Johannes (2012), Cement industry's waste and emission of energy and gases is a higher contributor of environmental pollution as the raw materials and fossils used is non-renewable this is a major risk to health and safety of the communities involved. The industry emits 5%-6% carbon dioxide, dusts and other gases. Other products exhausted from the kilns are; nitrogen oxides, fluorides, chlorides, sulphur dioxides, heavy metals, smaller quantities of organic compounds, oxygen and water (Ian and David, 2002). Toxic metals and organic compounds are emitted from the combustion or the industrial waste in a cement kiln. Crushers, grinders, clinker cooler and material handling equipment also emits dust (Mishra and Siddiqui, 2014).

To address overdependence on coal power and oil by ARM in their operations, there is need for ARM management to consider using alternative fuel substitution. This includes use of waste tyres to reduce energy consumption, invest more in tree growing in the neighbourhood to help in offsetting their carbon emissions and rehabilitating quarries by planting indigenous trees contributing to pollution control and CO₂ absorption. There is also need for the company to have in place fulltime monitoring of the air quality. This will help them know the emissions trend and as such are able to put in place measures to curb on emissions.

4.4.2 Adoption of high-end technologies to combat dust emissions

Second measure is upgrade of electronic precipitators to curb stack emissions. Process steps in kilns systems, clink coolers and the cement mills emit large quantities of dusts. Hot exhaust gas is passed through pulverized materials and a mixture of gas particles is dispersed, the particulates are from clinker or cement or even from the raw materials (Karstensen, 2006 & 2007). From this study it is evidently clear that ARM activities from cement transportation, cement production, and cement loading generate dust. The community members, and NEMA are concerned about this. To

address this issue ARM management needs to upgrade its electronic precipitators to curb stack emissions. Secondly they need to have the unpaved road between the 3 quarries and the factory paved to reduce on the road dust and have the frequency of water sprinkling increase as well as comply with the NEMA quarry operation time, that's from 8am to 5pm as well as have the cement loading zone concreted.

4.4.3 Adoption of environmental management system (EMS)

The world's cement consumption has been increasing resulting to an increase in pollution (Avetisyan, 2008) Consumers in the recent past have been questioning the validity of "green" products claim (Blengini and Shields, 2010) The major problem is the destruction of the environment (Da Silva and De Medeiros, 2004) The society , environmentalists and even regulators main concern is the protection of the natural resources and its sustainability.(Ribeiro and Guzman, 2010).

Large number sustainability reports and an increased significance issue have been a major discussion in regards to sustainability in the recent past.(La`nsiluoto and Ja`rvenpa`a`, 2008) Organization of the management programmes in environment ensures the implementation concept is friendly to employees (Yusoff and Lehman, 2009) New needs of information for organisation of public is provided in the environmental management program, it also details the information on environmental impacts and the developed initiative results. (Ribeiro and Aibar-Guzman, 2010).

It was noted that ARM does not have an Environmental Management System (EMS), implementing an EMS will help the company improve its performance (Baharum and Pitt, 2009). The ISO 14001 standard guides on improvements via a systematic approach to environmental management . The business processes and procedures can be changed if correctly implemented.. By having the EMS in place, ARM will be able to improve efficiencies of its processes, attain compliance with the statutory regulations as well cost cutting

4.4.4 Use of alternative materials

2% of the global primary energy is consumed in the cement industry . The carbon emissions from cement production is almost 5% (Hendriks *et al.*, 1998). Battelle (2002) reports that fly ash,gypsum and dust can be used as alternative raw materials . This can reduce carbon dioxide emission as well reduce cost. Waste from other industries such as waste plastics and solvents can

be used as alternative fuels. Waste conversion can result in a valuable product, by doing so there is reduction in fossil fuels and impacts on its extraction as well as mining and quarrying of raw materials is reduced. Western Europe uses about 42% of non-traditional fuels unlike China that relies largely on non-renewable fuel. There will be a reduced need for quarrying and pollution will be minimal when we use other forms of raw materials. This is one of the opportunities that ARM can take advantage of in order to cut on the use of fossil fuels. Secondly, it will help them bring down the amount of carbon emissions that is associated with detrimental environmental impacts.

4.4.5 Acquisition of buffer zone

It was also noted that there is no buffer zone between the surrounding residential area and the quarry where ARM fetches the limestone for the manufacturing of cement. Having a buffer zone of planted trees between the residential area and the quarry could help to address a number of issues currently being experienced by the residents and ARM management. One of the things that the buffer zone will address is minimise the sound and vibration from the quarry. Secondly the trees will intercept particulate matter and absorb air pollutants. To actualize this, there is need for the county and NEMA to demand that ARM compulsorily acquires land in the area to act as a buffer zone. ARM also needs to regularly meet with local residents and village elders on matters concerning good neighbourhood and environmental matters.

4.4.6. Installation of conveyor belt

The distance between the ARM and quarry is 6 kilometers. The raw material, which is limestone, is transported from the quarry to the plant via all-weather roads by ARM vehicles. One of issues noted with transportation of raw material by the vehicles to the factory is dust emissions from the all-weather roads and to minimise this. The ARM management have to water these roads on daily basis to suppress the dust. They also need to provide track drivers with PPEs such as facemasks to protect them from inhaling dust. To address dust issues and use of many vehicles to transport limestone to factory, there is need for the ARM to consider installation of conveyor belt that would help them transport raw materials to the factory. With this, the management will be able to cut on operation costs as well putting to the rest the need to sprinkle water on the dusty roads every day.

4.4.7 Large scale Tree planting and taking up schemes for afforestation

ARM management has established and maintained a tree nursery which has seedlings for provision to the community members and schools along the road on the forestation programme. Increase in tree cover will assist in trapping of the dust from the road transportation wake, act as wind breakers, and beautify the environment among other benefits. These trees are supplied at no cost to the schools and individuals. They have also started planting trees on old mines. To scale this up and offset their carbon emissions from cement manufacturing there need to collaborate with county government of Kilifi and Kenya forest and establish or acquire more areas in the region where ARM can do extensive tree planting. Some of the benefits that ARM will draw from venturing into large scale tree planting include; contribution to government achievement of 10% tree cover, carbon offsets from its operations, as well as improved air quality.

4.4.8 Improvement of the process efficiency

Enhancements to energy efficiency minimize CO₂ emissions from fuel and power consumption, cutting long-term cement manufacturing costs. Employing more energy-efficient process equipment, replacing existing installations with new ones, or transitioning to whole new types of cement production processes can all help to improve efficiency. The fuel needed to heat the kiln consumes the most energy in the cement manufacturing process. As a result, the most significant reduction in energy intake will come from increased fuel economy. Converting from direct to indirect firing, boosting cooler recovery, adding roller presses, and adopting vertical mills and high-efficiency separators are all ways to improve energy efficiency (Hendriks et al., 1998).

Switching to a new cement manufacturing technology is another possibility for enhancing energy efficiency. The dry manufacturing process is generally regarded to be much more energy efficient than the wet, and the semi-wet is thought to be more energy efficient than the semi-dry. Dry process kilns now generate 78 percent of Europe's cement, with semi-dry and semi-wet process kilns accounting for 16 percent and wet process kilns accounting for the remaining 6%. Wet process kilns in Europe will be converted to dry process kiln systems, as will semi-dry and semi-wet kiln systems, when they are updated. In principle, by improving kiln shell insulation, lowering the lime saturation factor of the kiln feed, and reducing clinkering time, temperature, and volume of exhaust gases, energy consumption and hence fuel-derived CO₂ emissions might be further reduced (Gartner, 2004). The novel cement sintering technology using the fluidized-bed cement kiln system is one of the emerging techniques in the cement industry. A suspension preheater, a

spouted bed granulating kiln, a fluidised bed sintering kiln, a fluidised bed-quenching cooler, and a packed bed cooler are all part of this system. The cement clinker generated in a fluidised bed kiln is of comparable or superior quality to that produced in a commercial facility. When heavy oil is utilized as fuel, NO_x emissions range from 115 to 190 mg/m³, whereas pulverized coal emissions range from 440 to 515 mg/m³. According to a feasibility study for a 3000 tonne clinker/day facility, the amount of heat utilized can be lowered by 10–12% when compared to a suspension preheater rotary kiln with grate cooler; thus, CO₂ emissions should be reduced by 10–12%. (IPPC, 2001).

4.5 Adequacy of Environmental policy and regulation in integration of CER

4.5.1 The Kenya constitution 2010

The Constitution of Kenya 2010 is the supreme law of the land; all the laws must be enacted in accordance to it. The principles and values must also be embodied in the supreme law of the land. The constitution acknowledges the protection of the environment, it provides that the Kenyan people should protect the environment as their heritage and a determination for various generations in future. A clean and healthy environment through legislative measures for the current and future generation is a constitutional Right to every Kenyan as articulated in Article 42, this can be achieved when the environment is well protected. The environment enforcement rights are under Article 70, the article addresses all the measures to be followed in case of a dispute in regards to environmental matters there are legal and additional remedies to be followed.

Article 69, sets out the state and individual obligation in matters of the environment. The state has been obligated to ensure exploitation, utilization and management of the said resources have been followed. The distribution and sharing of wealth from the said resources is under this article. The public has to be involved in management and conservation of the environment. The article further stipulates that the utilization of the natural resources should be for the benefit of the kenyan citizens.

This law supports the integration of CER as it requires everyone including organizations to work with communities and state organs in conservation and protection of natural resources to attain a sustainable ecological development and utilization of natural resources . It accords Kenyan citizens the right to a clean and healthy environment and as such companies such as ARM are expected to fully comply with this law by ensuring that their activities do not pollute the environment.

The challenge however is that this law just like any other law is implementation given the human resource and financial constraints faced by the implementing agencies.

4.5.2 The National Environment policy (2015)

The ARM could rely on a number of policies in the integrations of CER in its operations. The National Environment policy (2015) provides an integrated framework to planning and management of natural resources within the country. The policy recognizes the endangered ecosystems and offers policy measures to be followed in management of environmental practices and the governance to achieve the desired environmental goals.

The stewardship of the environment is under Chapter 5, these are precautionary approaches to environmental challenges advancing environmental responsibilities as well as development and diffusion of environmentally friendly technologies. In short, it's a responsible choice in environmental matters. Sustainable development requires that societal needs are met when business and industry supply goods and services at competitive prices, improved quality of life and efficiency in management of the natural resources.

Chapter six of the policy talks of environmental quality and health. A clean and healthy environment is very crucial. Ionizing agents and the presence of harmful substances to the environment is a threat to the ecosystems. Pollution to the environment should be a given specialized attention. Diseases such as malaria and other waterborne diseases can be caused by pollution to air and water. Water supply, sanitisation and proper management of waste is very crucial. Though the manifestation of this ailment may take time from the time of exposure , proper measures should be put in place. To achieve environmental health and quality, the policy proposes to; promote Environmental Health Impact Analysis as a component of EIA for projects, occupational health enhancement and capacity building promotion and safety services. To address issues around excessive waste generation as a result of unsustainable production and consumption patterns, the government commits to an integrated waste management strategy , economic incentive to companies that have implemented waste management and put in place facilities for cleaner production . The policy goes ahead and recognises the health and environmental impacts of outdoor and indoor air pollution. To address this the government commits to ensure air quality

standards are complied and enforcement capacity has been strengthened ,efficient non motorized polluting and alternative nonpolluting mass transportation . High noise pollution from machinery has been given a mention in the policy. To address the negative impact associated with exposure to high levels of noise, the government commits to a national strategy on noise pollution as well as strengthening infrastructure and capacity to enforce, monitor, and regulate noise pollution.

From the above policy overview, it is clear that the policy is supports integration of corporate environmental responsibility. It provides for use of clean technologies and implementation of the environmental strategies and regulations to address negative environmental impacts associated with cement mining. The challenge therefore lies with implementation of this policy by the concerned bodies such as NEMA and ARM

4.5.3 Waste Management Regulation of 2006

The regulation offers guidelines on the handling, packaging, treatment, storage and disposal of waste as required by NEMA. Under this regulation, local authorities should provide legitimate dumpsites or landfills for disposing waste in order to avoid pollution of the environment.

Waste generators are responsible for ensuring collection, segregation at source and proper disposal of their wastes. They are also responsible for minimization of waste generation through adoption of cleaner production methods such as improved production process, monitoring of product cycle and incorporation of environmental concerns in design and disposal of product. This regulation also provides guidelines for management of hazardous and biomedical wastes.

This regulation provides for integration of CER, as they require waste generators such as ARM to put in place measures for minimization of waste generated through us of cleaner production methods as well as avoid environmental pollution by proper disposal of waste through NEMA registered waste handlers.

As for cement companies this regulation require the plant operator/owner to segregates waste (hazardous and non-hazardous) by type and then disposes the wastes in an environmentally acceptable manner, to use only licensed Waste Carriers for collection of wastes and finally not to litter environment during waste transportation. From the data collected from key informants, waste collection and disposal services have been out sourced by licensed waste handler in line with waste management regulations The only challenge t is on disposal of end of life electronic devices kept

in their store since their inception. Currently the country do not have a regulation but guidelines on electronic waste disposal and management. Waste Electric and Electronic Equipment Centre is the only waste handler in Kenya licensed by NEMA to provide end-to-end management of electronic/electric waste.

4.5.4 Mining and Mineral Resources Policy 2016

The framework, principles and strategies have been set up within this policy. It provides strategies for exploitation and exploration of mineral resources for the development of social status of the country. For the current and future generation to benefit from the wealth generated from the minerals the policy offers guidelines to put in the place. It further provides safety and a healthy mineral resources development and an equitable distribution of resources and sharing of benefits to the community, county and the country at large. The policy objective is to attain a acceptable balance between mining and conservation of the environment and ensure the players within the set standard in health, safety, human rights and environmental protection. To achieve this the government proposed to put in place specific environmental health and safety legislative and regulatory framework and standards for the mining sector that are aligned with international standards and best practices. In addition, the government proposed to establish a clear legal framework, procedures and obligation pertaining to rehabilitation at mine closure by minerals holders as well as set aside an environmental deposit bond to meet rehabilitation and mine closure obligations. Despite this good policy measures, the government is yet to implement this policy fully by putting in place the necessary frameworks to enhance clean and healthy environment for all. For example, currently there is no law that compels mineral companies to rehabilitate quarries, it is a best practice in Kenya. Enactment of the deposit bond will enable government to undertake the rehabilitation incase should the mineral economies fails to do their duty. ARM now has some open quarries that need to be rehabilitated. Furthermore, the county government is yet to develop their own mining policy that is aligned to the national mining policy.

4.5.5 The Environmental Management and Coordination Act (EMCA) 1999

The Environmental Management Conservation Act is a legal framework for the management of the environment with structural and institutional framework. The act has an integration for the environmental concern in plans, policies, programmes and projects. The act offers a declaration that every Kenyan has a right to a clean environment and has a responsibility to play in

safeguarding the environment. The act established a strong framework for environmental management , this include the NEMA, the National Complaints Committee for investigating citizens complaints and the National Environment Tribunal mandated grievances and appeals against NEMA decisions on environmental licensing issues.

This act is effective for protection of the environmental and enforcement of environmental rights. However, a range of factors weakens it. They include weakness in institutional capacity of NEMA, lack of political will and inadequate funding for NEMA to fully enforce the law.

4.5.6 Mining Act 2016,

It is required in the Mining Act that all the activities of mining be in compliance with the provisions of existing land use laws, occupational health and safety laws, water right laws and protection and management of environments laws. The Act under this provisions makes it a mandate for mining license to be given only upon obtaining environmental impact assessment license, authorized environmental management plans, authorized social heritage assessments and mitigation and rehabilitation or mine closure plans.

County governments have a role under this mining act 2016 and are involved in the issuing of assent of permitting operations and surface rights, encouraging participation by community in the mining operations and also in selecting the mining sector operators. In additional the National Land Commission which is a constitutional body that is responsible of managing land in Kenya is also given the role to license mining activities particularly when such activities involve resettlement of communities and land acquisition.

Transparency and social protection is also addressed in the Act when mechanisms are developed which gives citizen a chance of having their view into the mining activities. Likewise, the acts promote the advancement of local surrounding and benefits to the community in aspect of creating employment and providing services.

The Act likewise incorporate a range of social, environmental and local content provisions that comprise of requirements of using domestically produced goods and services, submitting detailed mine closure plans and engaging business or companies owned by Kenyan citizens. Applicant of mining licenses ought to issue an environmental bond or a guarantee enough to cater for costs related with the environmental implementation and rehabilitation obligations. It is also required

in the at that mine should invest in and enables social responsibilities activities with the local communities, that consist of knowledge transfer, capacity building and prioritizing Kenyan in offering employment in the mining projects.

If successfully implemented, this Act will help Mining sector have its influence in promoting Kenya to a country that is prosperous and competitive, improving the livelihood of all its citizens by 2030 with an environment that is clean and secure.

4.5.7 The Draft Environmental Management and Co-ordination (Extended Producer Responsibility) Regulations, 2020.

The object and purpose of these Regulations is to establish mandatory extended producer responsibility schemes for all products and packaging at all stages of their life cycle in order to improve environmental sustainability by (a) reducing pollution and environmental degradation (b) promoting a circular economy (c) reducing waste at the source; e) Environmentally friendly product designs and packaging, as well as cleaner manufacturing techniques (f) Promotion of a culture of environmental consciousness and responsibility from production to final safe disposal; and (g) Inclusion of the environmental costs of end-of-life management of a product in the sale price of a product so as to promote adoption of designs that reduce environmental impacts of products.

These Regulations shall apply to all extended producer responsibility compliance schemes both individual and collective as well as producer responsibility organisations for the products that have been identified by the Authority

The extended producer obligations include reducing pollution and environmental impacts of the product that they introduce in the market. Secondly, putting in place circular economy initiatives and any other measures to reduce impacts of their product on health and environment. Thirdly, designing products and packaging materials that minimize waste facilitate reuse, recycling, recovery and are environmentally friendly at their end of life and lastly, the producer assumes responsibility for taking back, collecting and treating the waste resulting from the products that they introduce in the market.

If this regulation is passed into law, it will contribute significantly to clean and health environment in that it will drive reduction in waste disposal, increase resource conservation, increase recycling as well as encourage eco-friendlier product designs in cement and other related manufacturing industries.

4.5 8 Occupational Safety and Health Act 2007

The OHS Act aims on protecting the safety, health and wellbeing of employees in their jobs. It also makes an effort to guarantee that work activities do not harm the health and safety of the general population. Under the Occupational Health and Safety Act, all employees have three basic rights: The right to be informed about health and safety risks. The right to be engaged in decisions that affect their health and well-being. The ability to refuse labor that puts their health and safety, as well as the health and safety of others, in jeopardy.

In the case of the ARM facility, the legislation imposes general obligations on the plant operator in terms of occupational health and safety. These responsibilities include conducting S&H risk assessments, S&H audits, notifying of accidents, injuries, and dangerous occurrences, registering the workplace with the DOHSS, maintaining workplace cleanliness, avoiding overcrowding and providing ventilation, ensuring safe operation of machinery, including all prime movers and transmission equipment, and statutory. In accordance with the OSHA, 2007, the Plant as provided a first aid boxes in respective workstations, provided PPEs to the employees, installed firefighting equipment, provided sanitary conveniences (toilets) to the employees, maintains cleanliness, ensure safe operation of machinery and undertakes statutory examination of machinery.

4.5.9 National Climate Change Policy 2016

The policy focuses on the interconnection amongst climate change and sustainable national development. Climatic changes in a negative way affects the main sector which are paramount both to the society and economy comprising of; agriculture, environment, livestock and fisheries, water and forestry, extractives, trades among others. It is therefore elaborated in this policy the intervention measures which can aid in the attainment of low carbon climate resilient development goal. In Kenya the extractive industry is quickly emerging to a possibly high contributor to the economic growth. The have been discoveries of highly valuable resources for example titanium,

coal and petroleum. Extraction of natural resources lead to and is susceptible to climatic change. Large quantity of water and energy is used in the extraction of resources for example minerals and petroleum and they discharge GHG emissions. Exposing sensitive infrastructure for instance pipelines to extreme weather events could lead to disasters which have a major negative effect on the Kenyan environment, people, property and at large the economy. Extractive industries investments in infrastructure have to adopt climate proofing so as to safeguard value for money. There is need for Kenya to set up regulatory mechanism which will make sure extraction of resources contributes to low carbon climate resilience development.

Carbon asset mechanism and climate finance flows provides a chance of accessing new and additional levels of funding. For government, this implies getting to worldwide financing for goal-oriented climate resilient and low emission development programmes. For the private sector this involves coming up with insurance and financial services, exploiting new green economy opportunities, participating in project to generate carbon credits for sale in international markets. However, there are few companies in the country that have taken advantage of the opportunities offered by climate change policy. ARM has not aligned its Environment policy, activities with the climate change policy, and hence they need to align and tap on the opportunities presented by climate change policy and Act.

4.5.10 The Air Quality Regulations of 2014

This regulations centers on ensuring that there is clean and healthy ambient air through using measure to prevent, control and abate air pollution. This regulation accommodates the foundation of standards on emission as laid down in the Environment Management and Coordination (EMCA) Act of 1999. Unless it is direct otherwise by the Authority, the proponent of the project are mandated to perform an air quality audit upon which they ought to submit the report to the authority within six month upon end of a calendar year. In case of emission of pollutants beyond the set out limit in the Seventh Schedule, the project proponent must control the pollutant through use of air pollution control systems as per the ninth Schedule or through use of technology that the Authority approves. From the interview with Director NEMA Kilifi, ARM activities causes air pollution a matter that was also raised during the focus group discussion and a such there is need for ARM to put in place measures to contain their air pollutants by installing electrostatic precipitators, tarmacking the road between the quarries and the factory as well as putting concrete

on the cement loading zone . It was also noted that ARM do not submit the air quality reports on annual basis in a form of environmental audits to NEMA headquarters in Nairobi. Therefore, there is need for ARM to comply with the regulation and submit the air quality reports as prescribed by the regulation. There is also need for NEMA to enforce the regulation fully as well as having random control air quality audits for cement companies in the area. The other challenge that was noted was that the NEMA office lacks the necessary tools for air quality measurement. There is need for the government to provide budget for this to enable the Authority discharge its mandate to the fullest.

4.5.11 Noise and excessive vibration pollution control regulation, 2009

In the requirement of the regulation, the project owned who is conducting mining, demolition, quarrying work and construction to make sure that the levels of vibration will not exceed 0.5 centimeters per second beyond any source or 30 meters from any moving source. It additionally specifies that the significant lead agency will guarantee that quarries and mines are situated in regions assigned and at the very least 2km from human settlement. Any individual wanting to participate in mining, construction, demolition or quarrying work ought in the period of environmental assessment establish the required measures in the specification and plans so as to reduce or eliminate negative effects of mining quarry noise or construction. The project proponent to include the required reduction measured in the specification and plans. However, despite ARM obtaining the necessary noise permit from NEMA and county government for blasting, the county government of Kilifi and NEMA indicated that noise is major issue from the ARM activities and the community has been complaining a lot about this. There is need for NEMA and County to jointly work to ensure that ARM operate within the license condition that's from 8am to 5pm. It was noted from the focus group discussion that ARM sometimes operate the blasting beyond the recommended timelines. Furthermore, there is need for ARM to put in place noise cancellation measures to protect the community from noise emanating from blasting activities.

4.5.12 Environmental Impact Assessment and Audit regulation (amendment) 2016

Environmental Audit (EA) is the methodological documented, objective and periodic assessment of how operations of continuing project to establish the level at which these programs and activities comply with the authorized environmental management plan of the specified project and sound

environmental management practices. An exhaustive EA encourages a healthy and safe environment in all the phases of undertaking an operation same as decommissioning. The EA goal is determining if the owners of the project are conforming to the environmental requirement together with enforcing laws. ARM activities are subject to environmental audit as stipulated in the second schedule of the EMCA Act. The company is required to undertake environmental audits on annual basis and submit the same to the NEMA for review and decision-making. From the data collected in the field, it was established that ARM conducted the EA in 2014 and since then, they have not conducted another one as required by the law. This indicates failure by NEMA to enforce this law as well as non-compliance of the law by ARM. If environmental audit done well and in the frequent required by the law, it will promote safe and healthy environment

4.5.13 Water Quality Regulations, 2006

The Water Quality Regulations is applicable to water that is consumed for industrial, agricultural domestic and recreation purposes and more so water that is used for animals and fisheries. The purpose of the regulations is to prevent non-compliant wastewater from being discharged into the environment. In accordance with the laws' Third Schedule, the rules also provide norms and procedures for the discharge of poisons, toxins, toxic, radioactive waste, or other pollutants into the environment.

Standards for wastewater discharge into sewers and the aquatic environment are included in the regulations. While sewerage service providers are responsible for regulating discharges into sewage lines based on the prescribed standards, NEMA regulates all effluent emission into the environment.

No effluent from sewage treatment facilities, industry, or even other point sources should ever be discharged into the environment without first obtaining a valid NEMA effluent discharge license. Regardless of whether the water resource was polluted before or after the Environmental Management and Coordination Act (EMCA) was established in 1999, everyone should refrain from any behaviors that overtly or implicitly cause water pollution.

This regulation requires ARM to refrain from any activity that could pollute water, to not discharge any liquid, gaseous, or solid into a water resource that could pollute it, to obtain a valid effluent discharge license before discharging effluent into the environment, to obtain an EIA license before abstracting ground water, and to refrain from any activity that could harm the

environment.

This legislation requires ARM to avoid any action that might pollute water, not to release any solid, gaseous or liquid to sources of water that could pollute it, and to get a valid waste discharge license before releasing waste to environment.

To this end, it is clear that integration of CER in cement production process is fully supported by the existing environmental laws and policies. However, it is limited by shortcoming in organizational capacities of government institutions that are authorized to implement these laws, absence of political will and lack of financing of government institutions to enable enforcing of these laws. This challenge was evident in the data collected for example, it was established that NEMA was not able to do periodic or regular facility inspection because of limited human and financial resources. Same to ARM, where they are not able to implement strategies aimed at addressing CER challenges due to budgetary constraints. ARM has registered losses for 12 months to December due to the increased costs emanating from expensive short-term loans.

To address these challenges, self-regulations by corporates signing up for UNGC Code of ethics has been seen as more efficient in realization of integration of CER as they complement government regulations. Business for the business environment blog, on 20 February 2018 acknowledged that self-regulation presents cost savings and efficiencies which may be advantageous to the government and business. Compared to the command and control rules which are often expensive and burdensome in complying with the benefits that organization due to regulation are reasonable and predictable whereas as the regulator advantage for enforcement methods that are more efficient and enables them in managing scarce resources.

4.5.14 Green Economy Strategy and Implementation Plan 2016 – 2030

Green Economy Strategy and Implementation Plan 2016-2030 looks at binding social economic constraints towards attainment of Kenya's vision 2030. It is geared at guiding national government, county governments, private sector, society and other actors to adopt development pathways with green growth, cleaner environment and higher productivity around sustainable infrastructure, building resilience, sustainable natural resources management, resource efficiency and social inclusion and sustainable livelihoods.

Green economy include all activities or actions that help reduce carbon emissions into the atmosphere, which is a major component of greenhouse gases that exacerbate global warming thus causing climate change. in addition , green economy upholds the efficient use of natural resources and energy at the same time enabling economic growth that supports creation of job opportunities and improvement of livelihoods thus alleviating poverty.

Green Economy departs from past economic growth, largely driven by energy obtained from the combustion of fossil fuels. The use of fossil fuels results in emissions of greenhouse gases more so carbon dioxide into the atmosphere leading to global warming. This economic growth known as “brown economy” has led to the over-exploitation, depletion and degradation of natural capital namely, natural resources and ecosystem goods and services. This has triggered widespread environmental degradation without allowing sufficient time for regeneration of the natural resource capital base

Kenya just like other countries in the world has been implementing sustainable development and embracing eco-friendly technologies. To boost efficiency in the use of natural resources and energy, the industrial sector has embraced cleaner production technologies through technical assistance by the Kenya National Cleaner Production Centre. The Centre has built capacity of industries in improving efficiency in the status of production systems in order to reduce wastage of raw materials and energy aimed at minimizing waste generation at source. In Kenya, green initiatives are spread across public and private sectors of the economy. It is therefore important that green economy be incorporated at all levels aimed at reducing individual carbon footprint in order to uphold sustainability.

Opportunities presented by this green economy strategy that ARM can leverage on are there. They include investing in green and renewable energy to avoid over reliance of fossil fuels that have been associated with global warming. Energy efficiency so as to reduce on energy consumption and costs as well as adopting zero waste principle through integration of waste hierarchy in its resource use through prevention, minimization, reuse and recycling of waste. There are areas that ARM were found to be lack and the reason given was that transition to green economy especially the renewable energy is capital intensive more so at the initial phase of transformation where upfront capital for clean technology is very high.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The study was aimed at assessing the integration of corporate environmental responsibility at ARM cement production processes with four key objectives which were to establish how the ARM has integrated CER, challenges faced by ARM in implementing UNGC commitment, how it can enhance integration of CER in its operations, and examine the adequacy current policy and regulatory framework. The study established that ARM has a wide range of CER measures in set up in addressing the environmental effects from their operations. The policy commits to protect environment and human health through improving and maintaining the quality of environment in partnership with the communities; adoption of environmental management system; adopt air pollution prevention approach to all its operation; minimize waste generation as well as communicate to its workers and all stakeholders about its environmental performance. Secondly, the company has established and maintained a tree nursery, which has seedlings, which are

provided to the community members and schools along the road on the forestation programme. The trees assist in trapping of the dust from the road transportation wake, act as windbreakers, and beautify the environment among other benefits. These trees are supplied at no cost to the schools and individuals. Thirdly, the dust level in the three quarries is controlled by use of modern explosives and micro time delay explosives, which fracture the stone with minimal dust and noise. Fourthly, the coal mill stack uses electrostatic precipitators (ESPs) and cyclone to trap particulates, while measurement of exhaust gases, velocity through the duct, SPM values are continuously measured and data stored within the ARM systems. Fifthly, the manufacturing, office and domestic waste is handled in accordance with NEMA waste management procedure that outlines guidelines for waste management and disposal. Sixthly, the all-weather road between the three quarries and factory is sprinkled with water every day to reduce dust emissions. Lastly, the company has invested in a number of community projects such as building of dispensaries, police post and supply of fertilizer to the farmers in the area.

The study established that CER integration at ARM was driven by safety of the employees and communities living within and around ARM operation area as well as the company sustainability. Some of the benefits the company derives from integrating CER include cost cutting, improved compliance with various statutory regulations for cement industry as well as improved safety and well-being of the community and employees and improved relationship between the company and the local community. However despite above CER measures in place, the study established that ARM was facing quite a number of environmental issues .This include: overdependence on coal and oil to power by the plant due instability of the electricity power in the area, high noise and vibration at the mines, control of fugitive dust, high cost of end stack emission filter bags, absence of buffer zone between the company and the nearby residential area, as well as unsustainable watering of the all-weather roads from quarry to the plant

The second objective was on the challenges faced by ARM in implementing UNGC commitment. in this objective the researcher established that various challenges encountered by the company. This include stringent regulations, need for substantial capital outlay, use of outdated technologies, poor electricity transmission and distribution infrastructure and negative effects of politics

On additional measures that ARM can implement to enhance integration of CER, the researcher established that there exists huge opportunity for ARM to implement the following measures to enhance its CER. These include; upgrading its electronic precipitators to curb stack emissions., pavement of the all-weather road between the factory and the three quarries to reduce of dust emissions, assumption and execution of environmental management system to help them track and monitor their environmental performance , use of alterantive materials such as waste solvents, waste plastics or end of life tyres as source of energy to power the plant , the acquisition of the buffer zone and planting of trees between quarries and the nearest residential areas so as to curb on sound and dust emissions from the quarry activities and lastly is the installation of conveyor belt between the factory and quarries to transport raw materials hence curbing on noise and air pollution .

On the adequacy policy and regulatory framework, the research established that there existing a vast ray of policies and regulatory framework support the integration of Corporate Environmental Responsibility. These include ARM Environemnt Policy, National Environmental policy 2015, National Climate Change policy 2016, Kenya Constitution of 2010, Mining and Minerals policy 2016, Public Health Act 2012, Environmental Management and Coordination Act 1999, Environmental Impact Assessment and Audit Regulation 2003, Air quality regulation 2014 , Noise and Excessive Vibration Pollution Regulation 2006, Waste Management Regulation 2006, Mining Act 2016, draft Extended Producer Responsibility Regulation 2019, Draft National Sustainable Waste Management Policy and Regulation 2019 and Draft Deposit Refund Regulation 2014 . However, the effectiveness of these regulations and polices is limited by shortcoming in organizational capacities of government institutions that are authorized to implement these laws, absence of political will and lack of financing of government institutions to enable enforcing of these laws. To address these limitations there is need for companies to embrace self-regulations, government to provide more funding to implementing agencies such as NEMA, provision of more staff to NEMA to enable them do regular facility inspections

5.2 Recommendations

To ensure integration of corporate environmental responsibility at ARM cement production process and other corporates in the country, the study recommends the following interventions:

- a) One for the ways of achieving integration of CER by corporates is through regulatory compliance. Therefore, there is need for full enforcement of the existing national policies through regulations by the government and fine imposed on operations in contravention.
- b) Government to put in place policy instruments such tax exemptions for social or philanthropic investments, Internet platforms and award schemes to increase uptake of CER, training and capacity building for all enterprises, and providing funding for research on CER. This will go a long way in encouraging companies to take up CER.
- c) Government through its legislative arm, parliament to legislate bills geared towards promotion of corporate environmental responsibility. Some of these bills are the Extended Producer Responsibility Regulation, National Sustainable Waste Management regulation that advocates for circular economy and deposit Refund Bond Regulation that will see project owners take responsibility for their activities that may impact negatively on the environment.
- d) Finally, this study recommends the need for UN global compact to undertake compliance audit of its members to establish if the members are implementing what they signed up for and also provide support where need. UNGC should also establish an award scheme to be given to members to display exemplary work in CER. This will encourage members to put more effort in their commitment as well as attract more members into the network.

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APPENDICES



UNIVERSITY OF NAIROBI

**INTEGRATION OF CORPORATE ENVIRONMENTAL RESPONSIBILITY IN
CEMENT PRODUCTION PROCESSES: A CASE OF ATHI RIVER CEMENT MINING
IN KILIFI COUNTY**

**KEY INFORMANT QUESTIONNAIRE FOR NATIONAL ENVIRONMENT
MANAGEMENT AUTHORITY (NEMA)**

This research seeks to examine gaps in policies on integration of corporate environmental responsibility in cement manufacturing processes.

SECTION A: KEY INFORMANT PROFILE

Key informant's name and Rank	
Key informant's profession	
Key informant's experience in the profession (<i>in years</i>)	

SECTION B: POLICY AND LEGAL NEEDS

1. Is Corporate Environmental Responsibility (CER) a policy requirement in Kenya?

YES () NO ()

2. Do you believe Kenya's existing legal and policy frameworks are enough to facilitate full CER implementation?

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3. What changes, according to your opinion, should be made to the legal and policy frameworks at the national and county levels to facilitate CER integration?

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4. In your opinion, do you think integration of CER by cement companies in their day to day activities can contribute to a clean and healthy environment?

YES ()

NO ()

5. What are the key drivers to integration of environmental issues into your cement production processes?

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6. In your opinion do you think cement manufacturing companies including ARM are taking responsibility for its environmental activities?

YES ()

NO ()

If your answer is yes, please tell us how they integrated environmental responsibility in their day to day activities

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7. Based on the above response, do you think ARM has done enough to address environmental impacts of its activities?

YES () NO ()

If your answer is no, please propose some of the environment initiatives or programs you would like them to put in place?

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Thank You!



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**INTEGRATION OF CORPORATE ENVIRONMENTAL RESPONSIBILITY IN
CEMENT PRODUCTION PROCESSES: A CASE OF ATHI RIVER CEMENT MINING
IN KILIFI COUNTY**

KEY INFORMANT QUESTIONNAIRE FOR KILIFI COUNTY GOVERNMENT

This research seeks to examine gaps in policies on integration of corporate environmental responsibility in cement manufacturing processes.

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5. What action have these authorities taken to address these complaints?

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6. Have all these actions addressed the complaints fully?

(A) Yes (B) No

7. What challenges were encountered by the county government in addressing the community complaints?

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8. What more can be done by Kilifi County Government, ARM and NEMA to ensure that the cement manufacturing activities do not cause harm to human health and environment?

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Thank You!



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**INTEGRATION OF CORPORATE ENVIRONMENTAL RESPONSIBILITY IN
CEMENT PRODUCTION PROCESSES: A CASE OF ATHI RIVER CEMENT MINING
IN KILIFI COUNTY**

ARM KEY INFORMANT QUESTIONNAIRE

Dear Respondent,

My name is Valentine Cheruiyot. I am a graduate student undertaking Masters of Arts Degree in Environmental Policy at the University of Nairobi. I am conducting a research entitled '*Integration of corporate environmental responsibility in cement production processes, a case of Athi River Cement mining in Kilifi County*'. The purpose of this research is to collect information for purely academic purposes. All information collected during the research will be confidential and will be used for research purposes only. Your participation in this research project is completely voluntary.

You may decline altogether or leave blank any questions you don't wish to answer. Please answer the following questions to the best of your knowledge and ability.

Thank You.

ARM QUESTIONNAIRE

SECTION A

Name	
Position	
Experience in the profession (<i>in years</i>)	

SECTION B: Integration of Corporate Environmental Responsibility

1. Do ARM have Environment management policy in place?

YES ()

NO ()

2. Is the policy signed and supported by the senior management?

YES ()

NO ()

3. What are the policy commitments?

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4. What are the key drivers to integration of environmental issues into your cement production processes?

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5. What corporate environmental programs has ARM put place to address the environmental impacts associated with its day to day activities?

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6. What benefits has ARM obtained from integrating CER in activities?

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7. What challenges is ARM currently facing as it integrates environmental responsibility in its cement production processes?

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8. In your opinion, how can these challenges be addressed?

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9. Are you are aware of the complaints from your neighbouring communities members on the impacts of your activities on their health and Environemnt?

(Yes)

(No)

10. If your answer is yes, what measures have been put in place to address the above community complaints?

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11. What environmental initiatives or programs does ARM intend to implement in the future to mitigate adverse impacts of your activities on the environment and people?

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12. What support would you like to get from county and national government in integrating environmental responsibility in your operations?

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Thank You!



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**INTEGRATION OF CORPORATE ENVIRONMENTAL RESPONSIBILITY IN
CEMENT PRODUCTION PROCESSES: A CASE OF ATHI RIVER CEMENT MINING
IN KILIFI COUNTY**

FOCUS GROUP DISCUSSIONS

SECTION A

1. Number of the respondents in FGD
2. Gender: Numbers of

- Male ()
- Female ()
- Youth ()
- 3. Average Age of FGD respondents
- 4. Marital status in mnumbers
 - Married ()
 - Divorced ()
 - Separated ()
 - Single ()
- 5. Education level attained by respondents (numbers)
 - Primary level ()
 - O-level ()
 - A-level ()
 - Vocational Training ()
 - College diploma ()
 - University Degree ()
 - Other Specify.....
- 6. How long have you been residing in this area?
 - Less than one year ()
 - Less than three years ()
 - 3-5 years ()
 - Over 5 years ()

SECTION B:

- 1. What is your opinion about the activities of ARM?

- 2. Have ARM activities affected the health of the community and the environment

3. What measures has ARM put in place to address impacts of its activities on human health and environment?

4. What actions have NEMA and County taken to address impacts of cement activities on human health and environment?

5. Are these measures adequate?

6. How has the community been involved in addressing impacts of ARM activities on human health and environment?

7. What more can ARM, County and NEMA do to address the negative impacts of Cement manufacturing on human health and environment?

PHOTOS



Figure 3: Health facility servicing both workers and community members



Figure 4: Mbugoni Primary school constructed by ARM

