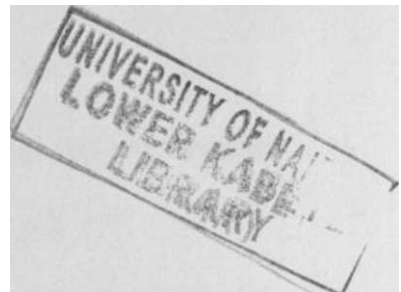


**A STUDY ON THE FACTORS AFFECTING THE UPTAKE OF CARBON  
FINANCE INVESTMENTS OPPORTUNITIES IN KENYA**

**BY**

**MARTIN M RIUNGU**

**D61/60215/2010**

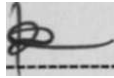


**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS  
ADMINISTRATION DEGREE AT THE UNIVERSITY OF NAIROBI**

**NOVEMBER 2012**

## DECLARATION

This project is my original work and has not been presented in any other university or college for examination purposes. No part of this project may be reproduced without the permission of the of the author and or the university of Nairobi



^ (VTvJ ) I—

**MARTIN M RIUNGU**

**DATE**

## DECLARATION BY SUPERVISOR

This project has been submitted as part fulfillment of the requirements for the award of a MASTER IN BUSINESS ADMINISTRATION degree with my approval

**JAMES NG'ANG'A**

**SUPERVISOR**

**DATE**

## **DEDICATION**

This project is dedicated to my loving wife, Catherine, my children Darrel and Bianca for always staying awake to give me a warm embrace every night I came home late from school, and my late grandfather Zakayo N'kanata M'puri for teaching me how to be a gentleman.

## ACKNOWLEDGMENTS

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In a very special way, I am indebted to the all-powerful Almighty GOD for all the blessings and graces He has showered in my life. I am deeply obliged to my supervisor James Ng'ang'a, for his exemplary guidance and support without whose help; this project would not have been a success. I would also like to appreciate the support and guidance given by Baimwera during this study period. To Kenyoru I say thank you for assisting in the proof reading and formatting of this research paper.

Finally, yet importantly, I take this opportunity to express my deep gratitude to my family for the unending support, care and love. Cate my love and companion, you have been a confidant and a solid rock in my life, you remained steadfast and ever understanding during my long hours of absence from home as I undertook this course. To my son and friend Darrel, you are a constant source of motivation to aim higher in my life; my daughter Bianca, you are the bundle of joy in my life, you give meaning to my life. To my mother Elisheba Kanugu and my dad Andrew Riungu, the two of you planted in me the seed of education and nurtured it to maturity. Finally, I say thank you to my old friends and colleagues Dorcas and Hannah for always being there to support me.

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## LIST OF ABBREVIATIONS

A/R- Afforestation/Reforestation

ACPC - Africa Climate Policy Analysis Centre

AfDB - African Development Bank

AFOLU -Agriculture, Forestry and Other Land Uses

CCBA- Climate, Community and Biodiversity Alliance

CCFF- Climate Change Financing Facility

CDM -Clean Development Mechanism

CER- Certified Emission Reduction

DNA - Designated National Authority

DOE- Designated Operational Entity

FDI -Foreign Direct Investment

GEF -Global Environment Fund

GHG -Greenhouse Gas

MDG- Millennium Development Goal

NGO- Non-Governmental Organisation

REDD- Reducing Emissions from Deforestation and Degradation

UNFCCC -United Nations Framework Convention on Climate Change

VCS-Voluntary carbon standard

## **ABSTRACT**

The global challenges of growth, urbanisation, scarcity and environmental change have become the key strategic drivers for business leaders in the present world. Governments and business constituencies are shifting from thinking of climate change and resource constraints as environmental problems to economic ones related to the sharing of opportunity and costs which present opportunities for sustainability if appropriate actions are taken. Over the last decade we have witnessed significant growth in non conventional financial instruments including carbon finance products. While opportunities for such sustainable solutions are indeed a reality in the developed economies, for countries in the Sub-Sahara region like Kenya these opportunities are considerable in theory; to date Kenya and other countries in Sub-Saharan Africa have missed out. In the context of the clean development mechanism, for example, the region's current share in the project pipeline was only 1.4 percent only 53 out of 3,902 projects or nine times smaller than its global shares in GHG emissions as at 2010. Despite the existing huge opportunity in the carbon finance market, the Kenyan companies have not awakened to the reality and moved in to tap the opportunity.

The purpose of this research was to undertake a review and analysis of the factors contributing to the low uptake of carbon finance opportunities in Kenya. The study design used was exploratory factor analysis to get in sights and examine how underlying factors influence the uptake of CF investment opportunities.

The research data collected related to responses from the target population on factors that contribute to uptake of carbon finance investment opportunities analyzed to give insight on the most prevalent factors and their rankings. The study further sought to

explain the relation of the most prevalent factors namely the high initial cost of investment, risk and return and information gaps on valuation and certification of CF projects. A multivariate regression model was applied to determine the relative importance of each of the three variables in relation to the study.

The research found that among the factors that are contributing to low uptake of carbon finance opportunities the most prevalent were: information gaps on certification and measurement of projects, associated risks of CF projects and initial investment cost. It was interesting to note that the three factors had a coefficient of determination with a value of 0.7524 implying that the three variables explain 75% of variation of uptake in carbon Finance investment opportunities in Kenya.

Among the three factors analysed information gap had the highest factor loading of 0.8 while High initial cost had the most statistically significant coefficient as indicated by the T ratio of 1.459. The study also deduced that investment uptake of CF projects was highly correlated to initial cost of investment and the associated risks and return posting a coefficient of 0.866 and 0.816 respectively

The study findings will be useful to the government as a reference for policy formulation in steering investments in CF, development agencies and academic community for future research

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of study

Governments and business constituencies are shifting from thinking of climate change and resource constraints as environmental problems to economic ones related to the sharing of opportunity and costs which present opportunities for sustainability if appropriate actions are taken. This transformation will bring with it huge shifts in terms of regulation, markets, consumer preferences, the pricing of inputs, and the measurement of profit and loss all of which will impact business. (World business council, 2010)

Environmental consciousness is taking its shape in various dimensions in today's complex business world. The financial sector has become increasingly concerned about how climate change might affect its investments and whether it should invest in efforts to mitigate such risks or to help clients address risks associated with climate change (JP Morgarn 2008). In addition, the private sector has begun considering climate change more systematically as the value of their products is judged according to their impact on GHG emissions.

Sub Saharan Africa has been hit the most; rising oil prices, adverse effects of global climate change, political unrest, among other issues have had adverse effects on these economies. The recent uprisings in the horn of Africa and the Middle East are clear manifestations on the existing challenges in management of the natural resources for sustainable development. In particular Kenya's economy has been navigating rough

economic waters, accelerated by short-term shocks. For instance in the year 2011 the Kenyan economy depicted a fundamental weakness in the economy by exposing the structural loopholes which was manifested by the depreciating Shilling, reaching an all time low against the US Dollar in October 2011.

The World Bank argued that high international food and fuel prices, the drought compounded by conflict in the Horn of Africa, the Euro crisis, the inefficiencies in the agricultural sector as some of the major causes of this crisis (World Bank, 2011) What is clear from all this realities is that demand and supply for energy has always and will continue playing a key role in the performance of the world economies and increasing the quality of life of the world dependants.

Sustainable procurement has already helped put sustainability concerns on major businesses' agendas. In Europe, for example, buyers are willing to pay a higher price for Brazilian soy and beef products when producers can prove they own and manage their lands according to rules setting an 80% forest cover standard in the Amazon region of Mato Grosso (Nepstad et al. 2008). These examples represent just a few of the many opportunities to support forest-related climate mitigation actions that also provide sustainable development benefits.

The five mega issues which are impacting the behavior of companies and in turn their strategies are the Climate Change, Pollution/Health Consciousness, Globalization backlash, Energy Crunch and Erosion of Trust. The finance sector is impacted because the world commands a hefty price for Carbon dioxide emissions and greenhouse gases (GHGs). This is the major reason why today's environmental issues elate to the level of

corporate financial strategy and policy involving CEOs, CFOs and BOD of companies. Hence, an understanding of carbon finance (a specific dimension of environmental finance), role of the financial services sector (banking, insurance & investments) and carbon trading (as other commodity trading) in climate/commodity exchanges by environment-conscious stakeholders in various industry value chain has become critical for business leaders.

Carbon finance is a way to ascertain the future revenues from the sale of the CERs, typically by setting Emission Reduction Purchase Agreements (ERPAs), which commit both the CDM project developer and a CER buyer (e.g., a carbon fund) to such transactions. As a result, CF tools are a bridge between CDM projects and the financial carbon markets, allowing CDM project developers to reflect the value of the CERs in their business plans. Since the signing of the Kyoto protocol and the emergence of carbon finance as a key integral part of capital movements, financial institutions have developed a number of carbon based insurance products, derivatives and structured products in order to manage and transfer risks and costs of carbon emissions and get more sustainable profits. Carbon emissions right has become a financial instalment, as more financial capital is being involved in the industry, the price is becoming more and more decided by financial markets

As of end-2007, proceeds from the sale of emission credits from CDM projects amounted to about \$7.4 billion, a 50% increase in value over 2006, triple the value in 2005, and representing credits on 537 million tones of carbon dioxide-equivalent (CO<sub>2</sub>-e). The overall carbon market has risen in leaps and bounds, reaching \$60 billion in 2007 or six

times its value in 2005 and culminating to 142 Billion in 2010 (Source The World Bank). Despite Africa's growing participation in the carbon market, African projects accounted for only 3% of CDM projects at the end of 2006 and 5% at the end of 2007 and 2% as of **2010**.

Although researchers have provided evidence that CDM delivers a certain degree of development dividends by providing finance for the diversification and increased reliability of energy supply, Critics have argued that CDM would have minimal impact on sustainable development given the high transaction costs that inhibit investor interest. (World Bank 2010)

At the policy level, the nature and scope of the carbon investment market is changing rapidly as we see more of the cost of carbon emissions being integrated gradually into the world economy.

## **1.2 Statement of the Problem**

Over the last decade we have witnessed significant growth in non conventional financial instruments including carbon finance products recently created by the climate investment funds. These and other innovative instruments can help to channel the additional funds needed for investing in new and existing generation assets which can provide the countries' energy solutions for sustainable socioeconomic development. Because of global concern with climate change, it is expected that carbon markets will develop more rapidly and with deeper financial backing than other sectors of financial assets. As of end-2007, proceeds from the sale of emission credits from CDM projects amounted to



about \$7.4 billion, a 50% increase in value over 2006, and triple the value in 2005. The overall carbon market has risen sharply over the past few years, reaching \$60 billion in 2007 or six times its value in 2005. (World Bank, 2010)

In the year 2007 traders bought and sold about \$60 billion worth of emissions allowances, mostly in Europe and Japan. If, as expected, regulation comes to the U.S, it has been argued that the carbon market for US will be worthy \$1 trillion annually by year 2020. (Ganther,2008). In the recent past we have witnessed a rush by investment banks, utilities, industrials, and hedge funds of major blue chip companies in Europe and Japan among them GE, Goldman Sachs, J.P. Morgan Chase, and AES into the business of carbon finance. Researchers have tried to define the key factors promoting and hindering investments in the carbon market, for instance in Europe studies have been done to investigate presence of outliers in the carbon prices. The study concluded that there was significant volatility of carbon prices attributed to growing uncertainties in post-Kyoto international agreements, which in effect increase the associated risk of such an investment (Chevallier, 2011)

In Asia studies by Mei Ling on harnessing carbon markets to power South East Asia clean development projects concluded that the region was most hit by climate change and hence needed to develop funds for mitigation and adaptation and carbon markets can be a source for this funding (Mei Ling 2011)

Jannelle argues a case for complementarity and expertise information, institutions and services and complementarity of market systems to develop the carbon market in New York and London. (Jannelle 2009)

While opportunities for sustainable solutions through carbon finance trade investments are indeed a reality in the developed economies, for countries in the Sub-Sahara region like Kenya these opportunities are considerable in theory; to date Kenya and other countries in Sub-Saharan Africa have missed out. In the context of the clean development mechanism, for example, the region's current share in the project pipeline was only 1.4 percent only 53 out of 3,902 projects or nine times smaller than its global shares in GHG emissions. Out of these projects only 4 are in Kenya. Africa's share of CDM transactions is still relatively low with 5% in 2007. Despite the existing huge opportunity in the carbon finance and the ever growing opportunity of (USD 140 billion as at 2010) the Kenyan companies have not responded with appropriate zeal to tap the opportunity and cushion against the ever raising financial pressure. Currently there are only four projects harvesting carbon credits in Kenya with three being in energy and two on land use with a total value of less than 1 million dollars.

This study sought to investigate factors contributing to uptake of carbon finance investment opportunities by the Kenyan companies and their relative importance. The study sought to answer the following:

- a) Do business view carbon finance as an alternative viable investment options to channel funds?
- b) What are the factors contributing to uptake of carbon finance, investment opportunities in Kenya?
- c) What are the major challenges affecting the entry of Kenyan companies towards tapping of the funds from the climate investment fund on carbon finance

## **1.3 Research Objectives**

### **1.3.1 General Objective**

The objective of the study was to undertake a review and analysis of the factors contributing to low uptake of carbon finance investments opportunities in Kenya, describe and explaining the main challenges affecting investments in carbon related projects and benefiting from the climate investment carbon fund.

### **1.3.2 Specific objectives**

To meet the above broad general objective the research sought to meet the following specific objectives.

- a) To find out the factors contributing to undertaking of carbon trade investment opportunities in Kenya, and
- b) To find out why the corporate companies have had a low response in tapping the benefits of the existing climate investment fund.

## **1.4 Significance of the Study**

The study will be used by government in policy development and also by development partners like The World Bank environmentalists and civil society in bring to picture the context of the real issues facing the carbon market and thus focus resources towards the right direction. In addition the study will be useful to academicians since it will offer the base for future research on the topic within the Kenyan context. The study will also be useful to the private sector in earmarking the available opportunities that can be exploited in the Kenyan market.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

Since the signing of the Kyoto protocol and the emergence of carbon finance as a key integral part of capital movements, financial institutions have developed a number of carbon based insurance products, derivatives and structured products in order to manage and transfer risks and costs of carbon emissions and get more sustainable profits. Carbon emissions right has become a financial instrument, as more financial capital is being involved in the industry, the price is becoming more and more decided by financial markets.

In theory Carbon finance includes all financial transactions which reduce carbon emissions, carbon emissions rights and its derivatives transactions, investment or speculative activities, the investment and financing activities on low-carbon energy projects and the associated security, advisory services and related activities (Zeng 2011).

#### 2.1 Definition of key terms

**Greenhouse gases** are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted **by** the Earth's surface, the atmosphere and clouds.

**Kyoto protocol-** Kyoto Protocol to the UNFCCC was adopted at the Third Session of the Conference of the Parties (COP) in 1997 in Kyoto. It contains legally binding commitments **by** countries agreeing to reduce their anthropogenic GHG emissions (carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons and

sulphur hexafluoride) by at least 5 percent below 1990 levels in the commitment period of 2008-2012. The Kyoto Protocol came into force on 16 February 2005

**National appropriate mitigation action** refers to voluntary emission reduction measures undertaken by developing countries that are reported by national governments to the UNFCCC. They are expected to be the main vehicle for mitigation action in developing countries under a future climate change agreement, and can be policies, programmes or projects implemented at national, regional, or local levels

**Clean Development Mechanism** -The Clean Development Mechanism (CDM) is one of the project based mechanisms of the Kyoto Protocol on climate change. Under the CDM, buyers from developed countries can acquire Certified Emission Reductions (CERs) for each tonne of greenhouse gas that is prevented from entering the atmosphere as a result of a CDM project in a developing country.

**Certified Emission Reductions-** These are certificates issued to organisations that have developed projects in developing countries that demonstrate that they avoid GHG emissions that otherwise would have occurred (Kyoto Protocol 1998). The certification process of the reductions ensures that these emission reductions are "additional;" that is, because of less attractive economics or specific barriers (e.g., technology risk, limited access to capital, or logistic constraints), in the absence of the CDM, the less carbon intensive option would not have been preferred. An international authority issues the CERs after the emission reductions have been effectively achieved.

**Carbon markets-** These are international markets where the carbon certified emission reductions are traded. For example, if a wind power project substitute's fossil fuel fired electricity with wind based electricity, project participants can obtain CERs each year corresponding to the emissions that would have been generated from the fossil fuel plant to produce the same amount of electricity. These CERs can then be sold at carbon markets or to contracted purchasers. CERs are essentially output based revenue that will add to commercial revenue from energy sales.

**Carbon finance** is a way to ascertain the future revenues from the sale of the CERs, typically by setting Emission Reduction Purchase Agreements (ERPAs), which commit both the CDM project developer and a CER buyer (e.g., a carbon fund) to such transactions. As a result, CF tools are a bridge between CDM projects and the financial carbon markets, allowing CDM project developers to reflect the value of the CERs in their business plans. Such ERPAs mitigate risks for both the project developer and CER buyer regarding the volume and value of a future transaction.

## **2.2 Key Players in the carbon finance market.**

**Multilateral Development Institutions and Funds-** Multilateral development banks (MDBs) are broadly defined as development institutions with a banking business model. In addition to their lending activities, they can also provide development research and advisory services. They have also set up a number of dedicated climate change funds. Notably, the World Bank established the Climate Investment Fund (CIF) in 2008, implemented jointly with the regional development banks.

**Bilateral Finance Institutions and Funds-** Bilateral finance institutions include the European Investment Bank (EIB), the Nordic Investment Bank, the Islamic Development Bank, the French Development Agency (Afd-France), the Japanese International Development Agency (JICA), the Commonwealth Development Corporation, the German Development Bank (KfW), the Overseas Private Investment Corporation, and the Netherlands Development Finance Corporation. In 2008, total climate change related finance disbursed by Afd, EIB, KfW and JICA alone was about \$13 billion.

**Export Credit Agencies** Export credit agencies (ECA) act as an intermediary between national governments and exporters to issue export financing. ECAs offer medium and long term credit insurance or guarantees, or act as direct lenders to importers on behalf of governments. In doing so, they facilitate the export of capital goods and related services, in particular in sectors such as infrastructure, transport, manufacturing, energy production or distribution facilities.

ECAs currently finance or underwrite about \$430 billion of business activity abroad about \$55 billion of which goes toward project finance in developing countries. Some ECAs are government sponsored, others quasi governmental, and others private. Financial terms and conditions are regulated internationally, primarily through the Arrangement on Officially Supported Export Credits (OECD, 2009). Almost all exporting countries have at least one ECA, which plays a counter cyclical role especially during moments of financial crisis when private market export financing becomes a scarce resource (IEA, 2010).

**UNFCCC Funds** Under Article 4.3 of the UNFCCC, Annex 1 Parties commit to providing financial assistance to non-Annex I Parties to support the implementation of the Climate Change Convention. To facilitate this transfer of funds, the Convention established a financial mechanism with operating entities. Until December 2010, the GEF was the sole operating entity of the UNFCCC's financial mechanism. In December 2010, the UNFCCC Cancun Agreements established the Green Climate Fund. It will serve as second operating entity to the UNFCCC financial mechanism. This fund is expected to become the largest single source of international Public climate finance by 2020.

**National Development Institutions And Climate Funds-** Sub regional development banks or national development banks provide an alternative funding channel for long term investment in many developing countries. Although these institutions have an uneven the record in generating long term financing, they are expected to play an increasingly important role in assisting countries with a successful transition to low emission climate resilient development pathways. Notably, they could play a major role in developing public private partnerships, such as the underwriting of green bonds and the capitalization of public private equity funds

### **2.3 Carbon Financial Instruments: Africa's perspective**

Past efforts to produce detailed inventories of Sub-Saharan Africa's energy conservation potential proved extremely difficult. Earlier assessments were heavily constrained by an inability to form technical teams large enough to develop the detailed methodological framework required to cover the wide range of technical processes, equipment types, and



operational conditions and assess an even greater diversity of emission reduction potential. To date, few, if any, reports have been published on inventories of GHG emission reduction opportunities in the region. However, with the recent development of the CDM methodological framework, that situation has changed.

The dynamic, bottom-up CDM process provides an unprecedented opportunity for exploring low carbon energy opportunities. The CDM has generated strong financial incentive, unleashing a dynamic, bottom-up response from project developers worldwide. Indeed, the number of validated CDM projects has grown rapidly, more than doubling every year (Gouvello, et al. 2008).

As of end-2007, proceeds from the sale of emission credits from CDM projects amounted to about \$7.4 billion, a 50% increase in value over 2006, triple the value in 2005, and representing credits on 537 million tonnes of carbon dioxide-equivalent (CO<sub>2</sub>-e). The overall carbon market has risen in leaps and bounds, reaching \$60 billion in 2007 or six times its value in 2005 and culminating to 142 Billion in 2010 (Source The World Bank). Despite Africa's growing participation in the carbon market, African projects accounted for only 3% of CDM projects at the end of 2006 and 5% at the end of 2007 and 2% as of **2010**.

Although researchers have provided evidence that CDM delivers a certain degree of development dividends by providing finance for the diversification and increased reliability of energy supply, reduced dependence on fossil increasing agricultural productivity through adoption of sustainable agricultural land management practices like soil conservation and rural electrification, among others. Critics have argued that CDM

would have minimal impact on sustainable development given the high transaction costs that inhibit investor interest. (World Bank 2010) Equally, high costs and complex criteria may persuade project developers to minimize the cost of activities that support sustainable development in the host country, such as investing in local communities or undertaking rigorous monitoring of sustainable development protocols. This in effect undermines the sustainability goals of CDM and indeed of African climate initiatives in general further crippling the motives of African players in the carbon trade market.

## **2.4 Carbon finance markets**

Over the past few years, the international community has developed a number of regulatory and market-based instruments to shift investments from fossil fuels to more climate friendly alternatives. As a result, investments in the sustainable energy market have grown from \$22 billion in 2002 to \$175-200 billion in 2010 (UNEP, 2010) it is estimated that they could reach \$400-500 billion by 2020 (World Bank 2010)

In response to this scenario financial institutions have developed a number of carbon based insurance products, derivatives and structured products in order to manage and transfer risks and costs of carbon emissions and get more sustainable profits. Spearheaded by the developed economies and financial markets like the Chicago stock exchange, carbon emissions right has become a financial instrument, the price is becoming more and more decided by financial markets. The world economy has witnessed increasing financial capital evolving from carbon emission rights market and the low carbon economic development turns into a carrier of financial tool for innovation. (Greigor, 2008)

The World Bank through the carbon finance has played a key role in the development of the carbon finance market. The world's first carbon fund, called the Prototype Carbon Fund (PCF) with an initial allocation of US\$180 million, was fully pledged and fully committed in 2003 under the caretaker of the World Bank. Since then other players have joined hands and more funds have been committed, including those targeting specific project segments like the Community Development Carbon Fund (CDCF), which focuses exclusively on small projects.

As of March 2008, the total funds pledged under the care of world bank had reached more than US\$2.1 billion while outside the World Bank, more than 60 carbon funds have been created.

Developed countries have committed to raising \$100 billion per year by 2020 to assist developing countries in addressing climate change. Even if this level of financing is raised, public expenditures alone will be insufficient to adequately transform economies. There is need to have the private sector play a significant role in steering the development of a sustainable carbon market.

Trading exchanges have been established to provide a spot market in permits, as well as futures and options market to help discover a market price and maintain liquidity. Carbon prices are normally quoted in Euros per tonne of carbon dioxide or its equivalent (CO<sub>2</sub>e). Other greenhouse gases can also be traded, but are quoted as standard multiples of carbon dioxide with respect to their global warming potential. These features reduce the quota's financial impact on business, while ensuring that the quotas are met at a national and international level.

The CER units can be sold privately or in the international market at the prevailing market price upon validation by UNFCCC. Currently there are six exchanges trading in UNFCCC related carbon credits: the Chicago Climate Exchange, European Climate Exchange, NASDAQ OMX Commodities Europe, PowerNext, Commodity Exchange Bratislava and the European Energy Exchange. Trading in emission permits is one of the fastest-growing segments in Financial services. For instance in the City of London it had a market estimated to be worth about €30 billion in 2007 with business leaders predicting that Carbon will be the world's biggest commodity market, and it could become the world's biggest market overall (Redshaw, 2010),

The carbon market is still complex and remains fragmented with the potential for unusually high unit margins and profits. With the ever increasing level of funding players in the carbon market are creating a tipping point from which to catalyze much larger scale private investment. This process should be geared towards promoting public private partnership by using international public climate finance to build enabling environments and removing domestic and foreign investment barriers in order to attract and drive public and private capital toward pro poor low emission climate resilient development. (Glemarec 2011)

## **2.5 Carbon credits supply and demand**

Despite the ever growing global demand for the carbon credits, attributed mainly to international agreements and the evolving carbon finance market, the supply has remained timid. Generally one would expect Africa to lead in the provision of carbon credits due to its endowment with natural resources and untapped potential. On the

contrary china and India have over turned the land and are taking the lead in the number of new projects targeting production of carbon credits, while Europe and America continue to deliver significant portion of the world carbon credits.

While they have potential to earn a good return on investment, most renewable energy and energy efficiency investments require substantial upfront costs. The shift to a green, low emission and climate resilient economy frequently involves higher upfront capital costs, matched by lower operating costs. It is estimated that 80 percent of the capital needed to address climate change issues will come from the private sector both businesses and consumers. (UNFCCC, 2008). Similarly, about 40 percent of the global additional investment needed in 2020 will come from households, 40 percent from businesses, and the remaining 20 percent directly from governments. (IEA,2009).

Upfront investment for clean energy projects can be forbidding. Financial constraints faced by individual consumers are often much more severe than actually revealed by national discount rates or long term interest rates. Implicit discount rates in industry are over 20 percent compared to less than 10 percent for public discount rates, and 4 to 6 percent for long-term interest rates (WEC, 2004). In addition, households or local governments might find it even more difficult than businesses to access limited credit should they decide to make such an investment. This constraint is felt even more acutely in developing countries given the limited access to consumer credits in the financial markets. Furthermore, individual investors often lack access to information and sufficient expertise at the right time and right place to evaluate investments. The most vulnerable segments of a population tend to have particularly high personal discount rates as well as

aversion to risks. Hence, poor farmers are unlikely to spontaneously adopt climate resilient cultivars in the absence of appropriate agricultural extension services and risk mitigation instruments such as crop failure insurance. In an attempt to increase the supply of the carbon credits from the developing countries the international community is continuously developing complementary policy guidelines and financing instruments to help in shifting the investments particularly from fossil fuels to more climate friendly alternatives. (OECD, 2009).

The private sector is reacting positively to both the strong likelihood of policies that support low emission development, and the financial pressures and incentives to encourage a move in the same direction. Despite the turmoil in the world's financial markets in 2008, and the subsequent economic crisis, the past two years have witnessed continued strong investment in clean energy technologies. In 2010 the clean energy sector grew by 30 percent above 2009 levels to achieve a record \$243 billion worth of finance and investment (Pew Charitable Trusts 2010). Over the medium to long term, and with the appropriate public sector support, private investment in clean energy technologies is expected to reach \$450 billion by 2012 and \$600 billion by 2020 (UNEP, **2010**).

Purchases of small-scale clean energy technologies (less than 1 megawatt) were a new and important force, driving clean energy investment to record levels in 2010. Investment in small-scale projects among G-20 members grew by 100 percent, doubling annual investment to \$56.4 billion (Pew, 2010) and possibly signaling a new paradigm in renewable power generation. However, a key issue with a number of these new and

innovative sources of finance is their acute regional and technological unevenness in availability and use, with the bulk of these funds going to a few large emerging economies and to a small selection of technologies. The European Union (EU), the United States (US), China, and a handful of large emerging economies currently receive the bulk of both the new investment and the acquisition activity.

One can attribute the "missing out" of the developing countries to various reasons but the key factors are lack of adequate capital to put up the projects and information gap on available options and mechanisms for harnessing the opportunities. In 2007, investment in the least developed regions, such as Africa, was limited to asset financing of \$1.3 billion mainly from biofuel plants. Although an estimated 575 million people still rely on traditional biomass in Africa (IEA, 2006), the region accounted for less than one percent of the total private investment in clean energy in 2007. Despite the existence of highly profitable opportunities in energy efficiency, financial flows to the Middle East and Central Asia also remain very limited

It is sometimes argued that present investment flows correlate reasonably well with the distribution of mitigation potential. However, failure to provide fair access to climate finance to all developing countries will have severe economic, social, political, financial and climate change implications. In many cases, the countries that receive the least public climate finance are the most vulnerable countries to climate change, and have the lowest capacity to access new sources of finance to adapt to it. The inequity of this situation is untenable and not only endangers a successful outcome of the present climate change negotiations, but of all global governance negotiations.

## **2.6 The Climate Finance Challenge**

Reducing emissions costs money, stabilizing GHG concentrations below climatically dangerous levels is estimated to require a low-carbon investment in developing countries of \$139-175 billion per year by 2030. In an ideal world, a global carbon market would channel financing to investments that would reduce emissions at least cost. In reality, the investment is difficult to bring to fruition, as evidenced by the large volumes of potential ERs from unrealized investments.

A range of barriers hamper low-carbon investment like significant risks related to the carbon market, its structure and market fragmentation (i.e. the variability in valuation of ERs depending on where, how, and when they were created); lack of predictability of future carbon regimes; uniformly high preparation costs and initial project costs; technology and location risks for Low-carbon projects, particularly related to unconventional technologies, the local business environment, and politics.

Taken together, these market failures hinder investment from flowing to some of the least cost sources. Another hurdle is that, in general, low-carbon investments have difficulty securing adequate, affordable, and sufficiently long-term financing. The possibility of receiving carbon revenues cannot mobilize commercial financing unless the revenues are relatively certain and free from risks related to possible changes in carbon regulations. Financing increasingly will need to go to areas that have historically attracted limited investment funding. European markets increasingly turn to LDCs for sourcing CERs. However, these countries present a number of barriers to investment, including typically small market size, weak business environments, high levels of perceived risk, relatively



low competitiveness, and dependence on foreign direct investment for a large proportion of their capital formation. (World Bank, 2010)

## **2.7 Incentives for promoting development of carbon projects**

There are various mechanisms that can be employed by government and private sector in creating an enabling environment for flourishing of carbon trade. These can either be classified as regulatory means or market based instruments. In the developing countries and particularly Kenya, that have no set targets under the Kyoto protocol regulatory instruments might be difficult to implement since they lack adequate backing and support role from the government.

Market based instruments use price or other economic variables to provide incentives for polluters to reduce harmful emissions and this indirectly contributes to increase in carbon credits harvested from the projects. They seek to address the market failure of negative environmental externalities either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by facilitating the establishment of a market for the use of environmental services. These incentives include the following;

*Fiscal incentives-* Fiscal incentives have a price effect on the demand side of the carbon credit market they may take the form of corrective taxes, subsidy reforms, or tax incentives. In a perfect world, the external cost of an unsustainable activity on the environment and public health, would be reflected in the market price of goods and services, as would any common benefits conferred by sustainable aspects of production,

ultimately making climate investments relatively more attractive. However, numerous unsustainable economic activities enjoy a price advantage, as the negative spillover effects of their production or consumption of goods on third parties are not fully reflected in market prices. A solution to this problem is to 'internalize' the cost of the externality in the price of a good or service through applying various options like imposing a corrective Pigou tax on the product or service (Yannik 2011).

Fiscal subsidy reforms can be used towards eliminating other price distortions created by market failures and market distortions while a tax related environmental instruments can go a long way in developing green technologies, preserving valuable natural capital, and increasing climate resilience through direct fiscal incentives like preferential tax treatment or exemptions. This may take the form of allowable capital deductions for investments in projects that contribute to carbon credits. (Laan 2010). The three fiscal policies if well applied have the potential to increase public revenue, which can help to finance other policy instruments such as early market development instruments or debt/equity instruments to finance investments in the carbon projects.

Scholars and policy makers have argued that the effects of fiscal incentives are not automatic and need to be used with caution. While we appreciate that a large body of literature supports this assertion, others argue that for instance subsidies mostly benefit the wealthy but indiscriminately removing them can also hurt the poor. For instance removing subsidies on kerosene, which is used in some countries for cooking, commercial and farming activities can disproportionately affect the poor and spark public protests. It is important to pay special attention to the distributional impact of subsidy

refonns. Some cases might require targeted support programmes to mitigate the impact on the poor, either in the form of direct subsidies or removal of regressive taxes such as VAT on food .(Yannik, 2011)

*Early market deployment instruments-* Early market development instruments consist of measures to boost clean technology development and deployment thus providing CERs, through securing and boosting market demand. These tools take the form of compulsory procurement requirements or direct grants. The most notable early market development mechanism is arguably the use of public spending to kick start green market development. Public procurement represents a large proportion of government spending in developing countries and thus if well applied can significantly contribute to shaping the direction of clean energy use and stimulating carbon revenues. Governments can also foster green procurement by commercial companies by requiring public institutions to meet specific energy efficiency targets and to purchase a specific percentage of power from renewable energy sources.

Government can also support early market development through a series of direct grants for R&D, project development or industrial restructuring. Public support for R&D is still needed in a number of areas. However as for any other subsidy scheme, the key drawbacks of direct R&D grants are their impacts on public resources and their potential requirement of innovative financing solutions.

**Debt based and equity based instruments-** These instruments specifically aim to lower the risk of lending to and investing in green investment, thereby attracting lower cost of capital finance from the private sector. Debt based instalments include the provision of

credit lines to commercial finance institutions (CFIs) for lending to green investors; loan guarantees to cover a portion of the risk of non repayment of the loan principal; project loan facilities to provide debt financing directly to projects where conventional CFIs are unwilling or unable to provide such financing themselves; or soft loan programmes to provide debt capital at concessional interest rates.

Companies need equity to start up or grow their business, activities that generally cannot be debt financed. Furthermore, a minimum ratio of equity is required to secure commercial loans. Equity based instruments foster direct investment in companies or projects. They include tax credits, 'first loss' equity positions by public investors in private equity funds, or deal flow facilitation in the form of project development facilities (Yannik 2011). As with premium prices or direct grants, debt based and equity based instruments are popular with beneficiaries. While the risks they aim to address are real, so are their costs. As with early market development instruments, long term implications of debt-based and equity based instruments on the public purse and market distortions should be carefully assessed.

**Trading instruments-** Trading instruments are used to create markets for a variety of environmental goods, including emission phase out natural habitat conservation and water quality trading. Emission trading instruments (ETIs) are fairly recent developments in international environmental finance. However, they, and other tradable permit schemes, are increasingly being considered for the management of natural resources and the environment. This is particularly so where regulatory approaches have failed to arrest ongoing degradation or where the cost of traditional policy tools is prohibitive to

government or society in general. ETIs encourage behavior through market signals rather than through explicit directives. When applying ETIs, the focus is on achieving outcomes through the self-interest of firms and individuals.(Carbon finance, 2010)

## **2.8 Carbon credits investment vehicles**

Depending on their investment objective and risk appetite, investors have a number of options to choose from within each asset class to obtain exposure to climate change investments. Broadly speaking, these asset allocation strategies may fall into four areas: asset allocation strategies, public equity and equity products, publicly listed debt market (debt/bonds), real assets (including real estate and timber & sustainable forestry, and alternative investments which include private equity/venture capital, hedge funds, infrastructure, commodities, etc.

**Public (Listed) Equity and Equity Products-** An equity share represents one unit of ownership in a company whose shares can be bought and sold on an exchange, such as the New York Stock Exchange or London Stock Exchange. An equity investor can profit in two ways; when the company's equity increases in value or when the company passes a portion of its profits by paying dividends to its shareholders. Institutional investors can invest in climate change activities by purchasing the publicly traded equity shares of companies, established or newly listed, either in domestically or internationally listed equity markets. Investors can invest in listed equities by individually picking the shares of companies and/or investing in climate change related investment funds. Even though worldwide there are an increasingly large number of equity funds targeting climate change investments, equity shares of companies in developing countries only make up a

very small percentage of these investments with none in Kenya. Investors often look for well-developed financial markets and transparency in capital markets when making their investments; the majority of developing countries, apart from the leading emerging markets, fall short of offering these conditions to the global investment community. So, while equity markets present many opportunities for institutional investors to obtain exposure to climate change opportunities, this is limited to companies that are already listed on stock exchanges and are operating in well developed, transparent, and liquid capital markets.

**Publicly Listed Debt Markets-** On the fixed income side, institutional investors can invest directly by participating in the bonds issued to finance green projects. A bond is a type of a security that is similar to a loan in that when the bond is issued, money is lent to the entity issuing the bond that then promises to repay the principal and interest through to the bond's maturity. Depending on national legislation, a company, a municipality or a government can issue bonds. Green bonds, also known as climate bonds, have been recently introduced by microfinance institutions (MFIs) such as IFC and EIB as a financial vehicle for institutional investors to invest in climate change related activities and to finance green infrastructure in developing countries. (Ward, 2010)

**Real Assets-** Real assets refer to those assets that have an intrinsic value and are tangible, and include real estate, timber, and forestry. Timber and forestry investment are particularly critical for both climate change mitigation and adaptation. Timber investments have a low correlation with other asset classes and are also often seen as an inflation hedge. There are a number of new funds offering exposure to timber and

sustainable forestry. For instance, in April 2010, MSS Capital, a London based firm, launched three separate funds that invest in sustainable forestry, with varying time horizons and return expectations. The first fund, at \$38 million, will have a 1 year time horizon and will invest in mature mahogany and teak trees that need felling, with expected returns of 12 to 25 percent. The other two funds, which are expected to close at £100 million each, will be for a five-year agro forestry fund, and a 15 year teak and agar wood fund (Environmental Finance, April 2010)

**Alternative Investments-** this include private equity/venture capital funds: Private equity (PE) can be defined as an equity investment in a company or an asset that is not publicly traded on capital markets, which means that private equity investments are not traded on exchanges. Venture capital (VC) is a form of private equity that invests in early stage companies targeting new technologies and/or new markets. Investors usually invest in private equity through limited partnerships and take part in a portfolio of private equity investments while preserving their limited liability. This leaves management to the general partners (GPs), who often get involved in the management of the companies in which they invest. PE/VC investments tend to be illiquid and are considered long term, with an investment horizon of 3 to 5 years for private equity and 4to7 years for venture capital (UNEP, 2009). Currently with the establishment of the Climate innovation centre for Kenya it is expected that this type of investments will become a reality in the country as the centre moves to provide soil funds to SMEs in setting up green energy projects.

PE/VC funds play an important role in providing capital to start up clean technology companies. In emerging market private equity, investments have focused on more mature segments and more proven technologies, and have taken the form of; providing

growth/expansion capital where access to capital markets has been limited, and making efficiency improvements in operations. According to Bloomberg New Energy Finance, during 2004-2009 nearly \$35 billion worth of new clean energy investments were made through private equity and venture capital funds, led by activity in Europe and the Americas. (Bloomberg, 2010) Overall, private equity activity has risen steadily in emerging markets. Indeed institutional investors increasingly view emerging markets as attractive for private equity, both on a standalone basis and relative to more developed markets.

## **2.9 Empirical evidence**

Chevallier investigated the presence of outliers in the volatility of carbon prices in France. He computed three different measures of volatility for European Union Allowances, based on daily data (EGARCH model), option prices (implied volatility), and intraday data (realized volatility). He detected instability in the volatility of carbon prices based on two kinds of tests: retrospective tests (OLS-/Recursive-based CUSUM processes, F-statistics, and residual sum of squares), and forward-looking tests (by monitoring structural changes recursively or with moving estimates). He showed that there was evidence of strong shifts mainly for the EGARCH and IV models during the time period. Overall, he suggested that yearly compliance events, and growing uncertainties in post-Kyoto international agreements, may explain the instability in the volatility of carbon prices. (Chevallier 2011)



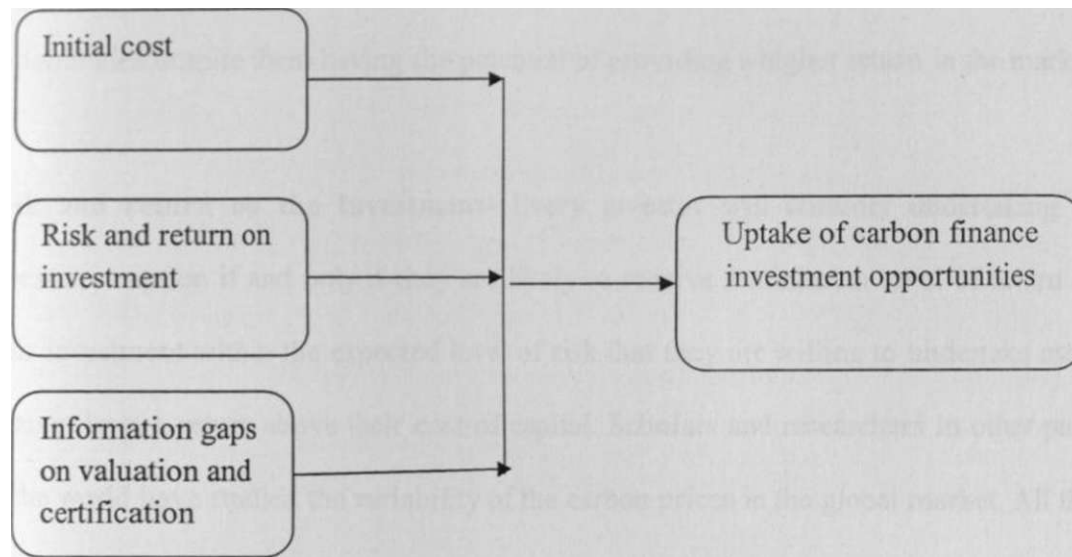
Ling carried out a study in Asia that evaluated the plans of Southeast Asia to establish green development. It mentioned that Southeast Asia was one of the regions hardest hit by climate change, in this regard the region developed funding for mitigation and adaptation efforts and currently at 5 per cent of projected needs and added that carbon markets can be a source of funding. It also noted that China and India currently dominate the carbon market with 60 per cent of total Clean Development Mechanism in the region, (MeiLing, 2011)

In a similar study Torres analysed the sequestration costs of agro-forestry afforestation and reforestation projects (ARPs) following a partial market equilibrium using average cost curves and economic break even analysis to identify the supply costs. The modeling done contrasted the voluntary and clean development mechanism transaction costs using data on the voluntary project, Cost curves were developed for seven different sequestration options considering transaction and implementation costs; information from agricultural production in Chiapas Mexico was used to integrate opportunity costs of two agro-forestry practices suggesting that sequestration costs may follow a "U" shape, with an initial reduction due to economies of scale and a subsequent increase caused by high opportunity costs. The widespread implementation of agro-forestry options not requiring complete land. He concluded that payments in the early years of the project and lower transaction costs favor the development of ARPs in the voluntary market especially in marginal rural areas with high discount rates (Torres et al 2010)

Knox studied the role of market complementarities in developing new carbon markets. He argued that markets are composed of social as well as economic networks. The reliance of these networks on social connectivity and proximity makes the development of new markets particularly suited to established financial centers like London and New York and reinforces the importance of these centers. London and New York provide not only resources and financial infrastructure, but also institutional proximity that develops routines and practices between complementary firms. He investigated three levels of complementarity between (existent and new) markets and within the new carbon markets: the complementarity of expertise and information, the complementarity of institutions and services and the complementarity of market systems. Case studies constructed from expert interviews in London and New York were used to support the argument. He concluded that the nature of financial agglomeration and market embeddedness affects carbon markets (Knox 2009)

Schneider who was concerned with the criticism accorded to CDM despite the enormous growth in the market analysed the impacts of the value chain on different policy scenarios on commercial activities. He utilised data from UNEP Risoe's CDM Bazaar and first established a seven-step value chain by conducting a factor analysis on the commercial activities indicated in the Bazaar and, second, identified nine prevalent business models with a cluster analysis of all 495 participating organisations. Based on these analyses, He discussed potential impacts on the value chain of different policy scenarios that relied on carbon credits as incentive. He found out that the importance of specific regulatory CDM know-how and general business activities such as finance varies strongly with the different policy scenarios. (Schneider et al 2010)

## 2.9 Conceptual framework



Independent Variables

Dependent Variable

Source: Author (2012)

## 2.10 Theoretical expected relationship between the variables.

**High initial cost-** While making any investment decision, companies will always consider the initial cost of the project since this has significant impact on whether to accept or reject the project. When initial costs are significantly high companies may consider borrowing from financial institutions or other avenues if their capital structure can support and if those borrowing opportunities do exist. Often when the associated costs are significantly high the borrowing costs also become higher due to the level of leverage, this on the other hand increase the associated costs of the project and the acceptability of the project.

It is expected that if business consider the costs of CF projects as being very high above other available projects then the likelihood is that few companies can afford this opportunities despite them having the potential of providing a higher return in the market.

**Risk and return on the Investment-** Every investor will consider undertaking an investment option if and only if they are likely to receive a minimum level of return on their investment within the expected level of risk that they are willing to undertake more often at least a return above their cost of capital. Scholars and researchers in other parts of the world have studied the variability of the carbon prices in the global market. All this issues increase the associated risks of the carbon related investment projects. However the revenues associated with carbon finance projects are high quality cash flows, since CER purchasers are usually from developed countries, purchase agreements are generally issued in foreign currencies, either US dollars or Euros. This feature is attractive to poor countries like Kenya that face commercial deficits and negative balance of payments. As noted by Morgan, while energy projects are generally import intensive, negatively affecting the balance of payment, CERs produced by cleaner energy projects are a high value, exportable by product. (Morgan (2008). Consequently one would expect that due to this positive characteristic carbon investments projects would be a high catch for companies in Kenya

ERPAs are international contracts expressed in hard currencies, to this regard they are free of inflation risk and, to a certain extent, exchange risk, at least against local currency devaluation.

For many CDM projects presented for validation, project developers insist that CDM revenues permit hedging their debt cash flow against currency devaluation. When a CER purchaser is a highly rated entity, such as a World Bank hosted carbon fund, ERPAs can help bring finance closer to a project; this is often an issue in Sub Saharan Africa, especially when private sector participation is desired. Adding such high quality cash flow can be a key argument to convince commercial banks or private investors to increase their financial participation in the investment, as a commercial loan or equity (Gouvello,2008) In addition this characteristic would imply that the associated project risks are lower since the market is almost certain.

**Information gaps on certification and valuation of CERs-** Investors while making their decisions on available options often consider the sustainability of the project and the extent to which the expected future cash flows can be projected over the life time of the project. With the changing carbon regimes and failure by some countries to adhere to the international conventions that govern the administration of carbon emissions, companies become skeptical on the sustainability of the projects in the long term. In addition the valuation and certification of CDM projects is not a clear cut line and thus may leaders may shy away from undertaking such projects until there are clear levels of measurement and approval that provide a minimum guarantee for long-term investments and returns

## **2.11 Summary**

This chapter discusses the various players and instruments in the carbon finance market, the supply and demand side of the carbon finances. It has also discussed the incentives for promoting investments in carbon finance and the challenges faced including the investment vehicles.

## **CHAPTER THREE**

### **RESEARCH DESIGN**

#### **3.1 Introduction**

This section deals with the methodology that was used in carrying out the study. It is subdivided into the research design, target population, sample size and sampling procedure, research instruments, instruments validity, instrument reliability, data collection and data analysis techniques.

#### **3.2 Research Design**

Since the study was geared towards seeking to understand, getting insights and describing the factors affecting the uptake of investment opportunities and projects that can lead to harvesting of carbon credits for the private sector in Kenya, the researcher used exploratory statistic research design. It aims at helping identify a problem, clarify it's nature and define the scope. It is useful in looking for insights, developing propositions and reaching a greater understanding of an issue Givern (2003). The research collected and analysed factors contributing to the research problem from various companies listed in the NSE.

#### **3.3 Target population**

Population refers to the universe of enquiry, or the people, organisations events or items that are relevant to the research problem. Givern (2003). According to Borg and Gall, (1989) the target population refers to all members of a real or hypothetical set of people, events or objects to which the researcher wishes to generalize results of the research.

The target population for the study was listed companies in the Nairobi Securities exchange in energy, manufacturing and agriculture sector.

### **3.4 Sample size and sampling procedure**

According to Best and Khan, (1998), a sample is a finite part of a statistical population whose properties are studied to gain information about the whole. When dealing with people, it can be defined as a set of respondents selected from a larger population for the purpose of a survey. Orodho and Kombo, (2002) define sampling as the procedure where a researcher uses people, places or things to study. The researcher selected all listed companies working in the agriculture, manufacturing and energy sector.

### **3.5 Research instruments**

The researcher collected data using questionnaires with both open and closed ended questions to the target population of investment managers and finance managers of listed companies in the NSE in the energy, agriculture and manufacturing and allied sector. Mugenda, (1999) cites that the use of questionnaires as a popular method of data collection in education because of the relative cost effectiveness with which they are constructed and administered.

#### **3.5.2 Reliability of instruments**

According to Kombo and Tromp, (2006) reliability of a test is a measure of how well a test measures what it is supposed to measure. The researcher used split-half technique of measuring reliability. According to Mugenda & Mugenda, (1999) split-half technique involves splitting an instrument into two parts. Subject scores from one part are

correlated with scores from the second part. This was done mainly to eliminate chance errors and hence increase the reliability of the data collected.

### **3.6 Data Collection Procedure**

A research permit to conduct the study was obtained from the necessary authority. The respondents that were involved were informed in writing. The researcher then issued the instruments to the respondents from the sampled entities and then picks them on the agreed time.

### **3.7 Data Analysis**

The researcher adopted an exploratory factor analysis. Factor analysis is a collection of methods used to examine how underlying constructs influence the responses on a number of measured variables De Coster, J. (1998)

The data related to responses collected from the target population on factors that contribute to uptake of carbon Finance investment opportunities which was the study variables that was analyzed to give insight on the most prevalent factors and their rankings.

Using exploratory factor analysis (CFA) coded data was entered into the computer using statistical package for social sciences (SPSS) where it was developed into a data base and analyzed. Findings were presented in tables, charts, graphs and inferential statistics such as the regression models. Both quantitative and qualitative data was generated. Qualitative data from open ended questions was thematically presented in narrative form and tables.



A multivariate regression model was applied to determine the relative importance of each of the three variables in relation to the study which sought to understand the factors affecting the uptake of carbon finance investment opportunities in Kenya. The regression model was as follows:

$$y = (30 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

**Where:**

Y = Uptake of carbon finance opportunities

Po = Constant Term

Beta coefficients

X<sub>1</sub> = High initial investment

X<sub>2</sub> = Investment risk and returns

X<sub>3</sub> = information gaps on valuation and certification of CERs

### **3.8 Summary**

In this chapter, the research focused in several aspects of research instruments which the researcher used in the study. In addition this section of the study describes the research design, the target population and the sampling method, procedure of data collection and data analysis.

## **CHAPTER FOUR**

### **DATA ANALYSIS, INTERPRETATION AND PRESENTATION**

#### **4.1 Introduction**

This chapter is a presentation of results and findings obtained from field responses and data, broken into two parts. The first section deals with the background information of the respondents, while the other five sections present findings of the analysis, based on the objectives of the study where both descriptive and inferential statistics have been employed in this analysis and discuss the issues in the best way possible.

#### **4.2 Response Rate**

From the data collected, out of the 34 questionnaires administered, 31 were filled and returned. This represented a 91.18% response rate, which is considered satisfactory to make conclusions for the study. According to Mugenda and Mugenda (2003) a 50% response rate is adequate, 60% good and above 70% rated very well. This also collaborates Bailey (2000) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. This implies that based on this assertion; the response rate in this case of 91.18% was very good.

This high response rate can be attributed to the data collection procedures, where the researcher pre-notified the potential participants (owner-managers) of the intended survey, used an electronic version of the questionnaire for sectors with Information Technology capacity, the questionnaire was self administered the respondents completed them and these were picked shortly after.

**Table 4.1 Response Rate**

	<b>Questionnaires administered</b>	<b>Questionnaires filled</b>	<b>Questionnaires &amp; returned</b>	<b>Percentage</b>
Respondents	34	31		91.18

### **4.3 Pilot Test Results**

To establish validity, the research instrument was given to two experts who were experienced carbon finance investments to evaluate the relevance of each item in the instrument in relation to the objectives. The same were rated on the scale of 1 (very relevant) to 4 (not very relevant). Validity was determined by use of content validity index (CVI). CVI was obtained by adding up the items rated 3 and 4 by the experts and dividing this sum by the total number of items in the questionnaire. A CVI of 0.887 was obtained. Oso and Onen (2009), state that a validity coefficient of at least 0.70 is acceptable as a valid research hence the adoption of the research instrument as valid for this study.

The questionnaires used had likert scale items that were to be responded to. For reliability analysis Cronbach's alpha was calculated by application of SPSS. The value of the alpha coefficient ranges from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = poor, 5 = excellent). A higher value shows a more reliable generated scale. Cooper & Schindler (2008) indicated 0.7 to be an acceptable reliability coefficient. The study involved questionnaires from 31

respondents. Since, the alpha coefficients were all greater than 0.7, a conclusion was drawn that the instruments had an acceptable reliability coefficient and were appropriate for the study.

**Table 4.2: Reliability Results**

<b>Variable</b>	<b>Cronbach's Alpha</b>	<b>Items</b>
Environmental consciousness	.79	16
Risk and return on investment	.77	11
Sustainability	.78	7

#### **4.4 Demographic information**

##### **4.4.1 Size of the company**

The study sought to determine the size of the company in respect to its turnover and the asset value. This aimed to determine their ability to invest in carbon finance investments and their overall assets financial performance. The findings were as indicated in Table 4.3.

**Table 4.3 Company's Turn over and assets value**

	Turn over				Assets value			
	Less than 500M	500M-2B	2B-5B	Above 10B	Less than 500M	500M-2B	2B-5B	Above 10B
Agriculture	2(20%)	3(30%)	4(40%)	1(10%)	2(20%)	2(20%)	5(50%)	1(10%)
Manufacturing	0(0.0%)	2(16.67%)	4(33.33%)	6(50%)	0(0.0%)	2(16.67%)	4(33.33%)	6(50%)
E Energy	0(0.0%)	0(0.0%)	0(0.0%)	3(100%)	0(0.0%)	0(0.0%)	0(0.0%)	3(100%)
\ Total	2(6.45%)	5(12.90%)	8(25.81%)	10(32.26%)	2(6.45%)	4(12.90%)	9(29.03%)	10(32.26%)

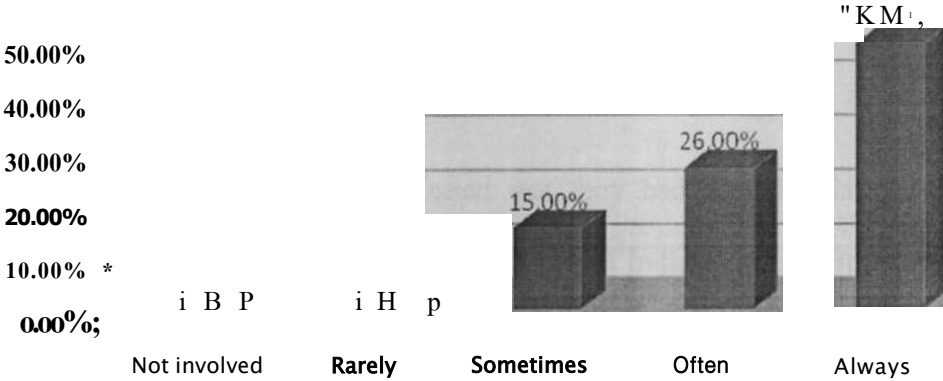
From the findings as indicated in Table 4.3 majority 4(40%) of the company's in agricultural had their turnover ranging between 2B-5B and also majority 5(50%) indicated that their assets value ranged between 2B-5B. Majority 4(33.33%) of the company's in manufacturing sector indicated that their turnover value ranged between 2B-5B and that their asset value ranged between 2B-5B respectively. Further all 3(100%) of the company's in energy sector indicated that their turnover and asset value was above 10B. This implies that the company's financial performance is good and therefore the study can deduce from the findings that the companies were in good position to invest in CF investments.

#### **4.4.2 The extent of involvement in strategy development and choice of investment options**

The study further sought to determine the extent of investment and finance managers involvement in strategy development and the choice of investment options. This was to

evaluate their roles and capability to respond to research instrument since the investment decisions are done at the company's strategy development and implementation. The study findings were as indicated in Figure 4.1.

**Figure 4.1 Involvement in strategy development and choice of investment option**



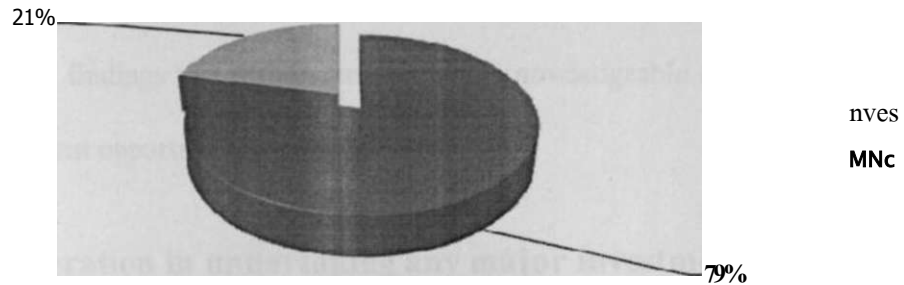
From the study findings as indicated in Figure 4.1 majority (49%) of the respondents indicated that they were involved in strategy development and choice of investment option, followed by (26%) who indicated often, (15%) indicated sometimes with few (6%) and (4%) indicating rarely and not involved respectively. This implies that the companies usually develop strategies on investment options before undertaking the actual investment e.g. through carrying out feasibility studies on viable investment projects, investing, monitoring and evaluating afterwards.

**4.4.3 Involvement in making investment appraisals over the last 3 years**

The study also found it paramount to determine if the companies had involved their finance managers in investment appraisal over the last 3 years. This was to determine the

frequency of companies appraising their projects. The findings were as indicated in Figure 4.2.

**Figure 4.2 Involvement in making investment appraisals**

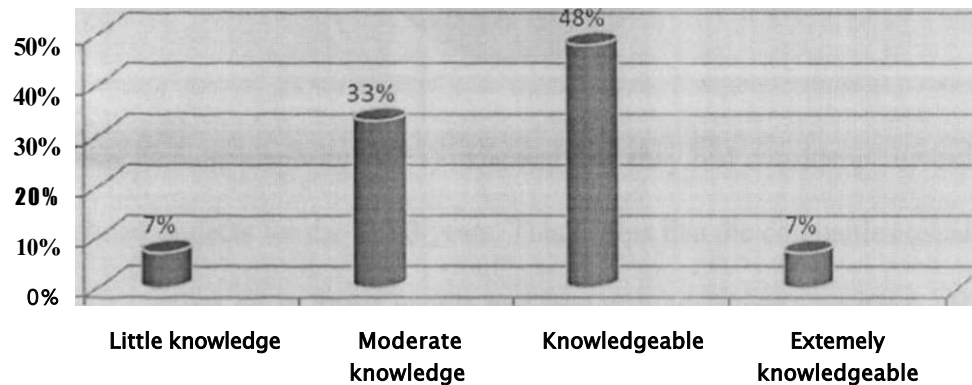


From the findings majority (79%) indicated that they had been involved in making investment appraisals over the last 3 years while (21%) indicating that they do not been involved. This implies that the respondents involve themselves in appraising investments frequently as benchmarked by the last 3 years period.

#### 4.4.4 Knowledge in carbon finance investments

Knowledge and information being very crucial in investment opportunities, the study found it paramount to establish from the respondents if they had knowledge about carbon finance investments opportunities. The findings were as indicated in figure 4.3.

**Figure 4.3 Knowledge in carbon finance investments**

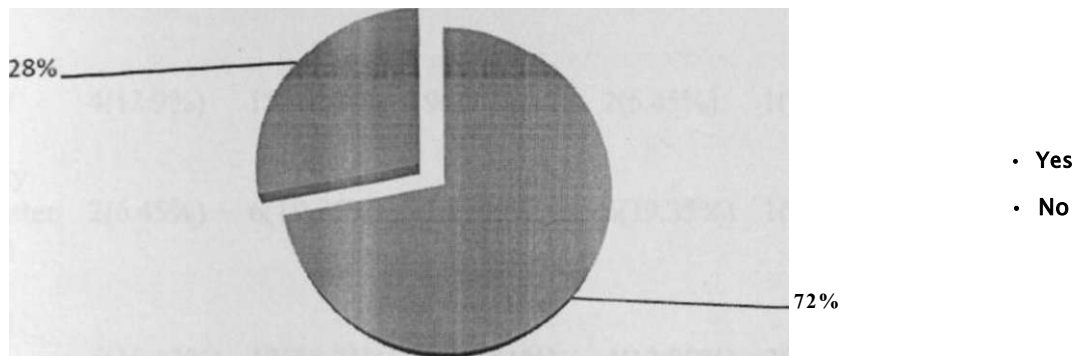


From the study Findings as indicated in Figure 4.3 majority (48%) indicated that they were knowledgeable on the available opportunities in carbon finance investments, followed by (33%) who indicated moderate knowledge with very few (7%) indicated that they had little knowledge and extremely knowledgeable respectively. The study can deduce from the findings that respondents are well knowledgeable concerning the carbon finance investment opportunities in the country.

#### **4.4.5 Consideration in undertaking any major investments in CF/related projects over the last 3 years**

The study further sought to determine if they respondents had ever considered investing in any major CF/related projects over the last 3 years. The findings were as indicated in Figure 4.4

**Figure 4.4 Undertaking major investments in CF**



From the study findings majority (72%) indicated that they had considered investing in a major CF/related projects for the last 3 years. This means that the companies usually have this discussions going on in their boards and senior management meetings. However



despite this consideration the amount of investments in the country are still low mainly attributed to the factors explained below.

#### **4.5 Factors affecting the uptake of carbon finance investments**

##### **opportunities**

The study also sought to establish the factors affecting the uptake of carbon finance investments opportunities in order to provide an insight of why many companies had not taken an initiative over the same. The findings were as indicated in Table 4.4.

**Table 4.4 Contributing factors for the low uptake of projects in the company**

<b>Factors leading to low uptake of CF investments opportunities</b>	<b>Very great extent</b>	<b>Great extent</b>	<b>Moderate extent</b>	<b>Little extent</b>	<b>Not at all</b>	<b>Mean</b>	<b>Std deviatric</b>
Knowledge gaps	8(25.81%)	12(38.71%)	5(16.13%)	4(12.9%)	2(6.45%)	3.59	0.68
High initial investment cost	4(12.9%)	15(48.39%)	9(29.03%)	2(6.45%)	1(3.23%)	4.11	0.38
Availability of other better investment options	2(6.45%)	6(19.35%)	16(51.61%)	6(19.35%)	1(3.23%)	3.98	0.29
Associated risk of CF related projects	5(16.13%)	12(38.71%)	8(25.81%)	4(12.90%)	3(9.68%)	2.23	1.02
Lack of willing financiers to fund the investments	6(19.35%)	15(48.39%)	9(29.03%)	1(3.23%)	0(0.0%)	3.59	0.68

From the findings as indicated in Table 4.4 majority 12(38.71%) of the respondents indicated knowledge gaps as the factor affecting carbon finance investment to great extent. Further majority 15(48.39%) of the respondents indicated high initial investment cost as the factor affecting carbon finance investment to a great extent. Majority 16(51.61%) also indicated availability of other better investment options to a moderate extent. The study further revealed that majority 12(38.71%) indicated associated risk of CF related projects as the factor affecting investing in carbon finance to great extent. 15(48.39%) also indicated lack of willing financiers to fund the investments as a factor affecting carbon finance investment. This implies that the factors indicated influences companies carbon finance investment to a great extent which might be the reason why majority have not taken an initiative of investing in carbon finance related projects.

#### **4.5.1 Results of Factor Analysis on the Contributing factors for the low uptake of projects in the company**

The objective was to determine whether some certain factors influence the low uptake of projects by companies. Under contributing factors for low uptake of projects factor analysis, the analysis indicates that factors extracted comprised of (77%) of all factor loadings. Only factors with Eigen value loading greater than 1.0 were extracted since these are the ones expected to be more reliable (Kaiser, 1960). The components included were; Knowledge gaps, high initial investment cost, availability of other better investment options, associated risk of CF related projects and Lack of willing financiers to fund the investments since their Eigen values loading was greater than 1.0. Eigen value is included as a factor when loading is done on variables and the result is greater or equal

to one. The Eigen values which represents the amount of variance explained by each factor determines the factor loading as noted for Factor (contributing factors) to be 3.21.

**Table 4.5 Results of Factor Analysis on the Contributing factors for the low uptake of projects in the company**

<b>Factors</b>	<b>Factor Loading</b>	<b>Eigen-value</b>	<b>%of Variance</b>	<b>Cumulative %</b>	<b>Cronbach alpha</b>
<b>Contributing factors for low-uptake of CF projects</b>		<b>3.21</b>	<b>30.76</b>	<b>30.76</b>	<b>.79</b>
Knowledge gap	<b>0.80</b>				
High initial investment costs	<b>0.73</b>				
Associated risk of CF related projects	<b>0.78</b>				

The study after establishing the factors affecting the carbon finance investment then sought to determine from the respondents the level of agreement over the carbon finance investment related statements. This was to determine their level of perception over the same subject. The findings were as indicated in Table 4.6.

**Table 4.6 Uptake of CF investments**

	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Mean</b>	<b>Std deviation</b>
Statements relating to low uptake of CF <u>investments</u>							
Cost of the initial investments on CF related projects is often high and inhibitive to CF projects in relation to the associated risks.	7(22.58%)	13(41.94%)	6(19.35%)	3(9.68%)	2(6.45%)	3.73	0.66
The available mitigation factors for the significant risks associated with the <u>marketing of CF</u>	5(16.13%)	14(45.16%)	10(32.26%)	2(6.45%)	0(0.00%)	3.66	0.33

credits are inadequate to insure investors and catalyze desire for such investments

If there were adequate policies and covers provided by insurance companies and the government on CF related projects I would increase the possibility of considering making investments in CF projects

3(9.68%)	5(16.13%)	13(41.94%)	9(29.03%)	1(3.23%)	3.76	0.39
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A green champion/ active promoter of CF projects is a key position and would boost the understanding and scoping of CF related projects in any business

4(12.90%)	13(41.94%)	10(32.26%)	2(6.45%)	3(9.68%)	2.98	0.98
-----------	------------	------------	----------	----------	------	------

The key significant risk associated with CF projects is its structure and market fragmentation for the future sales and unpredictability of future carbon regimes.

7(22.58%)	14(45.16%)	8(25.81%)	2(6.45%)	0(0.0%)	3.69	0.67
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From the study findings as indicated in Table 4.6 majority 13(41.94%) of the respondents agreed that cost of the initial investments on CF related projects is often high and inhibitive to CF projects in relation to the associated risks. Majority 14(45.16%) also

agreed that the available mitigation factors for the significant risks associated with the marketing of CF credits are inadequate to insure investors and catalyze desire for such investments. Further majority 13(41.94%) were neutral that if there were adequate policies and covers provided by insurance companies and the government on CF related projects they would increase the possibility of considering making investments in CF projects. Majority 13(41.94%) further agreed that a green champion/ active promoter of CF projects is a key position and would boost the understanding and scoping of CF related projects in any business. Further majority 14(45.16%) of the respondents agreed that the key significant risk associated with CF projects is its structure and market fragmentation for the future sales and unpredictability of future carbon regimes. This corroborates with the findings in Table 4.4 that high initial costs is the main factor affecting carbon finance investment in different investing potential companies.

#### **4.5.2 Results of Factor Analysis on statements regarding uptake of CF investments**

The objective was to determine whether some certain statements regarding the uptake of CF investments influence carbon finance investments. Under factor analysis, the analysis indicates that factors extracted comprised of 79% of all factor loadings. The components included were; Cost of the initial investments on CF related projects is often high and inhibitive to CF projects in relation to the associated risks. The available mitigation factors for the significant risks associated with the marketing of CF credits are inadequate to insure investors and catalyze desire for such investments, the key significant risk associated with CF projects is its structure and market fragmentation for the future sales

and unpredictability of future carbon regimes since as their Eigen values loading were greater than 1.0. The Eigen values which represents the amount of variance explained by each factor and determines the factor loading as noted for Factor as 3.04.

**Table 4.7 Results of Factor Analysis on statements regarding uptake of CF**

investments

<b>Factors</b>	<b>Factor Loading</b>	<b>Eigen-value</b>	<b>%of Variance</b>	<b>Cumulative %</b>	<b>Cronbach alpha</b>
<b>statements regarding uptake of CF investments</b>		<b>3.04</b>	<b>34.54</b>	<b>34.54</b>	<b>.77</b>
Cost of the initial investments on CF related projects is often high and inhibitive to CF projects in relation to the associated risks.	0.83				
The available mitigation factors for the significant risks associated with the marketing of CF credits are inadequate to insure investors and catalyze desire for such investments,	0.79				
The key significant risk associated with CF projects is its structure and market fragmentation for the future sales and unpredictability of future carbon regimes	0.75				

The study further sought to determine the factors contributing to the projects structure and market fragmentation risk of CF related projects. This was further to ascertain the additional factors influencing the companies' willingness to invest in carbon finance related projects. The findings were as indicated in table 4.8.

**Table 4.8 Factor contributing to the projects structure and market fragmentation**

**risk of CF related projects**

Factors contributing to uncertainty of projects returns and <u>market projections</u>	Very great extent	Great extent	Moderate extent	Little extent	Not at all	Mean	Std deviation
Variability in valuation of ERs depending on where, how, and when they were created	4(12.90%)	13(41.94%)	10(32.26%)	2(6.45%)	3(9.68%)	2.98	0.98
Lack of clarity on certification and quantification methods	4(12.9%)	15(48.39%)	9(29.03%)	2(6.45%)	1(3.23%)	4.11	0.38
Lack of predictability of future carbon regimes e.g. post 2012	2(6.45%)	6(19.35%)	16(51.61%)	6(19.35%)	1(3.23%)	3.98	0.29
Location risks related to local business environment and politics	3(9.68%)	5(16.13%)	13(41.94%)	9(29.03%)	1(3.23%)	3.76	0.39
Challenges in predicting the future cash flows associated with the <u>investment</u>	7(22.58%)	14(45.16%)	8(25.81%)	2(6.45%)	0(0.0%)	3.69	0.67
Difficulty in securing adequate and affordable and sufficiently long <u>term financing</u>	3(9.68%)	13(41.94%)	5(16.13%)	9(29.03%)	1(3.23%)	3.76	0.39

From the study findings majority 13(41.94%) indicated variability in valuation of ERs depending on where, how, and when they were created to great extent. Further majority

15(48.39%) further indicated lack of clarity on certification and quantification methods to great extent. Majority 16(51.61%) of the respondents also indicated lack of predictability of future carbon regimes eg post 2012 to great extent. Furthermore majority 13(41.94%) of the respondents indicated location risks related to local business environment and politics to great extent. Majority 14(45.16%) also indicated challenges in predicting the future cash flows associated with the investment to a great extent. Majority 13(41.94%) also indicated difficulty in securing adequate and affordable and sufficiently long term financing as a factor contributing to the projects structure and market fragmentation risk of CF related projects to a great extent. This implies that investing in carbon finance projects requires high costs and other related inhibiting factors that discourage the potential investors from undertaking investments in carbon related projects.

#### **4.10.3 Results of Factor Analysis of factors contributing to uncertainty of projects returns and market projections**

The objective was to determine whether the respondents views on certain factors contributing to uncertainty of projects returns and market projections. Under factor analysis, the analysis indicates that factors extracted comprised of 71.33% of all factor loadings. Only factors with Eigen value loading greater than 1.0 were extracted. The components included were: variability in valuation of ERs depending on where, how, and when they were created, lack of predictability of future carbon regimes eg post 2012, difficulty in securing adequate and affordable and sufficiently long term financing. The Eigen values which represents the amount of variance explained by each factor and determines the factor loading as noted for Factor was 3.44.



**Table 4.9 Results of Factor Analysis of factors contributing to uncertainty of projects returns and market projections**

<b>Factors</b>	<b>Factor Loading</b>	<b>Eigen-value</b>	<b>%of Variance</b>	<b>Cumulative %</b>	<b>Cronbach alpha</b>
<b>Factors contributing to uncertainty of projects returns and market projections</b>		<b>3.44</b>	<b>29.53</b>	<b>29.53</b>	<b>.78</b>
Variability in valuation of ERs depending on where, how, and when they were created	0.76				
Lack of predictability of future carbon regimes eg post 2012	0.73				
Difficulty in securing adequate and affordable and sufficiently long term financing	0.65				
Challenges in predicting the future cash flows associated with the investment	0.64				

The study further sought to determine the level of agreement of the respondents over statements relating to sustainability of CF investments. The findings were as indicated in Table 4.10.

**Table 4.10 Level of agreement over statements relating to low uptake of CF**

**investments**

<b>Statements relating to low uptake of CF investments</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Mean</b>	<b>Std deviation</b>
<b>Has the government has made key mile stones towards stimulating private sector investments towards investing CF related projects</b>	<b>7(22.58)</b>	<b>13(41.94)</b>	<b>6(19.35%)</b>	<b>3(9.68%)</b>	<b>2(6.45)</b>	<b>3.73</b>	<b>0.66</b>
<b>I agree that the current policy framework is cross sectorial and supportive of investments in CF</b>	<b>5(16.13%)</b>	<b>14(45.16%)</b>	<b>10(32.26%)</b>	<b>2(6.45%)</b>	<b>0(0.00%)</b>	<b>3.66</b>	<b>0.33</b>
<b>The government of Kenya is ready and capable of leading the policy reforms to promote and stimulate investments in this sector</b>	<b>3(9.68%)</b>	<b>5(16.13%)</b>	<b>13(41.94%)</b>	<b>9(29.03%)</b>	<b>1(3.23%)</b>	<b>3.76</b>	<b>0.39</b>
<b>The measurement and certification process of emissions reductions is clear and easily allows planning for future cash flows in CF projects</b>	<b>4(12.90)</b>	<b>13(41.94)</b>	<b>10(32.26)</b>	<b>2(6.45%)</b>	<b>3(9.68%)</b>	<b>2.98</b>	<b>0.98</b>
<b>The adaptation and mitigation technologies for appraisal and management of CF related projects are inadequate to spur interest in this investments</b>	<b>7(22.58%)</b>	<b>14(45.16%)</b>	<b>8(25.81%)</b>	<b>2(6.45%)</b>	<b>0(0.0%)</b>	<b>3.69</b>	<b>0.67</b>

<b>Clear guidance measurement and reporting of investments in CF significantly contribute to challenges affecting Cf projects</b>	<b>3(9.68%)</b>	<b>5(16.13%)</b>	<b>13(41.94%)</b>	<b>9(29.03%)</b>	<b>1(3.23%)</b>	<b>3.76</b>	<b>0.39</b>
<b>Government is not proactive in driving policy reforms to stimulate and catalyze investments in clean energy and CF</b>	<b>2(6.45%)</b>	<b>6(19.35%)</b>	<b>16(51.61%)</b>	<b>6(19.35%)</b>	<b>1(3.23%)</b>	<b>3.98</b>	<b>0.29</b>
<b>Lack of equity in distribution and allocation of climate finance funds at the global level has significantly affected the drive to invest in this projects</b>	<b>4(12.12%)</b>	<b>15(48.39%)</b>	<b>9(29.03%)</b>	<b>2(6.45%)</b>	<b>1(3.23%)</b>	<b>4.11</b>	<b>0.38</b>

From the study findings majority 13(41.94%) agreed that the government has made key mile stones towards stimulating private sector investments towards investing CF related projects. This was attributed to the setting up of the climate innovation centre in Kenya the only one in the region. Majority 14(45.16%) also agreed that the current policy framework is cross sectorial and supportive of investments in CF. Further majority 13(41.94%) of the respondents also agreed that the government of Kenya is ready and capable of leading the policy reforms to promote and stimulate investments in this sector. Majority 13(41.94%) of the respondents also agreed that the measurement and certification process of emissions reductions is clear and easily allows planning for future cash flows in CF projects. Further majority 14(45.16%) of the respondents also agreed that the adaptation and mitigation technologies for appraisal and management of CF related projects are inadequate to spur interest in this investments. Also majority

13(41.94%) of the respondents also agreed that clear guidance measurement and reporting of investments in CF significantly contribute to challenges affecting Cf projects. Majority 16(51.61%) of the respondents were also in agreement that Government is not proactive in driving policy reforms to stimulate and catalyze investments in clean energy and CF. Further majority 15(48.39%) also agreed that lack of equity in distribution and allocation of climate finance funds at the global level has significantly affected the drive to invest in this projects. This implies that the government plays very crucial role in stimulating and boosting investment through provision of stable policies and therefore the government should play a role in encouraging companies to invest in carbon finance investments through provision of better and attracting policies.

#### **4.10.3 Results of Factor Analysis on the Statements relating to low uptake of CF investments**

The objective was to determine whether some certain statements are true about the low uptake of CF investments. Under factor analysis, the factors extracted comprised of (86.67%) of all factor loadings. Only factors with Eigen value loading greater than 1.0 were extracted. The components included were; Has the government has made key mile stones towards stimulating private sector investments towards investing CF related projects, I agree that the current policy framework is cross sectorial and supportive of investments in CF, The measurement and certification process of emissions reductions is clear and easily allows planning for future cash flows in CF projects, The adaptation and mitigation technologies for appraisal and management of CF related projects are inadequate to spur interest in this investments, Lack of equity in distribution and

allocation of climate finance funds at the global level has significantly affected the drive to invest in this projects. The Eigen values which represents the amount of variance explained by each factor and determines the factor loading as noted for Factor was 3.785.

**Table 4.12 Results of Factor Analysis on the Statements relating to low uptake of CF investments**

Factors	Factor Loading	Eigen-value	%of Variance	Cumulative %	Cronbach alpha
<b>Statements relating to low uptake of CF investments</b>		<b>3.785</b>	<b>40.72</b>	<b>40.72</b>	<b>.77</b>
<b>Has the government made key milestones towards stimulating private sector investments towards investing CF related projects</b>	.96				
<b>I agree that the current policy framework is cross sectorial and supportive of investments in CF</b>	0.84				
<b>The measurement and certification process of emissions reductions is clear and easily allows planning for future</b>	0.83				

cash flows in CF projects

**4.6 Regression and Correlation Analysis of Results for initial cost, Risk and return on investment and knowledge gap on valuation and certification.**

The correlation matrix indicates that high initial cost of investment was highly correlated with sustainability (.942) and moderately with risk and return on investment (.565). The carbon finance investment opportunities were highly correlated to initial cost (.816) and risk and return on investment (.866).

**Table 4.6.1 Correlation Analysis between initial cost of investment, Risk and return on investment, knowledge gaps and carbon finance investment opportunities**

Initial cost of investment	Risk and return	Information gap on certification and valuation of projects	CF investment opportunities
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Initial cost of the investment	1			
Risk and return	0.942	1		
Information gap on certification and valuation of projects	0.565	0.452	1	
CF investment opportunities	0.866	0.816	0.643	1

---

Regression analysis is utilized to investigate the relationship between a range of variables, these including an error term, whereby a dependent variable is expressed as a combination of independent or explanatory variables, and "the unknown parameters in the model are estimated, using observed values of the dependent and explanatory variables" (Stoodley, Lewis and Stainton, 1980: 35). Multiple linear regression analysis was the technique used to test the hypotheses. The following represents the regression equation, according to the model used to represent the relationship between carbon finance investment opportunities as a linear function of the independent variables (high initial cost, Risk and return on investment, information gap on valuation and certification of projects), with  $\epsilon$  representing the error term (Stoodley, Lewis and Stainton, 1980: 36):

$$Y_i = a + p_1(IC) + p_2(RI) + p_3(IG) + \epsilon$$

**(Equation 1: Regression Equation)**

Where;  $Y_i$ = carbon finance investment opportunities

IC= Initial cost

RI=Risk and return on investment

IG=Information gap on valuation and certification of projects

$Y_i = a + 0.97 (IC) + 0.94 (RI) + 0.68 (IG) + i$  (**Equation 2: Regression Equation with Beta Values**)

The ps in the above equation represent the estimated parameters as indicated above. Advantages associated with multiple regression analysis are that this process offers a more accurate explanation of the dependent variable in that more variables are included in the analysis, and that the "effect of a particular independent variable is made more certain, for the possibility of distorting influences from other independent variables is removed" (Lewis-Beck, 1986: 47)

**Table 4.14: Regression Model Summary Results of Initial cost, Risk and return on investment, knowledge gaps and carbon finance investment opportunities.**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.867402	0.752386	0.735774	0.8062

Predictors: (Constant), initial cost of investment, Risk and return on investment, knowledge gaps on valuation and certification.

From the results shown above, the model shows a goodness of fit as indicated by the coefficient of determination ( $R^2$ ) with a value of 0.7524. This implies that the independent variables Initial cost of the investment, Risk and return on investment, information gap on valuation and certification of projects explain 75 percent of the variations of carbon finance investment opportunities.

From Table 4.10 the variable 'High initial cost has the most statistically significant coefficient as indicated by a t-ratio of 1.459. This implies that a one unit change in initial cost will change the carbon finance investment opportunities by 1.459 units. There is also a positive relationship between carbon finance investment opportunities and risk and return on investment with a statistically significant coefficient as indicated by a t-ratio of 1.423. A one unit change in return on investment will change the carbon finance investment opportunities by 1.423 units. Valuation and certification is also statistically significant as indicated by a t ratio of 1.246. This implies that the three factors Initial cost of the investment, Risk and return on investment, information gap on valuation and certification have great impact on carbon finance investment opportunities.

**Table 4.15 Regression Results of initial investment cost, Risk and return on investment, knowledge gaps on valuation and certification of projects and carbon finance investment opportunities.**

	Unstandardized Coefficients		Standardized Coefficients	t-values	t-critical	Significant
	Beta	Std. Error				
(Constant)	4.481	5.30		0.912	1.677	0.47:
Initial investment cost	1.421	1.222	0.97	1.459	1.677	0.37:
Risk and returns	1.752	1.324	0.68	1.246	1.677	0.041
Valuation and certification	1.782	1.235	0.94	1.423	1.677	0.034:

NB: T-critical Value 1.677 (statistically significant if the t-value is less than 1.677: from table of T-values).



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter is a synthesis of the entire study, and contains summary of research findings, exposition of the findings, commensurate with the objectives, conclusions and recommendations based thereon.

#### **5.2 Summary of Findings**

The research found that there are many factors that contribute to uptake of carbon finance investment opportunities in Kenya. Among these factors the most prevalent factors were information gaps on certification and measurement of projects, associated risks of CF projects and high initial investment cost. It was interesting to note that the three factors had a coefficient of determination with a value of 0.7524 implying that the three variables explain 75% of variation of uptake in carbon finance investment opportunities in Kenya.

Among the three factors analysed in detail information gap had the highest factor loading of 0.8 while High initial cost had the most statistically significant coefficient as indicated by the T ratio of 1.459. The study also deduced that investment uptake of CF projects was highly correlated to initial cost of investment and the associated risks and return posting a coefficient of 0.866 and 0.816 respectively.

three factors had a coefficient of determination with a value of 0.7524 implying that the three variables explain 75% of variation of uptake in carbon finance investment opportunities in Kenya.

Among the three factors analysed in detail information gap had the highest factor loading of 0.8 while High initial cost had the most statistically significant coefficient as indicated by the T ratio of 1.459. The study also deduced that investment uptake of CF projects was highly correlated to initial cost of investment and the associated risks and return posting a coefficient of 0.866 and 0.816 respectively.

The study also concluded Lack of equity in distribution and allocation of climate finance funds at the global level has significantly affected the drive to invest in these projects among the companies in Kenya.

### **5.2.1 Business view of carbon finance as an alternative viable investment options to channel funds**

Knowledge and information being very crucial in investment opportunities, the study found it paramount to establish from the respondents if they had knowledge about carbon finance investments opportunities that are available. From the study findings majority indicated that they were knowledgeable about the available investment opportunities in carbon finance projects. It was interesting to note from the respondents that 72% of the companies interviewed had considered undertaking a CF project however the projects do not finally take off.

## **5.2.2 Factors contributing to low uptake of CF investment opportunities in Kenya**

The study sought to determine the factors affecting the uptake of carbon finance investments opportunities in order to provide an insight of why many companies had not actualized the investment. From the Findings majority of the respondents indicated the following high initial investment costs, associated project risks and information gaps on valuation and certification of carbon projects are the key factors contributing to uptake of carbon projects. The three factors contributed to more that 75% on the level of uptake of carbon related projects with initial cost and associated risks having a correlation coefficient of more that 0.8 to the level of uptake of carbon projects in Kenya. The study explained the factors contributing to uptake of CF investment projects as follows

$$Y_i = a + 0.97 (IC) + 0.94 (RI) + 0.68 (IG) + e$$

Where;  $Y_i$ = carbon finance investment opportunities

IC= Initial cost

RI=Risk and return on investment

IG=Information gap on valuation and certification of projects

## **5.2.3 Major challenges affecting the entry of Kenyan companies towards tapping of the funds from climate investment fund on carbon finance**

While the study concluded that the government is proactive in driving policy reforms to stimulate and catalyze investments in clean energy and CF projects (with only 26% of the respondents giving a negative answer) it also noted that 61% believe that there is no equity in distribution of global carbon funds. It follows that lack of equity in distribution

and allocation of climate finance funds at the global level significantly affects the drive to invest in these projects. This implies that the government needs to play a very crucial role in stimulating and boosting investment through provision of stable policies and opening up opportunities to attract a reasonable share of the global carbon fund through public and private partnership.

### **5.3 Conclusions**

As far as factors contributing to low uptake of carbon finance investment opportunities in Kenya the study concludes that High initial investment cost, associated project risks and information gaps on valuation and certification of carbon projects to be the key factors that contribute to the uptake of carbon investment opportunities.

Concerning major challenges affecting the entry of Kenyan companies towards tapping of the funds from climate investment fund on carbon finance the study concludes that there is no equity in distribution and allocation of climate finance funds at the global level. Finally the lack of predictability of future carbon regimes is also a challenge affecting the companies in making investment decisions on accepting investment opportunities among companies in Kenya.

### **5.4 Recommendations**

From the study findings the study recommends that if a serious step has to be made in Kenya towards up scaling the uptake of carbon finance opportunities the following issues need to be addressed;

Investments at both national and organisation level on information gathering and dissemination among key decision makers and strategy formulators (including finance -lanagers, investment managers and business leaders) to demystify the myths around certification of projects and valuation of CERs. This trainings and information sharing will empower investment managers with adequate knowledge on the valuation and certification procedures for carbon related projects to empower them objectively appraise carbon related projects and investments opportunities.

The associated risks of **CF** projects are perceived to be higher than normal consequently there is need to develop the financial markets more to avail adequate funding for carbon related projects in addition to developing insurance products to cover investments risk in **CF** projects to motivate companies to invest in this projects.

The study also concluded that there are high costs of initial investments and such funds are not easily available in the market at affordable costs for business. To further develop this industry the government should consider offering guarantee for companies willing to invest in these projects this will significantly reduce the costs of borrowing by companies to finance **CF** projects. It would also be wise for the government to set up a revolving fund to finance **CF** projects which could be raised through issuing **CF** bonds hence ensuring that investors are able to access affordable insured funding to invest in these projects given the long project life's of **CF** projects.

In attempt to build public knowledge on carbon finance investment opportunities in Kenya the study recommends that the country adopts an all inclusive program involving

- irriculums to develop a culture and body of knowledge on this industry and promote the uptake of opportunities in carbon related projects in the in the long run.

## **5.5 Study limitations**

The study was limited to listed companies operating in manufacturing energy and agricultural sectors and the study variables were analysed for these companies only to provide an insight on the overall economy. It would have been important to expand the scope and assess the overall economy cutting across various sectors including financial services that are key in providing the capital for such investments

In addition the study was focusing on finance managers and investment managers only. However major investment decisions involving huge capitals outlays are not only made by this groups; most are and are board issues often approved by the board of directors, it would have been important to targets all key people involved in making investment decisions for companies including CEOs and board members. The study could have also been enriched by widening the scope of the respondents to cover government agencies, and other development partners like work bank who are key players in the industry. This was not possible due to the limited time of study and the financial resources required for such a study that could cut across various industries.

## REFERENCES

**Auden Schendler (2010) "When do increasing carbon taxes accelerate global warming?"**

**A note on the green paradox.**

**Bloomberg energy finance (2010) " Bloomberg Energy Finance summit news" Retrieved from <http://www.bloomberg.com/bnet/summit>.**

**Belfer Centre for Science and International Affairs, Harvard Kennedy School (2009) Climate Finance, "Policy brief", *Harvard project on climate agreements*, November 2009**

**Carbon Finance (2010) "Carbon Fund Managers upbeat on 2010" Retrieved from [www.carbon-financeonline.com](http://www.carbon-financeonline.com).**

**Christophe de Gouvello, Felix B. Dayo, and M Thioye (2008) "Low-carbon Energy Projects for Development in Sub-Sahara Africa" *Unveiling the Potential, Addressing the Barriers*.**

**Chevallier Julien (2011) "Detecting instability in the volatility of carbon prices" *Energy Economics*; Vol 33 issues 1 p 99 to 110**

**Catherine Mei Ling (2011) *Facing the storm through the market; harnessing carbon markets to power southeast Asia's green development***

**David d, S bucker and F Sweeney (2008) *Researching online***

**Daviet Florence (2009) "Beyond Carbon Financing: *The role of sustainable development policies and measures in REDD*.**

**De Coster J (1998) *Overview of factor analysis, pg 12***

David d, S bucker and F Sweeney (2008) Researching online

Daviet Florence (2009) "Beyond Carbon Financing: *The role of sustainable development policies and measures in REDD.*

De Coster J (1998) Overview of factor analysis, *pg 12*

Glemarec Yannick (2011) "Catalyzing Climate Finance" *A Guidebook on Policy and Financing Options to Support Green, Low-Emission and Climate-Resilient Development.* United Nations Development Programme, New York, NY, USA

Gunther Marc (2008) Carbon Finance Comes of Age. *Fortune*, 00158259, 4/28/2008, Vol. 157, Issue 8

Hamilton K, Sjardin, M, Marcello, T and G Xu. (2008). "Forging a Frontier": *State of the Voluntary Carbon Markets, Ecosystem Marketplace and New Carbon Finance*

Hugh coolican (2004) Research methods and statistics in Psychology *pg7*

International Energy Agency (2009). *World Energy Outlook 2009.* Paris.

Joseph Nganga, antony Lampkin, Paul Scott (2012) "*Climate Innovation Centre Kenya*" business plan 2012

Jannele Knox H (2009) The developing carbon financial service industry: expertise, adaptation and complementarity in London and New York: *Journal of economic geography* Nov2009, Vol. 9 Issue 6,

JP Morgan (2008) press release: leading wall street banks establish the carbon principles. Available online [www.ipmorgan.com/pages/ipmoruan/news/carbonprinciDlcs](http://www.ipmorgan.com/pages/ipmoruan/news/carbonprinciDlcs)

KYOTO Protocol (1998) The united nations framework convention on climate change (UNFCCC)



- Laan, Tara (2010): **"The importance of transparency in accelerating the reform of fossil-fuel subsidies."** *Untold Billions: Fossil-fuel Subsidies, Their Impacts and the Path to Reform*. Geneva International Institute for Sustainable development
- MC Givern (2003) "The practice of market and social research" *an introduction*
- Nepstad, D.C., et al. (1999). "Large-scale impoverishment of Amazonian forests by **logging and fire**". (*Nature* 398:505-8.)
- Nicholas Walliman (2010) Your research project second edition.
- Organisation for Economic Co-operation and Development (2005). *Environmental fiscal reform for poverty reduction: OECD Guidelines and Reference Series*. Paris.
- Organisation for Economic Co-operation and Development (2009). TGHG Mitigation Actions: MRV Issues and Options. Paris.
- Pfeifer Gregor (2008) "Carbon finance in Africa" *a policy paper for the Africa partnership forum*
- Tennigkeit, T. and Wilkes, A. (2008). "An Assessment of the Potential for Carbon Finance in Rangelands". *Working Paper no. 68*.
- United Nations Framework Convention on Climate Change Secretariat (2007). *Investment and Financial Flows to Address Climate Change*.
- Ward, Murray (2010). *Engaging Private Sector Capital at Scale in Financing Low-Carbon Infrastructure in Developing Countries*. Auckland Global Climate Change Consultancy.
- World Bank (2005). Environmental Fiscal Reform: *What Should Be Done and How to Achieve It*. Washington D.C.
- World Bank (2010) "carbon finance for sustainable development" 2010 annual report.

World Bank (2010). *The Economics of Adaptation to Climate Change*. Washington D.C.

World Business Council (2010) "Vision 2050", *The new agenda for business*" available on line <http://www.wbcsd.org/web/vision2050.htm> (retrieved on 16 July 2012)

World Bank Group (2011) "Kenya economic update" December 2011 edition 5.

Zeng and S. Zhang, "*Literature Review of Carbon Finance and Low Carbon Economy for Constructing Low Carbon Society in China*" *Low Carbon Economy*, Vol. 2 No. 1, 2011 available online <http://www.SciRP.org/journal/lce>

**QUESTIONNAIRE**

**FACTORS CONTRIBUTING TO LOW UPTAKE OF CARBON FINANCE**

**TRADE INVESTMENTS AND OPPORTUNITIES IN KENYA**

**SECTION A: Background Information**

1. What is the name of your organization?

2. Current Position/title\_

3. Management level

Senior management [ ] Middle level management [ ]

4. What is the size of your company/business

a) Turn over

Less than 500m                      500 M to 2B    2B to 5b                      5 to 10    above

10B

[ ]                      [ ]                      [ ]                      [ ]

b) Assets value

Less than 500m                      500 M to 2B    2B to 5b                      5 to 10

above 10B

[ ]                      [ ]                      [ ]                      [ ]                      [ ]



9 Have you participated in any senior management discussion on the possibility of investing in CF in the last 1 year

Yes [ ] No [ ]

If no,

10. Has your company considered undertaking any major investments in CF/related projects over the last 3 years

Yes [ ] No [ ]

If no,

11. What do you think was the main reason why you have not undertaken a major project in CF

12. How would you rate the following as contributing factors for the low uptake of such projects in your company

<b>Factors leading to low uptake of CF investments opportunities</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Knowledge gaps					
High initial investment cost					
Availability of other better investment options					
Associated risk of CF related projects					
Lack of willing financiers to fund the investments					

**13. Do you think that lack of adequate information about clean technologies and how to implement has significantly contributed to low investments or lack of interest by your company**

<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>strongly agree</b>
[ ]	[ 1	[ 1	t ]	[ 1

**14. Cost of the initial investments on CF related projects is often high and inhibitive to CF projects in relation to the associated risks.**

<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>strongly agree</b>
[ ]	[ ]	[ ]	t ]	M

**15. The available mitigation factors for the significant risks associated with the marketing of CF credits are inadequate to insure investors and catalyze desire for such investments**

<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>strongly agree</b>
[ ]	[ ]	[ ]	I ]	M

**16. If there were adequate policies and covers provided by insurance companies and the government on CF related projects I would increase the possibility of considering making investments in CF projects**

<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>strongly agree</b>
[ ]	[ ]	[ ]	[ ]	M

~ Do you have a green champion/active promoter of CF projects in your organisation

Yes [ ] No [ ]

18. A green champion/ active promoter of CF projects is a key position and would boost the understanding and scoping of CF related projects in any business

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ ]	[ ]	[ 1	[ 1	M

19. Risk profiling of investment options is similar irrespective of the nature of the investment

Yes [ ] No [ ]

20. How would you rate the associated risks in CF projects as an investment option

Very high	high	normal	low	very low
[ ]	[ ]	[ ]	[ ]	M

21. The key significant risk associated with CF projects is its structure and market fragmentation for the future sales and unpredictability of future carbon regimes.

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ ]	[ ]	[ 1	[ 1	M

22. How do you rate the following factors that contribute to the projects structure and market fragmentation risk of CF related projects

<b>Factors contributing to uncertainty of projects returns and market projections</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Variability in valuation of ERs depending on where, how, and when they were created					
Lack of clarity on certification and quantification methods					
Lack of predictability of future carbon regimes eg post 2012					
Location risks related to local business environment and politics					
Challenges in predicting the future cash flows associated with the investment					
Difficulty in securing adequate and affordable and sufficiently long term financing					

23. The organisation I work for has adequate capacity to assess and evaluate opportunities and associated risks in CF projects

Yes  No

24. Has the government has made key mile stones towards stimulating private sector investments towards investing CF related projects

Strongly disagree  Disagree  Neutral  Agree  strongly agree



25.1 agree that the current policy framework is cross sectorial and supportive of investments in CF

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ ]	[ ]	[ 1	[ 1	[ 1

26. The government of Kenya is ready and capable of leading the policy reforms to promote and stimulate investments in this sector

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ ]	[ ]	[ ]	M	[ 1

27. The company I work for has adequate technical skills to install and operate and maintain CF projects

Yes [ ] No [ ]

28. The measurement and certification process of emissions reductions is clear and easily allows planning for future cash flows in CF projects

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ i	t i	t ]	1 1	n

29. The adaptation and mitigation technologies for appraisal and management of CF related projects are inadequate to spur interest in this investments

Strongly disagree	Disagree	Neutral	Agree	strongly agree
[ ]	[ ]	[ ]	[ ]	M

30. Clear guidance measurement and reporting of investments in CF significantly contribute to challenges affecting Cf projects

Strongly disagree	Disagree	Neutral	Agree	
strongly agree				
[ ]	[ ]	[ 1	[ 1	M

31. Government is not proactive in driving policy reforms to stimulate and catalyze investments in clean energy and CF

Strongly disagree	Disagree	Neutral	Agree	
strongly agree				
[ ]	[ ]	t ]	[ 1	[ 1

32. Lack of equity in distribution and allocation of climate finance funds at the global level has significantly affected the drive to invest in this projects

Strongly disagree	Disagree	Neutral	Agree	
strongly agree				
[ ]	[ ]	[ ]	[ ]	[ ]

*Thank you for your co-operation*