

**AN EXPLORATORY ASSESSMENT OF THE OPPORTUNITIES AND
CHALLENGES OF CARBON TRADING IN TANZANIA**

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**A DISSERTATION SUBMITTED IN FULFILMENT OF THE
REQUIREMENTS FOR THE MASTERS DEGREE IN BUSINESS
ADMINISTRATION OF THE OPEN UNIVERSITY OF TANZANIA**

2014

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the University of Dar es Salaam a dissertation *titled “An exploratory assessment of the opportunities and challenges of carbon trading in Tanzania”* in partial fulfillment of the requirement for degree of Masters of Business Administration (Marketing) of The Open University of Tanzania

.....
Professor B.A.T Kundi
(Supervisor)

.....
Date

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DECLARATION

I, Everline Mark Kihulla, do hereby declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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Signature

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Date

DEDICATION

I dedicate my heartfelt thanks to the members of my family for their moral and material support that made this study possible.

ABSTRACT

The study assessed the opportunities and challenges for carbon trading in Tanzania. Specifically, the study analyzed the current situation of carbon trading in Tanzania in terms of awareness and knowledge available, assessed opportunities available for carbon trading, challenges facing carbon trading business and measures to enable Tanzania benefit from carbon trading opportunities. A sample of 60 respondents was selected from the selected carbon dealings institutions. Data were collected through questionnaires, documentation and interviews. Questionnaires were analyzed using the Software Package for Social Sciences (SPSS). The study findings reveal that many carbon trading personnel have little knowledge on the carbon business and negatively impacted business development and its prosperity. It further suggests that carbon trading protect green house gaseous in Tanzania. Also, the study found the availability of weak training on carbon trading business for imparting knowledge of carbon markets in Tanzania. Moreover, the study reveal that Tanzania lack enough carbon projects which limit its development. Also, poor regulations and technologies were a stumbling block in the growth of carbon investment in Tanzania. Likewise, carbon capture and storage are important elements for the effective carbon trading in Tanzania. The study suggests the following measures in order to improve carbon trading in Tanzania. These include creating a flexible and efficient market for carbon reduction and emphasize on the financial institutions to invest in carbon trading. The findings show policy and practical implications on carbon trading. One of the policy implications is that government should prepare policy which will tackle carbon emissions. This can be done through encouraging carbon trading. Also, carbon

trading business should be market driven and the government should let the business be driven by market forces.

ACKNOWLEDGEMENT

My interest in energy and environmental issues, especially from an institutional approach, owes great thanks to my supervisor Professor B.A.T Kundi. He has been an inspiring professor and a supervisor, and through his supervision he has encouraged me to meet challenges thus enhancing my academic understanding, and critical approach to this complex field.

I am also very grateful to my interviewees who took their time in a busy schedule to share their insights with me. This has greatly enhanced the analysis and discussion in my dissertation.

Lastly I want to thank my husband Mr. Frank John Mwakisonga for his patience and encouragement throughout my study as well as my late father Mr. Mark Kihulla who was not tired to support me during my study as well as my children Patrick Frank John and Mark Frank John for motivation and supporting house works while doing my Master degree.

LIST OF ABBREVIATIONS

AFOLU	-	Agriculture, Forestry and Land Use
C	-	Carbon
CDM	-	Clean Development Mechanism
CERs	-	Certified Emission Reductions
CSR	-	Corporate social responsibility
CCS	-	Carbon Capture and Storage
DAT	-	Dynamic awareness theory
EU ETS	-	European Union's Emissions Trading Scheme
GHG	-	Green House Gases
JI	-	Joint Implementation
MBA	-	Master of Business Administration
MEM	-	Ministry Of Energy and Minerals
MtCO ₂ e	-	Million tons of Carbon dioxide or equivalent
Mg	-	Milligram
OUT	-	Open University of Tanzania
PCT	-	Personal Carbon Trading
REDD	-	Reducing Emissions from Deforestation and Forest Degradation
TNRF	-	Tanzania Natural Resource Forum
TCO ₂	-	Tons of Carbon dioxide
UDSM	-	University Of Dar Es Salaam
UN	-	United Nations
VER	-	Verified Emission Reduction
VPO	-	Vice President Office

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CHAPTER ONE

1.0 INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter presents background information to the study, statement of the problem, objectives of the study, research questions, significant of the study and organization of the study.

1.2 Background to the Study

Over the past decade, carbon trading has emerged as the centerpiece of official efforts to address global warming (Cutajar, 2004). Hence, corporations, financial institutions, academics, governments, United Nations agencies and some environmentalists came to promote a neo-liberal, market-based approach to climate change emanating from the United States (Graham-Rowe, 2005). Neo-liberal, market-based approach to climate change had an increasing influence on policy development, particularly environmental governance, heralding a restructuring and rescaling of state and use of regulation (Plastow, 2010). Carbon trading is a complex system which sets itself a simple goal of making it cheaper for companies and governments to meet emissions reduction targets (Gilbertson and Reyes, 2009). The emissions trading are designed in such a way that the targets can generally be met without actual reductions taking place.

Carbon trading takes two main forms of ‘cap and trade’ and ‘off setting’. Under the scheme ‘cap and trade’, governments or intergovernmental bodies like the European

Commission hand out licenses to pollute (or ‘carbon permits’) to major industries (Radanne *et al.*, 2010). Instead of cleaning up its act, one polluter can then trade these permits with another who might make equivalent changes more cheaply. This is the approach underlying the European Union’s Emissions Trading Scheme (EU ETS), the world’s largest carbon market, which was worth US\$ 63 billion in 2008 and continues to expand rapidly (Graham-Rowe, 2010).

The second type of carbon trading is off setting. Instead of cutting emissions at source, companies, and sometimes-international financial institutions, governments and individuals, finance emissions-saving projects outside the capped area (Gilbertson and Reyes, 2009). UNEP (2009) reported the UN-administered Clean Development Mechanism (CDM) to be the largest such scheme. It was reported to have almost 1,800 registered projects as of September 2009, and over 2,600 further projects awaiting approval. Based on current prices, the credits produced by approved schemes could generate over US\$ 55 billion by 2012 (UNEP, 2009).

In theory, both cap and trade (with auctioned permits) and carbon taxes achieve a similar level of efficiency by reaching the abatement level targeted at a minimum cost (Viard, 2009). Carbon taxes a tax on fossil fuels, especially those used by motor vehicles, intended to reduce the emission of carbon dioxide. However, the two instruments differ in design. A cap-and trade-scheme sets a limit (cap) on emission levels and allows the price of the emissions (in this case CO₂) to vary. Carbon tax, on the other hand, puts a price on emissions, but allows the emission levels to change.

Carbon tax can be increased if the emission levels are still too high, whereas permits are allocated for the duration of a cap-and-trade scheme (Kasterine and Vanzetta, 2010).

Furthermore, although off sets are often presented as emissions reductions, they do not reduce emissions. Even in theory, they at most merely move ‘reductions’ to where it is cheap to make them, which normally means a shift from northern to southern countries. Pollution continues at one location on the assumption that an equivalent emissions saving will happen elsewhere. The projects that count as emissions savings range from building hydro-electric dams to capturing methane from industrial livestock facilities (Gilbertson and Reyes, 2009). The carbon savings are calculated according to how much less greenhouse gas is presumed to be entering the atmosphere than would have been the case in the absence of the project. But even the World Bank officials, accounting firms, financial analysts, brokers and carbon consultants involved in devising these projects often admit privately that no effective ways exist to demonstrate that it is carbon finance that makes the project possible (Lohmann, 2005).

Carbon trading lies at the centre of global climate policy and is projected to become one of the world’s largest commodity markets. However, carbon trading has a disastrous track record since its adoption as part of the Kyoto Protocol (Gilbertson and Reyes, 2009). How carbon trading works and why it fails outlines the limitations of an approach to tackling climate change which redefines the problem to fit the assumptions of neoliberal economics. It demonstrates that the EU emissions trading

scheme, the world's largest carbon market, has consistently failed to cap emissions, while the UN's CDM routinely favours environmentally ineffective and socially unjust projects. This is illustrated with case studies of CDM projects in Brazil, Indonesia, India and Thailand.

Gilbertson and Reyes (2009) reported that UN climate talks in Copenhagen discussed ways to expand the trading experiment, but the evidence suggests it should be abandoned. From subsidy shifting to regulation, there is a plethora of ways forward without carbon trading but there are no short cuts around situated local knowledge and political organizing if climate change is to be addressed in a just and fair manner (Mwampamba, 2007). Tanzania is already carrying out a range of low carbon projects. However, there is scope to do more, as illustrated in this analysis, in particular taking advantage of carbon financing opportunities (Mwampamba, 2007).

Key opportunities highlighted include improved production and use of biomass energy to safeguard forest resources. linked to REDD funding, the economy wide benefits of such a move could be significant. TNRF (2008) further argues that REDD funding would have strong co-benefits such as reducing health impacts to households, saving fuel costs, developing the local manufacturing economy and safeguarding biodiversity and associated forest industries as well as switching to modern fuels in the household sector. Due to forecast demand growth, switching to modern fuels such as LPG is an important part of the solution for safeguarding forests, and reducing emissions. Co-benefits include cleaner, modern energy for cooking particularly for a growing urban population.

Likewise, several key trends are evident with respect to voluntary carbon markets and community based forestry initiatives and objectives at present in Tanzania (TNRF, 2008). First, the voluntary carbon market has grown rapidly in recent years, more than doubling annually since 2005. This growth has been driven primarily by the expanding demand for carbon reduction mechanisms in Europe and North America. The vast majority of these carbon credits (quantifiable and saleable carbon emission reductions) come from a range of energy efficiency or energy use reduction projects. Forestry projects are difficult for a number of reasons, including challenges in measuring the amount of carbon sequestered and assuring the permanence of the reduction in carbon emissions resulting from forest growth (TNRF, 2008).

Tanzania needs additional investment to facilitate growth that is more sustainable than the current pathway (SEI, 2010). This could be achieved through using financing mechanisms that provide funding for projects and programmes where greenhouse gas (GHG) emissions reductions can be demonstrated. In addition to reducing carbon, many of these options could lead to more sustainable growth through protecting natural resources, improving environmental quality, delivering economic opportunities and reducing reliance on fossil imports (SEI, 2010).

1.2 Statement of the Problem

Tanzania has been slow in accessing the international carbon finance markets to date, with only one project registered under CDM and only recent uptake of voluntary credit schemes in the forestry sector (Watkiss & Hope, 2011). Commercial banks seem currently unwilling to lend to carbon projects due to the track record in

implementation to date (Radanne *et al.*, 2010; Zhang, *et al.*, 2013). One of the challenges of carbon trading is the mismatch between the short term domestic deposit base and the long term tenor required for capital intensive projects which creates a role for international financial institutions (Watkiss & Hope, 2011). Other challenge is measuring the amount of carbon sequestered and assuring the permanence of the reduction in carbon emissions resulting from forest growth. The opportunity to access carbon financing could help Tanzania to invest more in sustainable technologies and ensure that some of the current problems can be addressed (DFID, 2010). This could raise much needed finance while at the same time supporting domestic priorities and moving towards a more sustainable pathway (DFID, 2010).

The literature surveyed shows the opportunities, uncertainties' and risk associated with carbon trading (Grover *et al.*, 2010). TNRF (2008) revealed voluntary carbon market to grow rapidly in recent years, more than doubling annually since 2005 being driven primarily by the expanding demand for carbon reduction mechanisms in Europe and North America. The study shows the scant of literature on carbon trading in Tanzania. Therefore this has created information gap and hence attracted interest of conducting an exploratory assessment on opportunities and challenges for carbon trading in Tanzania.

1.3 Research Objectives

This study was conducted in order to achieve the set objectives. The objectives were of two types i.e. general and specific objectives.

1.3.1 General Objective

The general objective of this study is to assess the opportunities and challenges for carbon trading in Tanzania.

1.3.2 Specific Objectives

- i) To analyze the current situation of carbon trading in Tanzania in terms of awareness and knowledge available
- ii) To assess the opportunities available for carbon trading in Tanzania
- iii) To assess the challenges facing carbon trading business in Tanzania;
- iv) To recommend measures to enhance Tanzania's benefit from Carbon trading opportunities

1.4 Research Questions

- i) To what extent people are aware on the carbon trading business in Tanzania?
- ii) What are the opportunities available for carbon trading in Tanzania?
- iii) What are the challenges facing carbon trading business in Tanzania?
- iv) What are the possible measures to enhance Tanzania's in benefiting from carbon trading opportunities?

1.5 Relevance of the Research

The study findings are expected to assist in conducting an exploratory assessment on opportunities and challenges for carbon trading in Tanzania. The study is expected to make contributions to the expanding literature on issues related to carbon trading in Tanzania. Results from the study have significance to academia, extension of

knowledge frontier to policy makers. The study will fulfill my academic need of acquiring Masters of Business Administration (MBA). This dissertation will also be used as an important reference material to other academicians who will use the research document for further research.

Furthermore, the study is expected to provide knowledge on the carbon trading in Tanzania. The research findings are` also expected to raise some carbon trading in Tanzania which should be addressed by carbon producers and users in Tanzania. Similarly, the study will also benefit policy makers, non-governmental organizations, civil society organizations and community based organizations in policy making process and advocacy in the area related to carbon trading in Tanzania.

1.6 Study Scope and De-Limitations

The limitation of this study was expected to emanate from one reason or the other. The research didn't cover the whole country; rather it focused only in Dar es Salaam region. However, this was addressed by drawing a representative sample from the Ministry of energy and minerals, Vice President Office (Division of environment), Non – Governmental organizations, Institutions /Colleges and Private/Individual companies engaged in carbon projects based in Dar es Salaam.

Furthermore, there are other limitations such as finance which was addressed through soliciting funds from family members. Finally, human resource was another limitation as the research was carried out by a single person. In this case the sample size was limited to a manageable size by the researcher.

1.7 Organization of the Study

This study is composed of five chapters. Chapter One presents the introduction and background of the study. It presents the statement of the problem, objective of the study, research questions, and significance of the study, limitation of the study as well as the organization of the study. Chapter Two presents literature review on the topic under the study. It first provides the definition of the key concepts related to the study. It further presents the theories related to the study, the empirical studies and the conceptual framework of the study. Chapter Three presents design and methodology used in the study. It explains the area of the study, the population, the sampling design, and data collection instruments and data analysis plan. Chapter Four is the heart of the study. It presents the data, analysis and discusses the findings of the study as per research objectives. Chapter Five presents summary, conclusions and offers recommendations. It also shows areas for further studies.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review which is related to the study. It first, defines key concepts of the study, provides theoretical reflections of the study, empirical studies and the conceptual framework guiding the study.

2.2 Conceptual Definitions

This section provides overviews of different concepts including carbon, carbon trading and clean development mechanism.

2.2.1 Carbon Trading

Carbon trading is a complex system which sets itself a simple goal to make it cheaper for companies and governments to meet emissions reduction targets (Gilbertson and Reyes, 2009). It includes allowance-based agreements that impose national caps on emissions and allow participating countries to engage in emission trading as well as project-based transactions (for example, through the CDM or voluntary based projects). Gilbertson and Reyes (2009) hold that carbon trading lies at the centre of global climate policy and are projected to become one of the world's largest commodity markets.

2.2.2 Clean Development Mechanism

This is one of the key components of the Kyoto protocol with the purpose of helping developing countries to achieve sustainable development and assist industrialized

countries in complying with their emission reductions commitments. The CDM, defined in Article 12 of the protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets (United Nations, 2006).

2.3 Theories Related to the Study

This section presents theories which are relevant to this study. These include: - Economic Theory, Dynamic Awareness Theory, Social Development Theory and Diffusion Theory.

2.3.1 Economic Theory

This theory was developed by J.H. Dales of the University of Toronto and Thomas Crocker of the University of Wisconsin. The theory suggests that although prices and pollution levels should largely be controlled by the market, overall pollution limits would have to be set by governments. So pollution trading was seen as a way of making it as cost-effective as possible for businesses to comply with an emissions target set by the state (Lohmann, 2006).

2.3.2 Dynamic Awareness Theory (DAT)

DAT offers an alternative to explaining the creation of awareness in distributed work groups. It highlights the important role of users and social practices in awareness creation. The theory further points to the dynamic nature of awareness creation:

Awareness emerges over time and depreciates when not being actively attended by the users. Awareness develops gradually over time, meaning different levels of awareness can exist (Reimer and Haines, 2008). Awareness from this point of view assists carbon trading to be known to the stakeholders. Therefore, dynamic awareness was relevant in explaining opportunities and challenges available on carbon trading in Tanzania.

2.3.3 Social Development Theory

Social development theory consists of two interrelated aspects, learning and application. Society discovers better ways to fulfill its aspirations and it develops organizational mechanisms to express that knowledge to achieve its social and economic goals. The process of discovery expands human consciousness. The process of application enhances social organization.

2.3.4 Diffusion Theory

Diffusion of innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. Everett Rogers, a professor of rural sociology, popularized the theory in his 1962 book *Diffusion of Innovations*. He said diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. The origins of the diffusion of innovations theory are varied and span multiple disciplines.

2.4 The way forward For the Reviewed Theories

The above reviewed theories provide important inputs in assessing of the opportunities and challenges of carbon trading for Tanzania. The theories were used

in this study to show the linkage and relation between the different issues on carbon business. As may be seen the theories suggest prices and pollution levels should largely be controlled by the market forces while pollution limits would have to be set by governments.

2.5 Empirical Studies

This section presents literature reviewed in relation to the challenges and opportunities of carbon trading. It covers general literatures as well as literatures related to the developing countries including Tanzania.

2.5.1 World Related Studies

Starkley (2011) conducted a study on personal carbon trading through a critical survey. He urged that in recent years, there has been considerable discussion within UK climate policy circles regarding the appropriateness of personal carbon trading as an instrument for greenhouse gas emission reduction. His study was the first in a two-part survey of personal carbon trading (PCT), the term used here to describe proposed (sub-) national greenhouse gas emission trading schemes under which at least some emissions rights were allocated to and surrendered by individuals. After introducing the various proposed PCT schemes, the study compared, in terms of equity, the two most-discussed PCT schemes with two alternative emission trading schemes and a carbon tax.

The study has two key findings of having strong arguments that the equal per capita allocation proposed under some instruments is not completely fair while the second

argument is that the five instruments compared could be equivalent in terms of their equity. Along with equity, efficiency and effectiveness made up three key criteria for comparing environmental policy instruments. As PCT has no advantage in terms of equity, the study concluded that any case for PCT depended on it having advantages in terms of efficiency and/or effectiveness. However, the study was conducted in a different and well developed setting where this study was conducted in Tanzania which is a developing country.

Thomson and Khare (2008) presented an overview of Canada's experience with Carbon Capture and Storage (CCS) initiatives. The study examined the success Canada has had with carbon capture and storage and the reasons for being advantageous for Canada and hence make it part of their environmental sustainability effort. The study also discussed the barriers and challenges in carbon capture and storage deployment. The study ended with some speculation about how the technology could be adopted quickly if some organizations were more proactively involved with it. Carbon capture and storage had a potential to change how they reduced their greenhouse gas (GHG) emissions in the future. However, it has a long way to go as organizations start adopting it and unanswered questions get answered in the process. It certainly is a technology worth looking at as it can affect our future climate change initiatives. However, the study was conducted in a different and well developed setting hence the need to conduct our study in Tanzania.

Whitmarsh *et al.*, (2011) assessed public engagement with carbon and climate. They argued that the relevance of climate change for society seemed indisputable.

Scientific evidence pointed to a significant human contribution in causing climate change and impacts which were increasingly affecting human welfare. In order to meet national and international greenhouse gas (GHG) emissions reduction targets, there was an urgent need to understand and enable societal engagement in mitigation. However, previous researches indicate that this involvement was currently limited although awareness of climate change was widespread, understanding and behavioral engagement was far lower.

Furthermore, proposals for mitigative 'personal carbon budgets' implied a need for public understanding of the causes and consequences of carbon emissions, as well as the ability to reduce emissions. However, little has been done to consider the situated meanings of carbon and energy in everyday life and decisions. This study was built on the concept of 'carbon capability', a term which captured the contextual meanings associated with carbon and individuals' abilities and motivations to reduce emissions. They presented empirical findings from a UK survey of public engagement with climate change and carbon capability, focusing on both individual and institutional dimensions.

These findings highlighted the diverse public understandings about 'carbon', encompassing technical, social, and moral discourses; and provide further evidence for the environmental value-action gap in relation to adoption of low-carbon lifestyles. The study concluded that while carbon education may remove informational (and to a lesser extent, motivational) barriers to behavior change, structural measures are also required to encourage lifestyle change and enable

participation in broader social change. This research represents an initial investigation. The study focused on carbon business in different contextual setting from Tanzania.

Samek *et al.*, (2011) wrote a paper on in pang of carbon bank in Northeast Thailand looking at the community effort in carbon trading from agro forestry projects. They argued that C was a new commodity that was traded in financial markets. Also, there was potential for farmers in adopting agro forestry to sell C in addition to traditional timber and non-timber agro forestry commodities. Implementing agro forestry, C offset projects was a challenging task. However, it requires new, market-approved, C accounting methods that reduced transaction costs. The study described the Inpang Carbon Bank project in Northeast Thailand developed through collaboration between the Inpang Community Network, scientists at the department of forestry, Michigan State University (USA), Mahasarakham University (Thailand) and colleagues at the national research council of Thailand. Under this project a new protocol was developed, which was in review by the Chicago Climate Exchange, besides an on-line C offset monitoring, verification, and reporting management system, called Carbon2Markets. A cost recovery analysis for the Inpang Carbon Bank smallholder teak (*Tectona grandis* L.f.) offset project showed that C would have to be sold at a value not less than US\$1.66 per Mg CO₂.

FAO (2010) researched on carbon finance possibilities for agriculture, forestry and other land use projects in a smallholder context. The study was intended to guide extension service advisors and institutions who worked with small-scale farmers and

foresters with an interest in carbon finance and carbon projects. Its aim was to support setting-up carbon projects which involved small-scale farmers. Their participation allowed them to be involved in the development and implementation of the project, influence the design of the project to generate positive impacts for the farmers and increased their knowledge about carbon finance.

Arjunwadhar and Sethi (2008) investigated the energy savings and carbon credits looking at opportunities and challenges for Indian foundry industry. Foundry was one of the most energy-intensive manufacturing processes. A large amount of energy was consumed in the melting operation. Adoption of energy efficient melting technologies by foundries was a win-win option. Improvements in energy efficiency not only reduced energy costs, but also had the potential of generating additional revenues through sale of carbon credits. Seeking carbon credits by developing appropriate CDM projects based on energy efficiency improvements promises to be a win-win option for Indian foundries. While the primary benefit of the CDM project would be the savings in energy, additional revenues through sale of Certified Emission Reductions (CERs) could help in improving the project returns.

This study discussed a few options to improve energy efficiency of the melting operation. It also described the process for acquiring carbon credits by registering a CDM project. High transactions costs involved in developing CDM projects were usually a barrier, especially among small and medium scale industries. Bundling or bringing together, of small projects in different companies to form a single CDM project is permissible if the projects belong to the same type. The industry

associations are probably the best suited to play this the role of a bundler. Proactive efforts of industry associations would help in initiating CDM projects especially among the small and medium scale foundry units.

2.5.2 Studies in Developing Countries

Salé and Dewes (2009) investigated opportunities and challenges for the international trade of *Jatropha curcas*-derived biofuel from developing countries. This was due to the fact that the interest on non-food energy crops was increasing. *Jatropha curcas* has been highlighted as a possible source of biodiesel due to its characteristics of growing on barren, eroded lands under harsh climatic conditions, demanding low moisture and in resulting productive harvests. In face of the promising international biofuel market, several African and Asian countries were seizing biodiesel trade opportunities through exploitation of the benefits of large-scale production and trade of *jatropha*. Thus, the study aimed at analyzing the biodiesel export.

The strategic niche management framework was applied to analyze socio-technological experiments of *jatropha* cultivation in India. Therefore, before engaging into large-scale cultivation of *Jatropha* in developing countries considerable experiments ought to be made with the participation of all stakeholders. Furthermore, for developed markets access biofuel-producing countries would require certification systems which took into account certain specific environmental, social, and agricultural production practices.

Corbera *et al.*, (2009) looked on how do regulating and voluntary carbon-offset

schemes. They argued that the Kyoto Protocol's CDM has become a key instrument for climate change mitigation. Parties with emission targets were using it to buy greenhouse gas (GHG) emission reductions for compliance against the Protocol's emission reduction targets.

In parallel, the purchase of emission reductions through a voluntary carbon market has become a mainstream practice across business and individuals who, although not having any regulatory mandate, aim to offset their emissions. This voluntary market relies on mitigation projects which may or may not follow the standards of the CDM. This review compares these two instruments and traces similarities and differences in terms of project types, offset quality and contribution to sustainable development. It is shown that both mechanisms support a wide range of mitigation options and technologies, and differ considerably in the contribution of forestry and industrial gas offsets to their markets.

There was not enough empirical data to assess the actual additionality and quality of produced offsets and their contribution to national and local sustainable development. Large scale mitigation options provided a substantial percentage of GHG reductions in both markets, with methane-based mitigation and fuel switching dominating over renewable investments such as solar and tidal. Africa remains the least benefited continent in both schemes.

The review supports proposals towards reforming the CDM so that the least developed countries could also participate in a transition towards a decarbonized

global society. Voluntary markets, in turn, were likely to remain driven by investors' willingness to support projects which are in line with poor countries' demands and priorities.

Wen-Cheng *et al.*, (2013) examined mobilizing business in low- carbon economy. They argued that in order to essentially tackle climate change issues and achieve sustainable development in both developed and developing countries, the overwhelming triple-win solution for energy, environment and economy is to coordinate both low-carbon technology and economic growth. They further pointed out that, public fund investment plays an important role as a financial instrument for developing countries in achieving such a goal. However, an effective system should be introduced to steer private capital efficiently and promote closer cooperation among private and public sectors under limited resources and fund.

Jindal *et al.*, (2008) studied on carbon sequestration through forestry and agro forestry that could help in mitigating global warming. For Africa, carbon sequestration also presented an opportunity to fund sustainable development through financial inflows. However, with a low share of global carbon trade, there were strong concerns that African countries were losing out on this valuable opportunity.

Through a comprehensive review of 23 carbon sequestration projects across 14 countries the study discussed ways to overcome critical challenges to scale up carbon investments in Africa. Within the continent, East Africa was the preferred destination

for carbon investors. Most projects were non-Kyoto compliant and presented voluntary emission reductions. While project benefits such as increased local incomes and improved natural resources were promising, there were concerns that conversion of grasslands into tree plantations could harm local ecosystems. Insecure land tenure constrains new investments and increases the risk that local communities will lose access to forests. Another challenge was that projects with smallholders had high transaction costs. These costs could be overcome by building strong community institutions and simplifying project guidelines. To attract more projects, African governments need to build their capacity to identify relevant opportunities.

Ayuya *et al.*, (2011) investigated the socioeconomic factors affecting farmers' awareness of clean development mechanism projects using a case of smallholder forest carbon projects. The objective of the study was to identify the socio-economic and institutional factors which influenced the level of awareness of CDM projects. Also, to highlight the policy implications for the stakeholders when designing clean development mechanism projects among smallholder farmers. Findings show that 23% of the farmers were correctly aware of the project and the results of the ordered logic model indicate that age, gender, education level, group membership, existence of tree farming and contact with extension services was found to influence awareness level of smallholder forest carbon projects.

In assisting the community to adapt to climate change and produce sufficiently on a sustainable basis and achieve the desired food security under climate change challenges, the study recommended policies to increase awareness of such agro-

environmental initiatives and that of extension providers should distinguish their clientele anchored on vital demographic characteristics such as age and gender. Also, probability of younger farmers to be aware this initiative was higher, extension communications should be directed to such age group, particularly during the initial stages of the project information dissemination.

Jeker (2009) examined business opportunities in Africa for CDM projects and carbon trading. Jekers' study explored opportunities and challenges for Africa, including the political, technical, financial and legal barriers that have prevented Africa until now from participating and benefitting adequately from the CDM and similar other international financial mechanisms. To illustrate the issues concretely, it presented a case study of past efforts in Kenya to participate in the CDM. It then suggested possible ways to improve Africa's access to CDM markets in the future as well as practical steps private businesses can take to benefit from CDM and private markets in carbon trading. It argued that given inadequate public policy attention so far, African private sector needed to play a much stronger role perhaps in partnership with experienced players from the outside.

Elizabeth *et al.*, (2008) investigated the global carbon markets by asking if there were opportunities for Sub-Saharan Africa. They argued that human activities such as fossil fuel burning and deforestation had significantly increased the atmospheric concentration of GHG leading to global climate change. Global climate change and its associated weather extremes posed considerable challenges worldwide, and mitigating the adverse impacts of climate change was a high priority for the

international community. To reduce global emissions and curb the threat of climate change, many countries were participating in carbon trading. Carbon trading included allowance-based agreements that imposed national caps on emissions and allowed participating countries to engage in emission trading as well as project-based transactions (for example, through the CDM). The CDM allowed industrialized countries with greenhouse gas reduction commitments to invest in emission-reducing projects in developing countries as an alternative to generally more costly emission reductions in their own countries.

2.5.3 Empirical Studies in Tanzania

Mwampamba (2007) assessed how wood fuel crisis returned. He revealed that urban charcoal consumption in Tanzania and its implications to present and future forest availability. By lumping together charcoal and firewood consumption to determine the threats to forests from widespread use of wood fuel energy in sub-Saharan African, studies has greatly underestimated the individual impact of charcoal. Where high consumption levels were coupled with poor forest management and negligible regulation of the charcoal trade, the threat of an impending crisis caused by charcoal alone needed to be revisited.

Mwampambas' study used a survey of 244 households in six Tanzanian cities to determine whether current consumption levels, charcoal production techniques and forest management practices are sufficient to meet present and future charcoal demand. Projections to year 2100 were made to determine whether forests can continue to meet future demand under 24 scenarios that capture the numerous

uncertainties that exist of converting charcoal consumption into forest needed. The findings suggest that the scenario containing median consumption levels, low kiln efficiencies and low replenishment of harvested forests could deplete forests on public land by 2028. Best-case scenario occurred when the opposite conditions existed. The study concluded that charcoal consumption is a real threat to the long-term persistence of forests in Tanzania and proposes policy interventions for alleviating forest loss.

Mustalahti *et al.* (2012) examined how local priorities and needs could be met in REDD+ implementation and how these expectations match the global mitigation benefits. The researchers examined the local priorities and needs in the use of land and forest resources in two villages of the Angai Villages Land Forest Reserve in Tanzania, based on semi structured key informant interviews, participatory rural appraisal methods, and key informant interviews at different levels.

The Angai villagers highlighted three key priorities that have yet to be integrated into the design of REDD+: water scarcity, rural development, and food security. At the local level, improved forest governance and sustainable management of forest resources have been identified as one way to achieve livelihood diversification. The main conclusion is that although the national goals of REDD+ include poverty reduction, these goals are not necessarily conducive to the goals of the case study for the communities. There exist both structural and cultural limits to the ability of the Angai villages to implement these goals and to improve forestry governance.

The study indicated that a key contribution of REDD+ to local communities could be co-benefits in the form of ecosystem services. Firewood and charcoal, wild vegetables, fruits, medicines, and water, as well as rainfall catchment provided by the forest function as buffers against adverse climate change impacts and foster local adaptation to them. However, environmental co-benefits alone do not sufficiently reduce vulnerability to climate change. REDD+ could generate income and improve and diversify local livelihoods. The new forest governance regime underpinning REDD+ would thus have to identify options for improving local livelihoods. Without this, there is a real risk of raising expectations in local communities but without much being delivered.

The study also revealed that the challenges of harnessing carbon markets for pro-poor development under REDD+ are significant. A governance approach with room to maneuver such as fund-based and effort-based payments holds some promises. Funds could be available under an internationally and nationally funded and monitored carbon fund.

This fund could mitigate the changes of carbon price that are a risk to communities and could ensure that the agreed funding for community activities would be available in the long run. If REDD+ is designed in a way that addresses local priorities and needs and if it builds agriculture and livelihood diversification capacity at the local level, then there is an opportunity for a more fair and equal approach to forestry governance and climate change mitigation. However, the question remains to what extent such a solution would remain aligned with the aim of global carbon markets to

deliver low-cost mitigation.

Mshandete (2011) researched on the status, opportunities and challenges of biofuel in Tanzania. Biofuels in solid, liquid and gaseous forms are all renewable fuels derived either directly or indirectly from plant material. Recently biofuels have emerged as alternative fuel with potential to replace finite fossil fuels resources. In Tanzania liquid biofuel (biodiesel and bioethanol) developments are at an infancy stage and there is so far no commercial liquid biofuel production. Nevertheless, such bio fuel activities in Tanzania show that being part of the world is not left behind for the promotion of bio fuels as an alternative source of energy. To that effect, the objective of this review article was to understand the key issues pertaining to liquid bio fuels and their status as well as to highlight gaps and strategies to address the gaps in Tanzania.

Therefore this study was based on reviewing pertinent literature relating to liquid bio fuels in Tanzania and elsewhere. The study looked at policies and strategies in place, mode of production of bio fuels feedstock's, players in bio fuels and their roles, value chain, social-economic and environmental issues of bio fuels, land tenure issues and food security, sustainability, research and development. Information generated in this article revealed that policy, foreign influence, economics, environmental and political factors are main drivers for bio fuel industry. It was also evident that in Tanzania bio fuels could provide some opportunities for national consumption or for export and offer some genuine development opportunities.

However, clear policies, strategies as well as regulations for bio fuels development are still not in place. One important and immediate activity needed is for Tanzania's government and stakeholders to fast tracking the establishment of national bio fuel policy to ensure sustainability of the bio fuels industry. In conclusion, Tanzania has comparative advantages in the production of bio fuels. However management of the potential negative effects of the bio fuel industry to ensure that benefits outweigh any ecological, economic and/or social costs should to be taken into account and given utmost priority.

2.6 Implications of the Review of Empirical Studies

The reviewed empirical literatures on carbon trading have policy and practical implications. One of the policy implications is that government should prepare policy which will tackle carbon emissions. This can be done through encouraging carbon trading. Also, carbon trading business should be market driven and the government should leave the business being driven by market forces.

2.7 Research Gap

Despite the fact that different authors have published information on the carbon trading, most of them have investigated Canada's experience with carbon Capture and Storage (CCS) initiatives, public engagement with carbon and climate change looking to what extent in the public 'carbon capable, carbon Bank in Northeast Thailand through looking at community effort in carbon trading from agro forestry projects. Others looked at energy savings and carbon credits looking at opportunities and challenges for Indian foundry industry, carbon sequestration through forestry and

agro forestry that could help in mitigating global warming, the socioeconomic factors affecting farmers' awareness of clean development mechanism projects, global carbon markets through looking at opportunities for Sub-Saharan Africa. Bio fuels in solid, liquid and gaseous forms are all renewable fuels derived either directly or indirectly from plant material, urban charcoal consumption in Tanzania and its implications to present and future forest availability. However, no investigative information on the challenges and opportunities were available for carbon trading in Tanzania. Therefore, this created information gap which this study sought to address.

2.8 Conceptual Framework For Carbon Trading

The study was guided by the conceptual framework as formulated by the researcher. The conceptual framework covered awareness, availability, affordability and challenges facing carbon trading business in Tanzania. Awareness encompass strong knowledge of the Tanzanians on the availability of carbon and its potentials, strong training to the people to raise their degree of awareness on matters related to carbon trading, availability of strong communications and increase of awareness on the climate change in Tanzania. Also, the availability looks on carbon projects in the country, strong policy to promote carbon trading in Tanzania and technology to exploit carbon business. Affordability includes prices which limit its purchase by the ordinary people, poor purchasing power, public understandings as well as strong policy.

On other hand, the model predicts some challenges of carbon trading in Tanzania. These include: weak technology, carbon capture and storage, low understanding,

transaction costs, limited penetration, market network.

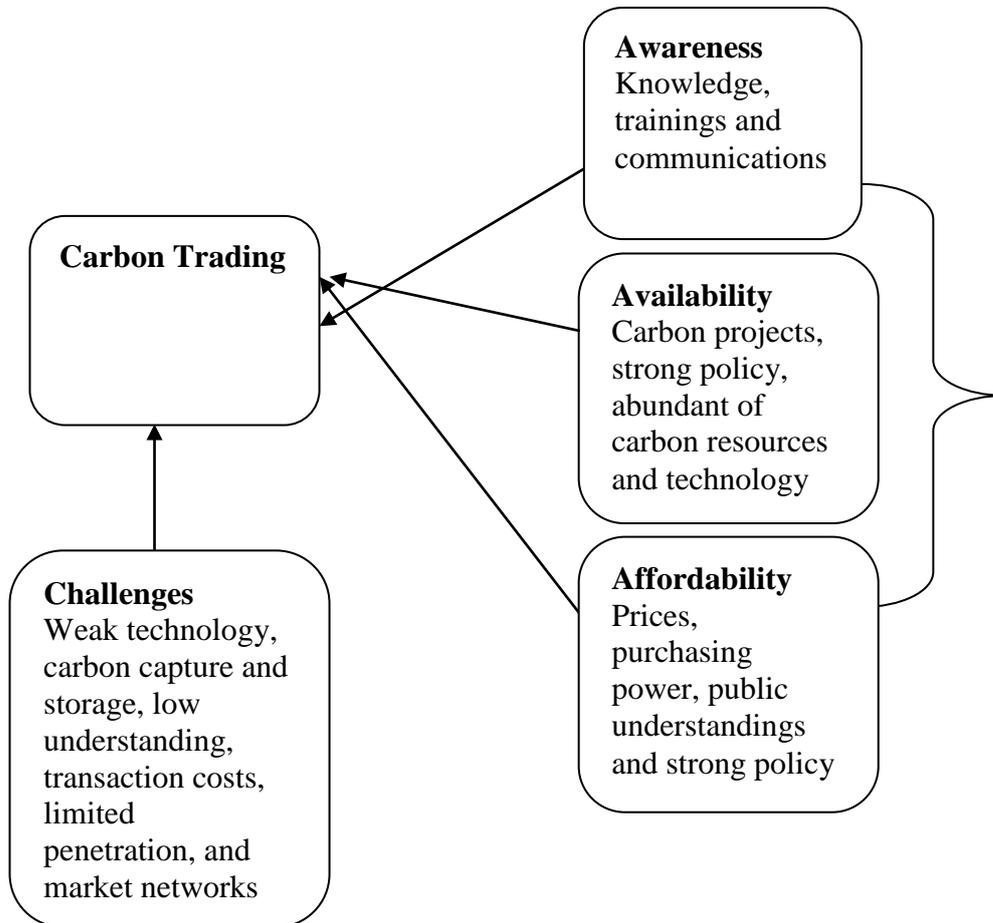


Figure 2.1: Conceptual Framework for Carbon Trading

Source: Formulated by the Researcher, 2014

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This section covers details in population of the study, research design, sampling procedures, sample size, data collection including primary and secondary one, data collection instruments and data analysis methods.

3.2 Research Strategies and Survey Population

Population is the fulfilled universe of people or things which the sample of the study is selected (Greener, 2008). Churchill and Brown (2007) defined population as all the individuals or objects that meet certain requirements for membership in the overall group. During the study, population of the study was all people dealing with carbon trading in Tanzania. However, because of research limitations including time and finance, respondents from Dar es Salaam were taken as a case study. The specific respondents based on their expatriates on the carbon trading were given more priority in data collection process. These were chosen because they were the ones who were well informed on the carbon trading and the possible challenges facing this sector to operate effectively and efficiently.

3.3 Research Design

Research design is a grand plan of approach to a research topic (Greener, 2008). Research design refers to a plan, blue print, arrangement of conditions for data collection and analysis (Kothari, 2007). Research design among other things,

involves specific plan of activities a researcher is supposed to do in the field. In this study, both qualitative and quantitative designs were used. The descriptive design was used to supplement the quantitative design. Questionnaires were designed to collect both quantitative and qualitative information on the opportunities and challenges for carbon trading in Tanzania.

3.3.1 Sampling Procedures

Greener (2008) defined sampling as a practical way of studying people and their activities, thoughts, attitudes and relationships in relations to business. But because everyone cannot be asked in the chosen population, sample is required to be applied. During this study therefore, purposive and convenient sampling techniques were used to obtain respondents from the population under the study.

A convenience sample is merely an available sample that appears able to offer answers of interest to the research study (Backer, 1994). This is a sampling technique that is preferable for its economic value. With this technique a number of respondents who happened to be around were provided with self-administered questionnaires.

Purposive sampling was another sampling technique that was used. This technique enabled a researcher to select a sample on the basis of his or her knowledge of the population, its elements and research aims. It bases on the researcher's judgment and purpose of study (Baxter and Babbie, 2004). The researcher applied this sampling technique to select respondents who were considered to be rich in information on the challenges and opportunities of carbon trading.

3.3.2 Sample Size

Kothari (2007) defined sample as few items selected from the universe for the purpose of study. Since the population or number of people was high while each category needed representation, a sample of sixty (60) respondents from various groups of people were selected for the study. These included employees involved in implementation of carbon trading projects, researchers, policy makers and investors for the carbon trading business. They were randomly selected and clustered according to their status. The sample elements selected was based on the representation of population of the interest group. All 60 respondents filled the questionnaires and some of them were picked as key informants.

3.4 Data Collection

During this study, two types of data were collected. In collecting the required information, primary and secondary data were used.

3.4.1 Primary Data

Primary data on opportunities and challenges of carbon trading in Tanzania were directly obtained from the field. It was collected from the sample population through employing questionnaires and interviews. Data were collected from the respondents of Dar es Salaam who dealt with carbon trading, other from policy makers like Ministry of Energy and Minerals of Tanzania, National Environment and Management Committee and the Vice President Office environmental division.

3.4.2 Secondary Data

Secondary data on opportunities and challenges of carbon trading in Tanzania were

collected from books, journals, reports from Vice President Office (Division of Environment), Ministry of Energy and Minerals of Tanzania and newspapers, both published and unpublished, as well as online sources.

3.5 Data Collection Instruments

During data processing and collection, a number of instruments were used. The following were the data collection instruments used in collecting both quantitative and qualitative information.

3.5.1 Questionnaires

Keya, *et al.*, (1989) defines questionnaire as a set of questions that are drawn up to meet the objectives of the survey. Questionnaires were carefully designed to avoid responses that might be biased in favor of the study objectives. They were prepared according to the status of the target group. Questionnaires were chosen by the researcher because they encouraged great honest and had possibilities of enquiring absent attitude and opinions. Also, they could be written for specific purpose and within a short time. A list of questions were prepared and distributed to different respondents from VPO office, ministry of energy and minerals of Tanzania, as well as individuals from private companies dealing with carbon trading projects.

This was due to the fact that the said respondents were believed to have the relevant knowledge on the study theme. Both closed and open-ended questions were employed so as to give respondents chances to air their views regarding opportunities and challenges for carbon trading in Tanzania. Moreover, the open-

ended questions were expected to provide primary qualitative data while the closed-ended questions provide responses helped the researcher to generate quantitative data.

3.5.2 Documentation

The researcher used different documents from the libraries and online resources and other research works done in relation to the research problem on hand. These documents included books, papers, newspapers, journal articles, online journals and various reports related to the problem under study. These helped to provide the researcher with the necessary information for the problem in question. Different libraries including the OUT library, UDSM library, TaTEDO library, online journals were visited to gain more information on the subject matter.

3.5.3 Interviews

Interview was another data collection instrument used to collect information during this study. This was an appropriate method for data collection because it allowed probing of complex issues in a relaxed atmosphere. It enabled the researcher to record additional pieces of information. Furthermore, through this method it was easy to overcome possible resistances and allowed direct observation for other relevant information.

Among other participants, key informants who were the top management of the VPO office and Ministry of Energy and Minerals were interviewed. Also, individual companies dealing with the carbon trading in Tanzania were interviewed too. These

were selected due to their positions as they have a lot of information related to the opportunities and challenges for carbon trading in Tanzania.

3.6 Data Validity and Reliability

This sub section presents information on the validity and reliability of the data collected. Its first part shows how data were valid while the second part shows how data collected were reliable.

3.6.2 Data Validity

Kimberlin and Winterstein (2008) defined validity as the extent to which the interpretations of the results of a test are warranted which depends on the particular use; the test is intended to serve. Likewise, Trochim (2006) defined validity as the extent to which an empirical measurement adequately reflects the real meaning of the concept under study. Also, Churchill (2007) defined validity as the extent to which the instrument accurately measures what was intended and supposed to measure. The questionnaires for this research were pilot- tested to some respondents from organizations implementing carbon trading projects and their comments were used to modify the questionnaires so as to be able to capture the required information.

3.6.1 Data Reliability

Miller (2008) defined reliability as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. In short, it is the stability or consistency of scores over time or across raters. Bryman and Bell (2007) argued that reliability relates to the consistency or

dependability of a measure. Kothari (2007) defined reliability as the extent to which data collection process yields consistent results. In addition, Saunders *et al.* (2007) maintain that the term reliability meant to what extent does the repeated measurement of the same object, using the same instrument, yields the same or very similar results. They argued that if it is reliable, you can be confident that all the items that make up the measure are consistent with each other and that, if you were to use the measure again with the same individuals, they would be rated similarly to the first time. This study adopted the construct validity to validate data and Cronbach Alpha (α) scale to measure internal reliability. The data was analyzed using excels and Cronbach alpha.

3.7 Data Analysis Methods

During this study, both qualitative and quantitative approaches were used in data analysis. The researcher interpreted data in accordance to the quality of arguments which were made rather than quantity of the respondents with the same opinions. The questionnaire was classified in terms of the answers that were similar so as to reduce the work of analyzing each questionnaire. The aim of interviewing was to allow the researcher to inter into person's perspectives. The assumption is that the person's perspective was meaningful, knowledgeable and able to be made explicitly.

3.8 Expected Results of the Study

By conducting this study the following was expected to be an outcome of the study

- i) The study was expected to reveal if the Tanzanians are aware on the benefit available for carbon trading

- ii) The study was expected to provide information on opportunities available in carbon trading business
- iii) The study was expected to illustrate the challenges available in carbon trading business and the way to overcome them.
- iv) Study was expected to recommend possible measures for the country for the purpose of benefiting from available carbon trading opportunities.

CHAPTER FOUR

4.0 STUDY FINDINGS, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study. It also analyses the findings and discusses the findings of the study as per the study objectives. The information presented in this chapter relied heavily on questionnaire and interviews. Also, other information was from various documents on the opportunities and challenges of carbon trading in Tanzania. This chapter begins with the profile of the respondents.

4.2 Profile of the Respondents

This section presents profile of the respondents' based on age, sex, marital status, academic qualifications, working experience of working/dealing with carbon trading, business ownership and designation level of the respondents.

4.2.1 Age of the Respondents

Age of the respondents was important in assessing opportunities and challenges of carbon trading in Tanzania. The study findings on the age distribution are presented in Table 4.1.

Table 4.1: Age of the Respondents

Age of the respondents	Frequency	Percent
18-30 years	5	8.3
31-40 years	10	16.7
41-50 years	24	40.0
51-60 years	12	20.0
60+ years	9	15.0
Total	60	100.0

Source: Field Data (2014)

The study findings show that 5 (8.3%) of the respondents were young ranging from 18 to 30 years. They were followed with the age of 60 years and above who were 9 (15%) and age group between 31 and 40 years with 10 (16.7%) respectively. Further 12 (20%) respondents aged between 51 and 60 years while the majority group of 24 (40%) respondents aged between 41 and 50 years. The study findings indicate that, most of the age groups were presented in this study. However, majority of the respondents were matured enough and hence presented the required information on the opportunities and challenges of carbon trading in Tanzania. Therefore, information presented were views from all age groups with a dominant age above 41 years.

4.2.2 Respondent Sex

Sex of the respondents was also considered important in providing views on the opportunities and challenges of carbon trading in Tanzania. It was believed that sex of the respondents had something to do in providing information required on the opportunities and challenges of carbon trading in Tanzania. The findings are summarized in Table 4.2 below.

Table 4.2: Respondent Sex

Respondents sex	Frequency	Percent
Male	37	61.7
Female	23	38.3
Total	60	100.0

Source: Field Data (2014)

The study findings indicate that 37 (61.7%) of the respondents were males while 23 (38.3%) were females. The statistics show that there was a significant difference in

terms of respondents' sex. This signifies that majority of male engaged in carbon trading business compared to females. Therefore, male views on the opportunities and challenges of carbon trading in Tanzania were dominant in this study.

4.2.3 Marital Status

Marital status of the respondents was considered as an important aspect in assessing the opportunities and challenges of carbon trading in Tanzania. It was assumed that the nature of business was influenced by marital status as of the respondents. The study findings are illustrated in Table 4.3 below:

Table 4.3: Marital Status

Marital status	Frequency	Percent
Single	11	18.3
Married	39	65.0
Divorced	6	10.0
Widow/Widower	4	6.7
Total	60	100.0

Source: Field Data (2014)

The study findings indicate that majority 39 (65%) of the respondents were married followed by single respondents who were 11(18.3%). 6 (10%) were no longer in marriage institution because of being divorced while the last 4 (6.7%) of the respondents were widow/widower. Based on the above statistics therefore, married respondents were dominant in engaging in carbon trading businesses in Tanzania. This implies that, marriage institution pushed people to engage in different kind of business including carbon trading for the purpose of meeting their family obligations. And also most of the marriage people are involved in the renewable energy

technologies business and educate people on the use of those technologies to reduce climate change effects.

4.2.4 Academic Qualifications

Furthermore, education level of the respondents was important in understanding the available opportunities and challenges of carbon trading in Tanzania. Table 4.4 presents the summary of information from the respondent's academic qualifications.

Table 4.4: Academic Qualifications

Academic Qualifications	Frequency	Percentage
Certificate	3	5.0
Diploma	18	30.0
Advanced diploma/University degree	30	50.0
Master's degree and above	9	9.0
Total	60	100.0

Source: Field Data (2014)

The study findings as presented in Table 4.4 show that the majority of the respondents possessed advanced diploma or university degree. Degree holders were 30 (50%) respondents. They were followed by the respondents with diploma education level who were 18 (30 %) respondents. Furthermore, 9 (15%) respondents were masters' degree holders and above and 3 (5%) respondents had certificates. The statistics above suggest that, respondents from all education backgrounds were consulted to provide their views on what they thought to be the opportunities and challenges of carbon trading in Tanzania. However, half of the total respondents were advanced/degree holders and hence, were assumed to have information on the challenges and opportunities for carbon trading in Tanzania.

4.2.5 Experience with Carbon Business

Experience with carbon business was important aspect in providing information on the available opportunities and challenges of carbon trading in Tanzania. Therefore, respondents were asked to indicate the period they have been engaging in carbon trading business in Tanzania and their responses are summarized in Table 4.5:

Table4.5: Experience with Carbon Business

Experience with carbon business	Frequency	Percentage
Less than 2 years	7	11.7
Between 2 and 4years	12	20.0
Between 4 and 6 years	26	43.3
6 years and above	15	25.0
Total	60	100.0

Source: Field Data (2014)

The findings reveal that more that, 26 (43.3%) respondents have been engaging in carbon trading for the period between 4 and 6 years. 15 (25%) respondents have been engaging in carbon trading for the period of 6 years and above. They were followed by 12 (20%) respondents who have been engaging in carbon trading for the period between 2 and 4 years. Only 7 (11.7%) respondents have been engaging in carbon trading for the period less than 2 years. The findings indicate that, respondents had different experience in carbon trading and hence provide mixed experience on the same business.

4.2.6 Form of Business Ownership

The researcher was interested in understanding form of carbon trading business in terms of ownership. Therefore, the study respondents were asked to state forms of ownership of their carbon business as summarized in table 4.6:

Table 4.6: Form of Business Ownership

Form of business ownership	Frequency	Percentage
Self-owned business (Sole Proprietor)	13	21.7
Partnership	17	28.3
Employee	30	50.0
Total	60	100.0

Source: Field Data (2014)

The study reveals that, 30 (50%) respondents were employees of the identified carbon business in Tanzania. They were followed by business owned through partnership who were comprising 17(28.3%) respondents. The last form of ownership of sole proprietorship (self-owned business) comprised of 13 (21.7%) respondents. The statistics show that there was a combination of forms of carbon business ownership though half of the total respondents were employees. This suggests that carbon trading business were owned in different forms because of capital required to start business. It was noticed also most of the business are medium enterprise dealing with distribution of renewable energy technologies like solar, improved and efficient cook stoves to reduce emission and land degradation. These businesses need a combined effort from different people to take off.

4.2.7 Designation Level of the Respondent

Lastly, the researcher considered designation level of the respondents to provide rich information on the available challenges and opportunities of carbon trading in Tanzanians firms. Therefore, respondents were asked to provide information in relation to their designations in their respective firms. Their responses are shown in the Table 4.7:

Table 4.7: Designation Level of the Respondents

Designation level of the respondents	Frequency	Percentage
Senior Manager	6	10.0
Line Manager	10	17.7
Supervisor	12	20.0
Junior staff	32	53.3
Total	60	100.0

Source: Field Data (2014)

The study findings reveal that only 6 (10%) respondents were senior managers of the identified carbon trading firms. These were followed by 10 (17.7%) respondents who were line managers in the identified carbon trading firms. 12 (20%) respondents were supervisors while 32 (53.3%) respondents were junior staff. The statistics show that more than half of the respondents were junior staff from the identified carbon trading firms. This was assumed to be contributed by the nature of many organizations structures components from the bottom to the top.

4.3 The findings of the Study

This part presents the findings of the study. The specific study objectives included finding out the extent to which the awareness on the carbon trading business in Tanzania, the opportunities available for carbon trading in Tanzania, challenges facing carbon trading business in Tanzania and possible measures the country should take to benefit from carbon trading opportunities. This part also analyses and discusses the findings of the study as per the objectives of the study.

4.3.1 Awareness on the Carbon Trading Business In Tanzania

This section probed the degree of awareness from the respondents on carbon trading

in Tanzania. Therefore, the respondents were asked to indicate their levels of agreement on the extent of awareness on the carbon trading business in Tanzania.

4.3.1.1 Strong Knowledge on the Carbon Trading

The researcher was interested in getting information on their carbon trading knowledge levels. Therefore, the respondents were asked to indicate their levels of agreement on whether or not they had strong knowledge on carbon trading. Their responses are summarized in Table 4.8.

Table 4.8: Strong knowledge on the Carbon Trading

Responses	Frequency	Percentage
Strongly disagree	9	15.0
Disagree	32	53.3
Neither agree nor disagree	2	3.3
Agree	10	16.7
Strongly agree	7	11.7
Total	60	100.0

Source: Field Data (2014)

The study findings demonstrate that 32 (53.3%) respondents disagreed to have strong knowledge on carbon trading in Tanzania. They were strongly supported by 9 (15%) respondents who strongly disagreed to have strong knowledge on carbon trading in Tanzania. Only 2 (3.3%) respondents neither agreed nor disagreed to have strong knowledge on carbon trading in Tanzania. Contrary to the above responses, 10 (16.7%) respondents agreed to have strong knowledge on carbon trading in Tanzania and were supported by other 7(11.7%) who strongly agreed to have strong knowledge on carbon trading in Tanzania. The study findings demonstrate that many carbon trading personnel had little knowledge on the carbon business itself. This had

negative impacts on the business development and prosperity. Awareness plays a key role in business development and once is lacking contributes to business failure.

4.3.1.2 Carbon Trading Protects Greenhouse Gaseous

Furthermore, the researcher was eager to understand from the respondents views on whether carbon trading played important role in protecting greenhouse gaseous in Tanzania. Therefore, they were requested to provide their views in relations to the protection of greenhouse gaseous by showing their levels of agreement as presented in Table 4.9:

Table 4.9: Carbon Trading Protects Greenhouse Gaseous

Responses	Frequency	Percentage
Strongly disagree	6	10.0
Disagree	13	21.7
Agree	25	41.6
Strongly agree	16	26.7
Total	60	100.0

Source: Field Data (2014)

The findings reveal that only 6 (10%) respondents strongly disagreed on the statement that carbon trading protects greenhouse gaseous in Tanzania. Their views were supported by other 13 (21.7%) who disagreed on the statement that carbon trading protects greenhouse gaseous in Tanzania. In contrast, 25 (41.6%) respondents agreed on carbon trading to protect greenhouse gaseous in Tanzania. These were strongly supported by other 16 (26.7%) respondents who agreed carbon trading to protect greenhouse gaseous in Tanzania. The above statistics suggest that carbon trading protects greenhouse gaseous in Tanzania as revealed by majority of the respondents.

4.3.1.3 Strong Training on Carbon Business In Tanzania

The respondents were asked to provide their views on the statement that there was a strong training on carbon business with the purpose of understanding the details of carbon markets in Tanzania. Their responses are presented in Table 4.10:

Table 4.10: Strong Training on Carbon Business in Tanzania

Responses	Frequency	Percentage
Strongly disagree	18	30.0
Disagree	27	45.0
Neither agree nor disagree	2	3.3
Agree	9	15.0
Strongly agree	4	6.7
Total	60	100.0

Source: Field Data (2014)

The findings reveal that 18 (30%) respondents strongly disagreed on the availability of strong training on carbon trading business with the purpose of understanding details of carbon markets in Tanzania. These were supported by 27 (45%) respondents who disagreed on the availability of strong training on carbon trading business with the purpose of understanding details of carbon markets in Tanzania. Only 2 (3.3%) respondents neither agreed nor disagreed on the availability of strong training on carbon trading business with the purpose of understanding details of carbon markets in Tanzania. On the contrary, 9 (15%) respondents agreed on the availability of strong training on carbon trading business with the purpose of understanding details of carbon markets in Tanzania who were strongly supported by 4 (6.7%) of the respondents who strongly agreed on the same matter.

The statistics show that most of the respondents disagreed with the statement. This

suggests that there were weak training on carbon trading business with the purpose of understanding details of carbon markets in Tanzania. Quoting the words of one of the interviewer, said that “If we had a strong training on carbon business we would no longer talking about climate change” Therefore, there is a need of creating dynamic awareness on the carbon business in Tanzania. The above views are supported by Dynamic Awareness Theory which insists on an alternative creation of awareness in a distributed work groups. DAT emphasize on role of users and social practices in awareness creation and should be dynamic (Reimer and Haines, 2008).

4.3.1.4 Communications on Carbon Emissions

Likewise, the researcher was interested in understanding whether or not communication on carbon emission was known to the majority of carbon traders. This was due to the fact that communication played a paramount role in carbon trading. The respondents’ views are summarized in Table 4.11:

Table 4.11: Communications on Carbon Emissions

Responses	Frequency	Percentage
Strongly disagree	15	25.0
Disagree	20	33.3
Neither agree nor disagree	5	8.3
Agree	12	20.0
Strongly agree	8	13.4
Total	60	100.0

Source: Field Data (2014)

The study show that 15 (25%) respondents strongly disagreed business communication on carbon emission to be known to the majority of carbon traders. These were supported by 20 (33.3%) respondents who disagreed business

communication of carbon emission to be known to the majority of carbon traders. Only 5 (8.3%) respondents neither disagreed nor agreed on business communication of carbon emission to be known to the majority of carbon traders in Tanzania.

Contrary to the above views, 12 (20%) respondents agreed business communication on carbon emission to be known to the majority of carbon traders. These were supported by 8 (13.4%) respondents strongly agreed business communication on carbon emission to be known to the majority of carbon traders. Based on these findings, business communications on carbon emission were not known to the majority of carbon traders and hence affected carbon business in general in Tanzania. They argued that weak communication discouraged carbon business performance in Tanzania.

4.3.1.5 Awareness on Climate Change Increased, Hence Reduced Emission

Moreover, the researcher was interested in understanding that awareness on climate change among the Tanzanians has increased and hence most of them realized the importance of reducing emission through conducting carbon trading. The respondents were asked to provide their views on the same matter and they are illustrated in Table 4.12.

Table 4.12: Awareness On Climate Change Increased, Hence Reduced Emission

Responses	Frequency	Percentage
Strongly disagree	13	21.7
Disagree	28	46.7
Neither agree nor disagree	2	3.3
Agree	11	18.3
Strongly agree	6	10.0
Total	60	100.0

Source: Field data (2014)

The study found that 13 (21.7%) respondents strongly disagreed that awareness on climate change among the Tanzanians has increased and has realized the importance of reducing emission through conducting carbon trading. They were supported by 28 (46.7%) respondents who disagreed that awareness on climate change among the Tanzanians has increased and has realized the importance of reducing emission through conducting carbon trading. Only 2 (3.3%) respondents neither agreed nor disagreed on the view presented.

On the other hand, 11 (18.3%) respondents agreed that awareness on climate change among the Tanzanians has increased and has realized the importance of reducing emission through conducting carbon trading. Their views were strongly supported by 6 (10%) respondents who strongly agreed that awareness on climate change among the Tanzanians has increased and has realized the importance of reducing emission through conducting carbon trading.

The above statistics therefore, signifies that the degree of awareness on climate change among the Tanzanians were low and realized little on the importance of reducing emission through conducting carbon trading. This in one way or another has affected carbon trading business in Tanzania.

The respondents' views on the lack of awareness are supported by what was advocated by DAT which offers an alternative to explaining the creation of awareness in distributed work groups. DAT highlights the important role of users and social practices in awareness creation. The theory further points to the dynamic

nature of awareness creation: Awareness emerges over time and depreciates when not being actively attended by the users. Awareness develops gradually over time, meaning different levels of awareness can exist.

Furthermore, the study findings corroborate with the findings of UKAid (2010) which revealed that low levels of information / awareness affected carbon trading in Tanzania. They pointed out that the relatively low levels of absolute and per capita emissions and lack of track record in low carbon development and competing priorities of poverty alleviation resulted in low levels of awareness.

4.3.2 Opportunities Available For Carbon Trading In Tanzania

The second objective was to examine the extent of awareness on opportunities availability for carbon trading in Tanzania. Specifically, it explored information on strong knowledge on the carbon trading, the role of carbon trading in protecting greenhouse gaseous, availability of strong training on carbon business for better understanding the intricacies of carbon markets in Tanzania, business communications on carbon emissions being known and awareness on climate change among the Tanzanians.

4.3.2.1 Availability of a Lot of Carbon Trading Opportunities in Tanzania

In examining the extent to which the availability of carbon commodities facilitated carbon trading in Tanzania, respondents were asked to provide their views on the statement that, there were a lot of carbon trading opportunities in Tanzania. Their responses are shown in Table 4.13:

Table 4.13: Availability of a Lot of Carbon Trading Opportunities in Tanzania

Responses	Frequency	Percentage
Strongly disagree	10	16.7
Disagree	26	43.3
Agree	17	28.3
Strongly agree	7	11.7
Total	60	100.0

Source: Field data (2014)

The study indicates that 10 (16.7%) respondents strongly disagreed on the availability of carbon trading opportunities in Tanzania. 26 (43.3%) respondents disagreed on the availability of carbon trading opportunities in Tanzania while 17(28.3%) respondents agreed on the availability of carbon trading opportunities in Tanzania. These were complemented with other 7 (11.7%) respondents who strongly agreed on the availability of carbon trading opportunities in Tanzania. The above statistics show that the large number of 36 (60%) disagreed on the availability of carbon trading opportunities in Tanzania. This signify that the degree of awareness on the availability of carbon trading opportunities in Tanzania were low to most of the Tanzanians. The study findings corroborate with the study findings of UKaid (2010) which found that key opportunities include the development of new renewable sources including solar, wind and geothermal, improved transmission and distribution to reduce losses (and therefore CO₂ intensity of electricity), demand side management and efficiency, and improved interconnection with neighbouring countries.

4.3.2.2 Tanzania Lacks Enough Carbon Projects Which Limit Development

Furthermore, the study sought to have information from the respondents whether or

not Tanzania lacks enough carbon projects and hence limited its development. Therefore, the respondents were asked to show their levels of agreement on the matter and their responses are presented in Table 4.14.

Table 4.14: Tanzania Lacks Enough Carbon Projects Which Limits Development

Responses	Frequency	Percentage
Strongly disagree	4	6.6
Disagree	12	20.0
Neither agree nor disagree	3	5.0
Agree	31	51.7
Strongly agree	10	16.7
Total	60	100.0

Source: Field data (2014)

The study reveals that 4 (6.6%) respondents strongly disagreed that Tanzania lacks enough carbon projects which limited its development. The above few respondents were supported by 12 (20%) who disagreed that Tanzania lacks enough carbon projects which limited its development. Only 3 (5%) respondents neither agreed nor disagreed that Tanzania lacks enough carbon projects which limited its development. On the other hand, more than half, 31 (51.7%) of the respondents agreed that Tanzania lacks enough carbon projects which limited its development. These were supported by 10 (16.7%) respondents who strongly agreed Tanzania lacks enough carbon projects which limited its development. The above data indicate that greater part of the respondents viewed Tanzania lacking enough carbon projects which limited its development. This connotes that Tanzania lacks carbon projects which limits its development. The above views are consistent with the findings of UKaid (2010) which shows that though Tanzania was already carrying out a range of low

carbon projects but lacked enough and bigger projects to prosper its own development. However, it had a room of doing more in terms of carbon trading in particular to take advantage of carbon financing opportunities available.

4.3.2.3 Availability of Weak Policy Which Affects Carbon Investments

The researcher was again interested in understanding whether or not weak policy of the country affected carbon investments and hence limited its availability to its users. Therefore, the respondents were asked to provide their views on what they thought on the weak policy and under-development of carbon investments. Their responses are shown in table 4.15:

Table 4.15: Availability of weak policy which affects carbon investments

Responses	Frequency	Percentage
Strongly disagree	10	16.7
Disagree	32	53.3
Neither agree nor disagree	2	3.3
Agree	10	16.7
Strongly agree	6	10.0
Total	60	100.0

Source: Field data (2014)

The study shows that majority of the respondents disagreed on the weak policy to affect carbon investment in Tanzania. These were represented by 10 (16.7%) respondents who strongly disagreed weak policy to affect carbon investment in Tanzania. These were supported by the higher number of 32 (53.3%) who disagreed weak policy to affect carbon investment in Tanzania. Only 2 (3.3%) of the respondents neither agreed nor disagreed weak policy to affect carbon investment in Tanzania. Contrary to the above views, 10 (16.7%) respondents agreed on weak

policy to affect carbon investment in Tanzania and were strongly supported by 6 (10%) respondents who viewed weak policy to affect carbon investment in Tanzania. The above statistics indicate that most of the respondents viewed weak policy to be not a stumbling block in the growth of carbon investment in Tanzania but the respondents revealed that poor regulations and cumbersome procedures led to low investment in carbon trading. This means that Tanzania have weak policy but have insignificant effect on investment flows in carbon investments.

4.3.2.4 Availability of Abundant Technologies for Reducing Carbon Emission

Furthermore, the research was eager to understand from the respondents' point of view on the availability of abundant technologies for reducing carbon emission in Tanzania. Hence, respondents were asked to provide their views by showing their levels of agreement on the statement that Tanzania had abundant technologies of reducing carbon emission in Tanzania. Their responses are shown in Table 4.16:

Table 4.16: Availability of Abundant Technologies For Reducing Carbon Emission

Responses	Frequency	Percentage
Strongly disagree	15	25.0
Disagree	24	40.0
Agree	13	21.7
Strongly agree	8	13.3
Total	60	100.0

Source: Field data (2014)

The study found out that majority of the respondents disagreed on the statement that there were abundant technologies for reducing carbon emission in Tanzania. 15

(25%) of them strongly disagreed on the statement while 24 (44%) disagreed on the statement that there were availability of abundant technologies for reducing carbon emission in Tanzania. In contrast, few of total respondents agreed with the statement of availability of abundant technologies for reducing carbon emission in Tanzania. These included 13 (21.7%) respondents who agreed while 8 (13.3%) respondents strongly agreed with the statement that there were abundant technologies for reducing carbon emission in Tanzania. The above views indicate that, most of the respondents interviewed perceived Tanzania to have weak technologies for reducing carbon emission in Tanzania. The respondent revealed that still we have no experts on making our own efficient technologies based on our environment.

4.3.2.5 Poor Technology Hinders Carbon Production and Market Sales

Moreover, the researcher was interested in understanding whether poor technology hindered or not carbon production and market sales in Tanzania from the respondents' views. Therefore, respondents were asked to show their levels of agreement on the statement that poor technology hinders carbon production and market sales in Tanzania and their responses are summarized in Table 4.17.

Table 4.17: Poor Technology Hinders Carbon Production And Market Sales

Responses	Frequency	Percentage
Strongly disagree	3	5.0
Disagree	7	11.7
Neither agree nor disagree	6	10.0
Agree	28	46.6
Strongly agree	16	26.7
Total	60	100.0

Source: Field data (2014)

The study found that few respondents disagreed poor technology to hinder carbon production and market sales in Tanzania. These include 3 (5%) respondents who strongly disagreed poor technology hindered carbon production and market sales in Tanzania and 7 (11.7%) respondents who disagreed poor technology hindered carbon production and market sales in Tanzania. 6 (10%) respondents neither agreed nor disagreed on the statement that poor technology hindered carbon production and market sales in Tanzania. On the other hand, majority of the respondents agreed poor technology to hinder carbon production and market sales in Tanzania. These include 28 (46.6%) respondents who agreed poor technology to hinder carbon production and market sales in Tanzania and they were strongly supported by other 16 (26.7%) respondents who strongly agreed poor technology to hinder carbon production and market sales in Tanzania.

The statistics above signify that, poor technology hindered carbon production and market sales in Tanzania. These views are consistent with what was revealed by UKaid (2010) that technical problem of the use in the country affected carbon investments. Lack of the necessary operation and maintenance infrastructure to support complex technologies were pointed to be among of them. However, Solar PV was building economies of scale and may be the first breakthrough technology.

4.3.3 Challenges Facing Carbon Trading Business in Tanzania

The third objective intended to find out the extent to challenges facing carbon trading business in Tanzania. Specifically, it explored whether or not weak technology hinders carbon trading in Tanzania; carbon capture and storage was still

a serious challenge to carbon trading in Tanzania. It also explores the extent to which low understanding and societal engagement in mitigation of carbon products is a challenge to carbon trading in Tanzania. Likewise, it explores high transaction costs of the carbon trading business, poor farmers' knowledge about carbon finance to be a challenge on carbon trading in Tanzania. Finally, limited penetration of carbon trading primarily due to affordability and access affect carbon trading in Tanzania and lack of carbon market networks affect carbon trading in Tanzania.

4.3.3.1 Weak technology hinder carbon trading in Tanzania

To achieve the above objective, the study sought the information from the respondents on how they perceived weak technology in hindering carbon trading in Tanzania. Therefore, the respondents were asked to provide their views on the role of weak technology in carbon trading in Tanzania as they presented in Table 4.18:

Table 4.18: Weak Technology Hinder Carbon Trading in Tanzania

Responses	Frequency	Percentage
Strongly disagree	5	8.3
Disagree	13	21.7
Neither agree nor disagree	1	1.7
Agree	27	45.0
Strongly agree	14	23.3
Total	60	100.0

Source: Field data (2014)

The study shows that small number of respondents disagreed on the statement that weak technology was among of the challenges facing carbon trading business in Tanzania. These included 5 (8.3%) respondents who strongly disagreed and 13(21.7%) respondents who disagreed on weak technology to be one of the

challenges facing carbon trading business in Tanzania. Only one (1.7%) respondent neither agreed nor disagreed weak technology to hinder or not hinder carbon trading business in Tanzania. On the other hand, higher number of the respondents agreed on weak technology to hinder carbon trading in Tanzania. These included 27 (45%) respondents who agreed and were strongly supported by 14 (23.3%) respondents who strongly agreed weak technology to hinder carbon trading in Tanzania. The above statistics shows that more than 41(68%) respondents agreed on the negative effects of weak technology on carbon trading in Tanzania. This implies that technology plays a paramount role in carbon trading and once not improved carbon trading business will be affected.

4.3.3.2 Carbon Capture and Storage Being a Serious Challenge to Carbon Trading

Likewise, the study was eager to understand from the respondents' perspective on how carbon capture and storage was still a serious challenge to carbon trading in Tanzania. Therefore, the respondents were asked to provide their views on the same and are presented in Table 4.19:

Table 4.19: Carbon Capture and Storage Being a Challenge

Responses	Frequency	Percentage
Strongly disagree	2	3.3
Disagree	6	10.0
Neither agree nor disagree	7	11.7
Agree	32	53.3
Strongly agree	13	21.7
Total	60	100.0

Source: Field data (2014)

The study findings revealed that few respondents disagreed on the challenge of carbon capture in carbon trading. These were 8 (13.3%) respondents who strongly disagreed and disagreed carbon capture and storage to be a serious challenge to carbon trading in Tanzania. They were followed by 7 (11.7%) respondents who neither agreed nor disagreed carbon captures and storage to be a serious challenge to carbon trading in Tanzania.

Contrary to the above, majority of the respondents showed to agree with the above challenge. These includes 32 (53.3%) and 23 (21.7%) respondents who both agreed and strongly agreed respectively carbon capture and storage to be a serious challenge to carbon trading in Tanzania. Based on the above statistics, carbon capture and storage looked a serious challenge to carbon trading in Tanzania. This signifies that carbon capture and storage were important elements for the effective carbon trading in Tanzania. The above respondents view reflects the study findings of Thomson and Khare (2008) that identified a number of challenges ranging from technological, economic, environmental, and social to legal ones to affect carbon trading.

4.3.3.3 Low Understanding and Societal Engagement in Mitigation of Carbon Products

Low understanding and societal engagement in improvement of carbon products was perceived to be a challenge to carbon trading in Tanzania. Therefore, the scholar was interested to get the respondents views on the same matter and their responses are shown in Table 4.20:

Table 4.20: Low Understanding and Societal Engagement

Responses	Frequency	Percentage
Strongly disagree	13	21.7
Disagree	15	25.0
Agree	19	31.6
Strongly agree	13	21.7
Total	60	100.0

Source: Field data (2014)

The study findings reveal that there were divided opinions on lower understanding and societal engagement in mitigation of carbon products being the challenge to carbon trading in Tanzania. 13 (21.7%) respondents strongly disagreed that low understanding and societal engagement in improving carbon products to challenge carbon trading in Tanzania. These were supported by 25 (25%) respondents who disagreed on low understanding and societal engagement in improving carbon products to challenge carbon trading in Tanzania.

On the other hand, other respondents had contrasting views on the same statement. 19 (31.6%) respondents agreed low understanding and societal engagement in improving carbon products to challenge carbon trading in Tanzania and were supported by 13 (21.7%) respondents who strongly agreed low understanding and societal engagement in improving carbon products to challenge carbon trading in Tanzania.

The statistics above which shows a divided views, indicate little contribution of lower understanding and societal engagement in challenging carbon trading in Tanzania. This signifies that understanding and engagement of societies in mitigation

of carbon products is not major challenge to the carbon trading in Tanzania. This implies that there are other more challenging factors to the carbon trading in Tanzania. The respondents opinions are supported by Sayfang and O'Neill (2011) findings which highlighted the diverse public understandings about 'carbon', encompassing technical, social, and moral discourses and provided further evidence for the environmental value-action gap in relation to adoption of low-carbon lifestyles.

4.3.3.4 High Transaction Costs of the Carbon Trading Business

High transaction costs of the carbon trading business were assumed to be another challenge to carbon trading in Tanzania. Therefore, the respondents were asked to provide their views based on the above assumption and are summarized in Table 4.21:

Table 4.21: High Transaction Costs of the Carbon Trading Business

Responses	Frequency	Percentage
Strongly disagree	5	8.3
Disagree	10	16.7
Neither agree nor disagree	3	5.0
Agree	30	50.0
Strongly agree	12	20.0
Total	60	100.0

Source: Field data (2014)

The study findings show that only 5 (8.3%) respondents strongly agreed high transaction costs of the carbon trading to be the challenge of the business and these

were supported by 10 (16.7%) who agreed with the former. 3 (5%) respondents neither agreed nor disagreed high transaction costs of the carbon trading to be the challenge or not of carbon business. On the other hand, 30 (50%) respondents agreed high transaction costs of the carbon trading to be the challenge of the business and were strongly supported by 12 (20%) respondents who strongly agreed high transaction costs of the carbon trading to be the challenge of the business. Based on the above statistics, high transaction costs of the carbon trading challenged the growth of business in Tanzania.

The challenge of high transaction cost as revealed by the researcher are supported by the work of Jindal *et al.*, (2008) which revealed that among other issues including insecure land tenure constrains new investments, increases the risk that local communities will lose access to forests to be a challenge to carbon trading business. These costs could be overcome by building strong community institutions and simplifying project guidelines. Likewise, the study findings are consistent with the work Arjunwadhar (2008) which revealed that high transactions costs involved in developing CDM projects were usually a barrier, especially among small and medium scale industries.

4.3.3.5 Poor Farmers' Knowledge on Carbon Financing Hinder Carbon Trading in Tanzania

Furthermore, poor farmers' knowledge on carbon financing was considered to hinder carbon trading in Tanzania. Therefore, the respondents were asked to provide their view on the same and their responses are shown in Table 4.22:

Table 4.22: Poor Farmers Knowledge on Carbon Finance Hinder Carbon Trading in Tanzania

Responses	Frequency	Percentage
Strongly disagree	7	11.7
Disagree	13	21.7
Agree	28	46.6
Strongly agree	12	20.0
Total	60	100.0

Source: Field data (2014)

The study found that only 7 (11.7%) respondents strongly disagreed to the view that poor farmers' knowledge on carbon financing hindered carbon trading in Tanzania. 13 (21.7%) of the respondents disagreed to the view that poor farmers' knowledge on carbon financing hindered carbon trading in Tanzania. On the other hand, 28 (46.6%) of the respondents agreed poor farmers' knowledge on carbon financing to hinder carbon trading in Tanzania. The above respondents were supported by 12 (20%) of the respondents who strongly agreed poor farmers' knowledge on carbon financing to hinder carbon trading in Tanzania. This shows that over 66 % respondents agreed on the effects of knowledge of financing in facilitating the growth of carbon trading in Tanzania. The above respondents' views uphold the findings of Ayuya and colleagues (2011) who revealed that socio-economic factors affected farmers' awareness of clean development mechanism projects.

4.3.3.6 Limited Penetration of Carbon Trading

Limited penetration of carbon trading due to affordability and access was assumed to affect carbon trading in Tanzania. Hence, respondents were asked to provide their views on the above assumption as they are summarized in Table 4.23:

Table 4.23: Limited Penetration Of Carbon Trading

Responses	Frequency	Percentage
Strongly disagree	4	6.7
Disagree	8	13.3
Neither agree nor disagree	4	6.7
Agree	25	41.7
Strongly agree	19	31.6
Total	60	100.0

Source: Field data (2014)

The study reveals that few respondents disagreed with the view that limited penetration of carbon trading in the country affect carbon trading 4 (6.7%) who strongly disagreed limited penetration of carbon trading challenged carbon business in Tanzania. 8 (13.3%) of respondents disagreed limited penetration of carbon trading challenged carbon business in Tanzania. Only 4 (6.7%) respondents neither agreed nor disagreed limited penetration of carbon trading to challenge carbon business in Tanzania. On the other hand, 25 (41.7%) respondents agreed limited penetration of carbon trading to challenge carbon business in Tanzania and were supported by 19 (31.6%) respondents who strongly agree that limited penetration of carbon trading challenged carbon business in Tanzania. This finding implies that penetration of carbon trading in Tanzanian societies played influential role in the growth of carbon business in Tanzania. However, the study revealed that there was little penetration of carbon trading in the country which challenged its growth.

4.3.3.7 Lack of Carbon Market Networks Affect Carbon Trading In Tanzania

Market networks was considered important variable in the growth of carbon trading in Tanzania. Yet, was considered to be a challenge to the growth of this business in Tanzania and hence, respondents were asked to provide their views on the lack of

carbon market networks in Tanzania and its effects carbon trading. Their views are summarized in Table 4.24.

Table 4.24: Lack of Carbon Market Networks Affect Carbon Trading in Tanzania

Responses	Frequency	Percentage
Disagree	7	11.7
Neither agree nor disagree	3	5.0
Agree	29	48.3
Strongly agree	21	35.0
Total	60	100.0

Source: Field data (2014)

The study found out that only 7 (11.7%) respondents from the total respondents disagreed on the statement that lack of carbon market networks affected carbon trading in Tanzania. 3 (5%) respondents neither agreed nor disagreed whether or not lack of carbon market networks affected carbon trading in Tanzania. contrary to the above views, majority of the respondents supported lack of carbon market networks to affect carbon trading in Tanzania. These were 29 (48.3%) respondents who agreed lack of carbon market networks affected carbon trading in Tanzania.

Also, they were strongly supported by 21 (35%) respondents who strongly agreed lack of carbon market networks affected carbon trading in Tanzania. based on the above statistics therefore, lack of market networks affected much carbon trading in Tanzania. This signifies that Tanzania lacks strong carbon market networks to facilitate effective carbon business. This has affected much carbon trading in Tanzania carbon gaseous sector.

4.3.4 Possible Measures to Benefit From Carbon Trading Opportunities

The fourth objective intended to find out possible measures the country should take to benefit from carbon trading opportunities in Tanzania. Specifically, it explored on creating a flexible and efficient market for carbon reduction, encouraging reduction of carbon emissions. Also, government putting more emphasis to the banks in investing in carbon trading business as among of the measures the country should take to benefit from carbon trading opportunities.

4.3.4.1 Creating a Flexible And Efficient Market for Carbon Reduction

Government role of creating flexible and efficient market for carbon reduction, encouraging reduction of carbon emissions was assumed to be one of the measures to be taken to benefit from carbon trading opportunities. Therefore, the respondents were asked to provide their views on this and are presented in Table 4.25:

Table 4.25: Creating a Flexible and Efficient Market for Carbon Reduction

Responses	Frequency	Percentage
Strongly disagree	3	5.0
Disagree	7	11.7
Agree	35	58.3
Strongly agree	15	25.0
Total	60	100.0

Source: Field data (2014)

The study findings revealed that few respondents disagreed creating a flexible and efficient market for carbon reduction to be one of the possible measures to be taken to benefit from carbon trading opportunities. These included 3 (5%) respondents who strongly disagreed with the above assertion and were supported by 7 (11.7%)

respondents who slightly disagreed. On the other hand, majority of the respondents agreed creating a flexible and efficient market for carbon reduction to be one of the possible measures to be taken to benefit from carbon trading opportunities. The dominant group consisted 35 (58.3%) respondents who agreed with the assertion and followed by 15 (25%) respondents who strongly agreed creating a flexible and efficient market for carbon reduction to be one of the possible measures to be taken to benefit from carbon trading opportunities. Based on the above statistics therefore, creating a flexible and efficient market for carbon reduction proved to be important measure in order to benefit from carbon trading opportunities in Tanzania.

4.3.4.2 More Emphasis on Investing in Carbon Trading Business by Banks

Furthermore, putting more emphasize by the government on investing in carbon by commercial institutions like banks was considered important measure in order to benefit from carbon trading. Hence, the respondents were asked to provide their views on the same statement and the results are shown in Table 4.26:

Table 4.26: More Emphasis on Investing in Carbon Trading by Banks

Responses	Frequency	Percentage
Strongly disagree	6	10.0
Disagree	10	16.7
Agree	27	45.0
Strongly agree	17	28.3
Total	60	100.0

Source: Field data (2014)

The study findings reveal that investment was perceived less important by few respondents including 6 (10%) of them showing strongly disagreement with the statement. These were followed by other 10 (16.7%) respondents who disagreed

emphasize by the government on investing in carbon by commercial institutions like banks to be important measure in benefiting from carbon trading. In contrast, majority of the respondents showed affirmation on the above statement of the importance of emphasize on investments on carbon trading by banks. These were 27 (45%) respondents who agreed emphasize by the government on investing in carbon by commercial institutions like banks to important measure in order to benefit from carbon trading and were strongly supported by other 17 (28.3%) respondents who strongly had the same opinion with the previous respondents. The statistics above indicates that emphasize as well as financial institutions investment on carbon trading was important measure in benefiting from carbon trading in Tanzania.

4.3.4.3 Having an Idea of Any Carbon Trading Business in Tanzania

The researcher was eager to have information on the awareness from Tanzanians on carbon trading business. Therefore, the researcher asked respondents whether or not they had an idea on carbon trading and their responses are shown in Table 4.27:

Table 4.27: Having an Idea of Any Carbon Trading Business In Tanzania

Responses	Frequency	Percentage
Yes	21	35.0
No	39	65.0
Total	60	100.0

Source: Field data (2014)

The study found that only 21 (35%) of the respondents had an idea on carbon trading in Tanzania while majority 39 (65%) of the respondents had no idea on carbon trading. The above statistics show a significant difference between two groups of

respondents. It indicates that, the higher number of the respondents lacked idea on the carbon trading in Tanzania. This implies that, lacking idea on carbon trading business affected the entire sector as a source of energy in Tanzania.

4.3.4.4 Benefits People Gets From Carbon Trading

The study sought to collect information on the kind of benefits people gets from carbon trading such as agriculture, technology, industrial and others by providing more details. Therefore, respondents were asked to mention the mostly benefiting sector from carbon trading in Tanzania as summarized in Table 4.28:

Table 4.28: Benefits People Gets from Carbon Trading

	Frequency	Percentage
Agriculture	5	8.3
Technology	4	6.7
Industrial	19	31.7
Others	32	53.3
Total	60	100.0

Source: Field data (2014)

The study revealed that few of the respondents argued agriculture and technology to benefit from carbon trading. These included 8.3% and 6.7% from agriculture and technology respectively. Other 19 (31.7%) respondents perceived industrial sector to benefit more from carbon trading while more than half (53.3%) respondents argued in support that carbon trading to benefit from other sectors which were not mentioned in the question. The statistics above suggests that, Tanzanians were still laying behind on the utilization of carbon products in agriculture, technology and industrial. Hence, they just get few benefits of carbon products through agriculture, technology and industrial sectors.

4.3.4.5 Community Awareness on the Benefit of Carbon Trading Business

The study sought to collect information on the awareness of community members aware on the benefit of carbon trading business. Therefore, researcher raised question on that to the respondents and their responses are shown in Table 4. 29:

Table 4.29: Awareness of Community on the Benefit of Carbon Trading Business

	Frequency	Percentage
Yes	17	28.3
No	43	71.7
Total	60	100.0

Source: Field data (2014)

The study reveal that few 17 (28.3%) respondents agreed that of community members were aware on the benefits of carbon trading business while majority 43 (71.7%) respondents had a view that community members were not aware on the benefits of carbon trading business in Tanzania. The figures above propose that majority of community members lacked awareness on the available benefits from carbon trading in Tanzania. Hence, lack of awareness on the available benefits affects carbon trading and its contribution to the community well beings.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This is a concluding chapter. It presents the summary of the findings, conclusion, and recommendations. It also provides areas for further studies.

5.2 Summary of Findings

The study aimed in assessing opportunities and challenges for carbon trading in Tanzania using the selected institutions. The study findings revealed that many carbon trading personnel had little knowledge on the carbon business which negatively impacted business development and its prosperity. The study findings further suggested that carbon trading protected green house gaseous in Tanzania. Also, the study found the availability of weak training on carbon trading business to impart people details of carbon markets in Tanzania. Likewise, the study revealed low degree of awareness on climate change among the Tanzanians.

Moreover, the study revealed that Tanzania lacked enough carbon projects which limited its development. Also, weak policy study found to be not a stumbling block in the growth of carbon investment in Tanzania, but poor bylaws, regulations and technologies discouraged investment flows in carbon investments. Likewise, technology was revealed to play a paramount role in carbon trading. This also, signified that carbon capture and storage were important elements for the effective carbon trading in Tanzania. On the other hand, understanding and engagement of

societies in mitigation of carbon products was found not to affect much carbon trading in Tanzania. Furthermore, the study found the following to be the measure in order to improve carbon trading in Tanzania. These included creating a flexible and efficient market for carbon reduction and emphasize on the financial institutions to invest in carbon trading.

5.3 Conclusion

Tanzania has a growing economy, aiming for strong economic development over the next 10-20 years, as it seeks to raise standards of living and address high levels of poverty. However, there are significant risks associated with the current growth pathway due to the unsustainable use of natural resources and the increasing reliance and inefficient use of fossil fuels. A more sustainable pathway should be adopted to ensure that Tanzania can become a middle income country whilst protecting its natural assets and environment. Having carbon business could be the biggest opportunity which could help Tanzania to invest in more sustainable technologies, easy access of funds and can ensure that some of the current problems can be addressed. This could raise much needed finance while at the same time supporting domestic priorities and moving towards a more sustainable pathway.

Therefore, the study found that most people aren't aware of the carbon trading and there are few opportunities and many challenges facing the carbon business currently known but expert organizations can work on them to earn the CER. However, technologies used are of low quality and therefore very little CER can be achieved. Overall, the study concludes that due to its location, availability of resources and

socio-economic conditions, there are significant benefits for Tanzania in promoting carbon business to ensure a more sustainable growth pathway. Such a pathway appears strongly in the country's self-interest, providing potential extra investment from carbon financing and numerous policy co-benefits. However, further assessment of the relative economic, social and environmental benefits and costs would be needed to further quantify the extent to which Tanzania should or could move in this direction.

5.4 Recommendations

The main objective of this study was to assess opportunities and challenges for carbon trading in Tanzania using the selected institutions. Based on study findings, the following recommendations are provided for further improvement of carbon business in Tanzania carbon sector.

Firstly, there should be clear effort of building capacity, mechanisms, institutions and governance systems for effective use must be developed to allow Tanzania to implement the business/projects and easy access of carbon funding for further development. This requires early and concerted action to build capacity across stakeholders and with the affected communities themselves. This should be an early priority.

Secondly, national policy should examine the potential effects of climate change and the potential for adaptation and carbon business. There is also a need to build on existing government and donor activities. There is a need to develop a new strategic

vision for Tanzania that addresses these areas, for example, with further development of the Vision 2025 document to include both domestic and international aspects.

Thirdly, there should be a regional collaboration. Regional collaboration and co-operation in the carbon sector will assist the entire sector to grow and hence all partners will benefit from economies of scale and to enhance regional resilience.

Fourth, the government should work to uplift the trade by enacting less bureaucratic laws and regulation as well as registration and licensing to entrepreneurs who want to be involved in this trade. It's clearly that carbon trade is very important not only to the livelihood of the communities but also to the government too as they can increase the country economy and reduce dependence on donor funds. Moreover, the Government should ensure that commercial banks receive suitable training so as to be part of the business by providing support for the initial investment.

Fifth, the study recommends that the responsible authorities should create awareness to the public on the importance of carbon trading in the country and how it could assist them in improving their business dealings as well as protecting environment.

Lastly, the study recommends that the government should prepare a workable policy on the carbon trading and other natural sources of energy in the country. By so doing, carbon trading will benefits from this policy by gaining access to finance, markets and favourable regulatory framework.

5.5 Areas for Further Research

The study examined the opportunities and challenges for carbon trading in Tanzania using the selected institutions. Recommendations and suggestions for future studies are provided accordingly. Other scholars should consider investigating if the opportunities mentioned above have been explored and the amount of carbon credit received. Also, further study is recommended to consider a large sample than what has been used in this study. The bigger sample will enable the research to reveal more truth on the challenges and opportunities for carbon trading in the country. Likewise, further study should assess if there are any government support or commercial banks supports to company/organizations who implement carbon business.

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APPENDIX
QUESTIONNAIRE

Part I: General Information

1. Your age (*please circle the appropriate answer*)
 - a. 18-30 years b. 31-40 years c. 41-50 years d. 51-60yrs e. 60+ yrs

2. Sex (*please circle whichever is relevant*)
 - a. Male b. Female

3. Marital Status(*please circle whichever is relevant*)
 - a. Single b. Married c. Divorced/Divorcee d. Widow/Widower

4. Academic qualifications (*circle the relevant answer*)
 - a. Certificate b. Diploma c. University degree d. Master's degree
 - e. Any other (Specify).....

5. How long have you been dealing with carbon business? (*circle the relevant answer*)
 - a. Less than 1 and 2 year b. between 2 and 4years c. between 4 and 6 d. 6 years and above

6. Business ownership(*circle the relevant answer*)
 - a. Self-owned business b. Partnership c. employee

7. Designation level of the respondents (*circle the relevant answer*)
 - a. Senior Manager

- b. Line Manager
- c. Supervisor
- d. Junior staff
- e. Any other

Part II:

The Extent To Which The Awareness On The Carbon Trading Business In Tanzania

From questions 8 to 12 indicate the level of agreement by ticking (v) one from the numbers given against each question on the extent to which the awareness on the carbon trading business in Tanzania (*Strongly Disagree= 1; Disagree= 2; Neither Agree nor Disagree= 3; Agree= 4; Strongly Agree=5*)

S/N	Question	1	2	3	4	5
8	I have strong knowledge on the carbon trading					
9	Carbon trading play important role in protecting green house gaseous					
10	There is a strong training on carbon business for better understanding the intricacies of carbon markets in Tanzania					
11	The business communications on carbon emissions known					
12	Awareness on climate change among the Tanzanians has increased and hence most of them realize the importance of reducing emission through conducting carbon trading					

Part III:

What are the Opportunities Available For Carbon Trading In Tanzania?

From questions 13 to 17 indicate the level of agreement by ticking (v) one from the numbers given against each question on the extent to which the availability carbon commodities facilitate carbon trading in Tanzania (*Strongly Disagree= 1; Disagree= 2; Neither Agree nor Disagree= 3; Agree= 4; Strongly Agree=5*)

S/N	Question	1	2	3	4	5
13	There are a lot of carbon trading opportunities in Tanzania					
14	Tanzania lacks enough carbon projects and this limit its development					
15	Weak Policy affect carbon investments and hence limits its availability to its users					
16	There are abundant technologies for reducing carbon emission in Tanzania					
17	Poor technology hinder carbon production and market sales					

Part IV:

Challenges facing carbon trading business in Tanzania

From questions 18 to 22 indicate the level of agreement by ticking (v) one from the numbers given against each question on the challenges facing carbon trading business in Tanzania (*Strongly Disagree= 1; Disagree= 2; Neither Agree nor Disagree= 3; Agree= 4; Strongly Agree=5*)

S/N	Question	1	2	3	4	5
18	Weak technology hinder carbon trading in Tanzania					
19	Carbon capture and storage is still a serious challenge to carbon trading in Tanzania					
20	Low understanding and societal engagement in mitigation of carbon products is a challenge to carbon trading in Tanzania					
21	High transaction costs of the carbon trading business					
22	Poor farmers knowledge about carbon finance hinder carbon trading in Tanzania					
23	Limited penetration of carbon trading primarily due to affordability and access affect carbon trading in Tanzania					
24	Lack of carbon market networks affect carbon trading in Tanzania					

Part V:

Possible measures the country should take to benefit from Carbon trading opportunities

From questions 25 to 28 indicate the level of agreement by ticking (v) one from the numbers given against each question on the challenges facing carbon trading business in Tanzania (*Strongly Disagree= 1; Disagree= 2; Neither Agree nor Disagree= 3; Agree= 4; Strongly Agree=5*)

S/N	Question	1	2	3	4	5
25	Tanzania should engage in implementing regional PoA programmes					
26	Government to create a flexible and efficient market for carbon reduction, encouraging reduction of carbon emissions by those companies who can do so at the least cost					
27	Carbon trading is "hard to implement, it's hard to monitor, it's non-transparent, it's highly political,					
28	Government put more emphasis to the banks to invest in carbon trading business					

Part VI:

Provide a brief explanation on the following

29. Do you have an idea of any carbon trading business here in Tanzania?

If Yes give us more details.(From which sector Agriculture, Energy, Industrial , any other you know)

.....

.....

30. Do you think the issue of carbon trading is known to most of the Tanzanians?

Explain in detail?

.....

.....

31. When and where did you hear people have benefited with the carbon trading business?

.....

.....

32. What kind of carbon trading business are people benefiting from (Agriculture, technology, industrial, other). Provide more details?

.....

.....

Do community members aware on the benefit of carbon trading business?

.....

34. Does the country have enough knowledge and capacity for implementing the carbon trading? (Provide an example on things which shows you that knowledge is there)

.....

.....

.....

32. What are the opportunities available for having carbon trading business?

(i) For the Government

.....

.....

(ii) For the community

.....

.....

(iii) For Implementers

.....

.....

33. What are the challenges of carbon trading business?

.....

.....

34. What possible measures the country should take to benefit from Carbon trading Opportunities?

.....

.....

Would you like to provide any additional information relating to the opportunities challenges and ant measures to be taken for carbon trading in Tanzania that you have not provided elsewhere?(You may attach extra paper for more information)

Thank you for your cooperation
Everline Mark Kihulla