

**Recognition, measurement and reporting for cap-and-trade
schemes in the agricultural sector**

by

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DEDICATION

This work is dedicated to my daughters, Valerine and Venessa, my wife, Catherine, and my mum, Mary. Thank you all for the love that inspired this work. To all of you I say, success in life may mean hanging on long after others have given up and:

“... the happiest people do not have everything, they just make the best of everything that they have.” (Anon)

..... live simply, love generously, care deeply and speak kindly. (Anon)

DECLARATION

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Thesis:

Recognition, measurement and reporting for cap-and-trade schemes in the agricultural sector

I declare that the above dissertation/thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.



SIGNATURE

30 May 2016

DATE

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To Almighty **God** for the grace He has shown throughout my studies, Lord, you promise to give rain for every seed that I will sow (Isaiah, 30:23) and now to Him who is able to do immeasurably more than all we ask or imagine, according to His power that is at work within us, to Him be Glory (Ephesians, 3:20).

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SUMMARY

The pressing global demand to transform to a low-carbon business community, which is required by the urgency of mitigating climate change, significantly alters the operating procedures for carbon emitters and carbon revenue generators alike. Although agricultural activities are not considered as heavy carbon emission source, the increased public focus on climate change has catapulted the exploitation of sustainable agricultural land management mitigating strategies as intervention by the sector. Additionally, the focus on market-based mechanism to address climate change, which has led to the evolution of cap-and-trade schemes, makes the agricultural sector become a source of low-cost carbon offsets. However, the fact that cap-and-trade schemes in the agricultural sector are voluntary has resulted into not only very diverse farming practices but also diverse accounting practices. The consequences of the diversity practices are that, the impacts on financial performance and position are not comparable. Therefore, the overall objective of this study was to investigate the recognition, measurement and disclosure for cap-and-trade schemes in the agricultural sectors

This study was conducted through literature reviews and empirical test. A qualitative research approach utilising constructivist methodology was employed. Primary data was collected in Kenya by administering three sets of semi-structured questionnaires to drafters of financial statements, loan officers and financial consultants. Secondary data involved content analysis of financial statements and reports of listed entities across the globe. It was established that proper accounting for cap-and-trade schemes adaptation activities is critical to the success of an entity's environmental portfolio. Additionally, a model for valuing an organisation's carbon capture potential as suggested by this study enables entities to better report the impact of the adaptation activities on the financial performance and financial position. The outcome of this study enables entities to integrate the carbon capture potential on an entity sustainability reporting framework.

Key words:

Cap-and-trade schemes, carbon capture potential, sustainability reporting, climate change, biological assets, carbon sequestration, fair value hierarchy, environmental report, integrated reporting, agricultural sector.

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Chapter 1

Introduction

1.1 BACKGROUND INFORMATION

The world today is facing the twin problems of food insecurity and climate change, challenges that are increasingly seen as being interdependent. Pachauri (2008:21) explains that, although the problems of food security and climate change are shaped by a confluence of different factors, they converge within the agriculture sector. Pachauri (2008:21) further notes that, the use of better farming methods can result in agriculture acting as a carbon bank, which in turn can address the problem of degraded natural resources, lack of food security and climate change. These profound concerns about climate change and food insecurity have pushed the green agenda from the debating chamber into the board room of private entities in the agricultural sector.

Garnaut (2011:311) argues that while it is inevitable that some degree of climate change will occur for our current purposes it is more important that adaptation to its effects takes place. There are various agricultural practices and policy options that can result in trade-offs and synergies across the twin challenges of food security and climate change. German Watch (2011:70) notes that, one such practice is mitigation finance, which can be regarded as a new option for supporting farmers in improving agricultural production and land management. Such finance would enhance productivity and the capacity of the agricultural sector to adapt to and mitigate climate change.

According to PricewaterhouseCoopers (PWC 2011), the consequences of climate change have necessitated a raft of economic measures at both the national and international levels to ensure that public and private entities become increasingly alert to the environmental impact of their activities. According to Garnaut (2011:311) poorly designed policies can result in unnecessarily high transaction costs and misallocated resources. Therefore,

entities have to establish measures that can be employed to enhance the positive effects and minimise the negative effects of the business procedures (PWC 2011).

The optimal form of adaptation to climate change and food insecurity, as well as its extent and timing, will depend on the ability of communities and businesses to assess the risks they face and the options available for addressing those risks (Starbatty 2010). A key focus for intervention to minimise negative environmental effects has been a market-based mechanism which has led to the evolution of cap-and-trade schemes (Garnaut 2011:310). According to Beder (2001) proponents of market forces argue that trading between parties allows carbon permits to move where they have the greatest economic value. Although there have been many cap schemes, the most dominant cap-and-trade scheme limits entities' emissions of greenhouse gases (GHGs), resulting in what is described as the carbon market (Beder 2001).

The carbon market has evolved gradually under the protocol to the United Nations Framework Convention on Climate Change (UNFCCC 2011), also commonly known as the Kyoto Protocol. The protocol was established as a response to the threat of global climate change, arising from human industrial activities that have caused a concentration of GHGs in the atmosphere. The consequences of climate change have been serious and have had a drastic effect on the environment, as well as social and economic levels of mankind. The UNFCCC (2011) which was concluded at the United Nations conference in Durban in 2011 recommended the adoption of a universal legal agreement on climate change as soon as possible, and no later than 2015. The carbon market is therefore expected to grow accordingly at a compounding rate.

According to Yale Environment 360 (2009), preferred solutions should focus more on market forces rather than on direct regulations such as carbon taxes. Beder (2001) argues that the focus on market forces will not only reduce emissions but will also reflect the level of GHGs emissions. PWC (2009) notes that such market-based solutions include tradable emissions

permits which limit the amount of carbon emissions, adding that in such trading schemes the government sets the quantities of emissions and the market sets the prices (PWC 2009:15). In contrast, Komanoff (2009) notes that although a cap-and-trade system helped curb sulphur emissions and lessen acid rain, the task of reducing carbon emissions and averting climate catastrophe will be far greater in magnitude. Komanoff (2009) further adds that decarbonising the world's atmosphere will entail scaling up hundreds of innovative technologies, some of which do not yet exist, as well as increasing the peoples' ecological consciousness.

According to Bhalerao (2011) one good thing carbon pricing has done is that it has helped the common people to understand which products induce carbon emissions, and hence should be used sparingly, and it also provides incentives for investors and innovators to produce and invest only in low carbon products, thus benefiting them financially.

1.1.1 Trends in the agricultural forestry and land use carbon market

Despite the recent global recession, the carbon market continues to expand with the voluntary over-the-counter markets showing significant increases in the volume of offset credits traded (Murray 2010). Table 1.1 shows the trend in the agricultural, forestry and land use (AFOLU) voluntary trading of carbon offsets and the average market prices.

Table 1.1: The voluntary agricultural forestry and land use offset markets

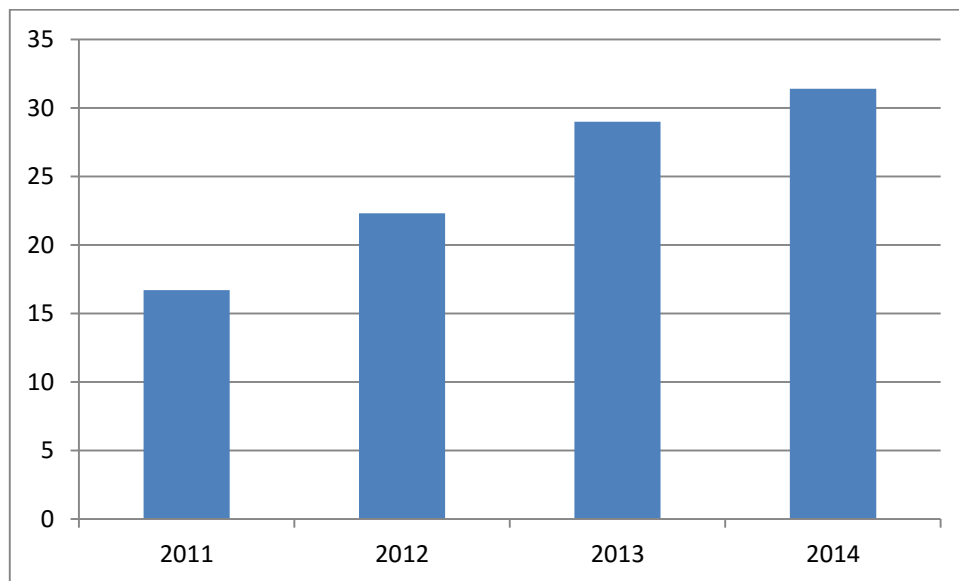
Voluntary Market	Year			
	2011	2012	2013	2014
Volume traded in millions of metric ton of CO ₂	16.7	22.3	29.0	31.4
Average market prices in US\$/metric ton of CO ₂	10.3	7.6	4.8	3.8
Value traded in millions of US\$	\$ 172	\$ 148	\$140	119.32

Source: Forest Trends (2015:12)

Although the carbon market has been experiencing a general price decline, various commentators such as Point Carbon (2010), Murray (2010) and Environmental Leader LLC,

(2010) recognise the fact that the carbon market continues to experience more expansion. This market expansion is clearly depicted in table 1.1 and figure 1.1. Additionally, the market has greater potential of growth as different countries, political regimes and private entities are designing projects that are geared to reducing carbon emissions.

Figure 1.1: Volume traded in millions of metric ton of CO₂

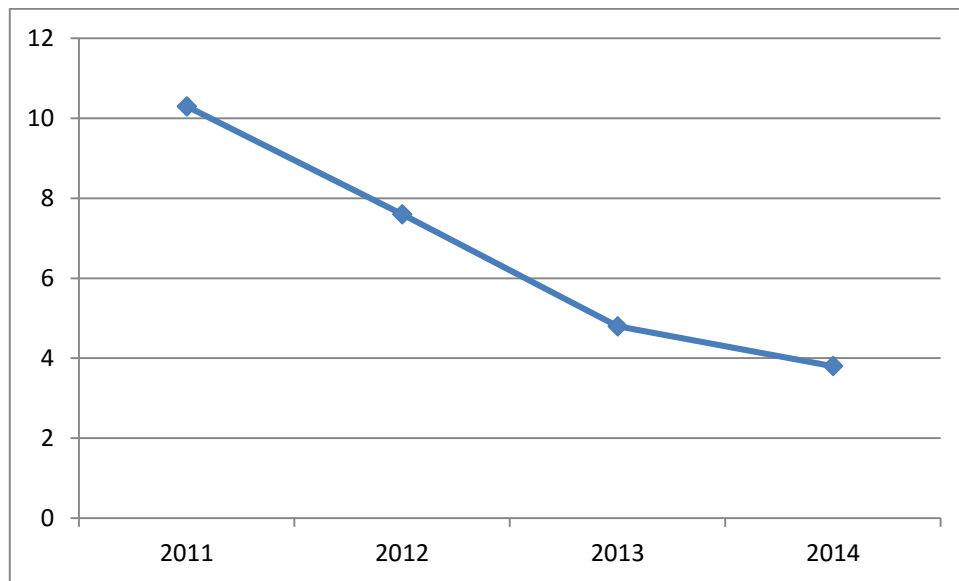


Source: Forest Trends (2015)

Despite the increasing volume of carbon offsets traded, the market prices continue to decline; these have been suppressed by an oversupply of offsets and low demand following the expiry of the first binding duration of the Kyoto Protocol and depressed economic growth (World Bank 2014). The general trend in market prices for carbon offsets is depicted in figure 1.2.

Although the market prices have been on a downward trend, Forest Trends (2015) notes that the prices are likely to stabilise and soar upwards. The likely integration of carbon capture and storage (CCS) into the global capital market will see the carbon market expand even more rapidly. It is worth noting that many entities have established carbon metrics to monitor the impact of their activities on the environment in what is popularly described as a 'carbon footprint'.

Figure 1.2: Average market prices in US\$/ metric ton of CO₂



Source: Forest Trends (2015)

For instance, in 2010 Barclays Bank (2011) purchased 1 191 956 carbon credits from projects in Brazil, China, India, South Korea, Tanzania, Kenya and Thailand. This purchase offset global carbon emissions from energy use and travel totalling 1 138 830 tonnes of CO₂ in 2009 and an additional 133 000 tonnes of CO₂ for 2008, which were captured as part of the bank's improved data management and estimation methods (Barclays 2011). According to Twining (2008) many other entities, including Standard Chartered, Merrill Lynch, and J P Morgan, already profit from trade in carbon assets, which had a market value of about €65 billion in 2007.

Redd Monitor (2011) explains that the World Bank manages 12 carbon funds and facilities, working in 57 countries. According to a report by Redd Monitor (2011) by 2010, when the Bank's Prototype Carbon Fund reached its tenth birthday, the Bank had a carbon finance portfolio of US\$2.4 billion, with more than 200 projects. The Bank provides finance to set up carbon projects, as well as buying and selling carbon credits (Redd Monitor 2011).

Another initiative includes the establishment of Deutsche Bank's Carbon Custody Clearing Centre (C4) which provides a unique clearing and settlement platform for carbon investors

(Babu 2011). According to Babu (2011), C4 is a true receipt versus payment (RVP) and delivery versus payment (DVP) settlement environment offering multiple benefits to carbon investors which includes the following:

- Carbon credits are settled in conjunction with cash thus eliminating the settlement risk;
- Using C4 off loads many of the operational aspects of the carbon settlement process to an established securities servicing firm;
- The C4 service provides consolidated holdings across multiple registries, facilitating rapid settlement and reducing risk; and
- Upon implementation of the information technology, offset credits can be automatically transferred to local registry accounts (Babu 2011).

The agricultural sector, which is seen as the target for generating carbon offsets, will not be left behind in the carbon market, as it is estimated that trading volume could grow to €2 trillion by 2020, more than double the size of the global commodities derivatives market (Twining 2008). The agricultural sector which provides CCS will be the bedrock for many entities to acquire offsets.

1.1.2 Carbon capture and storage (CCS) or carbon sequestration

Although the agricultural sector is a source of GHGs emissions, it also acts as a "sink" for sequestering carbon (Bjurstrom 2010). According to the Black Bear Conservation Coalition (BBCC 2009) carbon banking or carbon sequestration, refers to the process of growing trees in order both to capture and store carbon dioxide from the atmosphere. According to the United Nations Environmental Programme (UNEP 2009), the agricultural sector could have the largest readily achievable gains in carbon storage, at little or no cost, if best management practices were widely adopted. According to the UNEP (2009), farming practices such as avoiding turning over the soil and using natural nutrients like compost and manure could help to ensure that the sector is carbon neutral by the year 2030.

According to the Black Bear Conservation Coalition (BBCC 2009), when existing forests are conserved and sustainably managed, and cleared forests are replanted, such forests may become extremely effective, long-term carbon storage banks. In fact the UNEP (2009) asserts that agroforestry, where food production is combined with tree planting, has a particularly high potential for carbon sequestration. The agricultural sector also acts as key source of biomass for energy and fuel production. Carbon banking is on the rise and it will, in all likelihood, become a driving force behind re-forestation (BBCC 2009).

CNN International (2008) on the other hand explains that, many industrial installations across the EU and other parts of the world have been "capped" with the GHGs quotas that are based on the host countries' Kyoto obligations, which necessitate their seeking of offsets or risking paying hefty penalties. Additionally, under the Clean Development Mechanism (CDM), companies can invest in eco-projects to generate "carbon credits" (CNN International 2008). Energy companies pay money to landowners to create carbon banks so they may receive the carbon credits that are traded on the open market. Burritt and Schaltegger (2012:109) who sought to identify the benefits of sustainability accounting for the production and industrial use of biomass as an energy source concluded that accounting for biomass must recognise the broader ecological and social system of which production and use form part.

1.2 THE WITHDRAWAL OF IFRIC 3

Proper accounting and tracking of carbon credits can be critical to the success of an entity's environmental portfolio. Consequently, when the European Union (EU) was implementing the first phase of its emissions trading system, the International Accounting Standards Board (IASB 2005:2079) attempted to provide guidance to prevent diversity in practice from developing. The IASB's International Financial Reporting Interpretations Committee (IFRIC) issued IFRIC 3, *Emission Rights* in December 2004 (IASB 2005:2079), but withdrew it in June 2005.

The controversies that led to the withdrawal of IFRIC 3 included the following (Deloitte 2005):

- Volatility in income resulted from mismatches in the recognition of changes in the value of emissions allowances and an entity's emission liability. IFRIC 3 does not match the income statement effects of asset recognition and liability recognition. There is therefore likely to be income volatility, which could be avoided by changing the accounting treatment from one in which the asset is recognised when the entity obtains it and the liability is recognised as the entity emits GHGs.
- The accounting treatment is invariant to the entity's planned use of an emission allowance, for example, selling it versus using it to satisfy its emissions obligations (Deloitte 2005).

The withdrawal of IFRIC 3 resulted in no guidance on accounting for cap-and-trade schemes. The IASB and the Financial Accounting Standards Board (FASB) added accounting for cap-and-trade schemes to their joint projects and will be addressing the following issues (IASB 2010):

- Whether emissions allowances are assets and how the accounting is affected in terms of how the allowance is obtained or the nature of the allowance. This includes the way allowances should be recognised and initially measured.
- Whether baselines or the credits are assets and the nature of the asset is represented by the baseline.
- Whether the entity that receives allowances or a baseline from the scheme administrator has a liability.
- The subsequent accounting for allowances and baselines and whether the existing model in IAS 38, *Intangible Assets* or IAS 39, *Financial Instruments: Recognition and Measurement* is appropriate.

- The timing of recognition of an entity's obligations in emissions trading schemes and how should they be measured.
- The overall financial reporting effects of the cap-and-trade schemes (IASB 2010).

Discussions on the emissions trading scheme project were deferred in November 2010 when the IASB and the FASB decided to amend the timetable for some projects (IASB 2010). However, until the project is completed, there is no authoritative guidance in either the US Generally Accepted Accounting Principles (US GAAP) or International Financial Reporting Standards (IFRSs) on the accounting for cap-and-trade arrangements. This has resulted in the need to analogise the treatment of emission allowances, carbon off-set and permits thus creating diversity in financial reporting.

1.3 PROBLEM STATEMENT

The global problems of climate change, food insecurity and depleting resources are pushing many entities in the agricultural sector into a range of sustainability activities, commonly described as 'climate smart agriculture' (CSA). The Food and Agriculture Organisation (FAO) (2012:2) explains that CSA embraces practices that incorporate the necessary adaptation of agricultural growth strategies for food security and climate change, and that also create carbon capture potential. The GIC Group (2010) emphasises the need to link carbon offsets and allowances to agricultural produce through new aggregation strategies and the use of a sector-specific carbon pricing instrument and trading strategy that can create a link between the product origination and carbon content. Under various carbon emissions trading schemes proposed around the world, entities in the agricultural sector that manage to implement CSA will be able to meet their carbon ration targets, earn revenue and reduce costs by selling carbon off-sets.

These transitions will necessitate innovations in the area of financial reporting in order for entities to understand the returns from such investments, as well as the risks they may run

by choosing not to respond. In the past, various initiatives and research have been undertaken, on how to incorporate information about sustainability activities in the financial statements. Kerr (2008:83) notes that unless an economic development is measured and reported in the financial statements it will rarely receive much attention. The Global Reporting Initiative (GRI 2000) has developed an approach that covers environmental performance indicators in three areas, namely economic, social and environmental, while the United Nations Conference on Trade and Development (UNCTAD 2004) focuses on the use of eco-efficient indicators, and the ratio between an environmental and a financial variable which is a measure of the environmental performance of a firm with respect to its financial performance.

There is also the risk of diverse accounting practices for such schemes following the withdrawal of IFRIC 3, Emission Rights (Deloitte 2005; Griffin 2010:17). In fact, Cho, Michelon and Patten (2012:84) emphasise that, owing to a lack of guidelines, entities are using the sustainability and environmental reports for “impression management”. In their research, Tang and Luo (2011:23) established that the users of financial statements continue to demand more detailed information about the sustainability activities undertaken by an entity, which creates the need to provide a linkage between an entity’s strategy, governance and financial performance and the social, environmental and economic context within which it operates. This will accordingly facilitate sustainable decisions and enable stakeholders to understand how an entity is really performing. It is obvious that the development of a more standardised approach to reporting for cap-and-trade schemes will drive greater consistency, transparency, reliability and cost-effectiveness. Many entities continue to make significant investments in sustainability activity without a similar increase in:

- guidelines on how to report such information,
- identification of essential information to be reported, and
- identification of the key interest groups for such information.

Therefore this study sought to investigate the current practices in accounting for cap-and-trade schemes in the agricultural sector so as to make a proposal on the initial recognition criteria, measurements and subsequent financial reporting, presentation and disclosures. This study also proposes a model for valuing agricultural entities' non-current carbon sequestration and emission capabilities.

1.4 POINTS OF DEPARTURE AND ASSUMPTIONS

Various studies have been undertaken to study the impact of cap-and-trade schemes on financial reporting. Kerr (2008:77), who sought to investigate the impact of carbon allowances on accounting policies, notes that as environmental impacts were privatised, a whole new class of assets and liabilities emerged. Kerr (2008:78) concludes that although the environment as a public good is hard to price, professionals should prepare accounting policies that ensure the relevance of accounting information when it comes to evaluating corporate performance. Hopwood (2009), Callon (2008) and Lohmann (2008) focused on the many questions and challenges of reporting for carbon emissions permits, with Bebbington and Larrinaga (2008:703) insisting that carbon activities should be non-financial disclosures.

The agricultural sector provides the carbon capture and sequestration projects that are mainly targeted by industrial entities for carbon offset. This study thus focuses on the financial reporting of an agricultural entity's carbon capture potential and more specifically the valuation of the underlying biological assets. It should be noted that the carbon markets are not fully developed and prices for carbon offsets have been declining. Up to now, the main discussions have focused on the financial reporting of tradable permits and allowances with little focus on an entity's carbon capture potential. Equally, there has been no discussion focusing specifically on financial reporting in the agricultural sector. This study therefore focused on integrating an Environmental Capability Enhancing Asset (ECEA) metric as proposed by Ratnatunga, Jones, and Balachandran (2011) as the underpinning

metric for the conversion of non-monetary CO₂ emission and sequestration measures to monetary values. Whereas Ratnatunga *et al.* (2011) proposes ECEA as a separate intangible asset, this study argues that, in the context of an agricultural sector, biological assets are used in process of generating carbon offset. This is discussed in section 4.5.5.

1.5 RESEARCH OBJECTIVES

The overall objective of the study was to examine and propose best practices in the financial reporting of cap-and-trade schemes in the agricultural sector. In order to achieve the overall objective this study sought to achieve the following specific objectives:

- to identify the initial recognition criteria for cap-and-trade schemes in the agricultural sector,
- to identify the subsequent measurement of cap-and-trade schemes in the agricultural sector, and
- to identify the disclosure needs for cap-and-trade schemes in the agricultural sector.

1.5.1 Research questions

In order to achieve the overall objective this study was guided by the following research questions:

- What are the initial recognition criteria for cap-and-trade schemes in the agricultural sector?
- What are the subsequent measurement practices for cap-and-trade schemes in the agricultural sector? and
- What are the disclosure needs for cap-and-trade schemes in the agricultural sector?

1.6 DESCRIPTION OF THE RESEARCH METHODS THAT WERE USED

This research involved literature review, secondary data analysis as well as empirical tests. The literature review involved critical analysis of documentary publications relating to financial reporting in the agricultural sector. The secondary data was obtained from content analysis of annual reports, financial statements and other disclosures of listed entities in the agricultural sector across the globe. The empirical tests involved collecting primary data from farmers participating in the Kenya Agricultural Carbon Project (KACP) and users of financial statements. This is briefly explained in section 1.7 and discussed in detail in chapter 6.

1.7 RESEARCH SUBJECTS

The researcher purposed to use multiple sources of data so as to enhance the rigour and validity of the findings. The published financial statements of listed entities in the agricultural sector were analysed for content relating to sustainability reports and carbon capture potential. The primary data was collected by administering semi-structured questionnaires to the drafters of financial statements, loan officers in financial institutions offering green loans and financial consultants. The drafters of financial statements comprised of the farmers listed under the KACP. The second category comprised of loan officers in financial institutions offering green loans to the agricultural sector. The third category was financial consultants who are professionally engaged in the agricultural sector. The two categories of users were selected on behalf of other users of financial statements to triangulate the information provided by drafters of financial statements.

1.8 WHERE THE RESEARCH WAS CONDUCTED

This research involved listed entities in the agricultural sector in various securities exchanges across the globe because their annual reports, financial statements and other disclosures are publicly available. The empirical tests were done in Kenya

through KACP, the first agricultural based carbon project funded by World Bank (2014). The project utilises Activity Baseline and Monitoring Survey (ABMS) methodology, which is international pretested and approved (Verified Carbon Standards 2014). The project in Kenya was selected because it is the first and utilised international standards as discussed in section 6.2.1.2.

1.9 THE RESEARCH'S CONTRIBUTION TO THE SUBJECT

It was expected that this study would:

- prescribe ways of accounting and reporting for cap-and-trade schemes in the agricultural sector,
- propose a model for the valuation of biological assets that incorporates an entity's carbon capture potential,
- evaluate the way in which carbon capture potential influences an entity's sustainability indicators and environmental reports, and
- recommend ways in which to integrate carbon capture potential in an entity's sustainability financial reporting framework.

It was also expected that the outcome of this study could assist entities in evaluating their compliance with various environmental regulations and, thus, in refining their environmental and reporting policies. This would ensure that sustainability decision-making becomes more fact-based and empirical.

1.10 RESEARCH STRUCTURE

The rest of this research is organised as follows:

Chapter 2: Sustainability reporting in the agricultural sector

Chapter 2 provides a round-up of the various sustainability activities embraced by the agricultural sector across the globe, and discusses the way such activities lead to carbon

offsets or carbon allowances. The chapter also provides a brief overview of the state and mechanisms of the carbon markets and discusses statutory requirements and environmental care with respect to mandatory carbon reduction schemes. This chapter concludes by explaining how carbon reporting can be integrated into entities' sustainability reporting frameworks.

Chapter 3: Initial recognition and measurement of cap-and-trade schemes

Chapter 3 discusses the initial recognition, classification and measurement of carbon offsets in the agricultural sector as well as the various bases of accounting on initial recognition, such as the fair value, cost and intended use approaches. Other issues highlighted in the chapter include revenue recognition practices such as sell and defer income, governments grant and other practices. The chapter concludes by discussing in detail the derivative financial instruments arising in carbon markets and how they can be used to mitigate the carbon prices volatility.

Chapter 4: Valuation of biological assets used for carbon capture and storage

Many entities earn carbon offset credits by completing qualifying projects, either mandatory or voluntary, that result in the reduction or avoidance of GHG or the sequestration of GHG. This chapter explores current accounting practices in the valuation of an entity's carbon capture potential and how these affect the value of the underlying biological assets. The aim of this chapter is to discuss the models that can be used in the valuation of an entity's non-current carbon sequestration and emissions capabilities.

Chapter 5: Reporting for cap-and-trade schemes

This chapter evaluates various ways of presenting carbon activities in the financial statements. The different views on the presentation of assets and liabilities in a cap-and-trade scheme in the statement of financial position will be discussed in detail. The chapter

also evaluates the various challenges encountered when accounting for cap-and-trade schemes and carbon capture potential.

Chapter 6: Research design

In this chapter the research design and methodologies are discussed. The researcher employed a content analysis research method and semi-structured questionnaires. The content analysis was used to gather secondary data from the financial statements and sustainability reports of those entities that present descriptive disclosures. In this process, the researcher quantified and analysed the presence, meanings and relationships of various words and concepts, and then made inferences about the messages conveyed by the financial statements.

Chapter 7: Analysis of research findings

This chapter discusses the research findings based on an analysis of the questionnaire responses. In addition, an interpretation of the findings as a basis for conclusions is included.

Chapter 8: Summary and conclusions

The chapter provides a brief overview of the study and makes a number of conclusions and recommendations. As the carbon market expands, entities will need to ensure that they have appropriate protocols in place for capturing, measuring and reporting emissions. The chapter will recommend reporting strategies for carbon activities that can be adopted in order to place entities at a competitive advantage in terms of acquiring credits and offsets.

Chapter 2

Sustainability reporting in the agricultural sector

2.1 INTRODUCTION

This chapter explores the huge potential of agricultural activities to become a driver of low-cost carbon mitigation and sequestration. In order to achieve this, the chapter commences with a review of sustainability concepts and discusses various sustainability activities embraced by the agricultural sector across the globe. It then articulates the way in which such activities can lead to carbon offsets or carbon allowances. The chapter also provides a brief overview of the state and mechanisms of the carbon markets.

In order to show how carbon reporting can be integrated into an entity's reporting framework, this chapter also discusses the sustainability reporting framework and other initiatives aimed at a more consistent and comparable presentation of social, environmental, economic and governance reports. The last part of the chapter highlights the key challenges to a harmonised sustainability reporting framework.

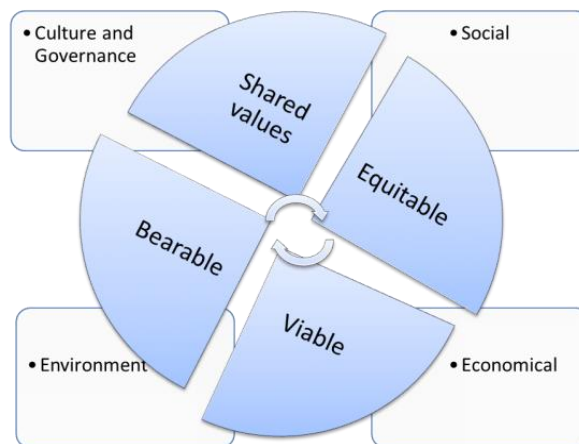
2.2 THE CONCEPT OF SUSTAINABILITY

According to Dow Jones (2011:9), sustainability entails a business model that creates long-term stakeholders' value by embracing the opportunities and managing the risks deriving from economic, environmental and social aspects. The dynamic nature of these environmental and social aspects makes sustainable practices very complex. The Global Reporting Initiative (GRI 2013) reflects on sustainability complexities in terms of six different themes, namely, economy, society, environment, labour practices, human rights and product responsibility. Balatbat and Wang (2010:18) contend that the complexity of sustainability is influenced by external institutional forces, industry characteristics and internal operation and control processes.

Dow Jones (2011:9) further argues that corporate sustainability is an investable concept while Elliott and Elliott (2012:844) concurs that corporate sustainability can enable an entity to achieve long-term shareholder value by gearing its strategies and management to harness the market's potential for sustainability. It is important to emphasise that sustainable practices come at a cost and, in return, help to manage the sustainability risks.

The International Federation of Accountants' (IFAC 2011:11) sustainability framework emphasises the importance of adopting a strategic approach so that sustainability can become part of the daily discussion, objectives, goals and targets and become integrated with the governance and accountability arrangements within an entity. The emerging sustainability paradigm necessitates the integration of governance and an entity's cultural and value systems into the social, environmental and economic contexts within which an entity operates. Such a sustainability framework is depicted in figure 2.1.

Figure 2.1: The concept of sustainability



Source: Adapted from Elkington (1997)

2.2.1 Environment indicators

In view of the fact that every entity exists within a specific environmental context the management of the entity must constantly assess the way the entity's operations impact on

that environment. It is therefore important that entities are conscious of the local and international environmental regulations governing the region in which they operate. The United Nations Environmental Program (UNEP 2012) plays a vital role in the development of multilateral environmental agreements and constantly provides on-going support for the updating of conventions and protocols that are legally binding on the states that are party to them. The UNEP (2012) also promotes the development of non-legally binding instruments in areas not yet covered by binding regulations. These regulations are designed to encourage governments and other actors, both public and private, to undertake appropriate initiatives and protect the environment on a voluntary basis.

Environmental performance indicators (EPIs) are concerned with the impact an entity has on living and non-living natural systems including ecosystems in the land, air and water. For example, indicators such as greenhouse gas emissions, water consumption and waste output can be used to assess an entity's environmental performance. EPIs may help to identify the most significant environmental impacts, as well as clarify and communicate companies' environmental goals. According to the American Institute of Certified Public Accountants (AICPA 2012), there are five key environmental performance areas:

- GHGs emissions;
- energy conservation and energy costs management;
- limited resources such as water, fossil fuels and forest products;
- waste management such as solid and hazardous waste produced, and
- chemicals use and management including the downstream effects (AICPA 2012).

The agricultural sector is a critical source of environmental degradation owing to the use of chemical fertilisers, lack of residual waste management and combustion that cause emissions. The AICPA (2012) identifies a four-step approach to implementing environmental accountability systems, as described below:

- identify opportunities and risks;
- establish baseline and metrics;
- develop goals and action plans;
- align resources, and
- act, manage and ensure the procedures are sustained (AICPA 2012).

This study focuses on financial reporting for cap-and-trade schemes in the agricultural sector and the way in which the related activities influence the content of financial statements and the process followed in preparing them. Cap-and-trade schemes entail the adaptation activities used to manage environmental risks while generating carbon revenues and, thus, can be directly linked to an entity's environmental responsibilities.

2.2.2 Economic indicators

According to PricewaterhouseCoopers (PWC 2007:5), economic performance indicators encompass the way in which the economic status of an entity's stakeholders changes as a consequence of its activities. PWC (2007:5) gives examples of economic indicators to include measures such as turnover, profit and dividends. The cost-effectiveness and efficiency of an entity's processes also contributes to economic sustainability (World Bank 2014). In the agricultural sector, enhanced productivity, carbon revenue and cost-effective adaptation activities represent some of the economic aspects of sustainability. The cost of monitoring these adaptation activities, which is a prerequisite before validating carbon credits, is included (VCS 2014).

2.2.3 Social indicators

Elliott and Elliott (2012:847) observe that, in any society, an entity has a role to play in order to make itself acceptable to that society. Social performance indicators are concerned with the impact an entity has on the social systems within which it operates and include, for example, labour practices, human rights, consumer rights, community interests and the

plight of other stakeholders in society. Elliott and Elliott (2012:847) assert that an entity should set its' objectives within legal, social and ethical boundaries.

In this regard, the agricultural sector plays an important role in every social set-up, as a source of livelihood and employment for many rural communities. In the agricultural sector, an entity that increases the area under cultivation without a commensurate increase in productivity causes social stress and is thus not sustainable.

2.2.4 Culture and governance

The management of an entity should inculcate a sustainability culture from the highest to the lowest level by equipping employees with skills to ensure that sustainability is embedded in the day-to-day operations of the entity. According to Elliott and Elliott (2012:846), leading entities that embrace sustainability embed cultural practices in the following ways:

- by integrating economic, environmental, social and cultural aspects in the long term with strategic objectives;
- by demonstrating transparency and accountability through open communication and timely financial accounting;
- by enhancing product safety and quality through the use of financial, natural and social resources in an efficient, effective and economic manner over the long term to foster customer loyalty;
- by setting the highest standards of corporate governance, codes of conducts and promoting ethical values, and
- by maintaining workforce capabilities that foster learning and knowledge management practices (IFAC 2011:25).

According to Hopwood, Unerman, Jessica, and HRH the Prince of Wales (2010) the need to embed sustainability creates the need to embrace a code of sustainable conduct. This is

done by developing robust systems and procedures to guide day-to-day activities. A sustainable conduct culture can be harnessed by:

- institutionalising sustainability by establishing structure at all levels of management,
- understanding and analysing the key sustainability drivers for the entity,
- integrating the key sustainability drivers into the entity's overall strategy,
- embedding sustainability in the mainstream business processes to ensure it is the responsibility of everyone in the entity,
- breaking down the entity's sustainability targets and objectives and ensuring they cascade down to strategic business units, departments and functional units,
- designing business processes that enable sustainability issues to be taken into account clearly and consistently in the day-to-day decision-making,
- providing extensive and effective sustainability training,
- including sustainability targets and objectives in performance appraisal,
- identifying champions to promote sustainability and celebrate success, and
- monitoring and reporting sustainability performance (Hopwood *et al.* 2010).

2.3 SUSTAINABILITY ACTIVITIES IN THE AGRICULTURAL SECTOR

According to Burritt and Schaltegger (2012:111), the agricultural sector accounts for 14% of global GHGs emissions. The emissions from the agricultural sector increase to 30% if the carbon emissions emanating from upstream activities such as the application of chemical fertilisers, and downstream activities such as the utilisation of fossil fuels, are taken into account (Burritt & Schaltegger 2012:109). However, according to estimates by Foucherot and Bellassen (2011:4), by adopting new technologies and “smart” farming methods, the agricultural sector is capable of reducing its carbon footprint to zero or negative. It is also important to highlight the fact that the agricultural sector is capable of supporting, directly or

indirectly, many environmentally friendly projects and therefore presents a huge potential to be a key source of low-cost carbon offsets.

According to the World Bank (2014), the agricultural sector mitigation measures have clear synergies with the global sustainable development agenda, because they influence the social, economic, and environmental aspects while providing food security. However, it will take a conscious and deliberate effort to build more sustainable and responsible patterns of behaviour in the agricultural sector owing to its traditional and cultural role in society (Maina & Wingard 2013). Equally important is the fact that profit-seeking in the agricultural sector can lead to the over-exploitation of agricultural land, resulting in a downturn in sustainability.

Foucherot and Bellassen (2011:4) note that the agricultural sector's potential to harness sustainability may be increased by implementing certain practices and technologies that enable:

- changes in practices so as to have a direct impact on the sources of emissions; for example, the reduced use of nitrogen fertilisers results in a reduction in nitrous oxide (N₂O) emissions;
- the use of agricultural land as a carbon bank by embracing practices that result in more carbon being sequestered in the soil;
- the substitution of fossil fuels with biomass fuel, which is extracted from crop residues such as rice husks, bagasse, miscanthus and sugar cane (Foucherot & Bellassen 2011:4).

2.3.1 Green agricultural practices

According to the UNEP (2011:36) green agricultural practices can guarantee food security on a sustainable basis, and significantly reduce the environmental and economic costs of agricultural practices. The UNEP (2011:36) explains that the greening of agricultural practices refers to the increased use of farming technologies that simultaneously:

- maintain and increase farm productivity while ensuring the provision of food on a sustainable basis;
- reduce negative externalities and gradually lead to positive ones; and
- rebuild ecological resources and restore the biodiversity of, for example soil, water, air and flora and fauna (UNEP 2011:36).

The Food and Agriculture Organisation (FAO 2012:2) also emphasises the need to adopt green agricultural practices. In addition, the FAO (2012:12) maintains that green agricultural practices entail the adaptation of agricultural growth strategies for food security and climate change, which also creates carbon capture potential.

Tilman, Cassman, Matson, Naylor and Polasky (2002:673) argue in support of green agricultural practices such as composting, noting that the marginal benefits provided by the use of synthetic fertilisers in terms of increased food production may be counterproductive, as only 30 to 50% of the fertiliser nutrients are deemed useful for cropping. Tilman *et al.* (2002:673) conclude that in order to address the challenge presented by the use of synthetic fertiliser, appropriate farming strategies must be adopted. These farming strategies include:

- research and extension services to develop crops with higher nutrient use efficiency;
- soil testing to determine nutrient deficiencies;
- the timing of synthetic fertiliser application;
- reduced tillage which in turn reduces leaching;
- reliance on organic nutrients with strategies that synchronise nutrient release from organic sources with crop growth;
- intercropping and crop-rotation practices;
- planting trees within the cropping system to create a carbon store; and
- landscape management such as planting shrubs and trees in buffer strips to prevent soil erosion (Tilman *et al.* 2002:673).

2.3.2 Renewable energy

According to the Government of the Republic of Kenya (GRK 2009), it is possible to reap significant economic and environmental benefits by undertaking increased investment in green and renewable energy. The energy industry itself, comprising oil and gas exploration and production, pipelines, refining, distribution and electric utilities, has a significant impact on the operations of all economic sectors (GRK 2009). The effects of fossil fuel on climate change have resulted in a shift in focus to clean and renewable sources of energy such as biofuel and thermal electricity power generation from biomass (World Bank 2014). The GRK (2009) asserts that biomass, such as wood, agricultural residue, manure and waste products from animal/food processing industries, can be used to generate electricity through fermentation and combustion processes.

2.3.3 Carbon capture

Ratnatunga, Jones and Balachandran (2011:10) explain that carbon capture potential is the ability of an entity's operations to absorb carbon from the atmosphere and reduce GHGs emissions. In the agricultural sector, carbon capture potential can be achieved by adopting new technology or improving the existing technology. There are two possibilities:

- projects that absorb carbon from the atmosphere and, more especially, the agricultural activities,
- projects that reduce or avoid emissions owing to advanced technology and/or efficiency (Ratnatunga *et al.* 2011:10).

2.3.4 Green loans and carbon financing

Green loans are credit facilities structured so as to include special features that favour environmentally friendly projects (World Bank 2014). According to Unerman, Bebbington and O'Dwyer (2007:266), some financial institutions are offering greater priority and preference to environmentally and socially friendly projects. When assessing such projects, environmental and social impact of the project to be funded is one of the key assessment

criteria, as financial institutions attempt to respond to climate change and mitigate the environmental impact. The World Bank (2014), for instance, manages 12 carbon funds, financing more than 200 projects in over 57 countries. The carbon funds established by the World Bank (2014), which also seeks to facilitate carbon trading, finance eco-friendly projects mainly in the agricultural sector where the social and environmental impact is more significant. However, Redd Monitor (2011) notes that the carbon funds have encountered several challenges in their over 10 years of existence. These challenges include:

- negative social impacts such as conflicts over access to resources and benefits;
- shortcomings in monitoring community benefits and a lack of transparency and accountability;
- limited effectiveness in transferring technologies to developing countries and poor communities (Redd Monitor 2011).

It is important to note that a carbon financing strategy can harness alternative and more cost-effective renewable energy that can accelerate entity's growth. Furthermore, the revenues generated by the trading of carbon credits further reduce the cost of borrowing. In addition, the low-cost carbon technologies in the agricultural sector further accelerate the financing of agricultural-based projects.

Redd Monitor (2011) highlights the reasons why carbon financing may not grow as fast as expected. Redd Monitor (2011) further notes, for instance, that, a typical clean development mechanism (CDM) project only generates its first carbon emissions rights (CERs) after more than two years after the registration process started. Additionally, the resulting "carbon revenues" are subject to major risks including but not limited to:

- non-registration of carbon projects by the CDM Executive Board;
- lower CERs volumes than predicted in the design documents; and
- drastic swings in CER prices (Redd Monitor 2011).

As a result of the aforementioned carbon revenue risks and delays, many financial institutions remain sceptical about carbon finance. Furthermore, the carbon revenues may not contribute to the upfront or initial capital costs of a carbon project in the agricultural sector.

2.4 MECHANISMS AND OPERATION OF CARBON MARKETS

According to Ravuru and Suvikram (2012:389), the CDM, a project-based system, aims to encourage sustainable development and to reduce the cost of compliance with the Kyoto Protocol through a market-based incentive mechanism. CDM compliant projects, particularly in the agricultural sector, are designed to reduce GHGs and restore the eco-system. The GRK (2012:6) identifies various GHGs that need to be addressed, including carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. According to Starbatty (2010:5), there are various types of regulations and voluntary initiatives that have developed in order to mitigate climate change. The intervention mechanisms adopted are depicted in table 2.1.

Table 2.1: Mechanisms to control greenhouse gases

Mechanisms	Refer to section in this chapter
Carbon taxes and penalties	2.4.1
Emission quota and allocated allowances	2.4.2
Baseline and credit	2.4.3
Voluntary carbon offsets	2.4.4

Source: Adapted from Starbatty (2010:5)

2.4.1 Carbon taxes and penalties

According to Ravuru and Suvikram (2012:389), carbon tax embraces the “polluter pays” principle by imposing a levy for any emissions in excess of regulatory levels. An entity will therefore reduce its tax obligation by reducing emissions using efficient and environmentally friendly practices. The carbon tax levy indirectly places a price on carbon dioxide and incentivises carbon-friendly business processes. The tax levies are set by assessing the

cost or damage associated with one tonne of carbon dioxide emission and the costs of controlling the associated pollution (World Bank 2014).

However, it is important for different countries to set tax levies at an appropriate level so as not to stifle the operation of the private sector and encourage a situation where entities pass the tax burden on to the end consumers (Ravuru & Suvikram 2012:389). Carbon taxes and penalties are mainly enforced through a regulatory framework that targets the heavy carbon emitters such as the energy sector. In many countries the agricultural sector is not considered to be a heavy emitter and is therefore not subject to carbon taxes.

2.4.2 Emission quota

The United States Environmental Protection Agency (US EPA 2011) explains that an emissions quota sets a limit on the amount of GHGs that entities in a particular sector can emit. Additionally, Green Business (2011) explains that in a quota system, entities receive emission allowances and must then surrender enough allowances to cover all their emissions at the end of the year, or face heavy fines (Cosbey, Murphy & Drexhage 2007). The allowances or permits act as authorisation to carry out emissions-causing activities that are within the scope of the regulated scheme.

The emissions allowances or permits, issued by the regulating authority are then allocated or auctioned to affected sources (US EPA 2011). In order to control the emissions, the total number of allowances allocated or auctioned cannot exceed the emissions quota of the specified sector or emissions source. According to Starbatty (2010:5), a successful cap-and-trade scheme provides strict environmental accountability that rewards innovation and efficiency without inhibiting economic growth.

The regulated entities or emission sources are provided with the flexibility to plan compliance, with quota, where entities can make up for a shortfall in allowances in one commitment period by surrendering allowances in the next commitment period (Cosbey *et*

al. 2007; Starbatty 2010:1; US EPA 2011). This flexibility enables entities that reduce their emissions to keep and carry forward any spare allowances or to sell them to other entities which are short of credits. The trading in allowances or permits provides an additional revenue stream and a financial incentive to reduce in emissions further (Green Business 2011).

According to Starbatty (2010), allowance trading enables sources to design their own compliance strategy based on their individual circumstances while still achieving the overall emissions reductions required by the quota. Additionally, the compliance strategies in well-designed quota schemes do not require prior approval, allowing the regulated entities to respond quickly to market conditions (Starbatty 2010). However, in order to ensure that regulated entities do not make excessive use of allowances in early compliance years at the expense of later compliance years, some quota schemes are structured to restrict the transfer of allowances between periods (Starbatty 2010:5).

According to the US EPA (2011), examples of statutory or mandatory quota schemes include the European Union Emissions Trading Scheme (EU ETS) and the New South Wales Greenhouse Gas Reduction Scheme (GGRS). In an emission quota system the permit to emit (allowances) may be allocated free or auctioned. According to Bohringer and Lange (2005:564), the free allocation of emissions allowances enables an entity to review its environmental policy to ensure it accommodates the allocated number of allowances. The essence of free allocation of emissions allowances is to mitigate the competitive disadvantages that result from the introduction of the scheme, and to prevent the shifting of the cost to the end consumers (Starbatty 2010).

An alternative to free allocation is auction where an entity purchases either from the regulatory authority or from other entities that have excess allowances within the controlled emission source. Starbatty (2010) explains that allowances are transferable instruments that can be bought or sold if they are not linked to specific activities or sources of emissions. In

addition, Starbatty (2010) notes that allowances are bankable in electronic registries, and can be bought and sold through organised exchanges or the over-the-counter market. The ability to purchase also creates the urge to speculate on price fluctuation for some scheme participants.

According to Starbatty (2010), quota schemes offers additional flexibility by allowing participants to settle their emissions obligations by making specified cash payments in lieu of surrendering allowances. The cash payment doubles as a penalty if an entity exceeds the maximum allowable emissions. Starbatty (2010) further explains that the cash payments that apply if a participant does not surrender enough allowances effectively establish an upper limit to the price of allowances. These cash payments and the exchange of allowances gradually developed into the carbon market. Quota schemes are mainly imposed on the industrial sector, which account for heavy emissions, and by extension exclude the agricultural sector.

2.4.3 Baseline and credit

Starbatty (2010) explains that in a baseline and credit scheme, the regulatory authority sets the baselines from which entities are expected to improve and enhance efficiency, for example one tonne of carbon emissions per air mile by an airline. Buckley (2004:2) notes that the baselines are assigned to a specific emitting source and cannot be traded. The trading mechanism is introduced at the end of the period, when the government issues tradable 'credits' to entities that have achieved some efficiency from the baseline. Conversely, the government requires entities that have emitted above the set baseline to provide credits (Buckley 2004:2). The entities with excessive emissions must then buy the credit certificates from those awarded for efficiencies, prompting active trading in carbon emissions.

The mechanisms of the baseline and credit scheme are similar to the cap-and-trade schemes in the agricultural sector under the verified carbon standards. In the agricultural

sector, emissions reductions results from project-based activities and these reductions are calculated by assessing actual emissions against a benchmark of the emissions that would have occurred without the project (Starbatty 2010). According to Buckley (2004:2), baseline and credit is a system in which firms earn emission reduction credits (ERCs) for emissions below their baselines because firms are prescribed a performance standard specifying the target industry emissions rate.

Buckley (2004:3) explains that firms with emission rates below the performance standard create ERCs, while entities with emission rates above the performance standard are required to purchase and redeem ERCs. In exchange for the emissions reductions achieved, the project developer receives certificates from an authorised body, following a verification process (US EPA 2011). Each certificate represents reductions in emissions by one tonne of CO₂.

It is important to note that credit certificates issued to entities in the agricultural sector can be used by regulated entities to offset their emissions obligations if the participants' scheme accepts the offsets as a settlement mechanism (Starbatty 2010). Hence, cap-and-trade schemes in the agricultural sector provide participants with flexibility where emissions reductions cannot be achieved cost-effectively. The decision for the regulated entities is always whether the emission reduction can be achieved internally or externally. Buckley (2004:33) explains that if the internal realignment of business processes and procedures cannot achieve the desired emissions reductions cost-effectively, then an entity needs to buy credits certificates as offsets. It is the flexibility in baseline schemes that has prompted entities in the agricultural sector to establish projects that can be verified and that award credit certificates or offsets. The trading mechanism also places the agricultural sector at the centre of the voluntary carbon market.

2.4.4 Voluntary carbon offsets

According to Hamilton, Sjardin, Shapiro and Marcello (2009) in addition to the so-called “compliance market” of the United Nations Framework Convention on Climate Change (UNFCCC) approved CERs, a number of voluntary carbon certification standards exists. The voluntary initiatives, mainly considered to be part of entities’ environmental responsibilities have prompted the emergence of the voluntary carbon market.

The fact that many entities are embracing corporate social responsibility and public relations as part of their strategic objectives can only mean that the voluntary carbon market will continue to expand. Hamilton *et al.* (2009) note that the most dominant voluntary carbon market includes the Chicago Climate Exchange (CCX).

2.4.4.1 Process of generating and marketing carbon credits in the agricultural sector

The process for designing and registering a cap-and-trade scheme project in the agricultural sector involves many steps and actors. According to Cosbey *et al.* (2007:1) setting up such a project constitutes the following procedures:

- project design and documentation describing all the technical parameters of the project and how emissions reductions will be generated and monitored,
- approval of sustainable development aspects by the host country,
- validation by an independent validator, called designated operational entity,
- registration with the CDM executive board for the project to start generating CERs,
- project monitoring for GHGs emissions,
- verification and certification by a designated operational entity, and
- issuance of CERs by the CDM Executive Board (US EPA 2011).

The World Bank (2014) explains that the above procedures can take anything between two and five years. Consequently, the economic benefits associated with any adaptation

activities are not realised in the short term. The long-term nature of such projects, particularly in the agricultural sector, has far-reaching implications for the recognition, measurement and reporting of useful information to the users of financial statements.

2.4.5 Status of carbon markets

In Kenya, Njiru (2011) notes that Mumias Sugar Company, a major player in the agricultural sector, is already engaged in voluntary carbon trading through an Emissions Reduction Purchase Agreement entered into by the World Bank and Japan Carbon Finance. Many other entities are in the process of establishing projects or redesigning existing projects and business processes so as to be able to generate CERs and take advantage of the carbon market (Njiru 2011). This will not only help entities to reduce their carbon footprint, but also facilitate the creation of an additional revenue stream.

The GRK (2012:3), through the Ministry of Finance, has prepared a national policy on carbon finance and emissions trading. This policy is expected to guide the setting up of a regulatory and institutional framework for developing and managing carbon trading in Kenya. The policy aims to create a carbon trade sector which will tap into international climate change finances, support sustainable development programmes, provide employment and economic diversification, increase access to innovative research and technology, improve Kenya's balance of payments, and foster the involvement of the private sector in carbon investment and trading (GRK 2012:4). The agricultural sector, which is the main stay of the economy, is expected to be the largest beneficiary of the initiatives being undertaken by the government (GRK 2012.5).

The carbon market has not been without challenges so far. The reduced industrial activity during the economic downturn occasioned an over-supply of allowances because many companies were unable to meet their operational targets (McGregor 2014). This over-supply of allowances resulted in market uncertainty, sending the carbon price sliding significantly and removing the incentive for polluters to cut their emissions (Forest Trends 2015:12).

Additionally, the compliance carbon market suffered a huge setback after the expiry of the first binding period of the Kyoto Protocol, without any binding accord following the failure of Copenhagen COP 15 negotiations (McGregor 2014). The setback also affected the voluntary carbon market resulting in prices being depressed (Forest Trends 2015:13). However, according to Forest Trends (2015:15) the market remained resilient to recording increased volumes, as depicted in figure 1.2. Although short-term 'back loading' measures to reduce the number of allowances in the market were unsuccessful, the carbon market is currently going through structural reform (Forest Trends 2015:12). These structural reforms are expected to enhance the credibility of the carbon market and provide cost-effective ways to achieve emissions reductions (Forest Trends 2015:12). The structural reforms explain why many countries and economic blocks are in the process of establishing emissions trading schemes which will further stimulate low carbon investment, particularly in the agricultural sector.

However, it is expected that the carbon market will only rebound once an internationally binding agreement has been adopted by different nations to cap the emission of GHGs. According to the UNFCCC (2015:31), representatives from 196 nations have agreed to cooperate to cope with the impact of unavoidable climate change by adopting green energy sources so as to cut down on carbon emissions. The 21st Conference of Parties (COP 21) accord, which is estimated to cost \$100 billion annually, is set to limit the rise in global temperatures to 2° above the pre-industrial era (UNFCCC 2015:21). Additionally the UNFCCC (2015:28) notes that in order to avoid the pitfalls of the Kyoto Protocol, the Paris agreement will evolve every five years, thus requiring nations to cut down on emissions to a zero footprints by the year 2050. This is expected to facilitate the expansion of voluntary carbon markets and reinvigorate the voluntary adaptation activities in the agricultural sector.

2.5 SUSTAINABILITY REPORTING

Investors, regulators and an expanding array of other stakeholders are increasingly interested in entities' financial and non-financial information, particularly about their sustainability initiatives. According to White (2009), an entity's commitment to sustainability necessitates the need for greater transparency in the disclosures of entity strategy, performance drivers and the management philosophies and briefs about shared social and environmental welfare. However, according to Herremans, Nazari and Ingraham (2012:28), regulatory, normative, and cognitive pressures result in differing rigour in the processes of sustainability reporting, namely:

- structuring responsibility for the report;
- gathering data and assuring its accuracy; and
- linking sustainability reporting to society's needs and expectations (Herremans *et al.* 2012:28).

White (2009) indicate that sustainability reporting involves disclosing both the non-financial and the financial indicators of an entity's impact on the environmental, economic and social dimensions of their operations, which is crucial in driving interest and investment in sustainability to the mutual benefit of both entities and investors. According to White (2009), environmental and sustainability reporting address the stakeholders' demand for more transparency and accountability in management's actions and decisions.

Accounting for sustainability involves evaluating risks and opportunities so as to link sustainability initiatives to the entity's strategy (White 2009). Furthermore, entities can improve their sustainability performance by measuring, monitoring and reporting information that is useful for decision-making. Such measurement and disclosures will in turn ensure that the sustainability initiative enhances its positive impact on society and the environment, thus leading to a more sustainable future. Elliott and Elliott (2012:847) argued that the growth in voluntary sustainability reporting is in response to market and political pressures.

Consequently, the trend in voluntary sustainability reporting has been spontaneous with no clear guidelines. This spontaneous growth in sustainability reporting has resulted in information that is impossible to analyse or compare which significantly impairs judgment when it comes to decision-making.

The agricultural sector, which, according to Maina and Wingard (2013), is largely perceived as a cultural practice, has not shown any trend in sustainability reporting. According to Ernst and Young (2009), traces of information about sustainability activities are scattered in an uncoordinated manner in the financial statements. Moreover, the lack of sector-specific guidelines leaves some room for the preparers of financial statements to highlight the favourable information only, omitting facts on negative impacts.

2.5.1 Content of sustainability reports

Deloitte (2009) indicates that reported information should identify and explain the connection between the entity's strategic objectives, the industry, the market and the social context within which the business operates. Equally important is the associated risks and opportunities, the key resources and relationships, and the governance structures established by management to ensure that the sustainability objectives are achieved. Further, such information should explain the connection between the business's strategy and the financial and non-financial performance. Ernst and Young (2009) argues that, if due consideration is made in preparing annual reports, sustainability reporting should not create any significant additional administrative burden, and may indeed create net benefits by helping to recognise and reduce compliance obligation.

In an attempt to create harmony in the information that is reported, the Global Reporting Initiative (GRI 2002) proposed that the scope and content of sustainability reports should include the following:

- Chief executive officer's statement – setting the tone and describing key elements of the report.
- Profile of reporting entities – providing a context for understanding and evaluating the information in the rest of the report.
- Executive summary and key indicators – a succinct, balanced and easily grasped summary of key information that provides a broad overview of the entity's sustainability performance in the latest period and, where possible, the two preceding periods.
- Vision and strategy – discussing the entity's vision and how that integrates with economic, social and environmental performance.
- Policies and organisational and management systems – how these are designed to enable the entity to implement its sustainability vision and strategy and to engage stakeholders effectively.
- Performance – the environmental, economic and social quantitative and qualitative disclosures are necessary to enable the users to understand and evaluate performance (GRI 2002).

However, it is crucial that sustainability reports allows entities to provide investors and other stakeholders with GHGs emissions information, and to show any financial investment and liabilities associated with those emissions.

2.5.2 Need for sustainability reporting

According to Ernst and Young (2009), an entity's response to sustainability will be a determining factor in its business performance. The quality of a company's strategy and performance in dealing with the opportunities and risks deriving from economic, environmental and social developments should be quantified and presented to the external stakeholders. The GRI (2002) notes that there are a variety of reasons why entities choose to produce sustainability reports, but at their core they are all intended to be "vessels of

transparency and accountability" as a way of engaging with various stakeholders. The following are the critical benefits of sustainability reporting:

- Business risk – the climate change threat ranks as a key operating risk to which entities have to respond by formulating climate change strategies that include the implementation of green projects.
- Shareholders' return and capitalisation – the price of the securities of sustainability responsive entities performs better than those of non-responsive entities.
- Tax incentives and project grants – the national governments of certain countries offer responsive entities incentives such as tax waivers, remissions and project grants.
- Regulatory compliance – many countries have enacted a regulatory framework to respond to climate change; responsive entities will find it easier to comply.
- Stakeholder expectation – consumers, suppliers and employees are gravitating toward entities that show concern for the environmental and societal impact of their operations (GRI 2002).

The idea behind the corporate disclosure of sustainability risks and performance is that, markets operate best and most efficiently when investors have the information they need to evaluate the future prospects of companies. Investors and other stakeholders need to know how entities in the agricultural sector are preparing to cope in a situation where sustainability issues create both risk and opportunity.

2.5.3 Sustainability risk disclosures

According to Unerman *et al.* (2007:6), sustainability risk management (SRM) and disclosures is a business strategy that aligns profit goals with a company's environmental and social policies. The driver for SRM adoption, particularly in the agricultural sector, is increasing

demand for entity legitimacy in the society in which it operates (Unerman *et al.* 2007:130). Entities that are implementing SRM generally focus on the environmental effects of each business process individually and then look for ways to minimise them.

Global climate change occasioned by pollution, unsafe product quality and work environment, employee and community welfare and the utilisation of limited resources are issues of interest where as many entities run the risk of being linked to them (GRI 2013:27). The entity's stakeholders are increasingly adopting zero tolerance to the social and environmental risk exacerbated by its activities (Deegan 2005:355).

In the agricultural sector, managing sustainability risk and securing consistently good performance means staying ahead in all aspects, namely, environmental, social, cultural and financial. According to PWC (2009), the risks of ignoring sustainability reporting include the following:

- Strategic risks – this refers to the uncertainty about long-term entity survival, consequently strategies are formulated that take into account global and local climate scenarios.
- Regulatory and litigation risks – these relate to compliance risk, which is the current and prospective risk arising from violations of, or non-compliance with, laws, rules, regulations, prescribed practices, internal policies, and procedures, or ethical standards. These risks expose the institution to fines, penalties, the payment of damages, and the voiding of contracts.
- Financial risks – this is the uncertainty about the future social and environmental costs, that might be incurred to rectify or mitigate adverse effects and the opportunities to cut costs by the trading of carbon credits
- Reputational risks – these are related to the trustworthiness of the entity, which as Unerman *et al.* (2007:133) explain that an entity can only maintain if it has the support of the community.

- Operational risks – these relate to the possibility of an entity facing labour unrest and product boycotts and include other interruption risks such as the Greenpeace's boycott of Shell Oil (PWC 2009).

2.5.4 Link between sustainability and cap-and-trade schemes

Solving the climate problem is one of the key global challenges to finding a sustainable social and economic development pathway. Edenhofer, Wallacher, Lotze-Campen, Reder, Knopf and Müller (2012:171) argue that the climate change problem cannot be solved by merely setting an effective and equitable climate policy. Concerted efforts and partnerships are required between public and private, small and big, corporate and individual, emitters and non-emitters alike.

According to Deloitte (2009) most sustainability disclosure is voluntary, but as trading systems for carbon credits and GHGs emissions regulations mature, there will be increased requirements for reporting key indicators on carbon. Sustainability accounting connects the entity's strategies to a sustainable framework by disclosing information on the three dimensions of environment, economic and society. In practice, however, it is difficult to put together policies that promote environmental, economic and social goals simultaneously.

According to James, Bent and Aeron-Thomas (2006:347), the trend in sustainability reporting has enabled entities to emphasise the creation of value through carbon trading. Additionally, entities are focusing on risk mitigation measures that are linked to the environmental and social subset of sustainable development. This development has been driven by multiple factors connected to:

- sustainability issues that materially affect a company's creation of value, risk and obligations; and
- the need for entities to respond to sustainable growth appropriately (Cosbey *et al.* 2007).

According to Edenhofer *et al.* (2012:171), voluntary sustainability activities, particularly in the agricultural sector, need to be complemented by a global framework of binding emission reductions which sets out long-term incentives for private sector entities that comply with the sustainability code. The Institute of Directors in Southern Africa (IoDSA 2012:4) recognises the reality, that, sustainability strategy, risk and performance and revenue generation have become inseparable. Thus, climate change mitigation and adaptation cannot be separated from revenue generation, as entities endeavour to minimise the cost of adaptation and sustainability activities. It can therefore be concluded that a cap-and-trade scheme in the agricultural sector not only enables an entity to price its sustainability activities, but also create a revenue stream. Consequently, cap-and-trade schemes and sustainability practices are linked and should purposely be reported together.

2.5.4.1 Sustainability reporting index

Deloitte (2009) emphasises the need to identify the critical success factors and the key indicators that need to be managed, measured and reported. According to Deloitte (2009) there are many diverse practices that can be attributed to sustainability. In order to enhance comparability there is a need to condense the key performance indicators as a basis for evaluating and assessing sustainability performance for decision-making. Deloitte (2009) concludes that sustainability performance indicators should be measured at the most granular level that is practical to implement.

Further, Deloitte (2009) noted that, many entities are adopting new techniques for making financial disclosures about their core activities and the impact that these have on the environment. Although the sustainability disclosures are driven by demands by various stakeholders, such as customers, suppliers, lobby groups and environmental agencies, the preparers of financial statements must assess how such information enhances a better understanding of the way entities manage resources to accomplish sustainable development.

Key among the initiatives to enhance a better understanding of sustainability performance is compacting information and forming an index. Such indexes serve as benchmarks for decision makers to integrate sustainability considerations in the assessment criteria, and provide an effective engagement platform for entities that intend to adopt sustainable best practices (Willis 2003:235). In the agricultural sector the applicability of these indexes, which are mainly developed for the energy and manufacturing sectors, is an area of interest for future research.

2.6 SUSTAINABILITY ACCOUNTING THEORIES

Deegan (2005:2) explains that, accounting theories are the principles that facilitate logical reasoning and form the general framework of reference. Sustainability disclosures entail adopting processes and methodologies for disseminating quality information to various groups of decision-makers. Accordingly, a sustainability report should enhance transparency and accountability in a timely and cost-effective manner and therefore it must be based on specific accounting theories. Scott (2012:19) argues that there are various accounting theories that can be propagated to support voluntary sustainability reporting. This study focused on the stakeholder, institutional and legitimacy theories.

2.6.1 Stakeholder theory

Although Deegan (2005:268) argues that every stakeholder must be treated fairly, the issue of stakeholder's power in the provision of accounting information cannot be ignored. The International Integrated Reporting Council (IIRC 2013:10) asserts that the processes of entities' value creation are influenced by the external environment, created through relationships with stakeholders and dependent on various internal and external factors. In order to succeed, in creating as much value as possible for stakeholders and to be sustainable over time, there is need for an entity to align the interests of customers, suppliers, employees, communities and shareholders consistent with the IIRC (2013:17). Consequently, in the context of this study, the researcher argues that the success of an

agribusiness depends on engagement with stakeholders on sustainability issues that extend to the reporting level.

Deegan (2005:270), while focusing on the entity from a systems-based perspective, emphasises the stakeholders' need for useful information that reflects a true and fair view of the state of affairs in order to facilitate making the right decisions. Entities' management should select accounting policies, accounting methods and rules to be applied for accounting for economic transactions, and for the preparation and presentation of financial statements that are in the best interests of all stakeholders (Scott 2012:423).

It is therefore important to emphasise that the process of formulating accounting policies and methods is important to both the internal and external stakeholders who are the users of financial statements. The preparers of financial statements should recognise the expectations of users of accounting information in order to attempt to meet and possibly exceed the interests of all the users. However, according to Deegan (2005:273) emphasis must be placed on the needs of those stakeholders who have the most significant influence. Consequently, from a stakeholder theory perspective, this study will focus on the way in which the main stakeholders have shaped the disclosures in accounting for cap-and-trade schemes in the agricultural sector.

2.6.2 Institutional theory

According to Carpenter and Feroz (2001:568), institutional theory views entities as operating within a social framework of norms and values that compel entities within the same environment to prepare financial statements that resemble each other. The strategic adaptation of sustainable agricultural land management (SALM) practices necessitates an agribusiness to change its internal processes and structures (Carpenter & Feroz 2001:570). Accordingly, the change in business processes affects the information to be collected, while the change in structure affects the responsibilities related to gathering and communicating sustainability information (Scott 2012:496). The commercialisation of the agricultural sector

has created the need to enhance accountability and transparency, which interconnect with some institutional factors that influence social and environmental voluntary disclosures (Deegan 2005:299).

According to the World Bank (2014), the agricultural sector acts as a carbon sink and thus is a target for carbon offsets by various entities, particularly the heavily regulated emitters of carbon. Accordingly, Scott (2012:166); Carpenter and Feroz (2001:570) explain that if the institutional factors are not well defined a loophole may be opened up whereby managers could use social and environmental accounting to pursue their own agendas. Equally important is the fact that sustainability reporting may be used to gauge an entity's commitment to transparency and accountability (Cho, Michelon & Patten 2012:80). Consequently, this study considered institutional theory to be key in supporting the arguments and discussions.

2.6.3 Legitimacy theory

Legitimacy theory asserts that entities should operate within the bounds and norms of the community they work with (Deegan 2005:253). Society's expectations of how an entity should behave constitute the social contract, and an entity will promote its reputation if it conforms to society's perceived expectations. As Deegan (2005:254) puts it, sustainability disclosure is best explained as a tool for maintaining an entity's legitimacy, which depends on an implicit social contract between an entity and society. Scott (2012:478) argues that if an entity establishes legitimacy it can minimise pressure and criticism from society, and ensure that its products are freely acceptable, as is the case with smart agricultural practices for example.

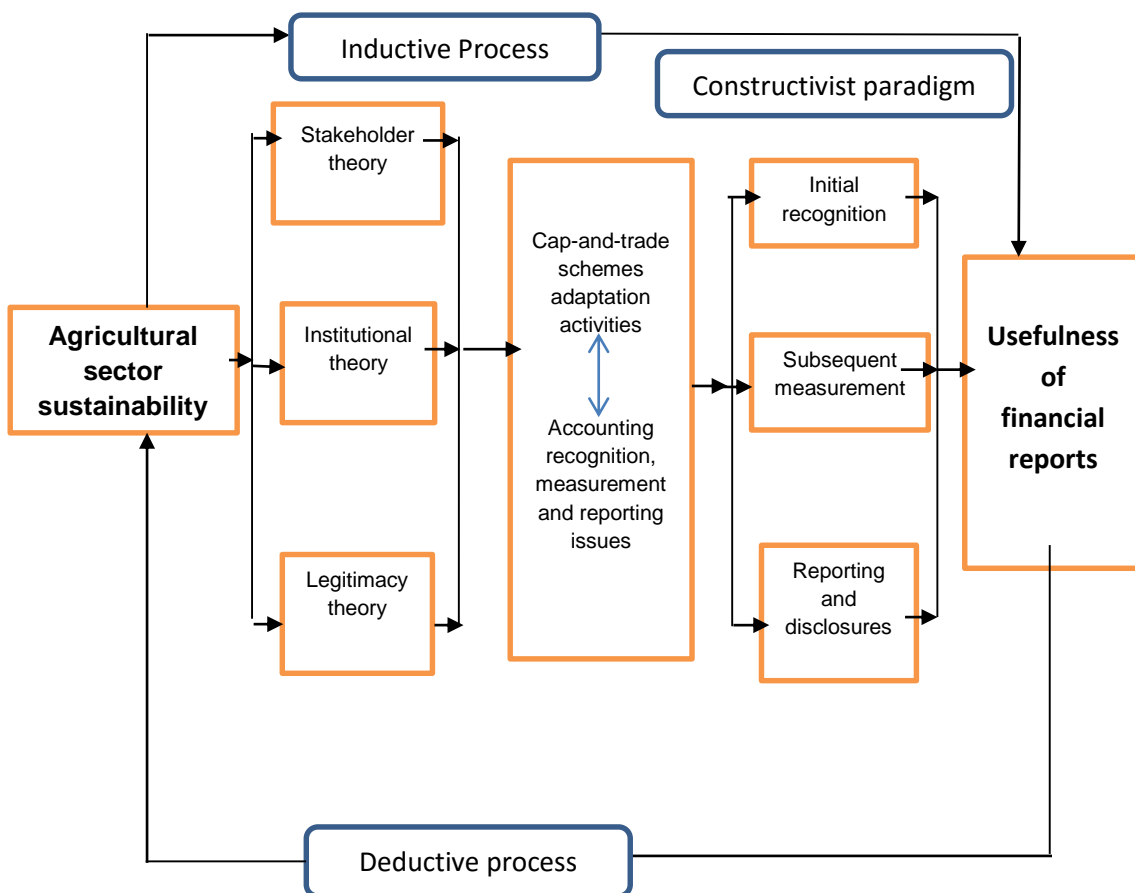
The agricultural sector plays an essential role in society by providing livelihoods and food security. Equally, the agricultural sector has a role to play in the international global market place and thus cannot ignore its role in climate change. Consequently, sustainability reporting in the agricultural sector creates better corporate reputations that, in turn, enhance

the stakeholders' wealth. Additionally, legitimacy accounting theory is, according to Deegan (2005:133), relevant when investigating voluntary corporate reporting practices because it provides a complementary perspective to both stakeholder theory and institutional theory.

2.7 THEORETICAL FRAMEWORK OF THE STUDY

A theoretical framework forms the building blocks of the interconnected issues between which relations need to be identified so as to provide answers to the research question. According to Deegan (2005:132), a theoretical framework assists in demonstrating the issues that must be resolved before considering other issues. In this study the theoretical framework depicted in figure 2.2 helps to relate the reality of smart agricultural practices to the theoretical underpinnings and accounting practices.

Figure 2.2: Theoretical Framework



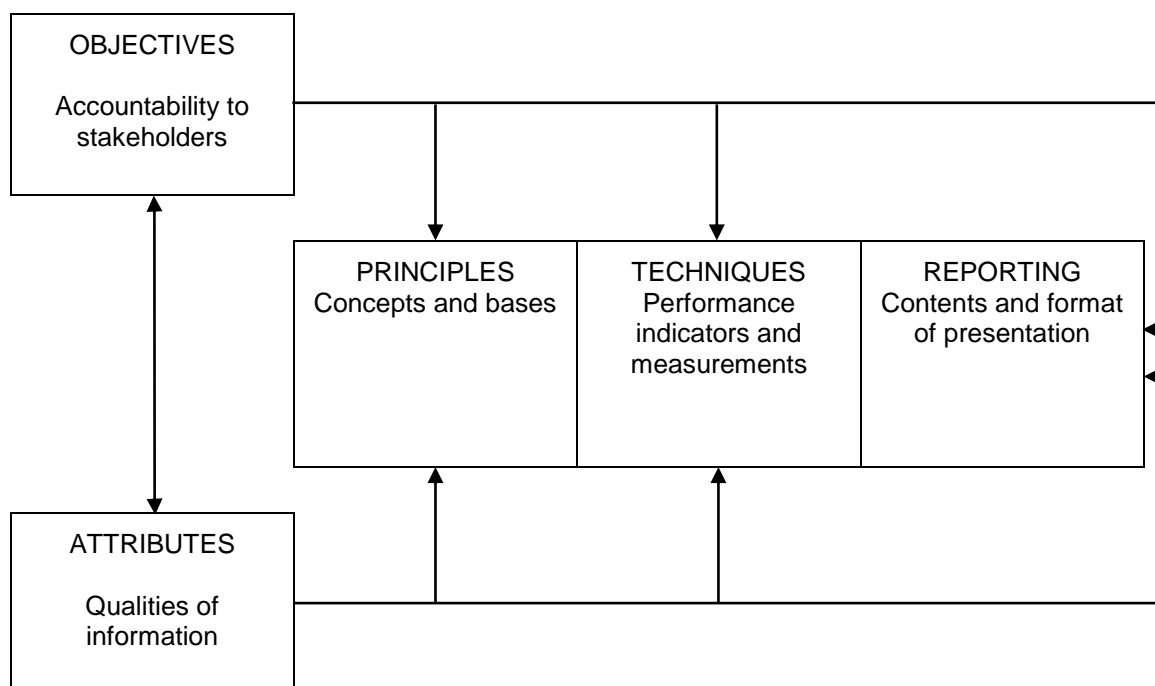
Source: Author (2016)

According to Willis (2003), a theoretical framework has the potential to significantly improve the way the researcher connects and interprets the findings of the research. A theoretical framework also facilitates the making of certain methodological decisions, as outlined in chapter 6. As explained in section 2.5.4, this study sought to link cap-and-trade schemes to issues related to the voluntary sustainability reporting framework used by the GRI (2013). The GRI framework is composed of two sets of principles, namely, indicators and quality, aimed at elevating the rigour, comparability, auditability and general acceptance of sustainability reports (GRI 2013:21). Consequently, the GRI framework is embraced in this study as the basis for enhancing the usefulness of the financial statements as depicted in figure 2.2.

2.7.1 Sustainability reporting framework

Deegan (2005:131) argues that if the practice of financial reporting is to be developed logically and consistently in order to inspire public confidence, then consensus on important issues must be built. The framework is depicted in figure 2.3.

Figure 2.3: Sustainability reporting framework



Source: Adapted from Global Reporting Initiatives (2013:7)

The GRI (2013) framework in figure 2.3 is principle-based and is broadly organised into two themes:

- principles for determining the indicators of what should be reported; and
- principles for ensuring quality and the appropriate presentation of reported information (GRI 2013:27)

Accordingly, the sustainability reporting framework requires consensus on the objectives of such reports, sustainability activities, the techniques of measurement and the reporting format (GRI 2013:30). The framework also propagates clear qualitative attributes of useful information which were embraced for the purpose of this study.

2.8 PROBLEMS IN IMPLEMENTING SUSTAINABILITY ACCOUNTING THEORY

A diverse set of stakeholders and varied stakeholder expectations about the content and format of sustainability reports presents the greatest challenge in developing a sustainability reporting framework (Hopwood *et al.* 2010). According to Unerman *et al.* (2007:92), there are some key issues and difficulties that underlie the implementation of a sustainability reporting framework, namely:

- Identifying the range of stakeholders to be considered based on the motive of the entity, for example an entity which focuses on maximising stakeholders' value may skew its reports to stakeholders with the greatest influence.
- The impossibility of engaging some stakeholders directly particularly where the entity's impact on non-human stakeholders is impossible to ascertain, or where the impact is indirect.
- Addressing stakeholders' heterogeneous views and expectations that tend to be dynamic, particularly when a positive impact on one stakeholder becomes a negative impact on another, for example a tobacco manufacturing entity that

caters for the farmers and employees but the products are harmful to the health of the consumers (Unerman *et al.* 2007:92).

Willis (2003:233) concurs that among other key challenges, the need to accommodate the broad variety of disclosure needs and expectations of a wide range of entity stakeholders presents the greatest difficulty when attempting to come up with an optimal sustainability reporting framework. As Willis (2003:235) argues, the present reality is that there is a lack of consensus and experience regarding what aspects of social and economic performance or impact should be measured and reported on, and what the most useful measures and indicators for those aspects are. Another major challenge in sustainability reporting is the use of such information for self-perpetuation or impression management and the resulting framing effects. These challenges will be explained in the following sections.

2.8.1 Impression management

According to Parker (2005:856), the accounting processes may fail to play the important role of protecting the public interests, and, accordingly, perpetuate exploitative social relations particularly where management does not act in the best interests of stakeholders. Impression management occurs when management selects the information to release, and presents it in a way that distorts users' perceptions of corporate achievements with the intention of influencing the decisions of users of the financial statements (Scott 2012:300).

There is a need to examine the reporting processes entities use to gather sustainability information, as well as the ethical transparency and accountability of the sequence followed so as to determine how these processes impact on the credibility of the sustainability performance report and, by extension, carbon activities (Johnson, Jamal & Berryman 1998). According to the stakeholder theory of accounting, firms tend to omit the interests of less powerful stakeholders and focus the information on meeting the needs of influential stakeholders such as shareholders and the government (Scott 2012:296). Parker (2005:856); Johnson *et al.* (1998) who emphasise the need for the institutionalisation of

sustainability reports, note that the voluntary environmental disclosures can lead to creative accounting and the agricultural sector is no exception. For instance, entities operating cap-and-trade schemes under the Kenya Agricultural Carbon Project (KACP) may focus more on the information needs of the project sponsors and disregard other stakeholders.

2.8.2 Framing effect

According to Scott (2012:67), a framing effect occurs when different descriptions of a situation lead to divergent rational decisions or perspectives. Deegan (2005:146) describes a framing effect as a form of cognitive bias, where people react differently to a particular decision depending on how the information is presented. Decision-makers have a tendency of avoid risk when a positive frame is presented and to seek risks when a negative frame is presented. Clarkson, Hanna, Richardson and Thompson (2011:15) explain that in a situation of information symmetry, decisions should not be affected by variations in the description of the problem.

Whereas the GRI (2013) framework outlines the principles that govern the presentation of sustainability reports, there are no procedures that can help to transform the content of such reports into a standard form so as to prevent the possibility of management frames. The fact that there is no standard way of representing cap-and-trade schemes adaptation activities in the agricultural sector also presents a loophole for management to frame the content of financial statements. This is further exacerbated by the diverse and complex operations in the agricultural sector which are little understood by the general public (Maina & Wingard 2013).

2.9 SUMMARY AND CONCLUSIONS

Sustainability as a concept, where an entity embraces social and environmental objectives alongside economic objectives, is complicated by the external environment, institutional factors and internal processes. Although it is a reality that strategy, risk, performance and sustainability have become inseparable, sustainability reporting is still going through

transformation and development. This transformation creates a challenge for regulators, practitioners and the users of financial statements alike. Sustainable development takes into account processes that utilise the natural resources efficiently, while taking into consideration the satisfaction of human needs under conditions of environmental conservation.

Regulators are tasked with creating norms and regulations, while practitioners, attempt to craft the best ways of presenting environmental, economic and social information on the activities in which the entity is engaged. The agricultural sector takes centre stage in the sustainability debate owing to its social and economic roles in society, as well as its ability to reduce the carbon footprint to zero and to become a key source of low-cost carbon credit. Cap-and-trade is a market-based policy tool, which sets a cap on the amount of emissions from a group of sources with the objective of reducing the overall pollution in a nation, region or industry. Although there are no such caps for the agricultural sector, the industry remains a major player in the voluntary carbon market.

There is no standardised methodology available for validating reported information and many entities prepare sustainability reports according to divergent sustainability policies and norms. Although sustainability reporting is expected to offer a fair image of the reporting entity's behaviour and its impact on sustainable development, the users of financial statements continue to grapple with evaluating the credibility of the sustainability reports provided. The most critical challenge for the reporting entity is to accommodate the broad variety of disclosure needs and expectations of a wide range of entity stakeholders.

The broad multi-stakeholder network and its interests give sustainability reporting both a theoretical and a practical approach. The effort and focus of sustainability reporting is to develop a sustainability reporting framework that can form the basis for preparing a sustainability report that inspires public confidence. Further, the presentation of such a report is largely voluntary, which presents entity management with the possibility of

impression management by highlighting positive aspects only and withholding negative aspects. In order to explore the financial reporting for cap-and-trade schemes in the agricultural sector, this study focused on the stakeholder, institutional and legitimacy theories of accounting. The next chapter focuses on the recognition and measurement of accounting issues arising from the adaptation activities linked to cap-and-trade schemes in the agricultural sector.

Chapter 3

Classification and measurement for cap-and-trade schemes on initial recognition

3.1 INTRODUCTION

Chapter 2 discussed the adaptation activities of cap-and-trade schemes in the agricultural sector, and set out the theoretical background to this study. This chapter will therefore identify the implications of those adaptation activities for accounting practices. Specifically, the chapter focuses on the classification and measurement of cap-and-trade schemes on initial recognition in the agricultural sector. The chapter will therefore explore initial classification options such as intangible assets, inventories, financial assets, property, plant and cost offsets.

The chapter will also discuss the various bases of measurement on initial recognition such as fair value, historical cost basis, current replacement cost and value in use (intended-use) approaches. Other issues to be highlighted in the chapter include revenue recognition practices. The chapter will conclude by discussing the derivative financial instruments arising in the carbon markets and how they can be used to mitigate carbon prices volatility.

3.2 SUSTAINABLE AGRICULTURAL LAND MANAGEMENT (SALM)

It can generally be argued that agricultural activities cause environmental degradation leading to lower productivity. Tennigkeit, Solymosi, Seebauer and Lager (2012:2) however, argue that there are certain agricultural activities that sustain and enhance agricultural productivity while also generating carbon credits. Lal (2004) further note that an increase of one ton of carbon in the soils of degraded land may increase crop yield by 20 to 40% per hectare for wheat, 10 to 20% per hectare for maize and 0.5 to 1% per hectare for cowpeas. Additionally, Lal (2004) argues that agriculture-based carbon sequestration has the potential

to offset 5 to 15% of the global fossil-fuel emissions. Tennigkeit *et al* (2012:2) explain that as these practices build up the soil's organic matter, they increase resilience to climate change effects and help store more carbon in the soil. This carbon storage can build value, thus resulting in the generation of carbon credits.

Although there are many strategies for enhancing carbon sequestration and capture, the main focus of this study is on standardised adaptation practices where monitoring and evaluation is done proactively. The strategies that can be used to increase the soil carbon pool, soil fertility restoration and woodland regeneration range from no-till farming, cover crops, nutrient management, manure and sludge application, improved grazing, water conservation and harvesting, efficient irrigation and agroforestry practices to the growing of energy crops. These strategies can be broadly classified in four categories as summarised in table 3.1 below (Verified Carbon Standard 2015, Tennigkeit *et al.* 2012:2):

Table 3.1: Summary of SALM activities

Activity	Effects
Residue management	Optimise decomposition and mineralisation of organic matters
Composting	Controlled biological decomposition
Cover crops	Green manure that can be ploughed back into the soil
Agroforestry	Agro-silviculture; hedge tree planting, woodlots, tree shading, silvo-pastoral system, fodder banks.
Companion planting	Mixed cropping to eliminate use of chemical pesticides

Source: Adapted from Tennigkeit et al. (2012:5)

According to the World Bank (2014), the SALM methodology has been applied in Kenya, the first programme of its kind in the world, to encourage farmers to adopt improved farming techniques and boost productivity in ways that also enable the farmer to generate verified carbon units (VCUs). The soil carbon methodology was developed by the World Bank and approved by the Verified Carbon Standard. When using the methodology Tennigkeit *et al.* (2012:5) explain that the decline in emissions or removal of carbon from the atmosphere is given by the activity data and the emission factor as follows:

Decline in emissions / sequestration = Activity data * Emission factor

Where;

$$\text{Activity data} = \text{Project area} * \text{SALM activity adopted}$$

Emission factor = model-based default values which indicate how much soil carbon is sequestered per unit area as a direct result of the SALM activity and expressed in tonnes of CO₂ per ha per year (Tennigkeit *et al.* 2012:5).

3.3 INITIAL RECOGNITION ISSUES

The purpose of this study was to establish the implications of the various SALM activities for the accounting process. The accounting process commences with the recognition of an element. Siegel and Borgia (2007) argue that if the recognition of an element is omitted, measures of financial performance are distorted and thus the predictive value of the financial statements is reduced. Additionally, Siegel and Borgia (2007) note that a decision with regard to either capitalisation or expense might make a difference in the accuracy of the description of the entity's financial position and performance, which could result in stronger signals emanating from the financial statements.

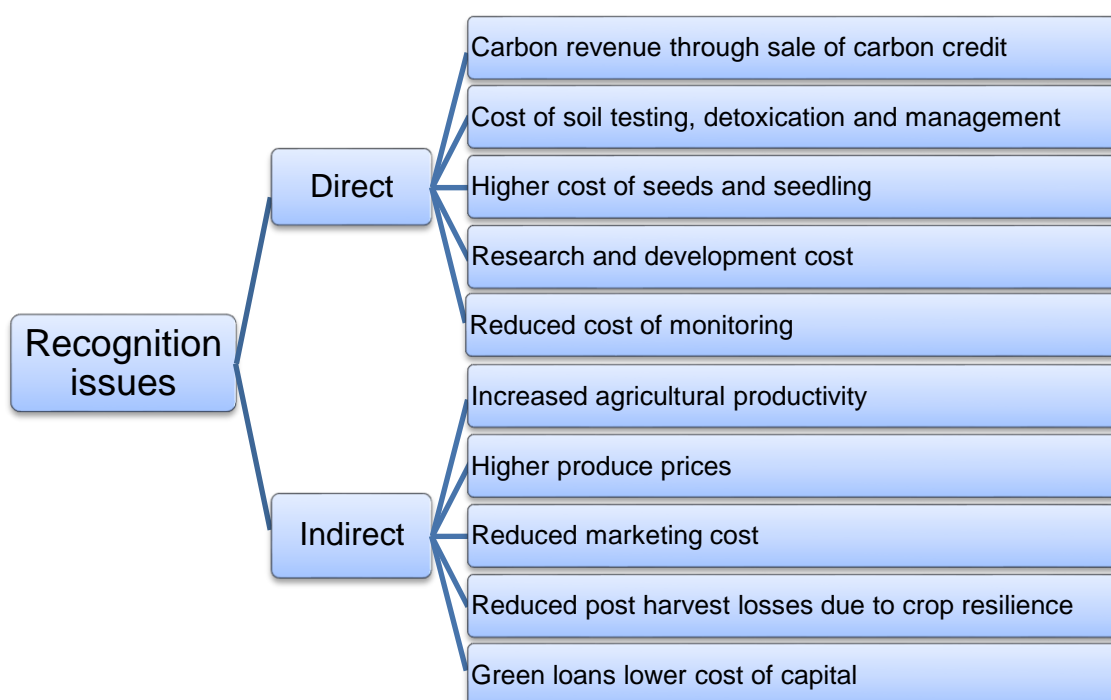
According to the IASB (2013a:A46), "recognition" is the term given to the process of incorporating an item that meets the definition of an element and satisfies the criteria for recognition in the financial systems. The IASB (2013a:A46) further argues that recognition involves depicting the item in words and assigning it a monetary amount and the inclusion of that amount in the financial records. Recognition helps to capture information about the nature and amounts of a reporting entity's economic resources and claims. Information on the expectations about the amounts, timing and uncertainty of cash and cash-equivalents is equally important for both the preparer and the user of financial reports. For the preparer it guides the process of measurement, while for the user it guides the process of interpreting the reporting entity's financial strengths and weaknesses.

The IASB (2013a) explains that an item that meets the definition should be recognised if it is probable that future economic benefits associated with the item will flow to or from the entity and the fair value or cost of the item can be measured reliably. Although the recognition for most transactions is straightforward, there are instances that require judgement and discretion to determine whether an item that meets the definition of an element also meets the recognition criteria.

Currently, there is no country world-wide that has regulations relating to carbon emission in the agricultural sector (World Bank 2014). The cap-and-trade activities in the agricultural sector can be argued to be voluntary because they are not part of the Kyoto Protocol and their accounting is optional under the United Nations Framework Convention on Climate Change (UNFCCC 2008:14). As discussed in chapter 2, sustainable land-based management strategies have enormous potential for mitigating climate change, increasing productivity and reducing input costs. The potential of mitigating carbon makes the agricultural sector a leading source of verified carbon units (VCUs) which different entities purchase as voluntary carbon offsets.

The synergies between voluntary climate change adaptations and mitigation strategies in the agricultural sector create various accounting recognition issues. The use of sustainable agricultural practices such as the use of manure in place of inorganic fertiliser, intercropping, agroforestry for nutrient incorporation and cover crops creates a myriad of recognition issues. In addition, the long-term nature of cap-and-trade schemes in the agricultural sector makes classification and recognition criteria even more complex. This study therefore identifies the issues summarised in figure 3.1 as the most critical and focal factors for consideration.

Figure 3.1: Initial recognition issues



Source: Author (2016)

The initial recognition decision is intertwined with initial classification and measurement, this is because an item is only recognised when it can be measured, and classification affects measurement (IASB 2013a:A46). As explained by Maina and Wingard (2013), agricultural activities are complex so it is therefore obvious that a single recognition criterion may not be applicable. Consequently, there are compound recognition issues, and any possible recognition criteria will be analogised depending on the classification and the issue under consideration.

3.4 INITIAL CLASSIFICATION

According to the IASB (2013a:A40), financial statements portray the financial effects of transactions and other events by grouping them into broad classes according to their economic characteristics. These broad classes are identified as assets, liabilities, equity, income and expenses. However, the IASB (2013a:A589) requires that in the absence of a

specific accounting standard or an interpretation that deals specifically with a transaction, management must use its judgement in developing and applying an accounting policy that results in information that represents faithfully the financial position, financial performance and cash flows of the entity.

In making that judgement, the IASB (2013a:A590) requires management to consider the definitions, recognition criteria, and measurement concepts for assets, liabilities, income, and expenses as stipulated in *the Conceptual framework for financial reporting* (IASB 2013a:A40). The following section will thus focus on the initial classification of various issues emanating from cap-and-trade schemes in the agricultural sector.

3.4.1 Classification as assets

The IASB (2013a:A41) states that a transaction or other event must be recognised as an asset when it is probable that any future economic benefit associated with the item will flow to the entity and the item has a cost or value that can be measured with reliability. It is necessary to agree on the asset in question before it can be measured and the nature and use of a transaction or another event determines its classification as an asset. Different assets exhibit different characteristics and can be held for a variety of uses in order to generate future economic benefits. For some assets significant judgement is therefore required to determine their classification.

In some cases, the process of aggregation of individual assets and liabilities converts them into a new asset or liability and the individual items lose their separate identity. Self-constructed assets and the installation of specialised equipment are examples of this type of aggregation. In such cases, the unit of account is, for measurement purposes, the lowest level of aggregation at which an identifiable asset is ready to contribute to the generation of future cash flows. Additionally, the IASB (2013a:A532) requires separate line items to be disclosed on the face of the financial statements. In view of the IASB requirements, this study considers the following sub-classification of assets to be necessary for reporting for

cap-and-trade schemes in the agricultural sector, as summarised in sections 3.4.1.1 to 3.4.1.5 below.

3.4.1.1 Intangible assets

Intangible assets are identifiable non-monetary assets, without physical substance, held for use, for the production of goods or services, to be rented to third parties or to be used for administrative purposes, for example franchises, copyright, knowledge about the market and contracts with distributors. In the original consensus, the IASB (2005:2079) considered carbon emissions allowances, whether allocated for free or purchased, to be intangible assets. This consensus was based on carbon emissions allowances that are not produced in the course of making inventories or other assets (IASB 2005:2081). The VCUs are generated or produced through a series of adaptation activities over an extended period of time (Forest Trends 2011:25).

Adaptation activities in the agricultural sector will involve certain adaptation costs that may merit recognition as intangible assets. Such costs will include soil testing, detoxication, soil cover management and new crop species technology development. These costs are incurred to increase soil organic matter and nutrients and enhance carbon absorption capacity. According to Forest Trends (2011:13), the time required to navigate a cap-and-trade project cycle in the agricultural sector, and the adaptation of third-party standard requirements that occur along the way, remain the most significant and unpredictable contributors to project cost.

The adaptation costs will certainly be recouped through increased productivity and the generation of VCUs and are therefore essentially internally generated intangible assets (Siegel & Borgia 2007). The IASB (2013a:A1045) requires an intangible asset arising from the development phase of an internal project to be recognised if, and only if, an entity can demonstrate all of the following:

- the technical feasibility of completing the intangible asset so that it will be available for use or sale,
- its intention to complete the intangible asset and use or sell it,
- its ability to use or sell the intangible asset,
- how the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset,
- the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset, and
- its ability to measure reliably the expenditure attributable to the intangible asset during its development (IASB 2013a:A1045).

One precondition for an asset to be recognised as an intangible asset is that it must be separately identifiable. The adaptation cost must have an additionality attribute if the project is to meet the CDM requirements under the UNFCCC (2008). Additionality means that emissions reduction or sequestration would not have occurred without the project activities. The additionality attribute therefore means that the effects of the adaptation cost can be monitored and tracked separately, and thus meet the criteria for recognition.

3.4.1.2 Biological assets

Agricultural activities involve managing the biological transformation process and harvesting the biological assets for sale or for conversion into agricultural produce or into additional biological assets (IASB 2013a:A1131). Biological assets are living animals or plants capable of biological transformation, which comprises the processes of growth, degeneration, production and procreation that bring about either qualitative or quantitative changes or both.

In the case of SALM, biological assets are targeted for the production of harvested agricultural produce and also VCUs. This requires some changes and adaptation to ensure

that the biological assets help in carbon sequestration or avoid carbon emissions. Additionally, SALM practices increase productivity and enhance harvested produce resilience which leads to reduced post-harvest losses. The IASB (2013a) requires that when biological assets are used for productive purposes, they must be classified under IAS 41, *Agricultural activities*.

As pointed out by Maina and Wingard (2013), the initial recognition criterion for a biological asset or for any agricultural product is basically a single accounting unit, but emerging discussions are calling for more than one unit of accounting on initial recognition (IASB 2014:2). Under IAS 41, the IASB (2013a:A1131) requires entities to treat a bearer plant and its agricultural produce as a single accounting unit until the point of harvest. The recent amendments will require an entity to recognise a bearer plant separately from its agricultural produce prior to harvest with effect from 1 January 2016, and to include the bearer biological assets under property, plant and equipment (IASB 2014:2). This begs the question of whether there is also a need to recognise the carbon capture potential of the biological assets as a separate unit of accounting.

According to Manor House Agricultural Centre (2015), practices such as companion planting take advantage of natural synergies that increase yields. Companion planting refers to practices where, for example, some plants attract helpful insects while others repel pests, for instance green beans and strawberries while others like borage help control tomato worms, while its blue flowers also attract bees. The question that arises is how the supportive attribute of one crop to the other should be accounted for. In the process of embracing cap-and-trade scheme activities farmers may have to buy seeds and seedlings at higher prices. Such seeds or seedlings are more adaptable to weather changes, more resilient to pests and have higher productivity. These are the additional factors that an entity that has adopted SALM activities in the agricultural sector must consider, with the implication that the value of biological assets on initial recognition will be equally higher.

3.4.1.3 Inventories

As highlighted in table 3.1, composting and residual management create manure which is a substitute for inorganic fertiliser. According to the IASB (2013a:A558), inventories comprise goods held for sale in the ordinary course of business activity, or for production for the purpose of such sales, or for daily consumption in the rendering of services. The composted organic matter, before application, forms part of the inventories of any entity that has adopted SALM practices.

Additionally, in the agricultural sector inventories will also include the agricultural produce which is initially recognised at the point of harvest, that might be amended by some recent proposal to have two units of accounting for bearer crops where the crop and produce are recognised separately before harvest (IASB 2014:5). Agricultural produce that is to be reclassified from biological assets to inventories should be initially recognised at fair value.

SALM activities are synonymous with organic farming, and some entities promote their produce as organically farmed. Organic agricultural produce attracts a premium price and are readily acceptable, depending on grading which is influenced by various factors (Manor House Agricultural Centre 2015). Such produce usually attracts better grades and thus higher market prices. Moreover, since organic agricultural products are readily acceptable by consumers there is a reduced cost to sell. Considering the requirement for valuing agricultural produce at fair value less cost to sell at the point of harvest (IASB 2013a), it is obvious that SALM activities significantly influence the fair value on initial recognition. Organic agricultural produces has a longer shelf life and is more resilient and this results in reduced post-harvest losses, which in turn influences the fair value at the point of harvest.

Where an entity is involved in processing agricultural produce or any other artificial processing after harvesting, these are not considered SALM activities. However, if the presumption that every agricultural product has a fair value that can readily be determined

(IASB 2013a:A1134) is relaxed, such processing may influence the fair value on initial recognition at the point of harvest.

3.4.1.4 Property, plant and equipment

According to the IASB (2013a), property, plant and equipment are tangible non-current assets held for use in the production or supply of goods or services, for rental to others, or for administrative purposes. Some property, plant and equipment are very unique in the agricultural sector such as the development of structures for handling compost, hedges for preventing soil erosion and bearer crops (IASB 2014:5). In addition, adaptation to SALM practices may lead to the development of special green houses that can trap carbon (CO₂) from the atmosphere, the use of organic growing media such as coconut coir, and the use of carbon supplementation equipment (Government of Canada 2015).

The principles under IAS 16, require that property, plant and equipment should be recognised initially at cost and that, in the case of bearer crops, the fair value at the point of transition be the deemed cost (IASB 2013a:A676; IASB 2014:5).

3.4.1.5 Financial instrument

According to the World Bank (2009), the overall objective of the KACP is to enable farmers to generate VCUs. The VCUs are marketable instruments issued upon validation and verification of the SALM activities. The IASB (2013a:A245) states that it is imperative to highlight to the users of financial statements the range of financial instruments used by an enterprise and how they affect the financial position, performance and cash flows. Additionally, the IASB (2013:A315) requires that an entity recognise and classify financial assets on the basis of the entity's business model for managing such financial assets.

Although the original argument on the classification of allocated allowances as financial assets (IASB 2005:2090) was decided in favour of intangible assets, the existence of markets and exchanges for the trading of emissions allowances provided evidence that they qualified as financial assets, as the allowances would be readily convertible to cash.

The issue of VCUs, which creates a marketable financial instrument, under the KACP is dealt with at intervals of three to five years in order to facilitate aggregation. The contracted farmers have to surrender the VCUs through the World Bank's (2014) bio-carbon fund. However, there is also an independent market on which VCUs can be sold.

3.4.2 Operating expense

The IASB (2013a:A42) explains that there is a close association between incurring expenditure and generating assets. Consequently, when an entity incurs expenditure, this may provide evidence that future economic benefits were sought but is not conclusive proof that an item satisfying the criteria of an asset was created. According to the IASB (2013a:A45), an expense takes the form of an outflow or depletion of assets or a decrease in economic benefits. It is therefore obvious that any expenditure incurred with no associated future economic benefits should be written off as an expense in the period incurred.

There are fundamental inconsistencies in expense recognition. For instance, the Federal Energy Regulatory Commission (FERC) (2014) requires entities to recognise emission allowances on a historical cost basis and to expense them as utilised on a weighted-average cost basis. However, it is important to mention that an expense is recognised in the income statement on the basis of a direct association between the costs incurred and the earning of specific items of income (IASB 2013a:A48). On this basis it becomes clear that most of the cost associated with adaptation to SALM practices cannot be treated as an expense. The only exceptions are research costs and the cost of monitoring and evaluation, which should be expensed immediately they are incurred.

3.4.3 The recognition for cap-and-trade scheme obligation

The original argument with respect to allocated or purchased emissions allowances is that if an entity is obligated to surrender allowances as it emits covered substances such as GHGs, a provision should be created relating to the extent of the emission at the reporting date (IASB 2005:2080). This is consistent with the requirement of *the conceptual framework for*

financial reporting (IASB 2013a:A42) and the requirement under IAS 37, *Provision, contingent liabilities and contingents assets* (IASB 2013a:A1014).

As highlighted in section 3.2, there are no regulations capping carbon emissions in the agricultural sector and any initiatives are voluntary. However, an entity may self-impose an obligation to mitigate sequestration beyond the baseline. This raises the question as to whether there is a need to create a constructive obligation.

3.4.4 Revenue recognition

Recently the IASB (2014) issued IFRS 15 which establishes the principles that an entity should apply to report useful information to the users of financial statements about the nature, amount, timing, and uncertainty of revenue and cash flows arising from a contract with a customer. According to the more harmonised principles, an entity should recognise revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. These core principles, which are delivered in a five-step model framework, are the following (IASB 2014):

- Identify the contract(s) with a customer.
- Identify the performance obligations in the contract.
- Determine the transaction price.
- Allocate the transaction price to the performance obligations in the contract.
- Recognise revenue when (or as) the entity satisfies a performance obligation (IASB 2014).

Although the IASB (2014) argues that the revenue recognition principles are required in order to enhance consistency in revenue recognition, inconsistency in revenue recognition still exists, further compromising the comparability of financial statements. Other views corroborating this include those of Horton, Macve and Serafeim (2011), who argue that

revenue recognition and measurement principles can easily conflict with liability recognition and measurement principles. This is true because the contract with a customer can commit the entity to continued future obligations. Additionally, Horton *et al.* (2011) regard different revenue recognition policies as being information signals rather than dealing with revenues as a fundamental measure of financial performance.

In the agricultural sector revenue may need to be recognised long before there is any contract with a customer (Horton *et al.* 2011). Similarly, there are various revenue recognition practices, some modelled around management expectations of the way the agricultural produce will be realised. Another common problem in the agricultural sector is the recognition of day one profit or loss and its implication for the volatility of profit, including policies such as sell and defer income.

3.4.4.1 Day-one profit and loss

The IASB (2013:A482) requires that when there is a difference between the fair value at initial recognition and the transaction price, any resulting gain or loss should be recognised in profit or loss unless otherwise stated by another accounting standard. There is thus a potential implication for fair-valuing accounting in the agricultural sector at inception to lead to the recognition of day-one revenue before the entity transfers or even enters into a contract with a customer in relation to the goods and services that are promised in the contract.

In relation to revenue recognition, the initial measurement of the performance obligation is required at the transaction price, with revenue recognised when the performance obligation is discharged. According to Deloitte (2013:1), the recognition of day-one profit and loss should be guided by how fair value was determined. This is consistent with the requirement by the IASB (2013a), which states that if the fair value is evidenced by a quoted price in an active market (Level 1 input) or based on a valuation technique that uses only data from observable markets (Level 2 input), then the difference is recognised as a gain or loss on

initial recognition. Otherwise, the modelled fair value at level 3 should be reset to the transaction price in respect to financial assets.

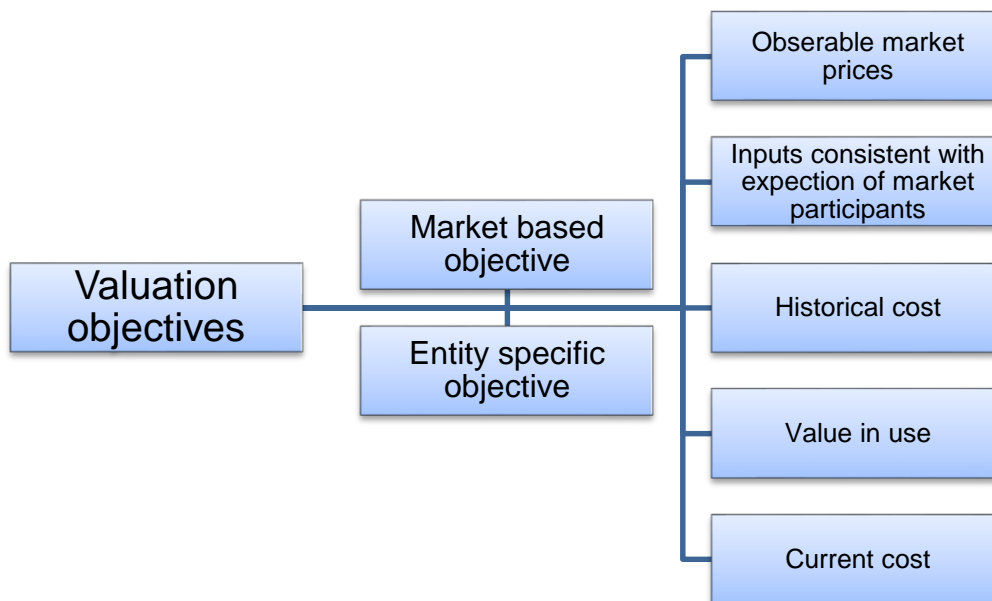
As observed by Maina and Wingard (2013), most agricultural produce does not have an active market, and the fair values have to be modelled using non-observable inputs (Level 3). This would imply that the fair value at initial recognition must be adjusted to bring it in line with the transaction price, which means that the day-one profit or loss is deferred by including it in the initial carrying amount of the asset. In respect of financial instruments, Deloitte (2013:1) explains that the deferred day-one profits or losses are amortised to income over the life until maturity of the related asset. In the agricultural sector there may be no transaction prices that can readily be determined on initial recognition of agricultural produce. This raises the question as to the best practices for reporting the day-one gains and losses, which will even be higher for entities that have adopted SALM activities.

3.5 MEASUREMENT ON INITIAL RECOGNITION

According to Graham (2012:97) there are significant interdependencies between initial recognition, classification and measurement because of the requirement that an item can only be recognised if the value can be measured or estimated reliably. In fact, if with respect to a transaction or other event none of the measurement alternatives is feasible, the item in question fails to meet the conditions for recognition as an element. According to the IASB (2013:A49), measurement is the process of determining the monetary amounts at which the elements are to be recognised and carried in the financial statements.

The alternative measurement bases are: historical cost, current cost (reproduction cost and replacement cost), fair value and value in use. Additionally, IASB (2013:A49) explains that, although historical cost is the most commonly adopted, the different measurement bases must be employed in differing degrees and in varying combinations if the financial statements are to provide useful information. From a very broad perspective, measurement can be looked at in terms of two measurement objectives, as depicted in figure 3.2.

Figure 3.2: Measurement objectives



Source: Adapted from Graham (2012:104)

3.5.1 Measurement objectives

The IASB (2013:A49) requires that value should be measurable with some reasonable degree of reliability. Although measurement reliability is important in assessing the timing of initial recognition, it is also an essential consideration in assessing possible measurement bases. This may mean that significant value is not included in the financial statements, and may compromise the decision-usefulness of the financial statements. Although there is a general contention that recognition date should be considered to occur, for the purposes of initial measurement, when the asset becomes ready to contribute to the generation of future cash flows, this may also be influenced by the measurement objectives (Graham 2012:98).

3.5.1.1 Market-based objective of measurement

The market value measurement objective is to measure an asset or liability at the price it would be exchanged for under competitive market conditions, reflecting the market participants' expectations as to the amounts, timing and uncertainty of future cash flows discounted at market rates of return for commensurate risk (Graham 2012:105). The market

value measurement objective reflects the price in an open and active competitive market. Competitive market forces in an open and active market serve to resolve the diverse expectations and risk preferences of individual market participants in respect of an asset or liability and produce a single price that can be expected to earn the current rate of return available in the marketplace for commensurate risk.

Applying the market value measurement objective requires a number of issues to be addressed because different prices may exist for similar items in different markets at the same time and, in many cases, these differences in the items will affect their value.

3.5.1.2 Entity-specific objective of measurement

The IASB (2013a:A49) explains that an entity-specific measurement objective looks at the expectations and risk preferences of management of the reporting entity. These expectations and risk preferences may differ in some significant respects from those of the market participants. Entity-specific measurements reflect management assumptions and expectations, which may differ from those explicit in market prices. Entity-specific measurement applies whenever market-based measurement does not apply. For instance, an entity might hold information, trade secrets, or processes that management expects will enable it to realise, or pay, cash flows that differ from those implicit in the market price (Graham 2012:109).

Entity-specific measurement is sometimes deemed to be more useful to investors and creditors than market values, expressing the view that management knows more about its business than does the market generally and that management will be held accountable relative to its own plans and expectations.

3.5.2 Bases of measurement

Graham (2012:104) explains that measurement involves the choice of attribute by which to quantify a recognised item and the choice of a scale of measurement. These attributes are

the traits to be measured, which in turn result in various bases of measurement becoming applicable on initial recognition. These bases of measurement will be briefly discussed in the context in which they relate to initial recognition measurement for cap-and-trade schemes in the agricultural sector.

3.5.2.1 Fair value

The IASB (2013a:A473) states that fair value is the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. Power (2010) argues that there are four conditions that shift the focus from a transactions-based and realisation-focused conception of accounting reliability in favour of market-based valuation models. Power (2010) identifies the four conditions as follows:

- cultural authority of financial economics;
- the problem of accounting for derivatives;
- the transformation of the balance sheet by conceptual framework projects from a legal to an economic institution; and
- the ability of fair value to enable standard-setters develop a professional and regulatory identity.

According to Maina and Wingard (2013), for many agricultural products a quoted market price does not exist, thus creating the need to select an asset valuation method that best reflects the expectations of market participants. This indicates that for most agricultural produce, fair value can only be determined at level 2 and level 3 in the fair value hierarchy which indicates progressively more illiquid and opaque market systems. Fair value arguably fails the tests of relevance and reliability for a measure of business performance because it focuses solely on exit price at the measurement date, which is purely hypothetical, as immediate disposal is often not the best option (IPSASB 2014; Power 2010; Graham 2012:102).

3.5.2.2 Historical cost basis

The IASB (2013:A49) explains that the cost of an asset is the fair value of the consideration given at the time of the acquisition or the accumulation of costs that can be attributed to the asset, which can include reasonable allocations of indirect overheads. Graham (2012:106) argues that the condition for asset measurement on initial recognition is almost unanimously agreed to be cost or a proxy of cost. An intangible asset, property, plant and equipment, and financial assets are all measured initially at the transaction cost. By contrast, grant assets, biological assets except bearer crops (IASB 2014), and derivative financial assets are measured at fair value on initial recognition.

According to the IASB (2013a:A49), the cost of a separately acquired asset comprises:

- the purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates; and
- any directly attributable cost of preparing the asset for its intended use (IASB 2013a:A49).

The cost of internally generated assets comprises the accumulated amount incurred to put the asset in a condition ready for the intended use. In the agricultural sector most of the cap-and-trade schemes to related assets are internally generated through lengthy adaptation activity procedures. The cost relating to the adaptation activities should therefore be systematically accumulated and perhaps capitalised, a condition which is also required for bearer crops (IASB 2014).

3.5.2.3 Current cost basis

Current cost is arguably the most economic cost of replacing an existing asset with an identical one or replacing an existing asset with an asset of equivalent productive capacity or service potential, at the reporting date (IASB 2013a:A49). It is the long-term nature of SALM adaptation activities that makes historical cost irrelevant. As is required by the IASB (2013a:A51), management must combine the bases of measurement so as to obtain a

balance between relevance and reliability, thus creating the need to use replacement cost as an alternative.

According to Graham (2012:106), a shift in the basis of measurement is also applicable where historical costs are negligible compared to replacement costs, thus rendering them irrelevant. On initial recognition, the current cost may not apply to many of the internally generated intangible assets relating to cap-and-trade schemes. As argued by Botosan and Huffman (2014:25), the potential benefit of the current cost measurement basis is more significant in a period of changing prices, while it may not be as significant during a period of relative price stability, or soon after the asset has been acquired. Current replacement cost will therefore apply to subsequent measurement and will be discussed in detail in chapter 4.

3.5.2.4 Value in use

The IASB (2013b:49) states that the value in use is the discounting of the estimated future cash flows expected to arise from the continued use of an asset and from its disposal at the end of its useful life. The discounting rate and estimated future cash flows must be determined by management based on the expectations of market participants. This is based on the requirement that any valuation technique must maximise the use of relevant observable inputs and minimise the use of unobservable inputs (IASB 2013a:A483).

According to the IASB (2013b), value in use requires management to contextualise the expectations of market participants, including the risk factors that they would consider. It is therefore inevitable that the estimates will reflect the reporting entity management's best estimates of future cash flows.

Botosan and Huffman (2014:5) argue that the way the asset is expected to realise value is a function of the business model, and for assets outside the business model this is largely influenced by managerial intent. Consequently, for assets that are not yet in use, the value in use may be guided by the intended use. The adaptation activities for cap-and-trade schemes in the agricultural sector require alignment to the business model, and therefore

value in use is largely applicable in their valuation, particularly subsequent to initial recognition.

3.6 MEASUREMENT UNCERTAINTY

According to Christensen, Glover and Wood (2012) the absence of a fair value for an asset creates measurement and recognition problems, but does not in any way negate the future economic benefits that can be obtained from both the use and the exchange of that asset. Because the overall complexity and estimation uncertainty inherent in financial statements have increased, it is necessary for an entity to establish other bases of measurement that can be used to estimate the value (Christensen *et al.* 2012). It is generally agreed that initial measurement should be determined as at the date of initial recognition. This has important implications because if prices change between the date when a fixed cash price is negotiated and the initial recognition of the asset acquired, then, in accordance with some measurement bases, the asset would be measured on the basis of the prices at the later date.

However, as argued by Siegel and Borgia (2007), some assets are not recognised on the basis of the strength of their definition but rather on the practical consideration of coping with the effects of uncertainty complicated by the deferred future economic benefits. Equally, the initial recognition of some non-contractual assets that are developed over a period of time may present some challenges as in the case of carbon assets.

It is the measurement uncertainty which, Botosan and Huffman (2014:36) argue, hinders the ability of accounting practices to make substantive progress regarding the question of decision-useful financial statements. As Botosan and Huffman (2014:36) put it, for assets that are intended for sale, the measurement basis that provides decision-useful financial information to investors is fair value while assets that are intended for use the historical cost.

Certainly, accounting practice can never be free from estimation uncertainty and economic indeterminacy (Botosan & Huffman 2014:36), neither of which can be mitigated by voluntarily disclosing supplementary information about measurement uncertainty. For instance, exit price may be determined by hypothetical market exchange transactions less expected cost to sell. Similarly, historical cost not only fails to represent the value of assets completely, neutrally and without material error, but is also generally not relevant to the users of financial statements (Botosan & Huffman 2014:36).

3.7 THE DERIVATIVE INSTRUMENTS RELATING TO CAP-AND-TRADE SCHEMES

The prices in the fast developing carbon markets have not been spared the unpredictable fluctuation. As Bloomberg (2014) notes, the oversupply of tradable carbon permits has depressed market prices to a record low. Additionally, Bloomberg (2014) argues that intermediate traders, who seek to reap benefits from increased volatility through short-term buying and selling, prefer to trade in futures. In the agricultural sector, there are also uncertainties surrounding the outcome of the verification process. The confluence of these factors creates uncertainties or risks that need to be managed by any entity participating in the carbon market.

Furthermore, it is important to note that in the voluntary offset market, the vast majority of sales are done before the emissions reduction have been achieved, by forward selling the credits they will produce in order to raise finances for project implementation, which, according to the World Bank (2009), are generally long-term projects. Such carbon credits, whether traded in the primary or the secondary market before being issued, are relatively risky because of the possibility that such projects may not deliver as expected.

Depending on the entity's management strategy, available financial and technical resources, and risk appetite, Ernst and Young (2009:6) note that some entities establish trading departments which trade carbon allowances/credits for speculative gain or for economic

hedging purposes or for a combination of the two. A survey conducted by Forest Trends (2015:39) indicated that out of the 6.7 MtCO₂ of forest carbon offsets transacted in 2012, transactions associated with immediate payment amounted to \$53 million, while another \$40 million was associated with future and forward agreements. According to Forest Trends (2015:39), the future and forward contracts therefore accounted for over 43% of the total market transactions and as the carbon markets continue to expand more contracts will evolve that can meet the definition of derivatives.

Consequently, various forward agreements and derivatives are emerging such as Vintage Year Swaps. Additionally, Ernst and Young (2009:8) explain that brokers may enter into forward contracts to purchase or sell emissions permits or, better still, enter into contracts for swaps of permits. A forward contract is extremely valuable in both hedging and in speculation because it may help a farmer to hedge against any unfavourable movement in prices by forward selling the produce and VCUs at a known price (Ernst and Young 2009:8). A speculator, on the other hand, relies on seasonal price fluctuations, which help to enhance the vibrancy of the derivative markets for VCUs (Bloomberg 2014).

Although the price at which offsets are sold depends on many interacting factors, it is difficult to extrapolate the particular influence that contract terms have on prices. However, the IASB (2013b) explains that since derivative contracts are settled financially, they should be accounted for at fair value.

3.8 SUMMARY AND CONCLUSIONS

This chapter has discussed in detail various initial recognition, classification and measurement issues pertinent to cap-and-trade schemes in the agricultural sector. Although the initial recognition criteria are clear in the conceptual framework, significant judgement is required to determine the timing of recognition and classification in the agricultural sector by virtue of the complexity of the underlying activities.

Initial recognition and classification depends not only on the nature of the asset, but also on the intended use of the asset in question. The synergies between voluntary climate change adaptations and mitigation strategies in the agricultural sector create various element recognition issues, indicating clearly that single recognition criteria may not be applicable. Consequently, some activities are classified as property, plant and equipment, or intangible assets or inventory if used for operational purposes, and as a financial asset if intended for trading purposes. The long-term nature of cap-and-trade schemes in the agricultural sector makes recognition criteria more complex. In fact, for some items that satisfy the definition of an asset, liabilities, income and expenses, significant judgement is required to evaluate whether such items satisfy the recognition criteria.

Although a market-based measurement objective has important qualities that make it superior to entity-specific measurement objectives, at least on initial recognition, the management of various organisations will have to continue to exercise judgement in selecting an appropriate method of accounting for SALM activities and the related VCUs. Regardless of the accounting approach adopted, the need to communicate clearly with stakeholders and other users of the financial statements about how the entity's performance and overall financial position has been, and will be, affected by the SALM activities remains very important.

Chapter 4

Valuation of assets used in cap-and-trade schemes

4.1 INTRODUCTION

In chapter 3, the initial recognition issues arising from sustainable agricultural land management (SALM) adaptation activities and the implications of initial recognition and measurement were discussed. After the recognition decision has been made, the preparer of financial statements must, at each reporting date, review the amount recognised for relevance and reliability. Consequently, the subsequent measurement decision is equally important as it helps to adjust previous estimates in response to emerging trends, unfolding reality and new facts. This chapter therefore focuses on measurement issues at each reporting date. The perspective is first what we can analogise from the international accounting standards and then what relates specifically to cap-and-trade schemes in the agricultural sector.

As explained in chapter 2, when a farmer completes a qualifying offset project that results in a reduction in or the avoidance of greenhouse gases (GHGs) emissions or the sequestration of GHGs, it creates significant value. Therefore, this chapter will explore the valuation options for the underlying non-current assets that produce verified carbon units (VCUs) in the agricultural sector, in order to propose a model that can be used in the evaluation of an entity's non-current carbon sequestration capabilities. The chapter will conclude by highlighting the influence the preparer of financial statements has on subsequent measurement.

4.2 SUBSEQUENT MEASUREMENT

As explained by the Department for Environment, Food and Rural Affairs (DEFRA 2009:8), it is obvious that the proper tracking, measurement and reporting of carbon activities has an impact on the success of an entity's environmental portfolio, irrespective of the sector in

which the entity operates. According to the Institute of Chartered Accountants in England and Wales (ICAEW 2006:4), proper measurement will not only improve the quality of the information contained in the financial statements, but will also enhance the usefulness of information provided to the users of financial statements. Although there is no clear division between initial measurement and subsequent measurement, the subsequent measurement decision is equally important in order to adjust the values recognised initially to the best estimates of information available at the reporting date.

This therefore means that any conclusions reached regarding measurement on initial recognition are tentative and will be re-assessed when their potential implications for re-measurement are considered. However, in some cases the adoption of particular measurement basis on initial recognition may limit or preclude some alternatives on subsequent measurement. For instance, the IASB (2013a:A1133) requires that for biological assets, the presumption of fair value is only rebuttable on initial recognition. Consequently, if fair value is determinable on initial recognition, an alternative basis of measurement may not be applied subsequently. This will obviously present application challenges, particularly when the relevant market becomes illiquid or disappears.

While focusing on the decision-usefulness of financial statements, the ICAEW (2011:5) and Scott (2012:153) argue that accounting measurements have important social consequences that affect everyone. This explains why it is important to always measure the substance of a transaction or other event accurately, irrespective of its legal reality. Such social and economic consequences include:

- evaluation of the performance of management and incentive schemes;
- effects on the firm's credit rating, the cost of capital and liquidity risk exposures; and
- price of the firm's equity shares and thus the profit for speculative traders (Scott 2012:153).

As a result of these social and economic consequences, the financial statements must always reflect a true and fair view (Deegan 2005:71; ICAEW 2006:14). This is why the IASB (2013a:A589) requires that all measurement be aligned to the requirements of applicable accounting standards and that any departure be disclosed. Accounting standards set out principles that limit managerial discretion relating to measurements that are reflective of the entity's economic realities (IASB 2013a:A590), thus seeking to minimise the possibility of creative accounting.

In practice, the principles set out in the accounting standards, are interpreted and contextualised by the preparers of financial statements. This interpretation includes making assumptions that form the basis of an accounting estimate, indicating that measurement may still have inherent bias arising from the discretion of the preparers. The following section reflects on the provision of accounting standards pertaining to financial reporting for the agricultural sector generally.

4.3 PROVISION OF ACCOUNTING STANDARDS

According to Bradbury and Baskerville (2007:12), one of the biggest challenges for standard setters is formulating a harmonised and sector-neutral accounting framework. This is due to the diversity of sector-specific issues. Some standard setters have responded by formulating dedicated standards that focus on the needs of specific sectors. This perhaps explains why the Sustainability Accounting Standards Board (SASB 2013:6), for the purposes of integrated reporting, focuses on developing and disseminating industry-specific accounting standards for material sustainability issues.

It is certain that the users of financial reports want to understand the factors that drive competitiveness and the potential for sustained value creation in an industry context (Bradbury & Baskerville 2007:12; SASB 2013:5). In addition, Bradbury and Baskerville (2007:12) argue that users may only focus on the externalities of an industry that are likely to affect other industries and that stem from entity investment in that industry. As explained by

Maina and Wingard (2013), the agricultural sector is unique, and its processes for generating income are peculiar and complex, with most of the economic value-creation processes taking place within firms rather than through market transactions (ICAEW 2011:18). This peculiarity is further complicated by entities in the agricultural sector making certain adaptations and completing qualifying offset projects in order to generate VCUs as an additional revenue stream.

The process of completing a qualifying project has a direct impact on the entire production cycle in the farming business, including the harvested produce. Therefore, the principles for the subsequent measurement of cap-and-trade schemes in the agricultural sector must be analogised from existing accounting frameworks.

4.3.1 International Financial Reporting Standards (IFRSs)

As noted by PricewaterhouseCoopers (PWC 2014:4), the IFRSs, as promulgated by the IASB, enjoy the widest application with most of the world's capital markets requiring the use of IFRSs for financial statements of entities with public accountability. Like most of the other accounting standards, the IFRSs are generic and many accounting issues relating to the agricultural sector have to be analogised (ICAEW 2006:19).

The only accounting standard which focuses on the agricultural sectors in particular is IAS 41, *Agriculture*. IAS 41 prescribes the measurement after recognition to be fair value less cost to sell, except where it is not possible to measure the fair value reliably (IASB 2013a:A1132). Although IAS 41, *Agriculture* requires full fair value accounting, it does not make any specific mention of cap-and-trade schemes in the agricultural sector. This indicates that, as argued by the ICAEW (2006:18), the ultimate measurements depend on real or imagined transactions.

4.3.1.1 The International Financial Reporting Interpretation Committee (IFRIC)

The IFRIC (IASB 2013b) has deliberated on several issues relating to the valuation of biological assets. Such issues have ranged from accounting for obligation to replanted biological assets, to the treatment of biological transformation when fair value is estimated on the basis of future cash flows. Another critical area of focus unique to the agricultural sector discussed by IFRIC (IASB 2013b) is the application of highest and best use to agricultural produce while using the most advantageous market. The IFRIC has also focused on determining the relevant market for immature biological assets (IASB 2013b).

4.3.1.1.1 Emission rights (withdrawn)

The IFRIC has developed proposals for accounting for cap-and-trade schemes in accordance with IFRSs that were effective from 1 March 2005 (IASB 2005:2079). IFRIC 3, *Emission rights* was a mixed measurement approach whereby allowances were accounted for at cost, under IAS 38, *Intangible assets*, while emissions obligations at a fair value were accounted for under IAS 37 (IASB 2005:2079). The IFRIC also proposed a mixed reporting approach whereby changes in the fair value of allowances are recognised in equity, while changes in the value of emissions obligations are recognised through profit or loss. In the year 2005, the carbon market was still in a formative stage, and many issues were emerging (IASB 2005:2080). Therefore, the IASB decided to withdraw IFRIC 3 in June 2005 owing to the reduced urgency for an emissions rights interpretation, and criticism of the limitations of the version (Deloitte 2009).

However, it is important to mention that IFRIC 3 was the only direct attempt to provide a framework for accounting for cap-and-trade schemes, and standard setters are still considering how to address the accounting of all tradable emissions rights and the related obligations (Deloitte 2013). More specifically, it is important to provide guidance on the accounting treatment of the activities that an entity undertakes in contemplation of receiving tradable rights in future periods, as it applies to the agricultural sector. As the market

develops it is becoming clearer that there are underlying accounting issues which need to be addressed more comprehensively than originally envisaged.

4.3.2 IFRS for Small and Medium-Sized Entities

The IFRS for SMEs, which is a simplification of the full IFRSs, is also generic to support all sectors, with the exception of section 34 which covers the agricultural sector (IASB 2009:200). The only difference between the IFRS for SMEs and the full IFRSs in relation to reporting for agricultural activities is that fair value application under the IFRS for SMEs is circumstantial. The IASB (2009:200) requires that, an entity engaged in agricultural activity must determine whether the fair value of a biological asset is readily determinable without undue cost or effort. Where the fair value is readily determinable the entity uses the fair value model, while in instances in which the fair value is not readily determinable, the entity uses the cost model for the relevant biological asset (IASB 2009:200).

Under section 34, the IASB (2009:200) does not confine the ability of the preparer of the financial statements to determine fair value without undue cost or effort to prices quoted in an active market. The argument is that even though market-determined prices or values are not available for a biological asset in its present condition, it may still be possible to determine fair value without undue cost or effort using alternative procedures. For instance, an entity must consider whether the present value of expected net cash flows from the asset discounted at a current market-determined rate results in a reliable measure of fair value (IASB 2009:200).

For those biological assets in respect of which fair value is not readily determinable without undue cost or effort, an entity must measure at cost less any accumulated depreciation and any accumulated impairment losses. The entity must measure agricultural produce harvested from its biological assets at fair value less estimated cost to sell at the point of harvest (IASB 2009:200).

4.3.3 Public sector accounting standards

The International Public Sector Accounting Standards Board (IPSASB) (2014:907) has issued IPSAS 27 in order to prescribe the accounting treatment and disclosures related to agricultural activity, a matter not covered in other standards. Biological assets, including those obtained in non-exchange transactions, should be measured on initial recognition and at each reporting date at fair value less cost to sell (IPSASB 2014:912), except where the fair value cannot be measured reliably on initial recognition (IPSASB 2014:914). Although the public sector accounting standards are aligned to the IFRSs, there are some peculiarities that relate to the public sector which include biological assets obtained in non-exchange transactions and impairment of non-cash generating biological assets. However, there is no specific focus on cap-and-trade schemes in the IPSASs.

4.3.4 Sustainability Accounting Standards

According to the Sustainability Accounting Standards Board (SASB 2013:3), the purpose of sustainability accounting and disclosures is to complement the financial report, such that financial information and sustainability information can be evaluated side by side and provide a complete view of a corporation's performance and value creation, both financial and non-financial, across all forms of capital. In the industry classification system framework, the SASB (2013:10) places the agricultural sector under renewable resources and alternative energy. The essence of focusing on sustainability at industry level is because there are intractable issues that are closely tied to the resource use and business models specific to a particular industry.

According to SASB (2013:7), sustainability includes both the management of a corporation's environmental and social impacts and governance, and the management of the environmental and social capitals necessary to create long-term value. It is worthwhile to note that the SASB (2013:8) recognises climate change first in the universe of sustainability issues. However, on the premise of sustainability's impact on the business model, this study

focuses on the adaptation activities that an entity pursues sustainably in order to complete projects that generate marketable carbon credit.

4.4 SUBSEQUENT MEASUREMENT AND VALUATION

At each reporting date, the monetary amount to be attributed to an asset must be determined, or at least reviewed (IASB 2013:A594). The different perceptions of economic reality create different bases of measurements (Power 2010:209; Vehmanen 2013:157), which add complexity to the subsequent measurement decision. This explains why the FASB (2014) recently embarked on a simplification initiative, the objective of which is to identify, evaluate and improve areas of generally accepted accounting principles (GAAP) for which cost and complexity can be reduced, while maintaining or improving the usefulness of the information required to be reported by an entity.

According to the ICAEW (2006:8), differing views on economic reality inform the valuation choice between cost, exit value, entry values or value-in-use. In most cases, it is the business model that is more significant when describing the economic reality (SASB 2013:7). In the agricultural sector, the business model is appropriate because most of the value-creation processes take place within the farm as opposed to market activities. Consequently, the entry, exit or historical cost may not provide useful information under any circumstances for the agricultural sector. The value-in-use utilising the residual valuation method thus becomes a more realistic approach for providing useful information to users of financial statements (Deloitte 2009). This applies to the agricultural sector and more specifically to the consequences of cap-and-trade scheme adaptation which create a single business unit model with multiple units of accounting.

4.4.1 Residual valuation method

According to the IASB (2013:A1130), agricultural activities involve the management of a biological transformation process. The process of biological transformation engages various types of asset that generate a single stream of cash flows and share the same risk profile.

In some cases the biological assets are permanently attached to land such as palm oil trees, agro-forestry, tea and coffee plantations (IASB 2013:A1133). In research conducted by Maina and Wingard (2013), it was established that most bearer biological assets do not have an active market. Consequently, the value of such bearer biological assets must be modelled on expected future cash flows (Vehmanen 2013:157).

The present value of future cash flows is a conglomerate figure involving all the assets collectively engaged in the farming activities. This call for the application of the business residual valuation method, where, the present value of the cash flows derived from the biological assets is determined (Deloitte 2009). The value of the land, equipment and machinery, and identifiable intangible assets such as brand names are then deducted from the market value of the operation to disaggregate them. The resultant residual value may then be allocated as the market value of the biological assets.

The IASB (2013:A476), recommends the use of the highest and best use criteria for all the non-financial assets involved in agricultural activities. However, when applying the requirement of IAS 41 (IASB 2013:A1132), in the context of IFRS 13, *Fair value measurement* (IASB 2013:A476), a problem may arise when applying the residual valuation method. This is because, if the highest and best use differs from its current use, it can result in a minimal or nil fair value for the biological assets. The problem can intensify if the estimation of future cash flows omits some potential elements such as carbon capture potential. The following section will focus on the identifiable assets whose value must be determined before allocating the residual value to biological assets.

4.4.1.1 Intangible assets

According to the SASB (2014:3), there are various forms of non-financial capital associated with sustainability – environmental, human and social – and corporate governance issues, which enhance long-term value creation. Additionally, Baruch (2001:7) notes that there is considerable interaction between tangible and intangible assets in the process of creating

value. This interaction can enhance or diminish the value, which in turn poses a serious challenge to the subsequent measurement of intangible assets, in some cases making it impossible to value intangible assets on a stand-alone basis.

As discussed in chapter 3, the VCUs are generated or produced through a series of adaptation activities, which involve certain adaptation costs to increase soil organic matter and nutrients and enhance carbon absorption capacity over the project cycle. This project cycle extends over a long period (Forest Trends 2011:25). Under the SALM practices, the intangible assets are embedded in the tacit knowledge of the farmer which makes technological adaptation possible. The IASB (2013:A1049) recommends two possible approaches to the subsequent measurement of intangible assets, i.e. the cost and the revaluation approaches from which an entity makes a choice as a matter of accounting policy.

Under the cost approach the cost incurred after initial recognition should be capitalised depending on the additionality attribute, and systematically amortised using a pattern that reflects the way the entity uses the embedded economic benefits (IASB 2013:A1049). The IASB (2013:A1050) explains that although the cost model is the benchmark, intangible assets can also be accounted for at fair value if an active market for such intangible assets exists. If an intangible asset is accounted for using the revaluation model, all the other assets in its class shall also be accounted for using the same model, unless there is no active market for those assets. However, accounting for intangible assets under the revaluation model in the agricultural sector has inherent limitations owing to the absence of robust markets and proper valuation techniques. Therefore, the intangible assets associated with agricultural sector sustainability adaptation activities are accounted for at cost and subjected to amortisation and impairment review.

4.4.1.2 Property, plant and equipment

In the agricultural sector, an entity utilises the value embedded in an item of property, plant and equipment by using it in the production or supply of agricultural produce, for rental to others such as labour quarters, or for administrative purposes (IASB 2013:A672). The accounting treatment is the same as all other sectors where, after initial recognition of an item of property, plant and equipment, a choice of either the cost model or the revaluation model is made by an entity as its accounting policy. The choice is greatly influenced by the business model of the entity.

Thus, the unique item of property, plant and equipment in the agricultural sector in respect of adaptation activities, such as the development of structure for handling compost, hedges for preventing soil erosion and bearer crops (IASB 2014:5), presents challenges in measurement after initial recognition, particularly the estimated depreciation rate applicable. Additionally, there are other items such as special green houses that can trap carbon (CO₂) from the atmosphere, the use of organic growing media such as coconut coir, and the use of carbon supplementation equipment the useful life of which is not only influenced by time but also defined by capacity. This uniqueness creates critical uncertainty when formulating depreciation policy and estimating and evaluating impairment losses.

4.4.1.3 Financial instrument

The IASB (2013:A245) states that it is imperative to point out to the users of financial statements the range of financial instruments used by an entity and how they affect the financial position, performance and cash flows. The IASB (2013:A315) requires that an entity recognise and classify financial assets on the basis of its business model for managing such financial assets.

Consequently, a project developer that produces VCUs produces marketable instruments, which are held for trading, and should classify them at fair value through profit and loss (IASB 2013:A316). According to Forest Trends (2015:3), the prices in the voluntary carbon

market have been very volatile in the recent past, ultimately declining to an all-time low. In some cases, the market disappeared, and re-emerged with new products and fragmentations (Forest Trends 2015:5). This volatility has had a significant impact on the financial position and financial performance of any entity managing a carbon portfolio, including project developers such as the farmers under the Kenya Agricultural Carbon Project (KACP).

Although under the KACP the farmers are contracted by the World Bank carbon fund, the existence of markets and exchanges for the trading of emissions allowances provides a publicly quoted fair value which forms the basis of VCU's valuation at each reporting date.

4.4.1.4 Inventories

Subsequent to initial recognition, the IASB (2013:A558) requires inventories to be valued at the lower of cost or fair value less cost to sell. In the agricultural sector, inventories include the agricultural produce that is initially recognised at the point of harvest, which may be held for trading, or for further processing (IASB 2013a:A560). Where an active market does not exist for the harvested produce, fair value may be estimated on the basis of methods such as warehouse receipting and contracts from manufacturers. Additionally, for any entity that has adopted SALM practices involving substituting inorganic fertiliser with organic manure, inventories will also include the composted organic matter before application, which is transformed into intangible assets after application. In this case, the fair value of the composted organic matter might be the replacement cost of fertiliser.

Where an entity is involved in processing agricultural produce or any other artificial processing after harvesting these are not considered to be SALM activities. However, if the presumption that every agricultural product has a fair value that can readily be determined (IASB 2013a:A1134) is relaxed, the processing can influence the fair value on initial recognition at the point of harvest. The only point of emphasis is that organic agricultural

products attract premium prices in any market, and that affects the fair value less cost to sell (Kremen, Greene & Hanson 2015:10).

4.4.2 Revenue recognition

As explained by Landry and Chlala (2001), revenue recognition becomes a major concern as companies attempt to meet stakeholders' expectations. Although the criteria for revenue recognition in principle, as outlined by various accounting standards, appear straightforward, in practice the concept becomes more complex. Landry and Chlala (2001) further argue that many revenue recognition and classification decisions can be subjective in the absence of an authoritative guidance or if such guidelines are not clear.

A contract resulting in the realisation of revenue is certain only in some cases, but for others there is some degree of uncertainty. This uncertainty makes revenue restatement a common practice in the agricultural sector. Consequently, a single revenue recognition policy may not capture the implications of biological transformation processes and the related cap-and-trade activities. The common practice is therefore a hybrid approach in terms of which revenue is recognised and deferred until a specified milestone or event occurs (FASB 2010:3). Subsequently, the revenue is recognised as earned when a substantive milestone is achieved. The milestone method of revenue recognition applies mainly to transactions and other events having all of the following characteristics (FASB 2010:5):

- there is substantive uncertainty at the date the arrangement is entered into that the event will be achieved;
- the event can only be achieved based in whole or in part on either the vendor's performance or a specific outcome resulting from the vendor's performance; and
- if achieved, the event would result in additional payments being due to the vendor (FASB 2010:5).

In light of the role played by agriculture in both the development of the economy and in food security, farmers often receive various forms of support from government agencies and other donors. In other cases, farmers may receive subsidised inputs such as machinery, irrigation networks and fertiliser as explained by the Food and Agriculture Organisation (FAO 2012).

If a grant which is related to a biological asset measured at its fair value less cost to sell is conditional, it is not recognised as income until the conditions attached to the grant are met. For example, if a grant requires an entity to farm in a particular location for a period of five years (IASB 2013a:A1134), the revenue relating to the grant will be deferred and amortised using a pattern that reflects how the entity complies with the underlying conditions. This is a typical exemplification of the milestone method of revenue recognition. Additionally, revenue relating to VCUs may be recognised when project activities are certified and deferred for those activities to be certified in future.

4.4.3 Biological assets

Agricultural activities involve the managing of the biological transformation process and harvesting the biological assets for sale or for conversion to agricultural produce or additional biological assets (IASB 2013:A1131). It is important to mention that SALM involves adaptation activities that have an impact on the biological asset transformation process, in terms of creating more carbon sequestration and absorption. It is therefore obvious that under SALM, biological assets are not the only target when harvesting agricultural produce, but also VCUs.

The IASB (2013a:A1136) explains that biological transformation, has a direct impact on future economic benefit and therefore must be considered at each measurement date (IASB 2013b:B1763). The question of how to relate this transformation to future economic benefits is what creates the measurement uncertainties at each reporting date. Moreover, agricultural entities are burdened with several kinds of risks, including price volatility,

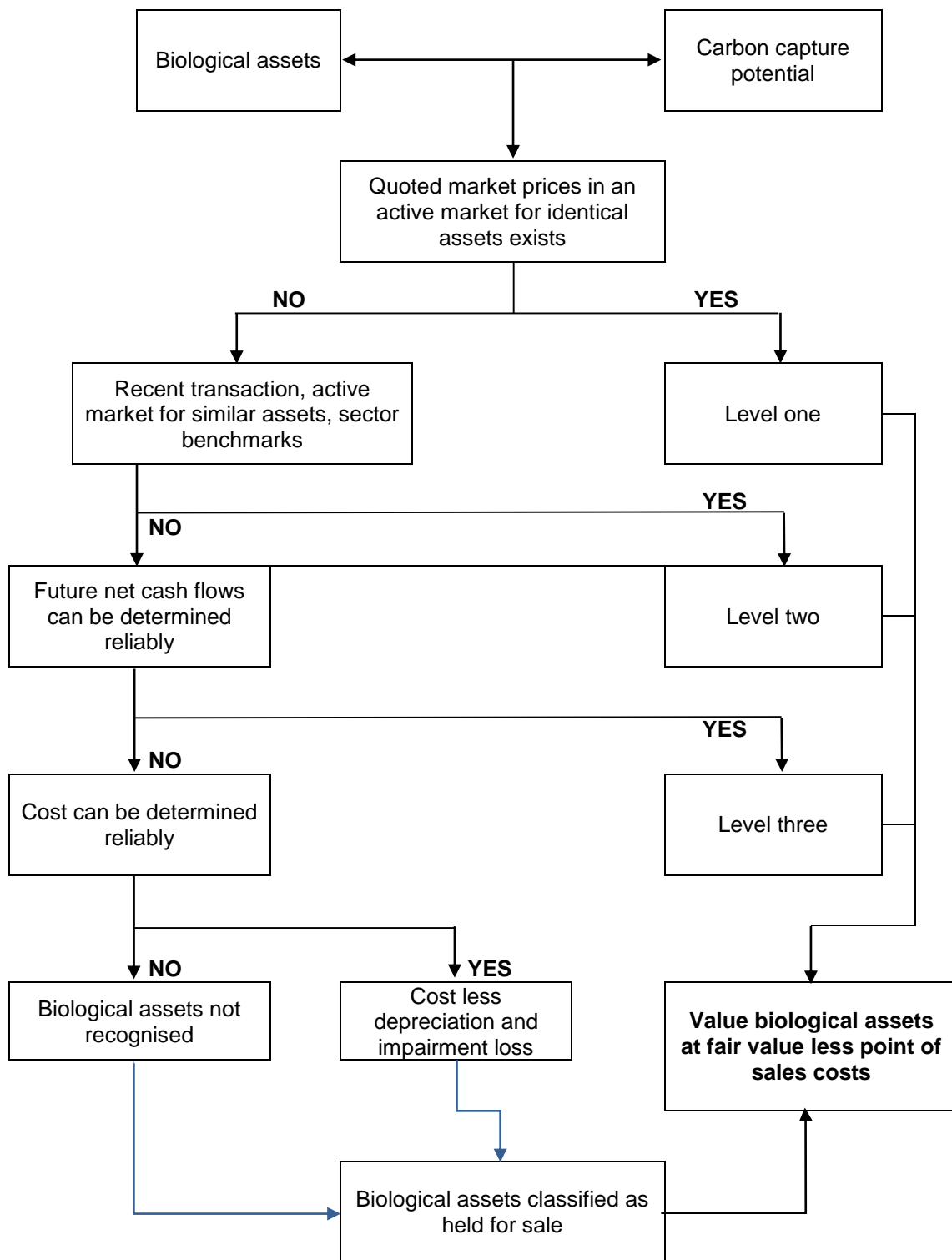
productivity uncertainties, grading of produce and post-harvest losses, all of which affect the measurement at each reporting date (FAO 2012).

According to Manor House Agricultural Centre (2015), practices such as companion planting take advantage of natural synergies that increase yields. Manor House Agricultural Centre (2015) gives the example of some plants such as green beans and strawberries that attract helpful insects; others like borage repel pests such as tomato worms, while its blue flowers attract bees which enhance the pollination success rate of. The question that arises is how the supportive attribute, of one crop to the other that enhances productivity, should be accounted for at each reporting date.

This study therefore argues that SALM activities will influence the valuation of biological assets as well as each of the underlying assets. Consequently, this study focuses on biological assets and carbon capture potential side by side, as depicted in the valuation path in figure 4.1.

In the process of embracing cap-and-trade scheme activities, farmers must make certain adaptations which alter the cost structure and layout of the farming process. For instance, a farmer may have to buy seeds and seedlings at higher purchase prices. Such seeds or seedlings are more adaptable to weather changes, more resilient to pests and have higher productivity. These are accordingly additional factors that an entity that has adopted SALM activities in the agricultural sector must consider at each valuation date. The following section discusses methods for estimating the fair value of biological assets at each reporting date.

Figure 4.1: Illustration of biological assets valuation path and carbon capture potential



Source: Adapted from Deloitte (2004:12).

4.4.3.1 Fair value measurement

The various accounting standards require that biological assets should be valued at fair value less point-of-sale costs, on the presumption that an active market exists (IASB 2013a:A1132; IPSASB 2014:912). The world over, the financial markets are more developed than the commodity markets, and although some financial instruments are linked to commodity prices there is nevertheless a significant disconnect between the efficiency of financial instrument trading and the related commodities, for example agricultural product futures (FASB 2014:8). This has raised the question of whether we can employ the same fair valuation framework to both financial and non-financial assets, leading to different approaches by the leading standard setters, namely, the FASB and the IASB. Whereas the FASB (2014) preferred to isolate financial and non-financial assets when estimating fair value, the IASB (2013b) seeks to clarify that it would be possible to ascertain fair value for any type of asset within the same conceptual framework.

A fair value measurement of a non-financial asset takes into account a market participant's ability to generate economic benefits by using the asset in its highest and best use or by selling it to another market participant that would use the asset in its highest and best use as required by IFRS 13, *Fair Value Measurement* (IASB 2013a:A475). According to the IASB (2013a:A1132), if an active market exists for a biological asset or agricultural produce, then the quoted price in that market is the appropriate basis for determining the fair value of that asset. However, the IASB (2013a:A1133) gives some leeway by allowing the fair value of an asset to be estimated on the basis of an alternative market, sector benchmarks or expected future cash flows. Therefore, as depicted in figure 4.1, the determination of fair value is based on unadjusted quoted market prices (level 1), observable market variables (level 2) or non-observable inputs (level 3) (IASB 2013a). In order to enhance comparability, it is therefore essential that an entity place greater emphasis on the observable variable in determining the fair value.

4.4.3.1.1 Quoted market prices in an active market

According to the IASB (2013a:A492), an active market is a market in which transactions for the asset take place with sufficient frequency and volume, and price information is available to the public. An active market is therefore characterised by minimal product differentiation, high liquidity and a narrow ask bid spread. If an entity has access to different active markets, then it will make use of the most relevant of these active markets (IASB 2013a:A474).

However, owing to the nature of agricultural activity, where most processes take place within the farm, an organised market can only exist for mature, consumable biological assets or for harvested agricultural produce. As argued by Maina and Wingard (2013:69) even where an active commodities market exists, such a market would not capture the diversity of agricultural produce. Furthermore, the market may be seasonal with price variations influenced by qualitative aspects, for example, nutritional content subject to grading. Thus, even in the case of mature, consumable biological assets, an entity may need to model the prices based on that entity's own estimation, assumption and business model (Maina & Wingard 2013:70). Nevertheless, for harvested produce or biological assets classified as held-for-sale the fair value less cost to sell can readily be determined on the basis of the best bids received. In an attempt to simplify financial reporting for bearer crops, the IASB (2014) recommends that these be accounted for at cost net of accumulated depreciation and impairment losses.

4.4.3.1.2 Alternative markets and sector benchmarks

The IASB (2013a:A482) requires that if an active market does not exist, an entity should use an appropriate valuation technique. The valuation technique used should maximise the use of observable inputs and minimise the use of unobservable inputs (IASB 2013a:A483). This will represent a fair value estimate at level 2 as depicted in figure 4.1. The observable input may include:

- recent market transaction prices calibrated to reflect the current market conditions;
- market prices for similar assets with adjustments to reflect differences; and
- sector benchmarks such as the value of cattle expressed per kilogram of meat (IASB 2013a:A483).

The estimate obtained should be adjusted to reflect any differences between transactions and to ascertain fair value within a narrow range of reasonable estimates (IASB 2013:A483). As a result of the diversity of agricultural activities, homogeneity of products may be impossible to attain and, thus, the fairest value estimation will involve modelling the market prices of similar products.

4.4.3.1.3 Valuation techniques

Maina and Wingard (2013:71) argue that most biological assets and agricultural produce do not have organised exchanges, and therefore value has to be modelled from existing information. The IASB (2013a:A484) adds in this regard that an entity should use valuation techniques that are appropriate in the circumstances and for which sufficient data is available. In addition, the IASB (2013a:A487) emphasises that even where the valuation inputs are not observable, the measurement objective remains the same. Consequently, the unobservable inputs will reflect market views and should be adjusted to exclude any entity-specific views that are inconsistent with market participant expectations.

The IASB (2013a:A482) requires a valuation technique for measuring fair value that is consistent with either the market approach, the income approach or the cost approach. The main characteristics of these approaches are summarised below (IASB 2013:A497):

- The market approach uses prices and other relevant information generated by market transactions that involve identical or comparable assets.
- The income approach uses valuation techniques in order to convert future cash flows or income and expenses to the present amount.

- The cost approach (current replacement cost) is based on the amount that would currently be required to replace the service capacity of an asset (IASB 2013a:A497).

4.5 VALUATION MODEL FOR BIOLOGICAL ASSETS INVOLVED IN CAP-AND-TRADE SCHEMES

In circumstances where market-determined prices or values are not available for a biological asset in its condition at the measurement date, management should come up with a model to facilitate valuation. Commonly, this will involve estimating the value in use, which is the present value of expected net cash flows, from the asset discounted at a current market-determined pre-tax rate (IASB 2013a:A498). The cash flows used should reflect the expectations of market participants in respect to the asset in its most relevant market, considering the highest and best use of the asset (agricultural produce) (IASB 2013a:A476).

The present value or income approach is a valuation technique that enables management to estimate the fair value of a biological asset in its present location and condition. Although management must consider all the cash flows, the IASB specifically prohibits the following cash flows:

- borrowing costs or cash flows for financing the assets,
- taxation, or
- re-establishing biological assets after harvest.

It is important to highlight that there are various factors that must be considered when estimating the amount calculated as the present value of future cash flows of biological assets (Booth & Walker 2003; IASB 2013a:A498). These factors include:

- probable estimates of future biological asset yields;
- market factors such as prices and market stability,
- the useful life of the biological asset;

- the appropriate discount rate.
- variations in amount and timing of the cash flows; and
- other factors that market participants would consider, such as organic production and carbon certificates.

Booth and Walker (2003) note in this regard that all the factors that must be considered relate to the future and are therefore uncertain, and any valuation estimate is sensitive to each of the factors. According to the IASB (2013a:A500), this necessitates risk adjustment by including a premium in the estimated value of the biological asset. In an example of vineyard planting, Booth and Walker (2003) noted that at a discount rate of 6%, useful lives of 30 years and 60 years will give a difference of approximately 10% in present value. The difference in present value will be higher if the discount rate is also varied and even more uncertain if the range of probable crop yields and market factors are taken into account.

Booth and Walker (2003) conclude that the resultant present value estimates can have a variance of $\pm 50\%$, and are therefore extremely sensitive to the choice of assumptions. Although Booth and Walker (2003) raised the question of whether variations of this order could ever be described as "reliable" measures of the value of a vineyard or winemaking business, the estimated values remain very relevant to any decision-making.

Consequently, the preparer of financial statements must make some estimates and include them in the financial statements. The future cash flows can be projected by multiplying expected productivity output, net of post-harvest losses, in a particular period ($O_n - PHL_n$) by the expected market prices in that period (P_n). This can be presented as a simple equation as follows;

$$\text{Cash flows (CF}_n\text{)} = \text{Net output (O}_n\text{- PHL}_n\text{)} * \text{Net market price (P}_n\text{)}$$

The IASB (2013a:A498) demands that present value must capture any factor that market participants would take into account in the prevailing circumstances. Consequently, the

above variables are volatile and are influenced by various factors emanating from the adoption of SALM practices:

- improved output owing to increased productivity;
- reduced post-harvest losses;
- the premium prices fetched by organic agricultural produce in the market and the lower cost to sell owing to the acceptability of the organic products;
- green loans offered by banks at lower interest rates; and
- production and marketing of VCUs by farmers.

The above factors significantly modify the cash flow discounting model depicted above. The following section will evaluate the impact of each of these factors on the valuation model.

4.5.1 Increased productivity

According to the World Bank (2014), SALM methodologies have proven to be very successful in increasing yields as a result of improved cultivation techniques. Although the methodology spells out the way carbon sequestrations in soils are measured, it also engages farmers in measuring the impact of their agricultural practices on crop yields (Verified Carbon Standard 2014:8). The increase in productivity is denoted as a change in output(ΔO). Thus, the above equation can be modified as follows;

$$CF_n = (O_n - PHL_n + \Delta O_n) * P_n$$

Where:

CF_n = projected cash flows

O_n = expected productivity output

ΔO_n = change in productivity due to adoption of SALM

PHL_n = post-harvest losses, in a particular period ($O_n - PHL_n$)

P_n = market prices in that period

N = the accounting period

4.5.2 Post-harvest losses

According to Grolleaud (2014), post-harvest losses are the reduction of harvested produce affecting either quantity or quality, and occur between the point of harvesting and the point at which the agricultural produce is used. Post-harvest losses focus on the leakages in the entire value chain from the on-farm losses, such as when grain is threshed, winnowed and dried, to losses during transportation, storage and processing. Although post-harvest losses are attributed to storage pests and poor handling, the quality and resilience of the harvested produce can make a significant difference, as is the case for an entity that has adopted SALM.

According to the African Post-Harvest Losses Information System (APHLIS 2015), the post-harvest losses of agricultural produce have been estimated at an average of 30% of all harvested produce. The APHLIS (2015) explains that traditional measures that mitigate post-harvest losses, which include timely harvesting and use of pesticides, have not been very effective. However, it is important to highlight that, agricultural produce under SALM comes with the added advantage of reduced post-harvest losses as the harvested produce is more resilient. The decrease in post-harvest losses can be denoted as ΔPHL_n . This will alter the above model as follows:

$$\text{CF}_n = (\text{O}_n - \text{PHL}_n + \Delta\text{O}_n + \Delta\text{PHL}_n) * \text{P}_n$$

Where:

CF_n = projected cash flows

O_n = expected productivity output

ΔO_n = change in productivity due to adoption of SALM

PHL_n = post-harvest losses in a particular period ($\text{O}_n - \text{PHL}_n$)

ΔPHL_n = change in post-harvest losses

P_n = market prices in that period

N = the accounting period

4.5.3 Improved market prices of agricultural produce

The IASB (2013a:A1132) requires that agricultural produce should be measured at fair value less estimated cost to sell at the point of harvest. According to the IASB (2013a:A1132), the harvested produce as a marketable commodity does not have measurement uncertainties and is therefore not subject to fair value measurement exception. It is also important to mention that, consumers readily accept organically farmed agricultural produce at a premium price, which in turn leads to lower cost to sell.

The fair value is the market price (P_n), which for organic produce is at a premium ($P_n + \Delta P_n$). The valuation of agricultural produce is at market price less cost to sell ($P_n - SC_n$), and in the case of agricultural produce the cost to sell is lower ($P_n + \Delta P_n$) - ($SC_n - \Delta SC_n$). The above model can therefore be modified as follows:

$$CF_n = (O_n - PHL_n + \Delta O_n + \Delta PHL_n) * (P_n + \Delta P_n) - (SC_n - \Delta SC_n)$$

Where:

CF_n = projected cash flows

O_n = expected productivity output

ΔO_n = change in productivity due to adoption of SALM

PHL_n = post-harvest losses in a particular period ($O_n - PHL_n$)

ΔPHL_n = change in post-harvest losses

P_n = market prices in that period

ΔP_n = market price premium

ΔSC_n = reduction in cost to sell

SC_n = cost to sell

N = the accounting period

4.5.4 Borrowing costs and green loans

The IASB (2013a:A804) refers to borrowing costs as the interest and other costs that an entity incurs in connection with the borrowing of funds, as ascertained at the effective rate of interest. Additionally, the IASB (2013a:A805) requires that an entity should capitalise borrowing costs that are directly attributable to the acquisition, construction or production of a qualifying asset as part of the cost of that asset. A qualifying asset is an asset that necessarily takes a substantial period of time before it is ready for its intended use or sale.

Although some biological assets require a considerable period of time to mature, the IASB (2013a:A1133) prohibits the capitalisation of borrowing cost relating to biological assets, such borrowing costs influence the cost of capital. For instance, Kakuzi (2014:21) determines the fair value of avocados and mature macadamia based on the net present values of expected future cash flows, discounted at current market-determined pre-tax interest rates. Kakuzi (2014:21) explains that the discount rate used reflects the cost of capital, an assessment of country risk and the risk associated with avocados.

It is important to highlight that entities involved in smart agricultural practices are eligible for green loans, which are offered at lower interest rates. These are credit products offered by banks that want to off-set their carbon emissions and reduce their carbon footprint. The IASB (2013a:A487) recommends that an entity has to determine the “rate” applicable by the market participant as the discount rate. The banks in this case are the key players in the credit market, and therefore the offer rate for green loans will not only influence the cost of capital but also the rate (r_n) used to discount future cash flows. Thus the rate applicable to the entities practising SALM will be $(r_n - \Delta r_n)$. In order to determine the value of biological assets (V_n), the future cash flows are then discounted to present value using market-related interest rates (r_n). This can be depicted as follows:

$$V_n = \sum_{k=0}^n CF_n / (1 + rn)^{-n}$$

Assuming that the biological asset cycle is not affected by the adoption of SALM practices, this model will be modified as follows:

$$V_n = \sum_{i=0}^n \frac{\{(O_n - PHL_n + \Delta O_n + \Delta PHL_n) * (P_n + \Delta P_n) - (SC_n - \Delta SC_n)\}}{1 + (r_n - \Delta r_n)^{-n}}$$

Where:

V_n = value of biological assets

O_n = expected productivity output

ΔO_n = change in productivity due to adoption of SALM

PHL_n = post-harvest losses in a particular period ($O_n - PHL_n$)

ΔPHL_n = change in post-harvest losses

P_n = market prices in that period

ΔP_n = market price premium

ΔSC_n = reduction in cost to sell

SC_n = cost to sell

R_n = the normal discount rate

ΔR_n = the discount rate related to green loans

N = the accounting period

4.5.5 Carbon capture potential

SALM practices use the activity baseline and monitoring survey (ABMS) approach (VCS 2014:5). Under the ABMS methodology, the direct measurement of soil carbon pools is not required, as the methodology uses land management practices as a proxy for carbon stock changes. The agricultural activities in use at the beginning of a project are assessed in order to determine the baseline, and the adoption of SALM practices is subsequently monitored (VCS 2014:6). As discussed in chapter 3, carbon capture and sequestration depend on the project area and project activities adopted, and a coefficient developed based on the Roth-C model (VCS 2014:15).

It is important to highlight the fact that verification and certification under the project are done at an interval of three to five years (World Bank 2014). Therefore, the activities embraced accumulate value over a period of time spanning up to five years. The value is directly proportional to the activities embraced, the area under such activities and the cost incurred (VCS 2014:15). It is also important to recognise that the value can be directly or indirectly attributed to certain non-current assets that give rise to future carbon-related revenues. Accordingly, the CO₂ sequestration or emissions capability of such an asset must be assessed and possibly included in the valuation of that asset when estimating the fair value. This is because carbon capture potential is an important factor that the market would consider when pricing such an asset (IASB 2013a:A804).

Ratnatunga *et al.* (2011:11) argue that in a carbon emissions management environment, if an organisation records the value of tangible assets, it should record the value of the related intangible assets as well. Under such considerations Ratnatunga *et al.* (2011:4) developed what they called the environmental carbon enhancing asset (ECEA), which is explained as those intangible assets of the organisation capable of producing carbon credits. The key issue in the valuation model is the values assigned to the model's coefficients, reflecting the capability of ECEAs to emit or sequester CO₂ in the future. According to Ratnatunga *et al.* (2011), the relationship of the carbon emission and sequestration (CES) accounting measures to the ECEA value can be estimated using the following equation (Ratnatunga *et al.* 2011):

$$\frac{\Delta S}{\Delta t} = r \cdot E \left(\frac{M - S}{M} \right) - dS$$

Where

- S current value of ECEA
- ΔS change in economic value
- E the costs incurred to support the ECEA
- M the maximum value of the ECEA sequestration capability

t	time
Δt	change in time
r	increase in carbon sequestration potential generated by increase in cost
d	decay or leakage in the model

Under the Roth C model, the baseline emissions and removals of carbon are estimated using the following steps (VCS 2014:23):

- Identify and delineate the project boundary;
- Identify the baseline scenario and demonstrate additionality;
- Estimate the annual emissions from the use of synthetic fertilisers;
- Estimate the annual emissions from the use of N-fixing species;
- Estimate the annual emissions from the burning of agricultural residues;
- Estimate the annual removals from existing woody perennials;
- Estimate the annual emissions from the use of fossil fuels for agricultural management;
- Estimate the equilibrium soil organic carbon in the baseline assuming no changes in agricultural management or agricultural inputs;
- Convert the equilibrium soil organic carbon in the project to transient soil organic carbon assuming a linear transition period;
- Estimate the annual emissions and removals from soil organic carbon; and
- Estimate leakage from the increase in the use of non-renewable biomass that occurs from the displacement of biomass used for energy to agricultural inputs (VCS 2014:23).

What is very clear is that the Roth C model of estimating carbon stock, as applied by Verified Carbon Standards (2014:12), is consistent with the methodology suggested by Ratnatunga, *et al.* (2011:4). Consequently, this study will adopt the ECEA model; however, in view of Ratnatunga *et al.*'s (2011) argument, that the value be identified as separate intangible

assets, this study proposes that intangible assets are not identifiable and therefore should be included in the value of the assets involved. This will modify the present value model for the valuation of biological assets by adding another component, namely, carbon capture potential.

$$V_n = \sum_{i=0}^n \frac{\{(O_n - PHL_n + \Delta O_n + \Delta PHL_n) * (P_n + \Delta P_n) - (SC_n - \Delta SC_n)\}}{1 + (r_n - \Delta r_n)^{-n}} + r \cdot E((M - S)/M) - dS$$

The value of a biological asset is therefore the present value of the sum of all streams of cash flows that it can help to generate minus the value of all the other identifiable assets. The value estimated above does not include adjustment for market risk such as interest rate and price risk.

4.6 MARKET ILLIQUIDITY

The model proposed in section 4.5.5 is only varied under perfect market conditions (Scott 2012:35). Ackerman and Beyers (2008) argues that the markets for most classes of non-monetary assets are illiquid, and the asset cannot always be traded immediately. Although the existence of an efficient carbon trading market would be able to put a 'fair' price on VCU's, the recent decline in carbon market prices casts doubt on its efficacy. Similarly, for most agricultural commodities, production is seasonal and volatile, and the underlying commodity may be perishable (Ackerman & Beyers 2008). Although the IASB (2013:805) requires an entity valuation model to maximise the use of market observable inputs, the above factors make the market's variables susceptible to manipulation and pricing distortions.

As argued by Ackerman and Beyers (2008) market liquidity introduces an additional dimension into asset pricing that extends beyond the simple present value of an asset's cash flows. A study by Serafeim (2010:63) revealed that portfolios of level 3 financial assets have higher implied betas relative to those designated as level 1 or level 2 assets. Consequently, the valuation techniques must be adjusted to reflect the sensitivity of estimates to changes in

key market observable input variables. Additionally, Serafeim (2010:63) argues that the transition of fair value from level 1 to level 2, and to level 3, indicates progressively more illiquid and opaque valuation estimates.

Consequently, it would be important to introduce a beta factor into the valuation model. Furthermore, owing to the fact that the carbon markets are not fully developed and prices of carbon offsets are very volatile, this study further proposes a stochastic volatility model (Todorov 2005) with a jump component to be incorporated in the valuation model. According to Todorov (2005) stochastic volatility models are in general characterised by the use of two driving correlated Brownian motions, one which determines the increments to the underlying process and the other the increments to the volatility process.

4.7 INFLUENCE OF PREPARERS OF FINANCIAL STATEMENTS

As highlighted in section 4.2, the accounting measurements and estimates may still have inherent bias arising from the discretion of the preparers. Barth *et al.* (2007:2) indicate that accounting amounts result from the interaction of features of the financial reporting system, which include accounting standards, and their interpretations, enforcement and litigation, and this obviously leads to obtaining different results when applying the same standards. Although an entity may establish accounting and reporting controls that include goal-congruent incentive schemes, a major challenge remains how to minimise opportunistic behaviour of managers that is in conflict with the interest of various stakeholders (Scott 2012:352).

The objective of the accounting standards is to constantly improve the quality of the financial statements in order to reflect the true and fair views (Deloitte 2009). However, providing guidelines and high quality standards is not an end in itself. Ball *et al.* (2003) by extension argue that high quality standards like the IFRSs may also lead to low quality accounting information depending on the incentives of the preparers. Poor preparer incentives, as well as underlying economic and political factors also influence the preparer's motives and

intentions when preparing financial statements. Other factors that also have an impact on financial reporting practices include the effective enforcement of standards and a strong corporate governance environment.

Developing an internationally acceptable set of high quality financial reporting standards means allowing accounting alternatives and accounting measurements that better reflect economic position and performance. Ackerman and Beyers (2008) argue that limiting alternatives can increase accounting quality because it limits the preparers' opportunistic discretion in determining accounting amounts. Therefore, accounting amounts that reflect an entity's underlying economic realities can increase accounting quality because investors will have access to better information for their decision-making.

4.8 SUMMARY AND CONCLUSION

The subsequent measurement decision is equally important for adjusting the values recognised initially to the best estimates of information available at the reporting date. This is because conclusions reached regarding measurement on initial recognition are tentative, and must be reassessed when their potential implications for re-measurement are considered. The subsequent measurement decision must be based on existing framework concepts such as the objective of financial reporting and the qualitative characteristics of useful financial information guided by management's interpretation of what will reflect a true and fair view.

In relation to the agricultural sector, it would seem that most of the value-creating processes take place within the entity. Consequently, the preparer of financial statements is limited in choice amongst the alternative measurement bases. As a result of the biological transformation process, fair value measurement estimation at level 3 is more consistent with existing concepts than either modified or unmodified historical cost. Because the farming business aggregates various units of accounts in the entire value chain, the residual valuation method would seem very appropriate. This would involve estimating the cash

flows of the entire operation and then attributing the value to each of the individual components, starting with the most measurable units such as property, plant and equipment, intangible assets and inventories. It is at the point of estimating the farm-wide fair value that we consider the implications of cap-and-trade schemes.

In addition to market forces, it was noted that the implementation of fair value reporting at level 3 has the potential to reflect the preparer's perspective on financial performance and financial position. Although it may be impractical to regulate the financial reporting processes, access to high quality accounting standards and guidelines can facilitate an improvement in financial reporting quality in voluntary market systems. The next chapter focuses on the disclosure of cap-and-trade activities in the financial report.

Chapter 5

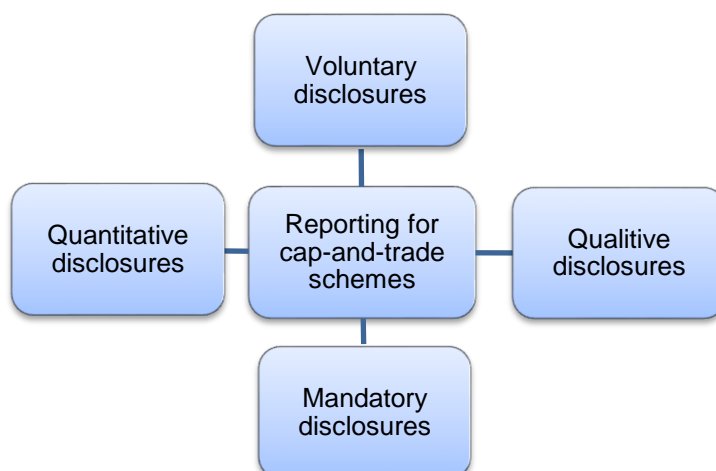
Reporting for cap-and-trade schemes

5.1 INTRODUCTION

In chapter 4, the study focused on the measurement of accounting issues relating to sustainable agricultural land management (SALM) after initial recognition. This chapter will thus focus on the presentation and disclosure of information about an entity's SALM activities in the financial statements. More specifically, the chapter will focus on the different views on the presentation of information about SALM activities in the financial statements, both in the notes and in the other disclosures annexed to the financial statements.

The first part will focus on the general trends in sustainability reporting, and then reflect specifically on mandatory and voluntary disclosures of either qualitative or quantitative information. Subsequently, the chapter will consider the possibility of including carbon activities in the entity's integrated report and sustainability reporting index. The chapter will conclude by evaluating the various challenges in reporting for cap-and-trade schemes in the agricultural sector.

Figure 5.1: Conceptual presentation of reporting for cap-and-trade schemes



Source: Author (2016)

5.2 TRENDS IN REPORTING FOR CAP-AND-TRADE ACTIVITIES

According to Daizy, Mitali and Niladri (2013:8), every entity engages in some strategic sustainability activities in an attempt to maintain a balance between economic growth, environmental protection and social equity. The sustainability activities embraced by an entity bring a complex dimension to the process of preparing financial statements. This complexity emanates from the diverse range of issues that an entity can focus on, including environmental degradation, the depletion of scarce resources and the emission of greenhouse gases (GHGs) (Balatbat & Wang 2010:1). Equally, there are different ways of reporting and articulating the influence of the sustainability activities in the annual financial reports (Stewart 2015:507). Accordingly, the concept of environmental reporting, which has been described in various terms such as the greening of accountancy and sustainability reporting, has garnered a lot of attention (Clarkson, Hanna, Richardson & Thompson 2011).

According to Barry (2012:32), corporate sustainability reporting was once focused on, as a compliance or reputational issue, but has gradually become a strategic issue which is focused on as a source of information for decision-making both internally and externally. The critical focus in sustainability disclosures is the information that is not presented in the financial statements. Equally important are the non-financial factors and resources that can influence the information presented in the financial statements (Stewart 2015:508).

In view of the fact that entities of different sizes and industry sectors produce an annual sustainability report, there are wide array of ratings and standards that can be used (Clarkson *et al.* 2011). Consequently, the preparers of financial statements exercise discretion in determining what to disclose and how to disclose sustainability information. The overall guideline on disclosing information in the financial statements is whether the disclosure will be useful for making informed decisions (IASB 2013a:A33). The attributes of useful information are outlined by the IASB (2013a:A34) as relevance, faithful presentation, comparability, verifiability, timeliness and understandability.

As discussed in chapter 2, an entity's responsibility to preserve the scarce resources and conserve the environment for future generations extends up to the financial reporting level (Barry 2012:33). Therefore, sustainability reporting should not only be done to meet statutory obligations and inform stakeholders, but should also articulate an entity's commitment to its own survival (Barry 2012:33). There are a variety of reasons why entities opt to produce these reports, but at their core they are intended to enhance transparency and accountability. In fact, according to Bahmani (2014:110) it can be argued that the informative role of disclosure is to reduce the information asymmetry that exists between an entity's management and other stakeholders. Additionally, the enhanced transparency enhances investor confidence, which in turn improves an entity's prospects in raising capital at lower cost (Barry 2012:33). Equally important is the fact that accounting information facilitates contracting and thus leads to efficient transactions and markets (Arvidsson 2011:278).

Proper reporting and disclosures will also improve an entity's sustainability performance evaluation based on how they have a positive impact on society, the economy, and a sustainable future (Ratnatunga & Jones 2012). The agricultural sector has the potential to reduce carbon emissions at low cost, making the sector very attractive for offset projects. Consequently, sustainable agricultural practices are emerging as a critical policy focus across the world owing to their potential impact on climate change and food security.

The synergies between the economic and sustainability objectives of an entity not only require high quality financial reporting but also emphasise communication and a multi-stakeholder approach in the process of synthesising and reporting carbon activities (Bahmani 2014:111). In addition, the financial reports must provide the link between an entity's strategy, governance and financial performance and the social, environmental and economic context within which the entity operates. This is consistent with Stewart's (2015:510) finding which established that the users of financial statements continue to demand more detailed disclosure information about the sustainability activities undertaken

by the entity. This begs the question as to how the financial report can be used as one channel of communication to serve the interests of all stakeholders.

The fact that there is no authoritative guidance on reporting for cap-and-trade schemes has resulted in numerous methods of communicating information about an entity's carbon activities in the financial statements. Research by Freedman and Jaggi (2011:46) found that entities in countries that had ratified the Kyoto Protocol had higher reporting indices for cap-and-trade schemes. Similarly, as would be expected, Kundu (2006) established that entities with more resources or a larger asset base tend to disclose more detailed information about carbon emissions.

As more and more entities continue to focus on environmental care and carbon emissions management strategies, more varied views on the reporting of such activities continue to emerge. For instance, Bebbington and Larrinaga (2008) emphasise the benefits of remaining within a non-financial reporting framework with regard to carbon activities. The Global Reporting Initiative (GRI 2000) focuses on integrated reporting within a certain framework for both quantitative and qualitative disclosures. Although sustainability reporting remains largely unregulated, the question is how such reporting can be used to communicate information to stakeholders so as to improve transparency and accountability.

5.3 MANDATORY DISCLOSURES

According to Leuz and Wysocki (2008:5), mandatory disclosure refers to the presentation of the minimum amount of information required by regulations, securities exchanges and the accounting standards that is enforceable on applicable entities. It can generally be argued that more rigorous enforcement of disclosure practices can lead to better accounting quality (Clarkson *et al.* 2011). There are advantages to standardising financial reporting disclosures, and standardisation can be achieved more cheaply and effectively when it is done on a mandatory rather than a voluntary basis (Stewart 2015:509).

The trend in financial reporting regulation is to minimise discretion and judgement on the part of the preparer of financial statements, a system that can be argued to be a spontaneous response to market failures in financial reporting disclosures (Clarkson *et al.* 2011; Cotter & Najah 2013:89). There are often multiple authorities able to impose non-financial disclosure requirements in reporting to stakeholders, and the requirements are uncoordinated (Cotter & Najah 2013:89).

It should be noted that there is a need for realism in terms of how much can be achieved by regulating financial reporting disclosures. This is because financial reporting quality depends not only on the regulatory framework but also on firm reporting incentives (Leuz & Wysocki 2008:11). Not all companies will fully comply with mandatory disclosure requirements as a result of weak institutional features, ineffective enforcement mechanisms and, in some cases, the shortage of professional competence (Arvidsson 2011:278).

In the absence of regulation, voluntary disclosures are frequently correlated with the preparer of financial statements' incentives to reduce information asymmetry, thus lowering the firm's cost of equity capital (Cotter & Najah 2013:92). Under an imperfect accounting regulation environment, reporting incentives become an important factor in determining management disclosure decisions as they are a signal to the market that the reporting entity is socially responsible. Hence, the preparer of financial statements must internalise the environmental and social costs that arise from failure to properly account for adaptation activities in the financial statements, thereby addressing the market failure problem (Cotter & Najah 2013:89).

According to the Institute of Chartered Accountants in England and Wales (ICAEW 2013), there is a need to change the attitudes of those who contribute to the financial reporting process, otherwise the focus will remain on compliance disclosures instead of disclosures to give a true and fair view. The change of attitude of the preparer can help to mitigate compliance costs and enhance the quality of non-financial and discretionary disclosures.

The mandatory disclosures are comprised mainly of the accounting policies as prescribed by the financial reporting standards or industry-specific disclosures.

5.3.1 Disclosures of accounting policies

Although there are no specific reporting standards for cap-and-trade schemes, it will still be mandatory for an entity to disclose the accounting policies applied to such transactions or events. As discussed in chapters 3 and 4, the consequence of there being various accounting treatments for adaptation activities and the related costs is that the effect on the different components of financial reports will differ depending on which treatment is adopted. As argued by Stewart (2015:508), although the users of financial reports would prefer accounting for adaptation activities to be comparable across the sector, in practice this may not happen.

A company's choice of accounting policy obviously affects its financial performance and financial position. An entity will therefore need to explain its accounting policy to the users of its financial statements to ensure that the impact of the entity's cap-and-trade activities on financial performance and financial position is understood (Clarkson *et al.* 2011). Equally, the preparer must explain the consideration and assumption on the basis of which the accounting policy were selected, because it is essential that such differences and the reasons for these are intelligible to investors and other stakeholders alike (Cotter & Najah 2013:95).

5.3.2 Industry-specific disclosures

According to Lynch, Lynch and Casten (2014:24), financial information reported by entities in the same industry sector tends to be more comparable than financial information reported by industries in different sectors. Suttipun and Stanton (2012:100) posit that owing to the unique features, entities from a particular industry sector may adopt disclosure practices additional to those mandatory for entities from all industries and the agricultural sector is no exception.

Entities in the agricultural sector may make additional disclosures which are motivated mainly by the intention to demonstrate commitment to safeguard the environment. Furthermore, the project sponsor or verified carbon units (VCUs) buyers may impose disclosure requirements or standards that entities in the agricultural sector have to comply with. For instance, participants in the Kenya Agricultural Carbon Project (KACP), sponsored by the World Bank carbon fund, are required to disclose the activities undertaken and the relationship of those activities with the agricultural produce (World Bank 2014).

5.4 VOLUNTARY DISCLOSURES

Voluntary disclosures are made at the discretion of management and are therefore based on certain motivating factors. Arvidsson (2011:278) explains that voluntary disclosure decisions are made by the preparers of financial statements after they are aware of the content of the information. Cotter and Najah (2013:89) contend that unconstrained accounting choices can lead to the preparers of financial statements having incentives to convey self-serving information. For instance, managers may be motivated by capital market responses or economic incentives (Cotter & Najah 2013:89).

Another factor that influences managers' discretion on whether to make a voluntary disclosure is the profitability of the firm (Cotter & Najah 2013:89). The preparer of financial statements in a profitable entity is more likely to disclose information to support self-interest such as favourable compensation schemes, by making more detailed voluntary environmental disclosures (Freedman & Jaggi 2005). Conversely, a company that is less profitable may disclose less information in an attempt to cover up the reasons for declining profits.

According to Balatbat and Wang (2010:7), there are 15 identifiable approaches to accounting for carbon allowances and permits. These methods can be reduced to six main approaches if the differences in classification are ignored. As demonstrated in the PricewaterhouseCoopers – IETA (2007:14) survey, lack of regulation or guidance on

sustainability reporting affects the comparability of financial statements. According to Leuz and Wysocki (2008:11) many efforts to regulate financial reporting are skewed toward financial disclosures, but the problems of disclosure in non-financial or narrative reporting are rarely addressed. Consequently, voluntary disclosures are mainly focused on from a non-financial narrative disclosure perspective.

The argument against voluntary disclosure is that the preparer of financial statements is selective when deciding what to disclose and how to disclose, and in some circumstances there may be a reluctance to provide such voluntary disclosures. Even if the preparer of financial statements voluntarily provides disclosures on the entity's private information, stakeholders may still be uncertain about managers' reporting objectives. The interpretation of managers' intentions may vary significantly when different groups of users exist (Arvidsson 2011:283). Preparers may also be uncertain about investor response to such disclosures, which will reduce entity's incentives to disclose private information.

According to Scott (2012:25), the information approach to decision-usefulness assumes that a rational user of financial statements is sufficiently sophisticated and can decipher the implication of information from any source. Therefore, the form of disclosure does not matter, and can be quantitative or qualitative narrative or both (Clarkson *et al.* 2011). The current diverse practices of accounting for carbon emissions adaptation activities are likely to impose significant costs on financial statements users as they try to compare the financial reports of different entities (Arvidsson 2011:286).

5.5 QUANTITATIVE DISCLOSURES

The measurement approach to decision-usefulness requires the preparer of financial statements to take responsibility for the proper recognition, measurement and disclosure of all elements of financial statements (Scott 2012:184). Quantitative disclosure entails the use of monetary amounts to show the factual situation of a transaction or an account balance in

an objective way. Most quantitative disclosures are extracted from the accounting records and thus require little professional judgement.

However, there are situations that require assumptions that form the basis of accounting estimates. The assumptions can arguably be influenced by personal preferences, inclination, motivation or opinions. Although, the Kyoto Protocol provides a legal framework that addresses global climate change by placing quantifiable obligations on participants to decrease their level of GHGs emissions (UNFCCC 2008:13), it does not extend to the accounting treatment of the related activities (Balatbat & Wang 2010:4). Furthermore, the practices under the Kenya Agricultural Project are activity based and no actual measurement takes place (VCS 2014:12). Consequently, the quantitative measures arrived at can be uncertain if the underlying assumption materially differs from the actual reality.

The IASB (2013a:A521) outlines the general minimum disclosures in a complete set of financial statements, without altering the measurement criteria. Accordingly, the IASB (2013:A40) requires the amount determined to be presented in the financial statements either as assets, liabilities, income, expenses or other comprehensive income so as to provide useful information to decision-makers. The measurement criteria were discussed in chapters 3 and 4.

According to Stewart (2015:507), the common practice of disclosing cap-and-trade schemes is by presenting either the gross element or offsetting or using a linked approach. The gross presentation approach means the assets, liabilities, incomes and expenses would be presented separately in the financial statements (PWC – IETA 2007:11). The offsetting or net presentation approach is where emission liabilities are recognised only when it is certain that the verified emissions exceed the number of emission permits on hand (Ratnatunga & Jones 2012). A linked presentation means the assets and liabilities are presented gross, but the amounts are presented together so as to reflect the net emission asset or net emission liability (Ratnatunga & Jones 2012). In addition, there is a common non-financial disclosure

practice where entities disclose their carbon footprint either in the financial report or in a separate sustainability or environmental report. The carbon footprint is computed as follows:

Operational carbon emission (metric tonnes)	xxx
Carbon sequestered (additionality)	(xxx)
Carbon footprint	xxx

In this context it is important to mention that the agricultural sector has the potential to sequester more carbon than it emits, thus making it a target for off-set.

5.6 QUALITATIVE DISCLOSURES

Worldwide, regulators view narrative disclosures as the key to achieving the desired understandability of financial statements (Clarkson *et al.* 2011). The making of non-financial disclosures can be very subjective, calling on an accountant to use their experience and judgement to provide the appropriate useful information (Arvidsson 2011:278). In an attempt to provide guidelines on qualitative disclosures in the financial statements, the IASB (2010) issued a statement of practice for management discussions and analysis.

5.6.1 Management discussions and analysis

According to Scott (2012:130), management discussion and analysis is a narrative explanation, seen through the eyes of management, of company performance, financial position, risk exposures and future prospects. Cohen, Gaynor, Webb and Montague (2008:7) explain that management discussion and analysis is one of the most important and most frequently used components of an entity's financial reports. Users of financial reports use the type of information provided in the management commentary as a tool for evaluating the success of management's strategies for achieving its stated objectives.

Although the statement of practice issued by the IASB (2010:8) focuses on a more harmonised approach to management commentary and disclosures, the exact wording depends on the nature of an entity's operation and the information the management wishes

to disclose. Scott (2012:25) argues that the preparers of financial statements could level the playing field through full disclosures of useful and cost-effective information to users in order to deal with the problem of adverse selection. Additionally, there should be a clear barometer to measure precisely and sensitively the financial performance as it indicates the manager effort in order to tackle the issue of moral hazards (Scott 2012:26).

According to Suttipun and Stanton (2012:99), some entities in the agricultural sector include cap-and-trade disclosures in the annual reports under the topic of corporate governance, corporate social responsibility or environmental reports. The most common themes of such disclosures are environmental policy, carbon emission adaptation activities and soil fertility management (Cohen *et al.* 2008:8).

5.7 INTEGRATED REPORTING

Integrated financial reports contain information on an entity's economic (financial performance, financial position and cash flows), environmental (energy, water usage and carbon emissions), social (e.g. labour practices, employee turnover and workforce diversity) and governance (e.g. independence of the board and approach to risk management) performance. Eccles and Daniela (2011:58) note that the impetus behind integrated reporting is transparency and one-channel communication of an entity's financial and non-financial performance.

The IASB (2010:10) argues that integrating sustainability into long-term strategic decision-making and reporting can enhance stakeholders' interest, but how reporting should be done is still an issue under development. Eccles and Daniela (2011:58) suggest highlighting the environmental risks and opportunities within the existing business model in the annual financial report. On the other hand, the GRI (2013:16) argues that the content and context of integrated reports can be guided by certain principles as follows:

- strategic focus and future orientation;

- connectivity of information;
- stakeholder relationships;
- materiality;
- conciseness;
- reliability and completeness; and
- consistency and comparability (GRI 2013:16).

According to the International Integrated Reporting Council (IIRC 2013:17), both qualitative and quantitative information are necessary for an integrated report to properly represent the organisation's ability to create value, as each provides context for the other. An integrated report should also provide insight into the nature and quality of the organisation's relationships with its key stakeholders, including how and to what extent the organisation understands, takes into account and responds to the stakeholders' legitimate needs and interests (Arvidsson 2011:278; IASB 2010:15).

5.7.1 Sustainability reporting index

If the sustainability report can be compacted to a single metric, the resulting index can enable users of financial reports to quickly gauge the performance of an entity and ensures easy comparison between different entities. Eccles and Daniela (2011:59) concurs that integrating sustainability into an analysis and valuation index can help to ensure that capital flows in the direction of more sustainable entities. It is obvious that the business reporting model needs to expand to serve the changing information needs of the market and provide the information required for enhanced corporate transparency and accountability (Ratnatunga & Jones 2012).

The Sustainability Accounting Standards Board (SASB 2013:5) suggests a sustainability accounting approach in defining metrics or indicators in both qualitative and quantitative dimensions. The objective of such an approach is to ensure that reasonable investors have

access to information that is useful in their decision-making process. The SASB (2013) identifies the following areas:

- attention to management of critical capitals;
- vulnerability to the depletion or misuse of these capitals;
- scenario-planning regarding alternative resources;
- the risks associated with the mismanagement of certain environmental or social issues; and
- the opportunities associated with global or industry sustainability challenges (SASB 2013).

There is a need to identify the key performance indicators and to form a string of indices for certain related disclosures. According to the SASB (2013:4), the index approach to accounting for sustainability performance can give the user of financial statements better access to the full information at a glance. This ensures that the users can better evaluate an entity's externalities and adequately consider other forms of capital and their effect on financial valuation. Further improvement suggested by Arvidsson (2011:280) includes economic indicators in sustainability performance and the identification of the opportunities and risks related to sustainability, linking them to other relevant sections.

One example of carbon indices in the provision of operational carbon product performances or footprints is a certification programme by the Carbon Trust (2015), which enables an entity to compare its product performance with others. Another example is a metric by the United Nations Conference on Trade and Development (UNCTAD 2004:62), which focuses on the use of an eco-efficient indicator, the ratio between an environmental and a financial variable, as a comparable measure of an entity's environmental performance relative to its size and activities. A sustainability index, if computed on the same framework, can help to provide a basis for comparability. Eccles and Daniela (2011:59) concur that the lack of

reporting guidelines on how the indices should be computed hinders the comparability of the sustainability report.

5.8 KEY CHALLENGES IN ACCOUNTING FOR CAP-AND-TRADE SCHEMES

Entities interested in implementing integrated reporting face a number of challenges, beginning with the fact that the frameworks (GRI 2013:27; IIRC 2013) specifying what goes into an integrated report are not industry specific in terms of how to measure and report on non-financial information (Ratnatunga & Jones 2012). Another challenge includes determining whether an active market exists and, if so, whether the quoted prices in such a market provide a reasonable basis for the valuation of VCU's (Ratnatunga & Jones 2012).

According to ICAEW (2013), there has been growing concern in recent years both at the problem of disclosure overload in financial reporting and the fact that in spite of the growing volume of disclosures, users still do not get all the information they need. Additionally, the ICAEW (2013) argues that there are several fundamental problems of financial reporting disclosure that no market or regulatory solutions can entirely remove, namely, subjectivity, self-reporting bias, potential self-inflicted damage, framing effects and boiler plate disclosures.

5.8.1 Subjectivity

A critical concern for the users of financial statements and regulators alike is whether the preparer of financial statements can provide an objective report of their views of the business financial position and performance (Cohen *et al.* 2008:7). In reality, only a few entities have internal control and measurement systems for non-financial information that are of the same quality and rigour as for financial information. Consequently, gathering all the non-financial information that can facilitate the issue of an integrated report is a formidable challenge in most entities.

The lack of an industry-specific framework and standards for non-financial information makes it difficult to compare the performance of different entities practising integrated reporting (GRI 2013:27; IIRC 2013). The challenge emanates from the fact that it will likely be adopted across industries and countries to varying degrees (Cotter & Najah 2013:97). Since relevance and materiality are subjective judgements, there will always be instances when users will question the preparers' choice of what is relevant and material to disclose. The GRI (2013:3) nevertheless acknowledges that an entity may monitor and manage a far wider array of sustainability issues than those covered under the G4 sustainability reporting guidelines. Consequently, the guidelines can only be useful in a generic context and they may not be entirely appropriate to particular entities' circumstances, leaving the preparers of financial statements to make judgements on what is relevant, material and reliable.

5.8.2 Self-reporting bias

According to Scott (2012:187), financial statements are the products of management, who are reporting on their own performance. Even where the preparers of financial statements are honest or where the reporting process is regulated, a degree of bias can be expected. It is often argued that data gathering and the preparation process relating to many sustainability disclosures are skewed to information that reflects the management's and the entity's social and environmental performance positively. Equally, the process of gathering data is sporadic, informal and unstructured to focus only on what management want to report about (Ratnatunga & Jones 2012).

5.8.3 Potential self-inflicted damage

It is often argued that it is against an entity's interests to be completely transparent because some disclosures may give valuable information to the competitors or to those with whom they contract. The competitor or contractor may use such information to the disadvantage of the reporting entity. Equally, an individual entity's disclosures may have externalities that benefit non-competing firms in other industries by revealing relevant information about new

consumer trends, best operating practices and governance arrangements (Leuz & Wysocki 2008:11).

5.8.4 Framing effects

Framing effects involve the preparer of financial statements when setting the agenda for how an entity's performance is evaluated by the users of the financial report. This is determined by the information given prominence or highlighted for the attention of the user (Arvidsson 2011:278). Arguably, the level of disclosure is effectively a compromise between the preparers and users, and it therefore requires a balancing of interests, not a single-minded pursuit of transparency.

5.8.5 Boiler plate disclosures

According to Cohen *et al.* (2008:7) boiler-plate disclosures entail a practice whereby the preparer of a financial report discloses in the notes to the financial statements certain information that is irrelevant to the circumstances of the reporting entity. The application of a boilerplate approach, that is, a 'checklist' approach, by the preparers of financial reports is one of the factors that affect the clarity and usefulness of disclosed information.

According to Hoogervorst (2013:4), the size of the annual financial report is ballooning for many entities and yet the amount of useful information contained within those disclosures has not necessarily been increasing at the same rate. As Hoogervorst (2013) explains, although the problem of disclosure is behavioural on the part of the preparer, the risk is that annual reports might become compliance documents rather than instruments of communicating useful information for decision-making.

Although the use of a disclosure template based on accounting standards (i.e. boilerplate practice) can assist preparers in complying with the IFRSs, the practice becomes harmful when the preparers merely comply by ticking a disclosure checklist. The preparer should take the initiative in fully comprehending the requirements of the IFRS and the essence of

the required disclosures so as to contextualise the disclosure requirements to the specific needs of the entity.

5.9 SUMMARY AND CONCLUSIONS

Society expects every entity to demonstrate leadership in sustainability so that the scarce resources used today do not jeopardise the survival of future generations. A sustainability strategy must therefore grow into a strong and robust management practice from the operational activities up to the financial reporting level. However, the fact that many such initiatives are voluntary and there are no industry-specific guidelines on what and how such information can be reported has compromised the comparability of financial reports. This could have significant implications for the way external users evaluate the sustainability performance of the entity and the decisions that can be taken.

There are various ways of articulating sustainability performance, such as integrated financial reports which contain information on an entity's economic, environmental, social and governance performance. Equally important are the performance indicators which should be organised into a sustainability performance index. In respect of the agricultural sector, SALM creates significant value within the entity's process.

Although the trend in financial reporting regulation is to minimise discretion and judgement on the part of the preparer of financial statements, the mandatory disclosures may be limited to accounting policies or industry-specific disclosures. However, the preparer of financial statements must make financial and non-financial disclosures both qualitatively and quantitatively, as each provides context for the other. Additionally, the preparer must explain the entity's accounting policy to the users to ensure that the impact of cap-and-trade practices on financial performance is understood.

There are several fundamental challenges such as subjectivity, self-reporting bias, potential self-inflicted damage, framing effects and boiler-plate disclosures. Although these are

significant challenges, they can and must be overcome and quickly by identifying the reporting incentives the preparers of financial statements consider when making voluntary disclosures, and how such incentives can be codified in the reporting guidelines. The next chapter will discuss in detail the research design and methodology that was used to undertake a field survey for this study.

Chapter 6

Research design

6.1 INTRODUCTION

This chapter describes in detail the research methodology and methods that were used in this study. The cognitive model that was applied in developing the relevant research methodology is briefly explained at the start of this chapter and this is followed by the rationale for the choice of an exploratory methodology. Further, the chapter identifies the population of the study and the processes that were used for sampling and recruiting research participants.

Additionally, the chapter highlights the research methods consisting of semi-structured interviews, semi-structured questionnaires, observation and content analysis and describes in depth the procedures that were used to collect and analyse the data in order to make generalisations. The last part of this chapter presents the issues surrounding the rigour, reliability and validity of the methodology adopted by the researcher; this is followed by a brief explanation of the strategies the researcher used to enhance the rigour and quality. The overall research design of the study is summarised in table 6.1.

Table 6.1: Summary of the research design

Methodological decision	Research design adopted
Epistemological position	Constructivist/interpretivist
Research approach	Qualitative research
Research methodology	Exploratory approach guided by a cognitive model
Research methods	Snow ball sampling method Interviews, observation, questionnaires and content analysis.

Source: Author (2016)

6.2 RESEARCH METHODOLOGY

As explained by Cooper and Schindler (2003:81), whatever the type of research, the study design applied must be the most appropriate for achieving the research objectives. The research design is the blueprint or master plan that specifies the methods and procedures for fulfilling the research objectives (Hoque 2006:1; Zikmund 2003:65). The overall objective of this study was to determine the initial recognition, measurement and disclosure practices relating to cap-and-trade schemes in the agricultural sector. In order to achieve the objective, it was necessary to make observations of current practices and trends in order to develop theoretical explanations.

The researcher believes that the current practices have evolved over time through interaction between the users and the preparers of financial statements in a process that Glaser and Strauss (2012) call “symbolic interactionism”. In this study, the theoretical perspective taken was based on stakeholder, institutional and legitimacy accounting theories, as detailed in section 2.6. Consequently, a constructivist/interpretivist research paradigm was deemed appropriate for this study.

According to Bryman and Bell (2011:402), symbolic interactionism is a theoretical perspective which asserts that realities and meanings are socially constructed through a cognitive process of interaction between people. These interactive processes are dynamic and interpretive necessitating the need for researchers to view events and the social world through the eyes of the people they study (Bryman & Bell 2011:402). Furthermore, for this research a qualitative methodology was deemed to be a suitable approach to gain insight into the process of constructing cognitive accounting models.

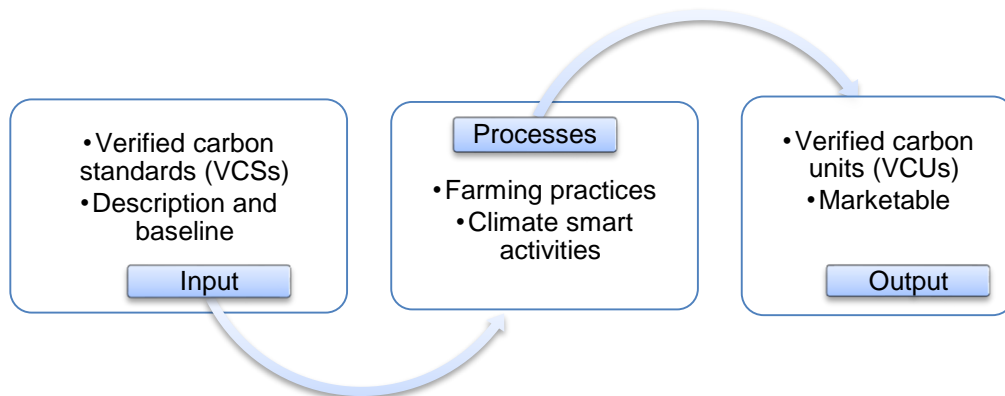
6.2.1 Cognitive accounting model

According to Hansen (2007:4), a cognitive accounting model focuses on factors which directly or indirectly affect financial performance. In this study, the focus is on the factors which could, either directly or indirectly, affect the generation of carbon credits in the

agricultural sector. According to Maina and Wingard (2013:54), agricultural activities are complex, involving various assets that are organised to produce a single stream of cash flows. The process of generating carbon credit involves the entire farming practice and thus it is necessary to conceptualise how the factors interplay.

Hansen (2007:1) further explains that the cognitive accounting models can be used to explain how accounting principles and standards are created. According to Bryman and Bell (2011:415), in a situation with little information cognitive models help to make meaning out of the fragmented information and, in a situation of information overload, the models help identify what is relevant. For the purpose of this study, a cognitive model was expected to enhance the understanding of the verified carbon standard processes and how the associated factors affect accounting practices. The cognitive model that was applied in this study is illustrated in figure 6.1.

Figure 6.1: Cognitive accounting model



Source: Author (2016)

6.2.1.1 Verified carbon standards

Verified carbon standards (VCS 2014) are global benchmarks for practices that give rise to voluntary verified carbon units (VCUs). As discussed in chapter 3, agricultural activities do not fall within the Kyoto Protocol, and thus initiatives within the agricultural sector are voluntary. Owing to the fact that adaptations are voluntary, then adaptation farming

practices can be very diverse. In order to enhance objectivity, this study will adopt the methodologies of farming practice that have been deemed suitable for the generation of VCSs (2014). These methodologies outline the baselines, project activities, project timelines and criteria for quantifying the GHGs sequestered. According to a study conducted by Kerr (2008:122), carbon sequestration potential is the amount of carbon dioxide (in tons) that a project can realistically remove from the atmosphere or avoid emissions over its lifetime. The carbon sequestering potential of biological assets is a critical factor of consideration in this study.

6.2.1.2 Farming practices

This study applied an inductive research approach that involved observing a particular phenomenon in its natural setting in order to draw conclusions and generalisations (Zikmund 2003:47). Currently, climate-smart agricultural practices are receiving more support as an avenue for promoting increased productivity and reducing emissions of GHGs, a process through which farmers also generate carbon revenue.

In order to enhance objectivity in this study, Activity Baseline and Monitoring Survey (ABMS) methodology as pretested and approved by VCS (2014) was adopted. The methodology is applicable to areas where the soil organic carbon would remain constant or decrease in the absence of the activities of the agricultural project (VCS 2014:1). The ABMS methodology estimates and monitors GHGs emissions of agricultural projects that reduce emissions through the adoption of sustainable agricultural land management (SALM) practices (VCS 2014). SALM is defined as any practice that enhances carbon storage or capture in the agricultural sector (VCS 2014).

6.2.1.3 Verified carbon units

The VCUs are the expected output from adaptation activities in the form of offset certificates that can be traded in the voluntary carbon market. One VCU is issued for every ton of GHGs that the project sequesters, reduces or removes from the atmosphere. According to

the VCS (2014), the proper measurement of GHGs emissions makes it possible to reward a wide variety of activities, which include SALM practices.

6.2.2 The qualitative research approach

According to Cooper and Schindler (2003:152), qualitative research locates the researcher in the world of the research participants in order to study a certain phenomenon in its natural setting. The researcher must explore and attempt to make sense of, or interpret, phenomena in terms of the meanings research participants bring to them (Zikmund 2003:111). A qualitative research approach is appropriate to use when a detailed understanding of a phenomenon is required.

Climate-smart agricultural practices are complex activities comprising various interplaying factors. Since qualitative research aims to provide a holistic account of a certain phenomenon by identifying the factors affecting the phenomenon and their interaction within certain contexts, it was therefore deemed suitable for this study. It can further be noted that qualitative research is very versatile, with a variety of methodologies being applicable for studying a phenomenon in its natural setting (Zikmund 2003:111).

According to Zikmund (2003:65), the term “research methodology” refers to the overall strategy used by researchers to guide and justify the methods used in the research. The choice of methodology is important, since the methodology determines how the research is shaped and conducted, how the data is collected, analysed and interpreted, as well as the end product of the research. The choice of methodology will be influenced by the aims of the study and the nature of the research problem under investigation. It also depends on the epistemological position of the researcher.

6.2.3 Epistemological position

According to Bryman and Bell (2011), epistemology is a philosophical concept that is concerned with knowledge what knowledge is, how it is created and how it may be explored.

Various epistemologies exist, including positivism/empiricism, critical emancipatory positions, constructivism/interpretivism, postmodernism and post-structuralism.

According to Cole, Chase, Couch and Clark (2011:142) some research methodologies are linked to specific epistemologies and theoretical perspectives. Hence, if a researcher takes the epistemological stance that knowledge is socially constructed, then the research methodology should reflect this particular view. Researchers may have different yet valid epistemological views (Cole *et al.* 2011:142). Cole *et al.* (2011:145) argue that what is important is that the researcher establishes their particular epistemological view and selects a methodology and methods consistent with that view. Various theoretical perspectives may also be used to guide the design and conduct of qualitative research in the absence of a particular methodology.

6.2.4 Choice of methodology

This study adopted a constructivist/interpretivist research paradigm. According to Bryman and Bell (2011:564), a constructivist epistemological position asserts that knowledge is socially embedded and is constructed from the interactions between the researcher and research participants. Research based on this epistemological position focuses on exploring the way people interpret and make sense of phenomena in their natural setting.

As noted in section 6.2, the researcher believes that accounting practices are socially constructed through a cognitive process of interaction between people and thus knowledge is co-created between the researcher and the research participants. Since there may be varying interpretations of phenomena depending on the context and experiences of those involved, an exploratory methodology best matched these criteria.

6.3 EXPLORATORY METHODOLOGY

An exploratory methodology is a qualitative research approach that enables the development of generalisations that can be used to explain certain phenomena (Saunders,

Lewis & Thornhill 2009:509). An exploratory approach is appropriate to use when the concepts pertaining to a given phenomenon have not been identified or the relationships between the concepts are not well understood. An exploratory approach is also recommended when the research questions relate to experiences or practices that have developed over time and the ensuing changes.

Accordingly, an inductive approach is taken in terms of which the researcher attempts to build an understanding of the phenomenon from data that has been collected and analysed, and then generate concepts to explain the phenomenon. This study aimed to develop a model for valuation of non-current carbon capture and sequestration potential in the agricultural sector. The model will act as a simplification of the reality by highlighting important aspects of that reality.

6.3.1 Constructivist/interpretivist approach

Bryman and Bell (2011:22) explain that a constructivist approach is based on the ontological view that knowledge is constructed through the interaction of the researcher and the research participants. The aim of constructivism is developing an interpretive understanding of the meanings participants ascribe to the phenomenon under investigation. As discussed by Maina and Wingard (2013:71), the agricultural activities are also influenced by sentimental, social and cultural perspectives. According to Bryman and Bell (2011:23), an objectivist approach, which is based on the assumption that an external objective reality exists which can be discovered or verified, was not applicable to this study. A constructivist approach, supported by flexible, clearly described research methods, was thus able to guide the formulation of the framework and was therefore adopted for the purpose of this study.

6.4 RESEARCH METHODS

As explained in section 6.3.1, an exploratory approach follows a flexible, iterative process consisting of overlapping phases of data collection, data coding, memo writing and concept generalisation. According to Bryman and Bell (2011:553), in qualitative research there must

be congruence between the methodology selected, the methods used for sampling, data collection and analysis. Although this is a qualitative study, some quantitative data was collected to describe the impact of cap-and-trade schemes on productivity.

6.4.1 Population and sampling frame

This study was conducted through the Kenya Agricultural Carbon Project (KACP) (World Bank 2014). The main aim of the KACP is to promote more productive, sustainable and climate-friendly agricultural practices, and support farmers in generating additional revenue from the sale of VCU's (World Bank 2014). The project enables farmers to benefit from the carbon credit revenue generated through improved farming techniques. According to the World Bank (2014), such credits are the first to be issued under SALM practices.

The KACP is sponsored by the World Bank (2014) through the carbon fund and involves 60000 farmers. For the purpose of this study, the 60 000 farmers define the population of the preparers of financial statements. Although the farmers are required to adopt standard and internationally accepted farming practices called verified carbon standards (VCSs) Kerr (2008:122) note that the KACP involves diverse farming activities and thus the population was found to be heterogeneous. Owing to these diverse characteristics, the researcher stratified the population as illustrated in table 6.2:

Table 6.2: Sampling Frame

Classification	Population
Consumable biological assets – crop	25,200
Bearer biological asset – crop	22,200
Consumable biological asset – animals	9,000
Bearer biological asset – animals	3,600
Total	60 000

Source: Adapted from the World Bank (2014)

The other participants in this study were the users of the financial statements. As stated in section 6.2, the researcher believes that accounting practices evolve over time through

constant interaction between the preparers and users of general purpose financial statements. The researcher therefore targeted two categories of users of financial statements, namely, bankers offering green loans and financial consultants. The two categories of users were selected because the researcher expects they have in-depth evaluation and assessment of financial statement of farmers. The population in respect of the bankers offering green loans included all banks licensed by the Central Bank of Kenya (2014). The banks were selected because it is expected that they undertake detailed and in-depth of risk profile of the entities they intend to finance. The population of financial consultants are those listed under the Kenya Postel Directories Ltd (2014). Financial consultants were selected because they are expected to provide technical support in the process of compiling financial statements. The sample frame for users of financial statements is illustrated in table 6.3.

Table 6.3: Sample frame for users of financial statements

Classification	Population
Bankers offering green loans	44
Financial consultants	65

Source: Author (2016)

6.4.2 Sampling techniques

Zikmund (2003:132) explains that qualitative research is generally characterised by research activities that are conducted in the natural setting in which the phenomenon occurs. Sampling in qualitative research serves an investigative purpose rather than being a statistical representation of a population. Since the objective of qualitative study is to generate insights into a research problem, Zikmund (2003:132) argues that the sample need not be probabilistic or statistically representative. The critical consideration in qualitative study is saturation of the data, which is explained in section 6.7.3.

This study adopted a snowball sampling technique. In snowball sampling, participants are recruited to the study for the knowledge they have about the phenomenon under

investigation based on chain referrals. In this study, snowball sampling was used to identify and recruit farmers involved with SALM, a practice that helps them generate carbon credits. All recruited participants were then interviewed to assess their competence and the experiences relevant to the study.

Since the study population of 60 000 farmers was deemed to be big, the study targeted 0.5% of the farmer participating under the KACP. Hence, the sample size decided on comprised 300 farmers; since the study was exploratory it was expected that this would provide enough data to facilitate generalisation. The sample was distributed on the basis of population characteristics, which were defined using the accounting criteria outlined in table 6.4.

Table 6.4: Sample distribution and size for preparer of financial statements

Classification	Population	Proportion	Sample size
Consumable biological assets – crop	25,200	0.5%	126
Bearer biological asset – crop	22,200	0.5%	111
Consumable biological asset – animals	9,000	0.5%	45
Bearer biological asset – animals	3,600	0.5%	18
Total	60 000	0.5%	300

Source: Author (2016)

As discussed in section 1.7, this study also intended to obtain the views of two categories of users of the financial statements, namely, the bankers offering green loans and financial consultants. These were classified as “other target participants” of the study and were sampled using snowball as outlined in table 6.5.

Table 6.5: Sample distribution for users of financial statements

Classification	Population	Proportion	Sample size
Banker offering green loans	44	50%	22
Financial consultants	65	40%	26

Source: Author (2016)

6.4.3 Participant eligibility

This study was interested in farmers involved in SALM in order to collect data about their farming practices and experiences. Owing to the nature of agricultural activities, this study had to take place where the farming activities and processes were being implemented. This enabled the researcher to investigate the way the SALM adaptation activities differ from traditional agricultural practices. This also enabled the research to establish the sustainability of SALM practices and how they affect the crop cycle and productivity. Consequently, this study identified the following eligibility criteria in relation to farmers:

- Farmers had to be involved in SALM, and have intentions to sustain the programme over time within the VCSs practices;
- They had to be maintaining proper books of accounts and preparing general purpose financial statements.

Initial purposive sampling therefore enabled the researcher to gain broad and multiple perspectives on the nature and process of SALM practices and their sustainability, which in turn provided a foundation for making generalisations.

6.4.4 Participant recruitment

Potential participants were identified from the list of KACP participants. Although the project draws membership from diverse geographic locations and farming activities, the impetus for the project is the need to address declining agricultural productivity and climate change adaptation (World Bank 2014). In the project, community-based organisations and individuals from diverse sectors involved in farming are recruited, trained and supported to adopt, implement and sustain SALM practices.

6.4.5 Recruitment procedure

In this study, primary data collection commenced in November 2014 and was concluded in December 2014. The recruitment process was as follows:

- The researcher obtained a list of the farmers participating under the KACP and clustered them by region and by activities, as indicated in section 6.4.1.
- The researcher purposively selected a 0.5% base for the stratification of the population.
- The selected participants were approached in order to be recruited as participants in the study.
- A precondition for participation in this study was that the farmer prepared general purpose financial statements.
- The details of those who voluntarily consented to participate in the study were taken, and the participants were given a timeline for subsequent visits.
- A detailed explanation of the purpose of the study was provided and detailed information on the study was supplied. This ensured that the researcher and the research participants had a common understanding of the purpose of the research.

6.5 DATA COLLECTION

Zikmund (2003:111) argues that in qualitative research, the researcher must be creative in the choice of information sources and must rely on multiple sources of data. This creates the need for a flexible but systematic inductive approach to data collection and analysis. Accordingly, emphasis was placed on coding the data into concepts and themes, focusing on the perspectives and meaning of the phenomena to the research participants (Cooper & Schindler 2003:455). This study therefore, adopted various methods of data collection such as interviews, semi-structured questionnaires, observations and content analysis (Saunders *et al.* 2009:146). The instruments of data collection and their use are briefly explained in sections 6.5.1 to 6.5.4.

6.5.1 Interview data collection

Cooper and Schindler (2003) explain that interviews are a common method for collecting data in qualitative research studies. In this study, interviews were used mainly at the point of recruiting participants, and were intended to elicit information about the farmer's participation in SALM, preparation of general purpose financial statements and their willingness to participate in the study. The interviews were semi-structured to enable the researcher to get an in-depth perspective of the farmers understanding of SALM practices. The focus of semi-structured interviews tends to be broad and flexible in order to enable greater exploration of the issues pertinent to the research topic.

According to Saunders *et al.* (2009:146), in-depth interviews are useful in exploratory studies in that the research participants' insights, experiences and interpretation of those experiences relevant to the research topic may be effectively elicited. According to Saunders *et al.* (2009:324), in-depth interviews involve the use of broad and open-ended questions, which may become more focused as the interview progresses or in response to the information emerging during the interview. During such interviews, research participants are encouraged to tell their stories, reflect on their experiences and be the expert (Saunders *et al.* 2009:336). The interview question schedule that guided this phase of the data collection is attached as Appendix I.

6.5.2 Semi-structured questionnaires

Zikmund (2003:332) explains that a semi-structured questionnaire combines open-ended questions with fixed-alternative or closed-ended questions. Semi-structured questionnaires were used to gather primary information from the preparers of financial statements, bankers offering green loans and financial consultants. The researcher administered three different sets of questionnaires. The first questionnaire was administered to the preparers of financial statements and is attached as Appendix II. The second questionnaire was administered to bankers offering green loans and is attached as Appendix III, while the third of questionnaire

was administered to financial consultants and is attached as Appendix IV. Semi-structured questionnaires were preferred because they help identify consistent answers while leaving some room for the respondents to express their views (Saunders *et al.* 2009:387).

6.5.3 Observational data collection

According to Saunders *et al.* (2009:288) participant observations are a method for collecting data in qualitative studies in terms of which the researcher enters the research setting to observe elements of the phenomenon under investigation. Participant observation is influenced by the type of research question, the epistemological position of the researcher or by pragmatic and ethical considerations and can enable the discovery of the meaning that people attach to their actions (Saunders *et al.* (2009:288). Salkind (2009:211) further explains that, depending on the nature of the study, researchers may be interested in observing processes, behaviours, events and interactions which can yield very useful data.

The researcher conducted a series of participant observations with the aim of recording events, processes and factors that influence the generation of VCUs. For the purpose of this study, participant observations are deemed necessary because:

- participant observations enable the generation of data in the form of photographic images directly from the farm where SALM is being practiced;
- the data from the participant observations would enable the researcher to understand the dynamics of various processes and activities and provide alternate perspectives on recognition and measurement for the accounting of farming practices; and
- participant observations would help to check the validity of information obtained from other methods (Saunders *et al.* 2009:295).

The areas of interest for observation were composting, soil treatment and detoxication, non-till weeding processes and post-harvest handling. All observational data were recorded as

photographic images and field memos consisting of descriptions of what was being observed or the interpretive reflections of the researcher. To ensure that information and insights were not “lost”, field-notes were recorded where possible during or soon after the observation took place using a format selected by the researcher.

6.5.4 Content analysis

Content analysis was used to gather secondary data from the financial statements and sustainability reports of those entities that present descriptive disclosures. Saunders *et al.* (2009:226) explain that content analysis is a research tool used to determine the presence of certain words or concepts in financial statements. The researcher quantified and analysed the presence, meanings and relationships of such words and concepts, then made inferences about standard presentation and disclosure of information for cap-and-trade schemes.

6.6 DATA ANALYSIS

According to Bryman and Bell (2011:578), in qualitative studies data analysis commences with initial coding of the data records, with the coding becoming more focused as the analysis proceeds. As the data was coded, memos were written with the aim of highlighting the researcher perspective on creating the code. From there, the memos and code were sorted and integrated to form the findings of the research, as discussed in chapter 7. In order to enhance consistency, a constant comparative method was used at each stage of the data analysis, this was achieved through the semantic network views. Constant comparison is a technique where data, codes and categories are compared and contrasted with the aim of developing and refining the properties of a category and thus organising the codes into code families. In analysing the data, the researcher compared quotations with quotations, quotations with codes, codes with codes, codes with categories and categories with categories. This comparison helped the researcher to conceptualise the logic presented by the data.

6.6.1 Data records

According to Salkind (2009:150), once the researcher knows what information to collect and where to get it, the researcher must organise a plan for gathering information before analysis. The data collected from the interviews was recorded using a voice recorder. All interview recordings were subsequently analysed to identify the respondents who qualified to proceed to the questionnaire phase. The voice records of the participants selected to proceed to the questionnaire phase and the accompanying field-notes were transcribed in a computer readable form. The researcher identified and recruited research assistants who were conversant with the local and regional dialects to support the data collection process. Each research assistant was trained on the data collection procedures and the need for participants to give their consent freely. After having been made fully aware of their role, each research assistant signed a confidentiality letter (attached as Appendix IX) and each was given a voice recorder. All electronic data records were stored on a password-protected computer disk. The hard copies of the completed structured questionnaires were filed and stored safely in a lockable filing cabinet.

6.6.2 Computer aided data analysis

In qualitative research, computer software may be used to facilitate the manipulation and simulation of information in the data analysis process. The use of qualitative data analysis software enabled the researcher to manage, query and organise the ideas generated during the analytical process. However, as Bryman and Bell (2011:594) explain, while the use of computer software can facilitate a more methodical and efficient approach to data analysis, it does not replace the analytical skill of the researcher.

Typically, this study used qualitative data analysis software called **ATLAS.ti**. At the end of the study a model was formulated which can facilitate the estimation of the value of biological assets with an element of carbon capture potential. Consequently, extracts of

quantitative data were summarised and analysed using Microsoft Excel for statistical generalisation. The quantitative data extracted in the study is attached as Appendix VI.

6.6.3 Data coding

According to Saunders *et al.* (2009:509), coding is the process of categorising segments of data or quotations with a short name that simultaneously summarises and accounts for each piece of data. It can also be said that coding is a way of classifying and indexing text in a way that facilitates the development of categories and, hence, conceptualisation. According to Bryman and Bell (2011:578), researchers use coding to move beyond individual data records with the aim of forming categories containing data segments from multiple data records. In coding, researchers select, separate and sort the data, determine what the data is about and then assign the data representative codes.

Saunders *et al.* (2009:511) explain that the aim of coding in qualitative research is to separate data into categories which will then be developed and integrated to form generalisations. There are various methods or processes for coding data such as initial and focussed data coding, open, axial and selective coding or theoretical coding. This study adopted the flexible processes of initial and focused coding also known as open coding.

The initial coding phase involves defining and labelling segments of data according to what the data represents or suggests. Initial codes should reflect actions to ensure that the focus remains on processes, perspectives and meanings specific to the study participants. In that way, the codes and resulting theoretical categories were “grounded” in the experiences of those participating in the study.

Bryman and Bell (2011:249) explain that during initial coding, the researchers must remain open to what the data suggests, stay close to the data and keep codes simple, precise and analytic by coding word by word, line by line, segment by segment and incident to incident. As more data is coded, the numbers of initial codes increase and additional data segments

are coded to either new or existing codes. The initial coding is followed by a more focused coding which involves using the most significant, frequent or related initial codes to sort, synthesise and integrate large amounts of data by creating code families. According to Bryman and Bell (2011:587) focused codes form the categories that will eventually be integrated to form in the generalisation.

6.6.4 Memo-writing

Bryman and Bell (2011:581) explain that memos are informal notes recorded by the researcher throughout the data analysis process. Memos enable researchers to reflect on the analysis and record ideas, discoveries, impressions, descriptions and contexts that crossed their mind during the data analysis. Although there is no recommended method or structure for writing memos, they help researchers to analyse their ideas about the codes, identify gaps in the data collection, develop certain codes into categories and demonstrate relationships between categories.

Irrespective of how memos are constructed or what form they take, the focus of memo-writing should be on the exploration, understanding and development of the emerging categories and their components. To do this, the researchers compared categories or sub-categories with general categories and made general statements that connected all of them. In writing memos about categories, researchers can determine what the categories consist of and specify any relationships between them and ensure that the points of reflection are not lost or forgotten.

6.7 RESEARCH RIGOUR AND QUALITY

In qualitative research, researchers bring to their studies certain ideas, preconceptions and biases about the nature of the phenomenon being investigated. Researchers must acknowledge and be explicit about how their preconceptions and biases may influence the research design and process. Achieving and demonstrating rigour and quality in qualitative research is important. According to Sinkovics, Penz and Ghauri (2008:691), quantitative

criteria such as objectivity and validity are not applicable in a qualitative research study. When considering the rigour in qualitative research the focus is on enhancing the credibility, dependability, transferability, auditability, confirmability and fittingness of the findings.

However, Sinkovics *et al.* (2008:636) argues that there are diverse and at times conflicting views on what comprises a rigorously conducted qualitative study. Sinkovics *et al.* (2008:636) subsequently proposes that a rigorous qualitative study is characterised by:

- congruence between the epistemological position of the researcher, the methodology chosen and the methods used in the study,
- coherence between the research aim and orientation,
- systematic and careful conduct of the research,
- convincing, relevant interpretation of the data, and
- clear accounting of the researcher's role throughout the research process (Sinkovics *et al.* 2008:636).

The overall objective of this study was to investigate financial reporting for cap-and-trade schemes in the agricultural sector so as to explain and predict the accounting treatment of the related activities. Accordingly, the researcher conducted an extensive literature review, which was covered in chapters 2 to 5. This enhanced the researcher's understanding of what is relevant for the purpose of this study thereby increasing the reliability. However, before making any generalisations, Bryman and Bell (2011:400) argue that researcher should determine whether there is methodological congruence and whether the data categories are adequately saturated. Bryman and Bell (2011:400) consequently outline quality standards and checklists for appraising the rigour and quality of qualitative studies. Therefore, in order to enhance the research rigour, the researcher focused on the strategies highlighted in sections 6.7.1 to 6.7.8 that follow.

6.7.1 Methodological congruence

According to Sinkovics *et al.* (2008:635), methodological congruence refers to the fit between the research problem, the epistemological perspective of the researcher, the methodology and the methods used in the study. Methodological congruence ensures that the researchers remain consistent in their approach throughout the entire research process. In the current study, the researcher constantly reviewed the epistemological position, the selected methodology and the methods used to conduct the study and adjusted them where appropriate.

6.7.2 Triangulation

According to Krishnaswamy, Sivakumar and Mathirajan (2006:177), triangulation involves the use of different methods to gain multiple perspectives on the phenomenon under investigation. Triangulation may also involve the use of multiple sources of data thus making it a strategy in which different methods are used to elicit information about the same phenomenon (Hoque 2006:467). In that way the concurrence of the resulting data can be compared and the validity of the research findings can be established.

Triangulation offers a method for gaining multiple perspectives, thus leading to a more thorough understanding of the research phenomena. This study purposed to use comparative and multiple methods of data collection in order to enhance the quality and rigour of the study. This was achieved by conducting pre-participation interviews which formed the basis for recruiting participants. The data was also triangulated using images and observation memos.

6.7.3 Data saturation

According to Saunders *et al.* (2009:235) saturation refers to the point where new data does not reveal any new characteristics of the categories or give rise to new concepts. Data may be considered saturated when no new codes or categories emerge from the analysis and when the researcher is confident that the analysis fully accounts for the phenomenon being

studied. Therefore, once the data is saturated, no further data collection is required (Keith & Hase 2008:160).

For the purpose of this study, the researcher enhanced the rigour by sorting and integrating memos and data codes, as well as reviewing and comparing all the information contained in the memos (Keith & Hase 2008:159). The research participants were subsequently selected based on their participation in KACP, and their adoption of standardised farming practices. All the participants were also required to be practising farming on a commercial basis and preparing general purpose financial statements. Furthermore, the use of diagrams and schemas facilitated the confirmation of connections and relationships between the categories until no new codes relating to the phenomena were apparent.

6.7.4 Rich data

In exploratory studies researchers should aim to collect rich data because it ensures that the resultant generalisations are based on data that is substantial, relevant, suitable and sufficient. Zikmund (2003:480) explains that rich data is detailed and captures participants' views, experiences and actions, as well as the contexts within which they participate. The researcher gave the participants ample time from the date of the interview to the date on which the questionnaire was administered so as to establish a rapport with the participants and ensure that data collection was not distorted by misconceptions. In this way the researcher was able to gather rich data about each of the participating farmers and their experiences. Furthermore, the data was corroborated by the responses of the key users of the financial statements concerned, namely, bankers offering green loans and financial advisors.

6.7.5 Double checking

Sinkovics *et al.* (2008:690) explain that in order to enhance confirmability and as a form of respondent validation, the researcher should double check participants' statements when seeking feedback from them. Double checking may be used to confirm data, descriptions or

experiences or to verify the researcher's interpretations incorporating the participants' responses to the study findings. While it is useful to gain feedback from those participating in the research, researchers need to be very clear on what is being checked and by whom, and about the way any responses should be interpreted, because the participant may focus on issues that are not of interest to the researcher. The researcher collected data in the months of November and December 2014. The respondent double checking was conducted in September 2015, and no variability was noted to contradict the findings of the research.

6.7.6 Peer debriefing

Peer debriefing is a technique where the researcher presents and discusses aspects of the study with peers or colleagues (Sinkovics *et al.* 2008:673). In this study, significant feedback was obtained by articulating important research decisions and procedures. The researcher expected that debriefing could assist in exploring, developing and reporting ideas about the data collection and analysis, thus improving the credibility of the research process. The preliminary findings of the research were shared with professors, experts and presented at workshops, including the annual research showcase hosted by the University of South Africa. This peer debriefing ensured that issues were properly interpreted.

6.7.7 Trail and auditability

Sinkovics *et al.* (2008:678) explain that trail and auditability refer to the degree to which research procedures are documented and the researcher is able to account for the role played throughout the research process. It is important for researchers to provide an account of the important methodological and analytical decisions made throughout the research process. In that way researchers can demonstrate the process by which the findings were developed, their conclusions justified and thus the credibility of the research findings enhanced. By demonstrating how the raw data was analysed and interpreted the researcher maintained a clear research trail in order to establish the rigour of the study and the credibility of the findings.

The researcher is very familiar with and passionate about financial reporting in the agricultural sector, and gathered sufficient data to merit generalisations. In order to ensure auditability, the researcher made systematic comparisons between observations and the semi-structured questionnaires for the respective categories and demonstrated the strong links between the collected data and the analysis. This ensured that the trail and auditability were maintained throughout the study.

6.7.8 Researcher bias

According to Sinkovics *et al.* (2008:680), qualitative studies are prone to researcher bias. In order to reduce this as far as possible, in this study triangulation was employed and data saturation ensured. The primary data collected by means of the questionnaire was triangulated using field observation images and field memos. In addition to the 52 completed questionnaires, 31 images were taken from the field as evidence of what the respondents were discussing. The research also documented two field memos, touching on various issues which complemented what was covered by the questionnaires.

Additionally, the issues covered by the preparers of financial statements were corroborated by obtaining the independent views of representatives of the users of financial statements. The preliminary findings were shared with peers and presented at workshops to ensure that the interpretations were valid. Furthermore, participant double-checking did not identify any variability that could contradict the findings. This was expected to significantly reduce the researcher bias and enhance the quality of the research findings.

6.8 SUMMARY AND CONCLUSIONS

This chapter described in detail the research methodology and methods that were used in this study. A constructivist/interpretivist research approach, which is a branch of the qualitative research paradigm, was adopted for the purpose of this study because the researcher believes that reality and meaning are socially constructed through a cognitive process of interaction between the preparer and users of financial statements. Further, the

rationale for the choice of an exploratory methodology was provided by the need to explore data and formulate principles for accounting for cap-and-trade schemes in the agricultural sector.

The population of the study comprised all the farmers listed under the KACP. A snowball sampling technique was used to select the research participants and multiple sources of data were used to enhance the rigour and validity of the findings. Moreover, a systematic procedure was applied to collect and analyse the data as a basis for making generalisations. The last part of the chapter presented the issues surrounding quality and rigour in qualitative research and outlined the strategies that were used to enhance the rigour and quality of this study.

Chapter 7

Data analysis, presentation and interpretation

7.1 INTRODUCTION

This chapter will present the research findings based on an analysis of the primary data. The chapter will also include an interpretation of the findings which form the basis for the conclusions. The primary data was collected using three sets of questionnaires (attached as Appendices II, III and IV).

The qualitative data was analysed using qualitative data analysis software called **ATLAS.ti**. Version 7.5.9. However, there was also some quantitative data (attached as Appendix VI) which was extracted and analysed using Microsoft Excel. While the qualitative data analysis process involved coding the data, linking quotes to codes, writing memos and analysing the semantic relationship emerging from the data, the quantitative data analysis mainly entailed ascertaining descriptive statistics for the model variables.

The following sections detail the findings and analysis, commencing with a discussion on the response rate, the general information pertaining to the respondents, and the feedback relating to each of the research objectives.

7.2 RESPONSE RATE AND GENERAL PROFILE OF RESPONDENTS

This study involved two categories of respondents, the preparers of financial statements and the users of financial statements. The preparers of financial statements are the accountants who are involved in the day-to-day processes of gathering information and compiling financial statements at the agribusiness level.

The users of financial statements are the stakeholders that apply the information contained in the financial statements to make economic decisions or provide advisory services. This study considered two categories of users, namely, commercial banks offering green loans

and financial consultants. Commercial banks offering green loans are financial institutions that extend credit facilities in the agricultural sector on the basis of a written policy. Financial consultants, on the other hand, are advisors and analysts who provide professional financial services in the agricultural sector.

7.2.1 Preparers of financial statements

The field survey in relation to the preparers of financial statements was conducted in two phases:

7.2.1.1 Interview phase

The interviews were primarily conducted to recruit the research participants. As discussed in chapter 6, a sample of 300 farmers was selected using a snowball sampling technique. Of these 300 farmers, 283 were eventually contacted. Therefore, the farmers who were reached or contacted for an interview accounted for 94% of the target sample. The remaining 6% of farmers was not accessible despite the researcher committing considerable amount of time in an effort to contact them.

Although the study was interested in the individual farmer's passion for carbon farming, the main criterion for determining eligibility was whether the respondent prepared general purpose financial statements. Of the 283 respondents interviewed, 137 were deemed suitable to participate because they conceded that they did indeed prepare general purpose financial statements. The other 146 respondents were considered ineligible because they did not prepare general purpose financial statements.

7.2.1.2 Questionnaire phase

The researcher distributed 137 questionnaires, of which only 89 were returned. The returned questionnaires were sorted for completeness and consistency eventually resulting in 37 questionnaires being rejected. Consequently, only 52 questionnaires were analysed as the basis for making interpretations. In the researcher's opinion, since the study was

exploratory, the 52 respondents provided a sufficient base for further analysis. Furthermore, it is possible for a farmer to engage in more than one category of activity, as a result of mixed farming, intercropping and companion planting, which increased the scope of coverage of the data. These categories of farming activity are discussed in section 7.2.1.3. The response rate in respect of the preparers of financial statements is set out in table 7.1.

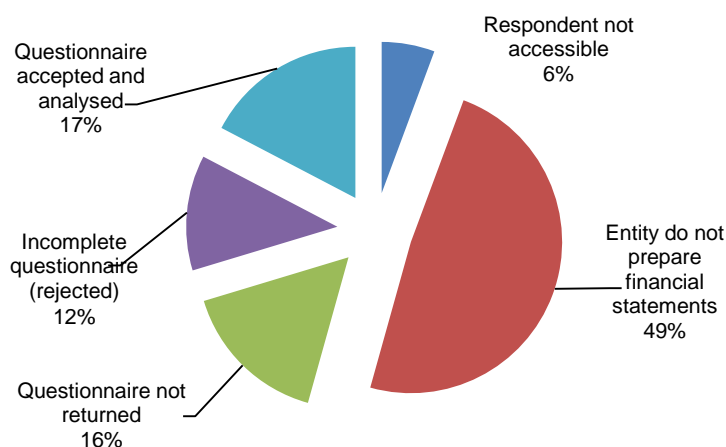
Table 7.1: Respondent 1 analysis

Sub-category of respondent	Frequency
Respondent not accessible	17
Entity do not prepare financial statements	146
Questionnaire not returned	48
Incomplete (rejected questionnaire)	37
Questionnaire accepted and analysed	52
Total sample size	300

Source: Research data (2015)

The information in table 7.1 can further be presented in pictorial form as shown figure 7.1.

Figure 7.1: Respondent 1 analysis



Source: Research data (2015)

It can be observed from figure 7.1 that 49% of the respondents did not prepare general purpose financial statements. The percentage of those who do not prepare financial

statements could possibly be higher, considering that another 6% of the target sample was not accessible. This is consistent with expectations in that many farmers do not prepare general purpose financial statements and rely on other farm statistics, for instance agricultural produce per area, to evaluate the performance of their agribusiness. In addition, 16% of the questionnaires distributed were never returned while another 12% contained inconsistencies and were therefore rejected. Consequently, only 17.3% of the questionnaires were accepted for analysis.

7.2.1.3 Categories of respondent

In order to enhance the representativeness of the sample, this study focused on four categories of farming activity. The classification of farming activities was based on the broader accounting perspective of bearer biological assets and consumable biological assets, which can further be subdivided into crops and animals. Moreover, a farmer may be engaged in more than one activity, as analysed in section 7.3. This classification was one of the main considerations when selecting respondents using the snow-ball technique. The representativeness of the sample and the response rate in comparison with the entire population is analysed in table 7.2.

Table 7.2: Representativeness of the sample

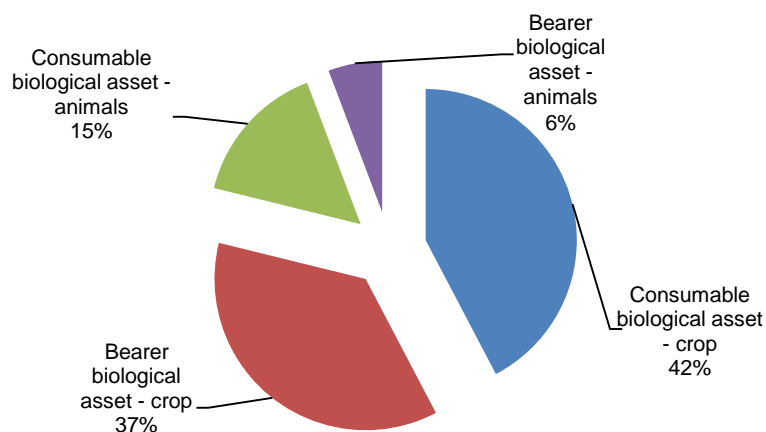
Classification	Population	Proportion	Sample size	Number of respondents	Percentage response
Consumable biological asset – crop	25 200	0.5%	126	22	42.3
Bearer biological asset – crop	22 200	0.5%	111	19	36.5
Consumable biological asset – animals	9 000	0.5%	45	8	15.4
Bearer biological asset – animals	3 600	0.5%	18	3	5.8
Total	60 000	0.5%	300	52	100

Source: Research data (2015)

The information in table 7.2 indicates that of the 60 000 farmers involved in sustainable agricultural land management (SALM) practices 25 200 were engaged in the cultivation of

crops that can support only one harvest. This information is presented in a pie chart, as shown in figure 7.2.

Figure 7.2: Type of biological assets



Source: Research data (2015)

The main areas for classification of the agricultural activities were consumable and bearer biological assets for either crops or animals. These are briefly discussed in sections 7.2.1.3.1 to 7.2.1.3.4.

7.2.1.3.1 Consumable biological assets – crop

This category involves crop cultivation that can only support one harvest such as maize farming. As indicated in figure 7.2 above, 42% of the farmers are involved in the cultivation of crops that can be categorised as consumable biological assets.

7.2.1.3.2 Bearer biological assets – crop

Bearer biological assets are those that can support more than one harvest such as tea and coffee plantations. As can be observed in figure 7.2 above, 37% of the respondents were involved in the cultivation crops that are bearer biological assets. This aggregates to 79% (42 and 37%) of all respondents participating under the KACP being involved in crop

cultivation and in turn affirms the expectation that, SALM practices are more effective when applied to the cultivation of crops.

7.2.1.3.3 Consumable biological assets – animals

Consumable biological assets involve the rearing of animals that can only support one harvest, for example beef farming. Figure 7.2 above indicates that 15% of the farmers were involved in rearing animals that are consumable biological assets.

7.2.1.3.4 Bearer biological assets – animals

Bearer biological assets involve the rearing of animals that can support more than one harvest such as dairy farming. Figure 7.2 above indicates that 6% of the respondents were involved in rearing animals that are bearer biological assets. The aggregate proportion of respondents involved in rearing animals was 21% (15 and 6%), which highlights the ineffectiveness of animal farming when applied to an agricultural carbon project.

7.2.2 Users of financial statements

The primary data collected from the preparers of financial statements was triangulated with additional primary data collected from the two categories of users of financial statements, namely, bankers offering green loans and financial consultants.

7.2.2.1 Commercial bank offering green loans

The bankers offering green loans were selected using snowballing by following up on the bank policy on credit to the agricultural sector, also referred to as a climate-smart loan policy.

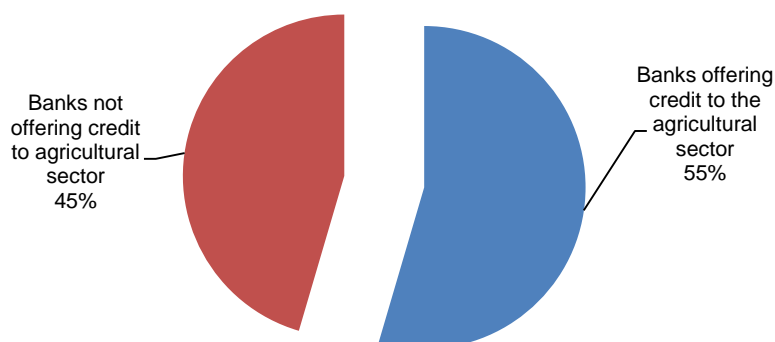
Table 7.3: Response rate bankers

Population	Proportion	Sample size	Response frequency	Response rate
44	50%	22	12	54.5%

Source: Research data (2015)

As indicated in table 7.3, the researcher obtained responses from 12 of the 22 bankers targeted that extend credit financing to the agricultural sector. The information in table 7.3 can be presented in the form of a pie chart, as shown in figure 7.3.

Figure 7.3 Response rate of bankers



Source: Research data (2015)

As indicated in figure 7.3, 55% of the target respondents had a written policy on extending credit to environmentally friendly projects. The financial institutions' policies were summarised in terms of various themes as shown in table 7.4.

Although all the banks selected have a climate-smart loan policy and extend credit to the agricultural sector no distinction is made between credit advances for farm inputs and green loans, as all credit facilities extended to the agricultural sector make use of the same discount policy.

Table 7.4: Bank credit policy toward the agricultural sector

Theme	Activities
Environmentally sustainable economic development	Committing to a range of actions that support the transition of value chain to sustainable production method and directing capital toward environmentally friendly projects
Minimising operational environmental impact	Measurement of operation carbon emissions and purchasing credits that are certified to the voluntary carbon standards so as to offset the operational emission. The project should genuinely help to reduce carbon dioxide (CO ₂) through auditable and traceable project activities that have additionality attribute
Stakeholders engagement	Support cross-sector collaboration and stakeholders' engagement to find environmental solutions.

Source: Research data (2015)

7.2.2.2 Financial consultants

The financial consultants were selected using the snowball sampling technique, or chain references, to identify those that consult to the agricultural sector.

Table 7.5: Response rate of financial consultants

Population	Proportion	Sample size	Response frequency	Response rate
65	40%	26	9	35%

Source: Research data (2015).

As indicated in table 7.5, the researcher was able to obtain responses from nine respondents out of the targeted 26 financial consultants, thus accounting for a 37% response rate. This low response rate is attributed to the fact that 63% of the financial consultants had never engaged professionally in the agricultural sector. It is also important to note that for those with consultancies in the agricultural sector the revenue generated from this sector accounted for less than 10%. Since the questionnaires were open ended and the study was exploratory, the response rate of 37% was considered sufficient as a basis for further analysis.

The information in table 7.5 is presented in a pie chart as shown in figure 7.4.

Figure 7.4: Response rate of financial consultants



Source: research data (2015)

7.3 ORGANISATION OF PRIMARY DOCUMENTS

In addition to the questionnaires, the researcher also documented two field memos and captured 31 field images (photographs). The questionnaires and the field memos were transcribed into MS Word documents, while the field images were uploaded into **ATLAS.ti**. This resulted in a total of 106 primary documents which were subjected to qualitative data analysis. This is presented in table 7.6.

Table 7.6: Nature of primary documents

Nature of primary documents	Frequency
Preparer of financial statements	52
Bankers offering green loans	12
Financial consultants	9
Field observation (images)	31
Field memos	2
Total primary documents	106

Source: Research data (2015)

The 52 preparers of financial statements were further analysed based on the category or categories of activities they are engaged in, using the criteria discussed in sections 7.2.1.3.1

to 7.2.1.3.4. Where a farmer dealt with more than one category of activity, the document was classified into more than one of the primary document families. This is presented in table 7.7.

Table 7.7: Farming activities of the respondents

Number of activities (a)	Frequency (n)	Total activities
Only one category	16	(1*16)=16
Two categories	26	(2*26)=52
Three categories	4	(3*4)=12
Four categories	6	(4*6)=24
Total respondent	52	104

Source: Research data (2015)

Table 7.7 above indicates that, 16 of the farmers specialised in only one category of activity, 26 farmers were involved in two categories of activities, four farmers were involved in three categories of activities, while six farmers were involved in all the four categories of activities. Consequently, the scope of respondent analysis, when considering the different activities based on primary document families, increased to 104 records.

It is also important to highlight that this study targeted respondents from a specific project, the KACP, who had embraced standardised practices. The respondents were also aggregated into groups to enhance the commercialisation of agribusiness. In addition, the group members constantly consult each other on practices and reporting issues. These factors made it possible to achieve data saturation, in other words, data collection reached the point where further collection or analysis of the data did not give rise to any new concepts or ideas.

7.3.1 Groundedness and density

Groundedness and density refer to the concentration of a particular quotation (frequency) around a particular code (variable of interest to the study or concept of measurement). Groundedness indicates codes or concepts that are well supported by the data. Codes with

more quotations are more grounded, indicating that the respondents speak about them or refer to them more often. Density explains the extent to which one code is linked to the other codes. Table 7.8 summarises the primary documents and code families matrix based on the number of quotations.

Table 7.8: Primary documents – code families’ quotations matrix

Code family	<u>Bearer biological assets</u>		<u>Consumable biological asset</u>	
	Animal	Crop	Animal	Crop
Adaptation activities	409	1044	169	1175
Initial measurement	705	1780	292	2070
Initial recognition classification	217	511	88	569
Management consideration in choice of measurement	313	799	123	914
Management consideration in making disclosures	509	1279	201	1461
Reason for joining KACP	133	331	54	369
Reporting for cap and trade	597	1505	234	1716
Subsequent basis of measurement	790	1985	329	2302
Types of financial reports	412	1021	166	1177

Source: Research data (2015)

Table 7.8 indicates the total number of quotations linked to a particular category of farming activity and the concept being assessed. For instance, there are 409 quotations linking adaptation activities to bearer biological assets – animal. Consequently, it can be determined that based on the number of quotations, the data indicates that the majority of the farmers were engaged in the cultivation of crops that are consumable biological assets. This is followed by the cultivation of crops that are bearer biological assets, the rearing of animals that are consumable biological assets and, lastly, the rearing of animals that are bearer biological assets. These findings are consistent with the classification presented in figure 7.2.

7.3.2 Responsibility for maintaining accounting records and types of information

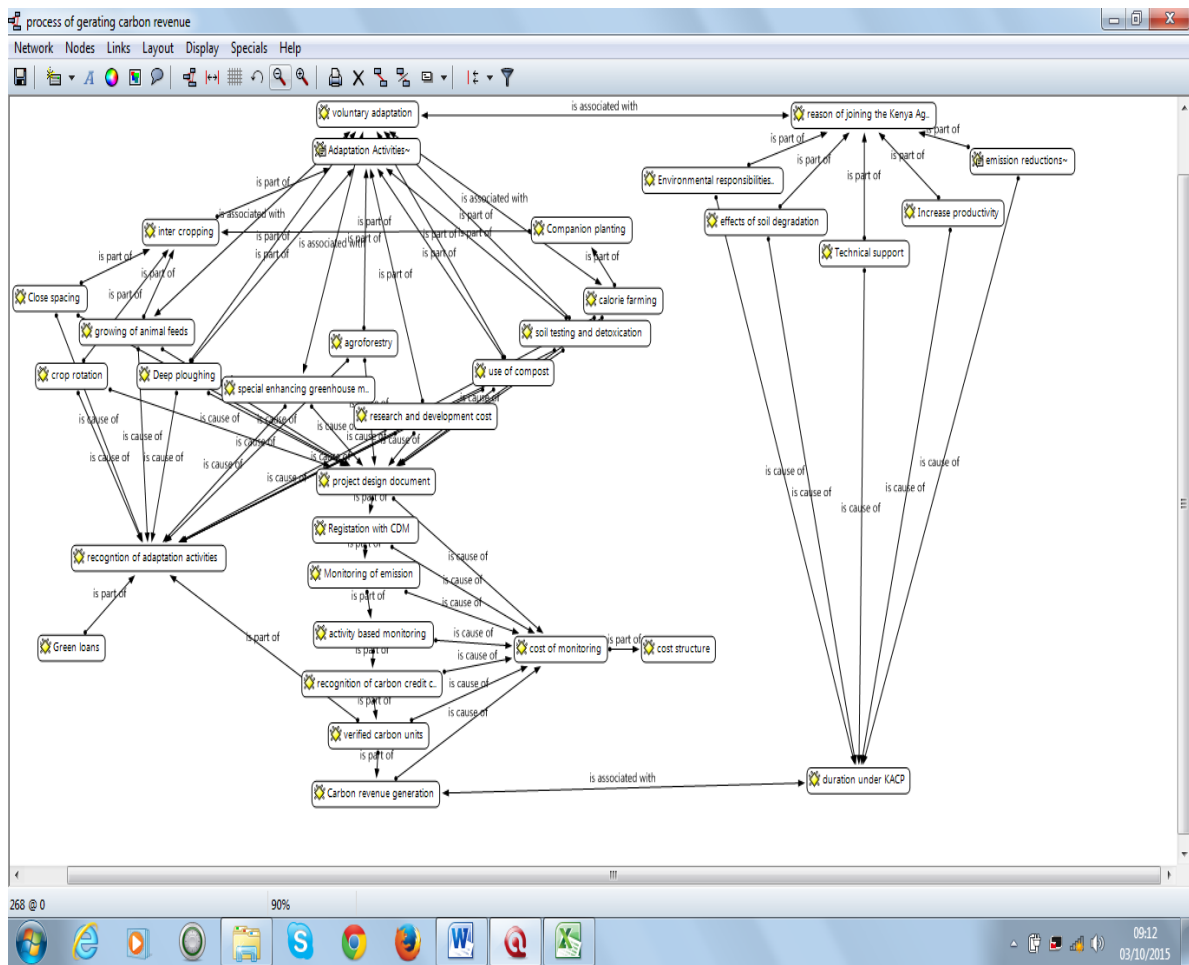
It is important to note that this study targeted entities that prepare general purpose financial statements. The integrity of the general purpose financial statements depends on who is responsible for their preparation. Consequently, it was established that all the entities engaged the services of an accountant, on either a full-time or a part-time basis, who was responsible for maintaining the accounting records. Although some farmers engage the services of a single accountant on part-time basis, it was established that all the entities rely on an internal employee for gathering transaction details and maintaining accounting records.

On the question of the component that farmers regarded as being most useful, the statement of cash flows was unanimously identified as the most useful component of the financial statements. This is an indication that farmers have little regard for accrual-based accounting information for internal decision-making. The following sections will present the research findings based on each objective.

7.4 INITIAL RECOGNITION AND CLASSIFICATION

The accounting process commences with the identification of transactions and other events that create recognition issues. The purpose of objective 1 was to establish the adaptation activities that merit recognition for accounting purposes. Additionally, this study purposed to establish how the recognised transactions or events are classified and measured on initial recognition. All the initial adaptation activities under the cap-and-trade schemes in the agricultural sector are coded and classified based on the relationship between them. Figure 7.5 represent a semantic view of the various adaptation activities as viewed from **ATLAS.ti**.

Figure 7.5: Semantic view of the initial recognition activities



Source: Research data (2015)

7.4.1 Adaptation activities

The information in figure 7.5 can be tabulated based on how each concept is supported by the primary data. Table 7.9 outlines the adaptation activities and the number of quotations (groundedness) supporting each activity.

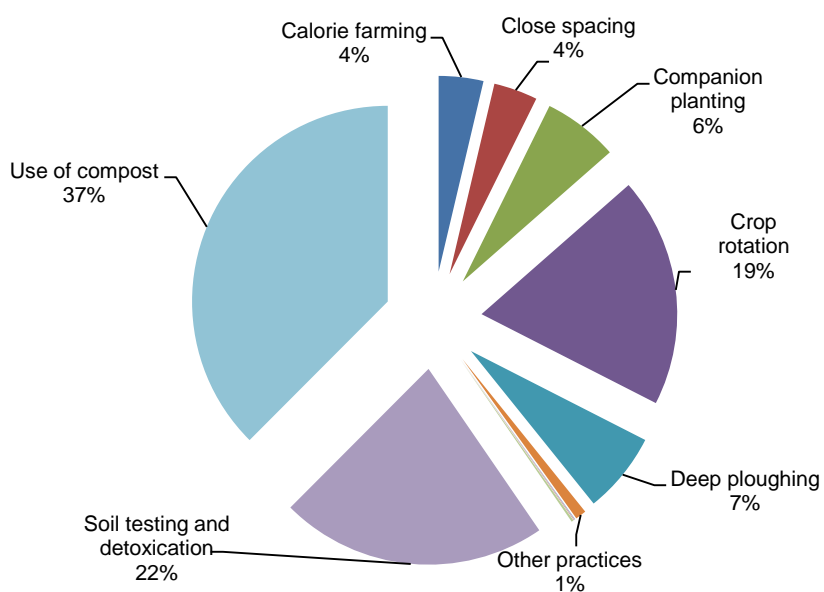
Table 7.9: Adaptation activities

Activity	Groundedness	Density
Calorie farming	61	4
Close spacing	60	3
Companion planting	103	2
Crop rotation	314	3
Deep ploughing	111	7
Inter cropping	15	5
Machinery for deep ploughing	1	3
Research and development cost	1	3
Sack farming to enhance surface area	3	1
Soil testing and detoxication	365	5
Use of composted manure and residual materials	621	5

Source: Research data (2015)

As table 7.9 shows, SALM involves diverse practices. The most significant practices are those that are well grounded or supported by most quotations. The information in table 7.9 can be presented pictorially, as shown in figure 7.6.

Figure 7.6: Adaptation activities



Source: Research data (2015)

As indicated in figure 7.6, the generalisation can be made that 37% of adaptation activities involve the use of compost, as this is the most grounded adaptation activity, followed by soil testing and detoxication at 22%. Another significant adaptation activity is crop rotation, which is represented by 19% of all adaptation activities supported by the data. Crop rotation includes the practice of planting legumes (nitrogen fixing crops), tubers such as cassava, onions and potatoes, which double up as alternatives to deep ploughing. A surprise observation was that farmers do not engage in research and perhaps rely on research conducted by the project sponsor and other government agencies. However, as discussed in chapter 3, the focus of this study is on the implications that adaptation activities have for the accounting process.

7.4.2 Materiality threshold

The purpose of this section was to establish the level at which an initial recognition activity meets the recognition threshold. According to the farmers, SALM practices embrace activity-based monitoring (ABM). Consequently, any activity undertaken is monitored separately and any related cost accumulated. This is because such adaptation activities have an impact on the verification of carbon sequestration and increase the productivity of the biological asset. Consequently, it can be argued that all activities being monitored under the KACP and their related costs are material and therefore merit recognition for accounting purposes.

7.4.3 Classification on initial recognition

Classification decisions are as important as is the recognition decision. The researcher intended to determine how the preparers of financial statements classify the various cap-and-trade adaptation activities that they monitor. The classification decision requires the preparer of financial statements to exercise significant judgement and discretion.

Consequently, the initial classification was, notably, the area with the most diverse practice, with many farmers accumulating the cost and accounting for the cost as a deferred adaption

cost, while others added the cost to the value of land or the underlying biological asset. However, for the purpose of this study emphasis was placed on the following classification.

7.4.3.1 Intangible assets

Intangible assets are those assets that do not have a physical form. The purpose of this section was to determine that element of cost that preparers of financial statements prefer to classify as an intangible asset.

Table 7.10: Adaptation activity classified as intangible asset

Activity	Groundedness	Density
Deep ploughing	111	7
Soil testing and detoxication	365	5
Use of compost	621	5

Source: Research data (2015)

Table 7.10 indicates that the cost of composting is the most common element that is classified as an intangible asset. As indicated in section 7.4.3.3, it can thus be inferred that a reclassification from inventories to intangible assets takes place when the compost is applied to tilled land. Another element that farmers prefer to classify as an intangible asset is the cost of soil testing and detoxication. The cost of deep ploughing was also classified as an intangible asset and also happens to have the highest density or link to other codes. An interesting finding was that farmers use tuber crops such as cassava as an alternative to deep ploughing.

7.4.3.1.1 Basis of measurement on initial recognition

The purpose of this section is to determine the basis for measuring initial adaptation activities that are classified as intangible assets.

Table 7.11: Basis of measurement of intangible assets

Basis of measurements	Groundedness	Density
Historical Cost/replacement cost	639	4
Value in use	10	5

Source: Research data (2015)

Table 7.11 indicates that the most common basis of measurement is historical cost or replacement cost. An interesting finding is that farmers use the replacement cost of fertiliser that would have been utilised as a proxy for historical cost, particularly in relation to the measurement of composted manure. However, the number of preparers of financial statements who mentioned the application of value in use was insignificant.

7.4.3.2 Property, plant and equipment

The purpose of the section was to determine the elements of adaptation activities that are classified as property, plant and equipment.

Table 7.12: Adaptation activities classified as property, plant and equipment

Activity	Groundedness	Density
Machinery for deep ploughing	10	3
Special enhancing greenhouse	40	4
Manure composting chamber	219	6

Source: Research data (2015)

As indicated in table 7.12, the most supported adaptation activity is the composting chamber, with 219 quotations linked to it. According to the preparers of financial statements, special structures must be constructed to enhance the carbon composition of the compost. The compost must be prepared using special procedures as required by verified carbon standards. A few farmers talked about greenhouses structures with the capacity to trap carbon from the atmosphere or prevent the carbon from the crop from diffusing into the atmosphere. In some isolated cases, farmers have acquired machinery that can be

employed for deep ploughing and which is also hired out to other farmers in order to reduce idle capacity.

7.4.3.2.1 Basis of measurement on initial recognition

The purpose of the section was to establish the basis of measurement applied to the element classified as property, plant and equipment.

Table 7.13: Initial measurement of property, plant and equipment

Basis of measurement	Groundedness	Density
Revaluation (fair value)	18	9
Historical cost	396	4
Residual valuation method	56	3
The cost of replacement	4	4
Value in use	10	5

Source: Research data (2015)

From table 7.13 it can be observed that historical cost is the most commonly used basis of measurement and was supported by 396 quotations. There were some isolated cases where residual valuation, revaluation and value-in-use methods were applied. The farmers who supported residual valuation methods argued that certain structures, such as compost silos and greenhouses, do not have a standalone value and must be viewed within the context of the farming activities they support, which is obviously a subsequent measurement decision. The farmers who supported revaluation methods were not in a position to justify the basis for establishing the market value.

7.4.3.3 Inventories

The purpose of this section was to establish the practices that preparers of financial statements classify as inventories.

Table 7.14: Adaptation activities classified as inventories

Activity	Groundedness	Density
Seed and seedling	466	1
Agricultural produce	105	3
Compost material	670	2

Source: Research data (2015)

From table 7.14 it can be observed that composted materials are most classified as inventory followed by seeds and seedlings. The farmers explained that the practice of hoarding harvested produce was necessary in order to realise good market prices. An interesting observation was that some farmers do not classify harvested agricultural produce as inventory regardless of the length of time the inventories are held from point of harvest to point of sale. Instead, the farmers prefer to account for the harvested produce at the point of sale on a cash basis. This emphasis of recognition on cash basis is consistent with the finding in section 7.3.2. This accounting practice is contrary to the accounting standards requirements, which recommends agricultural produce be recognised at the point of harvest (IASB 2013a:1730).

7.4.3.3.1 Valuation of inventories on initial recognition

The purpose of this section was to establish the factors that the preparers of financial statements consider when determining the fair value of agricultural produce at the point of harvest.

Table 7.15: Factors affecting valuation of inventories

Factor	Groundedness	Density
Aggregation and commercialisation	211	3
Increase productivity	417	6
Increased market prices	201	2
Post-harvest losses	164	2
Marketing process	167	4

Source: Research data (2015)

When it comes to the initial recognition of agricultural produce, there are several factors that influence the value to be recognised. As indicated in table 7.15, the main factor that is taken into consideration is productivity, as supported by 417 quotations. Productivity determines the supply of agricultural produce to the principal market and, if there is an oversupply or glut, the market prices will be suppressed. Productivity is more critical for perishable produce with a shorter shelf life. Other factors considered include aggregation where groups of farmers market their products collectively in order to combine their efforts to access the market.

The market price premium on organic products and the changes in the marketing process also affect the fair value less cost to sell, as required under IAS 2, *Inventories* (IASB 2013:A1134). Additionally, the reduction in post-harvest losses determines the value of inventories at the point of harvest. The argument here is that the markets for most agricultural produce do not have a clear price discovery mechanism and a publicly quoted market price may not be available.

7.4.3.4 Financial instrument

The purpose of this section was to establish the process of generating VCUs and the point at which they should be accounted for.

Table 7.16: Process of recognition of verified carbon units

Step/process	Groundedness	Density
Carbon revenue generation	112	4
Financial instruments	369	5
Issue of certificate	3	2
Monitoring of emission	2	3
Validation of project activities	196	3
Verified carbon units	48	5

Source: Research data (2015)

From table 7.16, it can be observed that most respondents supported the recognition of financial instruments through the process of adaptation activities; as supported by 369 quotations. However, there was divided opinion on the point at which revenue should be recognised, with some arguing that it should be recognised immediately the project activities are validated. Other preparers, on the other hand, argued that VCUs should not be accounted for until the cash proceeds from the sale of VCUs are received. Equally, some preparers of financial statements argued that the amount should be treated as accretion of the related cost whether classified as intangible assets or property, plant and equipment, as opposed to financial assets.

7.4.3.5 Biological assets

The purpose of this section was to determine the practices that the preparers of financial reports consider to be biological assets.

Table 7.17: Adaptation activities classified as biological assets

Activity	Groundedness	Density
Agroforestry	15	6
Close spacing	60	6
Companion planting	103	5
Crop rotation	314	6
Growing of animal feeds	10	7
Seed and seedling selection	466	6
Calorie farming	61	4

Source: Research data (2015)

As illustrated in table 7.17, various practices are recognised as biological assets. The most common is seed and seedlings after planting or transplanting, which is a transfer from 'inventories'. Other adaptation activities attributed to biological assets include crop rotation, companion planting, calorie farming and close spacing. Contrary to expectation, agroforestry is not a common practice under the KACP.

7.4.3.5.1 Valuation on initial recognition

Respondents stated unanimously that the initial recognition of biological assets is at cost, that is, the fair value of seed and seedlings transferred from inventories as required under IAS 41, *Agricultural activities* (IASB 2013:A1135). There were a few practices where the cost of compost and the cost of cultivation were included in the initial cost of biological assets.

7.4.3.6 Expense

The purpose of this section was to determine the element of cost that can be written off as expense.

Table 7.18: Elements of cost initially expensed

Element	Groundedness	Density
Activities monitoring cost	209	3
Finance cost	53	2
Monitoring of emission	2	3
Project design document	6	12
Registration with CDM	1	3

Source: Research data (2015)

As indicated in table 7.18, the cost of monitoring the adaptation activities and finance costs are the most common items that are treated as an expense. Other items that are expensed include the cost of project registration and documentation. Although a few farmers argued about the cost of monitoring emissions, it is important to highlight that, under the KACP it is a requirement to monitor activities.

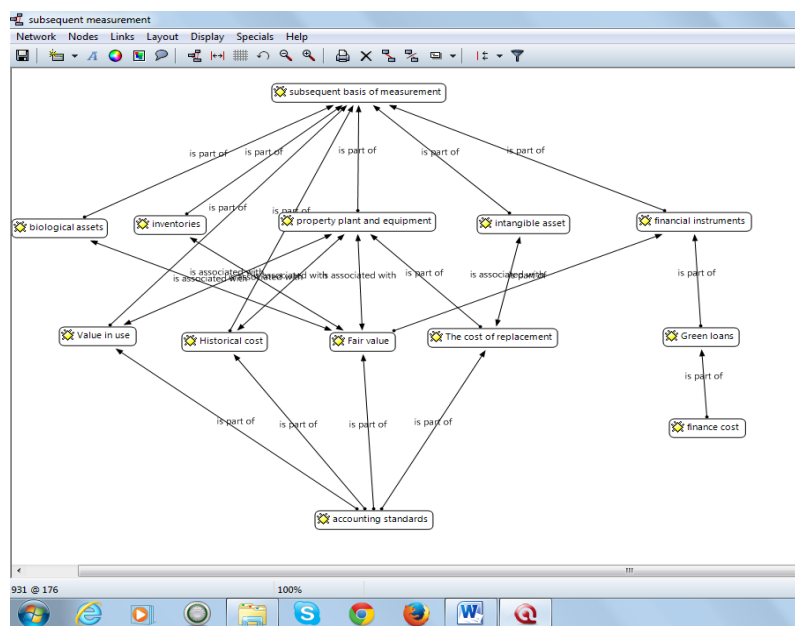
7.5 MEASUREMENT AFTER INITIAL RECOGNITION

The purpose of the second objective was to identify the subsequent measurement for cap-and-trade schemes adaptation activities in the agricultural sector. The subsequent measurement decision is as important as the initial measurement decision, because it helps to review the amount initially recognised and to guarantee that the financial statements

reflect a true and fair view. In addition, the measurement choice can significantly influence the content of the financial statements.

It was observed that the residual valuation method becomes more significant at the point of subsequent measurement because each class of asset must be assigned a value. Consequently, the value of the agribusiness as a going concern is determined. Then, the determined value is allocated to the assets involved in the agribusiness, starting with the assets whose market value is readily determinable and then moving to those assets whose market value is more opaque. The following is a semantic view of the various assets whose values are intertwined with biological assets and the common basis of measurement applied.

Figure 7.7: Semantic presentation of subsequent basis of measurement



Source: Research Data (2015)

It is important to mention that the assets of a farming business generate a single stream of cash flows. Consequently, the agribusiness value which is determined is a conglomerate figure that has to be disaggregated. The value of the agribusiness is determined by discounting the future cash flows expected from the biological assets as discussed in section 7.5.1. Under the residual valuation method, the value of the separately identifiable assets is

determined and subtracted from the value of the agribusiness in order to establish the value of the biological assets.

7.5.1 Valuation of biological assets

While the valuation of most of the other assets is straight-forwards, the valuation of biological assets involved in cap-and-trade schemes presents some difficulties owing to the number of factors that must be considered. For the purpose of this study the focus was placed on productivity, premium on market prices, post-harvest losses, cost to sell, borrowing cost, maturity duration and the carbon capture potential (extracts from the survey data are attached as Appendix VI). The data was analysed using descriptive statistics, as summarised in table 7.19.

Table 7.19: Factors that influence the value of biological assets used in cap-and-trade schemes

Parameter	Increase in output	Premium on market price	Decrease in post-harvest losses	Decrease in cost to sell	Decrease in borrowing rate	Maturity duration ratio	
Sample size (n)	52	52	52	52	52	52	
Average mean (%)	17.46	12	7.94	4.98	1.17	0.58	
Standard deviation (%)	5.42	3.48	2.08	2.23	0.61	0.093	
Standard error of the mean (%)	0.72	0.48	0.28	0.31	0.08	0.013	
99% confidence limits	Upper limit (%)	19.40	13.24	8.68	5.78	1.39	0.62
	Lower limit (%)	15.52	10.75	7.19	4.18	0.95	0.55

Source: Research data (2015)

7.5.1.1 Increase in output

The most significant factor that influences the way in which the value of biological assets used in cap-and-trade schemes is determined is their productivity. As indicated in table 7.19, adaptation activities increase the output of biological assets under cap-and-trade schemes by an average of 17.5% with a standard deviation of 5.42%. Additionally, the

standard error of the mean was 0.72% thus giving a confidence interval range of 15.5 to 19.4%, with a 99% degree of confidence.

7.5.1.2 Premium on market prices

The biological assets are measured at each reporting date at fair value less estimated point of sale cost. The fair value is a market-based measurement, and for biological assets the market value is imputed from the market price of the expected agricultural produce. Consequently, it was important to assess the significance of SALM practices in terms of market prices. As expected, the agricultural produce under SALM practices are organic and attract a premium market price. As indicated in table 7.19, the premium on market price was ascertained to be 12%, with a standard deviation of 3.48%. Equally, the standard error of the mean was ascertained to be 0.48%, indicating that the price premium will range from 10.75 to 13.24% at a 99% degree of confidence.

7.5.1.3 Decrease in post-harvest losses

Agricultural produce harvested through SALM practices are more resilient and have a longer shelf life after harvesting, which is expected to reduce post-harvest losses. As indicated in table 7.19, post-harvest losses decrease by an average of 7.9% with a standard deviation of 2.08%. In addition, the standard error of the mean was ascertained to be 0.28% thus giving an interval range of 7.19 to 8.68% at a 99% degree of confidence.

7.5.1.4 Decrease in cost to sell

Since biological assets are valued at fair value less cost to sell, it was important to assess the impact of cap-and-trade scheme practices on the cost to sell. The farmers generally agreed that the organic agricultural products are readily acceptable, which alters the marketing and distribution channels. In some cases, farmers argued that their produce is booked in advance long before the harvest. Consequently, the cost to sell decreases by an average of 4.98% with a standard deviation of 2.23%, as indicated in table 7.19. A test of

significance indicated that the standard error of the mean was 0.31%, giving an interval range of the reduction in cost to sell of 4.18 to 5.78% at a 99% degree of confidence.

7.5.1.5 Change in finance costs

Where the biological assets are long term, the expected future cash flows are discounted at a market determined interest rate. In the absence of a market determined rate, the cost of capital is used to discount the future cash flows. It was therefore critical to assess the impact of green loans on an entity's cost of capital. According to table 7.19, the average discount on interest rate was 1.17% with a standard deviation of 0.61%. The standard error of the mean was 0.085% which gives an interval range of 0.95 to 1.39% at a 99% degree of confidence. Although the financial institutions have preferential credit terms for the agricultural sector, there are some financial institutions which give an impressive discount on climate-smart agricultural practices such as SALM.

7.5.1.6 Maturity duration ratio

The maturity duration determines the frequency with which cash flows are expected. A shorter maturity duration for biological assets means more harvests and shorter cash flow cycles. As indicated in table 7.19, the maturity duration has a ratio of 0.58 with a standard deviation of 0.093. This increases the number of cash flows that must be discounted in estimating the value of biological assets. A test of significance indicates a standard error of the mean of 0.013, which gives an interval range of 0.55 to 0.62 at a 99% degree of confidence.

7.5.2 Carbon revenue return on investment

This study also sought to establish whether there is any relationship between cost of adaptation and the carbon revenue. This is an assessment of the carbon capture potential which, if verified, will be allocated carbon credits, which are tradable in the future.

Table 7.20: Carbon returns on investment

Parameter	Carbon revenue to change in cost structure	
Sample size (n)	52	
Average mean (%)	6.32	
Standard deviation (%)	3.10	
Standard error of the mean (%)	0.43	
99% confidence limits	Upper limit (%)	7.43
	Lower limit (%)	5.21

Source: Research data (2015)

As observed from table 7.19, an incremental change in cost of adaptation increases carbon revenue by an average of 6.32% with a standard deviation of 3.10%. This is a clear indication that adaptation activities are an investment which provides a return based on how well it is invested.

7.5.3 Productivity returns on investment

SALM adaptation activities seek not only to generate carbon revenue but also to increase productivity. This section sought to determine the relationship between an increase in productivity and an increase in cost, as depicted in table 7.21.

Table 7.21: Productivity returns on investment

Parameter	Productivity to change in cost structure ratio	
Sample size (n)	52	
Average mean (%)	20.4	
Standard deviation (%)	2.85	
Standard error of the mean (%)	0.3	
99% confidence limits	Upper limit (%)	21.45
	Lower limit (%)	19.41

Source: Research data (2015)

From table 7.21, it can be observed that a change in cost increases productivity by 20.4% with a standard deviation of 2.85%. This is a clear indication that there are returns on

investment, because designing better farming methods increases production. The standard error of the mean is 0.3%, thus giving an interval range of between 21.45 and 19.41% at a 99% degree of confidence.

7.6 PRESENTATION AND DISCLOSURES

The third objective of this study was to identify the disclosure practices for cap-and-trade scheme adaptation activities in the financial statements of entities operating in the agricultural sector.

7.6.1 Process of gathering information

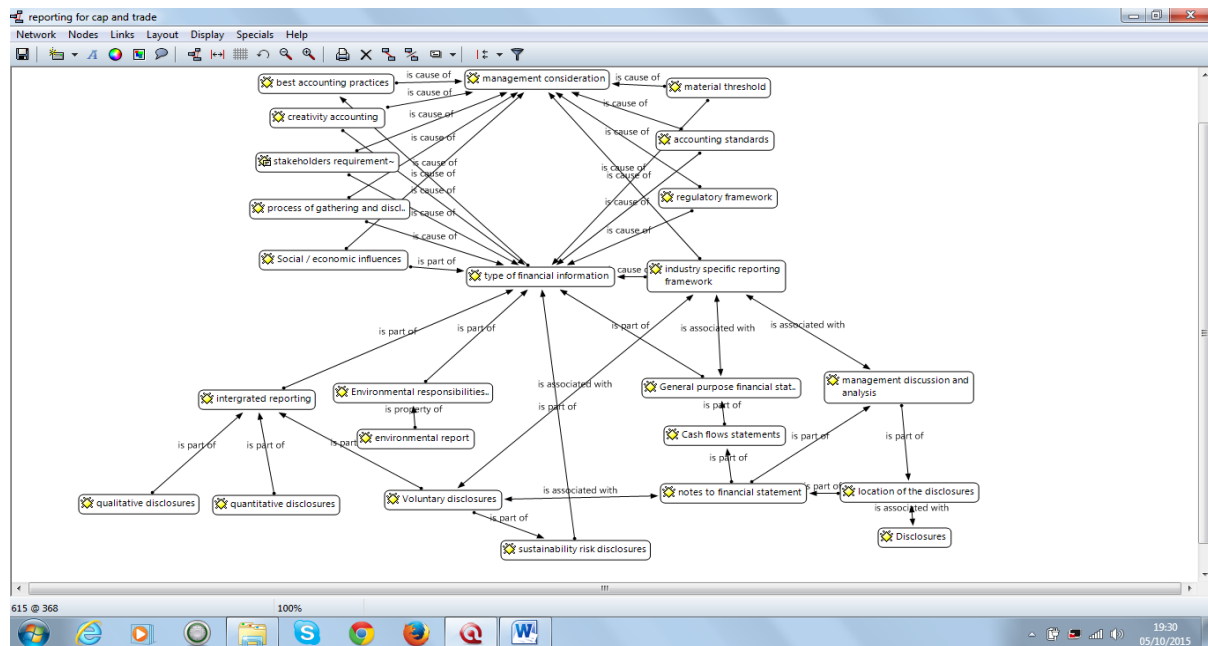
The purpose of this section was to establish the procedures management has put in place for gathering relevant information for disclosure in the financial statements. It is important to note that the researcher focused specifically on entities that prepare general purpose financial statements. These entities must have a system for recognising, measuring and disclosing financial transactions. It was therefore established that all the entities had procedures in place for recording the financial transactions relating to the agribusiness operations.

In regard to cap-and-trade scheme adaptation activities, the farmers maintained parallel records in the prescribed format that were largely non-financial. For example, records included the quantity of compost applied, the crop spacing, the ratio of companion crops and the ratio of high calorie crop, among others. In some cases, the records of adaptation activities, which entail activity-based monitoring, differed from the financial records. For instance, the financial records would indicate the purchase of pesticides while the cap-and-trade records indicated the effectiveness of the companion crop in relation to controlling pests.

7.6.2 Nature of disclosures and the preferred location

The purpose of this section was to establish the nature of the information disclosed and where the information should be disclosed.

Figure 7.8: Semantic layout of disclosure practices



Source: Research data (2015)

The purpose of this section was to establish the nature of the information disclosed and where the information should be disclosed.

The semantic view presented in figure 7.8 can be tabulated based on the way it is linked to the quotations, as shown in table 7.22.

Table 7.22: Disclosure practices

Type of disclosure	Groundedness	Density
Environmental report	43	1
Integrated reporting	42	4
Notes to financial statement	1	5
Management discussion and analysis	40	3

Source: Research data (2015)

This area presented a certain amount of difficulty with the majority of the preparers of financial statements demonstrating a lack of commitment to any course of action, as indicated by the low number of quotations. However, as indicated in table 7.22, environmental reporting received the highest support followed by integrated reporting and management discussion and analysis in that order. Contrary to expectation, the vast majority of the farmers argued that they use a template approach to preparing the notes to the financial statements, which makes no provision for disclosure for cap-and-trade scheme activities.

7.6.3 Nature of disclosures

The purpose of this section was to determine the nature of the disclosures that the preparers of financial statements make in the financial statements.

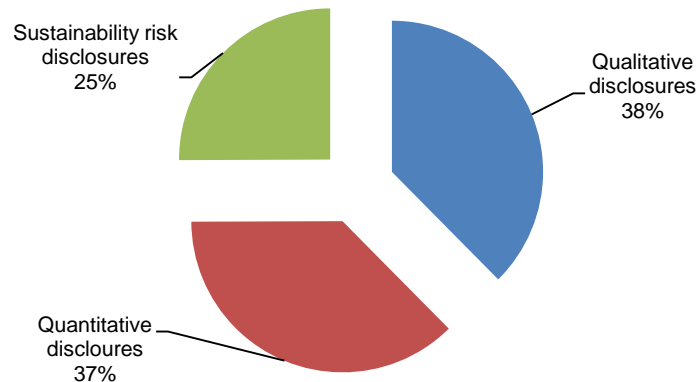
Table 7.23: Nature of disclosures

Nature of disclosure	Groundedness	Density
Qualitative disclosures	162	1
Quantitative disclosures	161	1
Sustainability risk disclosures	108	2

Source: Research data (2015)

The information in table 7.23 can be presented pictorially as shown in figure 7.9.

Figure 7.9: Nature of disclosures



Source: Research data (2015)

7.6.3.1 Qualitative disclosures

Qualitative disclosures are narratives about an entity's strategic commitment and its policy on environmental care. Such disclosures also articulate the entity's commitment to continue operations under the KACP. Since the disclosure of qualitative information is voluntary, most of the entities highlighted the success of the adaptation activities from a management perspective; this was supported by 38%, as indicated in figure 7.9. None of the entities commented on the failures of or shortcomings in their adaptation activities.

7.6.3.2 Quantitative disclosures

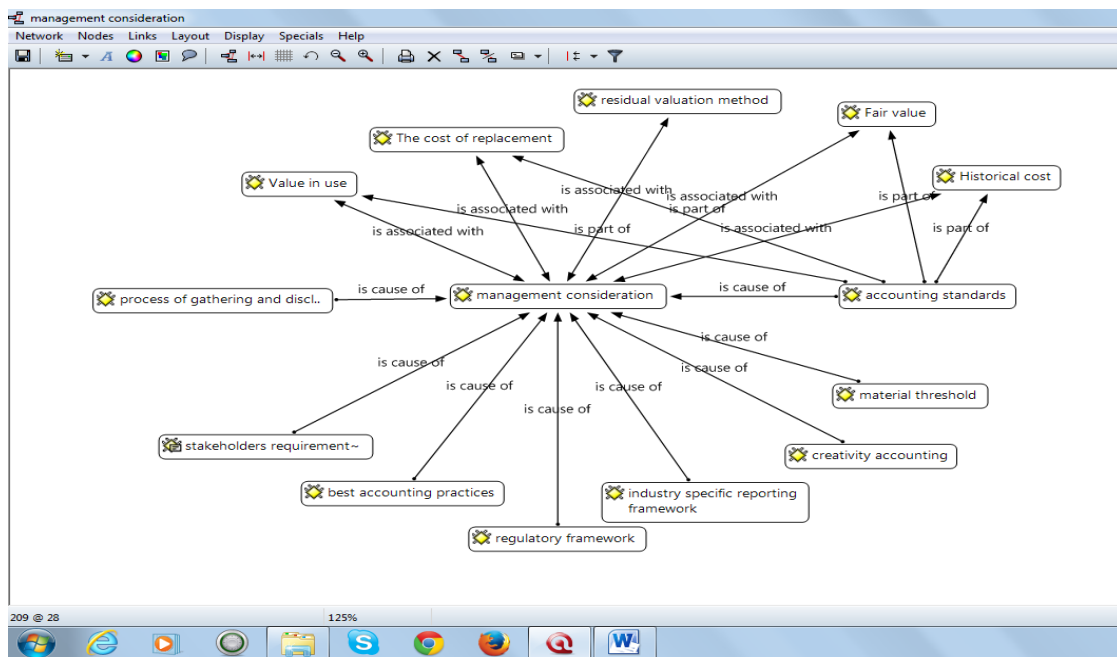
Quantitative disclosures are disclosures relating to the measurable parameters of the adaptation activities and the results of these activities. Such disclosures were noted to include areas under the adaptation activities, target area and objective timelines. As indicated in figure 7.9, approximately 37% of the respondents argued in favour of quantitative disclosures. Quantitative disclosures also included information about the ratios of biological assets cultivated and the expected target carbon sequestration or removal from the atmosphere. Other quantitative disclosures included the expected increase in

production, the verified carbon certificates received, the estimated revenue expected to be generated and an environmental performance index.

7.6.4 Management consideration

The purpose of this section was to establish the motivation of management to exercise discretion in the choice of a particular recognition, measurement and disclosure practice.

Figure 7.10: Semantic layout of management consideration



Source: Research data (2015)

The semantic view in figure 7.10 can be tabulated by extracting the critical issues of interest, as shown in table 7.24.

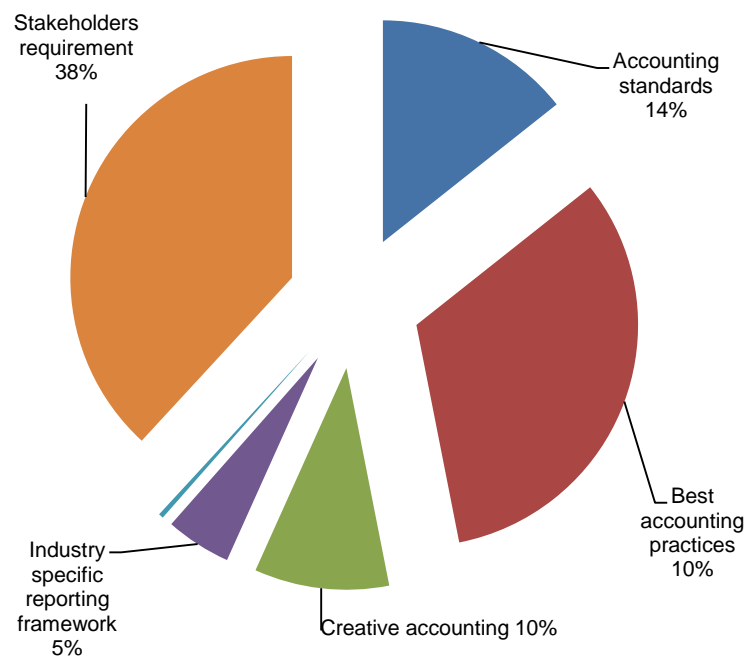
Table 7.24: Management consideration

Consideration	Groundedness	Density
Accounting standards	162	7
Best accounting practices	368	2
Creativity accounting	111	2
Industry specific reporting framework	54	8
Regulatory framework	4	2
Stakeholders requirement	431	2

Source: Research data (2015)

The information in table 7.24 can also be presented as a pie chart as shown in figure 7.11.

Figure 7.11: Management consideration



Source: Research data (2015)

As it can be observed from figure 7.11, numerous factors were identified as influencing the management exercising of discretion. The factors that are considered by management are discussed briefly in sections 7.6.4.1 to 7.6.4.6.

7.6.4.1 Stakeholders' requirements

Figure 7.11 indicates that management's main consideration is the conditions imposed by stakeholders, particularly the project sponsor, this was supported by 38% of the quotations. This is as a result of the power that the respective stakeholders have to demand such information. This perhaps explains why farmers maintain records about their adaptation activities separately and parallel to their accounting information system that in some cases conflict with their financial records.

7.6.4.2 Best accounting practices

The other consideration here is the need to provide useful information in the general purpose financial statements. This is perhaps driven by management commitment to transparency and accountability. The preparers of financial information therefore make voluntary disclosures based on the need to enhance the usefulness of the financial statements; this was supported by 33% of the quotations.

7.6.4.3 Accounting standards

This involves compliance with the requirements of international accounting standards. Although there is no specific requirement pertaining to adaptation activities, the preparers of financial statements are required to formulate accounting policies by analogising the requirements of accounting standards that govern related issues.

7.6.4.4 Impression management and creativity accounting

This involves the use of the content of financial statements for impression management, in terms of which the financial statements are tailored to present a point of view that is perceived as desirable for users. Although this compromises reliability, the preparers of financial statements argue that impression management helps to inspire stakeholder confidence, resulting in favourable decisions that give the entity impetus for future survival. The forms of impression management identified mainly include the application of a fair value

estimate to biological assets, the choice of expenditure to capitalise and the description of line items in the financial statements.

7.6.4.5 Industry-specific reporting framework

This involves benchmarking the reporting status with peers in the industry or demonstrating leadership in terms of reporting. Although there is no codified reporting framework for the agricultural sector, different entities have demonstrated passion and leadership in setting the scope and content of financial reports, particularly on matters of environmental care.

7.6.4.6 Regulatory framework

Whatever the legal nature of the entity, the regulatory framework, does not prescribe any recognition, measurement or disclosure requirements. Instead, the requirement mandates the entity to comply with international accounting standards.

7.7 DISCLOSURES BY LISTED ENTITIES IN THE AGRICULTURAL SECTOR

The purpose of this section was to establish how listed entities disclose information about their environmental activities generally and more specifically in terms of their emissions and carbon trading activities.

Table 7.25: Environmental disclosures in the agricultural sector

Disclosure type/location	Sustainability and environmental care		Carbon			
	foot print and measurement	related revenue	related cost	capture potential	risk policy	
Risk management disclosures	2%	0%	0%	0%	0%	20%
Management commentary	78%	5%	0%	0%	0%	0%
Directors responsibility	40%	0%	0%	0%	0%	0%
Values and mission	0%	0%	0%	0%	0%	0%
Separate report	5%	0%	0%	0%	5%	0%

Source: Research data (2015)

The agricultural sector, the world over, is not considered to be a heavy source of carbon emissions. Consequently, there are no regulations governing environmental practices in the agricultural sector. The result is that environmental mitigation activities in the agricultural sector remain largely voluntary. This is demonstrated by the way in which entities in the agricultural sector that are listed in capital markets make disclosures in the financial reports. As indicated in table 7.25, approximately 78% of the financial reports analysed disclosed information about sustainability and environmental care in the management commentary. The content analysis also indicated another 40% that emphasised their commitment to mitigate their environmental impact in the directors' responsibility statement.

The listed entities did not make any quantitative disclosures about their carbon footprint. This can be explained by the fact that the regulated heavy carbon emitters target the carbon offsets of small-scale commercial farmers, because this is more practical for demonstrating the additional impact in carbon sequestration. This leaves the listed entity with no specific interest in assessing its carbon footprint or undertaking the requisite procedures of registering any sequestration projects it may undertake.

Equally important is the fact that entities with a policy on sustainable agricultural practices have capped their carbon emissions, as indicated by the 20% disclosures of carbon risk policy in table 7.25. Such entities have not engaged in trading practices. The most common cap practice is setting baselines from which efficiency and improvement are measured. Another interesting observation is that the entities have embraced these measures on a voluntary basis, as part of their wider social and environmental responsibilities. The fact that the practices are voluntary has resulted in very diverse disclosures practices.

7.8 SUMMARY AND CONCLUSIONS

The field survey that was undertaken for this research involved two categories of respondents: the preparers of financial statements and the users of financial statements. The key concepts from the data (codes) were identified and linked to quotations in order to

establish their groundedness. Concepts that were well supported by the data formed the bases for generalisation. The accounting process entails recognition, measurement and disclosure as guided by materiality. It was established that all adaptation activities undertaken are monitored separately and the related costs incurred are accumulated. Therefore, such adaptation activities are deemed material for accounting purpose because they have an impact on the productivity of biological assets and are monitored for the verification of carbon sequestration.

The initial classification was notably the area with the most diverse practice, with many farmers accumulating the cost and accounting for it as a deferred adaptation cost, while others added the cost to the value of land or the underlying biological asset. The most critical aspect of adaptation activities is the use of compost and this creates an accounting recognition issue. Composting not only helps to create carbon sink but also increases productivity. It was also established that the most appropriate initial classification was intangible assets measured at cost. Several other initial recognition and measurement issues included soil testing and detoxication, crop rotation and calorie farming.

The measurement choice that is made after initial recognition can significantly influence the content of the financial statements. It was observed that the residual valuation method becomes more significant at the point of subsequent measurement because each class of asset must be assigned a value. Consequently, the value of the agribusiness as a going concern is determined, and the value is then allocated to the individual assets, starting with the assets whose market value is readily determinable.

In relation to disclosure, environmental reporting was recognised as the best approach to communicate an entity's initiative to reduce emissions. Contrary views supported integrated reporting and management discussion and analysis. Contrary to expectation the vast majority of the farmers argued that they use a template approach to prepare the notes to the financial statements. The template made no provision for disclosure for cap-and-trade

scheme activities. This explanation was given to justify the low level of integration of financial and non-financial information that is appropriate to present a true and fair view of an entity's state of affairs. The next chapter provides a summary of the research in order to draw conclusions as a basis for making recommendations.

Chapter 8

Summary, conclusions and recommendations

8.1 INTRODUCTION

This chapter will present a brief overview of the study, which will be followed by a summary of the findings as a basis for making a number of conclusions and recommendations. This chapter will also highlight the contribution of the study to the accounting discourse. The last part of the chapter will discuss the limitations of the study and make suggestions for areas for further research.

8.2 SUMMARY OF THE RESEARCH

The international community has made a concerted effort to address the problems of climate change and food security. In pursuit of these efforts numerous measures and innovations that have been undertaken were discussed in detail in sections 2.4.1 to 2.4.4, and can be summarised as follows:

- Carbon taxes and penalties
- Emission quota (allowances allocated)
- Base-line (input or output production or service efficiency)
- Voluntary carbon offsets (industry or sector initiatives)

Although all the measures and innovations are geared to rewarding clean methods of production, the global response to climate change leans towards a market-based mechanism which is referred to as the carbon market. Following the near collapse of the European Union carbon allowances market in 2013, the voluntary carbon market has gained prominence. The voluntary carbon market has seen entities that are not heavy emitters participating in sustainable development practices.

This study focused on the agricultural sector because it is within this sector that the global twin problems of food insecurity and climate change can be addressed simultaneously. The agricultural sector accounts for 14% of global anthropogenic greenhouse gas emissions, and when upstream activities such as the application of chemical fertilisers and downstream activities such as bio-energies are considered, emissions increase to 30%. The twin issues of climate change and food insecurity can be addressed through the use of sustainable agricultural practices that can be designed as a cap-and-trade mechanism.

Cap-and-trade schemes are a market-based policy tool that places a cap or baseline on the amount of emissions emanating from a specified source, with the objective of reducing the overall emissions of that specified source or industry. Although there are no such regulatory caps for the agricultural sector, the industry remains a major player in the voluntary carbon market generally and, more specifically, as a source of low cost carbon offsets for the heavy emitters of carbon.

8.2.1 Revisiting the problem statement and objectives

A cap-and-trade scheme involves an entity changing its processes and undertaking certain adaptation activities. These adaptation activities, which are geared to generating tradable offsets, create a myriad of accounting issues as discussed in chapters 3 and 4. In order to sustain the usefulness of their financial reports, entities involved have to account for various cap-and-trade scheme adaptation activities in a standardised way. However, in the absence of sector-specific accounting guidelines, entities use the sustainability and environmental reports for impression management. This is where the presentation of carbon activities gives management an opportunity to frame the content of the financial statements. This happens particularly in the agricultural sector where operations are diverse and biological transformation is least understood as discussed in sections 5.8.1 to 5.8.5.

This study investigated the current practices and made recommendations on best practices for recognition, measurement and reporting for cap-and-trade schemes in the agricultural sector. The research was guided by the following specific objectives:

- to identify the initial recognition criteria for cap-and-trade schemes in the agricultural sector,
- to identify the subsequent measurement for cap-and-trade schemes in the agricultural sector, and
- to identify the disclosure needs for cap-and-trade schemes in the agricultural sector.

8.2.2 Theoretical perspective

Cap-and-trade schemes are connected to an entity's sustainability activities. There are various ways of articulating sustainability performance, including integrated financial reports which contain information on an entity's economic, environmental, social and governance performance as discussed in sections 2.2.2 to 2.2.4. Equally important are the performance indicators, which should be combined to form a sustainability performance index.

In respect to the agricultural sector, sustainable agricultural land management (SALM) practices create significant value within the entity's processes. Consequently, a sustainability reporting framework should be developed that can form the basis for preparing sustainability reports that can inspire public confidence. Furthermore, the production of such reports is largely voluntary, which presents the management with the possibility of impression management by presenting only the positive aspects and withholding the negative.

The nature and content of financial reports is driven by the need to provide useful information to various stakeholders as an aid to decision-making. The broad multi-stakeholder network and its interests give sustainability reporting both a theoretical and a practical approach, while the purpose of financial reporting depends on its institutional

context. The concept of sustainability, where an entity embraces social and environmental objectives alongside the economic objectives, is complicated by external and internal factors. Consequently, as discussed in sections 2.6.1 to 2.6.3, this study was guided by three theoretical concepts, which formed the foundation of all the arguments, namely, institutional, stakeholder and legitimacy accounting theories.

8.2.3 Overall research design

A constructivist/interpretivist research approach, which is a branch of the qualitative research paradigm, was adopted for this study because the researcher believes that reality and meaning in this study are socially constructed through a cognitive process of interaction between the preparer and the users of financial statements. Further, the rationale for the choice of an exploratory methodology was informed by the need to explore data and formulate principles for accounting for cap-and-trade schemes in the agricultural sector.

The population of the study comprised all the farmers participating under the KACP as discussed in section 6.4.1. The data collected from the preparers of financial statements was triangulated with data obtained from the users of financial statements. The data was collected using systematic procedures, and then edited and cleaned before being analysed in order to form the basis for drawing conclusions.

8.3 CONCLUSIONS BASED ON EACH OBJECTIVE

In fact, for some items that satisfy the definitions of assets, liabilities, income and expenses, significant judgement was required to evaluate whether such items satisfied the recognition criteria. The initial recognition criteria are clearly stated in the conceptual framework for preparation and presentation of financial statements. However, it is important to note that initial recognition and classification depend not only on the nature of the asset, but also on the intended use of the asset in question.

In the agricultural sector, significant judgement is required to determine the timing of recognition and classification by virtue of the complexity of the underlying activities. The synergies between voluntary climate change adaptation and mitigation strategies in the agricultural sector further complicate the recognition and classification decision. Equally, the diverse adaptation activities clearly indicate that a single recognition criterion may not be applicable. This is further aggravated by the long-term nature of cap-and-trade schemes in the agricultural sector.

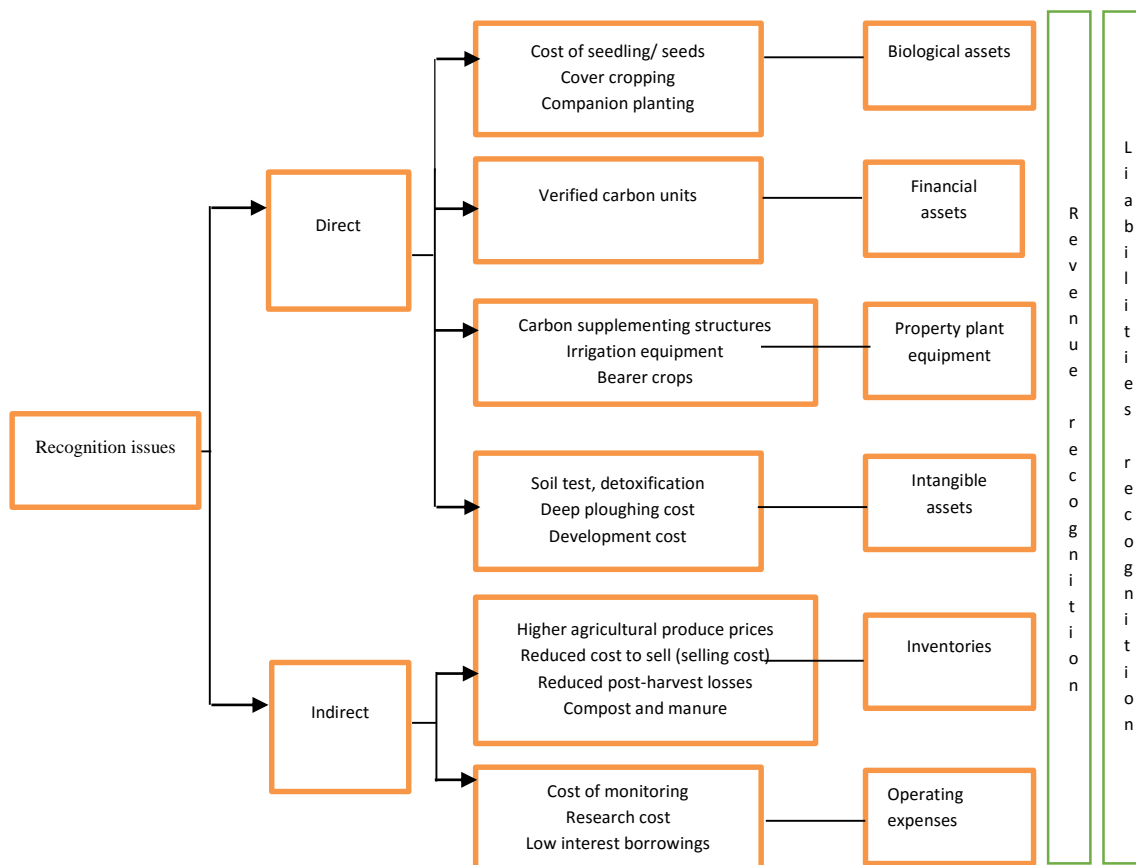
8.3.1 Initial recognition criteria for cap-and-trade schemes in the agricultural sector

There are two types of adaptation activities; adaptation activities that absorb carbon from the atmosphere (these are mainly agricultural activities), and adaptation activities that reduce or avoid emissions as a result of advanced technology and/or efficiency. To achieve the sequestration objectives, an entity must modify its business processes and undertake certain adaptation activities. The following is a summary of the range of initial activities that an entity can embrace:

- research and extension services to develop crops with higher nutrient use efficiency
- soil testing and detoxication
- timing of synthetic fertiliser application;
- reduced tillage which in turn reduces leaching,
- reliance on organic nutrients with strategies that synchronise nutrient release from organic sources with plant demand,
- multiple cropping systems, crop rotation and intercropping,
- agroforestry which involves planting trees in a cropping system to create carbon store, and
- landscape management such as planting shrubs and trees in buffer strips.

In order to be validated, each adaptation activity must be monitored and thus meet the materiality threshold. The researcher therefore argues that for accounting purposes, the adaptation activities must be recognised and classified from the date that monitoring commences. The following is a framework that can guide the recognition and classification decision in line with the research findings outlined in chapter 7.

Figure 8.1: Recognition framework



Source: Author (2016)

The initial recognition and classification decision is coupled with initial measurement. This study concluded that the historical cost basis of measurement or replacement cost is the most appropriate basis for measurement.

8.3.2 Subsequent measurement for cap-and-trade schemes in the agricultural sector

The subsequent measurement decision is as important as the initial recognition decision so as to adjust the values recognised initially to the best estimates of information available at the reporting date. This is because conclusions reached regarding measurement on initial recognition are tentative, and must be reassessed when their potential implications for re-measurement are considered. The subsequent measurement decision must be based on existing framework concepts, such as the objective of financial reporting and the qualitative characteristics of useful financial information, and should be guided by management's interpretation of what will reflect a true and fair view.

In relation to the agricultural sector, it is a fact that most of the value-creating processes take place within the agribusiness. These processes are further influenced by SALM adaptation activities. In addition, biological transformation processes means that fair value measurement estimation is best established at level 3, as discussed in section 4.4.3.1. Moreover, biological transformation process means that modified or unmodified historical cost will not provide reasonable estimation of the value of the agribusiness. Consequently, the preparers of financial statements are limited when selecting a measurement basis at each reporting date.

Furthermore, the farming business aggregates various units of accounts through the entire value chain, with the result that the residual valuation method would seem to be very appropriate as it involves estimating the cash flows of the entire agribusiness and then apportioning that value to each of the individual components. This apportionment starts with the assets with a carrying amount that can readily be determined, such as property, plant and equipment, intangible assets and inventories, which are also involved in the value creation chain. Carbon capture potential should be taken into consideration at the point where the farm-wide fair value is estimated.

This study embarked on developing a model that can be utilised in estimating farm-wide value. The model was discussed in detail in sections 4.5.1 to 4.5.5 but, at this point, it will be linked to the research finding.

8.3.2.1 Revisiting the model

The model developed in this research is intended to assist in the estimation of aggregate fair value for all assets engaged in cap-and-trade schemes in the agricultural sector, based on the cash flows expected from biological assets. The residual valuation method presents a challenge in terms of reporting a negative value for biological assets if all streams of cash flows are not taken into account.

The estimated fair value of biological asset (V_n) at level 3 was given by:

$$V_n = \sum_{i=0}^n \frac{\{(O_n - PHL_n + \Delta O_n + \Delta PHL_n) * (P_n + \Delta P_n) - (SC_n - \Delta SC_n)\}}{1 + (r_n - \Delta r_n)^{-n}} + r \cdot E((M - S)/M) - dS$$

The dependent variable of the research (V_n) is the estimated fair value of biological assets used in cap-and-trade schemes. The coefficient of the independent variables can be assigned values based on the findings of the research, as outlined in table 8.1.

Table 8.1: Independent variables

Variable	Explanation	Value
O_n	expected productivity output	1
ΔO_n	change in productivity due to adoption of SALM %	17.46
PHL_n	post-harvest losses, in a particular period ($O_n - PHL_n$)	1
ΔPHL_n	change in post-harvest losses %	(7.94)
P_n	market prices in that period	1
ΔP_n	market price premium %	12
SC_n	cost to sell	1
ΔSC_n	reduction in cost to sell %	(4.98)
R_n	is the normal discount rate	1
ΔR_n	is the discount rate related to green loans %	(1.17)
N	the accounting period	0.58
r	Carbon revenue to change in cost structure %	6.32
d	Productivity to change in cost structure ratio %	20.4

Source: Research data (2015)

When linked to the model, the parameters in table 8.1 provide the change value (Δ) and thus the model is condensed as follows:

$$V_n = \sum_{i=0}^n \frac{\{(O_n + 0.1746O_n - PHL_n + 0.0794PHL_n) * (P_n + 0.12P_n) - (SC_n - 0.0498SC_n)\}}{1 + (r_n - 0.0117r_n)^{-0.58n}} + 0.0632E((M - S)/M) - 0.20S$$

When the common factors are combined, the model can further be condensed as follows:

$$V_n = \sum_{i=0}^n \frac{\{(1.1746O_n - 0.9206PHL_n) * (1.12P_n) - (0.9502SC_n)\}}{1 + (0.9883r_n)^{-0.58n}} + 0.0632E((M - S)/M) - 0.204S$$

Although a market-based measurement objective has important qualities that make it superior to entity-specific measurement objectives, at least on initial recognition, the management of various organisations will continue to exercise judgement and select an appropriate method of accounting for SALM activities and the related VCUs. Consequently, the model above must be used with some caution and only when certain conditions are met.

The assumptions under which the model is applicable are thus outlined as follows:

- the entity has standardised post-harvest handling procedures;
- the entity has the skills required for the application and preparation of financial statements in compliance with accounting standards;
- the entity is exposed to stable climatic conditions and are not reliant on rain-fed agricultural practices; and
- market prices are relatively stable in any specific review period.

The implementation of the fair value measurement at level 3 has the potential to reflect the preparer's perspective on the financial performance and financial position as discussed in section 7.6.4.4. Since it is impractical to regulate the financial reporting processes, access to high quality accounting standards and guidelines can facilitate an improvement in the quality of financial reporting in voluntary market systems. Consequently, the model will be

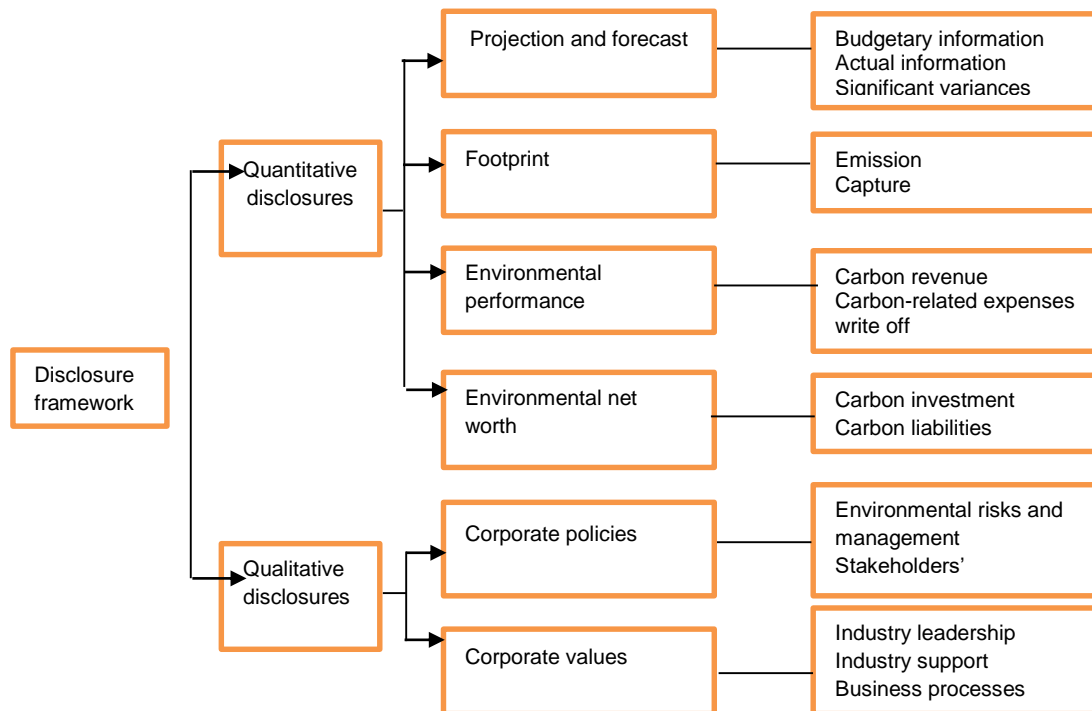
very useful in ensuring that financial statements are comparable from one year to the next and across the industry.

8.3.3 Disclosure needs for cap-and-trade schemes in the agricultural sector

Regardless of the accounting approach adopted, the need to communicate clearly with stakeholders and other users of the financial statements about the way the entity is performing, its financial health and the way it is affected by SALM activities remains very important. Entity commitment to sustainability calls for greater transparency in disclosures pertaining to entity strategy, performance drivers and management philosophies, as well as briefs about shared society goals. The preparers of financial statements must make financial and non-financial disclosures both qualitatively and quantitatively, as each provides context for the other.

Sustainability reports can be extended to allow entities to provide investors and other stakeholders with information on GHGs emissions. However, regulatory, normative and cognitive pressures dictate variations in the rigour of reporting processes, such as, assigning responsibility for the report, the gathering of data and assuring its accuracy. Although the trend in financial reporting regulation is to minimise discretion and judgement on the part of the preparers of financial statements, the mandatory disclosures may be limited to accounting policies or industry-specific disclosures norms. The findings of the research in terms of the third objective resulted in the development of a framework for presenting and disclosing information about entity cap-and-trade schemes activities, as outlined in figure 8.2.

Figure 8.2: Disclosure framework



Source: Author (2016)

In addition, the preparer has to explain the entity’s accounting policy to the users so as to ensure that the impact of cap-and-trade practices on financial performance and financial position is understood. An accounting policy sensitivity report should also be provided to enable the users to appreciate the effects of alternative courses of action that were available to management, and why such alternatives were overlooked.

8.4 CONTRIBUTION OF THE STUDY TO THE ACCOUNTING DISCIPLINE

This study has premiered in-depth research in the area of voluntary reporting practices in the agricultural sector. The agricultural sector has huge potential to be a driver of low-cost carbon mitigation and sequestration, in addition to its potential to reduce its carbon footprint to beyond zero. Further, this study has set out a standardised methodology for recognising and classifying adaptation activities in the agricultural sector. This standardised methodology can be used to validate the information reported by different entities even

where such report have been prepared in accordance with divergent sustainability policies and norms.

Although sustainability reporting is expected to offer a fair image of the reporting entity's behaviour and its impact on sustainable development, the users of financial statements continue to grapple with evaluating the credibility of the sustainability reports provided. Best practices for the recognition requirements as prescribed in the framework for preparation and presentation of financial statements are not industry-specific and thus are neither exhaustive nor conclusive. Equally important, the application of accounting standards on initial and subsequent measurement necessitates the need to analogise the adaptation activities to similar transactions or events. This study therefore makes the following contributions:

- It prescribes ways of accounting for and reporting cap-and-trade schemes in the agricultural sector.
- It proposes a model for evaluating the value of biological assets that incorporate an entity's carbon capture potential.
- It suggests the effect of carbon capture potential has on an entity's sustainability indicators and environmental reports.
- It bridges the gap between the information provided by the preparers of financial statements and the information needs of various groups of users in respect of the carbon capture potential of an entity.
- It recommends ways to integrate carbon capture potential in an entity's sustainability financial reporting framework.

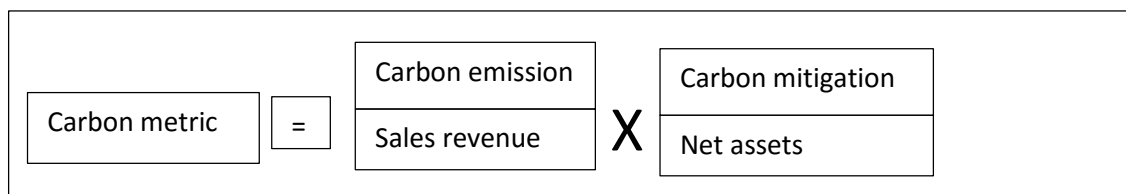
This study has also elevated awareness of an entity's carbon footprint and the related adaptation activities in the agricultural sector. Equally important, the findings of this study may assist entities in evaluating their compliance with various environmental regulations and thus in refining their environmental and reporting policies. This will also

ensure that sustainability decision-making becomes more fact-based and empirical. Additionally, the research proposes a carbon metric that can be used to compare the carbon performance of different entities.

8.4.1 Carbon metric

In order to enhance comparability, the reporting index should embrace an entity's operational controls and size. This study suggests an analytical carbon metric which focuses on emissions relative to revenue and mitigation relative to net assets. The carbon metric can be computed as follows:

Figure 8.3: Carbon reporting metric



Source: Author (2016)

The logic of the carbon metric is that a commercial entity emits carbon in the process of generating revenue and invests a portion of the net assets in an effort to mitigate its effects. Ideally, cap-and-trade schemes (carbon activities) are linked to entities' sustainability activities and therefore the metric eliminates the size effect and enhances comparability. The above metric can help an entity to achieve long-term shareholder value by gearing its strategies to harness the market's potential for sustainability products and services while at the same time successfully reducing and avoiding sustainability costs and risks.

8.4.2 Voluntary cap-and-trade activities reporting framework

The users of financial statements continue to demand more detailed information about the sustainability activities undertaken by an entity. The sustainability report should provide, at a glimpse, the linkage between an entity's strategy, governance and financial performance and

the social, environmental and economic context within which the entity operates. This sustainability report should also facilitate sustainable decisions and enable stakeholders to understand how an entity is really performing.

The preparers of financial statements face several fundamental challenges such as subjectivity, self-reporting bias, potential self-inflicted damage, framing effects and boiler plate disclosures which can be addressed through the use of a clear reporting framework. Although these are significant challenges, they can and must be overcome, and quickly, by identifying the reporting incentives that preparers consider when making voluntary disclosures, and how such incentives can be codified in the reporting guidelines. This can be achieved if the line items and disclosures, as outlined in table 8.2, are made in the financial reports.

Table 8.2: Cap-and-trade schemes reporting structure

Financial position	Financial performance	Non-financial disclosures
Carbon capture potential (assets)	Incremental cost associated with adaptation activities	Operational controlled emission
Carbon emission obligation	Increase in productivity associated to adaptation activities	Carbon sequestered from adaptation activities
Estimated cost to the economy of catering for the net carbon footprint	Carbon revenue Fair value on verified carbon units	
Net assets/obligation	Net gain or loss	Net carbon footprint
Cross-cutting issues		
Accounting policies		
Assumption and estimates		
Management objectives and stakeholders relationships		

Source: Author (2015)

Entities with a policy on sustainable agricultural practices have capped their carbon emissions but most have not engaged in trading practices. It can be concluded that such entities have a great deal of hidden value in the statement of financial position. Society expects every entity to demonstrate commitment to sustainability so that the use of scarce resources today does not jeopardise the survival of future generations. The sustainability

strategy must grow into a strong and robust management practice from the point where the operational activities take place up to the financial reporting level. However, the fact that many such initiatives are voluntary and there are no industry specific guidelines on what and how such information should be reported has compromised the comparability of financial statements. This could have significant implications for the way external users evaluate the sustainability performance of the entity and the decision that can be taken.

8.5 RECOMMENDATIONS

This study accordingly makes a number of suggestions and recommendations based on findings as outlined in sections 8.5.1 to 8.5.6.

8.5.1 Align business processes and strategy

As the carbon markets expand, entities will need to ensure that they have appropriate protocols in place for measuring and reporting GHGs emissions. Entities will also need to establish a GHGs management strategy that presents them with opportunities for generating tradable carbon credits, permits and offsets. Such a strategy will require a realignment of business processes and procedures so as to be able to capture or minimise emissions or sequester the GHGs. Sustainable development takes into account an efficient utilisation of the scarce resources taking into consideration the satisfaction of human needs under conditions of environmental care.

8.5.2 Exploit the low carbon massive impact offsets

There are many practices and technologies that can enable agriculture to reduce its impact on climate change in the same order of magnitude as its emissions. The agricultural sector is a main target for voluntary carbon offsets because of its massive potential impacts on the environment, economy and social welfare in terms of food security. Moreover, the agricultural sector takes centre stage in the sustainability debate owing to the social and

economic roles it plays in society, as well as its ability to reduce the carbon footprint to zero and become a key source of low cost carbon offsets.

8.5.3 Professional development of sustainability report

Whereas it is a reality that sustainability strategy affects both performance and risk profile, the reporting of sustainability activities of an entity is still a developing issue. This transformation creates a challenge for regulators, preparers and the users of financial statements alike. Accordingly, regulators are tasked with creating norms and regulations, while preparers of financial statements attempt to craft the best ways of presenting environmental, economic and social information on the activities in which the entity is engaged.

If progress is to be made in changing attitudes, so that there is less emphasis on detailed regulation and more emphasis on professional judgement, then all the parties involved in the practice and regulation of financial reporting need to work together. This will give rise to self-regulating and professional practices in sustainability reporting.

8.5.4 Stakeholder participation

There is a need to enhance the awareness and support of stakeholders. In the absence of the stringent regulation of cap-and-trade disclosures, it is arguably easier for participants in capital markets to take advantage of those who are less well informed through insider trading. Consequently, procedures should be established that incorporate stakeholder engagement as a core element of the process of managing, measuring and communicating performance. This process assists entities to capture the diverse stakeholders' aspirations and needs, and to balance and manage the inter-linked elements of social, environmental and economic performance in cap-and-trade reports.

8.5.5 Highlighting of environmental issues

In addition, it is critical to enhance the visibility of important environmental information in the financial statements. In order to demonstrate credible commitment to the disclosure, additional line items based on table 8.2 should be made. It is obvious that the benefits of financial reporting disclosures cannot be restricted to the key stakeholders. This is because general financial statements are 'public goods', and cannot be left purely to the discretion of the preparers of the financial statements.

8.5.6 Sector specific reporting framework

There is a need to create a sector-specific framework and accounting policies in order to eliminate discrepancies in accounting practice. Although some issues cut across sectors, accounting practices are associated with industry and entity-specific characteristics and the cap-and-trade schemes in the agricultural sector are no exception.

8.6 LIMITATIONS OF THE STUDY

This study was based on KACP, where participants have embraced a specific standardised farming methodology that is internationally approved. It is therefore important to highlight that there are other methodologies for which the findings of this research may need to be replicated. It is equally important to note that this study placed more emphasis on commercial orientation of all research participants. Moreover, the verification process and reporting for carbon standards involved a level of aggregation which it is expected to have influenced the accountant's decision on how to treat a particular transaction or event. In addition, the following limitations were also identified:

- Entities involved in agro-processing and value addition, which are not considered agricultural activities, are currently not isolating disclosures specific to the agricultural sector.
- The classification of some activities such as seedling farming for resale as inventories, and for transplant as biological assets was cumbersome.

- Companies complying with different accounting standards consequently had different disclosure requirements.
- Different securities exchanges have different classification criteria for listed entities.
- Some entities embrace template reporting practices and regulatory formats such as the interactive data format known as the eXtensible Business Reporting Language (XBRL).

8.7 SUGGESTED AREAS FOR FURTHER STUDIES

Future research could extend the preliminary exploration in this research by focusing more on a quantitative approach by collecting farm level data. Additionally, the following areas may be considered for future research:

- Full fair value reporting could be explored by broadening the scope to cover external costs (extrinsic value) and their impact on society in the proposed model. This is because the adaptation activities not only have an effect on the environmental report but also have some benefits for society.
- The general farm statistics (non-financial) and metrics used by participants who do not prepare general purpose financial statements could be evaluated.
- The influence that the volatility of carbon offset prices has in a surrogate market could be considered.
- The demand for an environmental report that is based on stakeholders' preferences and the associated costs of supplying environmental reports could be explored.

References

- Ackerman, K. and Beyers, S. 2008. Establishing fair values in volatile and illiquid markets. *The Southern African Financial Services Journal*. PricewaterhouseCoopers. 1 pp.14-19.
- African Post-Harvest Losses Information System (APHLIS). 2015. Post-harvest reviews. Cereal Grain Quality Losses in Sub-Saharan Africa Part 2 Reducing on-farm postharvest losses. www.aphlis.net [Accessed on 14 March 2015]
- American Institute of Certified Public Accountants (AICPA). 2012. EPA – the lean and environment toolkit, AICPA sustainability initiative resource review. www.aicpa.org. [Accessed on 13 February 2012]
- Arvidsson, S. 2011. Disclosure of non-financial information in the annual report: A management-team perspective. *Journal of Intellectual Capital* 12 (2) pp.277-300. Available online at <http://www.emeraldinsight.com> [Accessed on 23rd August 2014]
- Babu, N. Y. D. 2011. Course 7: Carbon Financing. The Carbon Rating Agency. Available online at <http://www.adb.org> [Accessed on 28th October 2011]
- Bahmani, D. 2014. The Relation between Disclosure Quality and Information Asymmetry: Empirical Evidence from Iran. *International Journal of Financial Research* Vol. 5, No. 2; 2014 pg 110-114.
- Balatbat, M.C. and Wang, W. 2010. 'Voluntary disclosure of accounting policies for the treatment of carbon emission permits: The UK EUETS case'. Centre for Social and Environmental Accounting Research (CSEAR), pp. 1-30. Scotland.
- Barclays. 2011. Carbon offsetting. Available online at <http://group.barclays.com> [Accessed on 30th September 2011]
- Barry, O. 2012. Six growing trends in corporate sustainability. *Accountancy Ireland*. Vol. 44.3 (Jun 2012): 32-33.

Baruch, L. 2001. Intangibles; Management, measurement and reporting. The Brookings institution. Washington.

Bebbington, J. and Larrinaga, C. 2008. Carbon trading: Accounting and reporting issues. *European Accounting Review* 17 (4): 697-717. Available online at <http://www.tandfonline.com> [Accessed on 13th January 2013]

Beder, S. 2001. Trading the Earth: The politics behind trade-able pollution rights', *Environmental Liability, Research Online open access*. (9)2, pp. 152-160.

Bhalerao, R. 2011. Carbon Credits Price. Available online at <http://www.buzzle.com> [Accessed on 29th July 2011]

Bjurstrom, A. 2010. The Role of Agriculture in Carbon Capture and Climate Change. NOVA publishers. ISBN: 978-1-60741-445-2. Available online at <https://www.novapublishers.com> [Accessed on 13th February 2013]

Black Bear Conservation Coalition (BBCC). 2009. Bear Habitat Incentive Programs Carbon Banking Opportunities. Available online at <http://www.bbcc.org> [Accessed on 5th June 2011]

Bloomberg. 2014. Carbon Market Volatility to Jump on EU overhaul Talks. Available online at <http://www.bloomberg.com/news> [Accessed on 30th December 2014]

Bohringer, C. and Lange, A. 2005. Economic Implications of Alternative Allocation Schemes for Emission Allowances. *The Scandinavian Journal of Economics*. 107 (3), 563-581.

Booth, B. and Walker, R. G. 2003. Valuation of SGARAS in the wine industry: time for sober reflection. *Australian Accounting Review* 13 (3) 52-60.

Botosan, C. and Huffman, A. 2014. A Business Valuation Framework for Asset Measurement. University of Utah. Available online http://eifrs.ifrs.org/eifrs/comment_letters [Accessed on 23rd February 2014]

Bradbury, M. E. and Baskerville, R. F. 2007. Sector neutral Accounting Standards: A Ten-year Experiment. Working paper series. Working Paper no. 48.

Bryman, A. and Bell, E. 2011. Business Research Methods 3rd Edition. Oxford University Press, New York.

Buckley, N. J. 2004. Short-Run Implications of Cap-and-Trade versus Baseline-and-Credit Emission Trading Plans: Experimental Evidence. McMaster University. Available online at <http://socserv2.socsci.mcmaster.ca> [Accessed on 20th August 2012]

Burritt, R. L. and Schaltegger, S. (2012) "Measuring the (un-)sustainability of industrial biomass production and use", *Sustainability Accounting, Management and Policy Journal*, Vol. 3 Iss: 2, pp.109 – 133. Available online at <http://www.emeraldinsight.com.oasis.unisa.ac.za> [Accessed on 23rd February 2013]

Callon, M. 2008. Civilizing markets: Carbon trading between in-vitro and in-vivo experiments. *Accounting, Organizations and Society* 34 (3-4): 535-548.

Carbon Trust. 2015. Product Carbon Footprint Certification. Available online at <http://www.carbontrust.com/certification> [Accessed on 25th August 2015]

Carpenter, V.L. and Feroz, E. H. 2001. Institutional theory and accounting rule choice: an analysis of four US state government decision to adopt generally accepted accounting principles. *Accounting, organisation and society*, Volume 26, Issues 7-8 pgs 565-596.

Central Bank of Kenya (CBK). 2014. Commercial Banks and Mortgage Institutions. www.centralbank.go.ke [Accessed 15 August 2014]

Cho, C. H., Michelon, G. and Patten, D. M. 2012. Enhancement and obfuscation through the use of graphs in sustainability reports: An international comparison. *Sustainability Accounting, Management and Policy Journal*, Vol. 3 Issue 1, pp.74 – 88. Available online at <http://www.emeraldinsight.com> [Accessed on 13th Feb 2013]

Christensen, B.E., Glover, S.M. and Wood, D.A. 2012. Extreme Estimation Uncertainty in Fair Value Estimates: Implications for Audit Assurance. *AUDITING: A Journal of Practice & Theory*: February 2012, Vol. 31, No. 1, pp. 127-146.

Clarkson, P., Hanna, J. D., Richardson, G. D., Thompson, R., 2011. The impact of IFRS adoption on the value relevance of book value and earnings. *Journal of Contemporary Accounting & Economics*, 7(1), pp.1-17

CNN International. 2008. Banking on carbon trading. Available online at <http://www.cnn.com> [Accessed on 5th June 2011]

Cohen, J., Gaynor, L., Webb L. and Montague, N. 2008. Management's Discussion & Analysis: Completing the Picture. Security Exchange Commission. Available online at www.sec.gov [Accessed on 31st May 2015]

Cole, C., Chase, S., Couch, O. and Clark, M. 2011. Research Methodologies and Professional Practice: Considerations and Practicalities. *The Electronic Journal of Business Research Methods*. Volume 9 Issue 2 2011 (pp 141-151). Available online at www.ejbrm.com [Accessed on 1st April 2014]

Cooper, D.R and Schindler, P.S. 2003. *Business Research Methods*, 8th Edition. McGraw-Hill Irwin. New York.

Cosbey, A. Murphy, D. and Drexhage, J. 2007. The Development Dividend Project – Phase III. Market Mechanisms for Sustainable Development: How Do They Fit in the Various Post-2012 Climate Efforts? International Institute for Sustainable Development. Available online at <http://www.iisd.org> [Accessed on 13th August 2012]

Cotter, J. and Najah, M. M. 2013. Corporate Climate Change Disclosure Practices and Regulation. Emerald Group Publishing Limited, Volume 5, pp.81-97. Available online at <http://www.emeraldinsight.com/> [Accessed on 3rd May 2014]

Daizy, D., Mitali, S. and Niladri, D. 2013. Corporate Sustainability Reporting: A Review of Initiatives and Trends. *The IUP Journal of Accounting Research & Audit Practices*, Vol. XII, No. 2, 2013.

Deegan, C. 2005. *Financial Accounting Theory*. McGraw-Hill Pty Limited. Australia.

Deloitte. 2005. IASB withdraws IFRIC Interpretation on Emission Rights. Available online at <http://www.iasplus.com> [Accessed on 25th September 2011]

Deloitte. 2009. CFO insights: Sustainability: developing key performance indicators. Measuring sustainability is the bottom Line. Available online at <http://www.deloitte.com> [Accessed on 9th August 2012]

Deloitte. 2013. Fair value measurement of financial instruments – 3. IFRS Watch.

Department for Environment, Food and Rural Affairs (DEFRA). 2009. Guidance on how to measure and report your greenhouse gas emissions. DEFRA. London.

Dow Jones. 2011. Dow Jones Sustainability World Indexes Guide Book Version 11.6, 7 September 2011. Available online at <http://www.sustainability-indexes.com> [Accessed on 22nd June 2012]

Eccles, R. G., and Daniela S. 2011. Achieving Sustainability Through Integrated Reporting. *Stanford Social Innovation Review* (summer 2011): 56–61. Available online at <http://www.hbs.edu> [Accessed on 23rd August 2014]

Edenhofer, O., Wallacher, J., Lotze-Campen, H., Reder, M., Knopf, B. and Müller, J. 2012. *Climate Change, Justice and Sustainability; Linking Climate and Development Policy*. Springer. ISBN 978-94-007-4539-1.

Elkington, J. 1997. *Cannibals with Forks: The Triple Bottom Line of 21st Century Business* Capstone Publishing, Oxford.

Elliott, B. and Elliott, J. 2012. *Financial Accounting and Reporting*, 15th Edition. Prentice Hall Financial Times. England. Pearson Education Ltd.

Environmental Leader LLC. 2010. Carbon Trading May Reach \$395B in 2014.

Environmental management & energy news. Available online at <http://www.environmentalleader.com> [Accessed on 30th August 2011]

Ernst and Young. 2009. The business response to climate change: Choosing the right path. Available online at www.ey.com [Accessed on 19 March 2013]

Ernst and Young. 2014. Bearer plants – the new requirements. Available online at <http://www.ey.com/Publication/> [Accessed on 14th February 2015]

Financial Accounting Standards Board (FASB). 2010. Revenue Recognition—Milestone Method of Revenue Recognition a consensus of the FASB Emerging Issues Task Force (Topic 605). The Financial Accounting Foundation. Norwalk.

Financial Accounting Standards Board (FASB). 2014. Simplifying Accounting Standards. Available online at <http://www.fasb.org/> [Accessed on 27th March 2015]

Food and Agriculture Organisation (FAO). 2012. Developing a climate smart agriculture strategy at the country level: lessons from recent experience. Available online at <http://www.fao.org> [Accessed on 14th January 2013]

Forest Trends. 2011. Building Forest Carbon Projects; Step-by-step overview and guide. Available online at <http://www.forest-trends.org> [Accessed on 14th February 2014]

Forest Trends. 2015. Ahead of the Curve; state of the forest carbon markets 2015. Ecosystem marketplace. Washington. Forest Trend. Available online at www.forest-trends.org [Accessed on 12th October 2015]

Foucherot, C. and Bellassen, V. 2011. Climate Report No. 31 – Carbon offset projects in the agricultural sector. CDC Climat Research.

Freedman, M. and Jaggi, B., 2011. Global Warming Disclosures: Impact of Kyoto Protocol Across Countries. *Journal of International Financial Management & Accounting*. Volume 22, Issue 1, pages 46–90, Spring 2011. Blackwell Publishing Ltd.

Garnaut, R. 2011. An Australian policy framework. *The Garnaut Climate Change Review*. Available online at <http://www.garnautreview.org.au> [Accessed on 15th September 2011]

German Watch. 2011. German Climate Finance Put to the Test: An assessment of German financial support for climate-related activities in developing countries from a development policy perspective. Available online at <http://germanwatch.org> [Accessed on 23rd February 2013]

GIC Group. 2010. Agriculture and Global Carbon Markets New Opportunities and Challenges. São Paulo, Brazil. Available online at <http://www.agritrade.org> [Accessed on 10th October 2012]

Glaser, B. G. and Strauss, A. L. 2012. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New Brunswick. London: Aldine.

Global Reporting Initiative (GRI). 2000. Sustainability Reporting Guidelines on Economic, Environmental and Social Performance. Boston. Global Reporting Initiative.

Global Reporting Initiative (GRI). 2002. Sustainability Reporting Guidelines. GRI: Boston. Available online at <http://www.globalreporting.org>. [Accessed on 25th April 2012]

Global Reporting Initiative (GRI). 2013. G4 – The GRI Sustainability Reporting Guidelines; Reporting principles and standard disclosures. The Global Reporting Initiative. Amsterdam. Available online at www.globalreporting.org [Accessed on 28th August 2015]

Government of Canada. 2015. Carbon Dioxide in Greenhouses. Ministry of Agriculture, Food and Rural Affairs. Available online at <http://www.omafra.gov.on.ca> [Accessed on 14th March 2015]

Government of the Republic of Kenya (GRK). 2009. Government of Green. Available online at <http://www.greenenergy.go.ke> [Accessed on 20th August 2012]

Government of the Republic of Kenya (GRK). 2012. The Climate Change Authority Bill. Kenya gazette supplement No. 61 (Bills No. 295). Available online at <http://www.kenyalaw.org> [Accessed on 17th July 2012]

Graham, L. 2012. *Accountants' Handbook*, Financial Accounting and General Topics, Volume 1. John Wiley & Sons.

Griffin, P. A. 2010. How Will the Billions of 'Free' Climate Change Allowances Under Cap-and-Trade Affect U.S. Companies' Balance Sheets? Available online at <http://papers.ssrn.com> [Accessed on 20th Feb 2013]

Grolleaud, M. 2014. Post-harvest system and food losses. Food and Agriculture organisation. Available online at <http://www.fao.org/> [Accessed on 12th February 2105]

Hamilton, K. Sjardin, M. Shapiro, A. and Marcello, T. 2009. Fortifying the foundation: state of the voluntary carbon markets 2009. Available online at <http://www.cabdirect.org> [Accessed on 20th August 2012]

Hasen, O.B. 2007. The construction of cognitive accounting models. 19th Nordic Academy of Management. Harstad University College. Norge. Available online at <http://www.nhh.no> [Accessed on 14th March 2014]

Hoogervorst, H. 2013. Breaking the boilerplate. IFRS Foundation conference. Amsterdam, Available online at <http://www.ifrs.org> [Accessed on 15th March 2014]

- Hopwood, A. G. 2009. Accounting and the environment. *Accounting, Organizations and Society* 34 (3-4): 433-439.
- Hopwood, A. Unerman, J. Jessica, F. and HRH The Prince of Wales. 2010. Accounting for Sustainability: Practical Insights.
- Hoque, Z. 2006. *Methodological Issues in Accounting Research: Theories, Methods and Issues*. Spiramus Press Ltd. London.
- Horton, J., Macve, R.H. & Serafeim, G. 2011. 'Deprival Value' vs 'Fair Value' Measurement for Contract Liabilities: How to Resolve the 'Revenue Recognition' Conundrum?, Social Science Research Network, Rochester.
- Institute of Chartered Accountants in England and Wales (ICAEW). 2006. Measurement in financial reporting; information for better markets initiative. Available online at www.icaew.com [Accessed on 30th June 2015]
- Institute of Chartered Accountants in England and Wales (ICAEW). 2011. Measurement in financial reporting information for better markets initiative. ICAEW. London.
- Institute of Chartered Accountants in England and Wales (ICAEW). 2013. Financial reporting disclosures: Marketing and Regulatory failures. Information for better markets initiative. Available online at <http://www.icaew.com> [Accessed on 1st May 2014]
- Institute of Directors in Southern Africa (IoDSA). 2012. King Committee on Corporate Governance (King III) Practice Notes. Chapter 9 Integrated reporting. Available online at <http://www.iodsa.co.za> [Accessed on 20th July 2012]
- International Accounting Standards Board (IASB). 2005. IFRIC Interpretation 3, Emission Rights. *International Financial Reporting Standards*. IFRS Foundation, London.
- International Accounting Standards Board (IASB). 2009. *International Financial Reporting Standard for Small and Medium-sized Entities (IFRS for SMEs)*. IFRS Foundation, London.

International Accounting Standards Board (IASB). 2010. IFRS Practice Statement Management Commentary; A framework for presentation. IFRS Foundation. London. Available online at <http://www.ifrs.org> [Accessed on 12th April 2015]

International Accounting Standards Board (IASB). 2013a. *International Financial Reporting Standards, Part A*. IFRS Foundation, London.

International Accounting Standards Board (IASB). 2013b. *International Financial Reporting Standards, Part B*; the accompanying documents. IFRS Foundation. London.

International Accounting Standards Board (IASB). 2014. Agriculture: Bearer Plants (Amendments to IAS 16 and IAS 41). IFRS Foundation, London. Available online at <http://www.ifrs.org> [Accessed on 13th March 2015]

International Federation of Accountants (IFAC). 2011. IFAC sustainability reporting framework 2.0. Available online at <http://www.ifac.org> [Accessed on 16th August 2012]

International Integrated Reporting Council (IIRC). 2013. The international integrated reporting Framework. The International Integrated Reporting Council. Available online at <http://www.theiirc.org> [Accessed on 23rd August 2014]

International Public Sector Accounting Standards Board (IPSASB). 2014. International Public Sector Accounting Standards. The International Federation of Accountants. New York.

James R. D. T. Bent, D. Aeron-Thomas, D. 2006. Developing a sustainability accounting framework to inform strategic business decisions: a case study from the chemicals industry. *Business Strategy and the Environment*. Volume 15, Issue 5, pp. 347-360. Available online at <http://onlinelibrary.wiley.com> [Accessed on 20th August 2012]

Johnson, P. E., Jamal, K. and Berryman, R. G., 1998. Detecting Framing Effects in Financial Statements. *Contemporary Accounting Research*, 12 (1). Available online at <http://ssrn.com> [Accessed on 10th May 2013]

Kakuzi Ltd. 2014. *Annual report and financial statements for the year ended 31 December 2014*. Kakuzi Ltd., Nairobi.

Keith, N. and Hase, S. 2008. Grounded Suggestions for Doing a Grounded Theory Business Research. *The Electronic Journal of Business Research Methods* Volume 6 Issue 2 2008, pp. 155 – 170. Available online at www.ejbrm.com [Accessed on 24th March 2014]

Kenya Postel Directories Ltd. 2014. Yellow pages. Kenya Postel Directories Ltd. Nairobi.

Kerr, S. G. 2008. Accounting Policy and Carbon Credits. *Journal of Business & Economics Research* – August 2008 Volume 6, Number 8 Bradley University, USA.

Komanoff, C. 2009. Putting a Price on Carbon: An Emissions Cap or a Tax? Available online at <http://e360.yale.edu> [Accessed on 22nd October 2011]

Krishnaswamy, K.N., Sivakumar, A.L., and Mathirajan, M. 2006. *Management Research Methodology: Integration of Principles, Methods and Techniques*. Pearson Education, Delhi.

Kundu, D. 2006. Financial aspects of carbon trading. *The Chartered Accountant*. 1496-1500. Available online at www.icaiejournal.org [Accessed 1st April 2013]

Lal, R. 2004. Soil Carbon Sequestration Impacts on Global Climate Change and Food Security. American Association for the Advancement of Science. Available online at <http://www.sciencemag.org> [Accessed on 13th January 2015]

Landry, S. and Chlala, N. 2001. Revenue recognition: more stringent rules on the horizon. *Ivey Business Journal*.

Leuz, C. and Wysocki, P. 2008. Economic Consequences of Financial Reporting and Disclosure Regulation: A Review and Suggestions for Future Research. Available online at <http://ssrn.com/> [Accessed on 31st July 2015].

Lohmann, L. 2008. Toward a different debate in environmental accounting: The cases of carbon and cost- benefit. *Accounting, Organizations and Society* 34 (3-4): 499-534.

Lynch, N. C., Lynch, M. F. and Casten, D. B. 2014. The Expanding Use of Sustainability Reporting Standards Setting and Assurance Opportunities for CPAs. *The CPA journal*. 84-3 pp 18-24.

Maina, P.N. and Wingard, H.C. 2013. Small and medium-sized entities in the agricultural sector: Fair value reporting challenges, *Agrekon: Agricultural Economics Research, Policy and Practice in Southern Africa*, 52:2, 52-74. Available online at <http://www.tandfonline.com> [Accessed on 15th March 2014]

Manor House Agricultural Centre. 2015. Grow Bio-intensive. Available online at www.mhacbiointensive.org [Accessed 6th June 2014]

McGregor, I. M. 2014. Global Climate Change Policy: will Paris succeed where Copenhagen failed? *E-International relations*. Available online at www.e-ir.info [Accessed on 15th December 2015]

Murray, J. 2010. Global carbon market expanded 68 per cent in 2009. The value of the market may have flat-lined, but the volume of credits being traded went from strength to strength. Available online at <http://www.businessgreen.com> [Accessed on 28th September 2011]

Njiru. J. M. 2011. Kenyan farmers join Carbon Trading. *Climate Exchange Network for Africa*. Available online at <http://cenafrica.net> [Accessed on 17th August 2012]

Pachauri, R. K. 2008. Battling Climate Change by Promoting Environmentally Sustainable Development. The Department of Economic and Social Affairs of the United Nations. Available online at <http://www.un.org> [Accessed on 18th Feb 2013]

Point Carbon. 2010. 8.2Gt CO₂e traded in 2009 – up 68% on previous year. Available online at <http://www.pointcarbon.com> [Accessed on 12th March 2012]

Power, M. 2010. Fair value accounting, financial economics and the transformation of reliability. *Accounting and Business Research*, Vol. 40. No. 3 2010 International Accounting Policy Forum, pp. 197-210.

PricewaterhouseCoopers – IETA. 2007. Trouble-entry accounting; Uncertainty in accounting for the EU Emissions Trading Scheme and Certified Emission Reductions. Available online at <https://www.pwc.nl> [Accessed on 27th July 2015]

PricewaterhouseCoopers (PWC). 2009. Carbon Taxes vs Carbon Trading; Pros, cons and the case for a hybrid approach. Available online at <http://www.ukmediacentre.pwc.com> [Accessed on 5th March 2013]

PricewaterhouseCoopers (PWC). 2011. Trouble-Entry Accounting – Revisited; Uncertainty in accounting for the EU Emissions Trading Scheme and Certified Emission Reductions. Available online at <http://www.pwc.com> [Accessed on 19th August 2012]

PricewaterhouseCoopers (PWC). 2014. IFRS and US GAAP: similarities and differences. Available online at www.pwc.com/ifrs [Accessed on 26th March 2015]

Ratnatunga, J. and Jones, S. 2012. Contemporary Issues in Sustainability Accounting, Assurance and Reporting. An inconvenient truth about accounting: the paradigm shift required in carbon emissions reporting and assurance. Emerald Group Publishing.

Ratnatunga, J. Jones, S. and Balachandran, K. R. 2011. The Valuation and Reporting of Organizational Capability in Carbon Emissions Management. *Accounting Horizons*: March 2011, Vol. 25, No. 1, pp. 127-147. Available online at <http://aaajournals.org> [Accessed on 25th October 2011]

Ravuru, N. R. and Suvikram, Y. V. N. S. 2012. Carbon Credits – A Step to Sustainable Future of the World, *Research Journal of Recent Sciences* Vol. 1(ISC-2011), 388-397. Chemical Engineering Department, Institute of Technology, Nirma University. INDIA

Redd Monitor. 2011. The role of the World Bank in carbon finance: New report from the Bretton Woods Project. Available online at <http://www.redd-monitor.org> [Accessed on 30th September 2011]

Salkind, N. J. 2009. *Exploring Research* 7th Edition. Pearson Prentice Hall, New Jersey.

Saunders, M., Lewis, P. and Thornhill, A. 2009. *Research Methods for business Students* 5th Edition. Prentice Hall, Financial Times, Pearson Education. England.

Scott, R. W. 2012. *Financial Accounting Theory*, Sixth Edition. Pearson Prentice Hall. Toronto.

Serafeim, G. 2010. *Information Risk and Fair Values: An examination of Equity Betas*. Essay on fair value reporting. Harvard University.

Siegel, P. and Borgia, C. 2007. The Measurement and Recognition of Intangible Assets. *Journal of Business and Public Affairs*, Volume 1, Issue 1, Florida Atlantic University

Sinkovics, R. R., Penz, E. and Ghauri, P. N. 2008. Enhancing the Trustworthiness of Qualitative Research in International Business. *Management International Review* Volume 48 Issue 6:689-714. Available online at www.researchgate.net [Accessed on 23rd March 2014]

Starbatty, N. 2010. Research paper; emissions trading schemes. Available online at <http://www.ifrs.org> [Accessed on 15th June 2011]

Stewart, J. 2015. *The Routledge Companion to Financial Accounting Theory*. Routledge, Waterstone's WHSmith Blackwell. London.

Sustainability Accounting Standards Board (SASB). 2013. *Conceptual framework of the sustainability accounting*. Available online at <http://www.sasb.org/> [Accessed on 22nd March 2015)

Suttipun, M. and Stanton, P. 2012. Determinants of Environmental Disclosure in Thai Corporate Annual Reports. *International Journal of Accounting and Financial Reporting* 2012, Vol. 2, No. 1. Available online at <http://www.oasis.unisa.ac.za> [Accessed on 3rd May 2014]

Tang, Q. and Luo, L. 2011. Transparency of Corporate Carbon Disclosure: International Evidence. University of Western Sydney. Available online at <http://papers.ssrn.com> [Accessed on 20th February 2013]

Tennigkeit, T., Solymosi, K., Seebauer, M. and Lager, B. 2012. Carbon Intensification and Poverty Reduction in Kenya: Lessons from the Kenya Agricultural Carbon Project, *Field Actions Science Reports*, Special Issue 7.

Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R. and Polasky, S. 2002. Agricultural sustainability and intensive production practices. Available online at <http://www.nature.com> [Accessed on 15th March 2013]

Todorov, V. 2005. *Econometric Analysis of Jump-Driven Stochastic Volatility Models*. Duke University.

Twining, J. D. R. 2008. Banking on carbon assets. A new regulatory environment for greenhouse gas emissions could hold good news for banks. Sustainability & Resource Productivity Initiative. Available online at <http://www.mckinseyquarterly.com> [Accessed on 25th October 2011]

Unerman, J. Bebbington, J. and O'Dwyer, B. 2007. Sustainability Accounting and Accountability. London. Routledge Taylor & Francis Group.

United Nations Framework Convention on Climate Change (UNFCCC). 2015. Conference of the Parties Twenty-first session. Paris, 30th November to 11th December 2015. Available online at <http://climateaction.unfccc.int> [Accessed on 15th December 2015]

United Nations Environment Programme (UNEP). 2009. Investing in Carbon Capture and Storage Nature's Way. UNEP. Available online at <http://hqweb.unep.org> [Accessed on 23rd February 2013]

United Nations Environment Programme (UNEP). 2011. Agriculture: Investing in natural capital. <http://www.unep.org> [Accessed on 15 August 2012].

United Nations Environmental Programme (UNEP). 2012. Development of International Environmental Law. Nairobi. Available online at <http://www.unep.org> [Accessed on 19th August 2012]

United Nations Conference on Trade and Development (UNCTAD). 2004. A manual for the Preparers and Users of Eco-efficiency Indicators Version 1.1. United Nations. New York. Available online at <http://www.unctad.org> [Accessed on 23rd August 2015]

United Nations Framework Convention on Climate Change (UNFCCC). 2008. Kyoto Protocol reference manual on accounting of emissions and assigned amount. Available online at <http://unfccc.int> [Accessed on 20th June 2015]

United Nations Framework Convention on Climate Change (UNFCCC). 2011. Durban Climate Change Conference - November/December 2011. Available on line at <http://unfccc.int> [Accessed on 3rd Feb 2012]

United States Environmental Protection Agency (US EPA). 2011. Cap and Trade; Basic Information. Available online at <http://www.epa.gov> [Accessed on 6th July 2012]

Vehmanen, P. 2013. Measurement of Assets and the Classical Measurement Theory. *LTA* 2/13 pp 130–161. Available online at www.ita.hse.fi [Accessed on 6th February 2014]

Verified Carbon Standard (VCS). 2014. Approved VCS Methodology VM0017. Version 1.0 Sectorial Scope 14. Adoption of Sustainable Agricultural Land Management. Available online <http://www.worldbank.org> [Accessed on 20th June 2015]

Watts, R.L., and Zimmerman, J.L., 1986. *Positive accounting theory*, Englewood Cliffs, Prentice-Hall.

White, G. B. 2009. Sustainability Reporting: Managing for Wealth and Corporate Health. Business expert press.

Willis, A. 2003. The Role of the Global Reporting Initiative's Sustainability Reporting Guidelines in the Social Screening of Investments. *Journal of Business Ethics*, Volume 43, Number 3 (2003), pp 233-237.

World Bank. 2009. Kenya Agricultural Carbon Project. Washington, DC: World Bank. Available online at <http://documents.worldbank.org/curated> [Accessed on 14th March 2014]

World Bank. 2014. Kenyans Earn First Ever Carbon Credits From Sustainable Farming. The World Bank. Nairobi. Available online at <http://www.worldbank.org/> [Accessed on 24th June 2014]

Yale Environment 360. 2009. Putting a Price on Carbon: An Emissions Cap or a Tax? Available online at <http://e360.yale.edu> [Accessed on 22nd October 2011]

Zikmund, W.G., 2003. Business research methods 7th Edition. Thomson South Western, United States.

Appendix I: Interview questions

Interview questions

The purpose of the initial face-to-face interview is to obtain voluntary consent and recruit participants in the study. The initial interview will also help to establish the eligibility of a potential participant in the study. The interview will be informal, and conducted in a conversational style in order to encourage each participant to talk freely. The interview proceeding will be voice recorded.

Initial Interview Questions (estimate 25 minutes)

	✓ Answered X Not answered
Please tell me about yourself and your farming business.	
Please tell me about how you joined the sustainable agricultural land use practices. Can you tell me about how you got started with Sustainable Agricultural Land Management?	
How does SALM 'fit' with your farming business? Have it changed the way you do things? Do you change the farming activities, seedling or just the practices?	
What have been your experiences in embracing SALM? What is the most remarkable change, what has been possible and what has been impossible?	
Has there been any challenge? If so, how have you been able to overcome them?	
How often do you prepare management accounts and annual financial statements?	
Who are the main users of your financial statements? Are there any users of financial statement who have ever requested for additional information / supplementary or supporting documents?	
Have your farming business ever participated in any research work? Under what conditions would you participate in this study? This study involves completing a questionnaire about your business' performance and trends. If you are willing, kindly sign a voluntary consent form.	

The end

Thank you

Appendix II: Research questionnaire A - completed by preparers of financial statements

Research questionnaire

Questionnaire A: To be completed by preparers of financial statements of the farming business.

Section 1: General information

1.1 Indicate the commercial farming activities you are engaged in under the Kenya Agricultural Carbon Project (if you are engaged in more than one farming activities, rank from the largest to the smallest based on revenue generated).

	Classification	Example	Rank base on revenue
A	Consumable biological assets – crop		
B	Bearer biological asset – medium-term crop		
C	Bearer biological asset – long-term crop		
D	Consumable biological asset – animals		
E	Bearer biological asset – animals		

1.2 Indicate the duration you have operated under the Kenya Agricultural Carbon Project.

Classification	Less than 1 year	1-2 years	More than two years
A Consumable biological assets – crop			
B Bearer biological asset – medium-term crop			
C Bearer biological asset – long-term crop			
D Consumable biological asset – animals			
E Bearer biological asset – animals			

1.3 Identify the main reason of joining the Kenya Agricultural Carbon Project.

		Rank	Explanation
A	Increase productivity		
B	Carbon revenue generation		
C	Technical support		
D	Reversing soil degradation		
E	Environmental responsibilities		
F	Social / economic influences		
G	Any other		

1.4 Identify the regularity with which you prepare financial statements.

Monthly	Quarterly	Semi-annually	Annually

1.5 Identify all type of financial information prepared by your company.

		Rank	Explanation
A	General purpose financial statements		
B	Special purpose financial statements		
C	Budgets statements		
D	Cash flows statements		
E	Cash flows forecast/projections		

1.6 Identify the party responsible for preparing financial statements.

		Rank	Explanation
A	Employee accountant		
B	Auditors		
C	Outsourced specialist consultants		
D	Computer software		
E	Cloud computing		
F	Any other		

1.7 Identify the main uses of the general purpose financial statements prepared.

		Rank	Explanation
A	Requirements of strategic partners		
B	General usage of external users		
C	Management internal uses		
D	Conditionality of bankers		
E	Statutory compliance		

1.8 Provide a brief account of the ease of transforming the traditional farming activities to verified carbon standards

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Section 2: Recognition for cap-and-trade schemes

2.1 State the initial activities for compliance with Kenya Agricultural Carbon Project.

		Rank	Explanation
	Agricultural land stripping and detoxication		
	Organic manure application		
	Seed and seedling selection		
	Crop rotation		
	Intercropping		
	Cover cropping		
	Use of special enhancing greenhouse mechanism		
	Composting of harvest stocks		
	Any other		

2.2 State how the initial compliance activities compare with indigenous (traditional) activities.

	Rank	Explanation
Agricultural land stripping and detoxication		
Organic manual application		
Seed and seedling selection		
Crop rotation		
Intercropping		
Cover cropping		
Use of special enhancing greenhouse mechanism		
Composting of harvest stocks		
Any other		

2.3 In comparison indicate the extent to which the initial compliance activities impact on the cost structure.

	Rank	Explanation
Agricultural land stripping and detoxication		
Organic manual application		
Seed and seedling selection		
Crop rotation		
Intercropping		
Cover cropping		
Use of special enhancing greenhouse mechanism		
Composting of harvest stocks		
Any other		

2.4 State the material threshold at transaction recognition level.

	Threshold	Explanation
Agricultural land stripping, soil testing and detoxication		
Organic manual application		
Seed and seedling selection		
Crop rotation		
Intercropping		
Cover cropping		
Use of special enhancing greenhouse mechanism		
Composting of harvest stocks		
Any other		

2.5 Indicate the preferred basis of measurement for the following items.

		Historical cost	Fair value	Replacement cost	Value in use
	Carbon revenue through sale of carbon credit				
	Cost of soil testing, detoxication and management				
	Higher cost of seeds and seedling				
	Research and development cost				
	Reduced cost of monitoring				
	Increased agricultural productivity				
	Higher agricultural produce prices				
	Reduced and predictable marketing cost				
	Reduced post-harvest losses due to crop resilience				
	Green loans lower cost of capital				

2.6 Indicate the initial classification of the following cost.

	Intangible asset	Inventory	Property plant & equipment	Financial assets (tradable securities)	Biological asset	Write off to SOCI as expenses
Agricultural land stripping and detoxication						
Organic manual application						
Seed and seedling selection						
Crop rotation						
Intercropping						
Cover cropping						
Use of special enhancing greenhouse mechanism						
Composting of harvest stocks						
Verified carbon units (VCUs)						

2.7 State the management consideration in classification of the item above.

	Rank	Explanation
Project sponsor requirements		
Provision of accounting standards and analogies		
Statutory requirements		
Best practices in reporting		
Desired financial performance and position (creativity)		

2.8 Indicate the most significant steps in verification of carbon credit.

		Rank	Explanation
A	Project design and development of project design document that describes all the technical parameters of the project and how emission reductions will be generated and monitored.		
B	Approval of sustainable development aspects by the host country,		
C	Validation by an independent validator, called Designated Operational Entity,		
D	Registration with the Clean Development Mechanism (CDM) executive board for the project to start generating Certified Emission Reductions (CERs)		
E	Project monitoring for greenhouse gas emissions,		
F	Verification and certification by a designated operational entity		
G	Issuance of Certified Emission Reductions (CERs) by the CDM Executive Board		
H	Any other		

2.9 Indicate the trigger event for recognition of carbon credit certificates.

		Rank	Explanation
	Project monitoring for greenhouse gas emissions		
	Verification and certification by a designated operational entity		
	Issuance of Certified Emission Reductions (CERs) by the CDM Executive Board		
	Uptake by project sponsor and commitment for payment		
	Identification of potential buyers		
	Receipts of cash proceeds from sale of VCUs		
	Any other		

Section 3: Subsequent measurement

3.1 Indicate the duration to maturity or first harvest under the Kenya Agricultural Carbon Project compared to indigenous practices.

	Classification	Examples	KACP	Indigenous
A	Consumable biological assets – crop			
B	Bearer biological asset – medium-term crop			
C	Bearer biological asset – long-term crop			
D	Consumable biological asset – animals			
E	Bearer biological asset – animals			

3.2 In approximation indicate the impact of KACP activities on output.

	Less 10%	10-20 %	21-30%	More than 30%
Production increased by				
Postharvest losses reduced by				
Marketing cost reduced by				
Finance cost reduced by				
Selling prices increased by				
Any other				

3.3 Indicate in comparison the post-harvest losses Kenya Agricultural Carbon Project in comparison with indigenous practices.

	Classification	Examples	KACP	Indigenous
A	Consumable biological assets – crop			
B	Bearer biological asset – medium-term crop			
C	Bearer biological asset – long-term crop			
D	Consumable biological asset – animals			
E	Bearer biological asset – animals			

3.4 Indicate the preferred basis of measurement for the following item at each reporting date.

	Historical cost	Fair value	Replacement cost	Value in use	Modified historical cost	Not Applicable
Agricultural land stripping and detoxication						
Organic manual application						
Seed and seedling selection						
Crop rotation						
Intercropping						
Cover cropping						
Use of special enhancing greenhouse mechanism						
Composting of harvest stocks						
Verified carbon units (VCUs)						

3.5 State the management consideration in choice of the basis of measurement.

	Rank	Explanation
Project sponsor requirements		
Provision of accounting standards and analogies		
Statutory requirements		
Best practices in reporting		
Desired financial performance and position (creativity and impression management)		

3.6 Indicate the extent to which change in input cost due to adoption of sustainable agricultural land management (SALM) practices influences the expected output.

	Less than 10%	10-20%	21-30%	More than 30%	Explanation
Agricultural produce					
Verified carbon units					

3.7 State the average duration over which verified carbon units are held before sale or transfer to project sponsors.

Less than a Month	More than a month but less than three months	More than three months but less than six months	Over six months

3.8 Explain the management procedures of dealing with credit certificates (VCUs) where market is illiquid (difficult to sell the credit certificates held).

	Rank	Explanation
Classify as held for trading		
Reclassify to not held for trading		
Impairment of value		
Any other		

Section 4: Disclosures

4.1 Highlight the process of gathering and disclosing information.

	Rank	Explanation
Structuring responsibility for the report		
Gathering data and assuring accuracy		
Coupling between reporting and stakeholders expectations		
Deliberating and reviewing the report before inclusion in disclosure		

4.2 Indicate the framework of disclosure that must be complied with.

	Rank	Explanation
Management develop framework		
Sustainability reporting index		
International financial reporting standards		

4.3 Highlight the preferred form of disclosure between quantitative and qualitative indicating the reason.

	Example	Reasons for the disclosures
Quantitative disclosures		
Qualitative disclosures		

4.4 Indicate the preferred location of the disclosures.

	Quantitative	Qualitative	Explanation
Separate environmental report			
Management analysis and discussions			
Notes to the financial statements			
Corporate values			
Schedules supporting financial reports			
Sustainability risk disclosures			
Any other			

4.5 State the management consideration in making the disclosures.

	Rank	Explanation
Project sponsor requirements		
Provision of accounting standards and analogies		
Statutory requirements		
Best practices in reporting		
Desired financial performance and position (creativity)		

The end

Thank you

Appendix III: Research questionnaire B - completed by bankers offering green loans

Research questionnaire

Questionnaire B – to be completed by bankers offering green loans

Part 1: General information

1.1 State the bank's policies on environmental responsibilities.

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1.2 State the regularity of measurement/ review of carbon foot print.

	Monthly	Quarterly	Semi-annual	Annually
Measurement				
Review by decision-makers for resource allocation				

1.3 State the duration over which the bank has been offering green loans.

Less than 1 year	More than 1 year but less than 3 years	3 to 5 years	More than 5 years

1.4 Indicate the relationship between green loan interest rate and other loan interest rate.

	Higher than	Equal to	Less than	Explanation
To agricultural sector				
To other sectors				

1.5 Indicate the link between green loan and carbon foot print.

	Less than 10%	10 to 25 %	25 to 50%	More than 50%
Direct link				
Indirect link				
No link				

Part 2 Recognition and measurement

2.1 Indicate how you would require a green loan beneficiary in the agricultural sector to recognised or accounted the following transactions.

		Intangible asset	Inventory	Property plant & equip	Financial assets	Biological assets	Write off to SOCI
	Agricultural land stripping and detoxication						
	Organic manual application						
	Seed and seedling selection						
	Crop rotation						
	Intercropping						
	Cover cropping						
	Use of special enhancing greenhouse mechanism						
	Composting of harvest stocks						
	Verified carbon units (VCUs)						

2.2 How would you require the following items to be measured?

		Historical cost	Fair value	Replacement cost	Value in use	Modified historical cost	Not Applicable
	Agricultural land stripping and detoxication						
	Organic manual application						
	Seed and seedling selection						
	Crop rotation						
	Intercropping						
	Cover cropping						
	Use of special enhancing greenhouse mechanism						
	Composting of harvest stocks						
	Verified carbon units (VCUs)						

2.3 State any additional recognition or measurement requirement for green loan beneficiaries.....

Section 3 Disclosures

3.1 How or where would you require the following information?

	Examples	Quantitative	Qualitative
Separate environmental report			
Management analysis and discussions			
Notes to the financial statements			
Corporate values			
Schedules supporting financial reports			
Sustainability risk disclosures			

3.2 Comment on whether information provided by green loan beneficiaries is deemed useful and clearly make suggestion for any area of improvement

The end

Thank you

Appendix IV: Research questionnaire C - completed by financial analysts

Research questionnaire

Questionnaire C: to be completed by financial analysts

Section 1: General information

1.1 Indicate the duration over which you have been consulting for the agricultural sector.

Less than 1 year	More than 1 year but less than 3 years	3 to 5 years	More than 5 years

1.2 Indicate the proportion of total revenue generated from the agricultural sectors.

		Less than 10%	10 to 25 %	25 to 50%	More than 50%
	Direct				
	Indirect				

1.3 Indicate the nature of consultancy assignments that is more recurrent.

	Rank	Explanation
Technical consultation		
Compilation of financial statements		
Valuation of biological assets		
Valuation of financial assets		
Others specify		

Section 2: Recognition and measurement

2.1 How often do management/other users consult you on the following issues?

	Quite often	Often	Never
Recognition of elements			
Classification of elements			
Measurement of elements			
Disclosures			

2.2 How do you advise the management on accounting classification of the following items?

		Intangible asset	Inventory	Property plant & equip	Financial assets	Biological asset	Write off to SOCI
	Agricultural land stripping and detoxication						
	Organic manual application						
	Seed and seedling selection						
	Crop rotation						
	Intercropping						
	Cover cropping						
	Use of special enhancing greenhouse mechanism						
	Composting of harvest stocks						
	Verified carbon units (VCUs)						

2.3 What would you advise to be the best basis of measurement for the following items?

		Historical cost	Fair value	Replacement cost	Value in use	Modified historical cost	Not Applicable
	Agricultural land stripping and detoxication						
	Organic manual application						
	Seed and seedling selection						
	Crop rotation						
	Intercropping						
	Cover cropping						
	Use of special enhancing greenhouse mechanism						
	Composting of harvest stocks						
	Verified carbon units (VCUs)						

Section 3: Disclosures

3.1 Indicate your advice on information disclosures in the following section of the financial report.

	Quantitative	Qualitative	Explanation
Separate environmental report			
Management analysis and discussions			
Notes to the financial statements			
Corporate values			
Schedules supporting financial reports			
Sustainability risk disclosures			

3.2 State any other issues pertaining to financial reporting for cap-and-trade schemes in the agricultural sectors that you consider important in order to enhance the usefulness of financial statements

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The end

Thank you

Appendix V: Published financial statements content analysis schedule

Published financial statements content analysis schedule

	Sustainability and environmental care	Carbon foot print and measurement	Carbon related revenue	Carbon related cost	Carbon capture potential	Carbon risk policy
Statement of accounting policy						
Statement of comp. income						
Statement of financial position						
Statement of cash flows						
Statements of changes in equity						
Notes to financial statements						
Risk management disclosures						
Management commentary						
Directors responsibility						
Values and mission						
Separate report						

Appendix VI: Quantitative data

Respondent	Category of farming activities	% increase in productivity (output)	% increase in market price (premium)	% decrease in post-harvest losses	% decrease in cost to sell	% decrease in borrowing rate	carbon revenue/change in cost	maturity duration ratio	cost structure to increase in productivity ratio
P 1 : Kitale Alphio Kisago Ndoli	BC	22	16	9	5	2	5	0.50	0.19
P 2 : Kitale Ambros	CC	20	15	7	4	2	4	0.54	0.24
P 3 : Kitale Amos Odoyo	CC,BC	19	12	9	3	2	6	0.75	0.22
P 4 : Kitale Anonymous Questionnaire 62	CC,BA	11	9	11	4	1	3	0.53	0.23
P 5 : Kitale Anonymous Questionnaire 68	CC,BC	19	13	9	3	2	6	0.63	0.23
P 6 : Kitale Ayuya George	CC,BC,BA	12	10	12	4	1	5	0.44	0.2
P 7 : Kitale Bernard Owiti	CC	30	18	7	2	1	4.5	0.63	0.21
P 8 : Kitale Boniface Owango	CC,BC	19	13	9	2	1	4.5	0.63	0.22
P 9 : Kitale Christopher Omiti	CC,BC	20	14	8	3	1	3.5	0.56	0.21
P 10 : Kitale Christopher Omwanda	CC,BC	18	12	9	3	1	4	0.54	0.22
P 11 : Kitale Geofry Franco	BA	2	2	1	1	0	1	0.53	0.05
P 12 : Kitale Gerald Muchiri	CC,BC,CA,BA	7	9	10	5	1	3	0.75	0.18
P 13 : Kitale Gilbert Ojwang	CC,BA	11	8	7	5	1	3	0.54	0.2
P 14 : Kitale Githio Stephen	CC,BC	19	12	10	3	2	6	0.53	0.23
P 15 : Kitale Helen Agandi	CC,BC,CA,BA	8	8	9	4	1	3	0.71	0.22
P 16 : Kitale Helen Ngera	BC,BA	15	15	10	4	2	3	0.50	0.19
P 17 : Kitale Henry Oduor Aboka	CC,BC	18	11	10	3	1	5	0.67	0.2
P 18 : Kitale Jack Otieno	CC,BC	9	12	8	4	1	4	0.50	0.23
P 19 : Kitale Joel Oule Osunga	CC,BC,BA	8	13	7	3	0	2	0.71	0.2
P 20 : Kitale Manor centre Sophia Wekesa	CC,BC,CA,BA	6	7	9	2	1	5	0.53	0.18
P 21 : Kitale Mary Atieno Oseso	CC,BC,CA,BA	9	9	10	5	2	4	0.50	0.16
P 22 : Kitale Millicent Akinyi	CC,BC	20	15	9	6	1	7	0.56	0.18
P 23 : Kitale Moses Onyango	CC,BC	19	16	8	5	1	6	0.54	0.19
P 24 : Kitale Oloo George	CC	24	12	9	6	1	7	0.54	0.2
P 25 : Kitale Regina Siriya	CC,BC	19	12	7	4	0	5	0.54	0.21
P 26 : Kitale Rosemary Anyango Otieno	CC,BC	20	13	8	6	1	6	0.50	0.23
P 27 : Kitale Ross Ndegwa	CC,BC	21	14	9	7	0	7	0.57	0.21
P 28 : Nyanza Alfred Omondi	CC	23	14	9	6	0	14	0.54	0.2

P 29 : Nyanza Ambros Otieno	CC	24	16	10	5	1	13	0.54	0.21
P 30 : Nyanza Anonymous Questionnaire 48	CC	22	17	9	2	1	13	0.54	0.22
P 31 : Nyanza Calorine Achieng	CC	23	18	10	3	1	14	0.54	0.23
P 32 : Nyanza Daniel Mzee	BC,BA	19	13	8	4	2	11	0.50	0.22
P 33 : Nyanza George Francis	BC,BA	21	14	7	5	1	12	0.57	0.23
P 34 : Nyanza George Ouma	CC,BC	19	15	6	6	1	10	0.50	0.22
P 35 : Nyanza Isaac Oduor	CC,BC	20	16	8	7	1	11	0.50	0.18
P 36 : Nyanza James Odhiambo	BC	18	12	6	5	1	9	0.53	0.19
P 37 : Nyanza Janet Omolo Achieng	CC,BC	19	11	7	6	2	9	0.54	0.21
P 38 : Nyanza Joseph Omondi	CC,BC	21	9	6	7	1	10	0.60	0.19
P 39 : Nyanza Martha Busaka Aloo	CC,BA	14	6	3	5	0	6	0.80	0.21
P 40 : Nyanza Mary Otieno	CC,BC	16	8	4	6	1	7	0.75	0.22
P 41 : Nyanza Moses Ogada	CC	17	6	3	1	2	6	0.50	0.22
P 42 : Nyanza Obiero Natron	CC,BC,CA,BA	12	5	5	7	1	7	0.75	0.18
P 43 : Nyanza Owino Jecinta	BC	19	14	8	9	2	5	0.50	0.19
P 44 : Nyanza Peter Okoth Otieno	CC,BC	18	11	9	6	1	6	0.67	0.21
P 45 : Nyanza Peter Onyango Otieno	BC	16	9	7	7	2	7	0.80	0.19
P 46 : Nyanza Regina Sifuna	BC	19	8	6	7	1	4	0.67	0.21
P 47 : Nyanza Samuel Odour Onyango	CC,BC	21	11	8	9	1	5	0.67	0.2
P 48 : Nyanza Thomas Nganga	CC,BC	19	12	9	10	2	6	0.80	0.19
P 49 : Nyanza Tom Nyachae	CC	21	16	10	12	1	7	0.54	0.2
P 50 : Nyanza Vivian Adhiambo	CC,BC,CA	17	15	9	8	1	5	0.67	0.2
P 51 : Nyanza Wilfred Ochieng	CC	25	15	8	5	2	5	0.54	0.25
P 52 : Nyanza Wilson Kisara	CC,BC,BA	20	13	7	5	2	4.5	0.53	0.225

Key

BA – Bearer Biological Assets – Animal

BC – Bearer Biological Assets – Crop

CC – Consumable Biological Assets – Crop

CA – Consumable Biological Assets – Animals

Appendix VII: Letter to respondent

22ND August 2014

Dear Sir/Madam

RE: REQUEST TO PARTICIPATE IN ACADEMIC RESEARCH

I am writing to request you to participate in an academic research titled **“Recognition, measurement and reporting for cap-and-trade schemes in the agricultural sector”**. I am a doctoral student with the University of South Africa (UNISA), and am studying towards a Doctorate of Commerce in Accounting.

This is a non-experimental field study whose main objective is to explore the current practices of reporting for cap-and-trade schemes in the agricultural sector. Your role as research participant will be limited to sharing information on your experience under the Kenya Agricultural Carbon Project (KACP). The study domain is in accounting and thus you will be requested to share specific accounting ratios of your farming business performance and accounting policies. Your participation will be in two parts as follows:

1. Initial interview – provide general views on experience under the KACP and voluntarily consent to participate in this study; and
2. Questionnaire – complete a detailed questionnaire on accounting treatment of various recognition and measurement issues arising from your participation in the project.

Your identity is not required anywhere and information provided will be treated with utmost confidentiality. However, the conclusion and recommendation will be available to all participants on request to ensure that the research is mutually beneficial. Your participation is voluntary. If you are will to participate in this study kindly acknowledge by signing the attached consent letter.

For any additional information or clarification kindly contact;

The research supervisor

Prof. Christa Wingard

Email: Wingahc@unisa.ac.za

Tel: +27 (0) 12 429 4013

or

Peter Njuguna Maina

P.O. Box 122 – 00200 Nairobi, Kenya

Email: petnmaina@gmail.com

Cell: +254 722 608 618

We thank you for your participation and sharing information.

Yours faithfully

Peter Njuguna

Appendix VIII: Voluntary Consent Letter

For research control purpose only

Interview Schedule Number Dated

Questionnaire Number Dated

Category of activity

Location/ Zone

I (optional) do hereby voluntarily consent to participate in the research “**Recognition, measurement and reporting for cap-and-trade schemes in the agricultural sector**”. I do understand that the research is for academic purposes only and the information gathered will be used for the said purpose. I also do understand that the:

1. Interview will be recorded verbatim and stored in a retrieval system
2. Questionnaire records will be maintained for future reference
3. Information will be held confidentially and will not be disclosed to any other party
4. The study will not involve any experiment and any field visit will be discretionary.

The results of the study will be shared to all research participants and you will be free to make additional contributions or remarks. Any correspondence pertaining to this study should be addressed to **Peter Njuguna** on +254 722 608 618 or emailed to petnmaina@gmail.com

Signature

Date

Appendix IX: Confidentiality agreement form

I ID number
do understand that this is an academic research and my role is to assist in field data collection. I also do understand that any information that is private and unique to an individual farming business is confidential and should not be disclosed whatsoever.

I hereby undertake to abide by the research ethics and observe confidentiality throughout the data collection process. I also undertake to safeguard the questionnaires and voice data records so as to guarantee the integrity of the information gathered.

Research assistant

NameSignatureDate

Appendix X: Ethics clearance letter



COLLEGE OF ACCOUNTING SCIENCES RESEARCH ETHICS REVIEW COMMITTEE

23 October 2014

Dear Mr Maina,

Decision: Ethics Approval

Ref #: 2014_CAS_0014
Name of applicant PN Maina
(researcher):
Student #:35944323
Staff #:

Name: Mr PN Maina, Department of Financial Accounting, 35944323@mylife.unisa.ac.za,
+254 722 608 618

Proposal: Recognition, measurement and reporting for cap-and-trade schemes in the agricultural sector

Qualification: Postgraduate degree

Thank you for the application for research ethics clearance by the College of Accounting Sciences Research Ethics Review Committee for the above-mentioned research. Final approval is granted for the duration of the project.

For full approval: The application was reviewed in compliance with the Unisa Policy on Research Ethics by the College of Accounting Sciences RERC on 11 September 2014.

The proposed research may now commence with the proviso that:

- 1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
- 2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the College of Accounting Science Research Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.
- 3) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.




University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 2111 Fax: +27 12 429 4165

4) [Stipulate any reporting requirements if applicable].

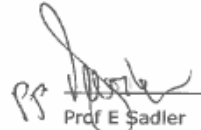
Note:

The reference number [top right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the CAS RERC.

Kind regards,



Prof HC Wingard
Chair: CAS RERC
wingahc@unisa.ac.za


Prof E Sadler
Executive dean

24/10/2014