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CLIMATE CHANGE AND INSURANCE INDUSTRY IN ETHIOPIA: CHALLENGES AND OPPORTUNITIES

By

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This is to certify that this thesis prepared by **Sinafikish Tekle Lemecha**, titled: "**Climate Change and Insurance Industry in Ethiopia: Challenges and Opportunities"** submitted in partial fulfillment of the requirements for the award of the Degree of Master of Arts in Environment and Development complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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STATEMENT OF THE AUTHOR

I first, declare that this thesis is my original work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted to the requirements for MA Degree at Addis Ababa University, College of Development Studies. I solemnly declare that this study is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

Name: Sinafikish Tekle Lemecha

Signature_____

College of Development Studies

Date of Submission: _____

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Acronyms

ARDO	Agricultural and Rural Development Office
CBO	Community Based Organization
CRGE	Climate Resilient Green Economy
CSA	Central Statistical Agency
EASPIF	Ethiopia's Agricultural Sector Policy and Investment Framework
EU	European Union
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
NGO	Non-Governmental Organisation
USD	United States of America Dollar
OECD	Organisation for Economic Co-operation and Development
GIZ	Gesellschaft für Internationale Zusammenarbeit
GPS	Global Positioning System
HH	Household Hold
IPCC	Intergovernmental Panel on Climate Change
MPCI	Multi-Peril Crop Insurance
UN	United Nation
UNDP	United Nation Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nation Framework Convention on climate Change
WII	Weather Index Insurance
WFP	World Food Programme
WTO	World Trade Organization
WHO	World Health Organization
AIC	Africa Insurance Company
EIC	Ethiopian Insurance Corporation
OIC	Oromia Insurance Company
NIC	Nyala Insurance Company
ATA	Agricultural Transformation Agency

Abstract

Climate change has become a leading issue among science, political, and legal scholars, and it definitely have profound implications for the insurance industry. Climate change related catastrophic events such as floods, droughts, fires, challenge the insurance industry's abilities to measure, predict, and price risk as well as their financial viability. Agriculture is one of the macro-sectors of the Ethiopian economy which accounts for more than 45% of the GDP with majority of farmers depend on traditional rain-fed agriculture; variations in weather conditions put them into substantial risks. Drought is the major extreme weather event in Ethiopia affecting the life of millions. The impact of climate change on agriculture has thus necessitated the need for appropriate action to combat the negative effects. The main objective of the study is to examine the processes of implementation and challenges and opportunities of insurance industry in the climate change adaptations and mitigation. The method of analysis is qualitative and description. Content analysis of policy and legal documents and explanation are also used. After assessing different studies and responses from different experts on the sector as well as data availed by some companies in the sector, it is concluded in this study that the existing practices of weather related insurance services that can play its own role in adapting to the impacts of climate change are not satisfactory. Major participants like the National Bank of Ethiopia /the Central Bank/ are not giving it the necessary focus for this important role of the insurance sector as a business. Different pilot tastings conducted for more than four decades in different initiatives from different actors shows no advancement in the sector. Weather related services of the insurance industry are infant. A number of challenges were indicated from in this study from the side of service delivery including cost of assessing the damage in cases of loss, the complexity nature of Index based insurance products costs of promotion/awareness creation, costs of feasibility study historical data analysis to determine premium rates, lack of insurance literacy among the local farmers and the like. In effect this study proposes a feasible solution marrying the merits of both state and private insurance. Considering the risks associated with drought which hit Ethiopia several times; it is suggested that government funded or supported services be studied and developed as soon as possible in Ethiopia to cope with the increasing risks of climate change.

Keywords: Weather Index insurance, compulsory insurance, crop, livestock, agriculture.

CHAPTER ONE: **Introduction**

1.1. Background

Consequences of extreme weather events are causing a huge financial as well as human life loss around the world. Countries have to make major financial efforts to compensate for losses. It is specifically very difficult for poor countries to compensate the impacts and reinstate. More than 40% of farmers in developing countries face threats to their livelihoods from adverse weather (World Bank, 2005a). Weather risk destabilizes households and countries and creates food insecurity. Africa is one of the continents expected to suffer a higher level of vulnerability to the effects of climate change and variability. According to the fourth assessment of IPCC (2007), "Africa is one of the most vulnerable continents to climate change and variability, due to its multiple stressor and low adaptive capacity".

Adaptation to climate change hazards requires system changes to prepare for climate change, which requires investments in human, social, physical, natural and financial assets, enabling capabilities and adaptive capacities. Adaptation is not about managing a transition to a determined and predictable future state. Rather, it is about managing uncertainty, for which adaptive capacity development is critical. Results monitoring, learning processes and integration of lessons learned into policy development and practices are important tools to develop adaptive capacities (UNDP, 2018)

Policy and institutional mainstreaming is necessary for the scaling-up and replication of successful adaptation approaches as well as the promotion of innovation (UNDP, 2018). As it is indicated by the European Climate Change Programme Working Group II Impacts and Adaptation Insurance Sectoral Report (2018) as a consequence of climate change, extreme weather events such as floods, droughts, heat waves and storms are becoming more common, accompanied by an overall increase in risk there is a need to give attention to climate risk management.

The Africa Regional Strategy for Disaster Risk Reduction and the Extended Programme of Action for the Implementation of the African Regional Strategy for Disaster Risk Reduction (2006–2015), developed under the leadership of the African Union (AU), provide a comprehensive regional framework to strengthen preventive, monitoring and mitigation measures, as well as regional and sub-regional capacities and coordination to reduce disaster losses in the region. However, disaster risk management is often focused on mitigation measures and a few risk transfer options, mainly relief programmes **(**FAO, 2016). The role of the private sector in agricultural risk management, especially in the form of insurance services, is often overlooked, as is the complementary role of the finance sector **(**FAO, 2016).

It has been recognized that Agriculture is one of the macro sectors of the Ethiopian economy which accounts for more than 45% of the GDP which makes the sector far more dominant. Besides, majority of farmers in Ethiopia depend on traditional rain-fed agriculture, variations in weather conditions put them into substantial risks. Drought is the major extreme weather

event in Ethiopia affecting the life of millions. Almost half of rural households in Ethiopia were affected by drought in a five year period from 1999 to 2004, and drought had a significant impact on the welfare of these households (Dercon et al., 2005).Based on the CRED database (HTTP://www.EMDAT.Be) the number of people affected in major drought events in Ethiopia were12.6 million people in 2003, 2.6 million people in 2005,6.4 million people in 2008 and 4.5 million people in 2011.In effect weather indexed insurance got attention in Ethiopia considering the high reliance on rain fed agriculture. To manage the vulnerability of the farmers and the country in general to the impacts of climate change, and as one form of adaptation measures to climate change the government is required to assess how to widely introduce and implement appropriate measures combat the impacts of climate change.

Ethiopia has initiated the Climate-Resilient Green Economy (CRGE) initiative to protect the country from the adverse effects of climate change and to build a green economy that will help realise its ambition of reaching middle income status before 2025.The objectives to identify green economy opportunities that could help Ethiopia reach its ambitious growth targets while keeping greenhouse gas emissions low. The government tries to attract development partners to help implement this new and sustainable growth model. The GTP explicitly recognizes that environment is a vital and important pillar of sustainable development, and states that "building a 'Green Economy' and ongoing implementation of environmental laws are among the key strategic directions to be pursued during the plan period" (GTP 2011; p.119).

The Government of Ethiopia's five-year development plan, building on Growth and Transformation Plan GTP II, which is the continuation of the GTP I aims to transform Ethiopia into an industrialised middle-income country by 2025. This transformation will be promoted by pursuing the following three objectives: (i) maintaining an annual average real GDP growth rate of at least 11%; (ii) pursuing aggressive measures towards rapid industrialisation and structural transformation; and (iii) ensuring the sustainability of growth by fostering a stable macroeconomic framework and climate resilient green economy. This is implemented in different sectors of the government including the agriculture and finance sector that need collaboration to promote and implement weather related insurance products to peruse the governments' plan of fostering climate resilient green economy.

The National Adaptation Programme of Action (NAPA) is a mechanism within the UNFCCC, designed to help the Least Developed Countries (LDCs) including Ethiopia to identify their priority adaptation needs to climate change and to communicate these needs to the Conference of Parties (COP) of the UNFCCC and other concerned bodies. The 2007 Climate Change National Adaptation Programme of Action (NAPA) of Ethiopia in its Identification of Key Adaptation Needs based on the review of adaptation options identified under MEA synergy assessments, ongoing programs and development project initiatives, the INC and the

outcomes of the two national and the eight regional consultative workshops conducted by the NMA, and 37 potential adaptation options were proposed (identified) for further prioritization and ranking and inclusion in the NAPA to address immediate adaptation needs. (NMA, 2007). One of the adaptation options identified is promoting drought/crop insurance program in Ethiopia.

This study was based on available literature from different sources such as journals, working papers, World Bank and other development organizations' websites and research publications that are relevant to the objectives of this study. Based on analysis from other developing countries perspectives and country context information, this study will try to identify the problems and prospects of climate risk management through insurance products in Ethiopia. Further it tries to assess the challenges and opportunities of the insurance industry that offers products focus on agriculture specifically on crop and livestock production to manage risks of climate change in Ethiopia. It will review major challenges of the few weather indexed insurance practices implemented so far in the country. It further will try to identifying the gaps in legal and institutional frameworks and best experiences to overcome the challenges and fill the gaps and making the institutions as well as the existing laws effective; in general how to widely introduce and implement these insurance products will be discussed. Thus this research assess the issues mentioned above and tried to come with recommendations that will suggest better ways to engage the insurance industry's in the effort of adaptation to the impacts climate change for the agricultural sector in Ethiopia.

1.2. Statement of the Problem

Climate change will affect the level and flow of water due to its effects on temperature and rainfall. Changing rainfall patterns could result in drought or flooding. Drought could lead to shortages of food and drinking water. Increasing atmospheric water vapour will lead to increased precipitations that result in flooding. Weather related risk remains a major challenge to farmers in low-income countries such as Ethiopia, whose livelihoods depend on agriculture. With changes in climatic conditions, agriculture has become an increasingly uncertain. The impact of climate change on agriculture has thus necessitated the need for appropriate action to combat the negative effects on livelihoods.

Well organized insurance markets have the potential to help mitigate the adverse consequences of such risks. Estimates indicate that in developing countries only 5% of direct natural hazard disaster losses are insured as compared with 40% in developed countries(DfiD,2013).Risk transfer still in its infancy in most developing countries (CEA, 2011a). In recent years, the provision of affordable insurance products to those farmers has received significant attention. Recent developments in index-based weather insurance offer new possibilities of providing insurance for smallholder farmers in those areas and help farmers adapt to and build resilience against changing weather conditions. Therefore, the

insurance sector could play a vital role in climate change adaptation, especially in a country like Ethiopia.

Howdenet al.(2008) had the opinion that agriculture in its many different forms and locations remains highly sensitive to climate variations. Since the vast majority of the Ethiopian populace is engaged in the agricultural sector and mostly are small-scale farmers, there is a high likelihood that reduction in their income as a result of the effects of climate change. According to Endalkachew (2004), from weather related hazards which is affecting crop in Ethiopia the impact of drought and flood were the highest.

With regard to weather related insurance services studies have been conducted in various parts of Ethiopia. A study on household willingness to pay for weather indexinsurance found several factors, such as basis risk, education and trust as an important determinant for insurance uptake (Hill et al. 2010; Clarke 2011; Sarris 2013b).Many rural households in Ethiopia have a limited understanding of crop insurance. For instance, in Tadesse et al. (2013) 64 % of households reported that they perceived insurance as something designed for rich people who can afford to pay insurance premium.

According to (Hazell and Hessreliminary lessons point are the need to:

(i) improve the availability and accessibility of quality weather station data;
(ii) refine delivery channels and keep farmers better informed on products and underlying triggers;
(iii) strengthen the capacity of stakeholders at all levels;
(iv) augment the overall effectiveness by combining with other disaster risk reduction tools for prevention; and
(v) improve the legal and regulatory framework for index products.

Thus, there is a need for assessing and revisiting the existing structure, capacity of government, insurance companies and NGOs, existing laws, policies as well as guidelines to identify the gaps and recommend efficient and effective ways to introduce and implement insurance as one adaptation mechanism to combat the risks of climate change. In doing so this study tries assess perception of major stakeholders, to identify any gaps in awareness and the functioning of institutions, laws, government structures and the existing policy instruments, and fill the gaps and so as to have efficient and effective introduction and implementation of weather related insurance services to serve as a risk transfer mechanism to the efforts of adaptation to the impacts of climate change in Ethiopia.

1.3. Objective of the Research

General objective

The major objective of the study is to examine the processes of implementation and challenges and opportunities of insurance industry in the climate change adaptations and mitigation in Ethiopia.

Specific Objectives

- To assess the process and steps in the formulation and implementation of insurance industry on adapting to and mitigating impacts of climate change.
- To assess legal and regulatory framework and institutions of insurance industry on adapting and mitigating climate change in Ethiopia.
- To assess the challenges in existing practices of climate insurance in Ethiopia.
- To assess the potential opportunities of insurance industry on adapting and mitigating climate change.

1.4. Research Question

1 What weather related insurance products are introduced in Ethiopia?
2 What are the typical challenges, opportunities and lessons learned in the introduction and implementation of climate insurance in Ethiopia?
3 What are the current practice and efforts for the advancements in resolving the challenges?
4 How the approaches and processes of introducing and implementing insurance to combat the impacts of climate change is perceived by the insurers?

1.5. Significance of the study

Some of the significances of this study will be basically to reveal the awareness level and attitudes of the policy holders, insurance companies and relevant government offices concerning the relevance and advantages of weather insurance in Ethiopia.To asses and show the efforts and challenges towards effective implementation of weather insurancein the country and fill the gap for improving the effectiveness of implementing new insurance products to combat the challenges of climate change.Besidestrying to identify the gaps and provide solutions on how to strengthen the availability of relevant insurance products to cover risks of climate change in the country. Considering Ethiopia's plan to achieve a middle income status by 2025 this study will finally to make some recommendations for effective introduction and implementation of insurance products that could combat the impacts of climate change in the country. In general, the study to be used as further reference for other researchers to conduct further studies in the area.

1.6. Limitation of the study

The limitation that was encountered during this study is key informant interviewees and stakeholders that I tried to contact via email due to COVID 19 pandemic were non-responsive which created a difficulty to get the necessary information in some organizations. Due to COVID 19 there was a problem to freely move and get people and make an interview. In some offices some of the workers are on extended leave and difficult to get. Moreover there is a problem of transparency in some organization in providing specific data as well as there was unwillingness of some target population to fill the questionnaire and to conduct an interview. Thus, a semi-structured interview to offset the aforementioned limitations

1.7. Scope of the study

The study focuses on the processes of implementation and challenges and opportunities of insurance industry in the climate change adaptations and mitigation in Ethiopia. The challenges and opportunities of the insurance industry can be assessed by incorporating many climate change related impacts on the sector due tocatastrophic events such as floods, droughts, fires, challenging the insurance industry's abilities to measure, predict, and price risk as well as their financial viability.

However, this study only focuses on insurance services as climate change adaptations and mitigation measure to manage the risks of climate change on the agriculture sector. Since, the major weather related problem in Ethiopia is draught, and the impacts of climate change affects mainly the agriculture sector this paper assesses the processes of implementation, challenges and opportunities of weather related insurance services existing in Ethiopia; and assess legal and regulatory framework of insurance industry on adapting and mitigating climate change.

1.8. Organization of the study

This study deals with climate change and insurance industry in Ethiopia: challenges and opportunities, and is composed of five chapters. It start with the first chapter about background of the study, under which an overview of the topic under study is presented as background of the study and then description is made on the statement of the problem, the research questions, the general and specific objectives of the study, the significance of the study, the limitation of the study, and organization of the study. The second chapter is dedicated to the review of related literature, under this topic a detailed coverage on the conceptual definitions. Besides, theory of climate change and insurance, history of climate change and insurance, roles and benefits of insurance to combat effects of climate change, type's approaches and operation and challenges of implementing climate insurance are discussed. Methodology of the research will be under chapter three. Chapter four is description and analysis. In this chapter the discussion is about the main the findings of this study. Data collected from different sources will be discussed and analysed. The lasts chapter is chapter five which covers conclusion and recommendation based on the findings of this study and the discussions made on the previous chapter.

CHAPTER TWO:Literature review

2.1. Conceptual Definitions

Adaptation: In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate (UNFCC, https://unfccc.int).

Adverse selection: Adverse selection may occur, if the customers are better informed about their individual risk profile than the insurance company. Thus, potential customers with a higher-than average risk profile are more likely to buy insurance coverage while low-risk profile customers might not take up insurance as a means to manage their low risk (Warneret al., 2013).

Basis risk: This technical term is a major constraint of index insurance products and describes the potential difference between the payout triggered and actual loss experienced by the farmer on the field (Warner et al., 2013).

Climate change: is defined under Article 1 United Nations Framework Convention on Climate Change. UNFCCC defines it as "a change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Indemnity: is a general legal principle related to insurance that holds that the individual recovering under an insurance policy should be restored to the approximate financial position he or she was in prior to the loss. Legal principle limiting compensation for damages be equivalent to the losses incurred.(https://content.naic.org/consumer_glossary).

Insurance: The American National Association of Insurance Commissioners defines insurance as "an economic device transferring risk from an individual to a company and reducing the uncertainty of risk via pooling."

Micro-insurance: As per the revised Insurance Business proclamation 1163/19 of Ethiopia "Any form of protection against risks that is designed for and accessed by low-income people, provided by different categories of categories of carriers but operating on basic principles of insurance and funded by premiums"

Moral hazard: The term "moral hazard" describes undesired or "maladaptive" behaviours on the part of the insured, i.e., reduced efforts in risk prevention because of insurance coverage(Warner et al., 2013).

Weather-based-index insurance: Index insurance products are a type of insurance which does not indemnify the pure loss, but ex ante agree to make a payment based on a proxy for the loss, i.e. a triggering event is pre-defined in the contract. In the case of weather-based-

index insurance this triggering event could be for example based on a certain amount of rainfall or wind speed.

2.2. Climate and insurance

2.2.1. Brief history

For the financial sector, climate change has brought about new challenges. Not only risks on capital due the expected weather abnormalities, drought, mass movements and famine, but also, new kinds of opportunities have emerged. Climate Insurance is one of them.

Insurance is a mechanism through which a risk is distributed among the group of persons who are exposed to the same type of risk, i.e., persons who bear the risk of suffering a financial loss as a result of events affecting property, life or body. In general insurance is a scheme that provides financial compensation for financial losses, the payment for compensation is from the pool of contribution made by the insured parties participating in the scheme, who will pay an assessed contribution called premium. Based on the above definition, it may be seen that insurance exists to combat the adverse effect of risks related to a certain activity.

The earliest known instance of insurance dates back to the Babylonian period circa 2250 BC, when the Babylonians developed a type of loan insurance for maritime business. Examples can be found in the Code of Hammurabi (Buckham et al., 2010).Upon receipt of a loan to fund his shipment, a merchant would typically pay the lender an additional premium in exchange for the lender's guarantee to cancel the loan should the shipment be stolen or lost at sea (Buckham et al., 2010).In effect, the lender assumed the perils of the goods in transit at a premium rate of interest.

The practice proved effective enough for it to later be adopted by the Greeks, Romans, and Italian city states. From about the late fourteenth century on, merchant bankers began to split the finance and insurance components by drawing up separate contracts for the debt and the marine insurance. The advent of marine insurance, the oldest of the modern lines of insurance business, thus separated credit risk from peril risk, reducing the cost of both (Buckham et al., 2010).

Insurance helps individuals, minimize the financial impact of unexpected and unwelcome future events, and helps them organize their businesses and their lives with greater certainty (Buckham et al., 2010). Risk-averse individuals are able to enjoy greater utility from their most important assets via the purchase of insurance products. Almost every conceivable asset or activity can be insured through familiar product types, such as motor, travel, and home content insurance, and by business through professional and product liability insurance, cover for business interruption, and many other contingencies. As a vital tool for the management of risk by both individuals and organizations, whether private or public, insurance plays an important role in the economic, social, and political life of all countries (Buckham et al., 2010).

With rising socio-economic costs associated with physical risks of climate, there is increasing evidence of a paradigm shift in governments' approaches, from 'inaction' or 'post-disaster reaction' towards a more comprehensive and integrated risk management framework, spanning the different sectors and layers of government (D'Hulster, 2018).

In 2015, the world's governments signed the Paris Agreement on Climate Change at the 21st Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC), which sets a binding pathway for the reductions of Greenhouse Gas (GHG) emissions to limit climate change to two degrees of warming by the end of the century. Article 2.1(c) of the Paris Agreement specifically sets out a goal of "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development." (IAIS, 2018)

Since 2015, several new initiatives have been launched to harness the expertise of the insurance industry to address climate challenges. In 2015, following a request from G20 Finance Ministers, the Financial Stability Board launched an industry-led Task Force on Climate-related Financial Disclosures (TCFD)(IAIS, 2018). The TCFD released its final recommendations in June 2017, setting a coherent framework for the identification, assessment, management and disclosure of climate risks and opportunities across sectors, with specific guidance for application by financial institutions – including insurance firms as both underwriters and asset owners (IAIS, 2018).

Insurers commonly respond to excessive risks by either withdrawing temporarily or permanently from a risky region or raising their premium prices to offset high losses and maintain profitability (Haufler, 2009). Otherwise, insurers will be faced with increasing claims resulting from climate-related disasters. Climate change will affect insurance firms through its impact on health, life, agriculture and property, amongst other things. And this believed to lead insurers to increase their premiums or consider withdrawing coverage from certain crops that would most likely be negatively affected by climate change. Increased premiums may discourage farmers from purchasing insurance while low premiums may force insurers out of business. Thus, climate change poses a threat to insurability (Lamond & Pening-Rowsell, 2014). It is commonly assumed that when premiums are high, the poor will be excluded from purchase and coverage. High premiums could discourage many from taking out weather related insurance policies. Insurance is regarded as an adaptation measure, however, (Mills, 2005) was of the view that insurance is a form of adaptive capacity for the effects of climate change but the sector itself will have to adapt in order to sustain its business.

2.2.2. Benefits of climate Insurance

There are different studies that show Insurance benefit farmers in combating climate change. A new study shows that weather-based insurance will help smallholder farmers to withstand the effects of climate change and market shocks (VOA, Feb 5 2015).The report, "Scaling Up Index Insurance for Smallholder Farmers" was carried out by the CGIAR Research Program

on Climate Change, Agriculture and Food Security, (CCAFS), and the International Research Institute for Climate and Society at Columbia University in New York. It showcased projects that have overcome many of the challenges that have hindered famers from having access to index insurance. This type of insurance provides support to small farmers when there's not enough rainfall to grow sufficient yields. The insurance is based on a specific "index" – for example wind speed or rainfall for crops.

According to TN Anuradha and Vinaynath Reddy in 2012, in area called Bihar, India, for instance, some farmers had signed up for a crop insurance scheme which allowed them to receive their first payment. This scheme has helped some of them get back on track and invest in new seeds. The insurance scheme was part of the Climate Smart Village project (CSVs), being set-up in three villages in the Vaishali district, by the CCAFS South Asia program. The aim is to better arm farmers for more variable weather patterns through climate smart practices. Climate insurance programs can help farmers manage risks better, enabling them to invest and take chances that they would otherwise avoid. This could in turn improve their livelihood.

Insurance as a risk management tool provides many benefits. Promoting the use of insurance solutions can lead to increased risk management awareness which has the potential to be translated into risk reduction activities by individuals, thereby strengthening national and community resilience (Warner et al.,2013). For instance, in contrast to many government programmes or social security schemes that are either tax-financed or involve cross-subsidization between different population groups, insurance is characterized by risk-based pricing resilience (Warner et al., 2013). The price for an insurance product thus varies with the insured's probability of loss. As a consequence, the prospect of reduction measures, reducing their probability of loss. Additionally, eligibility for payouts can be linked with concrete risk reduction measures. One example is the National Agricultural Insurance Scheme in India. The project tries to encourage farmers to adopt progressive farming practices by offering a discount on the premium to those who have adopted better water conservation and sustainable farming practices (Surminski and Oramas Dorta, 2011). Aside from providing financial incentives for loss reduction, governments along with the private sector can help to integrate policies and incentives for risk reduction in insurance systems. For instance, enhancing early warning systems and risk awareness, implementing zoning and building code standards, investing in public protection infrastructure, along with offering premium support for individual risk reduction activities. In turn, this will have benefits for both the policy-holders and the insurers, since they decrease risk and the cost of the scheme in the long term resilience (Warner et al., 2013).

Further, Insurance can provide financial security to take on risky but productive investments. Different studies show that insured smallholder farmers invested significantly more in their farms than those without crop insurance. Experiments in Northern Ghana in which farmers received either cash grants, grants for/or opportunities to purchase rainfall index insurance or a combination of them, after three years of field experiments, shows that insurance leads to

significantly larger agricultural investment as well as to riskier production choices(Fosu and Dittoh, 2011). They show that these increased investments led to higher output, where an additional expenditure of $60 per acre of fertilizer used generated $215 of additional output per acre.

2.2.3. Types of Climate insurance

2.2.3.1. Agricultural Insurance

The range of agricultural insurance products offered in a country is a function of the willingness of the government to subsidize them, the existence of a viable infrastructure for providing insurance (including regulatory structures, trained loss adjusters, product delivery mechanisms, etc.) and the information and data available to support underwriting and actuarial analysis that enables them to be viable products (Vincent et al.,2012).Developed economies are more able, and often more willing, to provide subsidies than developing countries. They are also more likely to have the data, information, and insurance infrastructure needed for delivering such insurance (Vincent et al., 2012). Agricultural insurance policies offered fall into three broad categories: specific or named peril products, multiple peril or all-risk products, and index-based products. Specific peril products provide coverage against a farm's losses from clearly specified or "named" perils; these products have been offered successfully by the private sector because the occurrence of such events is relatively easy to verify, mitigating moral hazard and adverse selection issues (Vincent et al., 2012).

The private insurance sector has not successfully offered multiple peril products on a purely commercial basis. The evidence from the United States and Spain, as well as several willingness-to-pay (WTP)studies, suggests that substantial subsidies (covering all administrative costs and about 40% of the actuarially fair premium) are needed to achieve participation rates of about 50% (Goodwin and Smith 2010;Garrido and Zilberman 2008; OECD 2011).

2.2.3.2. Weather index insurance

Weather index insurance is designed to trigger compensation against specific hazards such as droughts or floods, which are predefined and "indexed". Typically, these insurance contracts are non-indemnity and parametric, i.e., they are not linked to actual losses. Rather than assessing the damage to a crop, claims are settled on the basis of a simple and transparent index, such as rainfall measured at a nearby weather station. Experience has revealed that this can be a valuable tool for unlocking rural credit and hence improving rural livelihoods.

In contexts involving rural smallholder farmers, weather index products have distinct advantages over traditional crop insurance: by using the same index and premium rate for everybody in an area, they avoid adverse selection and moral hazard problems; the mechanism is simple, transparent and easy to administer, especially when weather stations are automated;

and payouts retriggered immediately and usually reach insures within a few weeks of the end of the contract (World Bank, 2005b).
The cost of setting up and administering an index based scheme is often much lower as well as avoiding the issues of moral hazard and adverse selection. However, one limitation is basis risk whereby any risk not reflected in the index results in loss. This may occur for several reasons including, if the measurement for the index threshold as used by the insurers' differs to that of the policyholders, and when the calculation for the index does not cover a 'useful' risk or fully reflect the risk in question. Managing this basis risk is essential when scaling up index insurance schemes to prevent policyholders being exposed to risks not covered in the index and in fact increasing their risk overall (IFAD, 2011).

In 2005/2006, the World Bank and World Food Program (WFP) tested the relevance of weather index insurance schemes in Ethiopia. Crop insurance scheme developed with the support of the World Bank and drought insurance scheme developed with the support of WFP. In 2009, the Horn of Africa Risk Transfer and Adaptation project (HARITA) of Oxfam America (OA) along with local and international organizations such as the International Climate Research Institute (IRI) at Columbia University, Swiss Re and NISCO were able to develop a more participatory weather index insurance product in Northern Ethiopia (Tadesse, et al., 2015). The HARITA project tried to integrate the Productive Safety Nets Program (PSNP) activities of the Ethiopian government with the so-called insurance-for-work (IFW) model (Brans et al. 2010).This pilot insurance scheme initially covers 200 teff-producing farmers in the KolaTenben districts of Northern Ethiopia (Brans et al. 2010; OA 2010). Later this pilot was scaled up from 200 farmers in one village to 13,000 in 43 villages (OA 2010). In 2012 about 19,000 farmers were insured over 76 villages in northern parts of Ethiopia (OA 2013).

On the other insurance pilot in 2009 WFP entered into partnership with local stakeholders for the Joint Project on Weather Index Agricultural Insurance in Bofa Area. The partners involved in the pilot project were, the Lume-Adama Farmers' Cooperative Union in Bofa and its insured farmers, Ministry of Agriculture and Rural Development - including its extension workers,NIC,Swiss Re,National Metrology Agency (NMA),and WFP.(Hazell & Hess, 2010)

The insurance covered haricot beans. The insurance policies were procured by the Lume-Adama Farmers' Cooperative Union for their members in the Bofa area(Hazell and Hess, 2010). The union is backed by a credit institution that facilitates low-cost credit for union members at the start of the season. Erratic and insufficient rainfall triggered insurance payouts according to the contract terms and conditions (Hazell and Hess, 2010). The 137 insured farmer families received a total of ETB 309,000 (US$24,700) in claim settlements on 1 December 2009. Considering the total of ETB 73,485 in premiums collected, NIC's "investment" generated a substantial ETB 235,515 or US$18,826(Hazell and Hess, 2010).
According to (Hazell and Hess) preliminary lesson points are the need to:

(vi) improve the availability and accessibility of quality weather station data;
(vii) refine delivery channels and keep farmers better informed on products and underlying triggers;
(viii) strengthen the capacity of stakeholders at all levels;
(ix) augment the overall effectiveness by combining with other disaster risk reduction tools for prevention; and
(x) improve the legal and regulatory framework for index products.

Several other studies have been conducted in various parts of Ethiopia. For instance, Hill and Viceisza (2011) found some evidence on the positive role of weather index insurance on fertilizer adoption. Other economic studies in Ethiopia on household willingness to pay for weather index insurance also found several factors, such as basis risk, education and trust as an important determinant for insurance uptake (Hill et al. 2010; Clarke 2011; Sarris 2013b).Many rural households in Ethiopia have a limited understanding of crop insurance. For instance, in Tadesse et al. (2013) 64 % of households reported that they perceived insurance as something designed for rich people who can afford to pay insurance premium as is the case of motor insurance (many people in the survey areas are aware of motor insurance).

Still, the outreach of index insurance, both crop and livestock, remains limited. In 2015, the number of farmers buying crop insurance to protect their farms was 34,132(for traditional and index based insurance combined). 98.23% of these farmers (33,527) bought index based insurance with a total sum insured of ETB 40,767,263 (USD 1.49 million). The total premiums collected were ETB 7,187,727 (USD 0.34 million), payouts were ETB 5,750,227 (USD 0.27 million), and the claims ratio was 80% (NBE, 2016).

2.2.3.3. Micro Insurance

Micro-insurance as its definition indicates covers not only weather related insurance products for small scale farmers but also any form of protection against risks that is designed for and accessed by low-income people, provided by different categories of categories of carriers but operating on basic principles of insurance and funded by premiums. Micro-insurance service has been playing pivotal role in changing the livelihood of Ethiopian smallholding farmers. The insurance service being provided in drought prone areas of the country in collaboration with donors and micro-finance institutions has created confidence among the farming and pastoral communities and upgraded the production and productivity of low income farmers. When the service had come to view in 2009, it was mainly for drought affected areas, says Nyala Insurance Company, Micro-Insurance Department Manager.

Index based and indemnity based insurance packages were offered to the farmers, he explains, adding: "Index based insurance system is used for tackling drought in pastoralist society who depends on pasture for their animals, whereas the indemnity insurance is multi-purpose insurance which is mostly provided for agro-pastoral society to pay compensations for accidents relating to fire, flood, pest and drought. The company has reached around 24,219

people over the last 10 years, but it is extremely low compared to the market potentials in the country (Hagos, 2017).

2.2.3.4. Government Funding

The existence of financial assistance and compensation schemes is particularly important in economies where insurance markets are less developed, or where income levels are low, as it may be unreasonable to expect individuals and businesses to make use of private markets such as insurance due to the lack of availability or unaffordability (OECD, 2015).Funded insurance policies play an important financial buffer role for national economies allowing communities to rebound from natural disasters. For many countries, insurance claims have provided financing for 30– 40% of the existing disaster losses (Coco Liu, 2014).

The role of the state as an insurer of last resort is also an important consideration. Governments are expected to be increasingly called upon to address the impacts of climate and natural disasters (Swenja, 2013). This can apply to the wider role of government as an overseer of risk management and may include actions such as clean-up post disaster or to meet the needs for adaptation, which were either foreseeable (e.g., long slow drought) or preventable (e.g., hurricanes) (Swenja, 2013).

As outlined in the G20/OECD Methodological Framework, the expected frequency and severity of disaster events also affect the choice of risk financing and transfer instruments, based on cost-benefit analysis, keeping in mind that there is always a trade-off between addressing financial vulnerabilities on the one hand and generating returns through the alternative use of funds on the other (i.e. the opportunity cost of those funds) (OECD, 2015). For high frequency events, moreover, investments in physical risk reduction may be the most efficient use of government resources to reduce vulnerabilities (OECD, 2015). Generally, but particularly in countries where insurance markets are limited and not capable of covering private assets, and where government risk-bearing capacity is limited, it is important for governments to assess carefully the potential role of disaster risk financing and risk transfer instruments in their fiscal management strategy (OECD, 2012).

If markets are unattractive or the risks cannot be managed effectively then the burden may shift towards government and individuals to do so (Mills, 2005). In fact this may stimulate government action to develop new approaches to insurance arrangements (Botzen and van den Bergh, 2008), for example, public–private partnerships.

Governments can provide financial support to climate-related insurance in different forms such as direct premium subsidies, financial support for reinsurance facilities or operational cost subsidies. Subsidies can benefit the customer and target the initial motivation of insurance companies to enter and serve the market. However, there is a controversial discussion on whether sustainable climate-related insurance solutions in developing countries can work without governments financing part of the costs to share catastrophe losses in order to keep insurance affordable and support a large market penetration. A World Bank study of

government support to agricultural insurance – an insurance type which is often offering protection from adverse weather events – showed that premium subsidies were the most common form of public intervention provided in almost two thirds of all the 65 surveyed countries (Mahul and Stutley 2010).

The Indian agricultural insurance system is one prominent example where the government approved subsidies up to 50 per cent of the premium on crop weather index insurance business in 2007. In the beginning, public premium subsidies have only been channelled through the Agricultural Insurance Company of India Ltd but in order to create a level playing field on the market, several private sector programmes have also been approved for public premium subsidies (Stutley, 2012).

2.2.3.5. Mandatory Insurance Schemes

Considering the current treats of climate change, role of insurance on different issues, opportunities related to introduction of insurance as a risk management tool and outcomes of piloted weather index based insurance in Ethiopia the writer of this paper tries to assess compulsory insurance practices to address this pressing problem as a disaster risk management tool.

Different mandatory Insurance practices show high penetration rates. Mandatory flood insurance, in Norway or Iceland, led to high penetration rates (Bouwer et al., 2007; CCS, 2008; OECD, 2003). The most serious problem in insurance is the adverse selection (Yueyun and Dongmei, 2013). Particularly with the asymmetric information, that may lead to the failure of the insurance markets as Arrow (1963) and Akerlof (1970) demonstrated in their seminal works. Although insurance companies have developed numerous ways to lessen this kind of problems such as using the pre-medical exams, smoking or not, and demographic data as well as deductibles and co-payments, the adverse selection still is a challenging problem in the insurance market (Ville-neuve, 2003). As a result, insurance companies do not want to do business unless they are allowed to charge extremely high premiums and the consumers and especially the good ones like the ones with good health or good driving records may not want to buy insurance (Yueyun and Dongmei, 2013). The possible solution is to make the relevant insurance mandatory, such as mandatory auto liability insurance and universal health insurance. The condition of using mandatory insurance to solve the adverse selection problem is to pool all people together and all of them will buy the insurance. One important issue of the compulsory insurance is whether it can improve the affordability to the insured's' (Yueyun and Dongmei, 2013). That is one main purpose of implementing the mandates.

Compulsory insurance mandated by the government such as universal health insurance and auto liability insurance, the relevant governmental spending will be increased so taxes will be raised because implementing the regulation needs personnel and the budgets (Yueyun and Dongmei, 2013). According to Yueyun and Dongmei (2013), the purposes for implementing compulsory insurance are various. These include;

- To better protect the citizens of a country now and/or in the future. The social security, Medicare, annuity, and universal healthcare are all for this purpose.
- To better protect the third parties. Most liability-related compulsory insurance like mandatory professional liability and auto liability insurance is for this purpose.
- To help solve the insurance market failure problem. There is no need to implement compulsory insurance if there is a necessary and sufficient private insurance market to cover the relevant risk. However, due to the adverse selection or moral hazard or social risk, the private insurance market fails. Then, there is a potential need for the government to implement such compulsory insurance. Compulsory natural disaster insurance and environment pollution insurance are for this purpose. And the other purpose is;
- To establish the public's confidence for the relevant industry.

The Benefits of Compulsory Insurance

1. Compulsory insurance affects an individual, organization and society's welfare. It can negatively affect someone's welfare but raise the others' welfare. As a whole society, a good policy is the one that will raise the whole society's welfare although that someone may be worse off. Imposing basic auto-liability insurance may hurt some low income people since their spending on the other items will be immediately and significantly lowed but in the long run, that could benefit them. For example, if such a person is hit by the other low income person, without mandatory auto insurance, the victim will obtain no compensations while with the mandatory auto insurance (assume that all have the mandatory basic liability insurance), the victim will obtain necessary compensations.
2. It is expected that more insurers will be available and so there will be more market competition with compulsory insurance. This is true because that the mandate will pool all people and/or risk together and so to lower the average risk; and particularly that will eliminate or at least lessen the adverse selection problem. As a result, more insurers will be willing to offer insurance and enter into the market competition. Consequently the insurance market will be more competitive.
3. The purpose of implementing the mandatory insurance is to cover all relevant people and/or risk. The universal health insurance is to cover all people's health care; and mandatory auto insurance is to ensure that all auto drivers have the minimum liability insurance. In effect compulsory insurance has an effect increasing coverage of the insurance product.

Compulsory insurance is insurance that individuals, businesses, or other entities are required by law to have in force. (Insuransopedia, 2018) Compulsory insurance usually coversperils that carry heavy financial costs. It is often intended to prevent the insured from financial ruin, ensure the compensation of victims (without burdening the state), or both. Those who are required to purchase compulsory insurance but operate without carrying any can face penalties, such as fines. Compulsory insurance affects an individual, organization and

society's welfare. It can negatively affect someone's welfare but raise the others' welfare. As a whole society, a good policy is the one that will raise the whole society's welfare although that someone may be worse off (Yueyun and Dongmei, 2013).

According to Yueyun and Dongmei (2013), in cases of compulsory insurance it is expected that more insurers will be available and so there will be more market competition with compulsory insurance. This is true because that the mandate will pool all people and/or risk together and so to lower the average risk; and particularly that will eliminate or at least lessen the adverse selection problem. The most serious problem in insurance is the adverse selection. As a result, insurance companies do not want to do business unless they are allowed to charge extremely high premiums and the consumers and especially the good ones like the ones with good health or good driving records may not want to buy insurance. The possible solution is to make the relevant insurance mandatory, such as mandatory auto liability insurance and universal health insurance. The condition of using mandatory insurance to solve the adverse selection problem is to pool all people together and all of them will buy the insurance. As a result, more insurers will be willing to offer insurance and enter into the market competition. Consequently the insurance market will be more competitive. And the second effect of the compulsory insurance is the coverage change. The purpose of implementing the mandatory insurance is to cover all relevant people and/or risk. The universal health insurance is to cover all people's health care; and mandatory auto insurance is to ensure that all auto drivers have the minimum liability insurance.

Compulsory catastrophe-insurance-based private-public partnership will not only enhance mitigation of value-at-risk but also provide the victims with sufficient financial protections for climate hazards that are not eliminated. This hybrid mechanism has become a prototype for developing catastrophe insurance in several countries (Qihao He, 2016)

2.3. Approaches and Operation of Insurance Industry on CC adaption and mitigation

Climate change poses risks to the world and to manage the risks of climate change requires urgent action. To mitigate atmospheric greenhouse gas levels through reducing global emissions and to adapt to the changes in climate at a local level is a global strategy. To minimise risks and maximise potential opportunities, the insurance industry can have its own role to play. Adaptation to the changes in climate is particularly critical to the insurance industry as it directly affects property and businesses.

The insurance industry has traditionally based its view of risk on historical records of hazard occurrences. The potential for the characteristics of the insured weather hazards to differ from those of the past as a result of climate change; if this statistical non-stationarity in hazard cannot be adequately anticipated by an insurer through their underwriting practices and in their risk capital reserves, then it could undermine the financial stability of their organisation.

For instance a review of the risks arising in agriculture, and of the ways in which they aremanagedbyfarmers, rural communities, financial institutions, farm input suppliers, private insurers and relief agencies, reveals the special difficulties and costs that covariate risks pose, especially those involving catastrophic losses. Past attempts by governments and relief agencies to assist the management of covariate risks have been costly and often ineffective. There is now much interest in index insurance products that might provide a more effective and market mediated solution (Hess& Hazell,2010).It is widely expected that climate change will lead to significant shifts in the frequency, intensity and geographical distribution of extreme weather events. Thus, the risk assessment tools used by insurers in their underwriting must take into account any non-stationarity to ensure that their estimates accurately reflect any changes in risks today.

An increase in the magnitude or frequency of weather hazards with future climate change could also lead to an increase in the risk of correlated losses. Such increases in expected losses due to climate change would have profound consequences for the future affordability and availability of cover. Thus, adaptation decisions must also be made to be robust to most possible changes in climate conditions.

2.4. Challenges of implementation climate change insurance

Access to insurance

In terms of product availability, distribution, and consumer engagement – remains a critical challenge across developing and developed countries (UNEP Inquiry,2015), INSURANCE 2030 Harnessing Insurance for Sustainable Development). Key barriers include low levels of financial literacy and engagement with financial services, as well as a lack of needed risk data, perceived cost ineffectiveness of products, and other regulatory barriers (UNEP Inquiry, 2015). While certain initiatives have had major positive impacts (including the expansion of micro insurance), market tensions remain between access to affordable insurance and risk-based pricing. Importantly, this is increasingly being recognized as a global issue: in certain developed countries, low-income populations with higher exposure to natural hazards are increasingly met with difficulty due to certain geographic areas being redlined by providers (UNEP Inquiry, 2015).

Asymmetric information and systemic risk

According Mohammed and Ortman (2005), two basic issues affect both insurer and insured in a study of insurance, namely asymmetric information and systemic risk. Asymmetric information relates to the problem that the insurer and insured may not have the same information as regards the probability of losses occurring. The problem could rise due to either adverse selection or moral hazard. Adverse selection occurs if those more at risk

purchase more insurance than others without knowledge of insurer. Moral hazard problems occur because the insured can take actions that cannot be observed by insurer. Systemic risk is a situation where a large number of people suffer a loss at a time which rises mainly from the impact of extensive unfavourable weather events over a large geographic area. As a consequence, many people make a claim at the same time leading to premium paid into pool is not sufficient to cover the loss incurred.

Premium affordability and risk-reduction incentives

Insurance companies distribute financial risk amongst policyholders, and risk-based premiums can incentivise individual policyholders to reduce risk(EU, 2018). However, insurance becomes less attractive for high-risk households or farmers when premiums reflect the underlying risk. Although lower risk policyholders have a weaker incentive to reduce risk, they are more likely to buy insurance since premiums are more affordable. This trade-off between premium affordability and risk-reduction incentives is important but difficult to balance, and is often influenced by the differing risk management objectives of individual countries and/or stakeholder groups. The differing risk management objectives show that there could be room for more open and transparent engagement of, and collaboration with, the various stakeholders involved in the risk management process (EU, 2018).

Regulatory environment and oversight

Many developing countries with low non-life insurance penetration lack well-functioning supervisory systems and effective regulatory frameworks according to international standards(Warner et al.,2013). This can hamper the development of sustainable insurance solutions which can function as climate risk transfer instruments. Therefore, an adequate regulatory and supervisory framework needs to be in place to ensure that insurance undertakings are financially viable and that products are designed and sold in a way that ensures value to the customer(Warner et al.,2013). The International Association of Insurance Supervisors (IAIS) established a set of essential principles, called Insurance Core Principles (ICPs), to be adhered to for an insurance supervisory system to be effective and which gives guidance on how these principles can be applied in low-income countries.

Especially when dealing with innovations, such as index-based insurance products, or with underserved markets as it is the case in most developing countries and emerging market economies, insurance regulators are usually challenged with a need for assessing and improving their regulatory and supervisory systems and ensuring that proportionate approaches are taken that consider the innovative character of these products, the necessary consumer information and appropriate delivery mechanisms(Warner et al., 2013). There are already some notable examples of countries which started making changes in national regulatory frameworks to enable the development and delivery of microinsurance and other

forms of insurance to poorer households such as Ghana, Nigeria and India (Qureshi and Reinhard 2012).

2.5. Empirical evidence on climate change and insurance

Most of the studies conducted with regard to climate change and insurance are quantitative, based on surveys, and concerned with the correlation between a specific risk public perceptions and mitigating activities especially of farming communities and smallholder farmers, studying their perceptions of, and adaptation to, increasing temperature.

Several studies examine climate change or climate risks, either by considering several types of climate risks without focusing on any specific climate risk (Tesfaye &Seifu , 2016). Some studies look more specifically at how climate change affects households' access to livelihood capital, such as land, livestock, water, and food production capacity (Haileslassie et al., 2011; Molua, 2015).

Among the articles treating a specific climate risk, drought is the dominant topic (Tadesse et al., 2015; Bewket, 2012;Tesfaye &Seifu, 2016).

Some studies indicate that the positive role of weather index insurance on fertilizer adoption Hill and Viceisza (2011).Most studies examine geographic regions identified as particularly vulnerable to climate change and climate risks such as drought or flooding . (Tesfaye &Seifu, 2016; Bewket, 2012) and conduct analysis on understanding of crop insurance by the target groups. For instance, in (Tadesse et al., 2013). And mostly on smallholder farmers and their adaptation to climate change (Haileslassie et al., 2011).

Other studies examine household willingness to pay for weather related insurance services(Goodwin and Smith 2010;Garrido and Zilberman 2008; OECD 2015) several factors found on these studies; for weather index insurance, such as basis risk, education and trust as an important determinant for insurance uptake (Hill et al. 2010; Clarke 2011; Sarris 2013b). Most of studies conducted in Ethiopia focus on weather index insurance services their effectiveness and challenges and policy implications of these services (Tadesse et al. 2013; Hellmuth et al., 2009).

Studies conducted in other countries indicated that the governments should be fully involved because no one is immune when extreme weather events occur. Building public-private partnership will go a long way in making climate risk insurance a successful apparatus for resilience in developing countries (Awojobi, 2018). And the benefits and importance of compulsory or government funded weather related insurance services (Swenja, 2013; Bouwer et al., 2007; CCS, 2008; OECD, 2003; Yueyun and Dongmei, 2013).

CHAPTER THREE: METHODOLOGY

3.1. Research settings

The study area is Ethiopia is a country located in the Horn of Africa with a land size of about 1.1 million square kilometres and a population size of 93,877,025 million people in 2013(CIA 2013). And estimated to reach114,964,000.00 million people by July 1, 2020 according to UN estimate (World Population Prospects, 2019) Ethiopia is bordered on the west by the Sudan and South Sudan, the east by Somalia and Djibouti, the south by Kenya, and the Northeast by Eritrea.

Ethiopia is a federal country divided into 9 regions and 2 city administrations. Currently the number of regions increased from 9 to 10, due to the recognition of the Sidama Zone of the Southern Nations, Nationalities, and Peoples' Region, to become a region in its own right. The Sidama Regional State was created in June 2020 following a referendum was held in the Sidama Zone of the Southern Nations, Nationalities, and Peoples' Region. Each region is sub-divided into zones and the zones into woredas, woredas are divided into Peasant Associations (PA), or kebeles, an administrative unit consisting of a number of Households.

Figure 1: Map of Ethiopia

According to World Bank (2013) Ethiopia is one of the world's poorest countries. The country's per capita income is substantially lower than the regional average (Gross National Income). The government aspires to reach middle income status and a climate resilient green economy by 2025. The country developed a Growth and Transformation Plan (GTP II) which is the third five-year national development plan to guide the country towards becoming a middle-income and climate-resilient green economy by 2025.

Public infrastructure investment has been at the center of the country's economic strategy, and Ethiopia has been able to achieve a substantial expansion of energy, road, railway, and telecom infrastructure. The private sector investment climate remains suppressed, however.(world Bank 2018) Public investments in basic service provision, such as education and health, have contributed to poverty reduction, as did the introduction of rural safety nets.

The country has diverse agro-ecological environment. Around 55 percent of the total land area constitutes moisture-stressed arid, semi-arid and sub-moist areas with less than 120 days of crop growing period. These drier areas are commonly low in soil fertility and high in rainfall variability and drought risk.

3.2. Target population and types of data

The target populations of this study are insurance companies in Ethiopia that implemented a pilot project of index based insurance products. Experts from different government offices, insurance companies, NGOs supporting insurance practices are participated on Key Informant Interview. These experts who participated on Key Informant Interview (KII) helped the researcher to collect information about the issue understudy.

The types of data used are primary and secondary data. Primary data were collected based on prepared checklists for expert interviews and questioners. The secondary data that the study were based on are different literatures, data generated from concerned government institutions, private companies, legal and policy documents or instruments and reports,.

3.3. Sampling technique and size

The population of interest of this study is insurance companies currently operating in Ethiopia as of 2020 and senior professionals in those selected companies. The sample frame is the 18 insurance companies, 4 NGOs and 1 Microfinance Institution and 2 Farmer Cooperatives. Purposive sampling was used after identifying the relevant offices to interview. An in-depth semi-structured interview is carried out with selected 25 experts of which involves more of technical questions with main stakeholders of insurance companies since from the 18 insurance companies only 4 of them are working on climate change related services all of the four companies were contacted, and NGOs supporting different pilot testing and projects on climate related insurance services like ILRI, JICA, WFP were contacted and the government office working on climate change the Ethiopian Environment and Climate Change Commission (ECCC) and the government office regulating financial institutions like insurance companies and MFIs which is the National Bank of Ethiopia is contacted. Further the researcher contacted one microfinance institution and one Farmers cooperative Union.

All professionals (with more than two year experience) on micro-insurance services of weather related crop or livestock index insurance services. From the above institutions total of 30 professionals participated in the filling he questioners and conducting the interview.

More experienced professionals in the area of business are selected for the interview. Managers of micro-insurance departments were selected from the insurance companies and project officers specifically involved in on micro-insurance services of weather related crop or livestock index insurance services are purposively selected. Table 1 summarizes the sample frame and sample.

Table 3.1: Sampling

Insurance Companies providing micro insurance services Total no= 4			
Company	Total Number of senior professionals /those >2 year Experience	No. of Interviewees	Remark
National Bank of Ethiopia	4	4	
Ethiopian Insurance corporation	3	1	Non respondent, 1 employee with no experience specific to micro- insurance. Only 3 years of pilot testing implementation was on the onset.
Nyala insurance Company	4	2	Non respondent, 2 employees are with no experience specific to micro-insurance.
Oromia insurance Company	3	3	
Africa Insurance Company	2	1	Non respondent, 1, employee with no experience specific to micro insurance.
Insurance Companies not offering micro insurance services Total No. =4			
Awash insurance company	2	2	Not offering micro insurance services
Nile insurance Company	2	2	Not offering micro insurance services
United insurance company	1	1	Not offering micro insurance services
Lucy Insurance Company	2	2	Not offering micro insurance services
NGO's supporting micro-insurance services of weather related crop or livestock insurance			
JICA	1	1	
ILRI	1	1	
WFP	2	2	
Cooperatives implementing micro-insurance services of weather related crop/ livestock insurance			
Adami Tullu Farmers cooperative	1	1	
Buttajirra Farmers cooperative	1	1	
Microfinanace company implementing micro-insurance services			
Bussa Gonnoffa	1	1	

Source: Own survey, 2019/20

3.4. Methods of data collection

3.4.1. Key Informant interview

Key Informant Interviews (KII) were held with 30 experts of different offices that have information, connection and knowledge about insurance and climate change in Ethiopia; including those who have participated inthe implementation of weather insurance in the country. Semi-structured interview questions were used to administer interviews with stakeholders from different relevant offices, including NGOs and government offices, and insurance companies supporting organizations. The objective of the KII were to understand the effectiveness of implementation practice of weather insurance/ index based insurance as well as the challenges and the challenges and opportunities of climate change for the insurance industry in general.

The interview tries to cover all attempts of insurance covers introduced, implemented or studied that can cover risks associated with the risks of climate change. It also covers issues like the government's responsibility in introducing implementing and supporting the availability of insurance facility. Awareness of existing policy and laws related to the issue at hand by the respondents'. It includes the respondents' assessment on the effectiveness of the already implemented insurance products, laws and policies and their suggestions to implement effective insurance products that can cover losses associated with the risks of climate change in detail.

3.4.2. Secondary data

Secondary data from different documents, books, journal articles, legal and policy documents as well as documents from different organizations were collected.

3.5. Methods of analysis

The research tries to analyse data collected from primary and secondary sources. The data analysis is believed to lead the researcher to recommend better options for implementation of insurance products to combat the challenges of climate change. There were desk reviews and analysis of legal documents, literatures, documentation of existing initiatives, policy documents, original legal texts and other background documents. Major actors were identified and legal and policy documents were reviewed, institutional frameworks of different periods and recent documents related to the issue at hand study documents and directives of the National Bank of Ethiopia. Understanding the reasons behind, policies, strategies, legal instruments and socio-economic issues, identifying gaps and possible interventions to fill the gaps were performed.

The method of analysis is qualitative and description, policy and legal documents content analysis is conducted whenever necessary.

CHAPTER FOUR: RESULTS AND DISCUSSION

This chapter presents the data analysis, interpretation of results and discussion of findings of the study. The chapter contains six sections: the analysis of Socio-demographic data, processes and steps in the formulation and implementation of insurance industry in relation to the Policy on insurance industry for climate change adaptation in Ethiopia, Rules and regulations of Insurance on climate change and their implementations in Ethiopia, Existing Practices of Climate insurance in Ethiopia; Challenges and potential Opportunities of insurance industry on adopting and mitigating Climate Change.

Qualitative data's are described taking into account the relevance accuracy and coherency of ideas and information obtained from expert's interviewed and policy and legal documents content analysis is conducted.

4.1 Demographic Characteristics of Respondents

As shown in the Table 4-1, 3 of the respondents were female which represents 10% of the respondents whereas 27 of the respondents were male which represents 90% of the respondents.

Regarding work experience 13% of the respondents have below 2 years work experience and the rest which is 83% of the respondents have above 2 years work experience.
About the level of experience of the respondents, 60% of the respondents are experts in managerial level while the others 40% are lower level experts working on in the area weather related crop/ livestock insurance services, which shows more of the respondents have plenty of experience on the subject matter with enough knowledge and information to understand the challenges and opportunities of weather related crop/ livestock insurance services.

The following table show that more mature and well experienced respondents are included

for data collection.

Table 4.1: Demographic Data of Respondents

		Frequency	Percent
Gender	Female	**3**	**10**
	Male	**27**	**90**
Work Experience	**<2**	**4**	**13**
	2-5	**3**	**10**
	5-9	**6**	**20**
	10-15	**8**	**27**
	16-20	**5**	**17**
	>20	**4**	**13**
Experience related to weather related crop/ livestock insurance services.	No Experience	**11**	**37**
	1-5	**5**	**17**
	6-10	**6**	**20**
	>10	**8**	**27**

Level of Experience	Managerial	**18**	**60**
	Non-managerial	**12**	**40**

Source: Own survey, 2020

4.2 The process and steps in the formulation and implementation of insurance on adapting to the impacts of climate change in Ethiopia

Ethiopia has initiated the Climate-Resilient Green Economy (CRGE) initiative to protect the country from the adverse effects of climate change andto build a green economy that will help realise its ambition of reaching middleincomestatus before 2025.The objectives to identify green economy opportunities that could help Ethiopia reach its ambitiousgrowth targets while keeping greenhouse gas emissions low. The government tries to attract development partners to help implement this new and sustainablegrowth model.

The GTP explicitly recognizes that environment is a vital and important pillar of sustainable development, and states that "building a 'Green Economy' and ongoing implementation of environmental laws are among the key strategic directions to be pursued during the plan period"(GTP 2011; p.119).

The Government of Ethiopia's five-year development plan, building on Growth and Transformation Plan GTP II which is the continuation of the GTP I aims to transform Ethiopia into an industrialised middle-income country by 2025. This transformation will be promoted by pursuing the following three objectives: (i) maintaining an annual average real GDP growth rate of at least 11%; (ii) pursuing aggressive measures towards rapid industrialisation and structural transformation; and (iii) ensuring the sustainability of growth by fostering a stable macroeconomic framework and climate resilient green economy. This is implemented in different sectors of the government including the agriculture and finance sector that need collaboration to promote and implement weather related insurance products to peruse the governments' plan of fostering climate resilient green economy.

The National Adaptation Programme of Action (NAPA) is a mechanism within the UNFCCC, designed to help the Least Developed Countries (LDCs) including Ethiopia to identify their priority adaptation needs to climate change and to communicate these needs to the Conference of Parties (COP) of the UNFCCC and other concerned bodies. The 2007 Climate Change National Adaptation Programme of Action (NAPA) of Ethiopia in its Identification of Key Adaptation Needs based on the review of adaptation options identified under MEA synergy assessments, ongoing programs and development project initiatives, the INC and the outcomes of the two national and the eight regional consultative workshops conducted by the NMA, and 37 potential adaptation options were proposed (identified) for further prioritization and ranking and inclusion in the NAPA to address immediate adaptation needs. (NMA,2007). one of the adaptation options identified is promoting drought/crop insurance program in Ethiopia.

As indicated on the NAPA of Ethiopia document, The National Steering Committee members established by NMA endorsed the criteria proposed before the prioritization process started. Once the criteria were defined, the teams next step was to determine the importance of the criteria and assign corresponding weights to them.

Table 4.2: Description of Criteria and their weight

Criteria	**Weights**
Level of Climate Change Risk (Loss Avoided by Poor People)	0.30
Poverty reduction potential (Impact on poor peoples' Income Growth)	0.20
Cost effectiveness	0.20
Complementarities with national and sectoral plans, policies & strategies, and other MEAs	0.15
Synergy with national plans including action plans under MEAs	0.15

Source: (NMA, 2007)

The NAPA of Ethiopia document prioritized 11 projects from the 37 identified adaptation options. And promoting drought/crop insurance program ranked first among the 11 projects listed on the NAPA document based on the criteria set as indicated on table 2 here in above.

Table 4.3: List of projects prioritized using Multi-Criteria Assessment (MCA)

Title of Project	**Average standard score**	**Rank**	**Estimated project implantation Cost (Million USD)**	**Estimated project design cost (Million USD)**
Promoting drought/crop insurance program in Ethiopia	1.00	1	8	0.1

Source: (NMA, 2007)

Having seen that the commitment of the Ethiopian government to implement green economy all sectors of the economy should plan and prepare themselves to implement the green economy following the government's policy direction towards it. When we see the relevant sectors of the economy related to climate change and insurance the major ones are the agriculture and the financial sector.

The agriculture sector of the Ethiopian economy in its plan towards CRGE states under the Ethiopia's Agricultural Sector Policy and Investment Framework 2010-2020 (EASPIF) that donors will need to be consulted about moving towards other forms of development assistance. -Consideration should also be given to refining the policy on strategic food reserves and the use of innovative risk management tools such as weather index insurance and commodity options trading (EASPIF, 2010-2020 P.23). Thus, one of the Policy considerations of the EASPIF is to explore use of innovative risk management tools (e.g. weather index insurance). This being so, the insurance services are under the supervision of the National

Bank of Ethiopia(NBE), which shows that NBE needs to engage with the Ministry of Agriculture in processesand steps in the formulation and implementation of weather related insurance services. This have a significant impact in bridging the gap relation to the policy on the financial sectors with regard to indicating clearly the role of insurance industry for climate change adaptation in Ethiopia. It will also help to streamline the effort to work towards the national strategic initiative i.e the CRGE form the financial services delivery side as insurance is one of the financial services delivered by the finance sector and regulated by NBE.

To date, most pilots have been authorized by donor agencies in collaboration with government bodies and few insurance companies. They involve very few parties and that any losses will be covered by the implementing parties. Before any major scale up of index products is therefore envisaged, the legal and regulatory issues need to be addressed.

On the other hand, the finance sector of Ethiopia's adopted the National Financial Inclusion Strategy in 2017 following the establishment of the Financial Inclusion Council in 2014, which was developed by the National Bank of Ethiopia. The National Council for Financial Inclusion, which reports to the Prime Minister's office encompasses key stakeholders from the MoFEC, Ministry of Industry, National Planning Commission, Ethiopian Development Research Institute and the NBE, which also has a financial inclusion secretariat. Though there is no reference to financial inclusion in the GTP II, The 2017 National Financial Inclusion Strategy aims to strengthen financial infrastructure, improve accessibility of financial products and services, improve consumer protection and improve financial education. It further aims to achieve universal access to and use of affordable and high-quality financial products and services by 2025. But still there is no clear indication on the policy document that in accordance with the national strategy initiative the finance sector via weather related insurance products will work towards strengthening risk management tools like weather index insurance products to as climate change adaptation strategy as it is indicated in the Agricultural Sector Policy and plan.

4.3 Legal and regulatory framework of climate insurance in Ethiopia

4.3.1 National Laws: The Constitution of Ethiopia (1995)

The current Constitution of Ethiopia has two articles in relation to the Environment which states that:-

Article 44 Environmental Rights

1. All persons have the right to a clean and healthy environment.
2. All persons who have been displaced or whose livelihoods have been adversely affected as a result of State programmes have the right to commensurate monetary or alternative means of compensation, including relocation with adequate State assistance.

Article 92 Environmental Objectives

1. Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment.
2. The design and implementation of programmes and projects of development shall not damage or destroy the environment.
3. People have the right to full consultation and to the expression of views in the planning and implementations of environmental policies and projects that affect them directly.
4. Government and citizens shall have the duty to protect the environment.

Ethiopia is also a signatory to a number of international conventions and protocols. These include the United Nations Framework Convention on Climate Change (UNFCCC ratified in 1994), the United Nations Convention to Combat Desertification (UNCCD adopted in 1994), the Convention on Biological Diversity (CBD ratified in 1994) and Cartagena Protocol on Bio-safety (Bio-safety Protocol adopted in 2000). The International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, adopted in Paris on 17 June 1994 and entered into force on 26 December 1996. Ethiopia has ratified the Convention on 24 June 1997. This indicates that as per Article 9 (4) of the current Constitution of Ethiopia "All international agreements ratified by Ethiopia are an integral part of the law of the land." Thus this convention is considered as the law of the land.

As per Article 2 (1) and (2) of The Convention to Combat Desertification aims at fighting desertification and mitigating the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements. The Convention explains that achieving its objective 'will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level.'

Article 10 (2) (e) and Article 19 (1) (a) of this convention states that "In their efforts to combat desertification, the State parties to this Convention have the obligation to 'facilitate access by local population to appropriate information and technology' and promote capacity building ' through the full participation at all levels of local people, particularly at the local level, especially women and youth, with the cooperation of non-governmental and local organisations'"

With the obligation on state partied to facilitate cooperation between different governmental and nongovernmental organizations to combat desertification the Ethiopian Government has to support and facilitate different sectors that can contribute to this objective to play their own role. Which can lead to the governments obligation to support relevant government and local

organizations including the private sector to participate on installing climate insurance services which has its own impact on combating desertification.

Ethiopia is also a signatory to a number of international conventions and protocols. These include the United Nations Framework Convention on Climate Change (UNFCCC ratified in 1994), the United Nations Convention to Combat Desertification (UNCCD adopted in 1994), the Convention on Biological Diversity (CBD ratified in 1994) and its Cartagena Protocol on Bio-safety (Bio-safety Protocol adopted in 2000) (EPA, 2012).

4.3.1 The commercial code of Ethiopia:

Insurance is an agreement where policy holder or his designated beneficiary, one party (the insurer)agrees to pay a certain amount of money called the premium to the insurer for an obligation entered by the insurer to make payment of a defined amount (the claim payment or benefit) upon the occurrence of a specific loss. This defined claim payment amount can be bases on the amount of lose sustained or can be a fixed amount which can reimburse all or a part of the loss that occurred. The insurer fixes the premiums after assessing losses expected based on different indicators.

Under an insurance arrangement, the pool participant is the policyholder. The risk of any unanticipated losses is transferred from the policyholder to the insurer who has the right to specify the rules and conditions for participating in the insurance pool. The insurance contract is the policy. It covers a policyholder for economic loss caused by a peril named in the policy. The policyholder pays a known premium to have the insurer guarantee payment for the unknown loss. In this manner, the policyholder transfers the economic risk to the insurance company.

The World Bank Weather Index Insurance for Agriculture: Guidance for Development Practitioners states that index products do not align with the traditional definition of insurance, as they do not indemnify actual loss and a policyholder does not actually have to have an insurable interest before they purchase an index based contract. This is important for a numbers of reasons, but chief among them is that, without strict regulation, buyers of these products will not have their interests protected by law. Equally, if not subject to the relevant financial regulations, sellers of these products may not make suitable financial provision for them and therefore be unable to make payments in the case of loss. To date, most pilots have been authorized by donor agencies in collaboration with government bodies and few insurance companies. They involve very few parties and that any losses will be covered by the implementing parties. Before any major scale up of index products is therefore envisaged, the legal and regulatory issues in the country will need to be addressed.

A clear legal and regulatory framework is a prerequisite to expand and improve the provision of micro-insurance. The efforts and activities in the regulatory area should focus on creating an enabling environment for the development of the micros insurance market. Initially, the

main regulatory challenges were defining micro insurance, agreeing to a broad policy framework and coming up with a draft of a micro insurance regulation.

4.3.1 Insurance Proclamation

Insurance companies in Ethiopia are highly regulated by the National Bank of Ethiopia (NBE) through the enforcement of the Insurance Proclamation 746/2012 and Directives issued by NBE. However, NBE in its goals and objectives that it plans to accomplish does not indicate or mention about climate insurance services and anything that it plans to work in line with the countries CRGE strategy and the National Financial Inclusion Strategy in relation to insurance services.

There is also no indication on both the proclamation of Insurance Business Proclamation no. 746/2012 which is drafted by NBE and approved by the parliament of GoE and the related Directives issued by NBE about the risks of climate change and their impact on the Insurance Industry.

It would appear that Ethiopian insurers have not paid adequate attention to the impact of climate change as there is no evidence to show that they have invested in any known research to investigate the potential effects on the industry by examining the link between climate change and weather-related losses. This attitude may stem from their belief that there is no link between climate change and indemnity claims. Consequently, meaningful discussion among insurers as well as via the Regulator i.e. NBE on the effects of climate change is yet to be seen in Ethiopia. There is thus limited focus on the effects of climate change on the Ethiopian insurance industry.

As per the previous proclamation of Insurance Business No.746/2012 There is no separate legal framework for weather related insurance services to be performed by other institutions than insurance companies. Insurance Business Proclamation No.746/2012 under its Article 2 states that ‘‘insurance” means an undertaking by an insurer to "indemnify"(stress mine) another person, in exchange for consideration called premium, against damage, destruction, loss or liability in respect of a certain risk or peril to which the object of the insurance may be exposed or to pay a sum of money or other thing of value depending upon the happening of a certain event; But this definition does not cover types of insurance like Index based insurance services which is mainly not based on indemnity type of insurance. Even though the definition of Insurance according to the commercial code of Ethiopia states under its Article 654 (1) that “An insurance policy is a contract whereby a person, called the insurer, undertakes against payment of one or more premiums to pay to a person, called the beneficiary, a sum of money where a specified risk materialises.”The proclamation which is promulgated after the commercial code and have a binding effect for it is a recent law for the issue at hand defines it in a way it does not cover non indemnity types of insurance services of index based insurance. For this the legal gap of implementing index based insurance services starts from the definition of Insurance itself.

Beside this the proclamation doesn't clearly define micro-insurance in the Ethiopian context to overcome this gap NBE had issued a directive in 2015. The directive issued in 2015 by NBE for micro insurance services which is called "Licensing, Licence Renewal, and Product Approval for Micro-insurance Providers Directive No. SMIB/1/2015". But it Is repealed shortly after being issued due to the above definitional legal gap on the main proclamation. Being cognizant of this the NBE drafted and an amendment and it is recently approved by the HPR and promulgated. Insurance Business (Amendment) Proclamation No. 1163/2019. Which is a proclamation to amend the Insurance Business Proclamation No.746/2012; tries to define micro insurance, so that, it lay legality to micro insurance services function. It states under its articles 42-44 that:

> "42/ "micro insurance" means any form of protection against risks that is designed forand accessed by low-income people, provided by different categories of carriers but operating on basic principles of insurance and funded by premiums;"
> 43/ "micro insurance agent" means a person licensed by the National Bank as a micro insurance agent who, acts for and on behalf of one or more micro insurance providers, and engages in intermediary services;"
> 44/ "micro insurance providers" means insurers, including those dedicated to deal in micro insurance business and microfinance institutions;"

4.3.1 Cooperative Societies Proclamation

On the other hand the Cooperative Societies Proclamation No. 985/2016 states that "saving and credit cooperative society" means a society established to provide saving, credit and loan-life-insurance services to its members; "loan-life-insurance" means an insurance given by a cooperative society to its members to cover loan taken by a deceased member before full repayment of debt;

The Objective of A cooperative society established pursuant to Proclamation No. 985/2016 as it is stated under Article 4 of the proclamation "shall have different objective which one of them as per sub Article of the same Article is: to provide loan-life- insurance coverage to members;

As per Article 2(1) of the same proclamation "cooperative society" which means an autonomous association having legal personality and democratically controlled by persons united voluntarily to meet their common economic, social and cultural needs and other aspirations, which could not addressed individually, through an enterprise jointly owned and operated on the basis cooperative principles.

As per Article 21 (8) any cooperative society shall deliver Micro insurance service to it`s member in the following manner,

a) the cooperative society may enter insurance agreement for its own or its member asset;
b) on the request and consent of its member provide micro insurance service for crop, animal or for other produces to avert risk or enter into agreement as agent of the insurance company; or

c) The cooperative society may give micro insurance for loan life insurance service or enter insurance agreement for its member.

And Article 21 (9) states that "saving and credit cooperate society collect member saving, provide credit, and also provide micro credit life insurance service for members loan or saving or for future saving, based on contractual agreement, for the amount of premium paid money by saving and credit cooperative society." And it further indicate in the next sub Article that detail implantation shall be prescribed by regulation issued by the Council of Ministers. But so far there are no regulations that were issued as to how cooperatives to provide this service to their members.

4.4 Existing practices of climate insurance in Ethiopia

Despite the importance of agriculture and frequent loss history due to droughts and other risks, for many years there has been very limited development of crop or livestock insurance in Ethiopia. First of all, weather related insurance services are very limited in Ethiopia. The performance is very low and has just recently been taken up by only four insurance companies; others are yet to take it up as there are only 4 out of 18 insurance companies practicing weather related insurance services. The numbers of insurance companies in Ethiopia are 18, of which 17 are private. Of the total branches, about 54 percent were located in Addis Ababa. Total capital of the insurance companies reached Birr 6.3 billion, of which about 75 percent was that of private insurance companies (NBE, Quarterly Bulletin, Vol. 35 no. 2 (2019).

Out of the 18 insurance companies currently working in Ethiopia only four of them are offering weather related insurance services. And all of them are still piloting different types of weather related insurance products since 1980s. Livestock insurance was piloted in 1980 and crop insurance in 2004 (Mahul & Stutley, 2010). All the pilot projects are being supported by different NGOs and the companies are covering all their admin costs covered with the help of these donor agencies. This indicates that despite its importance considering the current risks related to climate change that is posed on the overall risk management of the country one of the risk management tool i.e. weather related insurance services are not getting the necessary attention both by the private as well as the public sector and the government of Ethiopia in general. When we these different types of weather related insurance services pilot tested in different forms and in different periods in Ethiopia there is the traditional agricultural insurance and recently weather index insurance (could be crop or livestock).

4.4.1 Traditional agricultural insurance

Among the 18 Insurance companies the companies engaged in traditional agricultural insurance are Nyala Insurance Company (NIC) and Oromia Insurance Company (OIC).

Due to the production structure of the agricultural sector with its reliance on smallholder farming, the outreach of traditional crop and livestock insurance products that require physical

loss verification has remained very limited. According to the NBE, in 2015, a total of 886 crop and livestock policies were sold for traditional insurance products.

Nyala Insurance Company (NIC): NIC has started traditional crop insurance in 2007 when the company began offering multi-peril crop insurance (MPCI). Reinsurance was provided by Swiss Re. As it is discussed by the Manager Micro Insurance Department of NIC to the researcher NIC offers insurance to larger coffee estates and large scale green house horticulture production.

Problems including the high cost of administration for field assessments, a lack of an effective delivery channel, high premium rates and low awareness levels in the target market continue to constrain market growth. The MPCI product only paid out in 2008. One major reason for the low claims is that the target market is contract farmers in well-organized value chain, often on irrigated fields. These farmers are less vulnerable to drought and other risks than subsistence farmers. Thus the Manager Micro Insurance Department of NIC believes that farmers a multi-peril crop or livestock insurance is more preferable to cover other risks faced by the farmers so that the cover makes more sense to the farmers.

Table 4.4: Performance of MPCI of NIC from 2007 to 2015.

Year	Number of farmers	Sum Insured(ETB)	Premium(ETB)	Claims paid(ETB)
2007	120	663,875	31,269	-
2008	827	3,076,283	144,960	91,469
2009	676	3,372,960	179,104	-
2010	115	417,500	66,805	-
2013	124	372,320	23,838	-
2014	2,778	20,233,883	1,163,448	-
2015	0	0	0	-
Total	**4,640**	**28,136,820**	**1,609,425**	**91,469**

Source: NIC and NBE

According to the officials of NIC also offers traditional livestock insurance, the product was launched in 2010 following a pilot carried out in collaboration with the Association of Ethiopian Micro Finance Institutions (AEMFI) and funded by the World Bank. The product is offered in SNNP in partnership with the NGO World Vision Ethiopia (WVE).

Table 4.5: Performance of Indemnity Based Livestock Insurance of NIC

Year	Number of farmers	Sum Insured(ETB)	Premium(ETB)	Claims paid(ETB)
2011	141	1,850,500.	74,045.	13,000.
2012	76	1,543,000.	64,130.	45,700.
2013	19	391,000.	15,645.	14,775.
2014	18	495,000.	14,855.	-
2015	81	26,334,700.	856,352.	19,700.
Total	**335**	**30,614,200.**	**1,025,027.**	**93,175.**

Source: NIC and NBE

Oromia Insurance Company (OIC): According to the Manager MicroInsurance Department of OIC has been actively involved in traditional crop and livestock insurance since 2010. Analysis of pay-outs in recent years shows that only one pay out (out of five) was related to drought. Two pay-outs (one of them the largest claim so far) have been caused by hailstorms, and one pay out was related to flooding during harvesting. The pay out in 2011 was not related to weather, but to stripe (yellow) rust in wheat. The pay-out history shows that farmers are affected by a broad range of risks and index insurance cannot address most of these perils.

Table 4.6: Claims paid for OIC MPCI and reasons for claims

Year	Crops affected	Claims paid (ETB)	Location/zone	Reason for claims
2010	Maize	560,781	East Showa	Hailstorm
2011	Wheat	71,755	West Showa	Yellow rust
2012	Peas	12,425	South West Showa	Hailstorm
2012	Soya beans and sesame	514,171	East Wollega	Rainfall deficit
2014	Chicken peas	58,522	Oromia Special Zone	Excessive rain during harvesting

Source: OIC and NBE

The OIC livestock mortality cover caters mainly to well organize value chains such as the dairy sector. The conditions for the livestock cover are:

- Only dairy cows aged between 2 to 8 years are insurable
- Vaccination for at least three communicable diseases of the area e.g. Anthrax, Black Leg or Pasteurellosis
- Distinctive natural mark and ear tag number needed for registration
- Photograph from three dimensions taken for high cost animals
- Animals must be healthy and free from any injury
- Absence of pre-existing diseases
- Zero-grazing in urban areas (in selected cases field grazing in rural areas)

As can be seen from this list, this product is not suitable for pastoralists. Due to this OIC has introduced index based livestock insurance in 2012.

4.4.2 Index Based Insurance services

When we see some weather index crop (WICI) and weather index livestock insurance (WILI) practices in Ethiopia separately: both were practiced by four insurance companies (OIB, AIC EIC and NISCO) implement these insurance products. Here in under the experiences of two Insurance companies; one on weather index crop (WICI) and the other on weather index livestock insurance (WILI); and one Microfinance institution is discussed.

4.4.2.1 Weather Index Crop Insurance

Africa Insurance Company (AIC) is providing this service for 9 years since 2010. The company provides this service in Tigray Region in collaboration with microfinance

institutions (MFIs). Specifically Dedebit MFI which is working in Tigray Region. The MFI do the advocacy, awareness creation and need assessment. While the Insurance company issue the policy and make compensation in cases of loss. The payment is triggered based on weather forecast performed from California University International Research Institute. The research institute used satellite data to weather forecast. And the satellite data is analysed, indexed and developed by the research institute. The company make payout within 10 days of the seasonal assessment performed by the research institute stated the Manager in charge of Micro- Insurance services. AIC started this product with 200 farmers and after close to 9 years now the policyholders' of weather index insurance of AIC are around 29000. Even if, there is an increase in number of policyholders it is very limited as compared to the number of years it has been practiced, the significance of the sector to the country and its overall importance.

BussaGonofa MFI: was working on pilot projects at Awash-Melkassa, Erra, Kokaand Dodotawhich is east part of Ethiopia in Oromia Region. They were using data from National Metrology Agency (NMA) taking historical data and also real time Data. In the pilot project they selected four types of crops to be covered by the weather index crop Insurance. Insurance cover was for four crop types. The pay-out was based on the data from weather stations of rain fall which has a threshold on amount of rain which results in payment or not.

According to the manger of this MFI institution the challenges were:-

- Data availability,
- Financial viability and
- Basis risk.

The challenge with regard to data availability was:-

1. Getting full historical data of pilot cites: - this is needed to assess and determine the premium to be set for the specific cite bases on the risk associated.
2. Availability of weather stations: due to unavailability of weather stations in some areas it is difficult to get a historical data of the weather of the cite and be a able to determine the premium besides it is also difficult to determine that there was a drought and the risk is materialized during a certain year for compensation.

Financial viability as a challenge was related to the number of policy holders. It will not be economically feasible for the service provider unless it gets a significant number of customers to cover the costs and be profitable on this as a business. The greater number of policy holders, the more it makes the business financially viable. Besides, identifying which crops need to be covered based on the need of the farmers the availability and importance of crops also matters to have a significant number of customers and make the business in a certain area. Financial viability is also challenged due to the costs of delivering these service following weather stations which are not found in nearby localities makes it more costly.

The other challenge is the basis risk. which resulted in different outcome within 20 km radius of the weather station with regard to actual loss due to topographical differences.

4.4.2.2 Index-based livestock insurance (IBLI)

Oromia Insurance Company(OIC) is providing Index Based Livestock Insurance. Outreach of livestock insurance is even more limited than crop insurance.OIC introduced IBLI to eight districts of Borana in August 2012 and in 2015, only 1,377 farmers bought insurance for their animals. The total sum insured for index based livestock insurance was ETB 2,903,500 (USD 138,314) with total premiums amounting to ETB 281,374 (USD 13,409). In 2015, claims of ETB 29,080 (USD 1,385) were paid out which gives a claims ratio of 10.33%. This claims ratio is considerably higher than the claims ratio for traditional livestock insurance that was 2.3% in 2015. One main reason for the difference in claims ratio is the different target groups: index insurance was bought by pastoralists in drought prone Borana, while traditional insurance is only sold to commercial dairy and livestock farmers in Oromia that have a better risk managing capacity.

Low levels of rainfall have led to the loss of approximately 300,000 livestock in 2017 in the Borana zone of the southern Oromia region, reports the cattle site (http://www.thecattlesite.com). The insurance payouts of more than Ethiopian Birr 5.233 million (US$220,000) was the largest-ever micro-insurance indemnity made in Ethiopia. Each insured Ethiopian pastoralist received an average of ETB 2,255 (US$96), which will allow the herders to purchase feeds for their surviving animals and to restock their herds. When we see the loss ratio of both crop and livestock insurance services of OIC over the years 2010 to 2019 it shows it has increased and not encouraging as a business to continue with this business for a company if it only considers profit.

The following table shows the significance of the loss ratio of OIB of these index based insurance products.

Table 4.7: Crop and Livestock Insurance Policies Loss Ratio (OIC)

S.No	Fiscal Year	HHs Insured	Sum Insured	Premium Collected	Claims Paid	Loss Ratio (%)
1	2010/11	1,177	13,485,647.19	951,262.46	642,536.70	67.55
2	2011/12	530	12,847,317.90	514,196.09	12,425.00	2.42
3	2012/13	1,906	40,556,790.63	1,840,739.70	719,621.84	39.09
4	2013/14	2,326	39,784,022.58	1,987,788.82	139,020.00	6.99
5	2014/15	7,359	27,570,920.00	2,187,395.96	1,359,137.00	62.13
6	2015/16	5,143	27,814,164.58	2,226,174.80	883,440.00	39.68
7	2016/17	7,080	33,637,390.99	2,624,872.06	2,835,080.00	108.01
8	2017/18	8,047	114,243,115.50	6,291,669.77	5,379,230.00	85.50
9	2018/19	15,701	149,236,128.50	10,057,818.08	10,392,070.00	103.32
Total		**49,269**	**459,175,497.87**	**28,681,917.74**	**22,362,560.54**	**77.97**

Table 4.8: Crop and Livestock Insurance Policies Premium collected and related Costs. (OIC)

S. No	Fiscal Year	HHs Insured	Sum Insured	Premium Collected	Claims Paid	Cost of service provision
1	2012/13	627	5,172,500.00	467,546.89	0.00	46,754.69
2	2013/14	509	3,558,500.00	339,190.98	0.00	67,267.00
3	2014/15	1,446	8,434,800.00	798,894.65	585,887.00	188,780.00
4	2015/16	1,299	2,903,500.00	281,374.11	29,080.00	98,750.31
5	2016/17	2,195	12,285,000.00	1,203,423.25	1,893,030.00	192,197.75
6	2017/18	4,963	42,336,000.00	4,126,157.00	5,233,130.00	593,120.00
7	2018/19	1,346	7,497,000.00	741,874.00	0.00	0.00
Total		**12,385**	**82,187,300.00**	**7,958,460.88**	**7,741,127.00**	**1,186,869.75**

Perception of stakeholders on insurance industry in adopting and mitigating CC

Respondents believe that there is a change in the climate and specifically the temperature is increasing compared to the previous decade and rainfall is varying there is an interruption in between.

Respondents Suggested that:

- Combination of weather index insurance for crops that is backed or supplemented by some level of direct assessment of actual damages on the ground
- lack of appropriate insurance product that fits well with highly diversified farming practices of rural households with smallholdings (several crops are cultivated in very small land size and in farm plots that are spread geographically in many places; this is made worse by a highly diversified agro ecology.
- Only rainfall bases data to cover risks of drought in some areas may not cover all the risks faced by the farmers a multi-peril crop or livestock insurance is more preferable to cover other risks faced by the farmers so that the cover makes more sense to the farmers.
- Insurance cannot be a sustainable solution because if the adverse impact of the environment continues insurance may not be able revert all the consequences. Thus to combat the impacts of climate change needs diversified and integrated adaptation and mitigation measures and insurance is one of them.

4.5 Opportunities and Challenges of insurance industry on adapting and mitigating CC

From discussions and interviews conducted with the KII from the 4 Insurance companies conducted weather related Insurance services, and experts form NGO that participated in these different weather related climate insurance pilot testing. The researcher deducted the following opportunities and challenges of insurance industry on adopting and mitigating climate change in Ethiopia.

4.5.1 Opportunities

Awareness creation facilities: already existing structures or institutions of stakeholders like agricultural cooperative unions played an important role as intermediaries to provide farmers with WII products because they had longtime strong relationship with local farmers. Local development agents (DAs) such as agricultural extension workers and health workers also played an important role to raise awareness of farmers with regard to the benefit of insurance and the knowledge of WII.

Regulatory framework: World Bank has supported the Government of Ethiopia to develop Micro Insurance Regulatory Framework. Recently NBE approved amendment proclamation of lays the foundation for installing the appropriate regulatory framework. The term micro-insurance covers different types of micro insurance products including index-based crop insurance, and this would facilitate the penetration and sustainability of WII.

4.5.2 Challenges

Costs related to service provision:

The challenges of weather related insurance services depend on the type of product. For Indemnity based insurance service the main challenge is the cost of assessing the damage in cases of loss. due to the complexity nature of Index based insurance products costs of promotion/awareness creation, costs of feasibility study historical data analysis to determine premium rates are also huge that is still being supported for decades in our country for insurance companies practicing weather insurance products by different NGOs and International Organizations.

Lack of awareness and understanding: The other challenge to provide the service lack of awareness and difficulties with understanding the WII scheme: Different studies show that there is a lack of insurance literacy among the local farmers. Due to its complexity, WII is difficult to understand for potential customers i.e. farmers. Even if they can easily understand the benefits it is difficult for them to trust and accept the data, trust the providers and understand the pay-out system.

Unavailability of local data: A lack of local historical data such as rainfall and crop yield made it difficult to design the payout scheme including parameters such as “trigger” value and “exit” value. Precipitation data from global reanalysis products were used as the substitute for rainfall data.

Basis Risk: The most known challenge of weather index based insurance service is what is called the basis risk, which is, related to the weather index data being different from the actual result. These could result in payout without a loss incurred to certain number of insured policyholders due to the fact that the threshold for payment is met. Due to the above-mentioned lack of local data of rainfall and corresponding crop yield, there were some cases

where gaps were observed between the payout and the actual loss incurred by farmers, which had to be adjusted.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

The objective of the study was to examine the processes of implementation and challenges and opportunities of insurance industry in the climate change adaptations and mitigation in Ethiopia. The result shows that weather related insurance services are very limited in Ethiopia. Only four insurance companies out of the existing eighteen insurance companies are practicing weather related insurance services. The average number of years that weather related insurance has been taken up by these four insurance companies is 3.8 years. This shows that the weather related insurance industry is still infant. The key informants form the insurance sector stated that the performance is yet to pick and there is a lot of potential to grow. The little number of weather insurance policies that is being sold, by the companies currently practicing it, is not yet performing as expected. Thus, it is suggested in the study that other insurance companies, Cooperatives as well as Micro Finance Insurance companies need to follow and deliver this products so as to improve the reach and inclusiveness of this service as well as the performance.

The study shows that the strengths shared by most insurance companies are the growing insurable population, familiarity of insurance like traditional institution services for funeral "*Idir*" which you are required to pay but may not get payment unless there is a loss. But still, the community suffers from lack of awareness about insurance services and processes. Similarly, the strengths of climate insurance services are the huge number of insurable population, increase in awareness among the insured, availability of personal lines insurance products. Opportunities established were collaboration between cooperatives and local social organizations like '*Idir*' and '*equb*' and insurers. The weaknesses of weather related insurance services are poor goodwill of customers towards insurance, low customer awareness regarding insurance, low knowledge of the insurance market and competitive strategies used by the main insurance companies.

Climate change adaptive capacity and related response to its threats also largely affect the functioning of insurance markets, as it is likely that climate change, due to higher risks, will increase the demand for insurance. Also, if not addressed, climate change could lead to insurance becoming less affordable or even unaffordable, particularly for low-income segments of the population or for human settlements located in areas deemed particularly at risk. Likewise, climate change disaster risks need to be considered as a contingent liability within governmental priorities, implying a need to incorporate sovereign-level insurance mechanisms in governmental fiscal planning. For this, there is a need to create an enabling regulatory environment, legal and financial experts in establishing the fund, as well as technical risk assessment experts to ensure the viability of the fund.

In the context of climate change risk management, either private insurance or the state can play a crucial role in mitigating risks. Considering this some studies show that compulsory insurance is a much more feasible method of regulating climate change risks. After assessing different studies and responses from different experts on the sector as well as data availed by some companies in the sector it shows that a decade old pilot testing could not ascertain the financial viability and continuity of the insurance product provision by the private sector. In effect, the lesson that can be drown from these pilot tests is it is necessary to take advantage of the state's compulsory power, this study proposes a feasible solution marrying the merits of both state and private insurance. It should be developed as soon as possible in Ethiopia to cope with the increasing risks of climate change. Considering the risks associated with drought which hit Ethiopia several times.

5.2. Recommendations

Considering the importance of strengthening weather insurance practices in Ethiopia, this study recommends that National bank need to indicate in its strategic plans that it will strengthen and support companies engaged in providing weather related insurance products. The study established measures to be taken by the main actors - the Government, Agriculture Ministry and NBE at higher level and insurance companies, microfinance institutions, technology providers as well as cooperatives at grass root level in order for them to strategize in a manner that will eliminate their weaknesses and threats and take advantage of their strengths and weaknesses.

Different organs of government must work in integration, including, the Government- policy makers, Ministry of Agriculture and NBE. The engagement of the federal or national government as a whole is required since sustainability is not confined to a single subject or a single administrative agency, department, or ministry.

Experiences show that index insurance must also be placed within a larger developmental context, to enhance the resilience of agricultural producers to produce with reduced risk to produce more food and have more sustainably and strength in their capacity.

Therefore; taking advantage of the state's compulsory power, this study proposes a feasible solution marrying the merits of both state and private insurance. Compulsory Weather related Insurance should be developed as soon as possible in Ethiopia to cope with the increasing risks of climate change. Considering the weather related risks associated with drought which hit Ethiopia several times.

The GoE shall ensure seamless synergy and coordination with stakeholders - including civil society organizations (CSOs), academe, and the private sector - in relation to disaster resilience programs and projects and the development and promotion of research, education, and training mechanisms with relevant stakeholders. The government shall strengthen its support to the existing efforts of the private sector, CSOs, academe, and other stakeholders, by

assisting, coordinating or providing services that strengthen public-private cooperation and coordination.

The stakeholders should work to increase the number of climate insurance professionals and design innovative products that will be more acceptable by the farmers to engage in and buy the products and get satisfied which will increase the sale of insurance, this will help them eliminate the threats they are facing. Use agents and Brokers to further increase the sale of insurance setup a micro insurance unit (for those with no micro insurance units), increase the number of insurance salesmen or agents at every branch and advertise. This will help with customer awareness which will translate to an increase in performance of weather related insurance products.

For example, 3rd Party Insurance is to protect the Third Party the premium is paid by the motor owner. For weather insurance instead of the farmer It could be the consumer who pays for the insurance premium It could be made compulsory to be paid on consumption basis of all agricultural products and this could be managed like a pension agency by the government and money collected could be invested in cases where there is no risk and drought. In cases of incidents of risk could be covered out of this pool where ever it occurs in the territory.

Areas for Further Studies

The study provided strengths, weaknesses, opportunities and threats of performance of weather related insurance practices in Ethiopia but did not venture at the strengths, weaknesses, opportunities and threats of weather related insurance practices of Ethiopian insurance companies. A case study should be conducted on each Company practicing weather related insurance products in Ethiopia in order to provide specific solutions to those companies instead of general solutions to the problem of performance of insurance companies practicing weather related practices. This is because all companies have their own specific strengths, weaknesses, opportunities and threats and case study will help define the weaknesses clearly.

References

Anderson, J., F. and Brown, R., L. .(2005). FSA, Risk and Insurance: Education and Examination Committee of the Society of Actuaries, second printing, Printed in U.S.A

Anna Maria D'Hulster, (2018). Climate Change and the Insurance Industry: Taking Action as Risk Managers and Investors Perspectives from C-level executives in the insurance industry, The Geneva Association

Belay Zerga and Getaneh Gebeyehu, (2016). Climate Change in Ethiopia Variability, Impact, Mitigation, and Adaptation, Journal of Social Science and Humanities Research,Vol. 2 Issue 4

Buckham, David, Jason Wahl, and Stuart Rose. (2010), Executive's Guide to Solvency II, SAS Institute Inc., Cary, North Carolina, USA

Chen, Y., & Chen, D. (2013). The review and analysis of compulsory insurance. Insurance markets and companies: analyses and actuarial computations, (4, Iss. 1).

Coco Liu, (2014). Millions of China's Farmers Now Buy Climate-Change Insurance, http://www.scientificamerican.com/article/millions-of-chinasfarmers-now-buy-climate-change-insurance. Retrieved from https://perma.cc/K263-VS5D

Dercon, S., J. Hoddinott and T. Woldehanna. 2005. "Shocks and Consumption in 15 Ethiopian Villages, 1999–2004" Journal of African Economies 14(4). Retreived from http://dx.doi.org/10.1093/jae/eji022

Douglas, R. (2015) The Insurance Sector and the 2015 – 2016 UN Processes: Opportunities for Progress. Willis Research Network Working Draft.

Ethiopia's Agricultural Sector Policy and Investment Framework (PIF)2010-2020

Fosu, Matthias, and SaaDittoh, (2011) ''Crop Response to Fertilizer in Northern Ghana,'' Savannah Agricultural Research Institute working paper,.

Hellmuth M.E., Osgood D.E., Hess U., Moorhead A. and Bhojwani H. (eds) 2009. Index insurance and climate risk: Prospects for development and disaster management. Climate and Society No. 2. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.

IAIS, (2018) Issue Paper on Climate Change Risks to the Insurance Sector

Jimmy Adegoke, Pramod Aggarwal, Mark Rüegg, James Hansen, Daniela Cuellar, Rahel Diro, Rebecca Shaw, Jon Hellin, Helen Greatrex, Robert Zougmoré, (2017). Improving climate risk transfer and management for Climate-Smart Agriculture,A review of existing examples of successful index-based insurance for scaling up, Global Alliance for Climate smart Agriculture(GACSA)

Joanne Linnerooth-Bayer, ReinhardMechler, (2006). Insurance for Assisting Adaptation to Climate Change in Developing Countries: A Proposed Strategy. Risk and Vulnerability Programme, International Institute for Applied Systems Analysis, Laxenburg, Austria,Climate Policy ·

John C. Dernbach , and Joel A. Mintz, (2011). Environmental Laws and Sustainability: An Introduction, Retrieved from www.mdpi.com/journal/sustainability

Kim Lewis (2015) Retrieved from https://www.voanews.com/a/weather-index-science-farmers-insurance-climate-study-crops-ccafs-cgiar/2630164.html

Mahul, Olivier; Stutley, Charles J. (2010).Government Support to Agricultural: Challenges and Options for Developing Countries, World Bank,

Mebrahtu Brhan Gebre, (2014). Analyses of the willingness to pay for weather index insurance, Master thesis for the Master of Philosophy in Economics, Department of Economics Universitat Oslo,

Million A. Tadesse, Bekele A. Shiferaw and Olaf Erenstein. (2015). Weather index insurance for managingdrought risk in smallholder agriculture:lessons and policy implications forsub-Saharan Africa, Agricultural and Food Economics

Mulat Demeke, Michèle Kiermeier, Mariam Sow and Lavinia Antonaci, (2016). Agriculture and Food Insecurity Risk Management In Africa, Concepts, lessons learned and review guidelines, FAO.

National Planning Commission, (2015).Growth and Transformation Plan, (GTP II), 2015/16-2019/20. (Unpublished draft)

NBE (2019).National Bank of Ethiopia Quarterly Bulletin, Second Quarter 2018/19 Vol. 35 no. 2

Niels Balzer and Ulrich Hess, (2014).Climate change and weather risk management: evidence from index-based insurance schemes in China and Ethiopia,

Oladayo Awojobi, (2018) Climate Risk Insurance for Resilience: A Systematic Review

OECD (2015). Disaster Risk Financing: A global survey of practices and challenges, OECD Publishing, Paris.

Qihao He, (2016).Mitigation of Climate Change Risks and Regulation by Insurance: A Feasible Proposal for China Boston College Environmental Affairs Law Review, Vol. 43 Issue 2, Article 4,

Retrieved from http://dx.doi.org/10.1787/9789264234246-en OECD,

Stutley, C. (2010). Innovative Insurance Products for the Adaptation to Climate Change Project Ghana (IIPACC): Crop Insurance Feasibility Study.

Swenja Surminski, (2013). The Role of Insurance in Reducing Direct Risk — The Case of Flood Insurance, International Review of Environmental and Resource Economics,

The cattle Site. (2017). Retrieved from http://www.thecattlesite.com/news/52051/largest-ever-microinsurance-payout-made-to-ethiopian-pastoralists

TN Anuradha and Vinaynath Reddy.(2012) Retrieved from https://ccafs.cgiar.org/fr/blog/Farmers-reaping-benefits-climate-insurance-scheme%2520#.XEWhmdIzbIU

Tsegay Hagos, (Nov, 24 2017)The Ethiopian Herald, Ethiopia: Micro-Insurance Services Empowering Farming, Pastoral Communities

UN (2015) Addis Ababa Accord: Zero Draft of the Outcome document, A global framework for financing sustainable development, Retrived from www.un.org/esa/ffd/wp-content/uploads/2015/03/1ds-zero-draftoutcome.pdf

UN Environment, (2018) Retrieved from http://unepinquiry.org/wp-content/uploads/2018/04/Greening_the_Rules_of_the_Game.pdf

UN Environment, Retrieved from http://unepinquiry.org/publication/inquiry-global-report-the-financial-system-we-need/

UN Environment,(2018). Retrieved from http://unepinquiry.org/wp-content/uploads/2018/04/Making_Waves.pdf

UNEP (2014) Loss and Damage: When Adaptation is NOT Enough.. (http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=111)

UNEP Inquiry (2015) Aligning Africa's Financial System with Sustainable Development, Retrieved from http://apps.unep.org/publications/ index.php?option=com_pub&task=download&file=011746_en) UNEP Inquiry

UNEP Inquiry (2015), INSURANCE 2030 Harnessing Insurance for Sustainable Development, INQUIRY WORKING PAPER 15/01

Using insurance in adaptation to climate change, (2018). European Union,

Vincent H. Smith and Joseph W. Glauber. (Autumn 2012). Applied Economic Perspectives and Policy, Oxford University Press.

Warner, K., Yuzva, K., Zissener, M., Gille, S., Voss, J. and S. Wanczeck, (2013) Innovative Insurance Solutions for Climate Change: How to integrate climate risk insurance into a comprehensive climate risk management approach. Report No. 12. Bonn: United Nations University Institute for Environment and Human Security (UNU-EHS).

Weather Index Insurance for Agriculture: Guidance for Development Practitioners Retrived from http://www.worldbank.org/rural.(Nov. 2011)

Wondimagegn Tesfaye Lemma Seifu , (2016),"Climate change perception and choice of adaptation strategies", International Journal of Climate Change Strategies and Management, Vol. 8 Iss 2 pp. 253 - 270

World Bank, (May 21, 2018).Ethiopia Resilient Landscapes and Livelihoods Project (P163383), Combined Project Information Documents /Integrated Safeguards Datasheet (PID/ISDS)

World Bank. (2011).World Development Indicators, Washington, DC: World Bank.

Annex : Checklist of Questions for Experts/stakeholders

Addis Ababa University
Faculty of Development Studies
Department of Environment and Sustainable Development

Climate change and Insurance Industry in Ethiopia:
Challenges and opportunities

Interview Guide Questionnaire for Climate Insurance Experts/stakeholders

Dear respondents,
The purpose of this interview guide questions is to collect primary data on '**Climate change and Insurance Industry in Ethiopia: Challenges and opportunities'** for partial fulfillment of master's degree in Environment and Sustainable Developmentstudy. The information you provided will be used purely for academic purpose and shall be kept strictly confidential.

General direction
The interview questions consists two sections. The first section is general background information of the interviewee. The second section contains questions that related to the implementation of climate related insurance services in Ethiopian context.

Thank you very much for your understanding and cooperation in advance.

Section I
Background of the Interviewee
1. Name_____
2. Educational status_____
3. Position, if any /managerial or non managerial_____
4. Work experience _____
5. Experience on climate related insurance services_____

Section II

a) Insurance Companies

1. What is your present capital?
2. How old is the age of your company? (If possible write the time of establishment.)
3. Since when was your institution trying to implement weather insurance products?
4. What type of weather insurance products is your company offering?
5. When did you start selling weather related insurance policies? Please specify for each type of weather insurance related products.
6. How many weather insurance policies you sold since the beginning of the project? (please list it number per year)

7. Is the micro insurance service (considering only weather related insurance services) profitable by itself? Can you please support the answer with data from your company's experience? (please attach the data year by year cost verses profit of this insurance service)
8. How many weather insurance claims your company encountered since the beginning of this project? (please list it number per year and amount of money per year)
9. Do you believe weather insurance is important for a country like Ethiopia?
10. What do you think the challenge is?
11. Considering the number of potential customers, do you believe we can introduce weather insurance throughout the country effectively? How? Please explain.
12. Is there an attempt to modify the business model of weather insurance?
13. Why do you think this insurance product encounters a challenge as a business?
14. What is your opinion concerning the role of insurance in combating the impacts of climate change in Ethiopia?
15. Is there any type of weather related insurance policy which you have been asked from to avail from a customer but you failed to avail that insurance policy? Yes % No % If your answer if yes, please list them. a. b. c. d.
16. What do you think the government should do to support the attempt to introduce Weather insurance to the Farmers in a broader magnitude?
17. Do you think the Government has to introduce Weather insurance to the Farmers as compulsory insurance as it is the case for 3rd party insurance of Vehicle owners?

b) NGOs supporting Weather Related Insurance in Ethiopia.

1. Do you believe weather insurance is important for a country like Ethiopia? Why?
2. Was your institution supporting the implementation of weather related insurance products? If yes, Why? How? How much? (in monitory terms)
3. What type of support were you delivering and for which companies? Please include data related to the expenses for the pilot implementation if possible for each company and type.
4. What are the challenges and opportunities encountered during pilot project implementation?

5. What are the achievements observes during pilot project implementation in relation to introducing weather related insurance products?
6. Were your organization covering g administrative costs for the companies? For which companies and how much? Please include the data.
7. Were your organization covering cost of premium for the farmers? For how many farmers and how much? Please include the data.
8. Considering the number of potential customers, do you believe we can introduce weather insurance throughout the country effectively? How? Please explain.
9. Is there an attempt to modify the business model of weather insurance?
10. Why do you think this insurance product encounters a challenge as a business?
11. What is your opinion concerning the role of insurance in combating the impacts of climate change in Ethiopia?
12. What do you think the government should do to support the attempt to introduce Weather insurance to the Farmers in a broader magnitude?
13. Do you believe the Government has to introduce Weather insurance to the Farmers as compulsory insurance as it is the case for 3rd party insurance of Vehicle owners?