Performance of Weather Index Insurance (WII) Scheme in Sri Lanka

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FOREWORD

Agriculture has always been a high risk business. Farmers everywhere are exposed to the vagaries of the weather, pests and disease outbreaks, other natural hazards and unexpected price fluctuations. Therefore, any crop loss or damage adversely affects the socio-economic condition of the rural areas. Weather-related perils such as droughts, floods and cyclone pose pervasive risks for agriculture in Sri Lanka with adverse consequences not only for farmers but for other stakeholders in the agricultural marketing chain. Weather risks can be especially problematic for poor farmers living at subsistence or near subsistence levels.

Agricultural insurance is one of the strategies to cushion the effects of crop damages in case of certain risks. Although the agricultural insurance scheme has been in operation for over five decades in Sri Lanka, the achievement is far from the satisfactory level. Weather index based crop insurance is a new product in developing countries that addresses the failure of traditional crop insurance scheme and it prevents many of the problems that affect conventional crop insurance scheme. Weather Index Insurance (WII) scheme is a new concept for the agricultural insurance in Sri Lanka. In this context, the study on the "Performance of the WII Scheme in Sri Lanka" is timely and relevant. This study mainly focuses on the paddy sector and it attempts to evaluate the present performance, problems and future prospects of the weather index insurance (WII) scheme in Sri Lanka.

I congratulate the research team for successfully completing this report and I hope that the findings and recommendations of this study would be helpful to policymakers for policy formulation and planning for development of the crop insurance scheme in agriculture sector.

Professor Ranjith Premalal De Silva
Director/CEO

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EXECUTIVE SUMMARY

Agricultural insurance is a strategy to cushion the effects of crop damages that occur due to weather disturbances, pests and disease outbreaks and damages caused by wild animals. Crop insurance not only stabilizes the farm income but also helps the farmers initiate production activity after a bad agricultural year. Although the agricultural insurance scheme has been in operation for over five decades, the achievement is far from being satisfactory. Low farmer participation, delay in indemnity payments, lack of transparency in loss assessment and indemnity payments, lack of credibility and high transaction costs are few weaknesses associated with the crop insurance scheme. Index-based crop insurance scheme has been experienced in many developing countries for addressing the above conventional problems. In Sri Lanka, climate changed rapidly and the country frequently faced more extreme weather conditions during the last few years than ever before. The existing traditional crop insurance scheme is not popular among the farming community. Lack of suitability of the existing crop insurance schemes for crop losses is a prime problem as most of the crop losses are caused due to adverse climate conditions. For addressing these issues, a private insurance company, a member of cooperative group, has introduced a new concept titled Weather Index Insurance (WII) scheme for paddy farmers in 2010 as a pilot project. Initially, it functioned in several districts and now it restricted to three districts. Meanwhile, Agricultural and Agrarian Insurance Board (AAIB) is also planning to introduce WII for paddy farmers in the future. Hence it is timely to evaluate the successes and failures of WII scheme with its present performance of institutional perspective (supply) as well as with farmers' perspective (demand). The main objective of the research was to study the performance of Weather Index Insurance (WII) scheme for paddy in Sri Lanka. The specific objectives were, to examine the present status, drawbacks and opportunities of the existing WII scheme at institutional perspective (supply side), to observe the farmer responses to WII scheme (Demand Side), and to suggest measures to improve the existing WII scheme in Sri Lanka. The farmer survey was conducted in the Batticaloa district while institutional perspective data and information were obtained by the private insurance company, Agricultural and Agrarian Insurance Board (AAIB), the Annual Reports of Central Bank and the published literature.

The study found a few advantages in WII scheme compared to the conventional insurance scheme: being free from defects or delays, easily operated, transparency, less moral hazards and adverse selection and administrative costs being minimal. Though the WII scheme entails more positive characteristics than the traditional indemnity based insurance scheme, there are few major hurdles of WII in supply side perspective such as, basis risk due to micro climatic variations, large start-up cost, low density of weather stations, limited perils, lack of quality and updated weather data, and no proper institutional integrations. WII scheme is not much popular among the paddy farmers in Sri Lanka and it was proved that the farmer participation ratio with regard to WII scheme is below 0.5 percent of the paddy farmers in the country.

The study recommends to launch awareness and training programmes for farmers by insurance providers on how indexes are structured, what they cover and how pay-outs are measured. A robust awareness campaign could be mooted through mass media, posters and leaflets to promote WII. It is also vital to explore the possibilities of using the mobile phone technology. It will help increase the trustworthiness of farmers on the WII scheme. To minimize the basis risks, measures should be taken to update the network of collecting rainfall data by automated equipment for receiving real-time rainfall data and product design should be Improved. To design the proper WII scheme, community based participation mechanism should be introduced. A hybrid insurance scheme (Indemnity + Index) is needed to cover the other risks as well. Government intervention for WII scheme by providing infrastructure and services is recommended. Further, nationally reliable and internationally comparable data on weather and agriculture, weather stations should be well managed. It is very important to integrate weather information available from various sources into a national centralized data center to deliver more effective insurance schemes for farmers.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AAIB	-	Agricultural and Agrarian Insurance Board
ACP	-	Africa, Caribbean and Pacific States of India Limited
AIC	-	Agriculture Insurance Company
AYII	-	Area Yield Index Insurance
ALMAO	-	All Lanka Mutual Assurance Organization
BAAC	-	Bank of Agriculture and Agricultural Cooperatives
CICL	-	Ceylinco Insurance Corporation Limited
GIIF	-	Global Index Insurance Facility
IBCI	-	Index Based Crop Insurance
IBLI	-	Index Based Livestock Insurance
IFC	-	International Finance Corporation
IMD	-	Indian Meteorological Department
MPCI	-	Multiple Peril Crop Insurance
OFC	-	Other Field Crops
OXFAM	-	Oxford committee for Famine Relief
PAB	-	Personal Accident Benefit
SFSA	-	Syngenta Foundation for Sustainable Agriculture
WII	-	Weather Index Insurance
WIBCIS	-	Weather Index Based Crop Insurance Scheme

CHAPTER ONE

Introduction

1.1 Research Background

Agriculture is highly vulnerable to risk and uncertainty. There are two types of potential risks in agriculture; Price risk (Economic uncertainty) and Output risk (Natural hazards). Natural hazards can be divided into two categories such as climatic hazards and pests and diseases (Miranda et al., 2012).

Temperature, rainfall, humidity and evaporation are major climate parameters of Sri Lankan agriculture, impacting substantially on the agricultural productivity of the country. According to the Disaster Management Center, Sri Lanka frequently suffers from natural disasters, among which water-induced disasters such as floods, droughts and landslides are the most common and destructive types.

In Sri Lanka, majority of rural farmers are highly burdened with debt and low savings. In this context natural hazards add insult to injury and consequently, it is difficult for them to finance the following season. They are unable to repay their cultivation loan while facing numerous social and economic hardships. In 2014 both *Maha* and *Yala* seasons were affected by severe droughts that prevailed throughout the year. Although the year 2015 was a very successful cropping year, at the beginning of the 2015/16 *Maha* season, flood damages were recorded. The 2016 *Yala* season also brought misfortune with the flood situation prevailing. The overall paddy production for the year 2016 declined by 8.3 percent compared to 2015. Meanwhile, paddy production during the 2016 *Yala* season declined considerably by 21.9 percent due to turbulent weather that caused widespread flooding and landslides during the second quarter of 2016, delaying paddy cultivation of the *Yala* season necessitating re-cultivation in major producing areas. As a result, the extent harvested during the 2016 *Yala* season decreased significantly by 20 percent (Central Bank, 2016). Adverse weather conditions that continued from 2016 severely affected paddy production during 2017. Paddy production fell by 46.1 percent to 2.4 million metric tons during the year, recording the lowest paddy production over the last decade, highlighting the impact of adverse weather conditions (Central Bank, 2017). Production of other field crops (OFC) recorded a decline due to the impact of inclement weather conditions during the year 2017 (Central Bank, 2017). All these events put farmers in agony due to loss of produce and farm income, which are beyond the control of the farmers. The question remains as to how farmers should be shielded against such losses.

Agricultural risk is an unpreventable but a controllable element. Among available strategies for risk management in agriculture, insurance plays an important role and it is vital to share the risk. By means of agricultural insurance, farmers can stabilize farm

income and investment and guard against disastrous effects of losses due to natural hazards or low market prices. Crop insurance not only stabilizes the farm income but also helps the farmers initiate production activity after a bad agricultural year. It cushions the shock of crop losses by providing farmers with a minimum amount of protection.

Sri Lanka's agricultural insurance scheme was initiated in the 1958 *Maha* season in a pilot project covering approximately 26,000 acres of paddy in five districts and Sri Lanka was the first developing country in Asia to have launched an "all-risk" insurance of the paddy crop on a limited experimental scale with the assistance of the Food and Agriculture Organization (FAO). Later by 1958, the scheme was expanded to other crops such as green gram, cowpea, chilli, soya bean and even livestock. The Crop Insurance Board was established under the Parliamentary Act No. 27 of 1973 to operate a comprehensive agricultural insurance scheme for the benefit of the farmers in respect of rice, other field crops and livestock (Sandarathna, 1974). It was brought within broader framework by the Agricultural and Agrarian Insurance Board Act No.20 of 1999 and it was allowing the private sector involvement in crop insurance. But, only the Ceylinco Insurance Company Limited had entered the sphere of crop insurance as a private company (Rambukwella et al., 2007). There has been a compulsory crop insurance programme introduced in 2013 by the government, which was bundled with the existing fertilizer subsidy programme. A mark-up was added to cover the insurance premium when obtaining fertilizer at a subsidized price. As announced at the Budget speech 2017 the crop insurance that has so far covered only paddy cultivation has been expanded to cover other major five food crops too. This agricultural insurance scheme is funded by one percent levy charged from the profits of all registered banks, financial institutions and insurance companies since 2013. This one percent levy is credited to the National Insurance Trust Fund from which the farmers are paid compensation through Agricultural and Agrarian Insurance Board. In addition, the government in the year 2016 introduced a relief scheme in the name of 'National Loan Protection Scheme' to provide further relief to farmers who could not repay their bank loans due to damages caused to their crops. According to the Central Bank Annual Report 2015, when these two voluntary insurance programmes are considered, only less than four percent of the paddy-cultivated area (on average) is insured during 2003-2015. In most of the cases, crop insurance is obtained as a requirement in obtaining agricultural loans.

Index based crop insurance scheme is in operating in many developing countries in an attempt to address conventional problems. Index based micro insurance could guarantee a higher degree of community participation as a new way to stabilize the income of the rural poor (Smith et al., 2009). Increasing interest in implementing index based insurance products rather than traditional agricultural insurance is well documented. Index based insurance offers various advantages over other risk-coping mechanisms and traditional insurance programmes including lack of moral hazard, lack of adverse selection and low administrative costs. Moreover, index-based insurance feature standardized and transparent structure, re-insurance function, greater availability and the ability of parties to negotiate terms and conditions (Skees et al., 2008; Roth and McCord, 2008).

Index insurance is a new sector for agricultural insurance in Sri Lanka. A private insurance company, a member of Sri Lanka's cooperative group introduced the concept of index insurance to Sri Lankan agricultural sector. In 2011, the World Bank Group and partner private insurance company, supported by the Global Index Insurance Facility (GIIF), started working on stimulating the weather-related index insurance market in Sri Lanka through a combination of capacity building and awareness raising activities at both the institutional and the smallholder farmer levels. Since 2011, the insurance company has designed simple, flexible, and affordable weather-index insurance products for paddy and tea farmers. Index insurance is a new business line for the company, and an area of potential growth. The insurance company installed 35 weather stations funded by Desjardins Financial Security, an insurer within the Canadian Cooperative Desjardins Group. To develop WII products, the company received technical support from DID – Canada, K.A. Pandith from India and Basix, India.

1.2 Justification and Problem Statement of the Research

Although the conventional agricultural insurance scheme has been in operation for over five decades, there are several drawbacks associated with it such as, high transaction cost, delay in indemnity payments, lack of trust, lack of knowledge and no transparency (Rambukwella et al., 2007). The coverage of insured extent and farmer participation was also very low in this regard (Central Bank of Sri Lanka, 2017). It was observed that the present crop insurance policy is not demand driven and not adequate to protect farmers from unexpected losses. On the other hand, existing traditional crop insurance scheme was not popular among the farming community. Lack of suitability of existing crop insurance schemes for crop losses is a prime problem as most of the crop losses are caused due to bad climate conditions. Therefore, it is very important to provide relief assistance to ensure that farmers remain on their lands. Hence, introducing an appropriate crop insurance schemes to protect the farmers from the risks associated with natural calamities is timely.

Weather Index Insurance schemes(WII) are part of the new powerful instrument to manage weather related risks in agriculture effectively and it is a new sector for the insurance company and a potential area of growth (World Bank, 2017). Sri Lanka has a very short history regarding WII. Though the private Insurance Company was introduced WII for paddy in 2010, it covered limited areas of the country. Meanwhile, AAIB is also planning to introduce WII for paddy farmers in future. However, before expanding WII through AAIB it is very important to study the existing WII operated by the private insurance company. The literature also reiterates the importance of further research to investigate this supply side perspective in order to initiate Index based micro insurance scheme successfully in Sri Lanka (Heenkenda, 2011). Hence it is timely to identify successes and failures of WII scheme in terms of its present performance of institutional perspective (supply) as well as from farmers' perspective (demand).

1.3 Research Objectives

The main objective of the study is to study the performance of Weather Index Insurance (WII) scheme for paddy in Sri Lanka.

Specific Objectives are;

1. Examine the present status, drawbacks and opportunities of existing WII scheme in institutional perspective (supply side).

2. Observe the farmer responses to WII scheme (Demand Side).

3. To suggest measures to improve the existing WII scheme in Sri Lanka.

1.4 Organization of the Report

This report is structured six chapters. Chapter one describes the background, justification of the research, research objectives and organization of the research. Chapter two, reviews the relevant literature as a conceptual review and empirical Review. Chapter three is devoted to the methodology while Chapter Four describes the performance of institutional aspects of WII scheme (supply side). Chapter Five present the farmers' responses regarding the WII scheme (Demand side analysis) and Chapter Six brings the conclusion and recommendations for policy planning.

CHAPTER TWO

Literature Review

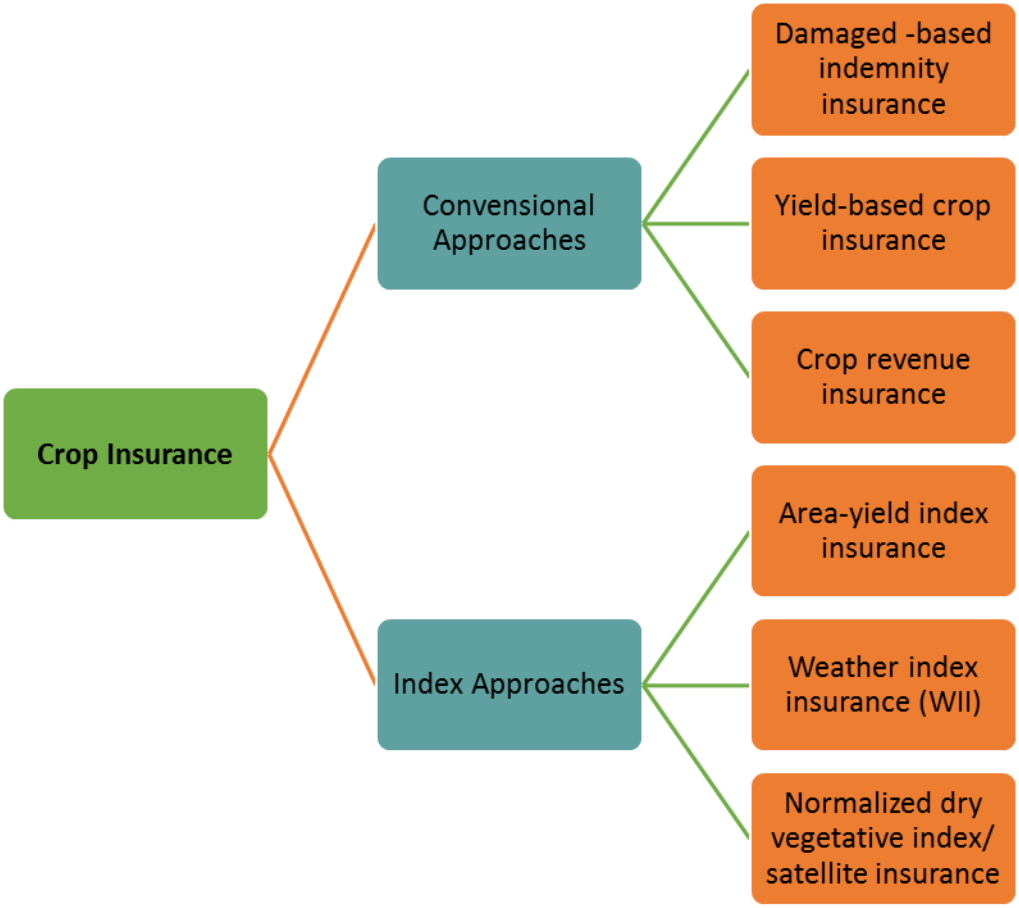
2.1 Introduction

This chapter presents the concept of the Weather Index Insurance and related experience of different countries. To date, weather-index based crop insurance is applied in many developing countries around the world. In 2007, GIIF (Global Index Insurance Facility) was launched by signing agreement between the European Commission and ACP (Africa, Caribbean and Pacific States) secretariat to provide weather index insurance facilities to agricultural farmers in ACP countries (GIIF Fact sheet available at: www.ifc.org/GIIF). Till August 2012, it provided insurance facilities to around 100,000 farmers in nine countries (GIIF Newsletter, August-September, 2012).

2.2 Conceptual Review

There are two major categories of agricultural insurance: Single and multi-peril coverage. Single peril coverage offers protection from single hazard while multiple-peril provides protection from several hazards (Raju et al., 2008).

According to World Bank (2011) and FAO (2011), there are two types of crop insurance approaches; conventional insurance approach and index insurance approach. Both insurance methods can be divided into three types as follows (Figure 2.1).



Source: FAO (2011), World Bank (2011)

Figure 2.1: Types of Crop Insurance

Conventional Insurance

Damage-based indemnity insurance (or named peril crop insurance) is crop insurance in which the insurance claim is calculated by measuring the percentage damage in the field soon after the damage occurs. The damage measured in the field, less a deductible expressed as a percentage, is applied to the pre-agreed sum insured. Yield-based crop insurance (or Multiple Peril Crop Insurance, MPCI) is coverage in which an insured yield (for example, tons/ha) is established as a percentage of the farmer's historical average yield. Crop revenue insurance takes into account both the crop yield and loss of market price (FAO, 2011).

Index-Based Insurance

Agricultural index-based micro insurance is affordable risk management tool for smallholder farmers with limited government involvement and the potential for the use of index-based insurance products in agriculture is significant. Any independent gauge can be used and developed as an index for insurance contract which is secure and must

be highly correlated with agricultural losses (Skees, 2001). Various measures can be used as indices such as meteorological variables (rainfall, temperature, wind speed, etc.) satellite images, area yield, and price and even mortality rate of livestock. In developing countries, more than 25 index-based risk transfer schemes report on the practical feasibility and investigate start up and implementation of pilot schemes; majority was an insurance product with pay-outs linked to a publicly-verifiable aggregate index. Most of index-based insurance schemes address either production (yield) risk or price risk, and aim at a specific crop. In this context, index-based micro approach has been tested in many developing countries in an attempt to address conventional problems and could guarantee a higher degree of community participation as a new avenue to stabilize the income of the rural poor (Levin and Reinhard, 2006; Mechler, Linnerooth-Bayer and Peppiatt, 2006).

Under the Area yield index insurance approach, the indemnity is based on the realized average yield of an area such as a county or district, not the actual yield of the insured party. The insured yield is established as a percentage of the average yield for the area. An indemnity is paid if the realized yield for the area is less than the insured yield regardless of the actual yield on a policyholder's farm. This type of index insurance requires historical area yield data.

In connection with Weather Index Insurance (WII), the indemnity is based on realizations of a specific weather parameter measured over a pre-specified period of time at a particular weather station. The insurance can be structured to protect against index realizations that are either so high or so low that they are expected to cause crop losses. For example, the insurance can be structured to protect against either too much rainfall or too little. An indemnity is paid whenever the realized value of the index exceeds a pre-specified threshold (for example, when protecting against too much rainfall) or when the index is less than the threshold (for example, when protecting against too little rainfall). The indemnity is calculated based on a pre-agreed sum insured per unit of the index (World Bank, 2011).

Weather index insurance principles were initiated by Halcrow (1949) and further developed by Dandekar (1977). Skees et al., (1999) theoretically proposed these principles for developing countries and later on empirically tested in Morocco (Skees et al. 2001). Mahul (2001) provided a more formal framework for weather index insurance in agriculture. Using historical rainfall and temperature data, Turvey (2001) illustrated how weather index insurance could be used to address specific-event risks measured at the local level and how rainfall and heat insurance could be priced in practice.Weather-Index Insurance (WII) is an innovation in index insurance that covers farmers against weather-related extreme events. The technology uses a proxy (or index) – such as the amount of rainfall, or temperature, or wind speed - to trigger indemnity payouts to farmers. This index helps determine whether farmers have suffered losses from the insured peril and hence need to be compensated (World Bank, 2011; Tadesse et al., 2015). In both developed and developing countries WII technology has gained attention because

its contracts are relatively simple in implementation, sales and marketing (Barnett and Mahul, 2007). Although a large amount of research and pilots have been undertaken worldwide, few examples of successful scale up at farmer level have been observed. Globally, index based crop insurance has been acknowledged as one of the critical risk mitigating tool in the agriculture sector and is being adopted by most of the agricultural based countries. Weather Based Index was seen to be most widely used worldwide, a number of pilot projects are ongoing using a combination of weather index as well as satellite index insurance.

The essential feature of WII is the insurance contract responds to an objective parameter (e.g. measurement of rainfall or temperature) at a defined weather station during an agreed time period. All policyholders within a defined area receive payouts based on the same contract and measurement at the same station, eliminating the need for in-field assessment. Typical features of a WII contract are:

- A specific meteorological station is named as the reference station.
- A trigger weather measurement is set (e.g. cumulative millimeters of rainfall), at which the contract starts to pay out.
- A lump sum or an incremental payment is made (e.g. a dollar amount per mm of rainfall above or below the trigger).
- A limit of the measured parameter is set (e.g. cumulative rainfall), at which a maximum payment is made.
- The period of insurance is stated in the contract and coincided with the crop growth period; it may be divided into phases (typically three), with each phase having its own trigger, increment and limit (Hazell et al., 2011).

Furthermore, weather insurance also has following characteristics;

- The weather based insurance schemes are quite easy to administer as claim payment is triggered by more transparent, objective and scientifically determined weather parameters. It also leads to low cost management.
- The overall design of weather insurance considers region, locations of agricultural and climatic conditions/properties and the productivity levels.
- It provides greater scope of flexibility in terms of indemnity level and coverage also.
- It is more transparent and therefore, gives high level of comforts to clients (Golait et al., 2008).

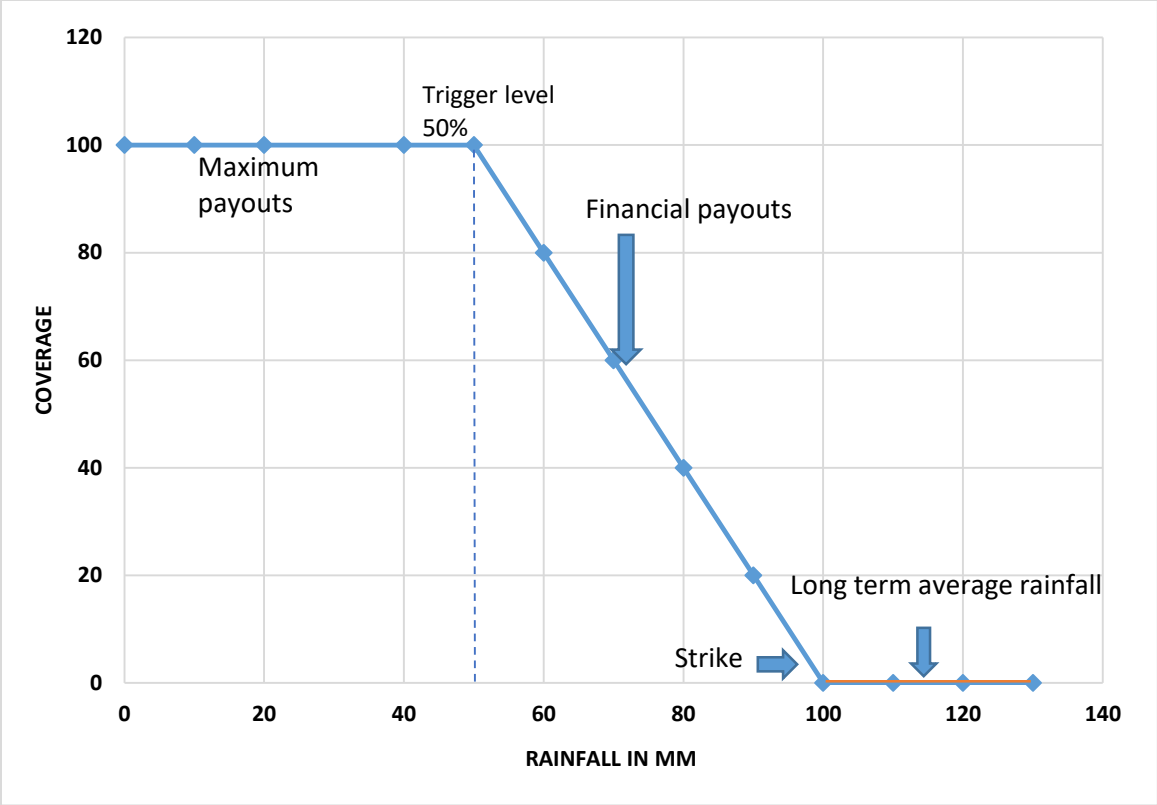
The basic payment structure of a weather-indexed product centers around two main values: the threshold and the limit. The threshold denotes the value of the index at which indemnity payments come into play, and the limit denotes the point at which payments reach a maximum level. Indemnity payments typically increase as the index approaches

to the limit, with the rate of increase a function of the threshold, the limit, and the actual value of the weather index (Skees., 2006).

Rainfall amount obtained by relevant officer from the nearest weather station and automatically calculated the threshold or the calculation of threshold level, 30 days' average maximum and minimum rainfall data were to be considered.

If the rainfall is less than the index at the specified measurement point and over the period specified in the contract, the insurer will pay out under the contract irrespective of the actual losses of the policyholder. The most common index in agriculture is rainfall. Typically, an insurer will offer a contract that will specify the index (for example, rainfall), over what period and where it will be measured, the threshold, the sum insured and any indemnity limits. The quantity of the pay-out is determined according to the provisions of the contract. A simple pay out may be the total sum insured under the contract. More commonly, contracts are written so that the proportion of the sum insured that is paid out is determined by how far the actual production observed in the insured unit deviates from the index.

According to the Figure 2.2, if we assume an area with an average rainfall of 120mm, the amount of rainfall received at the area weather station is below 100mm (strike or threshold level) for the first stage, and the insurer will start to pay Rs.1000 per each mm below 100. However, when the amount is below 50mm, (50 percent trigger level) which is given as the exit limit, the crop is expected to have suffered from water shortage that even if there are good rains thereafter, the crop will not recover. Thus at and below this level, the total sum insured is to be paid which is depend on farmers' contract coverage. The implementation is the same for all stages and coverage scenarios. At the end of the growing period, the pay out from each stage will be added to come up with the total pay-out for the whole contract.

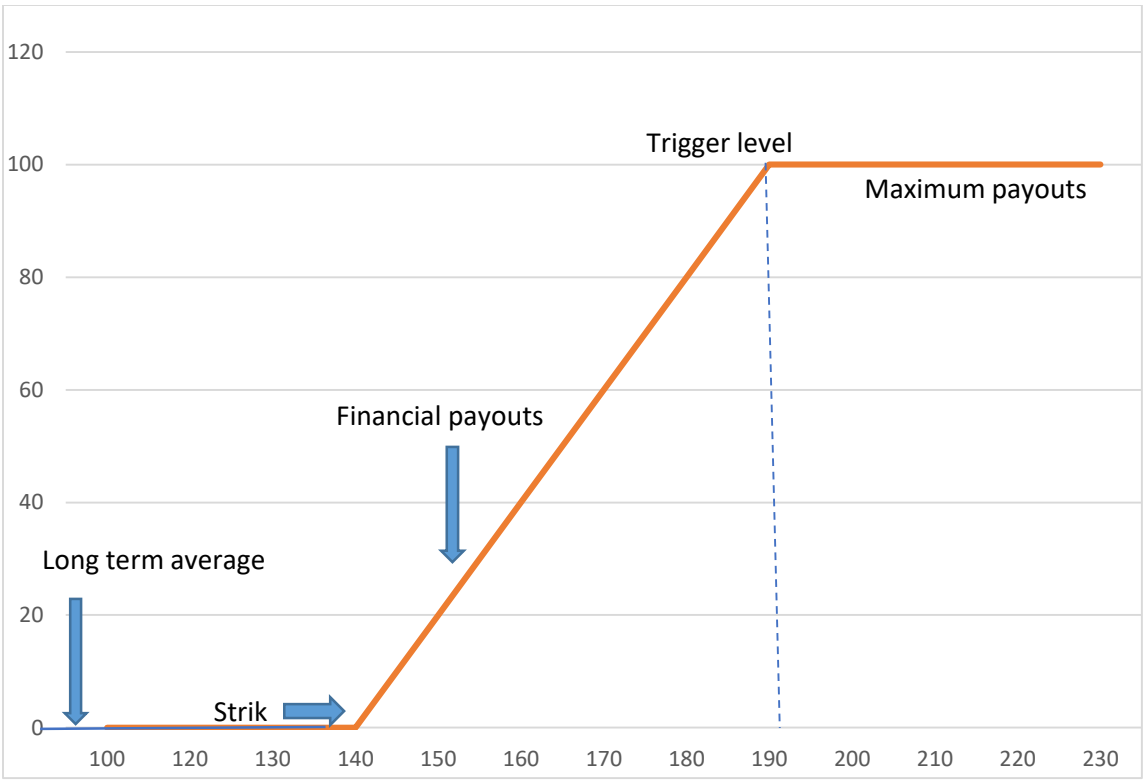


Note: all figures are hypothetical
Source: Based on Private Insurance Company data and information

Figure 2.2: How does Index Insurance Work- Example for Rainfall Shortage Situation

According to Figure 2.3, if we assume an area with an average rainfall of 140mm, the amount of rainfall received at the area weather station is higher 140mm (strike or threshold level) for the first stage, and the insurer will start to pay Rs.1000 per each mm higher 100. However, when the amount is higher 190mm, (50 percent trigger level) which is given as the exit limit, the crop is expected to have suffered from water excess that even if rain stops thereafter, the crop will not recover. Thus at and above this level, the total sum insured is to be paid which depends on farmers' contract coverage. The implementation is same for all the stages and coverage scenarios. At the end of the growing period, the pay out from each stage will be added to come up with the total pay-out for the whole contract**.**

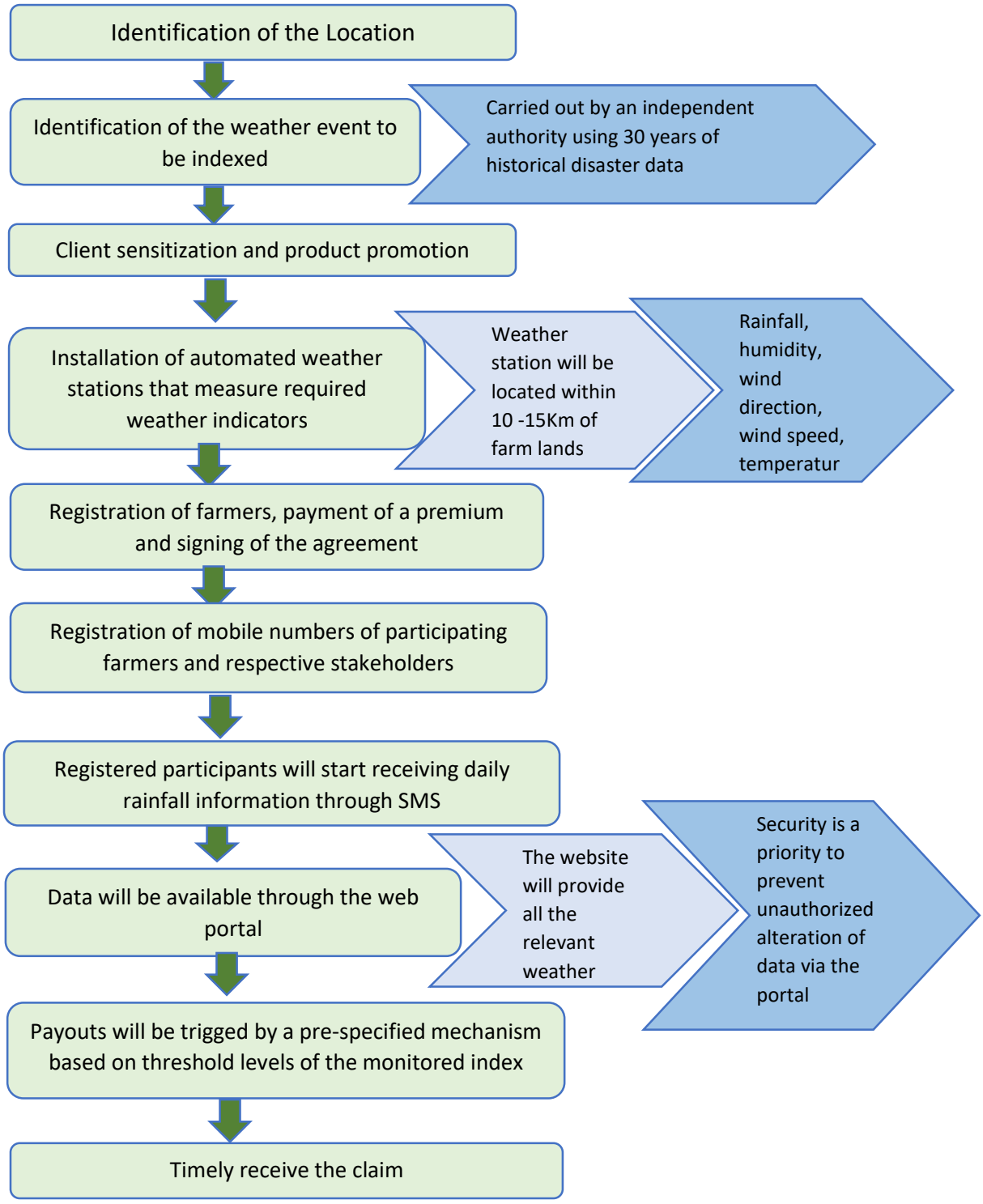
Some farmers take an insurance for monthly wise. If some farmer takes an insurance for the first month and if he eligible for the claim payment, he will get the claim after the season. This situation is caused to report delay in claim payment in most of the farmers.



Note: all figures are hypothetical
Source: Based on Private Insurance Company data and information

Figure 2.3: How does Index Insurance Work- Example for Excess Rainfall Situation

Figure, 2.4, depicts an overview of WII scheme process chain prepared by private insurance company with the support of Oxfam in Batticaloa district.



Source: Oxfam

Figure 2.4: An Overview of the Process-chain

2.3 Empirical Review: Evidence from Different Countries

Index-based insurance has been implemented in India, Ukraine, Ethiopia, Malawi and China. In Asia, countries such as China, India, and Thailand are at different phases of adopting index-based crop insurance with varying level of government support and private sector engagement.

Wickramasinghe (2018), stated that Climate/Crop Insurance is not listed as a major risk management strategy of dry zone farmers. Index-based climate insurance can be seen as a technically feasible and acceptable option to overcome the issues in indemnity-based insurance in Sri Lanka. Indemnity insurance is based on direct measurement of damage suffered by the farmer. In contrast, index-based insurance relies on an objective parameter (rainfall for instance) which is closely correlated with crop yield. When compared with indemnity-based insurance, index-based insurance is characterized with higher level of trust, lack of adverse selection and moral hazard, ability to address co-variate risks (such as droughts and floods), low costs and timely payouts.

In Sri Lanka there are well-established high density network of meteorological stations, availability of historical data, favourable rural financial culture, and the comparatively well-educated and literate population can help improve the WII. According to Heenkenda (2011), The high level of social organization, including a widespread network of banking and microfinance institutions, a postal network, an agrarian services network, an established telecommunication system and retail network offer a potential platform to deliver micro insurance products. Moreover, if well-established farm organizations can be linked with the insurance supply chain and would be developed with more trust than if it were developed by a commercial insurance company. There are clear indications that the framework conditions are also favourable for micro insurance development in the agricultural sector, but further research is needed to investigate this supply side perspective in order to initiate Index based micro insurance in Sri Lanka.

Raju et al., (2016), stated that, weather Index-Based Crop Insurance Scheme implemented by the Agriculture Insurance Company of India Limited (AIC) and private companies, has been in operation since 2007. It has been piloted across India to explore its effectiveness as an alternative to the NAIS, and provides insurance protection to the cultivator against weather incidence, such as deficit and excess rainfall, frost, heat, relative humidity, etc., which adversely impact rabi crops. The insurance is linked to credit, and farmers are required to obtain credit. In 2010-11, over nine million Indian farmers held WIBCIS policies. Presently, WIBCIS has succeeded only where it has been compulsorily bundled with loans as an alternative to the traditional area-based yield insurance and farmers still opt for traditional schemes that focus only on localized eccentric patterns of weather and do not cover the aforementioned larger risks. Heavy investments in developing a workforce for delivering agriculture extension services are also needed. Pro-poor products need to be introduced as a large chunk of insurance buyers are small and marginal farmers. Insurers and government must experiment with

cost-effective ways of increasing outreach. Government should provide equal opportunity for all insurers participating in WIBCIS. According to Raju et al., (2016), advantages, challenges and suggestions regarding WIBCIS has revealed as follows;

Table 2.1: Advantages, Challenges and Suggestions regarding WIBCIS

Advantages	Challenges	Suggestions
1. Trigger events such as adverse weather (rainfall, temperature, relative humidity, etc.) can be independently verified and measured	1.However, technical challenges exist in designing weather indices and also correlating weather indices with yield losses.	1. Innovations in low-cost automated weather stations: These are providing increased opportunities for deficit and excess rainfall coverage, as the cost of denser networks is falling.
2. Allows for speedy settlement of claims, say within 45 days from the end of the insurance period	2.Cultivator coefficients for popular varieties of major crops are still not very dependable for use in crop-growth simulation models, to develop indices.	2. Satellite imagery coupled with computer models has the potential to measure risks in new regions.
3. All cultivators – irrespective of loanee or non-loanee; small/marginal or others; owners or tenants/sharecroppers can buy WIBCIS	3. While historical weather data (up to 25-30 years) was considered essential, it is now considered in the industry that down-scaled daily observed weather for last 10 years is more relevant given climate change.	3. Specialized satellite imagery and computer models can be used to model flood risk and to show areas inundated by water (and also to monitor inundation periods).
4.WIBCIS provides transparent, fully objective, efficient and direct payouts for adverse weather incidences and thus, it is an effective risk mitigation tool against weather risks	4.The imperfect correlation between the index and a farmer's loss, which can result in the farmer receiving no claim payment despite having experienced a severe crop loss, is known as *basis risk*, and can deter demand.	4. Collect historic weather, crop, area, production, yield information from available weather stations from the pilot districts/sites. This applies to historical records of the chosen weather parameter(s) for underwriting and pricing purposes and to record parameter(s) for payout calculations during the period of insurance

Table 2.1 (Contd.): Advantages, Challenges and Suggestions regarding WIBCIS

5.The insured is not required to submit a claim form or other documents as proof of loss	5. Indeed, arguments against crop insurance reveal that "given the nature of agricultural production, India should stop investing in crop insurance schemes and replace these with a comprehensive Agricultural Calamity Compensation Fund, shared between the Center and States, for meeting a part of crop losses faced by farmers".	5. To make the assessment, the Indian Meteorological Department (IMD) concerned will need to share its data from potential pilot areas.
6. Claim payout is automatically calculated on the basis of weather data collected from the Reference Weather Station	6.Need crop specific and area specific products design. Development of new products for uncovered crops and areas.	6. Construct the index with collected weather and agricultural data using crop model output (WRSI/DSSAT) and pretest with farmer and local expert interviews
7.Since the weather data decides the compensation, the insured retains the incentive to put in extra effort to obtain better yields.	7.Tasks of appraising and approving the design of weather insurance products to capture reasonable risk/perils by regulatory agencies and designated expert committees.	7. Design and rate prototype agricultural insurance products with riders attached "Dry running" or "piloting" itself is treated as an empirical demand assessment.

Source: Raju et al, 2016

In the context of African region Kilimo Salama (Safe Agriculture) is a weather-index based insurance product developed in 2009 by the Syngenta Foundation for Sustainable Agriculture (SFSA). This was launched in partnership with Safaricom (the largest mobile network operator in Kenya) and UAP (a large insurance company based in Kenya). It insures farm inputs such as seeds and provides complete crop cycle cover for drought and excessive rain. Rainfall is measured using solar powered weather stations and, in case of deviation from normal rainfall, claim payouts are made to farmers. These weather stations are located at a radius of about 15 square kilometres. It monitors rainfall and several other weather parameters such as wind speed, sunlight and temperature and sends data to the central location every 15 minutes using GPRS technology. Since 2012, SFSA has partnered with Columbia University's Earth Institute to ground proof and scale satellite index insurance products. The foundation has entered into a partnership with Safaricom, which is the largest mobile network operator in Kenya and they developed an application that uses Safaricom mobile technology, to transfer money for claims payout

and premiums. Agricultural stockists act as a medium of distribution of insurance products. The farmers are registered with the agro-dealers using barcode which is linked to Cloud-based system. Farmers who purchase insurance embedded seed bags send an SMS to short code with details of unique code, upon which the farmer is automatically registered for insurance. The farmers could purchase an insurance cover by paying the premium amount. This can be made available in the form of scratch cards. Crop specific scratch cards (premium) could be made available in the market. These cards can be in different acreage denominations (up to 1 ha; 2 ha; etc.)**.** The farmers could then send an SMS using the number mentioned on them. In case of adverse weather conditions, farmers would receive compensation and the amount could be directly credited into their bank accounts. This amount could be used to replant and harvest their crops in the same season. This kind of technology ensures transparency, timely payment of claims and satisfaction among farmers The confirmation message is immediately sent to farmers and they are automatically connected to automated weather stations. Whenever there is a deviation in rainfall, leading to germination failure, the claim amount automatically gets transferred into the accounts of insured farmers. This process does not take more than four days and the farmers can use the money for replanting crops. The premium rates vary from 4-13 per cent and this is shared between the farmers and seed companies. The government plays no role in subsidizing premium payments. It must be noted that there is almost zero transaction cost in either issuing the policy or in disbursement of claims. This system of claim disbursement via mobile technology is efficient because of timely payout of claims and transparency in claims assessment (Gulati et al, 2018). The process is depicted in the following figure.

Source: Syngenta Foundation for Sustainable Agriculture (SFSA),2007

Figure 2.5: Crop Insurance in Kenya- Kilimo Salama

In Thailand, a study was undertaken at provincial level to assess the impact of using rainfall index as a threshold. Data availability is a challenge and has led to withdrawal of Weather Index Insurance (WII) in 2015. According to Sinha et al., (2016), WII have threshold levels based on historical rainfall. In absence of ground based weather data, a combination of satellite agriculture drought information can be used to make crop insurance more attractive as it would help reducing basis risk and improving insurers' and farmers' confidence in the product. Discussion with farmers, insurance companies, and the Bank of Agriculture and Agricultural Cooperatives (BAAC) in Thailand cited low awareness among farmers about the potential benefits of weather index insurance products and relatively low compensation as obstacles. Proper marketing and awareness raising campaigns should also accompany the introduction of index-based insurance products.

Past empirical studies on WII have focused on the evaluation of factors influencing demand and participation in the insurance programmes. For example, results of several studies reveal that the age and education level of the farmer, and trust positively influence the demand for crop insurance (Smith and Baquet, 1996; Mishra and Goodwin, 2006). On the contrary, there was negative relationship between farmers' age and their family size with the adoption of crop insurance indicator that reported off-farm income to influence demand for crop insurance positively. Sakurai and Reardon (1997) reported a negative influence that credit constraint influenced demand for crop insurance negatively. The findings of the study suggested policies that promote access to agricultural technology information should be encouraged. The insurance providers should add more effort in training farmers on benefits of an insurance scheme to compliment the information offered by the government extension services to enhance adoption. Also, membership in a group should be encouraged because group membership enhances information, knowledge sharing and access to credit at affordable interest rates to buy insured inputs (Wairimu, 2016).

Studies conducted in Sub Saharan Africa (SSA) indicate that sociodemographic and socio-economic factors are considered as driving factors for farmers to adopt index-based insurance products, in addition to premium rates and delivery channels. As expected, the higher the premium rate, the lower the farmers' willingness to purchase index-based insurance. Literacy, family size and on-farm income/savings have a positive impact on farmers' willingness to adopt insurance with estimated coefficients of 0.292, 0.018, and 0.211, respectively. As presented by the International Finance Corporation (IFC), weakness of insurance regulatory environment and poor financial facilities are considered as country/programme specific challenges that impede development of insurance markets in SSA. In addition, the review has identified challenges such as basis risk, quality and availability of historical weather and yield data, capacity building of stakeholders (farmer, insurer and regulator), limited product options for different weather risks, and lack of innovation for local adaptation and scalability (Ntukamazina et al., 2017).

According to the literature, few common problems can be identified in weather index insurance scheme in developing countries as follows;

Weather cycle: Weather index insurance is completely dependent on weather conditions. But weather cycle every year does not follow the same pattern as per hundred year's historical trend to trigger an unexpected event like El-Nino or earthquake. Actuarial soundness in this case could be undermined by unexpected weather cycle that may change the probability of insured events (Manuamorn, 2005).

Product familiarity and education: Rural farmers are the potential policy holders of index insurance, who do not have previous experience with insurance. For wider acceptance of this product, education is necessary to understand insurance policy (Alderman and Haque, 2007). Local insurers and government regulators or policy making entities also require some ideas to know how it management risk (Skees, 2008), and in facilitating and regulating the market. Also it will help insurers in marketing the product (Alderman and Haque, 2007; Manuamorn, 2005).

Financing large losses: In weather index based insurance, potential losses may occur in large scale when the index triggers. If this happens, insurers have to pay to all policy holders at a time rather than payment to individual that requires large sum of money to pay indemnity. In developing countries, local insurance companies typically do not have sufficient financial resources to cover the losses resulted in from insured events without presence of re-insurance facilities (Skees, 2008). They need either government or international development organizations support, or re-insurance facilities (Skees, 2008; Alderman and Haque, 2007).

Gebre (2014) conducted a study regarding WII in which household demographics, farmers risk perception, farmer's impatience, education, land size, previous knowledge of financial markets, involvement in water harvesting technologies, and household's off-farm income were taken as determinant factors of willingness to pay for weather index insurance. Results show that those households that are less risk-averse have more willingness to pay than the risk-averse households. The households educated through informal education system (stated as other education) such us adult literacy programme, church/mosque schools and other literacy programmes have also 0.62 unites more willingness to pay than those who did not complete any education. Besides, the results show that women, old age households and households with area of large extent have less willingness to pay for insurance. The increase in off-farm income of households also increases willingness to pay for insurance. Results indicate that the effect of households' risk perception, time preference, education, familiarity with local financial products, involving in water harvesting 40. However, the effects of age, sex, land size, and off-farm income on willingness to pay for weather index insurance are found statistically insignificant.

CHAPTER THREE

Methodology

3.1 Study Area and Locations

The private insurance company has started their pilot project in Kurunegala and Kalutara, but at present it is operational only in Batticaloa, Vavuniya and Trinccomalee districts. In Batticaloa district, WII scheme started since 2014 *yala* season while in Vavuniya and Trincomalee it started from 2017/2018 *maha* season. Among the three districts, we selected Batticaloa for the farmer survey as the farmers in Batticaloa district had more experience regarding WII scheme than those in the other two districts. Four weather stations are function in the Batticaloa district; Karadiyanaru, Kiran, Vaharai and Vellawalai. However, at that moment the weather station in Vallawalai did not function due to a technical error. We selected Koralaipattu North DS division (main town is Vaharai) and Manmunai West DS division (main town is Vavunathivu) for the farmer survey as these DS divisions are situated in the radius of 15 square kilometres away from the relevant weather stations. We could not have selected Vaharai DS division as the weather station did not function at that time and Kiran Ds division not selected as the WII scheme was introduced in that area recently. The areas suitable to introduce weather index insurance scheme has been selected by officers in Oxfam with the help of private insurance company agents.

With regard to institutional survey (supply side) of WII schemes, secondary data and information was obtained from a number of institutes and companies including private insurance companies, Agricultural and Agrarian Insurance Board (AAIB), Department of Meteorology, Oxfam and Annual Reports of the Central Bank of Sri Lanka.

Flood Situation Statistics - Batticaloa (18th Mar 2008 3 pm)

DS Division	No. of Affected Communities		No. of Displaced Communities		Remarks
	No. of Families	No.of Persons	No. of Families	No.of Persons	
Eravur Pattu	3,281	13,289	19	74	Displaced families living in 1 IDP Camp
Eravur town	2,506	11,429	3	11	Displaced families living in 1 IDP Camp
Kattankudy	3,385	15,468	nil	nil	
Koralai Pattu West	840	3,657	nil	nil	
Manmunai North	5,500	20,498	329	1,161	Displaced families living in 3 IDP Camps
Manmunai Pattu	4,514	17,013	1,428	5,738	with friend and relations
Manmunai South & Ervuvil Pattu	8,895	33,655	31	134	with friend and relations
PorathivuPattu	1,667	5,577	29	102	with friend and relations
Total	30,588	120,586	1,839	7,220	

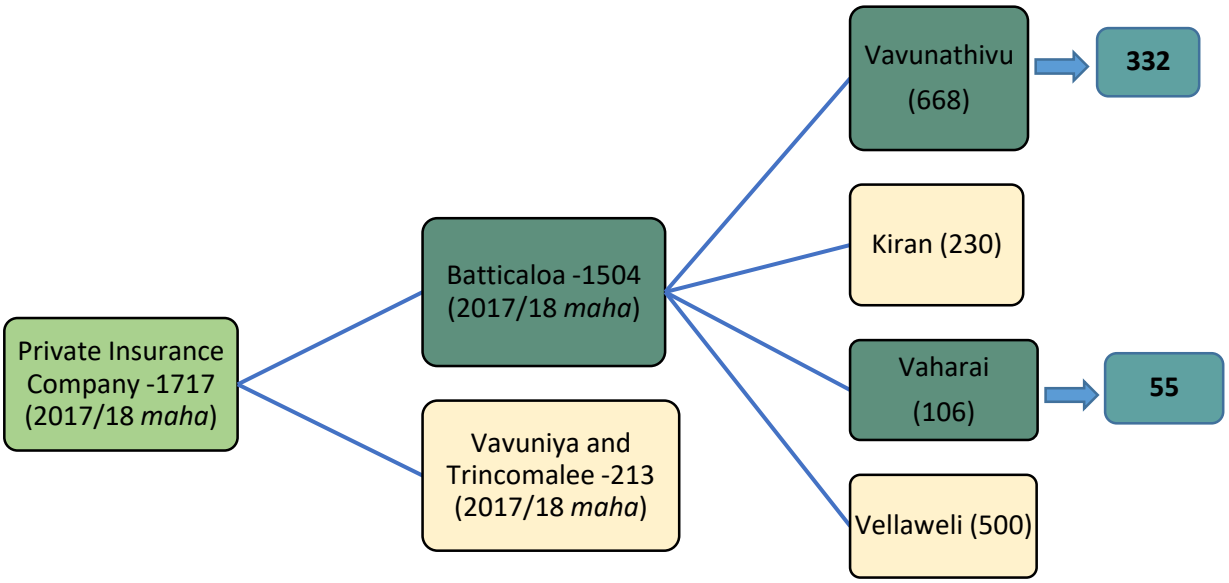
Source: www.humanitarianinfo.org/srilanka,2008.

Figure 3.1: Flood Affected Areas in Batticaloa District in 2008

3.2 Population and Sample Selection

The sample was selected using stratified sampling for this study. A total of 1563 paddy farmers were engaged in WII scheme under the four weather stations in the Batticaloa district. As explained earlier, the sample was selected among paddy farmers only from

two DS divisions under two weather stations. There were 774 paddy farmers engaged in WII scheme under two weather stations and from that 50 percent was selected as sample farmers (387). The number of sample farmers from each farmer organization was selected proportionately and finally, 387 paddy farmers were selected randomly from five farmer organizations (Figure 3.2 and Table 3.1)



Source: Private Insurance company, 2018

Figure 3.2: Population and Sample Selection

Table 3.1: Farmer Organizations and Number of Sample Farmers

DS Divisions	Farmer Organization	Population	Sample
Vavunathivu	Pamparachenai Farmer Organization	255	117
	Irunuravilo Farmer Organization	185	116
	Paruththichenai Farmer Organization	167	76
	Pannanganal Thottam Farmer Organization	61	23
Vaharai	Kaddumurivu	106	55
Total		**774**	**387**

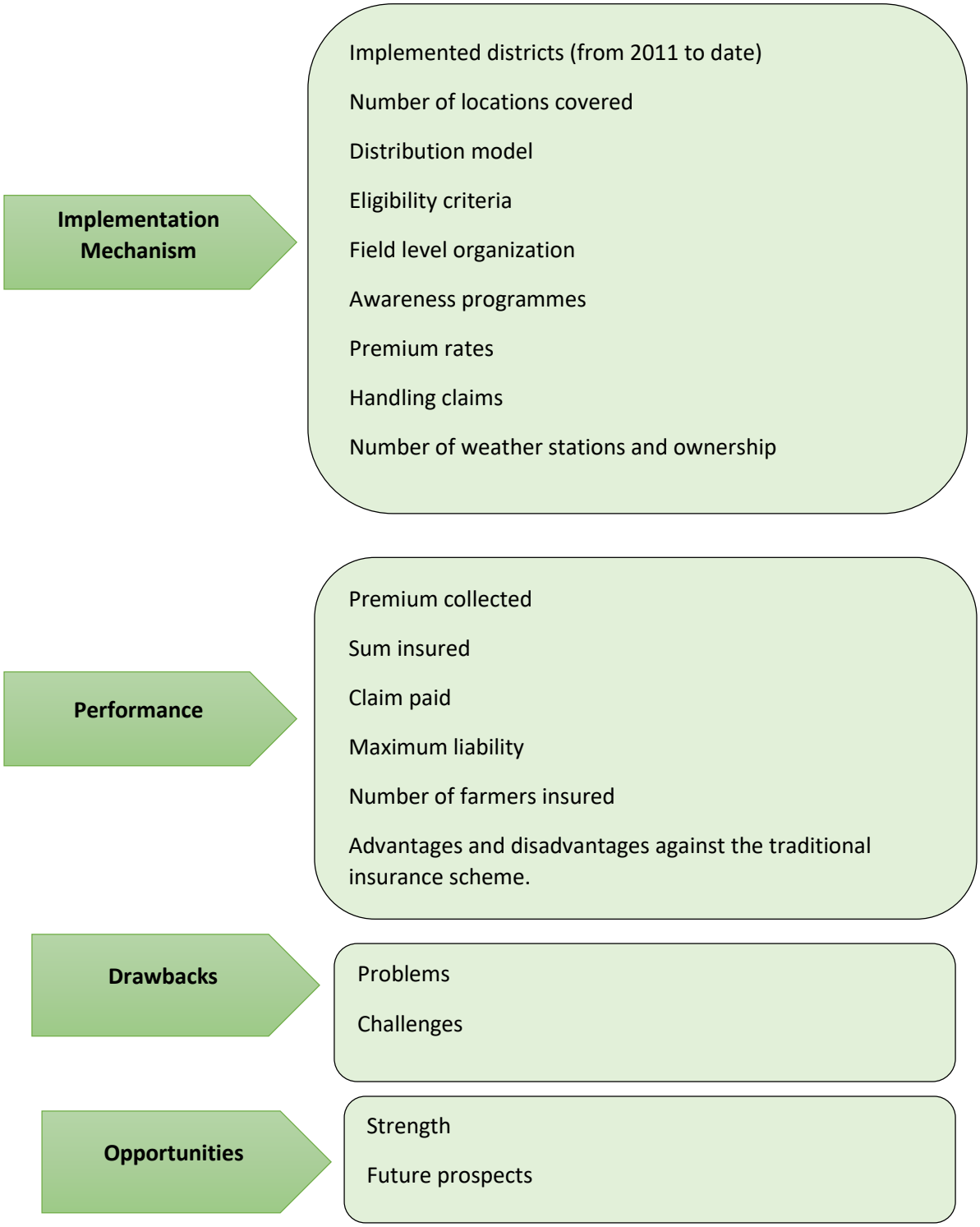
Source: Private Insurance Company,2018

3.3 Variables, Type of Data and Data Collection

The study objectives have been achieved by collecting both primary and secondary data and information, through a survey of farmers, focus group discussions (FGD), Key informant interviews and secondary sources of information.

3.3.1 Type of Data and Information and Method of Data Collection for Objective One

The following type of data and information have been collected for the objective one



The key informant interviews were carried out to gather qualitative data with senior officials as well as field officers in the private insurance company and officials in AAIB, and agricultural insurance experts. Interview guide lines were prepared to gather information on present performance, drawbacks and opportunities of the WII schemes as well as experience, knowledge, perceptions and views. In addition, annual reports of the Central Bank of Sri Lanka and other published literature were used to collect the data and information.

3.3.2 Type of Data and Information and Method of Data Collection for Objective Two

The following type of data and information have been collected for the objective Two.

Socio economic condition of the sample farmers	*Age *Gender *Level of education *Main occupation *Secondary occupation *Monthly income *Number of earning members in a family income
Cultivation information	*Extent of landholdings *Type of ownership *Irrigation type
Causes & consequences of risk in paddy cultivation	*Main reason for crop damages *Occurrence of crop damages *The way of covering crop damage cost *Most important impact on respondents' production & income caused by drought *Measure to cope during crop damages
Participation for the WII scheme	*Farmer awareness *Way of creating awareness *Seasons in which joined for the first time *Reasons for not participating continuously *Way of paying premium *Time taken to receive indemnities
Farmer responses	*Farmer satisfaction *Farmers' attitude *Willingness to pay premium * Willingness to join in future *Problems *Suggestions

The survey was based on a pre-tested structured questionnaire to gather primary data and information on existing WII schemes, problems and suggestions of insured farmers. Farmers who subscribed to WII scheme during the period of 2016/17 *maha*, 2017/18 *maha* and 2018 *yala* seasons were considered for the questionnaire survey. As well as a focus group discussion was conducted with farmer leaders/farmer organizations to elicit their ideas and suggestions regarding the scheme and focus group discussion guidelines were prepared to derive data and information.

3.4 Data Analysis

The data was analyzed using SPSS22 statistical package. The study used descriptive statistical methods (mean, frequency, percentage and count) to analyse the quantitative data.

3.4.1 Data Analysis for Objective One

We collected both qualitative and quantitative data for the Objective One. Qualitative data and information we collected for the implementation mechanism, drawbacks and opportunities and it was presented in tabular and descriptive method. Secondary data was collected for analysis of the performance of WII scheme.

To measure the performance of the WII scheme four important ratios were used;

- Loss Ratio = $\dfrac{\text{Indemnities Paid (Rs.)}}{\text{Premium Collected (RS.)}}$
- Paid Rate Ratio = $\dfrac{\text{Indemnity Paid (Rs.)}}{\text{Maximum Liabilities (Rs.)}} \times 100$
- Expenses Ratio = $\dfrac{\text{Total Expenses (Rs.)}}{\text{Premium Collected (Rs.)}}$
- Participation Ratio = $\dfrac{\text{Number of Insured Farmers in WII}}{\text{Number of Paddy Farmers}} \times 100$

3.4.2 Data Analysis for Objective Two

All the data were analyzed using statistical Package of Social Science (SPSS) which facilitated the generation of descriptive statistics using frequency and percentage. The mean score from a four-point Likert type of scale to analyze the data was obtained with regard to farmer attitudes. Data was illustrated in graphical and tabular form.

Likert scale was used to assess the attitudes of farmers to WII scheme as specified below:

Opinion	**Point**
Strongly Agree (SA)	4
Agree (A)	3
Disagree (D)	2
Strongly Disagree (SD)	1

The mean response to each item was calculated using the following formula:

$$\bar{X} = \frac{\sum FX}{N}$$

Where;

$\bar{X}$ = mean response

∑= summation

F = number of respondents choosing a particular scale point

X = numerical value of scaling point

N = total number of respondents to the item

The mean response to each item was interpreted using the concept of real limits of numbers. The numerical value of the scale points and their respective real limits are as follows:

Strongly Disagree (SD) = 1 point with real limits of 0.5 -1.49

Disagree (D) = 2 points with real limits of 1.50- 2.49

Agree (A) = 3 points with real limits of 2.50 – 3.49

- Farmer awareness
- Way of awareness
- Season in which they joined for the first time
- Reasons for not participating continuously

Strongly Agree (SA) = 4 points with real limits of 3.50 – 4.49

Decision Rule: The mean of the these weights is 2.5 { (4+3+2+1) ÷4 = 2.5}. A mean score of 2.5 or more implied that farmers agreed that particular item.

The Probit model was employed to study awareness about crop insurance scheme. The Probit model was specified as per the following Equation,

$Y=a_0 + \beta_1 E + \beta_2 F + \beta_3 FO + \beta_4 IN + \beta_5 G + Ui$

Where,

Y= Awareness about Index Insurance Scheme (1 for aware, 0 otherwise)

E= Education level of farmer

F= Farming experience of farmers (years)

FO = Participation of farmer organization (1 for aware, 0 otherwise)

IN=Monthly income of farmers (Rs)

G= Gender

Ui= Error-term

CHAPTER FOUR

Performance of Institutional Aspects of WII Scheme

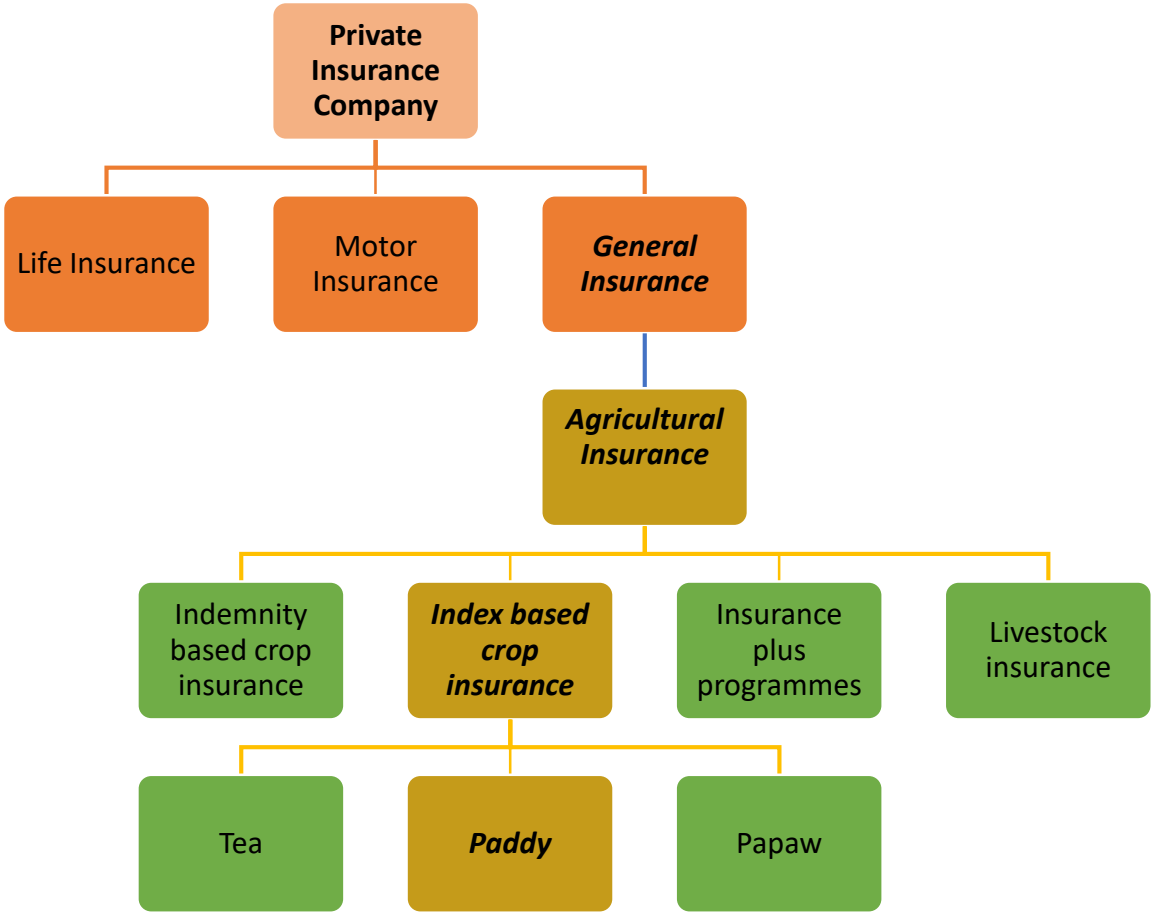
4.1 Introduction

Weather Index Insurance (WII) scheme is a new concept to farmers, banks and agricultural insurance companies in Sri Lanka. It covers crop production losses caused by excessive and deficit rainfall by studying the changes of rainfall amounts received at farmers nearest weather station. A private insurance company, a member of a cooperative group, has introduced weather index insurance (WII) scheme in Sri Lanka at the first time in 2010 with the main indices of rainfall. Government sector agricultural insurance institute namely, Agricultural and Agrarian Insurance Board (AAIB), has also tried to introduce weather index insurance scheme recently. This chapter is an analysis of the performance of weather index insurance scheme, conducted by these two institutions.

4.2 WII Scheme for Paddy Conducted by Private Insurance Company

4.2.1 Implementation Mechanism

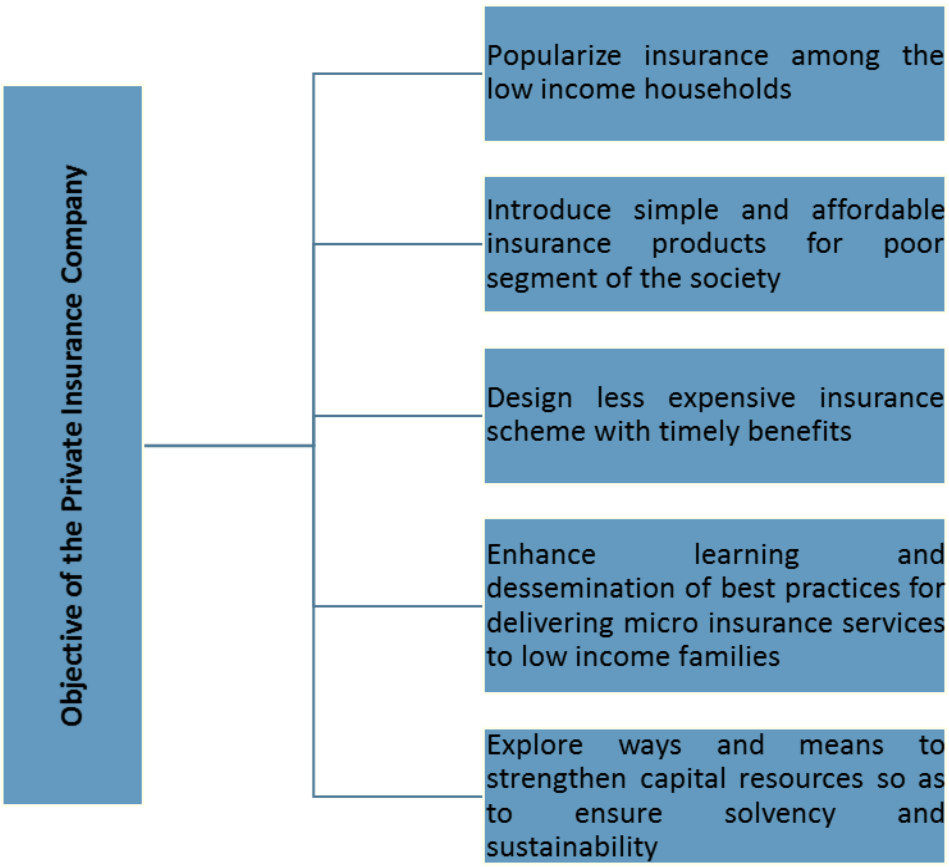
The private insurance company has good outreach to over one million members through its savings and credit institutions as well as has good farmer societies and community based organizations island wide, started WII scheme in 2010 under the general insurance section (Figure 4.1). To develop WII product, the company has received technical support from DID-Canada, K.A.Pandith from India and Basix, India (https://www.indexinsuranceforum.org/project/sanasa-insurance-sri-lanka). In this study we considered only the Index based crop insurance scheme as well as under that we selected only paddy. The company is started WII for tea in the year 2012 for the selected 15 Meteorology Department weather stations in Matara, Galle, Kalutara and Ratnapura districts. Presently it functions only in the Galle district. Weather index insurance for papaw started in Vavuniya district since 2017**.**



Source: Private Insurance Company, 2018

Figure 4.1: General Insurance Products Offered by Private Insurance Company

The objectives of the company implementing WII scheme are as follows, (Figure4.2).



Source: Private Insurance Company, 2018

Figure 4.2: Objectives of the Private Insurance Company

The private insurance company intends to develop the weather index insurance market in Sri Lanka through a combination of capacity building and awareness creation at both company as well as farmer level to achieve their core objective which is to minimize Sri Lankan farmers' risk of an income loss due to unfavourable weather conditions. After the project completion they hoped to achieve;

- Development of a simple, flexible, affordable weather index based insurance product will be catering to diverse client needs for food crops in Sri Lanka.
- Assist in developing institutional capacity of the company.
- Raise awareness among at least 50,000 farmers on the availability of the index insurance products and the benefits.

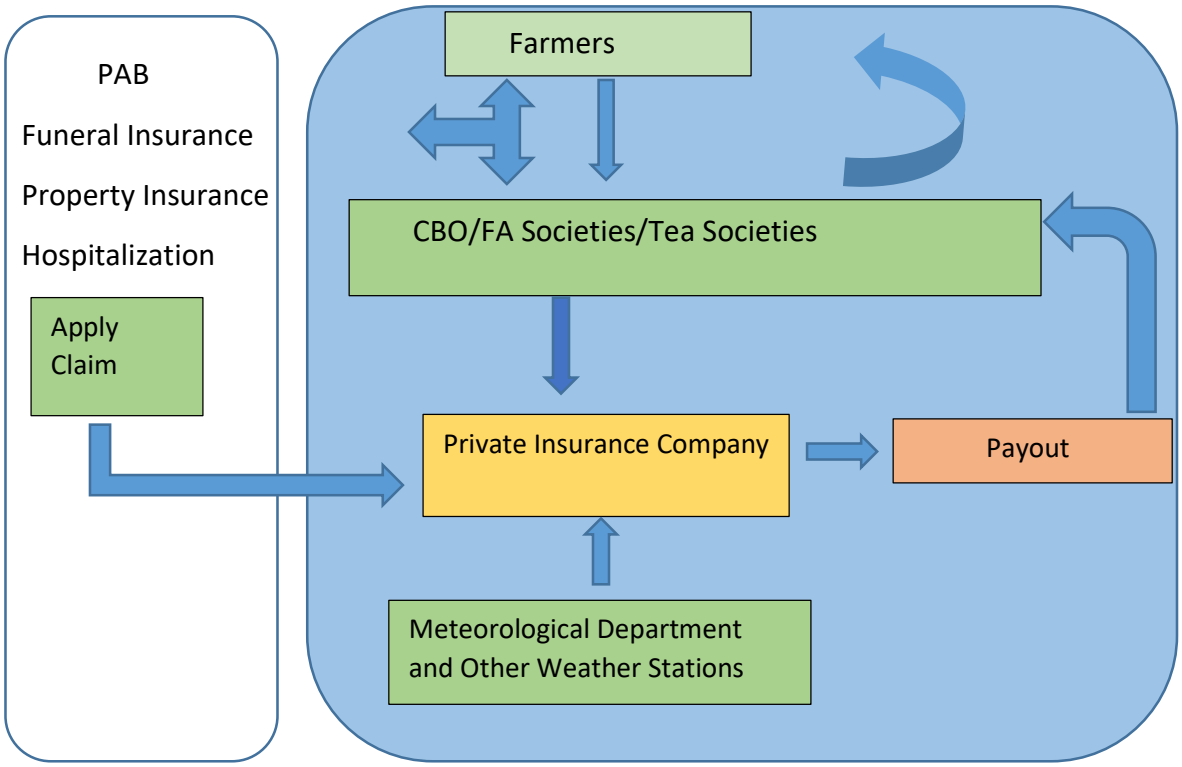
In June 2011, the World Bank group, supported by Global Index Insurance Facility (GIIF), partnered with this company to develop an index- based insurance product for the first time for paddy farmers. A pilot product was conducted in two areas with two weather stations in Kurunegala and Bombuwela and around 600 policies were issued. Prior to the development of WII product, they carried out a feasibility survey with the participation of more than 2000 farmers. Further, to develop WII scheme, they obtained services from

best Sri Lankan agronomists in paddy and tea sectors. A system was put in place to obtain data from the Meteorological Department of Sri Lanka. Fifteen weather stations installed by the Sri Lankan government provided regular data, used for developing the product and monitoring the policy. Based on the historical data and feedback from the field workers in the areas, product specifications were developed for all the locations. After launching a pilot product for just over 100 farmers, the product was further adjusted to meet both climatic variations and farmer expectations.

4.2.1.1 Field Level Organization and Distribution Network of the Private Insurance Company

Under the agricultural insurance section Technical Expert and Head of Underwriting are the same level position. Under the Head of Underwriting there are six Regional Managers, 38 Branch Managers and six Agri coordinators at the field level. In addition, there are 60 marketing staff and 230 agents involved at the field level in the agricultural insurance scheme conducted by the private insurance company. Marketing staff consisted of graduates qualified in the subject of agricultural science to assist and motivate society agents to sell WII products. The company has introduced WII scheme bundled with few life and general insurance products and community based organization are the main distribution channel of the company for WII product.

The following Figure depicts the distribution network of WII scheme in this company.



Source: Private Insurance Company, 2018

Figure 4.3: Distribution Network of WII Scheme

4.2.1.2 Implemented Districts and Number of Locations

The pilot project started in Kurunegala and Kalutara districts covering two locations and enrolled 570 farmers. The first insurance period started from 2010/11 *Maha* season in Kurunegala and Kalutara districts and covered nine locations with 2,241 farmers. From the 2011/12 *Maha* season, up to 2014 *Yala* season, WII scheme has been operating in Kurunegala, Anuradhapura, Matale, Kandy and Hambantota districts. Later WII did not operate in those districts due to lack of continuous meteorological data and other operational problems. From the 2014/15 *Maha* season WII scheme was introduced to the Batticaloa district with the premium subsidies given by the OXFAM. Until now it is operated in the Batticaloa district. However, the number of locations have decreased gradually. Significant increase in farmer participation also could not be found during that period and this situation affects the private insurance company's objective of increasing farmer participation to 50,000.

Table 4.1: Implemented Districts, Locations and Number of Farmers in WII

Year/season	Implemented Districts	Number of Locations Covered	Number of Farmers
2010 *yala*	Kurunegala, Kalutara	2	570
2010/11 *maha*	Kurunegala, Kalutara	9	2241
2011 *yala*	Kurunegala	10	1904
2011/12 *maha*	Kurunegala, Matale, Kandy, Hambantota ,Anuradhapura	12	3337
2012 *yala*	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	10	2908
2012/13 *maha*	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	12	2617
2013 *yala*	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	16	3527
2013/14 *maha*	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	16	3105
2014 *yala*	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura, Batticaloa	16	2810
2014/15 *maha*	Batticaloa	16	3435
2015 *yala*	Batticaloa	16	2151
2015/16 *maha*	Batticaloa	16	2986
2016 *yala*	Batticaloa	16	2448
2016/17 *maha*	Batticaloa	9	1621
2017 *yala*	N.A	N.A	N.A
2017/18 *maha*	Batticaloa, Vavuniya, Trincomalee	11	1717
2018 *yala*	Batticaloa, Vavuniya, Trincomalee	11	2396

Source: Private Insurance Company, 2018

4.2.1.3 Weather Stations

For the operation of weather index-based insurance, current data and the historical data for the analysis are obtained from the weather stations of Sri Lanka. Meteorology Department had 23 principal meteorological stations and 39 agro meteorological stations island wide established in collaboration with certain institutions (www.meteo.gov.lk). In addition, there are around 520 rain gauge stations under the Meteorology Department only for the purpose of measuring and reporting the rainfall data. However, at present only around 420 rain gauge stations function well.

Table 4.2: Weather Stations

Meteorological Weather Station	University of Moratuwa + SICL
Jaffna	Kegalle
Mannar	Pawatkulan-Vavuniya
Vavuniya	Sanasiparathen -vavuniya
Trincomalee	Vakarai- Batticaloa
Anuradhapura	Koralayeipattu-Batticaloa
Puttalam	Vellawalli- Batticaloa
Mahailluppallama	Karadiyanaru- Batticaloa
Polonnarauwa	Thambalagamuwa- Trincomalee
Batticaloa	Mahaoya- Ampara
Kurunegala	Oddusudan
Katugastota	Omantei
Colombo	Navidanweli-Batticaloa
Ratmalana	Weeragoda
Ratnapura	Ampara
Nuwara Eliya	
Bandarawela	
Badulla	
Moneragala	
Potuvil	
Mattala	
Galle	
Hambantota	

Source: Department of Metrology and Private Insurance Company, 2018

Further, 100 automated rain gauges are established near the rivers in Sri Lanka. The current meteorological observations network has supplied rainfall data and other climate data to the Department of Meteorology. In 2015, a private insurance company along with the Oxfam introduced WII scheme to Batticaloa and to collect rainfall data they invested automated weather stations with the technical support of University of Moratuwa. Table 4.2 depicts the principal meteorological stations and automated weather stations.

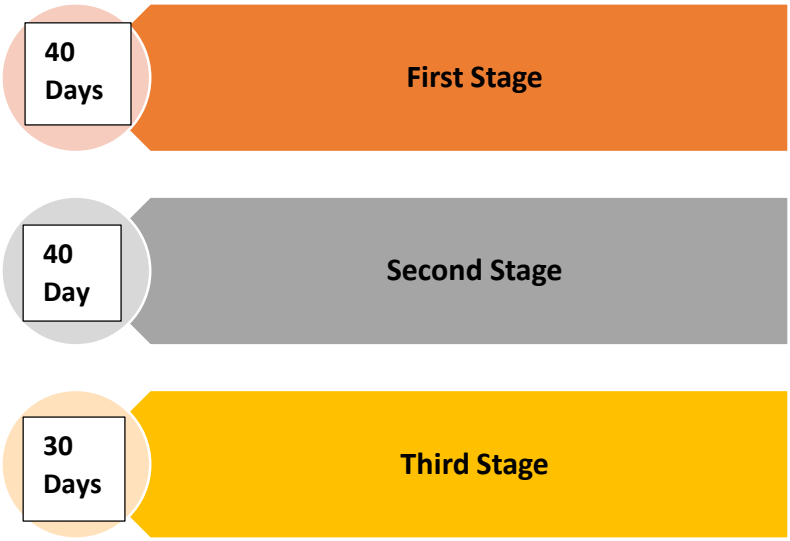
4.2.1.4 Eligible Criteria and Enrolment Process of WII

There are three major requirements that have to be fulfilled for the success of WII scheme;

- 30 years' weather (rainfall) data
- Having a weather station functioning
- Paddy cultivation area

Paddy farmers who cultivate lands within the radius of 15 km from the weather stations are eligible for the WII scheme. Under the WII scheme farmers can get protection for the perils of low or high rainfall and flash rains (high rainfall occurred in continuously within four days).

Insured period is valid for a season. For example, during the Yala season insurance period is 110 days and it starts from 20th May and ends 6th September. Insurance period is divided by three stages as follows.



Source: Private Insurance Company,2018

Figure 4.4: Insurance Period with Stages

Farmers have to insure their paddy lands before the season begins. For the Yala season insurance period commenced on 20th May, and before the end of month (31 of May) farmers have to subscribe for the insurance scheme. Farmers have to fill the simple form and soon after payment of premium, the original form with the signature of the authorized officer is issued. Further, summary of the insurance deed is also issued by the authorized officer to the insured farmer at that point in time. Benefits of insurance scheme, rules and the regulations are enclosed the insurance deed. Finally, confederate (collective) insurance deed is entailing insured farmers' names and their insurance policy numbers is issued by the private insurance company to the farmer organization.

The private insurance company has to pay Rs.30.00 to the Meteorological Department per month for obtaining historical weather data (Rs.300.00 per year). For obtaining the current weather data from a weather station they have to pay Rs.45 per month to the Department (Rs.450.00 per year).

4.2.1.5 Awareness and Training Programmes

Various training modules for participants at different levels of the company's and the societies' sales force were developed with technical inputs from BASIX (BASIX is a Hyderabad – based group of companies with a mission to "promote a large number of sustainable livelihood" including for the rural poor and women, through the promotion of financial services and technical assistance in a integrated manner) (World Bank, 2011). On creating awareness about the availability of the product, and previous claims pay-outs were used as demonstration cases to help inform farmers' decisions. Additionally, all the features included as part of the relationship (such as the accidental death benefit included in the product offered by the insurance company) was made visible to the customers during the customer education campaign since they add considerable value to the product and most people were not aware that they have them. This required investment in training and awareness session aimed at sales force so that the relevant message could be effectively communicated. In 2014, the private insurance company is provided insurance education to over 25,000 farmer households. It is also trying to implement awareness programmes for farmers with the help of Oxfam. To increase understanding of WII, they decided that customer education programme should be conducted as an ongoing process for a further period of two or three cultivating seasons. The private insurance company provided training programmes for the field officers but they could not provide any international training programmes for them. Further, to make farmers aware the company carried out an attractive marketing materials such as;

- Leaflets containing all the information
- Village mobile programmes
- Video programmes (teledrama of WII)
- Radio and T.V. advertisements

4.2.1.6 Present Operation of WII Scheme

The private insurance company started WII scheme jointly with the Oxfam in Trincomalee, Batticaloa and Vavuniya. In the Batticaloa district, WII scheme started in 2014 *yala* season as a pilot project with 200 farmers. At the start the WII scheme was offered at a fully subsidised rate as the Oxfam subsidised completely for the cost of insurance premium. Oxfam also funded the implementation of weather station and technical support provided by the University of Moratuwa and is coordinated by the private insurance company. Implementation cost for the weather station was Rs. 150,000. Four weather stations were operating in the Batticaloa district; Karadiyanaru, Kiran, Vakarai and Vellawalai. Each weather station serves the radius of 15km^2 area around each weather

station. The areas suitable for the introduction of weather index insurance scheme were selected by officers of Oxfam with the help of private insurance company agents. However, at present, weather station in Vellawalai is not functioning to technical faults. In 2016/17 *maha* season, the first WII scheme was launched in the relevant areas around the Karadiyanaru weather station with the help of Oxfam. Oxfam contributed to the whole premium at the first season and paid half premium for the next season. From the third season, the farmers have to bear the premium by themselves. From the 2017/18 *maha* season, WII scheme was started in Vellavali, Kiran, Vakarai and Mahaoya areas.

Though the current rainfall data can be obtained from different weather stations, historical data need to be obtained from the Department of Meteorology. According to officials from the private insurance company there is a time lag of more than two months to obtain rainfall data from the Department Meteorology and they have to pay Rs.30 per month for a weather station to obtain historical weather data and have to pay Rs.45 per month for the current data of a weather station.

Rainfall data collected from weather stations is sent to the officers of Oxfam, field officers and the higher officers in private insurance company and leaders of the farmer organizations via SMS**.** Field officer responsible for weather station data, should check rainfall data monthly and in the case of incompatibility in data or deactivating of weather station it should be reported to a higher officer in the head office of private insurance company as well as to the University of Moratuwa.

4.2.1.7 Premium

In a move to curb exploitation of WII scheme, the private insurance company has limited three acres per person for a season. Hence, a person has to pay the maximum premium of Rs. 9,000 / three acres (Rs. 3,000/ acre) and total benefit can be up to Rs. 90,000/ three acres (Rs. 30,000/acre). Farmer can obtain insurance units as they wish to cover their cost of production and he can obtain a maximum of 1000 units. There are ten units per acre of paddy lands. Premium is 10 percent of the sum insured. If farmer insures only one unit, he has to pay Rs. 300 as premium and he can get Rs.3000 as compensation per unit. Minimum sum insured is Rs.3000 for one-unit and maximum amount is Rs. 300,000. In addition, farmers have to pay Rs.47.42 as tax with the premium.

Table 4.3: Extent of Paddy Lands, Premium and Sum Insured

Extent of Land (Ac.)	Insurance Premium (Rs.) (Without tax)	Sum Insured (Rs.)
01	3,000	30,000
1/2	1,500	15,000
1/4	750	7,500
1/8 or less than	375	3,750

Source: Private Insurance Company, 2018

If the farmer wants an insurance cover acre wise, the premium rates and sum insured can be arranged according to the Table 4.3. Further, farmers can subscribe for a month for the season. The season includes three months. If farmer likes to insure for the first month, he can pay Rs.1000/unit only. However, if the farmer is eligible to claim for the first month he can obtain the claim after the season. Farmers can pay the premium monthly or the whole amount at once. If farmer wishes to insure their land for the first month only or second month or third month only for the season he can do so.

4.2.1.8 Claim Handling

Insured farmers are eligible to claim payment if the total rainfall during the season was lower or higher than a given threshold level. It is necessary to consider the trigger level at which the contract starts to pay out and rainfall data recorded in the respective weather station.

Transparency and indemnity payments:

Daily rainfall data obtained from the relevant weather station for a particular season are displayed in the notice board in the farmer organization to make farmers aware. Further, the list of farmers eligible for the compensation is also displayed in the same notice board. Hence, requesting for the compensation is not required and within one month after the season, the farmers can get their indemnity credited to their bank account.

Other benefits:

- In the event of an accidental death or permanently disabled of a contributor he will receive Rs.6000/ insurance unit.
- Indemnity will be paid for the flash rains.
- When farmer is hospitalized for rat fever, medicinal bills up to Rs.6000 can be reimbursed or can get Rs.200 per day for hospitalization for up to 15 days (per unit).
- If the number of insurance units are increased, the benefits also increase accordingly.

If a farmer pays Rs.450 as the insurance premium per unit, he can get more benefit than mentioned above. They are as follows;

1. If farmer obtains more up to five units, he is eligible for Rs. 5000 as death gratuity for a unit and maximum Rs. 30,000.
2. If farmer subscribes above five units Rs.2000 gratuity is paid for each extra unit and a maximum of ten units is paid as Rs.40000 as death gratuity.
3. If farmer subscribes to more than ten units, Rs.1000 is paid for each extra unit up to a maximum limit of Rs. 50,000 death gratuity.

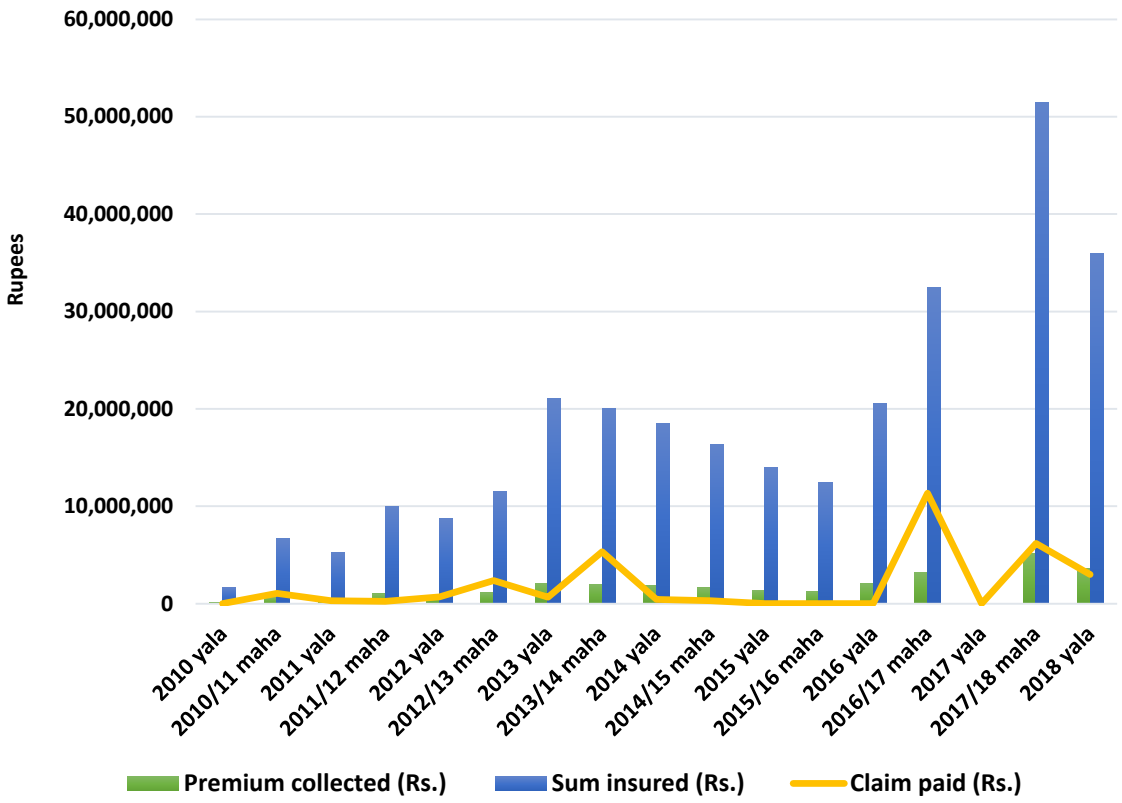
The policy holder will get a pay out when rainfall is below or above an agreed point (trigger point) based on automated weather station records. When the compensation paid to the eligible farmer it should be approved by a committee comprising three members of farmer organization and two officers of the insurance company.

The main triggers are drought, excess rain and flash rains. The product trigger was modified based on field feedback and observed variations in weather. There are different trigger levels for different stages of the crop, different weather station and in different areas. Compensation is also paid for the flash rains (If 75 percent of the necessary rain for the relevant stage is received within four days it is called flash rain). If the paddy is destroyed by flooding caused by rainfall in other areas and not recorded in relevant weather station it is considered for being eligible for is compensation. If accumulation of rainfall in insurance period is below or equal to predefined threshold, claim will be paid without conducting a survey or field assessment and it helps fast claim settlement.

According to the commencement of cultivation period, claim configuration has changed. To the season one can subscribe monthly wise (Rs.1000/month) and the sum insured is Rs. 10,000.

4.2.2 Performance of the Weather Index Insurance Scheme of Paddy

WII scheme was started in the 2010 *yala* season as a pilot project and no record of a claim payment. In 2016/17 *maha* season the private insurance company had to pay a large amount as claims due to damages in the Batticaloa district. Hence, the company has not carried out the WII scheme in 2017 *yala* season. It shows that after certain massive claim payment, private insurers are reluctant to proceed with the agricultural insurance scheme due to financial instability. The following figure depicts the performance of WII scheme for paddy. Premium rate is calculated as a 10 percent of the amount of sum insured.



Source: Private Insurance Company, 2018

Figure 4.5: Performance of the WII Scheme of Paddy

Three important ratios were used to measure the performance of the Weather Index Insurance scheme for paddy. These are;

- Loss Ratio
- Paid Rate Ratio
- Expenses Ratio
- Participation Ratio

4.2.2.1 Loss Ratio

$$\text{Loss Ratio} = \frac{\text{Indemnities Paid (Rs.)}}{\text{Premium Collected (Rs.)}}$$

Table 4.4: Loss Ratio Analysis

Season	Premium Collected (Rs.) (1)	Claim Paid (Rs.) (2)	Difference between 1-2 (Rs.)	Gross Loss Ratio
2010/11 *maha*	672,300	1,058,706	-386,406	1.57
2011 *yala*	528,600	316,425	212,175	0.60
2011/12 *maha*	1,001,100	231,473	769,627	0.23
2012 *yala*	872,400	690,000	182,400	0.79
2012/13 *maha*	1,157,400	2,376,384	-1,218,984	2.05
2013 *yala*	2,110,100	657,950	1,452,150	0.31
2013/14 *maha*	2,005,200	5,330,938	-3,325,738	2.66
2014 *yala*	1,853,500	444,000	1,409,500	0.24
2014/15 *maha*	1,639,700	307,435	1,332,265	0.19
2015 *yala*	1,403,528	0	1,403,528	0.00
2015/16 *mah*a	1,240,020	10,796	1,229,224	0.01
2016 *yala*	2,059,800	0	2,059,800	0.00
2016/17 *maha*	3,242,000	11,347,000	-8,105,000	3.50
2017 *yala*	N.A.	N.A.	N.A.	N.A.
2017/18 *maha*	5,151,000	6,181,200	-1,030,200	1.20
2018 *yala*	3,594,000	3,000,000	594,000	0.83

Source: Authors calculation by data obtained from Private Insurance Company, 2018

The loss ratio analysis can be used in formalizing the financial stability of a crop insurance scheme. Under the weather index insurance scheme for paddy, the minimum premium rate is Rs.300.00 per unit and maximum premium rate is Rs.3000/10 units or one acre of land. According to the amount of premium collected and indemnities paid by the private insurance company, we calculated the gross loss ratio. At the preliminary season (2010/11 *maha)*, the commitment on claims far exceeded the premium collection. In the last eight-year period, there were only five seasons where payment of indemnities was over and above the premium collection. These seasons were the 2010/11 *maha*,2012/13 *maha*, 2013/14 *maha*, 2016/17 *maha* and 2017/18 *maha*. The gross loss ratio was higher than one in those seasons. The highest gross loss ratio was recorded in *maha* 2016/17 in which the company was called upon to pay indemnities in a massive sum for damages reported under drought conditions in the Batticaloa district. As a whole this situation depicts that the private insurance company has strong financial stability making WII scheme operational in most of the seasons. The company has seen high pay-outs in the past and was keen to have reinsurance support to prevent any erosion to its balance sheet in case of widespread losses.

4.2.2.2 Paid Rate Analysis

$$\text{Paid Rate Ratio} = \frac{\text{Indemnity Paid (Rs.)}}{\text{Maximum Liability (Rs.)}} \times 100$$

Paid rate is another important ratio to assess the performance of agricultural insurance scheme. However, claim payment of the private insurance company is calculated proportionately. If the company has to pay Rs.100 as a claim 80 percent is borne by the GIC in India (Re insurance company) and the rest 20 percent is paid by the company. Thus the company faces financial instability in conducting the WII scheme. However, considering the paid rate ratio only three seasons recorded in the ratio reached 20 percent or more. The ratio reached the highest (35 percent) in 2016/17 *maha* season and nearly 27 percent in 2013/14 *maha*.

Table 4.5: Paid Rate Analysis

Season	Claim Paid (RS.)	Maximum Liability (Rs.)	Paid Rate (%)
2010/11 *maha*	1,058,706	6,723,000	16
2011 *yala*	316,425	5,286,000	6
2011/12 *maha*	231,473	10,011,000	3
2012 *yala*	690,000	8,724,000	8
2012/13 *maha*	2,376,384	11,574,000	21
2013 *yala*	657,950	21,101,000	4
2013/14 *maha*	5,330,938	20,052,000	27
2014 *yala*	444,000	18,535,000	3
2014/15 *maha*	307,435	16,397,000	2
2015 *yala*	0	14,035,275	0
2015/16 *maha*	10,796	12,400,201	0
2016 *yala*	0	20,598,000	0
2016/17 *maha*	11,347,000	32,420,000	35
2017 *yala*	N.A.	N.A.	N.A.
2017/18 *maha*	6,181,200	51,510,000	12
2018 *yala*	3,000,000	35,940,00	9

Source: Authors calculated using data from Private Insurance Company, 2018

4.2.2.3 Expenses Ratio

$$\text{Expenses Ratio} = \frac{\text{Total Expenses (Rs.)}}{\text{Premium Collected (Rs.)}}$$

Total expenses consist of operation cost and administrative expenses. It is very difficult to identify the above costs only for the WII scheme in the private insurance company as WII scheme is only insignificant role of their insurance activities. Roughly when the company earned Rs.100 premium they have to bear Rs.20 as administration cost.

4.2.2.4 Participation Ratio

Analysis of participation can be assessed in two ways.

- Participation in terms of acreage (area insured/area sown)
- Participation in terms of the number of farmers (number of insured paddy farmers/total number of paddy farmers)

$$\text{Participation Ratio} = \frac{\text{Number of Insured Farmers in WII}}{\text{Number of Paddy Farmers}} \times 100$$

Participation ratio in terms of acreage could not be identified in WII scheme as they insured paddy lands in unit basis. Participation ratio in terms of the number of farmers is calculated approximately. The number of paddy farmers in Sri Lanka by season was taken from the National Fertilizer Secretariat as they are assisted with fertilizer subsidy programmes in different seasons. According to the Table 4.6, the farmer participation in the WII is far below 0.5 percent out of the total paddy farmers in Sri Lanka. It clearly shows that though the private insurance company has a large number of farmers and farmer societies, through WII scheme they could cater only to a very small number of paddy farmers. When considering the total paddy farmers in Sri Lanka, less than 0.5 percent are benefited by the WII scheme. It concludes that WII scheme is not a popular and an advanced insurance scheme up to now.

Table 4.6: Participation Ratio

Season	Number of Insured Farmers in WII	Number of Paddy Farmers **	Participation Ratio (%)
2012 *yala*	2908	652281	0.45
2012/13 *maha*	2617	1044343	0.25
2013 *yala*	3527	658560	0.54
2013/14 *maha*	3105	941792	0.33
2014 *yala*	2810	538048	0.52
2014/15 *maha*	3435	998710	0.34
2015 *yala*	2151	705370	0.30
2015/16 *maha*	2986	910320	0.33
2016 *yala*	2448	760347	0.32
2016/17 *maha*	1621	846537	0.19
2017 *yala*	N.A.	558931	0.00
2017/18 *maha*	1717	882299	0.19

Source: Authors calculated data obtained from Private Insurance Company,2018 and
**National Fertilizer Secretariat

4.2.2.5 Differences between Traditional Insurance Scheme and WII Scheme

Index insurance and indemnity insurance have different features and does not compete each other. We believe both these insurances can implement the benefits of each type of insurance. When compared to traditional insurance scheme (Indemnity based insurance scheme) with the WII scheme in Sri Lanka, the followings differences have been identified through an institutional perspective (Table 4.7).

Table 4.7: A Comparison of Traditional Insurance Scheme and WII Scheme

Traditional Insurance Scheme	WII Scheme
Pay-out based on the losses measured in the field	Pay out based on the value of an "index"
Administration cost is high	Lower administrative costs. Index-based insurance does not require field inspections of individual farms.
Complicated process of claim handling	Simple and fast claim handling process
Covers many perils	Up to now covers drought, excess rain, flash rain and flood
Covers many crops	Up to now, covers paddy ,tea and papaw
High transaction cost	Low transaction cost
Little transparency	High transparency
Cumbersome application procedure for enrolment	Less cumbersome application procedure.
Adverse selection and moral hazard is high	Adverse selection and moral hazard is less
Claim settlement process is time consuming	Comparatively fast claim settlement process
Low Premium	High premium
Easy to bundle with the loan scheme	Difficult to bundle with the loan scheme
Low start-up cost	High start –up cost
Need a survey when there is a claim	Does not need a survey when claim occurs

Source: Authors summarized data based on insurance company sources, 2018

4.2.3 Major Drawbacks and Challenges of WII Scheme

The key informant interviews with relevant officials of the private insurance company revealed that there are major drawbacks and challenges in functioning the WII scheme.

Drawbacks

1. **Basis risk**

Differences between the loss experienced by the farmer and the pay-out triggered. It could result in farmer experiencing yield loss but not receiving a pay-out, or in a pay-out trigger without any loss. This is caused by high microclimatic variations in certain areas in Sri Lanka. In a discussion with officials in private insurance company, it was revealed that there was mismatch in the amount of rainfall reported by the weather stations and the actual rainfall experienced by the farmers in certain areas even within a radius of 15km.

2. **Limited perils**

WII scheme generally covers only one or two weather perils. SICL has covered drought and flood (Excess rain and flash rains were also considered So WII scheme cannot provide wider coverage to include agricultural risk.

3. **Lack of weather data**

WII depends on the availability and quality of weather data. For WII scheme function without a hitch weather data for 30 years, well-functioning weather station and proper mechanism to obtain current rainfall data are necessary. The lack of relevant and reliable long-term yield and weather data remains a key technical constraint in designing WII scheme. Hence, shortage of historical and current weather data is often a major hurdle to operate the WII scheme.

4. **Lack of weather stations**

WII coverage has to be limited to radius of 15km, adequate number of weather stations (WS) are not available to provide cover to all the cultivated areas.

5. **Difficult to introduce micro climatic areas**

Due to high microclimatic variations, value of rainfall declared by the weather station does not reflect rainfall experienced in certain locations. According to the officials of insurance company, sometimes field officers had to visit the paddy field to solve the problems and again a traditional (indemnity) insurance scheme is preferred.

6. **Difficult to decide the trigger levels**

Deciding trigger levels realistically is delayed due to unavailability of WS wise yield data.

7. **Delays in payment**

Delay in payment could be due to differences in the availability of weather data and infrastructure in different areas.

8. **High start-up cost**

In terms of costs, weather index insurance needs relatively high start-up costs (i.e., weather stations and actuarial cost)

9. **Lack of coordination with other institutes**

Lack of interaction with institutions such as AAIB, SICL, Department of Meteorology and National Insurance Trust Fund (NITF).

10. **Farmers' lack of ability to pay upfront premium as high cost of premium.**

Challenges

1. **Market size**

The market is still in its infancy in developing countries and has some start-up costs.

2. **Weather cycles**

Actuarial soundness of the premium could be undermined by weather cycles that change the probability of the insured events.

3. **Consumer education and awareness programmes**

Updating awareness of WII is a long term and expensive process. Society leaders and members were not convinced that weather index insurance solution could manage the major risks they face. Without proper awareness, it is very difficult to popularise WII scheme.

4. **Farmers take more time**

Farmers take time to "try out" by refraining from purchasing large quantities of an unknown product and waiting to see results of an insurance product with a trial purchase before investing.

5. **Delay in taking backup data**

There have been difficulties obtaining rainfall data (mainly in back up data) in a timely manner from the Meteorological Department. This has been a major challenge for the successful operation of weather index insurance in Sri Lanka.

6. **Very good technical capacity, precise actuarial modelling and experiences are required**

Index insurance scheme is highly technical programme. Hence, it is very important to be very good technical capacity and experience in this regard.

7. **Government policy**

New agricultural insurance scheme introduced by the government is a major threat to continue the WII scheme. Hence if the government paid compensation up to Rs. 40,000/acre when the crop damages occur no farmer likes to pay premium and joined the WII scheme in future.

4.2.4 Opportunities

Strength of the private insurance company to conduct the WII

- There were more than 8000 societies of the company scattered in the country. It means there was already a strong network of agents and distributions with personal communications to the farmers in place with good farmer societies and community based organization island wide. So it has a good market potential to develop the WII product.
- They have goodwill from inception among the Sri Lankan farmers as well as society.
- The company had good human resources with good technical knowledge. Majority of the field staff of the company were agricultural science graduates with knowledge of agricultural practices to convince clients and it helped improve communication with farmers on agricultural topics.

Future Prospects

The private insurance company is trying to expand their crop insurance towards the price index insurance in future. Also they try to expand drone system for weather index insurance with the support of the Asian Institute of Technology.

Private insurance company plans to modify the product design to reduce premium costs. Premium subsidies are also being explored as a possible means to reduce costs and expand the market.

Smallholder farmers are often confused about the differences between traditional indemnity insurance and index insurance. A strong mass media awareness campaign should be designed to increase understanding on weather index insurance.

The company also planned to expand the community based weather stations in future. The concept of community-based weather stations was tried out by the pilot-scale action research study (2015-2018) carried out by the Institute of Policy Studies of Sri Lanka (IPS) in collaboration with the Department of Meteorology and Janathakshan, aiming to bridge the climate information and communication gaps among the farming communities in Sri Lanka (Wicramasinghe, 2018). Special features of the community-based weather stations are;

- Automated system
- Facilities to upload data to online website
- High security and barriers to access in altering data
- Solar power
- Data availability such as rainfall, humidity, wind direction and speed and temperature
- Access to historical data

4.3 WII Scheme Conducted by Agricultural and Agrarian Insurance Board (AAIB)

AAIB is the government insurance institute which implemented WII scheme in Vavuniya targeting the 2017/18 *maha* cropping season as the first stage of the pilot project. As the AAIB started to implement WII scheme since 2017/18 *maha* season we could not collect the relevant data. AAIB commenced partnership with International Finance Corporation (IFC) to modernize their agriculture insurance offering. Agricultural and Agrarian Insurance Board is conducting a project on introduction of index based insurance to improve the effectiveness of the agricultural insurance schemes and thereby increase the agricultural insurance coverage in Sri Lanka. The project is being conducted with the technical assistance of the International Finance Corporation (IFC) of World Bank Group. Five districts including Anuradhapura, Kurunegala, Ampara, Vavuniya and Polonnaruwa were selected for the pilot project. Index based insurance system was implemented in Vavuniya targeting the 2017/18 *maha* cropping season as the first stage of the pilot project. Firstly, they selected Vavuniya as the majority of the farmers are rain fed farmers in the area. Though there are 11 weather stations in Vavuniya, only three weather stations function at the moment. Those belonged to the Department of Meteorology, Department of Agriculture and to an NGO respectively. From the 2017/18 *maha* season they have collected rainfall data from eight agrarian services centers by using rain gauges. There is no historical data in the Vavuniya district. Also, there is no responsible officer to check on the functioning of the rain gauge properly. AAIB takes assistance from the officers in the Department of Meteorology and they assist standardization of the rain gauges. Development Officers, Management Assistants and Agriculture Research and Production Assistants (ARPA) in eight agrarian services centers in the Vavuniya district have been trained on collecting of rainfall data by the AAIB officers with the help of officers in the Department of Meteorology. Then they have selected well-functioning four agrarian services centers and provided new instruments and those rainfall data are sent to the Metrological Department. From that four agrarian services centers daily rainfall data is sent to the AAIB via mobile phones. However, though these four centers' weather station had functioned well for a few months and failed thereafter.

According to the officials of AAIB, following problems were identified in the implementation of index based insurance project in the Vavuniya district.

1. Unavailability and deviation of data – Weather data of around 30 is needed to develop an index. AAIB bought those historical data from the Meteorological Department. Daily rainfall data is needed continuously to operate the index. So it is good to share these data with AAIB without a charge considering the importance of the project to the agricultural sector in Sri Lanka.

2. Weather station problem - There are few weather stations under the Meteorological Department and other stations which are maintained by voluntary organizations. Many gaps were identified in historical data which affects the quality of the index.

3. Trigger level was not defined properly (flood trigger level or drought trigger level)- Water requirement data of each crop type according to the district/ agro ecological zone/ soil type was needed to determine the trigger values in index. Updated data is not available on these topics. Not many research is done on these topics as well.

4. The land registry of the Sri Lanka is still maintained manually. It should be computerized to enhance the efficiency level.

5. Farmer fields are still not mapped. Hence, it is difficult to confirm the land ownership. So mapping of farmer fields with GPS coordinates is necessary to implement of index insurance.

CHAPTER FIVE

Farmers' Response Towards WII Scheme: Field Level Results from Batticaloa District

5.1 Introduction

This chapter is an analysis of socio - economic background of the sample of farmers, their perceptions, problems and suggestions regarding WII scheme in the Batticaloa district.

5.2 Socio-economic Characteristics of Sample Farmers

Of the 387 sample farmers 57 percent were male while 43 percent were females. Within the farmer organizations, female participation was high only in Katumuruvu farmer organization. In terms of age distribution of sample farmers, it was found that the highest percentage of farmers (26%) was in the age group of 41 - 50 years. Around one fourth were in the age group of 30-40 years. The mean age of farmers was 46 years and as a whole 64 percent of the farmers were in the age of 20-50 years, implying that sample farmers in the Batticaloa district were in their productive age. This finding somewhat agrees with Ibitoye (2011), who classifies productive age of farmers to be between 20 and 50 years. Many researchers are convinced that farmer education increases the probability of adopting new agricultural concepts and technologies (Feder et al., 1985). Therefore, the study sought to find out the education level of the respondent farmers in producing areas. In the Batticaloa district, it was found that 27 percent were illiterate, while 47 percent had studied up to the primary level. Around one fifth of farmers had studied up to O/L. It reveals that the majority of the sample farmers had studied up to primary level or illiterate. Education increases farmers' decision to accept agricultural innovation such as the agricultural insurance scheme (Onuche et al., 2015). This lower education is highly unfavourable for the insurance providers when conducting awareness programmes on the WII scheme. For example, results of several studies revealed that the age and education level of the farmer positively influence the demand for crop insurance (Smith and Baquet, 1996; and Mishra and Goodwin, 2006). As expected, the majority of the insured farmers (97%) are engaged in farming, as their mainstay. Only one percent is working as farm assistants and one percent is engaged in the livestock sector while one percent is working in the government sector. However, 93 farmers, representing a quarter of the total sample, were engaged in a secondary occupation. Due to their low income, they tried to engage in an additional income earning activities. According to Table 5.1, 38 percent of farmers worked in the private sector while 27 percent were engaged in self-employment activities as a secondary occupation.

Table 5.1: Socio-economic Characteristics of Sample Farmers

Characteristics		Number	Percentage (%)
Gender (N=387)	Male	221	57
	Female	166	43
Age Distribution (N=387)	20-30	55	14
	31-40	86	22
	41-50	101	26
	51-60	93	24
	>60	52	14
Level of Education (N=387) -	No schooling	104	27
	Primary education	180	47
	Up to O/L	83	21
	Up to A/L	11	3
	Passed A/L	6	2
	Graduate	3	1
Main Occupation (N=387)	Farming	374	97
	Livestock	5	1
	Farm assistance	4	1
	Government sector	4	1
Secondary Occupation (N=93)	Private sector	35	38
	Self employed	25	27
	Livestock	16	17
	Farm assistance	10	11
	Government sector	3	3
	Agri labour	2	2
	Fishery	2	2
Monthly Family Income Distribution (N=387)	0-10000	221	57
	10001-20000	128	33
	20001-30000	32	8
	30001-40000	2	1
	40001-50000	3	1
	50001-60000	1	0
Number of an Earning Members in a Family - (N=387)	One	348	90
	Two	27	7
	Three	12	3

Source: Author's Survey Data, 2018/2019

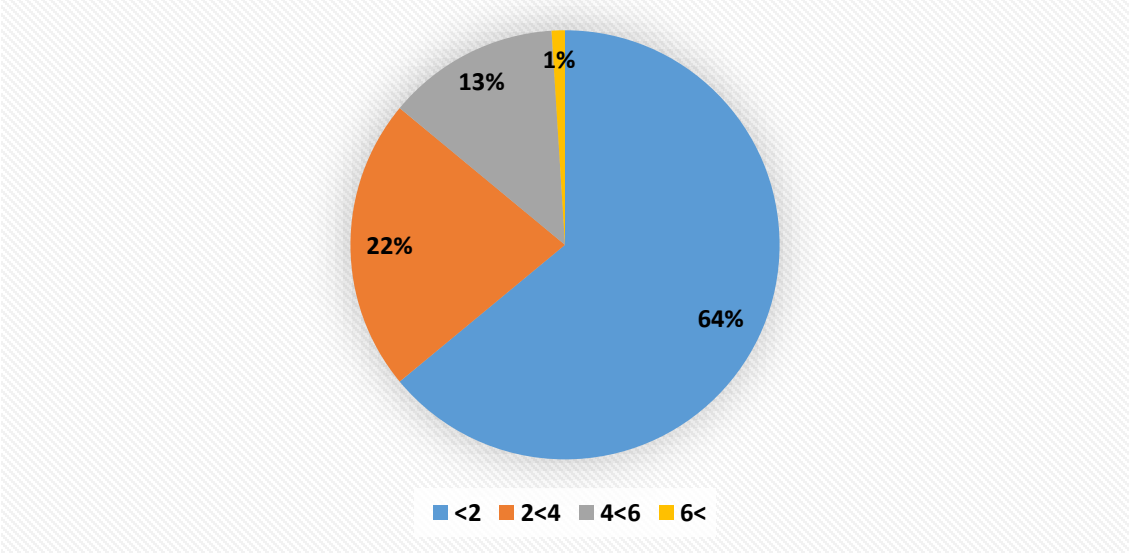
The monthly household income of majority of the farmers (57%) were below Rs. 10,000. Around 30 percent of the farmers belong to Rs.10001-20000 monthly income category. Only one percent of the sample farmers were in the monthly income range of Rs.40001-

50000. The study revealed that, majority of the sample farmers belong to lower income group. The low average income was reflective of a higher level of poverty in the study area. The study further revealed that about 90 percent of the families had single earning member and seven percent had two earning members while only three percent had three earning members in the family.

5.3 Cultivation Information

5.3.1 Extent of Landholdings

According to the statistics, the highest percentage (64%) of insured farmers in the Batticaloa district had landholdings of less than two acres while only one percent had more than six acres. About 22 percent of the sample farmers had 2-4 acres of landholdings. Following figure depicts the above situation.



Source: Author's Survey Data, 2018/2019

Figure 5.1: Extent of Landholdings of Sample Farmers

5.3.2 Type of Ownership

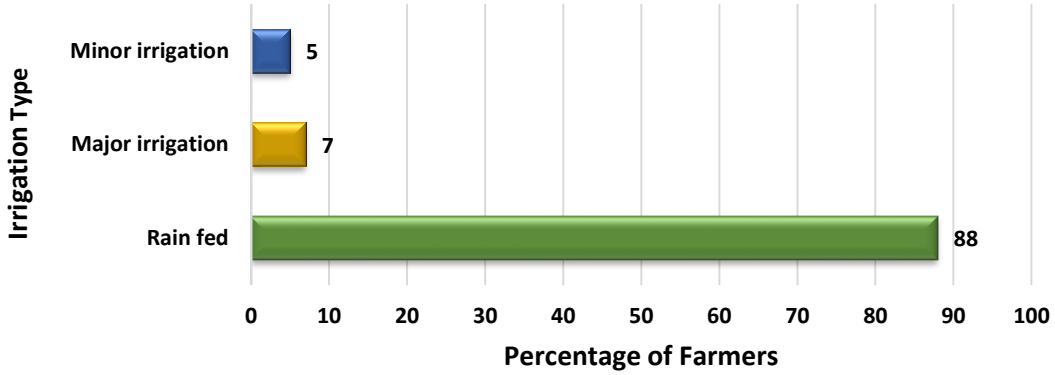
In the surveyed areas, more than 95 percent of the farmers under index insurance scheme, solely own their lands (Table 5.2).

Table 5.2: Ownership of Lands of the Sample Farmers

Land Ownership	FO1		FO2		FO3		FO4		FO5		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Single owner	112	97	23	96	113	97	74	97	53	96	375	97
Jointly owned	0	0	1	4	2	2	2	3	0	0	5	1
Leased	1	1	0	0	1	1	0	0	0	0	2	1
Share tenancy	3	2	0	0	0	0	0	0	2	4	5	1
Total	**116**	**100**	**24**	**100**	**116**	**100**	**76**	**100**	**55**	**100**	**387**	100

Source: Author's Survey Data, 2018/2019

5.3.3 Irrigation Type



Source: Author's Survey Data, 2018/2019

Figure 5.2: Irrigation Type

According to figure 5.2, majority of the sample farmers (88%) were served by rain fed irrigation while seven percent under the major irrigation and five percent under the minor irrigation. This data reveals that the area is more appropriate for the implementation of WII scheme as the pure rain-fed farmers are the most vulnerable group to the changes in the rainfall.

5.3.4 Constraints Faced by Farmers in Paddy Cultivation

Climate related disasters was the main challenge reported by the sample farmers in the district and it was stated by nearly a quarter of the farmers. Pest and disease attack affecting the paddy cultivation (13%) and lack of quality seeds (13%) were next important issues faced by the paddy farmers. The data reveals that the climate related disaster was the major problem in paddy cultivation in this area and is shown the importance of weather related risk minimizing tool such as Weather Index Insurance (WII) scheme.

Table 5.3: Major Problems Faced by Paddy Farmers

Major Problems	FO1		FO2		FO3		FO4		FO5		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Climate related damages	81	7	15	1	78	7	55	5	50	4	279	24
Pest and Disease attacks	42	4	9	1	35	3	33	3	33	3	152	13
Lack of good quality seeds	46	4	9	1	59	5	33	3	3	0	149	13
Increased cost of production	46	4	11	1	45	4	22	2	16	2	139	12
Difficulties to obtain crop loans	45	4	6	1	49	4	22	2	10	1	131	12
Heavy Debt	32	3	12	1	47	4	29	3	3	0	122	11
Labour scarcity	29	3	3	0	21	2	23	2	13	1	89	8
No reasonable market price during the harvesting period	18	2	1	0	12	1	6	1	25	2	62	5
Poor extension service	3	1	1	0	1	0	3	0	11	1	18	2

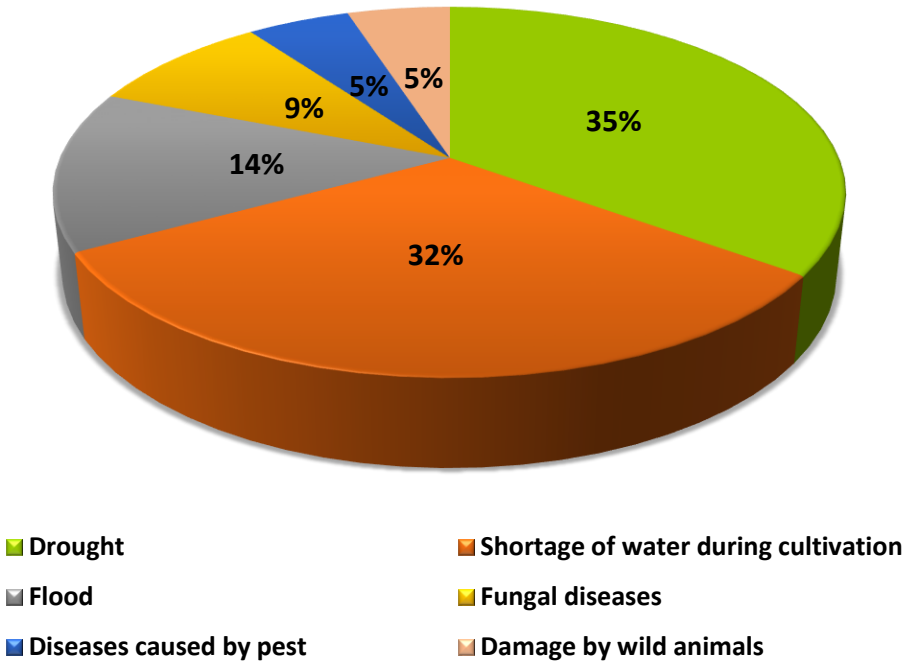
Source: Author's Survey Data, 2018/2019

*multiple responses

5.4 Causes and Consequences of Risk in Paddy Cultivation

Climate related disasters have become a common phenomenon and farmers have to face either abandoning of cultivation, shifting to alternative crops or crop losses. Significant climate related incidences were observed during, consecutively for three years from 2015 to 2018. The loss of crop yield affects the farmer and farming in a number of ways.

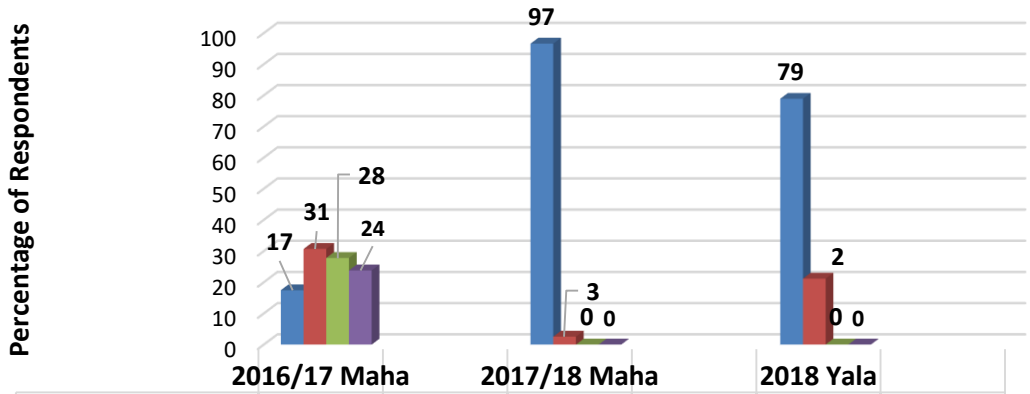
Farmers in Sri Lanka face various risk and it is directly related to the farmer yield and income. Almost all sample farmers in the district have an experienced climate related damages to their paddy cultivation during the last three years (2016, 2017 and 2018). When considering the type of crop damages, drought is the major disaster that affected the district and shortage of water during cultivation season is another important risk factor (Figure 5.3). According to the data and information, weather related natural disasters are prime reason for the risk in paddy cultivation and rainfall is the most important variability. It clearly shows the appropriateness of WII scheme for the study area.



Source: Author's Survey Data, 2018/2019

Figure 5.3: Main Reasons for Crop Damages

Crop damages can occur at various stages, from the sowing to harvesting. In 2016/17 *maha* season paddy cultivation in the study area has damaged by drought mainly at the harvesting stage while 2017/18 *maha* season and 2018 *yala* seasons paddy cultivation has damaged mainly at the flowering stage. Considering the three seasons as a whole, paddy cultivation has damaged by drought mainly at the flowering stage (30%) and harvesting stage (27%). This situation is depicted in the Figure 5.4.

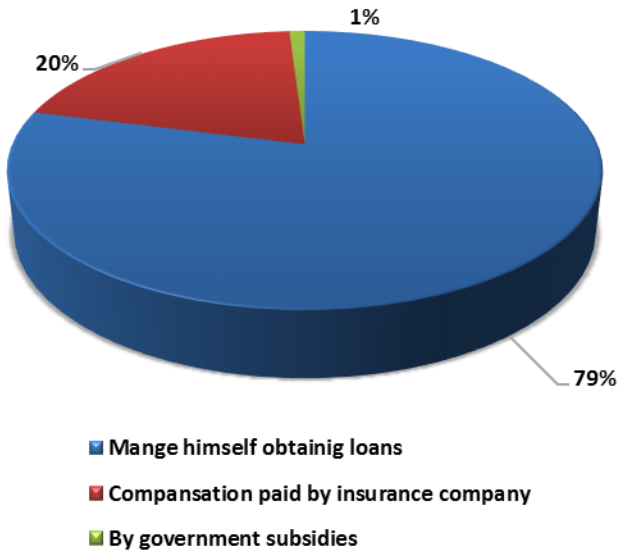


	2016/17 Maha	2017/18 Maha	2018 Yala
Flowering stage	17	97	79
Harvesting stage	31	3	21
Nursery stage	28	0	0
Vegetative state	24	0	0

Source: Author's Survey Data, 2018/2019

Figure 5.4: Occurrence of Crop Damages

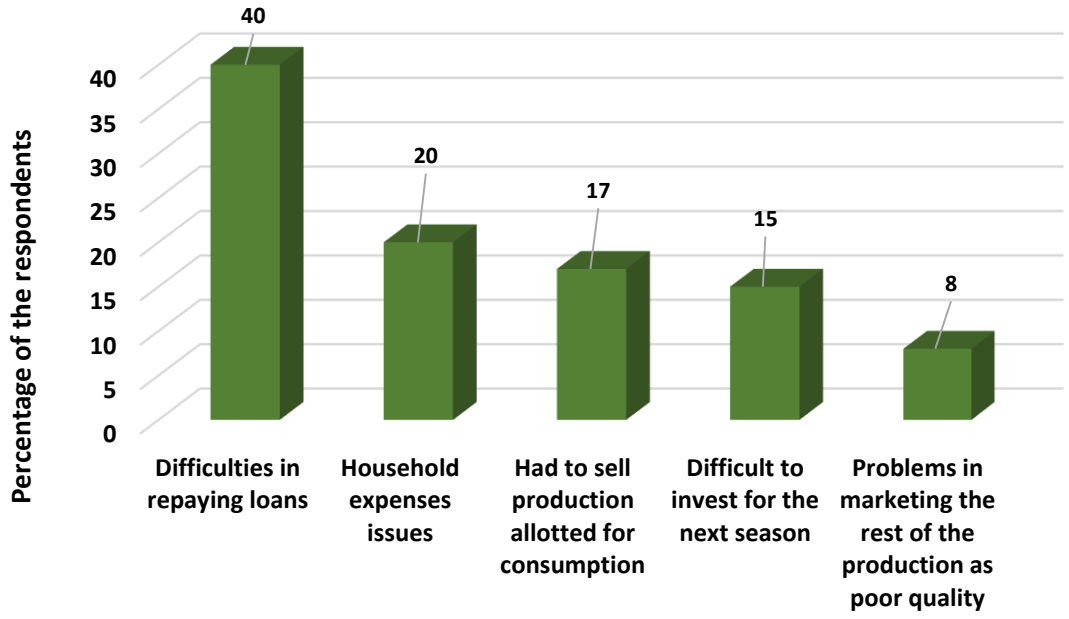
The ways of managing crop damage cost by the sample farmers are depicted in Figure 5.5. It shows that 79 percent of respondents cope with the crop damage cost by themselves by obtaining loans from formal and informal ways and 20 percent recovered their crop damage cost with insurance claims and only one percent covered it by way of government subsidies.



Source: Author's Survey Data, 2018/2019

Figure 5.5: Ways of Managing Crop Damage Cost

When the paddy farmers faced crop damages in the Batticaloa district, various impacts were linked with that. According to the survey data, around 40 percent of the respondents highlighted difficulty in repaying the loans they obtained from formal and informal sources. Household expenses was an issue for around a quarter of the sample while 17 percent reported they had to sell the production that had been allocated for their consumption. After the natural disaster it is very difficult to invest for the next season for 17 percent of the sample farmers. This is depicted Figure 5.6.



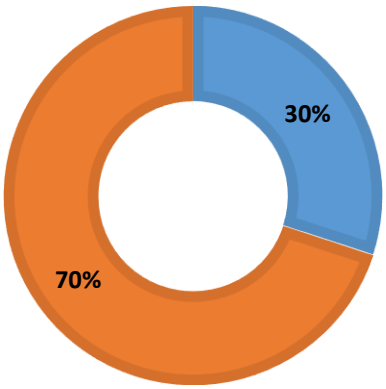
Source: Author's Survey Data, 2018/2019

Figure 5.6: Impacts Caused by Crop Damages

5.5 Participation in the Weather Index Insurance Scheme

5.5.1 Awareness about Weather Index Insurance Scheme

Awareness among the sample farmers regarding weather index insurance scheme was in a very poor level. Figure 5.7 reveals that 70 percent of the sample farmers do not have satisfactory knowledge on weather index insurance scheme.

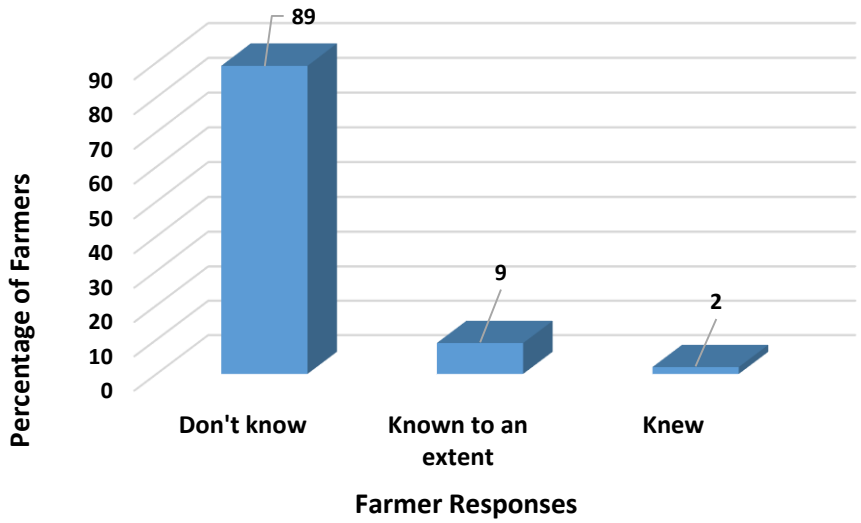


Source: Author's Survey Data, 2018/2019

Figure 5.7: Farmer Awareness on Weather Index Insurance Scheme

WII scheme bundled with the other micro insurance products offering additional covers such as PAB (Personal Accident Benefits), health, property, funeral expenses. However, 99 percent of the sample farmers were not aware of the other benefits associate with the WII scheme. As well no one reported to have received claims with regard to those benefits.

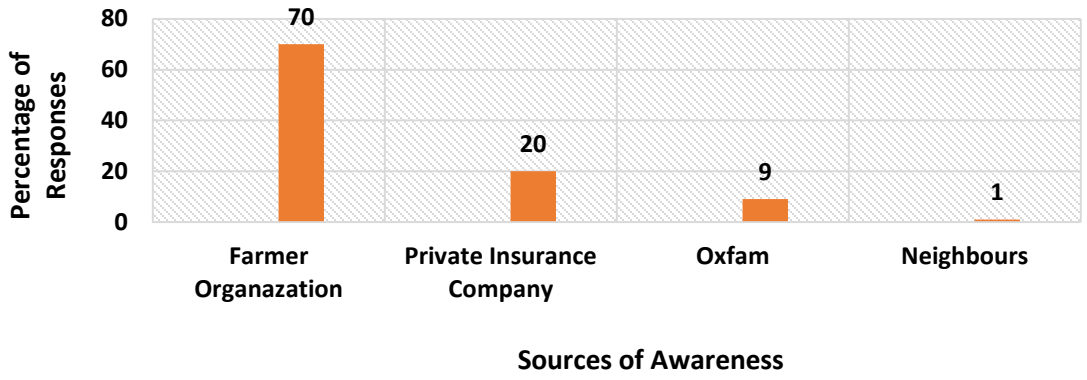
When asked about the knowledge on the differences of WII insurance scheme and Indemnity insurance scheme 89 percent of the sample farmers reported they do not know the difference between two. About nine percent of the farmers had some knowledge about it and only two percent had a slight idea about the differences of two insurance schemes (Figure 5.8).



Source: Author's Survey Data, 2018/2019

Figure 5.8: Awareness about the Differences of WII Scheme and Traditional Insurance Scheme

Among the aware farmers, 70 percent had learnt about the weather index insurance scheme from the farmer organization and 20 percent were aware of it from the private insurance company.



Source: Author's Survey Data, 2018/2019

Figure 5.9: The Ways of Awareness

Almost all the sample farmers had joined the farmer organization functioning in the relevant area and 99 percent of the farmers like to work with the farmer organizations. Farmers had good trust and confidence towards the farmer organization and the leader of the farmer organization.

Probit regression was performed to identify the factors that influenced the awareness of farmers about WII scheme implemented by private insurance company. The estimates of the Probit model have been presented in Table 5.4. The level of education of sample farmers and participation of farmer organizations were found to have significantly influenced the farmers' awareness regarding the WII scheme. Hence, encouraging education and training to farmers and farmer leaders about WII and is very important. Through this study it was identified that farmer leaders in the Batticaloa district can be instrumental in this process. Hence, educating and training farmer leaders is highly significant in popularize insurance among farmers.

Table 5.4: Probit Regression Model of Farmers' Awareness about WII Scheme

Variables	Coefficients	'P' Values
Constant	0.218	0.9197
Education	0.512	0.0003***
Farming experience	0.629	0.1499
Participation of farmer organization	0.873	0.0852**
Monthly income	0.131	0.2155
Gender	0.165	0.2221

Note: ** and *** denote significant at 10 percent and 1 percent levels respectively
Source: Author's Survey Data, 2018/2019

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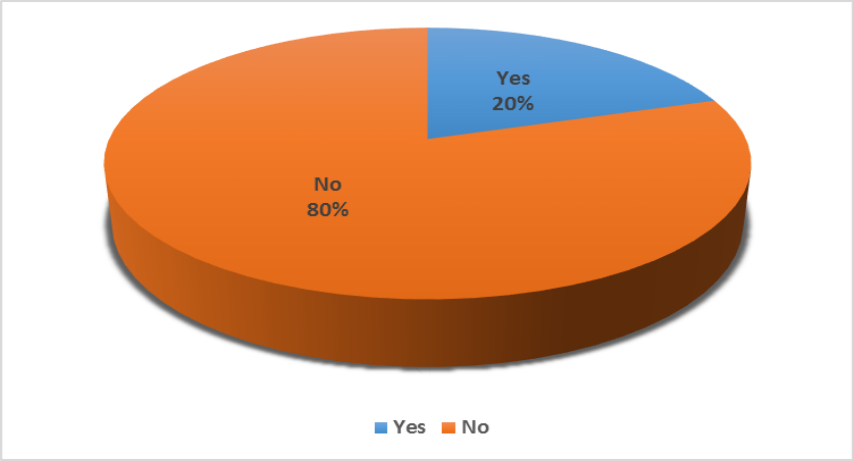
5.5.2 Farmer Participation for the Weather Index Insurance Scheme

Majority of the sample farmers (63%) have joined the scheme for the first time during the 2016/17 *maha* season. In the 2017 *yala* season the private insurance company has not provided insurance coverage due to their financial instability. However, in 2017/18 *maha* season it was decreased to 23 percent. In 2018 *yala* season 14 percent of the sample farmers joined this scheme. It reveals that new farmer participation for the weather index insurance scheme has decreased gradually (Table 5.5).

Table 5.5: The Season in which Farmers Joined the Weather Index Insurance

Season	FO1		FO2		FO3		FO4		FO5		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2016/17 *maha*	102	88	18	75	92	79	33	43	0	0	245	63
2017/18 *maha*	14	12	6	25	25	21	43	57	0	0	88	23
2018 *yala*	0	0	0	0	0	0	0	0	54	100	54	14
Total	**116**	**100**	**24**	**100**	**117**	**100**	**76**	**100**	**54**	**100**	**387**	**100**

Source: Author's Survey Data, 2018/2019



Source: Author's Survey Data, 2018/2019

Figure 5.10: Farmer Responses on the Continuous Participation

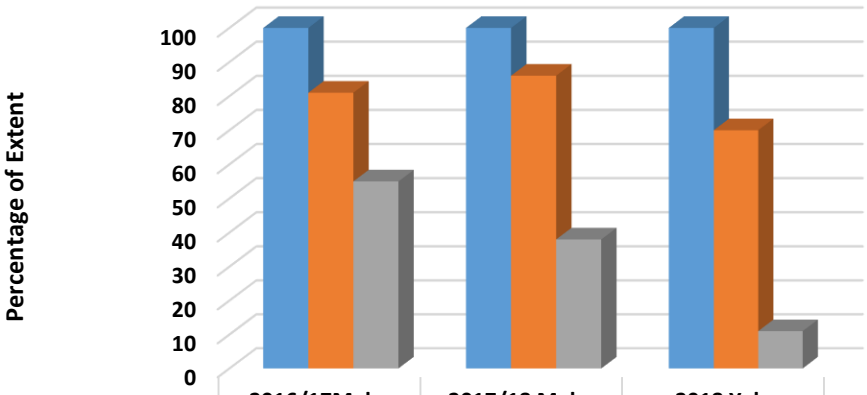
According to Figure 5.10 majority of the sample farmers (80%) did not continuously participate in the WII scheme. Among these farmers, majority cited (44%) not receiving their compensation as the main reason. About 37 percent of farmers reported financial difficulties in paying the premium. Action of the other members of the farmer organization also affects the decision of the sample farmers. It was 11 percent. It reveals that most of the farmers joined the insurance scheme without prior knowledge about the insurance scheme. Table 5.6 depicts the situation.

Table 5.6: Reasons for not Participating Continuously

Reasons	Number	%
Compensation not received	76	44
Not having the money to pay the premium	64	37
Following other farmer org's members who did not insure	19	11
The insurance coverage was not provided by the private insurance company	13	8
Total	**172**	**100**

Source: Author's Survey Data, 2018/2019

During 2016/17 *maha* season around 738 ha of paddy land has been cultivated considering the area and out of that 81 percent were damaged while only 51 percent were insured out of the total cultivated extent. In 2017/18 *maha* season 403 ha were cultivated and out of that 86 percent were damaged while only 38 percent were insured. In 2018 *yala* season, around 975 ha were cultivated and of that 70 percent damaged and only 11 percent were insured. The damaged extent was higher than the insured extent. Figure 5.11 depicts the above situation.



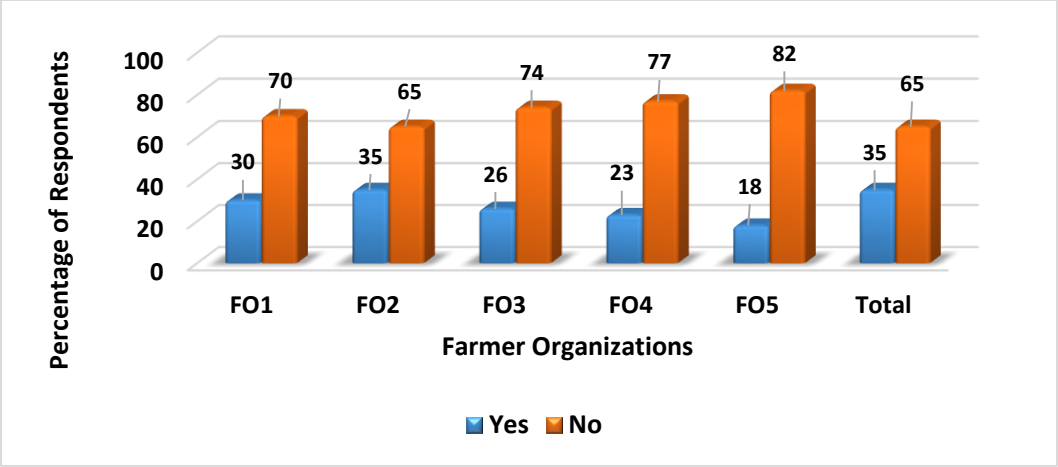
	2016/17Maha	2017/18 Maha	2018 Yala
Cultivated Extent	100	100	100
Damaged Extent	81	86	70
Insured Extent	55	38	11

Source: Author's Survey Data, 2018/2019

Figure 5.11: Cultivated Extent, Damaged Extent and Insured Extent of Paddy Lands

At that juncture premium subsidy was fully or partiality paid by the Oxfam (NGO). Generally, at the initial stage the Oxfam paid the full premium amount and in the other season they subsidized half premium for the same group of farmers in same area. From the third season farmers had to continue it by paying full premium themselves and the Oxfam had introduced premium subsidy to the other area. When the Oxfam discontinued the premium subsidy in certain areas the volunteer farmer participation in the WII scheme also decreased gradually. It reveals that without the assistance of the Oxfam the farmers do not want to be part of the weather index insurance scheme in future. It depicts the lack of knowledge of majority of the farmers on the importance of the weather index insurance scheme.

According to Figure 5.12, 65 percent of the total sample farmers were not willing to participate voluntarily as well as not willing to pay the premium. About 35 percent of the farmers were willing to engage voluntarily in future as well as they were willing to pay the premium.



Source: Author's Survey Data,2018/2019

Figure 5.12: Willingness to Pay Premium and Voluntary Participation in Future

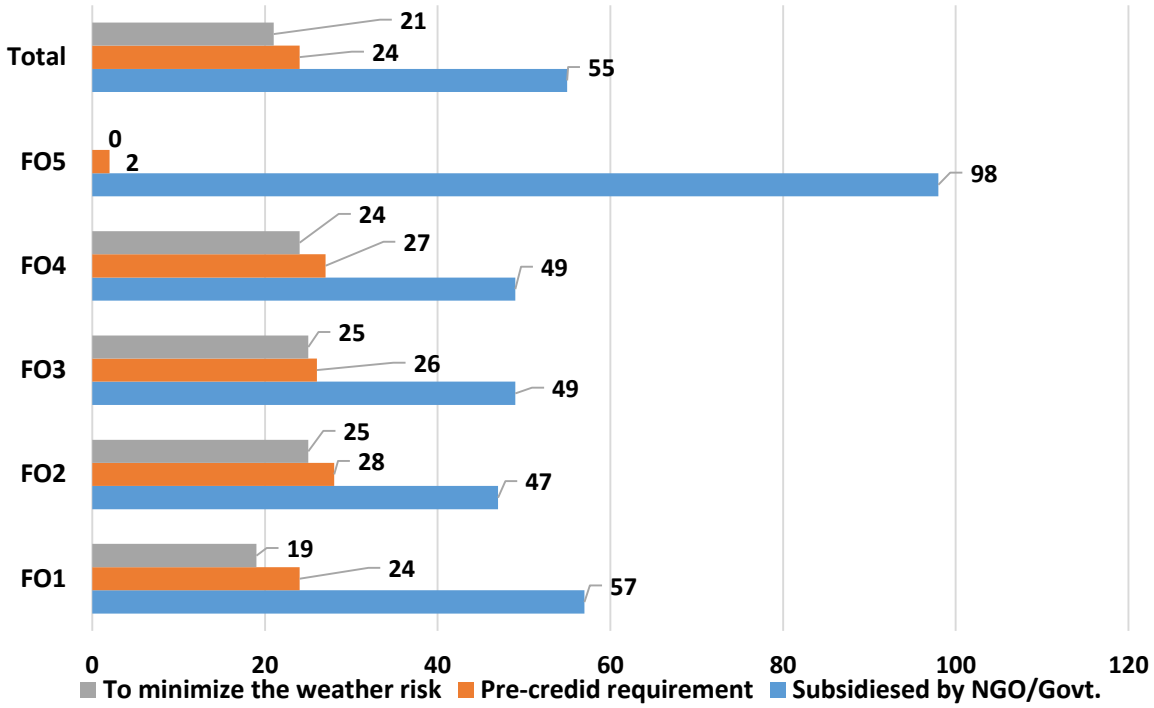
When considering the people who were not willing to pay the premium and take part voluntarily participation, 48 percent reported that they have no enough money to pay for the premium. Nearly 40 percent of the sample farmers said that they do not trust this insurance scheme as in the traditional insurance scheme and the rest of the farmers claimed to have not received compensation, hence engaging in an insurance scheme has no benefit (Table 5.7).

Table 5.7: Reasons for Reluctance to Pay Premium and Volunteer Participation

Reasons	FO1 %	FO2 %	FO3 %	FO4 %	FO5 %	Total %
No trust	47	67	71	58	0	39
Financial difficulties	31	0	25	11	100	48
Not received compensation	22	3	4	31	0	13
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: Author's Survey Data, 2018/2019

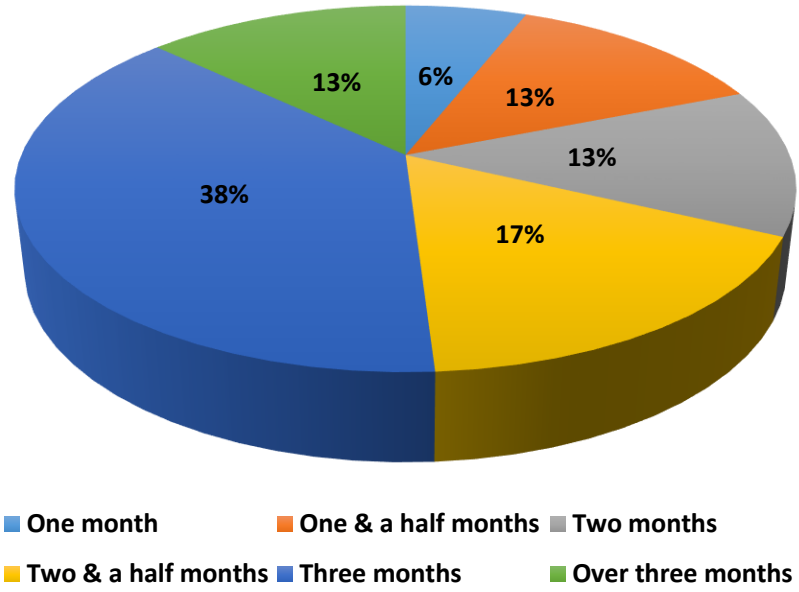
Majority of the sample farmers (55%) engaging in weather index insurance scheme reported that they joined the WII scheme as the insurance premium was fully or partially paid by the NGO (OXFAM). Around a quarter of the farmers participated in this insurance scheme as the pre credit requirement while only 21 percent considered it as a risk minimizing tool (Figure 5.13)



Source: Author's Survey Data, 2018/2019

Figure 5.13: Reasons for Joining Weather Index Insurance Scheme

When considering 2016/17 *maha*, 2017 *yala* and 2017/18 *maha* seasons as a whole, three fourth of the sample farmers received compensation from the private insurance company and only 26 percent did not receive any compensation. Prompt inspection of crop losses and payment of indemnities without delay is essential for an efficient agricultural insurance programme, particularly to build confidence among the farmers about the product. Figure 5.14 indicates the time taken to receive indemnities.



Source: Author's Survey Data, 2018/2019

Figure 5.14: Time Taken to Receive Indemnities

In terms of institutional and theory perspective, weather index insurance has a fast payment method than the indemnity based insurance scheme. However, in reality the farmers' perspectives are contrary to this. According to the survey data, majority of the famers (38%) revealed that the payment of indemnities was held up for three months and 13 percent reported that it took over three months. As a whole, 68 percent of the sample respondents revealed that the payment was held up for over two and half moths. The objective of weather index insurance scheme is to minimize the weakness of traditional insurance scheme and to ensure prompt payment of indemnities.

The responses of farmers on satisfaction with the weather index insurance scheme are presented in Table 5.8. Only 34 percent of the respondents expressed satisfaction with the scheme while 52 percent expressed dissatisfaction. The remaining 14 percent did not respond either way. Out of the dissatisfied farmers, 98 percent of the respondents expressed displeasure over the awareness and instructions provided by the private insurance company or OXFAM. About 60 percent of the farmers were not satisfied with claim procedure while nearly half were unhappy over the premium rate.

Table 5.8: Opinion of Farmers on Weather Index Insurance Scheme

Response	Number	Percentage
Satisfied	131	34
Not satisfied	203	52
**Not satisfied with*		
a) Awareness/instructions	198	98
a) Claim procedure	125	62
b) Premium rate	98	48
c) Compensation	75	37
No response	53	14
Total	**387**	**100**

*Multiple responses

Source: Author's Survey Data, 2018/2019

Farmers' attitudes towards WII scheme are presented in Table 5.9. The highest mean score (M=3.2) reported that the attitude of "no clear understanding about the insurance scheme". The respondents perceived that insurers exploited farmers with high premium (M=3.1) and it came the second highest mean score. The sample farmers also reported that insurance does not compensate farmers fairly (M=3.0). Claims are not handled at the expected time (M=2.8) and no proper information dissemination system was in place (M=2.6). The findings show that sample farmers in the Batticaloa district generally had a negative attitude towards the WII scheme.

Table 5.9: Attitudes of Sample Farmers Towards WII Scheme

Attitudes	Frequency (N=387)				Mean Score
	SA (4)	A (3)	D (2)	SD (1)	
Insurance exploit the farmers with high premium	190	95	64	38	3.1
Insurance does not compensate farmers fairly	183	71	105	28	3.0
Though there are some problems it is a good method	95	85	15	192	2.2
No clear understanding about the insurance scheme	198	101	45	43	3.2
Not satisfied with the handling of insurance services	63	109	43	172	2.2
Weather crop insurance scheme is practical and minimizes the risk	82	97	21	187	2.3
No proper information dissemination system in WII	82	167	51	87	2.6
Claims are not delivered at the expected time	97	172	68	50	2.8

Source: Author's Survey Data, 2018/2019

Problems faced by the sample respondents with regard to weather index insurance scheme can be discussed on priority basis. The farmers voiced their opinions on the following problems (Table 5.10). Majority of the farmers (41%) cited not receiving compensation as the main reason. About 20 percent of the total sample reported that they had no proper awareness programme with regard to weather index insurance scheme while one fifth of the farmers reported that the compensation payment took a long time.

Table 5.10: Problems Faced by the Respondents

Problems	**N**	**%**
Didn't receive compensation	159	41
No proper awareness programme	85	22
Insurance companies take too long to pay compensation	74	20
Insurance company did not consider the farmers difficulties	21	5
Compensation is not adequate	20	5
Representatives of insurance company don't act honestly	15	4
This system not functioning in a proper way	13	3
Total	387	100

Source: Author's Survey Data, 2018/2019

The study obtained information on various suggestions made by the farmers to solve or minimize the problems affecting the weather index insurance scheme. The farmers' suggestions were analysed on a priority basis. Around 43 percent of the farmers surveyed suggested that there is a need to introduce improved system than this insurance scheme. Importance of the proper awareness programme was suggested by a quarter of the sample farmers. Improvement of quick and easy payment of compensation was suggested by seven percent of the sample farmers while six percent of the respondents reported that amount of compensation should be increased. Around 14 percent of the farmers did not respond (Table 5.11).

Table 5.11: Farmers' Suggestions

Problems	**N**	**%**
Need to introduce an improved systems than this system	167	43
Need a proper awareness programme	96	25
Need to improve the process of paying compensation easily and fast	28	7
Need to increase the amount of compensation	25	6
Need to reduce the premium	18	5
No response	53	14
Total	**387**	**100**

Source: Author's Survey Data, 2018/2019

CHAPTER SIX

Conclusion and Recommendations

6.1 Conclusion

A private insurance company along with the financial support of GIIF, introduced Weather Index Insurance (WII) scheme for Sri Lankan paddy farmers on pilot basis in 2010. Agricultural and Agrarian Insurance Board (AAIB) with the technical assistance of the International Finance Corporation (IFC) also tried to implement index insurance system in the Vavuniya district targeting 2017/18 *maha* cropping season as the first stage of the pilot project. WII scheme is a new concept and it is introduced to overcome the existing problems in conventional indemnity based insurance schemes such as poor farmer participation, moral hazards, adverse selection, lack of trust, delay in payment claims, high administration cost and lack of awareness.

Though the WII scheme is devoid of many of the problems that plague conventional crop insurance scheme it has not, achieved the expected outcome in Sri Lanka. This survey revealed that the farmer participation ratio with regard to WII scheme is below 0.5 percent and it is shown that the WII scheme is not popular so far among the paddy farmers in Sri Lanka. The study concluded that WII scheme have few clear benefits such as being free from defects of delays, easily operated product, transparency, less moral hazards and adverse selection, less administrative costs compared to the conventional insurance scheme. Nevertheless, there are some major hurdles found out in WII in supply side perspective such as, basis risk due to micro climatic variations, huge start-up cost, low density of weather stations, limited perils, lack of quality and updated weather data, no proper institutional integrations such as AAIB, private insurance companies, Department of Meteorology and National Insurance Trust Fund(NITF). Though the WII scheme has more positive characteristics than traditional indemnity based insurance scheme it is not the only solution for all risks faced by the farmers and It cannot be operated in all areas. There have been difficulties in obtaining rainfall data in a timely manner from the Meteorological Department which has challenged the smooth operation of WII in Sri Lanka.

The study concluded that, farmer awareness and the literacy level are the key hindrances to adopt WII scheme in the study area. The analysis showed that there is a notable awareness gap with regard to operation of WII scheme among the sample farmers. Farmers were disappointed when they were not compensation by the insurance provider in absence of crop damages. Though WII scheme is bundled with the other micro insurance products offering additional covers such as PAB (Personal Accident Benefits), health, property, funeral expenses majority of the sample farmers were not aware that the other benefit included in the WII scheme. Further, no one reported to have gotten of those benefits. The study revealed that, farmer participation and satisfaction towards the

WII was in a low level as in a conventional insurance scheme. Further, the study revealed there is delay in indemnity payments as in the conventional insurance scheme. Lack of awareness, having no confidence and negative attitudes of farmers with regard to insurance schemes are the main obstacles to popularize the new WII concept.

As a whole, WII scheme has so far met limited success, as the poor density of weather stations, absence of timely rainfall information, lack of mechanism to data sharing and absence of institutional integration block its way. But it could play an important role in future with new technology. To the success and minimizing the present drawbacks of WII scheme, awareness and education programmes for farmers, implementation of community based participation mechanism, proper integration within the government and private insurance institutions, Meteorology Department, other institutes or organization which handle the weather stations and farmer organization are very important. Finally, the study concluded that, even though the WII scheme has few key challenges, it minimises weaknesses attached to the conventional insurance scheme. Hence it is very important to implement a well-designed WII scheme incooporation with the government and private sector insurance providers.

6.2 Recommendations

For minimizing the basis risks, measures should be taken to update the network of collecting rainfall data by automated equipment for receiving real-time rainfall data and product design should be improved.

For designing the proper WII scheme, participation of farmer or farmer organizations should be amalgamated in particular areas. Thus community based participation mechanism should be in place to improve the WII scheme.

It is very important to introduce a hybrid insurance scheme (Indemnity + Index) to cover the other risks. With that hybrid insurance scheme, the crop losses which are not covered by the index insurance, are covered by the indemnity insurance scheme

Any index based insurance programme requires a well-developed infrastructure and institutional network arrangements to operate an efficient and effective insurance system. Hence, government intervention in WII scheme is vital to provide infrastructure and services.

Continuous farmer awareness is the most important factor for expanding WII scheme. Hence, farmer awareness programmes and training are needed to be conducted through farmer organization. A strong awareness campaign through mass media, posters and leaflets is needed to promote WII.

It is vital to see the possibilities to use mobile phone technology. Farmer enrolments, premium collection, claim settlement, and other regular communication such as how

index performs, the progress of the index, when claims become payable can be provided on the phone. Weather information and agricultural extension services can be provided through SMS in local language and pre-recorded messages. It will help increase the trustworthiness of farmers with regard to WII scheme.

Premium subsidies should be introduced with the support of the government as a possible means to reduce the premium cost of farmers.

Improved, nationally reliable and internationally comparable agriculture and weather data, weather stations should be well managed and community based and automated weather stations should be installed.

It is very important to integrate weather information available from various sources into a national centralized data base. Different public and private sector organizations collect agricultural, meteorological, and insurance-related data, but that data and information not shared among related organizations or public domain. Hence, it is very important to standardize and develop data collection covering national, state and district level information and linking this with all government records. It will help both government and private insurers to provide better insurance schemes for farmers.

The weather station density should be increased to reduce the square kilometer radius from weather stations. It is better to reduce the radius from 15 to 5 square kilometers from the relevant weather stations. It will represent the situation accurately and it will help minimize the basis risk.

Accurate and timely weather data is the key to successful index insurance products. Possibility of using new technology innovations and other remote sensing techniques and introduced satellite imagery based data and computer models for WII should be taken into account. If possible to use satellite data, it solves the backup data problems in WII scheme and it can provide information across a larger area and on different crops, which can make scaling up possible in an efficient manner.

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