

Insurance for Rice Production in the Context of Climate Change Impact in Vietnam

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ABSTRACT

Vietnam is one of countries predicted to be among the most affected by climate change due to its geographic location, long coastlines, heavy reliance on agriculture, natural resources and forestry. Climate change has a clear impact on all sectors including economic, social and human health. Agriculture is highly sensitive to climate changes including temperature increasing, sea level rising, flooding, epidemic breakouts, the extreme climate event, especially droughts and salt water intrusion. However, agricultural insurance faces many difficulties and challenges, especially in attracting the participation of the people, the size of the household production and policy support (such as financial support and extension) has a major influence on the household making a decision for participating in, and on the willingness of paying for insurance for paddy production. Therefore, government and local government has enhanced strategies and make stabilize production by supporting policies and investing large amounts of funds in improving agricultural production. The structural solutions including dyke strengthening, irrigation system, constructing water resevoirs, etc.; the technological solutions such as adjust the growing seasons and sowing times, development of tolerant rice varieties to drought, acidity, salinity and pests, applying alternate wetting drying(AWD) for reduce water use and GHG emissions, aerobic planting, fertilizer management, pest management towards ecological safety,... as adaptative strategies to minimize the risks for Vietnam's rice production and the countries benefiting from the Mekong river.

Keywords: Climate change, Rice production, Insurance, Impact, Mekong delta, Vietnam

1. INTRODUCTION

Vietnam is among the countries that are likely to be hardest hit by the impacts of climate change (World Bank, 2010). Changes in climate can have serious implications for economic development, especially in the agricultural sector, due to its direct exposure to and dependence on weather and other natural conditions. Studies for the Southeast Asian region show that climate change could lower agricultural productivity by 15%–26%t in Thailand, 2%–15% in Vietnam, 12%–23% in the Philippines, and 6%–18% in Indonesia (Zhai and Zhuang 2009). Rice is the most important crop with 43.2 million ton of productivity and 8.1 million of milled rice for exportation a year. The Red River Delta (RRD) and Mekong River Delta (MRD) is the most important agricultural regions in Vietnam. In RRD and MRD, rice is the most important crop and accounted for 68.4% of country rice cultivated areas and 71.3% of rice quantity in comparison with national rice quantity. Hence, any change in rice production in RRD and MRD will be threatened to food security and rice exportation by Vietnam.

Beside with high pressures of population, industrialization and urbanization, climate change has brought big challenge to sustain rice quantity and production in Vietnam. The results of the climate change and sea level rise will be an important basis to guide the ministries, organizations and localities in order to assess the potential impacts of climate change, thereby helping to develop and

implement the policy, adaptive strategies and further work to minimize the risks for Vietnam's rice production. In this report, a brief review of the studies in Vietnam on the impacts of climate change on rice production and adaptive strategies.

2. CLIMATE CHANGE AND ITS IMPACT ON RICE PRODUCTION IN VIETNAM

Situated in Southeast Asia in the Indochinese Peninsula, Vietnam territory is lasting from 8°15' to 23°22' latitude and between 102°8' to 109°30' longitude (ADPC 2003). It has 329,314 sq. km of natural area, in which 7,348.5 thousand hectares (22.2 percent) is arable land. Vietnam lies in the region of tropical monsoon climate with a high temperature. The average temperature varies between 21 - 27 degree Celsius, rainfall volume of 1800-2000mm/year and is not evenly distributed among the months of the year. In Vietnam, the sea level has risen between 2.5 to 3.0 cm per decade in the last 50 years, but with regional variations. According to ADPC report, sea levels may increase by 33 cm in 2050, 45 cm in 2070, and 1 meter in 2100 (ADPC, 2003). If sea level rises 1 meter, a national potential land loss is predicted of 12% which will expose about 17.1 million people or 23.1 % of the population. The Mekong River Delta will be the most affected region with 1.77 million ha of saline land, accounting for 45 percent of the land (Chaudhry & Ruyschaert, 2007). Land loss and sea water invasion in the Mekong River Delta and parts of the Red River Delta, which are the most important agricultural areas in Vietnam, will cause serious risks to farmers as well as agricultural exports, and possibly to national food security. The major production risks affecting the rice sector include climate change events such as drought and SLR as well as the occurrence of rice pests and diseases.

The most climate change relevant studies carried out in Vietnam so far:

- 1994: A climate change scenarios report developed in Asia, a project funded by the Asian Development Bank (ADB);
- 2003: Climate change scenarios developed for GHG inventory for the purpose of Vietnam National Initial Communication to the United Nations Framework Convention on Climate Change (IMHEN, 2003)
- 2006: Climate change scenarios constructed by using the coupled method (MAGICC/SCENGEN 4.1 software) and the statistical downscaling method for Vietnam domain and other smaller regions (IMHEN, 2006);
- 2007: Climate changes scenarios developed for the draft of the Vietnam National Second Communication to the United Nations Framework Convention on Climate Change (IMHEN,2007);
- 2008: Climate change scenarios developed by using the MAGICC/SCENGEN 5.3 software and statistical downscaling method (IMHEN, 2008);
- 2008: Climate change scenarios for Vietnam domain developed by using dynamical method (IMHEN, SEA START and Hadley Centers, 2008);

The other studies include the tidal gauges data at Vietnam coastal station; Vietnam studies on sea level rise such as East Sea Tides and Water Level Rise along Vietnam Coasts; and the Assessment of sea level rise-induced damages all carried out by the Marine Center in Vietnam (General Department of Sea and Island, MONRE).

Since 2012, Vietnam began to use several models to study climate change and impacts. Intergovernmental Panel on Climate Change- IPCC will release scenarios of climate change in global and regional scope in the fifth assessment reports towards the end of 2014. World Bank assessed five countries to be the most affected by sea level rise including Egypt, Vietnam, Bangladesh, Surinam, and the Bahamas in which Vietnam is the second country in the world that will be strongly influenced by the impacts of climate change.

Changes in climate and impacts on rice yields

Vietnam released the first scenario of climate change and sea level rise (SLR) in 2009 (MONRE, 2009) and revised in the 2012 (MONRE, 2012). In the revised and updated version, scenarios of climate change and SLR are more detailed and downscaled to sub-ecological zone over country with three scenarios (low, B1; medium, B2, high, A2). Given medium scenario (B2), temperature will increase from 2.0 to 2.8 degree Celsius; rainfall will increase less than 2% in winter, and more 6% in the raining season, SLR will increase from 62cm to 82cm in 2100. Temperature, rainfall will be distributed inadequately, winter in some areas will be colder, raining season have more rainfall but dry season was less water.

Rice crop was very sensitive to any change in climate and ecological condition, hence, rice cultivation was considered as most vulnerable to climate change (Bouman, 2006; Zhang, 2008). Based on the different scenario of climate change, the trend of rice yield in business as usual (BAU) seem to reduce in period 2020-2040 and slightly increase in 2050. It can be seen that rice yield in spring season in the RRD seem to reduce to 2020, then slight increase in 2040 and continuously reduced in 2050, especially high emission scenario (A2) (Figure 1a); rice yield in wet season was forecasted slighter change in the Red River Delta Region for all emission scenario (Figure 1b).

In normal cultivated condition, rice yield in spring season will be reduced in B1, A2 and seem to slight increase in B2, especially in period 2040-2050 in MRD region (Figure 2a). In summer season, rice yield in the MRD seem to continuously reduce upto 2050 in B2 scenarios while the other scenarios, it is forecasted to reduce but less than B2 (Figure 2b). Hence, local province need to be revised and update scenarios and re-plan rice production to cope with impacts of climate change on rice production.

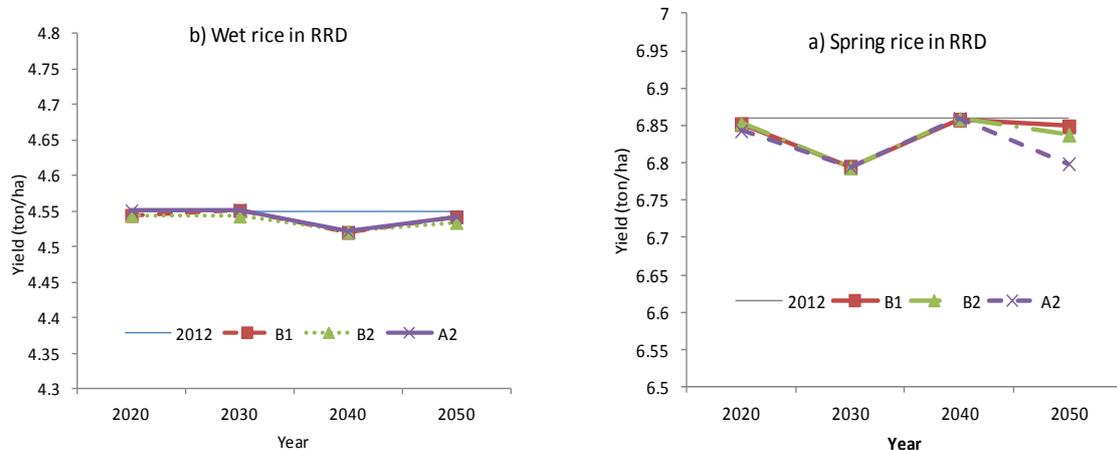


Figure 1. Trend of change in rice yield for different scenario in Red River Delta Region

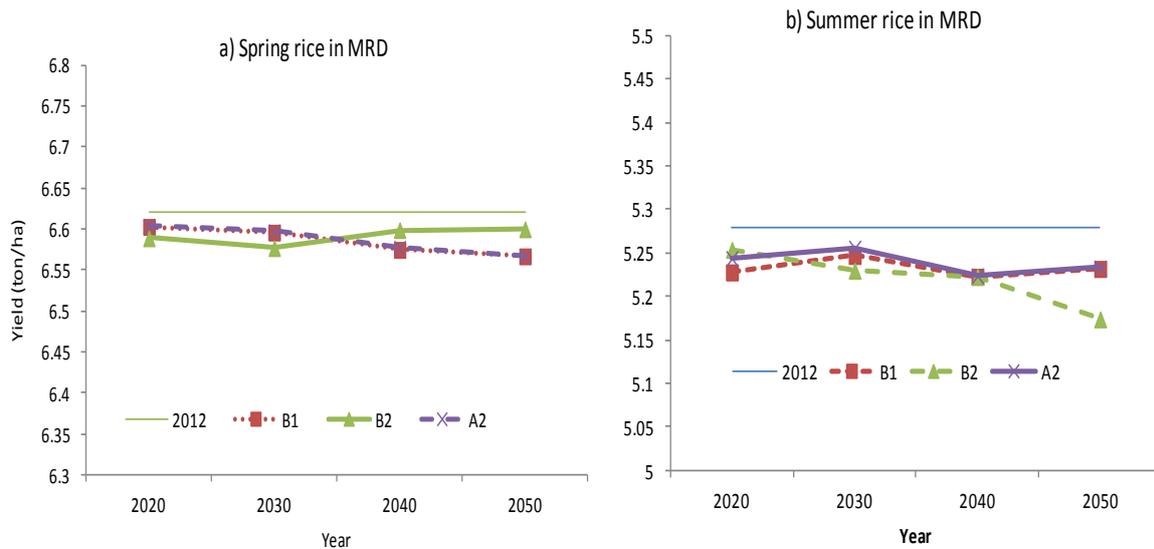


Figure 2. Trend of change in rice yield for different scenario in Mekong River Delta Region (Nguyen Hong Son, 2014)

Impact of change in rice quantity to national food security and rice exportation:

According to the medium scenario (B1), temperature will increase from 2.0 to 2.8°C; rainfall will increase less than 2% in winter, and more 6% in the raining season, SLR will increase from 62cm to 82cm in 2100. Temperature, rainfall will be distributed inadequately, winter in some areas will be colder, raining season have more rainfall but dry season was less water. Rice quantity in Vietnam will reduce by 5.62% (1.14 million ton) in 2020; 7.83% (1.59 million ton) in 2030 and 8.61% (1.75 million ton) in 2050 (Table 1). In this case, Vietnam will be no longer rice exportation and food security country if no integrated solutions are conducted to protect rice yield and adopt to climate change in RRD and MRD. Hence, Vietnam government needs to replan landuse strategies for rice and technically support farmers to protect cultivated areas and improve benefit from rice production. So climate change is a very real threat to Vietnamese socio-economical development. Higher temperatures, the rising of sea water level and extreme weather events will all have significant impacts across the nation. However, the concept of climate change and its effects are just well known by experts and management agencies. Dealing with the serious implications of climate change will be a major challenge for Vietnam in the next decades.

Table 1. Change in rice quantity in RRD and MRD up to 2050

Year	Reduced in quantity (1000 ton)			
	Spring rice	Summer rice	Wet rice	Total rice
Red River Delta Region				
2020	-39.35	-	-34.43	-73.79
2030	-371.05	-	-5.74	-376.79
2050	-123.68	-	-51.65	-175.34
Mekong River Delta Region				
2020	-489.89	-575.28	-	-1,065.17
2030	-679.53	-531.02	-	-1,210.55
2050	-331.86	-1,239.06	-	-1,570.92
Total change				
2020	-529.25	-575.28	-34.43	-1,138.96
2030	-1,050.58	-531.02	-5.74	-1,587.34
2050	-455.55	-1,239.06	-51.65	-1,746.25
% change				
2020	-2.61	-2.84	-0.17	-5.62
2030	-5.18	-2.62	-0.03	-7.83
2050	-2.25	-6.11	-0.25	-8.61

Source: Nguyen Hong Son, 2014

Most recently, drought, water shortage and saline intrusion are affecting some 2.3 million people in the South-Central, Central Highlands and Mekong Delta regions of the country. To date, 14 provinces have declared a State of Emergency (Binh Thuan, Ben Tre, Vinh Long, Soc Trang, Ca Mau, Tra Vinh, Tien Giang, Long An, Gia Lai, Kon Tum, Ninh Thuan, Kien Giang, Bac Lieu and Dak Lak) (MARD report, 30 March, 2016). Induced by the El Nino phenomenon, the drought in South Central Coast and Central Highland provinces has led to serious groundwater depletion in several water-scarce districts. The drought has effected some 70 percent of a cultivation areas in these regions, with Dak Lak, Gia Lai, Kon Tum, Ninh Thuan and Binh Thuan being a hardest hit.

The Mekong Delta provinces are facing saline water intrusion as a result of low water levels in the Mekong River. Saltwater has intruded as distant as 90km internal in a Mekong Delta, about 10-25km over than usual. Up to 11 out of a 13 cities and provinces in a delta were influenced by salinity that caused critical water shortages and shop- worn cultivation production. In the winter-spring crop 2015-2016, more than 339,200ha of rice in coastal Mekong Delta provinces is prone to saltwater intrusion and drought, accounting for 35.5 percent of those localities' rice area and 21.9 percent of the region's total rice area. Of them, 104,000ha have been severely impacted. The agriculture ministry requested the Government set aside VND10.55 trillion for drought and salinity control in the long term. The amount includes VND623 billion for cushioning impact of drought and salinity, VND215 billion for resuming production, VND650 billion for building dykes to prevent saltwater intrusion and supplying fresh water, over VND1 trillion for developing drought and saltwater control works in 2016-2020, and VND8 trillion for carrying out projects with inter-regional effect in the next five years.

Government investment in agricultural R&D and the wide adoption of high input responsive, high yield rice varieties, in order to supply farmers with more drought- and salinity-tolerant crop varieties and highly efficient production practices that are more resilient in adverse soil and weather conditions,

which are known to be the most important source of income and output growth indicated that government investment in agricultural R&D has the highest return in agricultural production and poverty reduction, far above education, road, and irrigation. The economic return is estimated to be 12.22 VND for every one VND used for agricultural R&D in Vietnam (Fan,*et al.* , 2004).

2. AGRICULTURAL INSURANCE IN VIETNAM: ADVANTAGE AND DISAVANTAGE

Agricultural insurance was introduced in Vietnam in 1982. However, the insurance has focused on ensuring social security and sustainable rural development. Vietnam used to have agricultural insurance service but in small scale and carried out typically in several places, however almost it is not successful.

- 1980: Bao Viet insurance company started service in agriculture at Vu Ban and Nam Ninh districts (Ha Nam Ninh province) then the activities extended up to 16 provinces, however it finally closed the service in 1999 due to the big loss (Mahul and Stutley, 2010);
- 1999: GRET, a non-government organization, had set up a particular insurance to assist credits program of pig feeding; however it had to be closed in 2004 due to so many reasons such as the irresponsibility of the personnel of technical support department who did not pay all attention to the job; lack of supporting from local authorities; high elasticity of demand to pig price; demand for insurance reduce when there is a fall in disease prevalence; and GRET finally had no more money and time to spend for this program (Roth and McCord, 2008);
- Recently, Bao Viet has restarted this service only in some industrial crops as rubber and livestock (cow), yet it again stops its service to livestock because of high cost and poor performance, as a result, the loss is to high (Hien Anh, 2011);
- 2001: Groupama Vietnam has started its insurance programme on livestock, crops, and aquaculture productions (most of them is shrimp growing) in Mekong Delta and Southern East provinces of Vietnam. Although being a big and experienced company in agricultural insurance in France as well as over the world, it also has not succeeded since having low rate of revenue while the indemnity to loss is really high, losing continuously is a key factor to stop its scheme on crop in 2009 and just keep the scheme for several kind of livestock as cow and pig (Hien Anh, 2011);
- Bao Minh provides climate index insurance for agricultural loans at Dong Thap, however, with a high premium (about 15% on amount of credits received), it does not get much concern from the banks.

Agricultural production in Vietnam regularly suffers the risks posed by weather and erratic climate, natural disasters unexpected occurrences. In this context, farmers often face the risk of crop failure. That is the prerequisite for the development of agricultural insurance market in Vietnam. Moreover, Vietnam can be seen as a great potential market for agricultural insurance: nearly 70% of the population lives in countryside. Agricultural production makes up 21.65% of GDP and tends to increase its proportion over the years due to great support from “Agriculture, Farmers and Rural development” policy and increasing export prices of agricultural products. Vietnam is one of the top countries which export agricultural products such as rice, coffee, pepper, rubber, seafood...which account for 23% of total exporting revenue of Vietnam; GDP per capita of Vietnam is raising to USD 1,400 and is classified as a lower middle income country; Vietnam ranks at 6th in the list of countries that have heavily incurred loss due to disaster and serious disease on crops which cause a big loss to the economy - up to 1.5% of GDP, furthermore, more than 70% of the population encounters a series of risk from changing the nature (World Bank, 2009).

However, nearly 20 years after the implementation of pilot agricultural insurance market is still being open. There are many difficulties, so many mixed opinions from all sides, but there is no effective solution to develop this potential market. Not insured, the farmers suffered in agricultural production when the risk occurs, the state budget is still required to support farmers and businesses, then missed a potential market. So agricultural insurance policy needs a long-term vision.

The traditional insurance products perform insurance for farmers based on the yield of each plot was insured. But precisely because of that calculation, leading to only those farmers most at risk any

new insured. The insurance company can not assess the impact of the disaster better producers. So the insurance provider no profit opportunities. The biggest concern of the provider of insurance services is moral hazard. When farmers have to buy insurance, could they have behaviors towards increasing the possibility of damage: reduced investment costs for production, such as fertilizer and irrigation; lax management, even including fraud. Service providers are forced to increase premiums to maintain profitability. But this reduces the ability to access the services of the farmers. Vicious circle which made the implementation of agricultural insurance becomes slow, the market shrinking

In recent years, insurance market of Vietnam in general is growing rapidly; however, revenue from agricultural insurance gets only 1.18% of total market revenue (Ministry of Finance, 2013). A content of pilot agricultural insurance program had been included in Decision 23/QD-TTg on January 06th 2010 about approving for a proposal of “developing trading in rural area period 2010-2015 and its vision to 2020”; however, Vietnam had just started to implement this insurance activities since October 01st 2011 according to decision 315/QD-TTg dated March 01st 2011.

In 2012, almost insurance companies report loss in agricultural insurance service. The value of loss was 927,700 USD (19.7 billion VND); 263,700USD (5.6 billion VND); 9,890,000USD (210 billion VND); and 14,128,000 USD (300 billion VND) for Vinare, Bao Viet, Swiss Re, and the others (Hai Linh, 2013). It is clear that, this is the poor performance to insurance companies when indemnity is much higher than revenue from premium (Table 2).

Table 2. Revenue of agricultural insurance in Vietnam 2007-2012

	2007	2008	2009	2010	2011	2012
Proportion of agricultural insurance (%)	0.01	0.02	0.01	0.05	0.08	1.18
Revenue (USD)	833,341	1,000,848	1,201,319	1,441,253	1,722,345	1,942,359
Indemnity (USD)	142,830	216,529	248,034	296,350	411,396	417,000
Retained indemnity (USD)	113,068	159,783	185,872	223,122	316,412	284,012
Indemnity rate (%)	30.71	37.60	36.12	36.04	42.26	36.09

Source: Ministry of Finance (2013)

In initial stage of development, agricultural insurance faces many difficulties and challenges, especially in attracting the participation of the people. The factors affecting the willingness of rural households to participate in and pay for agricultural insurance, based on quantitative modeling. The size of the household production and policy support (such as financial support and extension) has a major influence on the household making a decision for participating in, and on the willingness of paying for insurance for paddy production by rural households. Thus, to implement agricultural insurance extensively, it is necessary to grasp the needs of households and to implement comprehensive support policies for agricultural production.

Agricultural insurance market in Vietnam has developed slowly over a long time, with great difficulty from many sides. This shows that the strategy is to develop a system with an appropriate policy to promote the development of this potential market.

The role of Vietnam government on agricultural insurance development

The government should play a key role in monitoring and coordinating related ministries in carrying out these supporting programs. Successful stories from other countries are usually in the form of a mixed program, for example the case of Malawi in which crop insurance is often combined with a set of credit support, input supply, extension activities, and a market for production output. In the case of

livestock insurance in India and Bangladesh, it is popularly attached with preventative injection and epidemic disease controlling programs (Manhul and Stutley, 2010). When the insurance market runs effectively, it would be more useful in improving farmers' saving and credit activities (Skees and Hartell, 2006).

In Vietnam, the government though has put much effort on setting up profound regulation system for this kind of insurance as well as adjusting it continuously from 2011 up to now, the documents still exists gaps and confused things affecting on implementation process of pilot agricultural insurance program. Adjusting documents on agricultural insurance:

- Decision 315/QD-TTg dated 01/3/2011 of Prime Minister on Implementing agricultural insurance plan for period 2011-2013.
- Circular 47/2011/TT-BNNPTNT dated 29/6/2011 of Ministry of Agriculture and rural development on guiding the way how to implement agricultural insurance on cropping, livestock feeding, and aquaculture activities
- Circular 121/2011/TT-BTC dated 17/08/2011 explaining some articles in decision 315/QD-TTg and Circular 43/2012/TT-BNNPTNT dated 23/8/2012 to adjust and complement some points in Circular 47/2011/TT-BNNPTNT.
- Decision 3035/QD-BTC Dated 16/12/2011 of Finance ministry about Rules, premium fees, and indemnity rates in agricultural insurance
- Decision 2114/QD-BTC dated 24/08/2012 on adjusting and complementing some points of Decision 3035/QD-BTC Dated 16/12/2011 of Finance ministry about Rules, premium fees, and indemnity rates in agricultural insurance
- Circular 57/2013/TT-BTC dated 06/05/2013 about Adjusting and complementing the Circular 121/2011/TT-BTC
- Decision 1042/QD-BTC dated 8/5/2013 of Finance Ministry on adjusting and complementing some points of Decision 3035/QD-BTC Dated 16/12/2011 of Finance ministry about Rules, premium fees, and indemnity rates in agricultural insurance
- Circular 96/2013/TT-BTC (active on 23/07/2013) about adjusting Circular 121/2011/TT-BTC and 101/2012/TT-BTC
- Decision 358/QD-TTg dated 27/02/2013 adjusting decision 315/QD-TTg

Regarding to financing and setting up the market: the Decision 315/QD-TTg and Decision 358/QD-TTg of the government which subsidies for insurance premium totally or partially depending on the status of producer that is poor household, nearly poor household, non-poor household, or agricultural production organization, they can receive the rate up to 100%, 90%, 60%, and 20%, respectively. However, this insurance still does not attract many farmers, especially the non-poor households and organizations. The poor and nearly poor households almost produce in small scale and not stable, they participate this because of paying nothing or just small amount of money but getting full indemnity whenever there is any risk occurs. Therefore, it is necessary to get the joint of large producers, who used to be non-poor households and organizations, to develop this market.

In reality, these large producers do not want to join this market due to:

- High premium rate
- The tradition of farmer which is getting used to private and sole production process even that it is in small scale, unstable, low tech, experience bases, and spontaneous; however, catastrophe usually taken place in this area, disease on crop is widespread. Therefore the insurance companies usually not interest in this market;
- Accepting risk, which is popular attitude of farmers. As a result, farmers tend to not spend much for insurance when they do not know well about how much it could be loosed from catastrophe. Households who pay for insurance premium now are almost imitating their friends and neighbors or just because of thinking that they are sponsored for insurance fee. It is not much of people understanding that "spending for insurance premium could protect their profit from risk"
- Regulation and policy to support insurance in this field somehow still do not meet its demand.

There is always existence of dilemma situation in agricultural insurance. The farmers who face to low risk do not want to buy insurance while the insurance companies try not to involve to this market where there are too much risk. Therefore, the role of government on this field is must in the process of developing this market. Supporting policies aim to share the responsibility and risk between government, insurance companies, and the farmers, in which government should play a vital role in directing or targeting the market toward market-oriented: the government; insurance companies should be more dynamic in finding market; and the farmers should be more active in risky prevention as well as eliminating dependent behavior.

The Government should choose the best model for Vietnam: insurance companies are forced to sell agricultural insurance at a legal minimum rate of revenue and the loss of this participant is considered as the payment for social responsibility. The government can use some policy to punish companies who cannot fully conduct the community duties and give them economic priorities such as corporate tax reduction if they reach to the high proportion of agricultural insurance.

Although there should be great support of the Government, but the role of the business is very important. So, in a decree on public-private partnerships, MARD has proposed in this kind of project content agricultural insurance. Besides, there should be a strong legal framework for the implementation of agricultural insurance, because of its nature as a form of public investment; should have an independent supervisory authority (instead mobilize governments and unions such as now by this force is limited capacity).

3. CONCLUSIONS

Rice production in Vietnam faces severe challenges from climate change. There are synergies between climate change study and crop production analysis that can improve our understanding of long-term food security in Vietnam. This analysis integrates rice yield response to inputs, technical change, and policy interventions with impact assessment of climate change on agricultural and water systems. By combining both socioeconomic and environmental conditions in the analysis of rice production, this study takes a holistic approach to the issues of food security, agricultural productivity, and climate change.

There are many problems existing during the development process of the agricultural insurance in Vietnam, especially from the pilot agricultural insurance schemes. Additionally, it also mentions the vital role of the government in developing the agricultural insurance as well as some suggestions on what they could do to best assist other stakeholders in involving well into this scheme.

The research still missing the role of other stakeholders involved insurance. Further research can pay attention to demand side of the insurance market; quantitative method such as willingness to pay and other ways to create a sustainable agricultural insurance market

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