

Security Interests of Crops Against Environmental Uncertainty in Malaysia

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ABSTRACT

Environmental uncertainties are externalities part that had been measured in many economic models yet still cannot be estimated in an accurate manner. This resulted in loss of millions of dollars, and in turn affects the household income of the farmers in Malaysia. During the years between 2008 until 2012, more than US\$30 million has been rewarded to the affected farmers as compensation. Nonetheless, Malaysian government have initiated the insurance scheme that compensate the farmers that experienced the environmental uncertainty events such floods and drought accordingly. However, it is still in the stage of parliament bill and expected to be launched this year. Furthermore, the current el Niño phenomenon had affirmed the government decision in introducing the crop insurance which is implied to the rice farmers for its' initial stage. This paper focuses on discussing the impact of environmental uncertainties towards crops in Malaysia especially rice and the expected impacts of the crop insurance establishment in Malaysia.

Keywords: environmental uncertainties, crops insurance, rice security impacts, climate change

INTRODUCTION

Since before the agricultural revolution in 19th century, peasantries have been forced to make decisions under the environmental uncertainties; adopting various survival strategies for their crops and faced such huge amount of unexpected calamities such as drought, floods, pest and diseases. Security interests of crops have been the priority in order to sustain their continuity of producing the food supplies such as rice and other vital crops. The adaptation and mitigation actions in dealing with the damages caused by climatic changes and other uncertainties in production were significantly important in order to sustain agricultural productivity and attain food security in general. So far, there were so much efforts that have been done in encountering such environmental uncertainties including the development of many procedures in field that can potentially-thought overcome these problems.

Environmental uncertainties directly affect the agricultural production especially rice as well as socio-economic dimensions of farmers and economic performances of the nation. Agriculture contributes approximately 10% of Malaysia GDP, and at least one third of the country population depends on the sector for its livelihood, with almost 14% employed on farms and plantation. Changes in climatic factors, results in a year to year variability of crop production, physical damage, loss of harvest, and drop in productivity (Abdullah, Auwal, Darham, & Radam, 2014).

The great flood event in one of the state (Johore) in 2006 – 2007 has been reported to displace 110,000 people, damaging an estimated US\$ 84 million worth of infrastructure and causing US 576 million in economic losses and an estimated US\$ 20.46 million worth of agricultural produce was damaged or lost affecting about 7,000 farmers (Austin & Baharuddin, 2012). A series of major

drought and flood events have been occurred in recent and few years back as reported in nation news which affected a significant number of farmers in Malaysia can be seen in **Table 1**.

Table 1. Selected Drought and Flood Events in Malaysia

Flood & Drought Events	Year of Incident	Loss (US\$ million)
According to weather experts, the world, in 1997-1998, was the worst El Nino was recorded in the last 150 years. Even El Niño in 1998 caused losses of more than US\$ 3.6 million in Malaysia over the world with the loss of almost US\$ 0.24 billion.	1997-1998 *Geografi Alam Sekitar	3.7
Loss suffered by the agricultural sector as a result of floods that hit the country last month some US\$ 12 million. Rice commodity suffered the biggest losses of US\$ 5.4 million while other plants around US\$ 4.8 million. Livestock and fisheries, each recorded a loss of US\$ 2.1 million and US\$ 1.3 million.	2007 *Utusan Malaysia	20.9
Massive floods recently caused the agricultural sector and agro-based industry in Kelantan suffered losses reaching US\$ 25.2 million. Rice crop suffered losses of US\$ 8.4 million followed by aquaculture (US\$ 4.8 million), agro-based companies (US\$ 2.9 million), vegetables (US\$ 0.7 million), fruits (US\$ 0.5 million), livestock (US\$ 0.48 million) and fishery (US\$ 0.26 million). The total loss involving infrastructure and assets of the agencies under the ministry also estimated each hit US\$ 6.2 million and US\$ 0.6 million.	2014 *Utusan Malaysia	26.1
Agriculture and agro-based industry to reach US\$ 71.8 million losses due to floods in the country recently. US\$ 46.6 million involving damage to crops, infrastructure damage US\$ 23.9 million and US\$ 1.3 millions of asset impairment.	2014 *Sinar Harian	0.07
About 100 farmers in Beta Hilir, Kelantan here claimed to have suffered losses of about US\$ 48000 when paddy crop is damaged due to the drought that hit the country.	2014 *Utusan Malaysia	0.05
More than 3,000 farmers in the Kerian District, Perak. Losses expected to reach US\$ 13.4 million as a result of the El Nino phenomenon. This is a great loss to the country because the farmers and the rice supply in Kerian contributed to the country's rice production and domestic needs.	2016 *BERNAMA	14
A total of 159 small-scale farmers around the state of Johor affected by the El Nino phenomenon. Estimated losses suffered by the farmers involved more than US\$ 124800.	2016 *Malaysian Digest	0.12

Note: Currency conversion rate at MYR 1 equal to US\$ 0.24 and (*) referred to various reputable Malaysia's news sources

Such events were unexpected, so sudden that it is almost impossible (to the current) to manage it. In this regard, crop insurance is one of the most important instruments from a financial management perspective that can ease the rice farmer's spirit to continue producing under some sort of believe that their crops have been secured.

Rice and Climate Change

The agricultural sector, as worldwide phenomena, is exposed to a variety of risks which include climate variability, weather-related hazards of cyclone and flood, pest and diseases, commodity price fluctuation, change in consumer demand among others. The unpredictability of the output or yield from a single crop production is mandatory in such condition. Few dimensions can be controlled as the production procedures would be in farmer's territory to manage.

However, the externality of environmental uncertainties would be the major constraints in Malaysian agricultural production. The Malaysian agricultural sector in terms of production will have a socio-economic impact on the people in the sector and nation as a whole as the result of climate change phenomenon. The absence of complete information among the farmers in weather prediction, calamities or environmental unexpected events consequently affects their productivity. As the average temperature increases, the yield of rice production will gradually decrease as soon as it hit certain degree. There are needs in new resistant varieties development and other production technological advances that able to manage the extreme heat in the future as predicted.

Adapted from Ariff (2016), the average simulated rice yield for generated weather data shows a decreasing trend of rice yield for 3 selected main granaries of Malaysia in 70 years period. The simulated or generated weather data of scenario A1b, A2 and B1 was referred to IPCC Special Report: Emission Scenarios that have been published in 2000. According to **Figure 1**, the simulated rice production shows a decreasing in yield for selected granaries throughout the years until 2080.

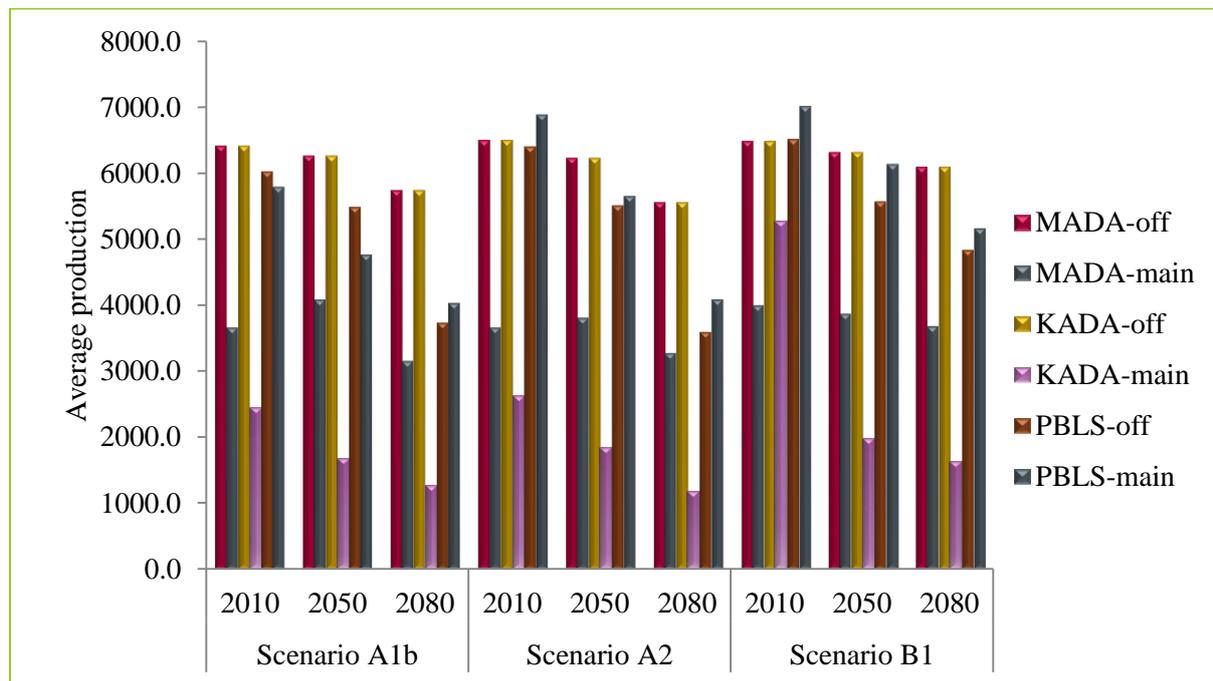


Figure 1: Average Simulated Rice Yield for Generated Weather Data
Source: (Ariff, 2016) and (Nakicenovic & Swart, 2000)

Rice production, same as other important crops in Malaysia faces similar environmental uncertainties like adverse weather conditions such as drought and floods as well as pest and disease infestations. Undeniably rice planting area was going down the slope as the farmers often experience adverse impacts of climate variation even though the Malaysian government has allocated so many

incentives and subsidies for rice producers including the fertilizers, scheduled irrigation system and output subsidies. Externality factor as mentioned could be one of the major reasons for the decreasing yield along with other factors in production.

Security Interest of Rice Farmers

Unexpected events especially related to the environmental uncertainties created an inconvenience among the rice farmers in really secured the expected yield in their rice production. Therefore, the security interest of the crops such as insurance could be a managerial decision that might change the perception and equip the entire industry of rice to be attractive especially to newcomers to venture in. Crop insurance can be seen as a contract between a farmer and an insurer, where the farmer will pay premiums with an agreement of receiving claim or indemnity in case of any failure beyond his control occurred. Common coverage level that has been offered by most insurers includes a choice of crop yield or revenue insurance product with a certain level of yield or revenue guarantee.

Apart from providing farmers with another management tool, crop insurance scheme also provides many advantages to the farmers as it will improve the farmer's availability in accessing credit from a financial institution (Pasaribu, 2010). Various reports across countries suggested a successful implementation of the crop insurance where the risk could be transferred to the agricultural insurance firms and thus increasing the confidence of farmers and facilitate their investment into agricultural production in general (Abdullah et al., 2014). The dismissal of environmental uncertainties consideration that haunts rice farmers over the years which recorded a huge amount of monetary losses could finally be solved, reverently.

The idea of having agricultural insurance for rice farmers has been debated among the Ministry of Agriculture and Agro-based Industry officials but has yet to be implemented. However, the initiative in advancing the plan of implementing the crop insurance especially in rice production this year after conducted few studies, has been taken by the government mandated to Agro Bank under the ministry's supervision. Crop insurance (rice production for the initial stage) have expected to be officially launched by the year 2016 and still waiting to be officially debated in the parliament. The government was very keen to take a good care of the rice industry as the sustainability of the rice production directly affects the food security of the nation. The Self-Sufficiency Level (SSL) of the nation has always been the main agenda in agricultural policy since the supply for domestic consumption still yet to be achieved (Figure 2).

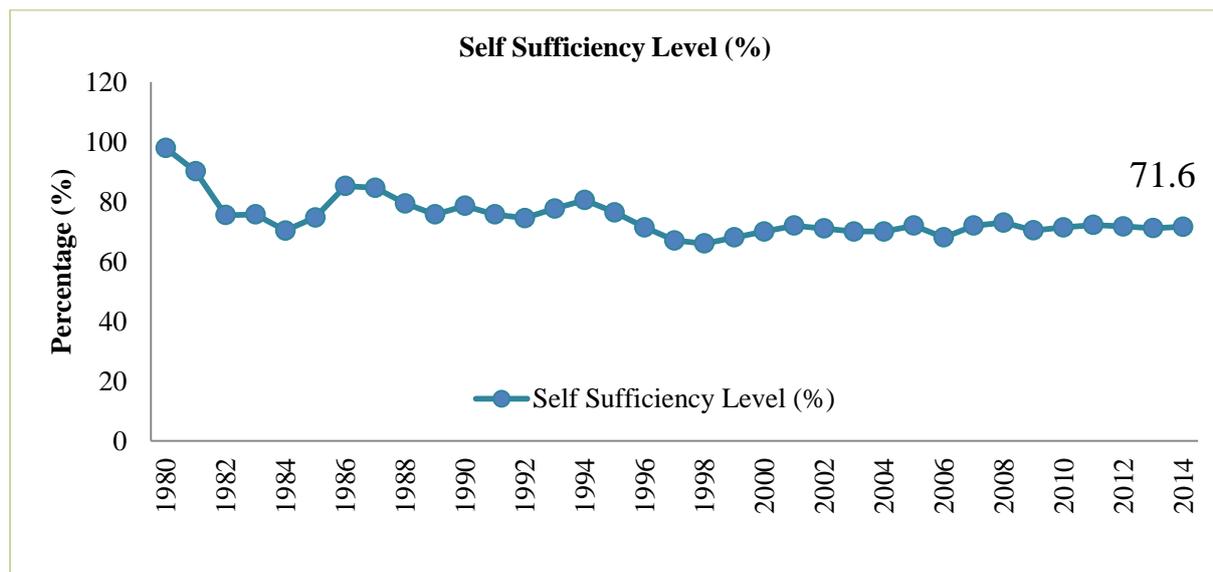


Figure 2. Self-Sufficiency Level (SSL) of Rice in Malaysia
Source: (Ariff, 2016)

The commitment in fulfilling the national food security goals has been addressed by Malaysian government even from the first National Agriculture Policy (NAP1). The policy reflects on three issues: ensure sufficient supply and affordable price for the citizens, meet the target self-sufficiency level and ensure high price to rice/paddy farmers for better income and reducing higher level of poverty in the sector.

Despite the continuous increase of government subsidy for rice farmers, the rice planting area is decreasing as the farmers often experience adverse impacts of climate variation. Until today, crop failure protection scheme against these risks still not available in Malaysia and farmers have to dig their pockets and rely on the government aids to overcome losses of the crop failure. The government has spent approximately US\$ 30 million from 2008 to 2012 to help farmers who were affected by adverse weather conditions by giving the financial aid to compensate their losses.

Rising production cost and variability of weather necessitate the use of agricultural insurance by producers, input providers and processors. The dependency of farmers solely on the yield from rice production jeopardizes their socio-economic circumstances individually and the rice production's continuity. Hence crop insurance is an important tool to alleviate the natural disaster risks; seen as a key financial instrument to stabilize farmers' income and improve their resilience to financial hardship from a poor harvest (Abdullah et al., 2014).

Different categories of crop insurance have been identified by different scholars. From the standpoint of production, there are cost, yield and revenue insurance, but yield insurance is widely used in about 40 countries. Premium paid by farmers will be included as part of the cost incurred in their rice production. There is a proposal for payment of compensation in accordance with the level of rice production but the complexity in handling the indemnity by phases of rice production at initial stage of crops insurance scheme establishment has coerced most of the firms or countries to start with much convenient product offers. As for Malaysia, the general rice production costs distribution can be seen from **Table 2**.

Table 2. Distribution Costs by Phase of Rice Production

Period	Phase	Allocated Cost (%)
Planting - Rice Stalk Formation	50 days	67.2%
Stalk formation - Flowering	35 days	27.1%
Fruiting - Harvest	30 days	5.7%

Source: (Maidin, 2014)

Nevertheless, compensation as a whole (yield insurance) was less difficult to mechanize especially for the initial stage of crop insurance implementation. Over time, the payment mechanism can be improved in order to avoid the negative impacts from the insurance scheme such as the inequities in compensation for different kind of losses among the affected farmers. Fluctuating prices of rice and few other changes could occur unexpectedly, changing the structure of original product offered; hence the modification of basic yield insurance towards an extended version might be needed as another risk emerged.

Risks in Rice Production

In the developing countries like Malaysia, risk sharing institutions are hardly available to farmers and they need alternative ways to protect themselves against risks. Most of the Malaysian rice farmers are self-insured and relying on the government's aid when the calamities happened as crop insurance is not available to the date. This may due to the covariance of risks combined with the reluctance of commercial banks to offer credit and insurance to small farmers (Zant, 2008); contributes to the failure of crop insurance establishment.

The price of the contracts is not the only factor in determining the success or failure of the insurance arrangements rather than it is perceived the quality of the contract by the farmers. Insurance companies that attempt to attract customers by offering high value may attract the most prices-sensitive and least loyal customers, possibly resulting the program or agency becoming unstable over time (Abdullah *et al.*, 2014). Rice farmers will definitely look into the best product offered considering the uncertainties which if and only they are aware and understand the risks. And,

Malaysian rice farmers are well aware of those risks and explicitly showed high consciousness of the threat from environmental uncertainties.

In order to get the wider picture of the different categories of risks associated with the rice production; the example of identification and characterization of different types of risks associated with rice production have been reported by Abdullah, Gindi, Darham, & Radam (2015) as they carried out a study in the North West Selangor Integrated Agriculture Development Area (IADA) where rice is the main crop of cultivation. The granary area is one of the important national rice production areas with a total rice planting area of 18,980 ha. There is a total of 10,300 rice farmers in the area which capable of producing approximately 5.5 tons/ ha of average yield every season.

There were significant differences between farmers' income level groups in their attitudes toward risks with respect to three categories of risks. The attitude of farmers' level income groups toward production, financial and environmental risks differs between low-income level, middle income and high-income level farmers, but there is no difference in their attitude toward social risk. However, the social risk that hard to be measured has always been forgotten may relate to the environmental risk since the negative impacts obtained from the environmental calamities could somehow affect the socio-economic condition of the farmers in an indirect manner. **Table 3** shows the risk categories considered by rice farmers in one of the main granary (IADA) in Malaysia.

Table 3. Categories of Risk Associated with Rice Production among IADA Rice Farmers

Risks Category	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.(p)
Production Risk					
Between Groups	18.842	2	9.421	21.477	0.000
Within Groups	123.706	282	0.439		
Total	142.549	284			
Financial Risk					
Between Groups	15.561	2	7.781	21.506	0.000
Within Groups	102.385	283	0.362		
Total	117.947	285			
Social Risk					
Between Groups	0.362	2	0.181	0.554	0.575
Within Groups	92.419	283	0.327		
Total	92.781	285			
Environmental Risk					
Between Groups	19.124	2	9.562	27.245	0.000
Within Groups	99.326	283	0.351		
Total	118.45	285			

Source: (Abdullah *et al.*, 2015)

Environmental risks in rice production have been widely reported by many local as well as international scholars (Abdullah *et al.*, 2014; Abdullah *et al.*, 2015; Austin & Baharuddin, 2012; Lichtenberg, 2002; Masud, Rahman, Al-Amin, Kari, & Leal Filho, 2012) in which have been being the centre of government's interest since before the millennium. The government has to bear the damages and losses due to the climatic change impacts particularly in rice production; including the socio-economic burden among the small rice farmers after calamities.

A study conducted in Malaysia have reported that rice farmers in the North West Selangor IADA were willing to pay a premium of US\$ 18.38 for every US\$ 240 protection coverage per crop season, or 7.66 % of total coverage per crop season. It shows the willingness among the rice farmers to pay the premium in order to safeguard their future business from unpredictable losses (Abdullah *et al.*,

2014). Farmers are willing to participate in crop insurance scheme at some affordable rates. It portrays the readiness of the farmers to internalize the premium as part of production cost and use the crop insurance as one their management tools.

Currently, different management strategies were adopted by both farmers and government, ranging from informal practices such as avoidance of highly risky crops and incomes diversifications to formal measures such as insurance in order to minimize or mitigate the risk factors associated with production (Abdullah et al., 2015). Less risk and more profitable crops such as oil palm have replaced so many other food crops; even rice cannot be spared. Small rice farmers spatially diversify planted crops in an effort to reduce the environmental uncertainties and weather shocks. Nevertheless, the complicated interrelation of direct impacts of environmental uncertainties on rice in financial losses per say is still not well-defined to integrate the social losses as it is an externality experienced by our rice farmers.

Externalities in Rice Production

Internalizing externalities as part of the economic measurement is vital in avoidance of the total market failure. The concept that derived from the utility function with additional cost to bear and to cover the environmental losses by any firms (in this case the rice farmers); take into account the inhibition of agricultural multi-functionality. It is because various functions derived from the environment cannot be tangibly seen since it has been categorized as non-marketed goods.

In many cases, indemnity from yield insurance has always been measured only for the purpose to compensate the financial losses to farmers without any recognition of the societal losses whereas rice production integrates much more functions that beneficial to society at large. The continuity of rice production by farmers provides a lot more resources to be consumed, not exclusively on the monetary profit from the yield revenue only. In general, few integrated functions that accumulated in rice production can be seen in **Figure 3**.

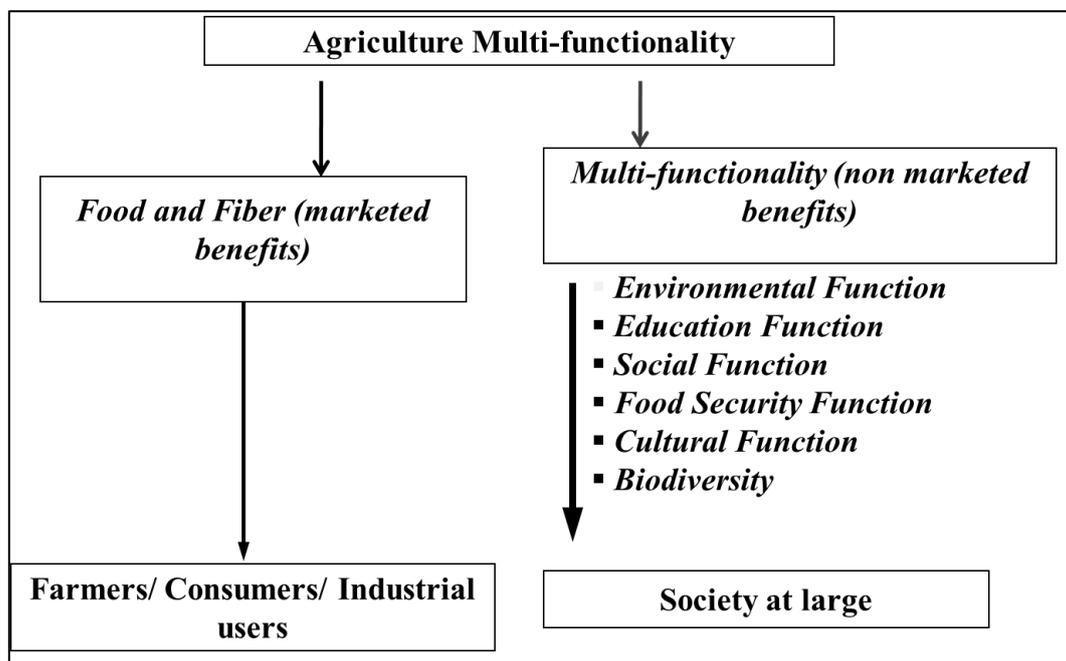


Figure 3. Rice Production Multi-functionality

Source: (Othman, Bennett, & Blamey, 2004; Rahim, Serin, & Wahab, 2013)

Undeniably, the provision of multi-functionality of rice production still not carefully measured may leave some loopholes in the establishment of crop insurance. It can be the key to sustainable agriculture and rural development without forgetting the negative externalities from rice cultivation. However, planting rice with consideration of green agriculture demands should not be underestimated

(Zakaria & Rahim, 2015) as negative externalities derived from rice production can be counter-balanced by the technological advancement. With food security as a national top priority, it cannot be helped that the continuance of rice cultivation is imperative without overlooking the enhancement in technological areas; while crop insurance is able to act as a complement in dealing with production failure cause by environmental uncertainties.

Government Role in Crop Insurance Establishment

What government have done before?

The principle of balance growth with equity was emphasises in Malaysia's economic development strategy. It recognises the growing contribution of fisheries in the achievement of national economic, nutritional and financial goals, and calls for the sustained expansion of a modern, progressive fishing industry. A number of insurance schemes for fisheries have been introduced since the mid-1980s. A fishing vessel insurance scheme in Malaysia ceased operations due to non-participation by the target group; coverage by fishing insurance in Sri Lanka is also diminishing for the same reason; profits in shrimp aquaculture insurance in Bangladesh are low; and the performance of insurance schemes in Indonesia has generally been poor.

However, only one of these schemes has been successful, a scheme involving personal accident insurance. Its success was largely due to its having been made a mandatory requirement for vessel licensing. A special scheme introduced in conjunction with a credit programme for vessel purchase/upgrading, collapsed due to poor design. Borrowers' participation was mandatory for the year of a loan, but optional for successive years. Consequently, most borrowers failed to renew coverage after the first year. A group of personal accident insurance scheme offering wide coverage at nominal premiums to members of fishermen's associations, also failed, because of its voluntary nature and of the lack of promotion by local, village-level agents. Insurance cover should be made mandatory in respect of vessels whose displacement exceeds 70 Gross Registered Tonnes (GRT).

Fishermen's associations should be compelled to provide group personal insurance cover with all credit and loans arrangements. Furthermore, fishermen need to be educated on the importance of insurance and the benefits of adequate insurance cover; local agents need to be trained and motivated with regard to insurance issues; claim procedures and settlement mechanisms need improvement; and greater co-operation between the various agencies and institutions involved is also needed.

In 2013 financial budget, the government had also proposed to introduce insurance schemes for hawkers, small business owners, farmers and fishermen, with total yearly allocation amounting to about US\$ 71.52 million. The government proposed a group insurance coverage scheme of US\$ 1200 for hawkers and small business owners registered with the Companies Commission of Malaysia. The Government will allocate US\$ 3.84 million a year under the scheme. For fishermen, our government have introduced a scheme with a US\$ 24000 maximum coverage, and an allocation of US\$ 55.2 million in 2013 as an incentive for fish landing as well as payment of living allowances for the fishermen.

Only 52,000 of the 100,000 fishermen nationwide have registered under the Malaysian Fisheries Development Authority (LKIM) which qualified them to receive various benefits under the Fishermen Insurance Scheme according to LKIM Director General in 2014. This included the scheme benefits compensation of over US\$ 240000 for the family of a fisherman who died at sea, while US\$ 12000 would be given to fishermen involved in an accident at sea which caused permanent disability. The registered fishermen is also entitled to other allowances like cost of living allowance, medical expenses due to accidents, daily hospital allowances and funeral expenses involving wife and children. Few cases involving the scheme's impact can be seen in **Table 4** below.

Table 4. Selected Few Cases under Fishermen Insurance Scheme

Insurance News	Source	Date Reported	Details
A total of 47,635 registered fishermen in all countries eligible to participate in an insurance scheme to enable them to enjoy adequate protection if an accident while at work, or to work.	*BERNAMA	22 May 2012	Maximum coverage for injury or death Conducted from May 15, 2012 Premium RM100 / year
In 2012 a total of US\$ 0.72 million was paid to the fishermen who died at sea, died on land such as fatal accidents on the road and admitted to hospital	*Sinar Online	13 April 2013	Compensation of US\$ 24000 due to death in the sea and the compensation of US\$12000 as a result of the death on the ground. Hospital wards allowance of US\$ 24 per day.
Fisheries Development Authority of Malaysia (LKIM) Terengganu denied a fisherman in Kampung Baru Kuala Abang, Dungun that he does not get appropriate attention in relation to insurance compensation since suffering a stroke last year. The reason given was because he was suffering from health problems (stroke) were not due to an accident. This issue was also considered to have been completed because the explanation was given to the family (his wife)	*Sinar Harian	8 October 2013	Compensation insurance will not be granted to fishermen who suffer critical illnesses other than accident.
The hardships life of a single mother after the death of her husband, (a fisherman) to raise her five children have been taken care of when received the payment of insurance compensation amounted US\$ 24480 today. Her husband fell on the boat while fishing in the waters near the coast of Sri Menanti in March last year in bad weather conditions and complaining of pain in the stomach before it gets worse and was rushed to the Sultanah Fatimah Specialist Hospital (HPSF).	*Utusan Malaysia	14 May 2014	Total compensation resulting from the death at sea of US\$ 24480 was given to widows of fishermen in Muar in 2014.
Four missing fishermen while fishing in the waters of Kemaman since June 21, will obtain insurance compensation Fisheries Development Authority of Malaysia (LKIM) to a maximum of US\$ 24000 if eligible.	*BERNAMA	6 July 2015	The total compensation of US\$ 96000 will be given to the families of victims who disappeared while fishing if eligible.

Note: Currency conversion rate at MYR 1 equal to US\$ 0.24 and (*) referred to various reputable Malaysia's news sources

In general, fishermen in Malaysia as well as those in other developing countries, often flirt precariously with poverty. They predominantly reside in rural areas and often have poor access to basic amenities. The 9th Malaysia Plan placed fishermen among the 70000 poor families benefiting from the Skim Pembangunan Kesejahteraan Rakyat (Citizen Peace/Harmony/ Wealth Development Scheme). The plan acknowledged that the poverty levels (in terms of income level and access to basic amenities) in the rural and agricultural areas of Malaysia, in which the majority of the fishing communities are located, are relatively high.

In an attempt to remedy this unfortunate condition, the government introduced a special programme to diversify and enhance the sources of income of these communities. For insurance, considered as cut-off as those who responded, 'No coverage of a health/life insurance', to be deprived in terms of health insurance, and others to be non-poor. However, one should note that some of the participants have alternative forms of insurance, such as boat insurance, and that such forms of insurance are not included as part of the health insurance. Fishery as part of agricultural network and placed under the same ministry with other agricultural commodities were the first that received such attention from government as the welfare of fishermen has always be the priority of Malaysian government. Further steps would be the establishment of crop insurance for rice as the first priority and then followed by other important crops as planned by our government.

Current Initiative

The initiative in developing the crops insurance still in debate as the fundamental structure need to be strong enough that allows a less difficult enhancement can be made in the future. The centre of the discussions is more likely towards the efficient payment mechanisms and the determination of appropriate monetary valuation of the indemnity itself. In addition, the geographical dimension of Malaysia that excluded from the line of environmental catastrophes circle such cyclones and other environmental calamities but until recent years triggered a significant movement from government to respond.

More important, the Malaysian government is considering a cautious approach in this particular matter so that the negative impacts (if there) will be controllable. Therefore, a fundamental structure for the decision-formulating process on crop insurance particularly for rice producers involves few vital stages and considerations.

- Demand assessment must come first in order to ensure that any initiatives are in response to real risk management needs. A detailed investigation of the incidences and experiences on decreasing rice production resulted from extreme climatic changes, and an assessment of operating costs have been done by researchers in Malaysian Agricultural Research and Development Institute (MARDI) and other academic or research institutions; put the empirical evidence to be based on. Otherwise it is impossible to give more than a vague estimate of the likely cost of the insurance. Farmers demand and government's vision need to be aligned so the insurance initiative's objectives can be met.
- The selection of the crops to be insured should be based on the national priority. Similar to most of the Asian countries which rice is the staple food for the people, Malaysia also have the more than a solid reason to consider rice as the crop that needs to be insured although the annual per capita consumption trend for rice at domestic level showed a decrease from 150 kg in 1980 to 78.6 kg in 2014. Moreover, the SSL level still not met and new challenges in facing the environmental uncertainties among the rice farmers should be an ample reason for the government to commence the initiative and implement it to the rice industry for the start.
- Big data initiative is one of most important preparation by the government in complementary of crop insurance establishment. Efficient payment mechanism highly depends on the availability of a comprehensive data provision. Preparation of big data for crops in Malaysia has been ordered by the Ministry of Agriculture and Agro-based Industry to be carried out for the development of new efficient policies by the government. MARDI is mandated to implement this initiative and are working to establish an effective unit in implementing the plan. This platform could be a big help in future to define the coverage level for crop insurance (for example) when the indemnity is

calculated as the difference between guaranteed yield (historic yield) and actual yield (example: set by remote sensing based model) times the pre-agreed price.

- The missing of the monetary value of intangible benefits from rice production should not be abandoned as the rice farms' multi-functionalities provide much more services and products to farmers and the society at large. Currently some studies have been carried out by local researchers and such studies are growing as it gets the favourable support from the government in providing funds. This kind of studies can provide some guidelines to insurance provider either it is firm or government financial institution to internalize the positive externality values derived from other functions from agricultural production especially rice.
- For now, the establishment of crop insurance for rice have been drafted and structured by Agro Bank with cooperation from all of the agricultural agencies under the Ministry of Agriculture and Agro-based Industry. As mentioned, the product is expected to be launched this year depending on the endorsement by Malaysian parliament. Further details of this crop insurance structure are not yet to be announced and considered as private and confidential matter. This proposal should be debated in detail because of the weak structure of the product allows the failure of the objectives of this initiative. Among the considerations is the indemnity payment mechanism which significantly related with losses assessment procedures. Efficient and transparent procedures are very important in the continuation of initiatives. If not, this crop insurance initiative for instance may become the new burden to the government as it fails to leverage private firms to embark on this initiative.

CONCLUSION

Rice specifically is an important commodity in ensuring stability for country's economic and social development. Increased volatility of environmental uncertainties threatens the country's rice productivity which consequently affects the socio-economic level of the rice farmers. This paper discusses the causes that led to the inhibition of the production of rice in terms of volatility impact of natural disasters in the last 30 years. Farmers certainly are in need of security on rice production activities so that it is not affected by unforeseen events that destroy their crops. The government realized that the farmers' concerns as they require a management strategy or tool in managing the things they cannot control. Therefore, various initiatives have been undertaken and planned to be implemented including the crop insurance for rice. Crop insurance establishment can be a starting point towards sustainable agriculture and rural development in Malaysia.

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