



## **Willingness to Pay for Crop Insurance to Adapt Flood Risk by Malaysian Farmers: An Empirical Investigation of Kedah**

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### **ABSTRACT**

This study examines the factors that may affect the willingness to pay (WTP) crop insurance by Malaysian rice farmers in Kedah, Malaysia, for the adaptation of flood risk. 350 farm households are selected and a structured questionnaire is used to elicit data from the respondents. The data are analyzed with descriptive statistics and logit regression model. The average WTP for monthly crop insurance premium by the respondents is MYR 48.15 for every RM 1000 coverage/ha/season. The significant variables influencing WTP crop insurance by the farmers are the age of household head, attending the training course, farm income, and experience and farm size. From the findings of this work, it is urged that to promote crop insurance in Malaysia, the government may require a strategic policy to convince the farmers of the credibility and reliability of insurance scheme by improving farmers' awareness and understanding of crop insurance through advertisement and training.

**Keywords:** Willingness to Pay, Contingent Valuation Method, Crop Insurance, Logit Model, Flood Risk

**JEL Classifications:** G22

### **1. INTRODUCTION**

Climate change exacerbates the impacts of natural hazards (Field, 2012) necessitating the reassessment and reframing of current risk reduction strategies in the agriculture sector in the Asia-Pacific area. One particular risk reduction strategy is linked up to crop insurance for the advantages it provides (Arnold, 2008). Crop insurance highlights risk mitigation compared to the current response-driven mechanisms, provides a cost-effective way of coping with the financial impacts of climate and weather-induced hazards, supports climate change adaptation by covering the residual risks not covered by other risk reduction mechanisms such as irrigation systems and best management practices, stabilises rural incomes hence reducing the adverse effects of income fluctuation and socio-economic development, provides opportunities for public-private partnerships, reduces burden on government resources for post-disaster relief and reconstruction, helps communities and individuals to quickly renew and restore the livelihood activity, and addresses a wide variety of risks emanating

from climatic and non-climatic origin, depending on the way the insurance products are designed.

Having an insurance proves to give a large heap of advantages. However, the spread of crop insurance is not so popular in the Asia-Pacific region. According to the statistics provided by Re (2010), South and East Asia rank third in non-life insurance premiums. Japan ranks the highest in non-life insurance penetration, followed by China, South Korea, Taiwan, and India respectively. Health policy in the given area is more popular, compared to non-health insurance; however, there exists a difference between developed and emerging economic systems. The most popular kind of insurance in the region is the automobile insurance and insurance for industrial and commercial institutions. In spite of the fact that the greater part of the population is involved in the agricultural sector, agriculture crop and livestock insurance are but a fraction of the total premiums. In parliamentary law to promote crop insurance, it is but right to understand the elements that contribute to its limited spread in the Asia-Pacific area. Such apprehension is the main idea of this inquiry.

Developing communities are in agreement that the having crop insurance can help lessen the effects of climatic and non-climatic disasters. Several initiatives in the Asia-Pacific region have been taken over the years to implement having crop insurance at the grassroots level with the objectives of lessening the impact of disasters to the different communities. All the same, such initiatives still did not produce the desired target of having progressive countries avail crop insurance compared to developed lands in the area. Such failure may be answered for by various barriers. Malaysia, being an economic system in the process of transition, does not provide crop insurance even for rice.

There are only 42% or 15 countries in East Asia and the Pacific that have agricultural insurance. The two low-income countries include the Democratic People's Republic of Korea and Vietnam. China, Indonesia, Mongolia, Philippines, and Thailand make up the low average income countries. Malaysia is the upper middle-income country while the seven high-income countries include Australia, French Polynesia, Guam, Hong Kong SAR (China), Japan, Republic of Korea, and New Zealand. There is a great difference among the 20 countries, territories, and areas in the Asia-Pacific region in the status of agricultural insurance market development. For example, agricultural insurance in Japan dates back to 1929. There were also about nine million crop and livestock insurance policies that were sold yearly. In 2009, the agricultural insurance premium volumes boasted of US\$1.2 billion. In contrast to Japan, Bangladesh, Indonesia, Nepal, and Malaysia either have no commercial crop insurance programs or were at the inception of such products in 2010 (Iturrioz and Arias, 2010).

There have been initiatives to implement risk prevention strategies at the grassroots level in order to reduce the impact of disasters in most developing countries of Asia and the Pacific. This strategy was successfully implemented. According to a study by the Network of Asia and the Pacific (2013), developing economies such as Malaysia, Vietnam and the Philippines are different in the levels of development of agricultural insurance programs and institutional mechanisms. The practice of insurance in the Philippines, one of the first countries to have practiced insurance system is mainly run by public insurance institutions with a strong public-private partnership. Unlike the Philippines, Vietnam has had a long history of failure in agricultural insurance, along with employment problems (Iturrioz and Arias, 2010). The main point of insurance in developing countries is increasing losses and expenses that are related to the government disaster. Malaysia has had a long experience in implementing insurance for industrial crops; however, insurance for agriculture industry is relatively new. The new crop insurance program was recently enacted by the government.

## 2. BACKGROUND OF THE STUDY

Malaysia, being an economy in transition, poses a different position in crop insurance compared to other developing countries (APAN, 2013). Malaysia has a high proportion of plantation crops in Asia. Most of the plantation crops are covered by insurance of natural hazards. This support is of private insurance companies. Due to competition among insurance companies, there is a price

advantage that plantation owners are given. Not so for agricultural insurance, including arable crops and animal husbandry. A large proportion of the land and its people are involved in agriculture, but Malaysia does not have safe access to arable crops.

Natural disasters represent farmers' imminent threats in Malaysia, therefore, we need for financial support especially for food and cash crops. Today is only the private sector providing insurance plantation crop insurance. However, planting crops insurance policy in Malaysia more commonly is known as insurance for growing trees such as rubber and palm oil. As such, under this scheme, only large-scale plantations are insured. Lonpac Insurance Berhad and Syarikat Takaful Malaysia are two insurance companies that offer insurance plantation crops. Unfortunately, the coverage given by the sector of private insurance is not enough. Hence, Malaysian farmers are exposed and vulnerable to natural phenomena such as drought, crop diseases, floods, hail, change the climate, pest outbreaks, and windstorms (Zuriah and Heizal, 2002).

The International Strategy for Disaster Reduction (ISDR) also states that Malaysia is vulnerable to natural disasters such as storms, landslides, tsunamis and floods (UNISDR, 2011). In the last 30 years, Malaysia has become a victim of the floods that have caused havoc even the Malaysian economy. In December 2006, the agricultural sector in Malaysia has reported an estimated wealth of \$18.8 million losses due to flooding. The damage also includes 6797 farmers and 8322 ha of arable land. These losses cost the government 2.6 million dollars which have been given as financial aid to the farmer. Last 2007, floods in Malaysia caused economic damage of 0.1% in gross domestic product. Floods in 2007 caused an estimated \$18.5 million losses. As such, the money that the Government of Malaysia has to spent to recover the damage caused by floods has become a burden.

Muda Agricultural Development Authority (MADA), is the largest rice producer which is located in Kedah in northern peninsular Malaysia. MADA produces 40% of the total rice production in Malaysia (MADA, 2009). MADA (2009) reported that since 1998, MADA areas have experienced six major flooding. The floods that occurred in particular between 2003 and 2008 have shown a tendency to increased flooding in recent years. This damage has been experienced by farmers producing rice on the MADA area. Currently, Agro banks are offering loan to the farmers in Malaysia (APAN, 2013). Their objective to provide the loan to the farmers is to finance the agricultural sector (APAN, 2013). "Rice Scheme," a product of Agro Bank, gives farmers the opportunity to borrow at a low-interest rate. The loan amount depends on the size of the land and location. Farmers can loan maximum up to MYR 2768 (USD 692) per hectare, and the repayment period is within a season.

Payment can be made through the deduction of a grant or a direct cash payment to the bank. However, if a farmer has incurred losses, which will be expanded in payment. Such "Rice Scheme" has provided minimal support for rice farmers because farmers are forced to repay the loan. Farmers may face serious debt if consecutive loss incidents occur. Given this scenario, crop insurance can provide a better alternative funding mechanism for rice farmers produce (APAN, 2013). Crop insurance is considered

as one of the most useful tools for risk management of natural disasters (Botzen et al., 2010; Filippini et al., 2009) and can adapt to climate change (Falco et al., 2014). Hertel and Lobell (2014) indicated that crop insurance is most effective the management tools for farmers that can be used in the agriculture industry today, where the degree of doubt is very linked to high marginalization. Patt et al. (2010) showed that crop insurance can function as an important official document for managing alternative risk for rural farmers of economic systems in development to make against the dangers of production as a result of changes in climate weather. Generally, there are many socioeconomic factors (such as income, education, farm size, etc.) and natural occurrence factor (drought, bushfire, and flood) that could influence a farmer to ensure his or her farm. Sarris (2002) suggested that the farm-specific variables such as the size of the cultivated area and socioeconomic variables such as age and household size have a significant positive influence on the demand for crop insurance. Kouame and Komenan (2012) applies the Heckman model to key out the elements that can impress the demand of the farmers for crop insurance in Ivory Coast. Their study revealed that variables such as the age of the farmers, farming experience, farm size, household size and the ratio of the plant to the total income of farmers exert significant effects on the demand of farmers for crop insurance. Similarly, Danso-Abbeam et al. (2014) in the evaluation of available farmers to pay insurance showed that age of head of household, the level of training and access to extension services can affect the farm income available to farmers to compensate for agricultural insurance. Thus, farmers can be promoted or discouraged by these factors, as well as insurance policies in force.

According to Kwadzo et al. (2013) crop insurance is not widely used in developing continent. In Malaysia, under the policy of the Third National Agriculture, the Ministry of Agriculture has gone hand-in-hand with the Central Bank of Malaysia on the proposition of creating a national system of crop insurance for the farmers (Ministry of Agriculture, 2010). Such proposal has the aim of protecting farmers from losses due to overflows. The crop insurance policy offers an increase in raising capital for financial establishments and be more confident in interacting with insured farmers. The rice crop proposal is deemed as the focal point for the inclusion of insurance in the agricultural farming community. The following points were considered in identifying rice as the entry point:

- a. Rice is considered as a staple food with the biggest share in arable cropping in Malaysia
- b. The areas in which rice is grown are prone to floods
- c. Rice is vulnerable to other forms of disaster in which the hydrometeorological tools could not give accurate statistical data about the gravity of effects of natural hazards and its relevance to losses in crops (APAN, 2013).

Recently, the plantation crop insurance was offered by a private insurance sector. APAN (2013) reports one of the main reasons of the government for the delay of introducing crop insurance to Malaysian farmers is the expensive cost of the implementation of crop insurance. In order to identify the safe handling of crops and prevent natural disasters from happening, it is important to know the basic knowledge related to crop insurance, identify the

factors that affect farmers in their decision to participate in crop insurance, and assess the willingness to pay (WTP) of the farmers for crop insurance. The actual reasons for the demand of crop insurance have not been totally looked into despite the accessibility of literature which measures the demand for crop insurance to avoid the natural disasters in developing countries (Akter et al., 2009; Botzen et al., 2010; McCarthy, 2003; Kwadzo et al., 2013). In the case of Malaysia, only one study was done in Integrated Agricultural Development Area in Selangor, Malaysia. The study shows that farmers are willing to pay for crop insurance (Guo, 2016). The study reveals the mean of WTP value of RM 76.57 per RM 1000 coverage protection of crop for every season. It is equivalent to 7.6% of the total protection coverage. However, the study does not include the awareness and attitude of the farmers, which in turn, has an effect on the willingness of the farmers to avail of crop insurance. Given the background mentioned, this present study aims to understand the factors that limit the spread of crop insurance in the agricultural sector. The study is limited to Kedah, Malaysia. With this given context, the objective of the study is to look into the awareness of the farmers about crop insurance in Malaysia and their perceptions about it. The specific objectives of the study are as follows:

1. To estimate the WTP of the farmers to have a crop insurance scheme
2. To identify the factors that influence their WTP.

To look into the WTP of farmers in order to have crop insurance is deemed relevant because no study has been done yet in Malaysia. Hence, looking into the awareness and perception of farmers and the factors that affect the WTP for crop insurance is important in order to consequently avoid the risk of flooding in Malaysia. This study aims to design a suitable alternative framework in order to prepare for the disastrous effect of changes in the environment as well as a means of articulating policies for adaptation. In order to have a common ground for understanding the WTP for crop insurance scheme and factors that affect the WTP of the farmers, the following hypotheses were tested:

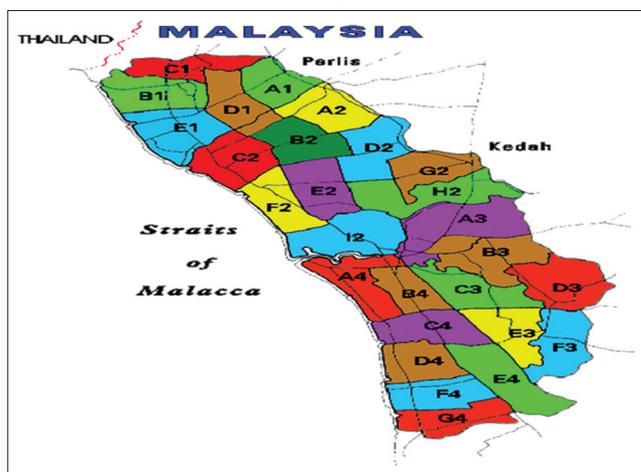
- $H_1$ : There exists a direct relationship between the socioeconomic factors of farmers to their WTP for crop insurance.
- $H_2$ : There exists a positive and significant relationship between the awareness and perception of farmers towards crop insurance and WTP of the farmers for crop insurance scheme.

## 2.1. Study Area

This study was conducted in the MADA region in Kedah, Malaysia (Figure 1). The location of MADA is under the Muda Irrigation Scheme. Muda irrigation scheme is approximately 125,155 ha big. In this area, approximately 76% of the land is used for rice cultivation which is 96,558 ha. It is estimated that 48,500 families live in this area. This area produces 40% of the total production of rice in Malaysia (MADA, 2009).

## 2.2. Design of the Study and Sample Methods

MADA includes 27 farmer organizations (PPK) which include 55,000 farmers. From the 27 PPKs, 7 PPKs have been selected in this study. The 7 PPKs are Arau, Kangar, Tunjang, Jitra, Aloer Senibong, Bukit Besar and Hutan Kampong. From each of the 7 PPK, 50 farmers were selected which constitutes a sample

**Figure 1:** Map of Kedah

Source: [www.mada.gov.my](http://www.mada.gov.my)

size of 350 farmers ( $50 \times 7$ ). We used interview method to collect the data. The interview was conducted with the heads of the households who were working as rice farmers in the village. The questionnaire consisted of sections A, B, and C. Section A includes the questions related to the households' socio-economic characteristics such as gender, age, household size, education, and income. Section B includes the questions related to the awareness and perception of the farmers towards crop insurance. Section C asked the farmers about their WTP for crop insurance. In this study, contingent valuation method (CVM) was used. CVM was employed by many studies to determine the benefits of environmental goods and services. In this method, the researcher can directly ask the respondents about their WTP to improve the environmental quality (Carson et al., 1998). The CVM methodology focuses different issues such as improvements in water quality and sanitation (Lindhjem and Navrud, 2011; Vörösmarty et al., 2010; Orgill et al., 2013), valuing forestry (Canadell and Raupach, 2008; Gelo and Koch, 2012; Mason et al., 2013), exposure to flood risk (Kellens et al., 2013), wetland conservation (Kaffashi et al., 2013; Turner, 2013), offsetting carbon emissions, groundwater contamination, and health economics (Georgiou and Turner, 2012; Del Borghi et al., 2013; Everard et al., 2013), cultural economics (Carvalho et al., 2010; Wicker et al., 2012), transportation safety and economics (Daly et al., 2012; Kristiansen, 2013), and a wide range of environmental services (Ojeda et al., 2008; Loiseau et al., 2012). Regardless of the diversity of study purposes, all universally stated that consumers usually have a positive attitude about WTP.

This paper attempts to get what farmers in Kedah are WTP for crop insurance program. In the questionnaire of the CVM, a complete understanding of the proposed hypothetical project, all necessary facts about the features of the suggested project must be presented to farmers to give them a clear picture of the proposed project (Lee and Han, 2002). Thus, the researcher can help the farmers to reveal their WTP. That is why section C includes an explanation of the recent condition with respect to financial assistance allocated by the government, the existing problems and the risks from the current system of flood management, and the method of payment. The insurance premium for every crop

protection coverage of RM1000 per crop cycle was proposed as a payment method for the adaptation of flood in MADA. The households were informed that if they vote for the suggested scheme, they would have to pay crop insurance premium to adapt the flood risks. They were also informed that if they accepted to pay the additional cost, their disposable income will be decreased because of the payment. If households decided not to vote for the scheme, it would be anticipated that they were satisfied with the recent system of financial support and were eager to endure with the recent financial help.

If the households agreed to select the proposed crop insurance, they were asked the following valuation question:

Given the income and expenses of your home, would you be willing to pay this additional price in terms of insurance premium per month per RM 1000 coverage for every growing season, so the government can accomplish this program? But bear in mind that this will leave less money to you for other expenditures, for example, food, clothing, shoes, automobile use, travel, and savings.

Different procedures of questionnaire format have been employed in CVM such as open-ended questions (Bateman et al., 1995; Beltrán and Rojas, 1996), a payments card (Kim et al., 2010; Peters and Hawkins, 2009), dichotomous choice (Lockwood, 1996; Pollicino and Maddison, 2001; Afroz and Masud, 2011), and iterative bidding games and referendums. In this study, we used a payment card with 10 altered premium prices on the basis of the pre-test (RM 25, 35, 50, 100, 150, and 250 (USD1 = RM 4.02)). The farmers were requested to select one value which might present their WTP. The values on the payment card indicated the crop insurance premium per RM 1000 protection coverage per crop season to adapt the flood risk in MADA.

### 3. RESULTS AND DISCUSSION

#### 3.1. Socio-economic Characteristics of the Respondents

Socioeconomic characteristics of the farmers help to improve their public presentation to adopt practices in making out the hazard. They help increase the entrepreneurial abilities of farmers in their decision process for managing risk, especially those relating to agricultural enterprise system (Sani and Haruna, 2010; Falola et al., 2013). Based on this rationale, the relevant socio-economic characteristics of the respondents were investigated to determine how they affect the willingness of the farmers to participate in crop insurance program to adapt the flood. Table 1 shows the socioeconomic characteristics of the respondents. It is reported in Table 1 that 87.2% of the respondents were male while 12.8% were female. It is expected that male will be more than female because rice production is energy consuming and men are more capable of doing vigorous activities than women. The age of farmers is found between 25 and over 75 years. The majority of the farmers which is 62% are from the age group between 25 and 50 years. Thus, it can be concluded that middle-aged farmers are mostly in our sample. The second biggest group of farmers (22%) was between 51 and 75 years. The decision of the farmer to adopt a new policy can be affected by this age

distribution. Traditionally, in the case of agricultural production, family labor plays a substantial part in farm labor supply. The average household size of the respondents is approximately 8 persons. It reveals that the rice farmers have available family members for rice production activities. The farming experience of the farmers' reveals that they have been in rice production for at least 8 years, with the majority having farming experience of 20-29 years. Furthermore, the mean farming experience of the farmers is 22.56 years.

**Table 1: Socio-economic characteristics of the respondents**

| Variables                                 | Frequency (%) |
|---|---------------|
| Gender                                    |               |
| Male                                      | 305 (87.2)    |
| Female                                    | 45 (12.8)     |
| Age (years)                               |               |
| Below 25                                  | 25 (7)        |
| 25-50                                     | 217 (62)      |
| 50-75                                     | 77 (22)       |
| Over 75                                   | 32 (9)        |
| Household size                            |               |
| 1-5                                       | 74 (21)       |
| 5-10                                      | 256 (73)      |
| >10                                       | 21 (6)        |
| Level of education                        |               |
| No formal education                       | 35 (10)       |
| Primary                                   | 63 (18)       |
| Secondary                                 | 163 (47)      |
| Tertiary                                  | 79 (22)       |
| Income (MYR)                              |               |
| <2000                                     | 46 (13)       |
| 2000-4000                                 | 161 (46)      |
| 4000-6000                                 | 95 (27)       |
| >6000                                     | 49 (14)       |
| Farming experience in year                |               |
| 10-20                                     | 116 (33)      |
| 20-30                                     | 147 (42)      |
| 30-40                                     | 60 (17)       |
| >40                                       | 28 (8)        |
| Farm size (ha)                            |               |
| <1  | 119 (34.1)    |
| 1-3                                       | 123 (35)      |
| 3-4                                       | 71 (20.4)     |
| 4-5                                       | 18 (5.2)      |
| 5-6                                       | 11 (3.2)      |
| >6  | 8 (2.1)       |
| Access to extension agricultural services |               |
| Yes                                       | 292 (83.4)    |
| No  | 58 (16.6)     |

**Table 2: Awareness level of the respondents**

| Items     | Number of respondents (%) |
|-----------|---------------------------|
| Aware     | 154 (44)                  |
| Not aware | 196 (56)                  |

**Table 3: Perception about importance of various sources of awareness**

| Items              | Banks | TV   | Family members | Workmate | Newspaper |
|--------------------|-------|------|----------------|----------|-----------|
| Mean               | 3.8   | 2.9  | 2.5            | 2.3      | 1.9       |
| Standard deviation | 0.45  | 0.34 | 1.03           | 0.23     | 0.45      |

Table 1 shows the educational status of the farmers. It is reported that 47% had secondary education, while 22%, 18%, 10%, and 3% had tertiary, primary, and no formal education. The results of the study also indicate that the 36% of farmers have a net income between RM 2000 and RM 4000 while 27% have between RM 4000 and RM 6000 and 13% have less than RM 2000 respectively. Table 1 indicates that 34.1% of the respondents hold <1.0 ha of the land area while 58.4% have between 1.0 and 4.0 ha of agricultural land and only 2.1% hold above 6 ha of agricultural land. Table 1 also reported that 83.4% of the respondents have access to extensive agricultural services.

### 3.2. Risks Faced by the Farmers

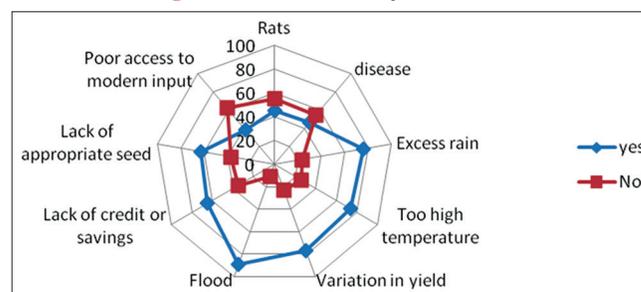
Figure 2 presents the risks by the respondents. Most of the risks faced by the farmers were production risks. This result supports the findings of Salimonu and Falusi (2009) who classified price fluctuation, drought, pest, and diseases attack and erratic rainfall as the most important risks faced by farmers. Field (2012), Wang et al. (2012), Zhang et al. (2013) also reported that in recent years, there has been increased frequency of global natural disasters caused by extreme weather events such as droughts, floods, and frosts.

### 3.3. Awareness and Perception of Crop Insurance by the Farmers

Respondents were asked whether they have heard of crop insurance. The results of the survey show that 44% of farmers have reacted positively and reported that they had an idea about crop insurance scheme. On the other hand, 56% of farmers responded that they knew nothing about crop insurance. The results are shown in Table 2. Farmers who know about crop insurance, they were further asked about the sources of information and were also asked to classify the important sources of information on a 5-point Likert scale. According to the farmers, banks and TV channels were the two most significant sources of information. In addition of this, farmers stated that banks can take an important role in creating awareness on crop insurance. For example, when farmers visit to borrow agricultural credit to the banks, staff members of the banks can inform them about crop insurance culture and its outstanding features and system conditions. The results are shown in Table 3.

In this survey, the perception of the farmers about crop insurance is measured on a five-point Likert scale. The results indicate that the three factors, namely "higher premium," "designed for wealthy farmers" and "one kind of tax" are classified as major perceptions of farmers regarding crop insurance with the average score values of 4.65, 4.59 and 4.32, respectively. This proves that most of the farmers believed that crop insurance system is

**Figure 2: Risked faced by the farmers**



**Table 4: Perception of farmers towards crop insurance**

| Items              | Less remuneration | One kind of tax | Relief in form of subsidy | Intended for rich farmers | Difficult strategy | Higher premium | Precious in terms of time and money |
|--------------------|-------------------|-----------------|---------------------------|---------------------------|--------------------|----------------|-------------------------------------|
| Mean               | 2.70              | 4.32            | 2.60                      | 4.59                      | 3.30               | 4.65           | 2.31                                |
| Standard deviation | 0.99              | 1.48            | 0.62                      | 1.33                      | 0.89               | 1.39           | 1.23                                |

**Table 5: Distribution of the WTP**

| Amount per season/ha | Number of respondents (%) | Min | Max |
|----------------------|---------------------------|-----|-----|
| <50                  | 242 (69)                  | 30  | 45  |
| 50-100               | 53 (15)                   | 55  | 90  |
| 100-200              | 39 (11)                   | 110 | 185 |
| >200                 | 16 (5)                    | 200 | 200 |

WTP: Willing to pay

planned particularly for wealthy farmers. The reason may be it is perceived as expensive, high quality and unavailable to the poor and marginal farmers. They also perceive that the existing method of the other insurance scheme is really confusing. The results are given in Table 4.

### 3.4. WTP for Crop Insurance

This study finds that 76% of the respondents are willing to pay and 24% of the respondents are not willing to pay. Table 5 shows the amount that the respondents were willing to take crop insurance. The results show that 69% of the farmers are willing to pay less than MYR 50 and 17% of the farmers are willing to pay between MYR 50 and MYR200/ha/season for RM 1000 coverage as an insurance premium. However, just 5% of the interested farmers are willing to pay above MYR 200/ha/season. Overall, the average WTP by the farmers is MYR 48.15/ha/season. The farmers who are not willing to pay are asked their reasons for not willing to pay. In response to that question, 51.4% of the respondents state that the premium should be subsidized by the government. Furthermore, 64.3% of the respondents give the reason that they do not believe in conventional insurance.

### 3.5. Factors Affecting WTP Crop Insurance

To identify the factors that might affect respondents' WTP for crop insurance, a logistic regression model is conducted using the SPSS 17.0 software. In this model, the dependent variable is the farmers' WTP for crop insurance. The farmers who are willing to pay crop insurance are assigned a value of 1, and those who are not willing to pay are assigned a value of 0. In this model, nine independent variables are selected to identify the main factors affecting the farmers' WTP. The definition and expected sign of the coefficient are given in Table 6. The logistic regression model is as follows:

$$\text{Logit}(P) = \beta_0 + \beta_1 x_1 + \dots + \beta_p x_p$$

Where,  $\text{logit}(P)$  is the dependent variable and  $x_1, x_2, \dots, x_p$  are the independent variables. In the model processing, we conduct the backward selection method. First, we introduce all variables into the model and complete a test to exclude variables until all variables in the equation are statistically significant. We use the maximum likelihood estimation to select the covariates. Table 7 presents the results of the estimated logistic regression model. The coefficient of the age of the household head is negative and

statistically significant at the 1% significance level. This result is consistent with similar studies by Falola et al. (2013), Uematsu and Mishra (2011) and Piyasiri and Ariyawardana (2011). The coefficient of farm size indicates a positive and significant relationship with willing to pay crop insurance. This result follows the study of Gininda et al. (2014) and Zanini et al. (2001). The coefficient of attending training is positive and statistically significant at 1% level of significance. This result is consistent with Ghazanfar et al. (2015) who also find that the respondents are willing to pay more if they attend in any training course. The coefficient of farm income is negative and significant at the 1% significance level. The coefficient of farming experience is positive and statistically significant at 5% level of significance. Sherrick et al. (2004) and Brandstrand and Wester (2014) state that more experienced farmers are perceived to have a positive opinion of insurance, and are more willing to pay for crop insurance. The perception and awareness are positive but they are not statistically significant. The reason may be the awareness of the farmers is not high and their perception of crop insurance is not positive. They find it as expensive and designed for wealthy farmers.

## 4. CONCLUSION AND RECOMMENDATIONS

This study evaluated the factors that affect the WTP of the farmers by using the logit regression model with the farmers' divergence in terms of various socio-economic conditions. CVM survey was conducted with 350 farmers in Kedah, Malaysia. From the findings of the study, following conclusions are made:

- The results of the study report that majority of the rice farmers of the study area are medium aged. As expected, 47% of the farmers have secondary school education which will enable them to adapt new methods of rice production. In this study, we also find that 36% of respondents reveal that their monthly earning is in the range of RM 2000 to RM 4000. Their income is above the Malaysia's national poverty line income of MYR 800 (10<sup>th</sup> Malaysian Plan). The major risks faced by the farmers are rat attack, disease, excess rainfall, high temperatures, variation in yield, and flood. This study reports that most farmers think crop insurance scheme is designed especially for wealthy farmers because it costs high quality and is not available to the poor and marginal farmers. They also perceive that the procedure currently works for another insurance scheme is very complicated.
- This study finds that 76% of the farmers are willing to pay the crop insurance scheme. The rest of the farmers believe that the premium should be subsidized by the government and they do not believe in conventional insurance.
- Furthermore, from the findings of the logistic regression model, we conclude that younger people are WTP more than the elderly. The reason behind this is that older people are not

**Table 6: Independent variables**

| Code           | Definition   | Valuation  | Prediction |
|----------------|--|--|------------|
| x <sub>1</sub> | Age of respondent  | In years   | +/-        |
| x <sub>2</sub> | Farm size  | In acres   | +          |
| x <sub>3</sub> | Household size   | In number  | -          |
| x <sub>4</sub> | Educational level of household head                        | 1=No formal education, 2=Primary, 3=Secondary 4=Tertiary                 | +          |
| x <sub>5</sub> | Attending the training course                              | 1=Yes, 0=No  | +          |
| x <sub>6</sub> | Farm income  | In MYR*  | +          |
| x <sub>7</sub> | Farming experience of household head                       | In years   | +          |
| x <sub>8</sub> | Perception towards crop insurance                          | 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly agree | +          |
| x <sub>9</sub> | Level of awareness of the respondents about crop insurance | 1=Aware, 2=Not aware   | +          |

**Table 7: Logit regression on factors influencing WTP crop insurance by the respondents**

| Variables   | Coefficient | Standard error | P value |
|---|-------------|----------------|---------|
| Age of respondent                                 | -0.03       | 0.02           | 0.00    |
| Farm size   | 0.22        | 0.02           | 0.00    |
| Household size                                    | 0.03        | 0.89           | 0.34    |
| Educational level of household head               | 0.13        | 0.23           | 0.21    |
| Attending the training course                     | 0.64        | 0.12           | 0.01    |
| Farm income                                       | -0.51       | 0.39           | 0.01    |
| Farming experience of household head              | 0.11        | 0.08           | 0.05    |
| Perception on crop insurance                      | 0.21        | 0.49           | 0.45    |
| Awareness of the respondents about crop insurance | 0.16        | 0.12           | 0.55    |
| Constant  | 0.12        | 0.35           | 0.12    |

WTP: Willing to pay

open minded and are very conservative. They want to stick with their old ideas. Any new idea is not acceptable to them. On the other hand, young people welcome new ideas. With regard to this issue, it is suggested that the government can design special educational programs to educate the farmers about crop insurance and its products. If they can manage it, it will encourage the older and uneducated farmers to help the crop insurance. Farmers who have larger farms are also willing to pay more than the small and poor farmers. Because they face various risk. For this reason, they are more likely to focus insurance and WTP (Enjolras et al., 2012). Furthermore, larger farms need larger investments to produce higher yield and they tend to discover methods to decrease the magnitudes of crop failure. Since the small farmers are not willing to participate in the crop insurance scheme, the agricultural extension officers can reach the information about the crop insurance to them and encourage them to participate. In this study, regarding the source of crop insurance, some farmers mentioned about the role of banks in this issue. Although banks are meeting their parts to make farmers familiar with crop insurance procedures and benefits, but this opportunity is restricted to just those farmers, who avail agricultural credit/loan from banks and other farmers who do not avail credit from banks, cannot use the advantages of this facility. Thus, the banks can also discover the ways to assist the small and poor farmers as their power and WTP for crop insurance is increased. This result also indicates that those earning high incomes of their agricultural operations are willing to pay less than the low-income group. Farmers with higher total income tend to be less risk averse and have a smaller demand for insurance (Wang et al., 2015). This result makes some confusion because it is expected that if the farmers are large farmers, their income should be higher and they should be willing to

pay more. But in this study, it is opposite. This means that the farmers who're earning are high; they do not only depend on agricultural production. They have a non-agricultural source of income which is not investigated in this study. We find it as the limitation of this study. Since we find that training course significantly affects the WTP of the farmers, so it is suggested that the government can arrange more training course for the farmers to increase their consciousness level about the crop insurance. It will increase their participation rate in crop insurance plans. Unfortunately, the awareness level of the farmers is very low among the farmers because the education level in the rural area is not very high and there is not yet a single formal program designed by the government for the promotion of crop insurance products. Thus, the government can involve media (electronic and print) to promote the benefit of the crop insurance scheme.

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