An Alternative Model for Supporting the Rice Farmers in Adaptation of Climate Change

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ABSTRACT

In Malaysia, the contribution of agriculture has been declining at 8.9% in 2000 and 8.2% in 2005. Because the climate is changing and farmers have to confront a number of barriers to adaptation to climate change. Primary data are received from the survey questions administered in Kedah, Malaysia and analyzed to investigate farmers' intention to use the proposed integrated waqf environmental protection model by adopting the theory of reasoned action. Based on the responses received from the field, it has been shown that the attitude of the farmers significantly affects farmers' intention to use the proposed model.

Keywords: Integrated Environmental Protection Model, Adaptation, Climate Change, Barriers, Theory of Reasoned Action, Structural Equation Modeling

JEL Classification: Q54

1. INTRODUCTION

In Southeast Asia, agriculture is an important source of livelihood. About 115 million hectares are devoted to the production of rice, corn, palm oil, natural rubber and coconut (ADB, 2009). Rice has been feeding the population of the area and is the staple food of about 557 million people (Manzanilla et al., 2011). In 2007, the average annual per capita expenditure was almost 197 kg (FAOSTAT, 2012) and delivered 49% of the calories and 39% of protein in the diet (FAOSTAT, 2012). Since a big portion of the field of rice production is in particularly vulnerable regions, rice production in the region is increasingly threatened by the effects of climate change (Masutomi et al., 2009). Many countries have, in fact, have started to experience a lack of activity that slow production levels caused by the major constraints of rice production in Southeast Asia. Changes in temperature regimes have a significant impact not only the period of growth but also the way of growth and productivity of rice crops. A 10% decrease in rice production has been found to be linked with every increase of 1°C temperature (ADB, 2009). Peng et al., 2004 reported that rice crops in the dry season in the Philippines dropped to 15% for every increase of 1°C in the temperature. These effects of temperature

and annoying climate change can cause a decline in global rice production (Redfern et al., 2012). They had negative effects on agricultural production and socio-economic conditions of farmers. In Malaysia, the rate of temperature increase during the period of 30 years from 2059 to 2090 is generally twice the rate of increase simulated before the 20 years between 2029 and 2050 (Quasem et al., 2010). The climate change is directly affecting the economy of Malaysia by reducing the agricultural output and food security (Quasem et al., 2010). This is because farmers are influenced by farming. It is also mentioned that the most vulnerable poor people are employed in agricultural activities and have a relatively greater number of family members (Siwar et al., 2009).

In Malaysia, a possible vulnerable states in terms of poverty are Sabah (23%), Terengganu (15.4%), Kelantan (10.6%), Sarawak (7.5%), Kedah (7%), Perlis (6.3%) and Perak (4.9%). In these lands, the projected temperature and precipitation changes are likewise very high (Ninth Malaysia Plan, 2006; NAHRIM, 2006). The international strategy for disaster reduction (UNISDR) states that Malaysia is a vulnerable victim to natural phenomena such as storms, landslides, tsunamis and floods (UNISDR, 2011). Over the past 30 years, Malaysia has become a victim

of floods that have caused great havoc even to the Malaysian economy. Last 2007, flooding in Malaysia caused an economic damage of 0.1% to the gross domestic product (GDP) of the country. Back in December 2006, the agricultural sector of Malaysia has reported a huge amount of loss estimated to USD 18.8 million because of floods. The damage also includes 6797 farmers and 8322 hectares of arable land. Such losses cost the government 2.6 million dollars given us financial aid to the farmer. The floods in December 2007 caused an estimated loss of USD 18.5 million. 46% of the losses were shouldered by the government. As such, the money that the Malaysian government has been spending for the damages caused by floods has become a burden. The largest producer of rice located in the northern peninsular of Malaysia, The Muda agricultural development authority (MADA), produces 40% of the total rice production in Malaysia (MADA, 2009). MADA (2009) reported that since 1998, the MADA areas have experienced six major floods. The floods that occurred specifically between 2003 and 2008 have shown the increasing trend in floods in the recent years. Such damage was experienced by the farmers producing rice in the MADA area. The said damage was estimated at 76,287 tons (an average of 5.5 tons per hectare). Losses were at its worst in 2005 in which 19,185 hectares or 20% of the surface of the MADA were affected. At present, bank loans are offered by Agro Bank to Malaysian farmers. The main focus of Agro Bank is to finance the agricultural sector (APAN, 2013). "Rice scheme," a product of Agro Bank, gives farmers the opportunity to borrow money at low-interest rate. The loan amount is dependent on land size and location. Farmers can loan of up to USD 692 per hectare, and the repayment period is within a season. The payment can be made through deduction of a grant or a direct payment to the bank in cash. However, if a farmer has incurred losses, they will be expanded within the payment. Such "rice scheme" has provided minimal support for rice farmers because farmers are obliged to repay the loan. Farmers may face serious debts if consecutive incidents of loss happen. Given such a scenario, crop insurance may provide a better alternative in the financing mechanism for rice farmers produce (APAN, 2013).

In order to stress the impact of climate change in Malaysia, the second national agricultural policy (1992-1997) was revised in 1998. The third national agricultural policy (1998-2010) recognized this fact that the farmer's livelihood is still under threat due to climate change. Subsequently, the government of Malaysia, incorporated provisions of necessary incentives and initiatives in these designs to attain the end of maximizing the income of the stakeholders through the optimal use of resources. Income stabilization and poverty reduction program among the rice farmers is affected badly due to the adverse effects of the climatic factors on agriculture in Malaysia. It is urgent to focus on adaptation to climate changes to guarantee the sustainability of the agricultural production. Currently, government and no-government sectors are providing various supports, incentives, and subsidy to the farmers during the rising tide, but the empirical measurement of the sufficiency of these supports is missing in the literature. Thus, this study firstly proposes an integrated waqf environmental protection (IWEP) model as an alternative solution for the farmers to confirm them in adjusting the climate change.

Secondly, it attempts to investigate farmers' intention to apply the proposed model using the theory of reasoned action (TRA).

1.1. Proposed Model

The proposed model seeks to integrate the waqf directly with farmers who are affected due to the damage to the environment. The waqf is a kind of charity recognized in Islam. The waqf is defined as the act of inserting the title of an asset owned by the provision and allocation of its benefits for a specific use (Sadeq, 2002). Waqf can be applied to a non-perishable property that the benefit can be extracted from it without consuming the property itself (Chowdhury et al., 2011; Sadeq, 2002). Waqf also is fixed as the routine of taking a property and preventing the use of it to the effects of repeated extraction of profit (or income) to answer the purpose of waqf (Ali, 2009). A more detailed description makes some conditions () such as:
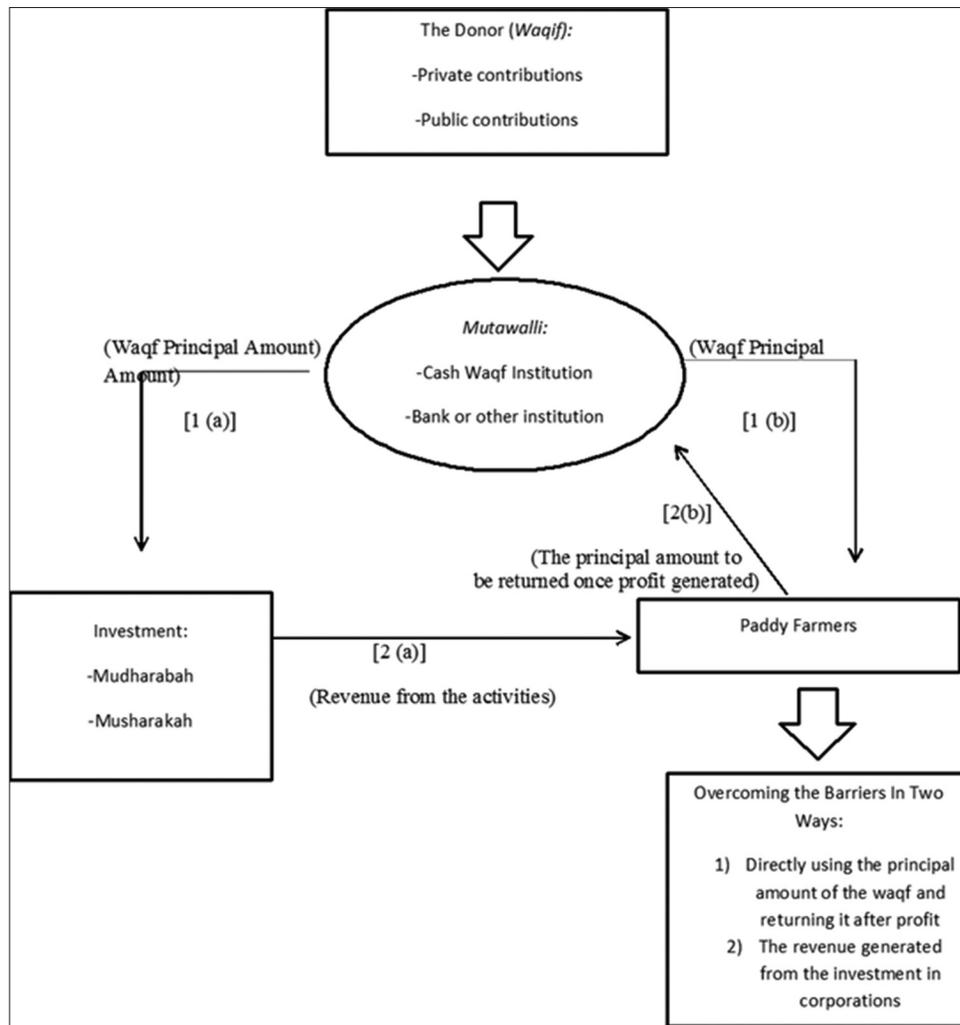
a. The waqf should be constant.
b. The attribute should be granted on a lasting base; although in some cases temporary waqf is allowed.
c. The waqf should have legal content to execute the deed.
d. Must be for charity functions.
e. Intended to beneficiaries who are yet active.

In a standard waqf contract, three parties are taken such as the donor, the manager, and the beneficiaries. The donors is the individual or parties that donate to the pool of waqf fund. The role of the donor is rather important in the initial stage, where the donor contributes the fund and have a right to determine the way in which the property should be invested and also the designated role of the waqf property's benefit (Nuruddeen, 2010). The circumstances that the donor had forced on the property should be upheld and appreciated. The donor may also control the way the waqf is achieved and the process of succession of the managers (Ahmed, 2007).

The manager is often the term that is being used to define the manager of the collected waqf funds. The manager is normally responsible for managing the waqf assets to confirm that it serves the best interest of the beneficiaries. The most prevailing task is to preserve the property and to maximize the potential revenues from the property for the interest of the beneficiaries. The manager can either do the role with compensation for acting it or even in some cases, voluntarily (Siswantoro et al., 2007).

The proposed IWEP model was validated and tested by the focus group survey of expert people. The group of expert people includes 10 people. We included 4 expert people from the Department of Economics, International Islamic University Malaysia, 6 from the waqf institutes of Malaysia such as Jawhar and Lembaga. The model was modified according to their comments and later it was used in the survey to know the farmers' intention to use the model. The proposed model is illustrated in Figure 1. The model aims to integrate the waqf directly as assistance to the farmers affected by the environmental damages. The IWEP model is aimed to work as follows:

a. The fund establishment: The donors, both public and corporate sectors will jointly lead the cash waqf to the cash waqf institution (CWI) with the aim to make a perpetual

Figure 1: The integrated waqf environmental protection system flow model

waqf. The corporate sectors may donate as a division of their corporate social responsibility. The public may also contribute voluntarily in cash form.

b. The parties involved: The donors will then become the waqif and the CWI will act as the mutually which manages the fund and are responsible for reaching the necessary investment decisions of the waqf fund which will generate tax income. The farmers will be the targeted beneficiaries of this waqf model.

c. The operation:

I. Transferring the fund: Funds are then being transferred to the guardian, which will manage the fund operations, revenue generating process and making sure the funds fulfill the usage condition specified by the waif, if any is stipulated. Mutually as the system flow diagram shows; can be either from an established CWI or any other establishments; such as a religious establishment or non-profit systems.

II. The method of Disbursement: The manager may invest the fund's legal contract, and the profit generated can then be disseminated to the farmers or used to overcome their barriers as shown in Figure 1 (1a and 2a). Similarly, the motorway may directly give a proportion of the principal

amount to the farmers, which will then invest in their crops or equipment, with the condition that once the profit is generated, the principal amount of the waqf is to be returned to honor its perpetuity concept as shown by Figure 1 (1b and 2b).

III. Utilization of funds: The funds, disbursed can then be utilized by either the farmers directly or by CWI as mutually to provide the facilities in order for them to overcome the barriers that they are facing.

d. The remedy classifications: The suggested aid to adopt against the barriers of adaptation can be classified according to the barriers itself:

I. Financial Barriers: The aid was in the kind of financial aid to help farmers cultivate for the next season in case of natural disasters. The assistance may also involve measures against climate change such as purchasing new varieties of seed and other equipment that need funding.

II. Social Barriers: The aid will be in the kind of knowledge and cognizance of the farmers about the society and the climate change issue and adopting standards.

III. Physical Barriers: The aid will be in terms of facilities that sweep over the physical difficulties faced by the farmers.

IV. Human Barriers: The aid will be in terms of a subsidized cost modern training center in the body politic of the art facilities. These training centers will provide a facility for skills development, teaching and courses as well as programs. It will be useful in achieving the aim of encouraging, improving and enhancing their human capital capacity and skills.

V. Natural Barriers: The aid will be aiding the farmers to conform to natural barriers such as the land structure, the irrigation problem, and other geographical hindrance.

e. The implications: After receiving the assistance provided by the CWI, the farmers would then be able to react to the adaptation barriers of climate modification and natural calamities which result in the diminution in their craw. Besides, the farmers may go through a steadfast increase in their production, which increases their gross output, contribute to the value added, profit, employment, and productivity, which in turn leads to the increase in the national income or GDP.

1.2. Literature Review

The climatic change causes changes in several agriculture relevant factors that influence the sustainability of growing production. Farmers believe that vulnerability of some of the factors like injurious insects (supported by 42.9% of the farmers), temperature (supports by 58.6% of the farmers), soil fertility loss (supports by 49.5% of the farmers), cost of inputs (supports by 61.1% of the farmers), shortage of rainfall (supports by 45.5% of the farmers), excessive rainfall (supports by 35.9% farmers) increased over the last 5 years (Al-Amin and Alam, 2011). Referable to the climate change impacts on agriculture, the projections of NAHRIM of rice production in terms of climate change, at a gifted level of temperature and CO_2 level, shows more than 0.4% variation of rainfall by 2020 and will cause a fall in rice production in Malaysia (NAHRIM, 2006). Hence, the agricultural sustainability in the future in Malaysia is projected to be vulnerable due to climatic changes.

Barriers to adaptation are defined as those conditions and factors that workers experience as impeding, diverting or obstructing the process of developing and implementing climate change adaptation strategies (Biesbroek et al., 2011). On that point are significant barriers to implementing adaptation to climate change that include both the inability of natural systems to adapt to the rate and magnitude of climate change every bit well as technological, financial, cognitive and behavior and social and cultural constraint (Change, 2007). In the context of agriculture, past studies point to a number of factors that impede farmers' ability to respond to climate change. On the other hand, "barriers are the conditions or factors that render adaptation difficult as a response to climate change" (Nielsen and Reenberg, 2010).
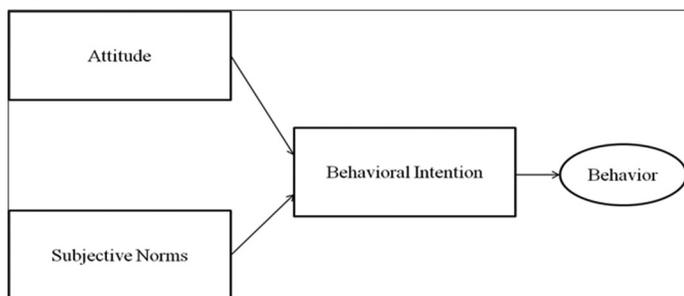
Farmers' adaptation practices to cope with the agricultural vulnerability due to climatic change are not found equal and satisfactory (Alam et al., 2011). Their adaptation methods are based entirely on their thoughts or answers. As a result, only 30.3% farmers in Malaysia believe that they have been able to properly cope with climatic vulnerabilities (Alam et al., 2012).

On the issue of the availability of external supports, most of the farmers are not cognizant of the current supports provided by external parties to adapt to climate change (Al-Amin and Alam, 2011). But, in parliamentary procedure to fight the farmers to increase the productivity and income, government's subsidy for the agricultural industry each year is increasing. Currently, the government of Malaysia provides an immense amount of subsidy to the rice cultivation, encourage producers to ensure more and to increase the return to the country's self-sufficiency level. Since sustainability of agriculture and farmers' livelihood is strongly dependent on the subsidy and support in Malaysia, and the present level of farmers' adaptability to climate change lacks the expected level. Hence, there is a demand for additional support and efforts by the regime and other beyond the current agencies' strategies of subsidy and incentives. Adjustment to climate change is a broad topic. The financial management of farms and farmers needs to be undertaken for a minimum of two seasons. So that if the crop is damaged in one season, farmers can be formed in order to possess the seeds for next season. In this way, their ability to endure the cost of any other crop production will warranty their existence financially up to the collection of the new crops.

Today, heavy rainfall and storm is a very normal event in the study area. For that reason, farmers should take the steps to share the crop and take initiative for adaptation of climate change. Also, farmers need crop insurance facilities, but no such option is available shortly. Furthermore, they involve taking adaptation strategies to reduce the risk of income loss due to changing climatic conditions and altered. In this context, waqf can be considered as an alternative solution. For example, Majelis Ulama Indonesia (Indonesian Ulama Council) of the Bandung Municipality in 2010 has published a religious decree regarding tree waqf. The council considers tree waqf as a permissible act of waqf based on Al-Quran and Prophet's tradition. Thus, this research proposes the IWEP model which is a participating form of contract between waqf institutions and farmers. Therefore, under this proposed model, the assets are considered to be more sustainable and kept maintained for the hereafter. This paper utilized data obtained from a structured questionnaire based on the TRA. The structural equation modeling (SEM) method was then applied to test the hypotheses of this study.

1.3. Theoretical Framework

The TRA is a theory that attempts to explain an individual's behavior as a decision that is being worked upon by the individual's intention to perform the behavior. This theory deals with the rational, volitional, and systematic control in which individual will choose to engage in a behavior if their intention is at a high level (Downs et al., 2005; Fishbein and Ajzen, 1975, Hansen et al., 2004). Figure 2 presents the TRA. The hypothesis explains that the behavioral intention or the intention to perform a behavior is determined by the individual's attitude towards a behavior and the subjective norm or the perceived social acceptance of people around him or involved people who matter to the individual. The behavioral intention had been defined as the person in question's subjective probability that the individual will or will not perform a specific behavior. Attitude can be defined as the general feeling of favorable or unfavorable for the behavior in question (Hansen

Figure 2: Theory of reasoned action. Source: (Fishbein and Ajzen, 1975)

et al., 2004; Chang, 1998; Fishbein and Ajzen, 1975). Subjective norm, on the other hand, is the perceived judgment of related people in relation to the said behavior on whether or not the individual should engage in the said behavior (Chang, 1998; Fishbein and Ajzen, 1975). The intention to perform denotes the individual's perception on both what the individual perceives as the consequences of doing the behavior and normative belief on whether or not the behavior should be performed (Ajzen and Fishbein, 1980; Davis, 1986; Dillon and Morris, 1996; Downs et al., 2005).

The TRA is being chosen as the theoretical framework for this paper based on the following reasons:
I.   The assumptions underlying them are the same: This work seeks to examine the acceptance of the individual based on the presumption that people are rational and they utilize the information available as well as the opinion of other people that matters before deciding to do a certain demeanor.
II. Appropriate and clearly defined variables to help obtain information: As the theory had underlined that an individual's intention to perform or behavioral intention is influenced by the attitude and the subjective norm, the procedure of getting data on these variables can be managed consistently. The individual tested can be confronted with a lot of options on each variable in order to predict their behavioral intention.

In the context of this study, the acknowledgment to this framework seeks to resolve the trouble of the toleration of the respondents to the IWEP model. As the study purports to understand what causes the farmers to be willing to accept the IWEP model. The specific behavior in question is that whether the proposed model will be accepted and applied by the farmers in overcoming climate change adaptation barriers if it is taken away. Practicing the same theory into this case, the dependent variable would be the behavioral intention or the intention to accept IWEP model; the independent model would be the attitude of the farmers towards the IWEP model and the subjective norms towards the IWEP model. Founded in the theory also it is assumed that a person is more likely to perform a specific behavior if the behavioral intention is firm.

1.3.1. Attitude toward adaptation to climate change
The first independent variable in the TRA is the attitude; defined as a disposition of an individual to respond in favor or not in favor of an object, person or event (Azjen, 2005). The assumption used is that the attitude that a farmer or an individual have towards a policy measure expresses its value, although this is not necessarily always the case. Attitude can be described as something that can reflect

the overall evaluation of the behavior performed by the individual (Groot et al., 2007; Fishbein and Ajzen, 1980) D'Emden (2008) states that subjective norm or the perception of farmers towards innovation-specific features or particular perceptions arrested in connection with the effects of an innovation; in particular, the perceived usefulness can be important factors in decision-making. If a farmer checks by accepting or application of a particular technology or method will result in reduced exposure to climate risks and increases performance, which will almost probably be willing to accept innovation. In the perspective of this study, the farmers may hold a belief that accepting the IWEP model may pose, a path to overcome the adaptation barriers faced; which in this case accepting would be beneficial for them. On the contrary, they also may convey a feeling that by accepting the IWEP model, there would be no benefit to them, therefore, they respond not in favor of the mannequin.

1.3.2. Subjective norms on adaptation to climate change method
The other independent variable is the subjective norms; defined as the belief prevailed that a specific person who matters either approve or disapprove performing the behavior (Ajzen, 2005). This independent variable is equally important as the farmers' attitude may be determined by the approval or dislike of people close to them. If the person that matters approve the notion that the IWEP model would be beneficial and should be applied, it may modify the posture of the farmers to lean towards accepting it. The same applies to the contrary, if the masses around the farmers did not sanction the notion that accepting the IWEP would be good, they would be less than inclined to hold a lucky attitude towards accepting a good example. In some instances, the individual itself perceives the judgment or what the people about them ought to respond in whether or not they should enlist in the behavior (Chang, 1998; Fishbein and Ajzen, 1975). As the two variables being brought together, it will fit with the behavioral intention of the farmers, making it a suitable method to gauge the farmers' intention to use the IWEP model.

1.3.3. Research hypothesis
1.3.3.1. Hypothesis 1
H_0: Attitude towards the behavior of farmers significantly (positively) affects their intention to use IWEP model.

H_1: Attitude towards the behavior of farmers does not signify (positively) affect their intention to use IWEP model.

1.3.3.2. Hypothesis 2
H_0: The Subjective norm of the farmers significantly (positively) affects their intention to use IWEP model.

H_1: The subjective norm of the farmers does not signify (positively) affect their purpose of using IWEP model.

At the single level, this work will provide a breakthrough way in overcoming the barriers to climate change and adapting to climate change for the Malaysian paddy farmers. This work serves to examine the possible barriers impeding the capacity of the farmers to adapt and assisting them to adjust to climate change more efficiently and efficaciously.

1.4. Methodology

1.4.1. Survey design and sampling method

The questionnaire utilized as a component of this study depended on a survey among farmers of the MADA district in Kedah, Malaysia (Figure 1). The area (i.e., Under MADA) is located on the Muda Irrigation Scheme, which handles approximately 125,155 hectares, of which 105,851 hectares are in the northwestern division of the State of Kedah and 20,304 hectares are in the southern region of the state of Perlis. Approximately 76 % (96,558 hectares) of the country is under rice development and roughly 48,500 cultivating families dwell there and are included in rice creation. Kedah contributes around 50% of the aggregate rice generation and is the eighth largest state as far as area territory. The central atmosphere with storm gives a wet season in which rice grows and a dry season in which it grows and can be harvested. The dry months of January and February permit the rice fields to dry out and rise to mature. The watering system from the Muda Irrigation Project permits rice fields to be overflowed amid the dry season and permits two rice crops for each year to be developed under more concentrated cutting edge development.

1.4.2. Survey plan and sampling techniques

The study used TRA with three factors such as attitude, subjective norm and intention to use IWEP models to plan and prepare the theoretical framework. The questionnaire of the survey has two sections. Part A includes the questions referred to the socioeconomic information about the farmers. Part B includes several items to measure the attitude, subjective norm and intention of the farmers. All the measurement points were adapted from a comprehensive recap of past studies (Duasa and Thaker, 2016; Ramayah and Suki, 2006). Most of the items were prepared and altered according to the setting of the work. They were not taken as found in the recent literature. All items for section B were measured utilizing a five-point Likert scales representing a spread from 1 (strongly disagree) to 5 (strongly agree). The items are shown in Appendix.

Figure 3 presents the map of MADA in Kedah. The area under MADA is the location of the Muda Irrigation Scheme which consists of 27 farmer organizations which are named in Malaysian language Pertubuhan Peladang Kawasan (PPK) with 55,130 farmers. Of the 27 PPK, using random sampling method five PPKs have been selected in this study, and are named Arau, Kangar, Tunjang, Jitra, Aloer Senibong, Bukit Besar and Hutan Kampong. From each of the five PPKs, 80 farmers were selected randomly with a total sample size of 400 (80 × 5). The sample size required for this study was computed based on (Hair et al., 1998). According to his suggestion, each item should contain a minimum of 15-20 samples. Our study has three constructs (8 items for attitude, 6 items for the subjective norm and 8 items for intention, totaling 22 items). It results sample size of 440 (22 × 20 = 440). Hence, 400 samples were considered for this study, which was as same sample size as the recommended value of at least 400 (Boomsma, 1987). As the country's main rice producer, it contributed some 50% of the1.63 metric tons total produced in 2001. Kedah is the 8th largest state by land area and 8th most populated state in Malaysia, with a total land area of 9500 km² (3700 sqmi), and a population of 1,890,098.

Table 1 shows the socio-demographic characteristics of the farmers in the study area. The ages of the respondents ranged between 25 and over 40 years. The biggest number of farmers (80.3%) was from the age group above 40 years. The second biggest group of farmers (17%) was between 36 and 40 years. It could be concluded from this result that the population of rice farmers in the study area is middle age or older people. On the other hand, only 0.7% of the farmers' age ranges between 26 and 30 years. This age distribution could have a positive impact towards climate change adaptation. This is because middle and older farmers have the most experience in farming. The findings of this research also found that the educational status of the farmers ranged with the majority having only primary school education. The consequences indicate that 32.7% of farmers owned a primary education, while 31.3% had lower secondary education, 27.3% had higher secondary education, 8.3% received no formal education, and only 0.3% had a diploma degree. The distribution of education could not have a positive impact on climate change adaptation. With respect to income levels, this study found that the highest percentage of farmers (60.7%) experienced a level of monthly income of RM2000 and below. The highest part of farmers (40.0%) experienced a monthly income of between RM 2000 and RM 4000 per month. Of the farmers, 34.0% and 4.0% had monthly incomes ranging between RM 2000 and RM 4000 and RM 4000 to RM 6000, respectively. Only 0.3% of the farmers had monthly incomes ranging from RM 6001 to RM 80,000. The results indicate that farmers in Malaysia are relatively poor. According to the Department of Statistics Malaysia, more than half of households in Malaysia have a monthly income of less than RM 3,000. The remaining households' income is between RM 3001 and RM 4000 (12.9%), RM 4001 and RM 5000 (8.6%), RM 5001 and RM 10.000 (15.8%) and above RM 10,000 (4.9%) (DOSM, 2009).

1.5. Results and Discussion

1.5.1. Knowledge about climate change

Table 2 represents the respondents' knowledge about climate change occurrence. Out of the total 400 respondents, 96.3%

Table 1: Socio-economic information of the respondents

Basic information	Group	Number of respondents (%)
Gender	Male	372 (93.0)
	Female	28 (7.0)
Age	1=25 years or below	0 (0)
	2=26-30 years	3 (0.7)
	3=31-35 years	8 (2)
	4=36-40 years	68 (17)
	5=above 40 years	321 (80.3)
Education level	No formal education	33 (8.3)
	Primary	
	Primary	132 (33.0)
	Lower secondary	125 (31.3)
	Higher secondary	109 (27.3)
	Diploma	1 (0.3)
Income of household (RM/ month)	2000 and <2000	243 (60.7)
	RM2001-RM4000	140 (35.0)
	RM4001-RM6000	16 (4.0)
	RM6001-RM8000	1 (0.3)

(n = 385) are having at least a basic idea on what climate change concept is and the remaining 3.7% (n = 15) have no idea on what climate change is.

1.5.2. Sources of information on climate change
The respondents were given a question with multiple options (respondents may select more than one option) on how they receive the information on climate change. As shown in Table 3, the majority of the respondents claims that they gain information on the occurrence of climate change through two most prominent media; the television (55.3%; n = 221) and the newspaper (49.3%; n = 197). The remaining claims that they obtain information through various means such as friends (12.3%; n = 49), community (4.7%, n =19), internet (2.7%, n = 11), advertisement (1%, n = 4) and others (11.7%; n = 47).

1.5.3. Factors that caused the climate change occurrence
Table 4 represents the respondents' belief on the factors that help to contribute to the climate change. The table reports that 26.7% (n = 107) of the respondents identified human activities as responsible for climate change. There is an equal amount of respondents (18.3%, n = 73) who agrees that climate change is due to natural cause as well as the result of human activities and natural process. With the exception, only 1% (n = 4) of respondents claim that they don't know what causes climate change and 35% (n = 140) of the respondents think that all factors mentioned in the questionnaire are responsible for climate change.

1.5.4. Awareness of changes in rainfall and temperature
Table 5 represents the respondents' awareness of the changes in rainfall and temperature for the past few years. The table reports that 69% (n = 276) of the respondents noticed an increasing trend in rainfall quantity while 5.7% (n = 23) claim the opposite. The remaining respondents have either no idea (13.6%, n = 54) or think that there is no change in the rainfall pattern (11.7%, n = 47).

1.5.5. Awareness on drought and flood occurrence
Table 6 shows the respondents' awareness on the occurrence of drought and flood in their respective area. It is reported that 57.7% (n = 231) of the respondents are in the opinion that the drought and flood are more frequent than before, while 5% (n = 20) stated the opposite. The remaining 12% (n = 48) claim that there is no change in the flood and drought occurrence and 25.3% (n = 101) states that they have no idea on whether it changes or not.

1.5.6. Attitudes towards climate change occurrence
Table 7 represents the result of the section of the questionnaire that tests the attitude of the respondents towards climate change occurrence. Out of the 400 respondents, a total of 42% (n = 168) indicated concern about the climate change that occurs and the likely impacts of the climate change. The remaining respondents resort to different actions such as adaptation to climate change (10.3%, n = 41); spread of information about the climate change problem occurring (8.7%, n = 35); suggestions for government initiatives that should be introduced (30.3%, n = 121) and national long-term adaptation policy that is needed (7%, n = 28).

1.5.7. Awareness on government assistance programs
The awareness of government assistance program refers to the condition whether the farmers are having any information that there exist assistance programs that can help them deal with the barriers. Table 8 reports the awareness pf the respondents on government assistance programs. The respondents were asked whether they are aware whenever there exist any assistance programs within their area. 94.7% (n = 379) of the respondents indicated that there is enough information that reaches them on the assistance of the programs. The remaining 5% (n = 20) reported that they didn't get the information on the assistance provided. A

Table 2: Knowledge on climate change

Knowledge about climate change	Frequency (%)
Yes	15 (3.7)
No	385 (96.3)

Table 3: Composition of information sources on climate change

Medium	Frequency (%)
Newspaper	197 (49.3)
TV	221 (55.3)
Advertisement	4 (1)
Internet	11 (2.7)
Community	19 (4.7)
Friends	49 (12.3)
Others	47 (11.7)

Table 4: Factors that caused climate change occurrence

Causes of climate change	Frequency (%)
Human activities	107 (26.7)
Natural causes	73 (18.3)
Human activity and natural process	73 (18.3)
Others	3 (0.7)
Don't know	4 (1.0)
All	140 (35)

Table 5: Awareness on changes in rainfall and temperature

Rainfall increase and temperature	Frequency (%)
Increasing	276 (69)
Decreasing	23 (5.7)
No change	47 (11.7)
Don't know	54 (13.6)

Table 6: Awareness on drought and flood occurrence

Drought and flood occurrence	Frequency (%)
Increasing	231 (57.7)
Decreasing	20 (5)
No change	48 (12)
Don't know	101 (25.3)

Table 7: Attitudes towards climate change occurrence

Attitude towards climate change	Frequency (%)
Concern about the climate change	168 (42)
Trying to adapt to climate change	41 (10.3)
Inform others about the climate change problem	35 (8.7)
Government should take initiatives to increase awareness	121 (30.3)
National long term adaptation framework is needed	28 (7)
All of the above	7 (1.7)

respondent did not answer this item, indicating a response rate of only 99.7% for this section.

1.5.8. Hindrance towards accepting government's assistance
Table 9 presents the result of the perceived hindrance towards accepting the government support programs that are being offered. In the questionnaire, we listed five alternatives for the respondents to choose and they are allowed to choose multiple responses. The results in Table 9 shows that 45.7% (n = 183) of respondents believes that the assistance provided does not meet their farming needs. There are 21.7% (n = 87) respondents that expect a high cost or fees will be imposed if they are to subscribe to the assistance. A total of 17.3% (n = 69) assume that there will be many terms and conditions to abide by if they accept the assistance. The remaining respondents either think that the assistance is not relevant or needed at the moment, or that they have other reasons than the given responses (4.3%, n = 17).

1.5.9. Reasons the respondents are not aware of the support programmes
The respondents were asked the reason behind the failure to be aware of the support programs offered by the Government. Table 10 reports that the respondents answered that they were unaware of the government support programs because they feel like it is not important for them (23.7%, n = 95). This response indicates that the respondents feel that there is no need to know or there is no benefit of knowing any information on the support programs offered. A total of 20.7% (n = 83) feel like there are not much information disseminated on the existence of the support programs making it hard for them to know about the programs offered by them. Besides the lack of information, respondents also feel that there is little or not much promotion on the support programs (6.3%, n = 25). This indicates that the respondents feel like there is less effort to make the support programs more attractive for them. A total of 0.7% (n = 3) answered that there are other factors that stop them from subscribing to the government assistance rather than those response options given.

1.5.10. Awareness on cash waqf existence
The awareness on cash waqf refers to the condition whether the farmers know that cash waqf is an existing concept. In this study, the respondents were asked whether they were aware of cash waqf. The results of the study show that 88% (n = 352) of the respondents indicates that they already know that cash waqf exists and the remaining 11.3% (n = 45) indicates that they are not aware of it. The result is reported in Table 11.

1.6. Knowledge on Cash Waqf Operation
The knowledge of the farmers on the operations and how cash waqf works were tested in the questionnaire by asking the question "do you know how cash waqf works?" and respondents were given a selection of yes and no answers. Out of the total of 400 respondents, 70.3% (n = 281) of the respondents claimed that they had the knowledge on the cash waqf operation. The remaining 29.4% (n = 118) however, did not know how it works (Table 12).

1.6.1. Barriers to adaptation
The respondents were asked to rate their opinion on what constitutes a barrier in adapting to climate change. They were presented with a 5-point Likert scale with values ranging from 1 as "strongly disagree", 2 as "disagree", 3 as "neutral", 4 as "agree" and 5 as "strongly agree". As represented in the Table 13, the mean is calculated on all eight items related to the "barriers to adaptation". It is found that the mean is in the range of 3-4, which suggests a neutral response. Table 13 shows that in the majority were either undecided about whether or not they are facing these barriers or they see it as something that is not pressing.

Table 8: Awareness on Government assistance programs

Awareness on support/assistance programs provided by Government	Frequency (%)
Yes	379 (94.7)
No	20 (5)

Table 9: Hindrance towards accepting Government's assistance

Hindrances	Frequency (%)
Do not meet the farming needs	
Yes	183 (45.7)
No	17 (4.3)
High cost or fees incurred	
Yes	87 (21.7)
No	13 (3.3)
Many terms and condition	
Yes	69 (17.3)
No	11 (2.7)
Not required at the moment	
Yes	147 (36.7)
No	11 (2.7)
Others	
Yes	17 (4.3)
No	13 (3.3)

Table 10: Reasons the respondents are not aware of the support programmes offered

Item	Frequency (%)
Not important to know	
Yes	95 (23.7)
No	29 (7.3)
Less information provided	
Yes	83 (20.7)
No	16 (4)
Less promotion	
Yes	25 (6.3)
No	16 (4)
Others	
Yes	3 (0.7)
No	12 (3)

Table 11: Awareness on cash waqf existence

Awareness on cash waqf	Frequency (%)	
Yes	352	(88)
No	45	(11.3)

Table 12: Knowledge on cash waqf operation

Knowledge on cash waqf operation	Frequency (%)	
Yes	281	(70.3)
No	118	(29.4)

1.7. Scale Reliability and Data Analysis

Reliability of the scale is established by calculating cronbach α with the SPSS 20.0 program. As shown in Table 14, item -to-total statistics reports that an element (SN4) did not meet the threshold value of 0.3 (Caro and Garcia, 2007). Therefore, this item was eliminated from further analysis. Excluding this item, Cronbach α was found greater than the threshold of 0.7 (Kline, 2015); (Nunnally and Bernstein, 1994) for basic research (Nunnally et al., 1967). The two-step process was utilized to perform the SEM analysis through AMOS 19.0 based on the study of (Byrne, 2013) and (Anderson and Gerbing, 1988). Firstly, we performed the CFA to ensure the reliability, convergent and divergent validity. Secondly, we performed the SEM to test the causal relationships between the latent variables. The method of maximum likelihood estimation ("MLE") was performed on each stage suggested by Byrne (2001). In this analysis, the goodness of fit (GOF) of the model was evaluated by several indicators: χ^2/DF (Chi-square test for the degree of relatedness of freedom), GFI (GOF index), Tucker-Lewis index and RMSEA (mean square error approach). Browne and Cudek (1993) and Hair et al. (1998) suggested that model fit is good when indices $\geq$0.9, λ^2/df between 2 and 5 and RMSEA $\leq$0.08.

1.8. Validity of Measurement Model

CFA was conducted using MLE in order to examine the measurement model. We found that all the GOF statistics were very close to the recommended limit p<0.001; $\frac{\lambda^2}{df}$=2.782; GFI=0.966; TLI=0.923; CFI=0.963;RMSEA=0.077). Established along the modification indices, paths were added in order to decrease the Chi-square value (Ullman and Bentler, 2003). According to (Jöreskog and Sörbom, 1993) recommendations, our all items were found significant (t > 2.58) with factor loading values (λ > 0.5) except three items which are Att1 (λ = 0.43), IN4 (λ = 0.20) and SN4 (λ = 0.32). These three items were deleted in the measurement model and CFA was again conducted. This creates satisfactory modelfit P<0.001; $\frac{\lambda^2}{df}$=2.612;GFI=0.972;TLI=0.933;CFI=0.972; RMSEA=0.065) . If CFI $\geq$0.9 (Kline, 1998) and RMSEA $\leq$0.8 (Hu and Bentler, 1998), the items established unidimentionality. We proved that our all constructs were unidimensional since CFI = 0.972; RMSEA = 0.065. Convergent validity indicates two approaches. Firstly, all factor loading should be significant and above 0.5 (Bagozzi et al., 1991) and secondly, all average variance extracted values should be above 0.5 (Ruvio and Shogam, 2008; (Fornell and Larcker, 1981) and composite reliability should be above 0.7 (Hair et al., 2012). In this study, these statistics showed strong convergent validity (Table 15).

1.9. Test of Structural Model

Table 16 reports the results of the SEM. The results show that the standardized coefficient estimates between attitude and intention (β = 0.49; t = 5.32; P < 0.001) is positive and significant. It supports our hypothesis as shown in section 1.3.3. The result asserts that there is a positive relationship between attitude and farmers' intention to use our proposed IWEP model. When the farmers have a more positive view towards the involvement of IWEP model, the more favorable their attitude towards the behavior and

Table 13: Barriers to adaptation

Barriers to adaptation	Mean value
I have financial problem to adapt to CC	3.1100
I cannot access the financial assistance	3.1100
I do not get enough information about CC adaptation	3.4733
My income is not enough to adapt to CC	3.3967
Lack of social relationship (with society) to adapt to CC	3.5167
Lack of communication with & participation of local communities towards adaptation to CC	3.5800
I do not get any fund from the Government to adapt to CC	3.7433
There is a high cost of adaptation measure	3.6967

Table 14: Reliability of scales

Variable	Item	Corrected item-to-total correlation	Cronbach's α	Factor loading λ	AVE	CR
Attitude	Att1	0.357	0.866	-	0.713	0.812
	Att2	0.534		0.50		
	Att3	0.664		0.71		
	Att4	0.657		0.70		
	Att5	0.642		0.67		
	Att6	0.586		0.62		
	Att7	0.575		0.64		
	Att8	0.664		0.72		
Subjective norm	SN1	0.594	0.856	0.66	0.703	0.909
	SN2	0.625		0.32		
	SN3	0.612		0.74		
	SN4	0.209		-		
	SN5	0.676		0.80		
	SN6	0.631		0.78		
Intention	Int1	0.606	0.912	0.64	0.612	0.812
	Int2	0.591		0.63		
	Int3	0.606		0.64		
	Int4	0.513				
	Int5	0.570		0.64		
	Int6	0.573		0.66		
	Int7	0.439		0.54		
	Int8	0.420		0.52		

AVE: Average variance error, CR: Composite reliability

successively they will intend to use the IWEP model. This result is consistent with the findings from (Suki and Ramayah, 2010); (Brown, 1999); and. They found that attitude to actual behavior would improve the predictive power of the model. The results of this study also shows that the path for the subjective norm and intention is non-significant (β = 0.17, t = 1.032, P > 0.05) which does not support our hypothesis as shown in section 1.3.3. This result is not consistent with the findings from (Ramayah and Suki, 2006); (Gopi and Ramayah, 2007); (Chen and Hsu, 2006) who found strong relationship between subjective norm and intention. By searching literature, we found that there are some studies who also found subjective norm as the weakest link in intention model (Tarkiainen and Sundqvist, 2005); (Han et al., 2010).

The findings of the study confirmed the efficacy of the TRA theory as a research model in the case of rice farmers in Malaysia. The contribution of this work is that we tested to analyze whether the attitude and subjective norm can predict farmers' intention to use the IWEP model. If we find the positive attitude of the farmers' towards IWEP model, it can be proposed as an alternative solution for the farmers to adopt the climate change. In analyzing the result of the SEM, we can relate the result and the hypothesis. In the case of hypothesis testing, based on the TRA, there is two hypothesized acceptance factor which are attitude and subjective norms. The SEM result had shown that for the first observed variable tested, which is attitude; the coefficient is significant and the t-value falls within the critical ratio, therefore supporting the first null hypothesis which states that the attitude towards behavior of farmers significantly (positively) affects their intention to use integrated cash waqf environmental protection model. The possible explanation for this result could be related back to the respondents' knowledge on the cash waqf system. The notion of having knowledge on the subject matter of cash waqf and knowledge on the practical usage of it had made them be more comfortable towards accepting the IWEP model. Besides having knowledge, the respondents, which in the majority are Malays and Muslim, had possibly assigned a positive attitude towards cash waqf. The reason behind this is that Malays had religious affiliations which made them be more inclined to accept the IWEP model as a way to overcome the adaptation barriers that they are currently facing. Apart from having knowledge on waqf operations, the knowledge about climate change also can contribute towards a positive inclination to accept the IWEP model. This is because if the farmers did not know about climate change, they might feel like it is not a serious threat to their livelihood and will view adaptation process as something unnecessary. The high percentage of the farmers having awareness and knowledge on climate change can be referred to the reliable sources of information that they commonly use; that is the television and the newspapers. The farmers, besides relying on newspapers and television to realize about the climate change occurrence; also are aware of natural indicators such as the rainfall, temperature, drought and also flood occurrence.

The attitude towards IWEP can also be based on the farmers' attitude towards climate change. In this study, it is found that half of the respondents indicated a concern on climate change. This result indicating that they feel that climate change is a real threat. This notion can alter their inclination to be more towards accepting IWEP model. The participation rate in the existing government assistance programs, however, shows an alarming discovery. The majority of the respondents did not participate in the government assistance programs and the possible reason is that they feel like they face many hindrances to apply for the assistance. Besides the hindrance, the farmers also had attributed that there are many parties that contributed to the climate change as opposed to blaming themselves as one of the parties contributing to climate change. Based on this belief they held, there is a possibility that the farmers did not subscribe to any adaptation programs or assistance as they feel like the parties causing climate change is responsible for their doings.

The second observed variable tested; which is the subjective norm, had yielded an insignificant coefficient and t-value. The

Figure 3: Map of Kedah. Source: http://www.mada.gov.my/

Table 15: Convergent and discriminant validity

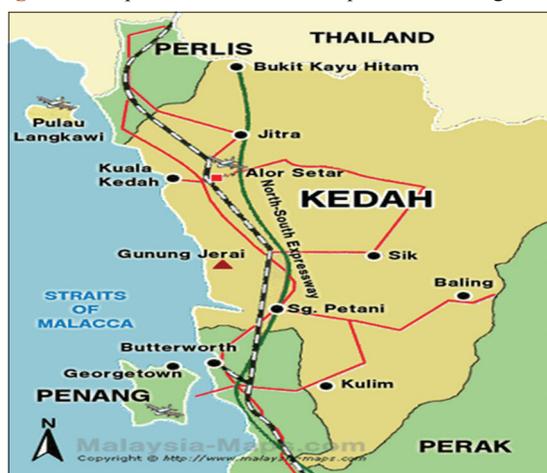| Hindrances	CR	AVE	Attitude	Subjective norm	Intention
Attitude	0.812	0.713	0.760		
Subjective norm	0.909	0.703	0.552	0.749	
Intention	0.812	0.612	0.295	0.640	0.716

CR: Composite reliability, AVE: Average variance error

Table 16: SEM results

No	Hypotheses	Estimate	CR	Hypothesis supported
H₁	Attitude towards the behavior of farmers significantly (positively) affects their intention to use IWEP model	0.49	5.32***	Yes
H₂	Subjective norms of the farmers significantly (positively) affects their intention to use IWEP model	0.17	1.023	No

SEM: Structural equation modelling, IWEP: Integrated Waqf environmental protection, CR: Composite reliability

t-value for this variable is less than the critical point making the null hypothesis which claims that subjective norm of the farmers significantly (positively) affects their intention to use IWEP model to be rejected in favor of the alternative hypothesis. The possible explanation for this result could be related back to the age and experience factor of the farmers. Based on the demographic result obtained from the questionnaire, the farmers in the majority are coming from an elderly stage of age, making them be less susceptible to accept or value the opinion of those who matters around them. In addition to the age factor, the majority of the farmers had responded that they possess experience in farming, which could possibly denote that they had been accustomed to making their own decisions in their farming practices, making them be less inclined to value the opinion of those who matters around them.

The path analysis had shown a result that somehow contradicts the TRA that was being referred to in the process of constructing the model. In the TRA, both attitude and the subjective norms had a fair share in influencing the acceptance of the respondents towards the suggested model. In this case, however, the subjective norms had not yielded a significant t-value, suggesting a non-significant relationship. As explained earlier, there could be those factors and also probably other factors that contributed to this result. This finding is, however, not unusual. There is another study that found the subjective norms to also be a poor predictor of the intention to perform; which they justify through the low involvement of those who matters in the choice of food. This is due to the fact that the choice of food is acknowledged as a personal choice or habitual behavior (Hansen et al., 2004).

2. CONCLUSION AND POLICY IMPLICATIONS

The result of the SEM shows an alarming result that suggests although the model is developed to cater for their needs, the acceptance of the farmers still play a crucial role in determining whether it will work. In other words, if the farmers choose not to implement the model in order to overcome the barriers of adaptation, all the effort in developing the model will go in vain. In order to prevent such unfortunate thing from happening, the government can implement policy, like the policies that exist for the pollution correction. The government can either make the climate change adaptation process as a process that will gain incentives on the farmers' side, so the farmers will be motivated to implement the IWEP model to help them to adapt to the climate change. This includes granting subsidies for farmers' that wants to adapt to the climate change using the IWEP model. Besides incentives, another way can be the imitation of the command-and-control. The government can make it compulsory for the farmers to subscribe to the IWEP in cases of natural calamities that result from the climate change.

In an effort to ensure that the IWEP model is being fairly implemented, the government can imitate the approach that is used widely in pollution abatement process, which is the 'command-and-control' approach. The 'command-and-control' approach is a way to solve the market failure due to the externalities caused by pollution. This method uses pollution limits or technology-based restrictions. The methods include setting the standard or making it compulsory to adopt certain technology to keep the pollution at the desired level. The case of polluters is ultimately different from the farmers' case in the sense that the polluters are the parties that have a control on the damage they caused and are going to cause, while the farmers are the victims of natural occurrences. There is, however, a plausible way to adapt the pollution abatement approaches for the farmers in order to ensure that the IWEP model is being implemented. This is due to the fact that although the role of polluters and the farmers are different but they will, however, work towards recovering or abating the impact that happens to their surroundings.

The existing "command-and-control" approach in environmental economics consists of multiple methods such as setting ambient standards; or the maximum allowable pollutant level, technology-based standard; or setting a specific equipment to be used to reduce pollution, and the performance-based standard; or setting the limit but not specifying the technology should be used. All of these methods intend to reduce the damage done to the environment; therefore these can also be applied in the case of the farmers, definitely with slight modification. In adopting the "command-and-control" approach, the government can make it compulsory for the farmers to subscribe to the IWEP model in order for them to recover from the impacts of climate change such as natural calamities.

The market approach is another approach that is widely used in environmental economics in order to abate pollution. This approach uses incentive-based policy tools in order to provide motivation to abate. The incentives are mainly through the market forces such as subsidies and taxes that are imposed to encourage abatement or discourage pollutions. This approach can be imitated to motivate the farmers in order to be more inclined to choose the IWEP model. There are few methods in the market approach such as the pollution charges; where there will be fee charges to the polluters that varies with the quantity of pollutants released, subsidy; a concession that provides financial aid for pollution reduction, deposit or refund; the payment for positive action that counters potential pollution, and pollution permit trading system; the establishment of market for rights to pollute (Callan, 2010). In the case of the farmers, they can be provided with subsidies or tax cuts in order to provide encouragement or motivation to be more inclined to use IWEP model. Lastly, it is suggested that waqf institutes can recognize the power of the social media to propagate the data about the IWEP model. Furthermore, the government can conduct the awareness programs or campaign to the farmers. In this room, farmers can receive funding for their intention to use IWEP model.

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APPENDIX

Attitude						
1	Engaging in IWEP model is fair	1	2	3	4	5
2	Engaging in IWEP model is valuable	1	2	3	4	5
3	Engaging in IWEP model is pleasant	1	2	3	4	5
4	Engaging in IWEP model is beneficial	1	2	3	4	5
5	Engaging in IWEP model is suitable	1	2	3	4	5
6	Engaging in IWEP model is fulfilling Shariah principles	1	2	3	4	5
7	Engaging in IWEP model is in line with my social values	1	2	3	4	5
8	Engaging in IWEP model is in line with my religious values	1	2	3	4	5
Subjective norm						
9	Most people who are important to me think that I should use this IWEP model for financing purposes	1	2	3	4	5
10	Most people who are important to me think that I should use this IWEP model for enhancing my skills	1	2	3	4	5
11	Most people whose opinion I value would approve my action to use this IWEP model for financing purposes	1	2	3	4	5
12	Most people whose opinion I value would approve my action to use this IWEP model for enhancing my skills	1	2	3	4	5
13	It is expected of me that I should use IWEP model for financing purposes	1	2	3	4	5
14	It is expected of me that I should use IWEP model for enhancing my skills	1	2	3	4	5
Intention to perform						
15	I intend to use IWEP model if it is offered	1	2	3	4	5
16	I will try to use IWEP model if it is offered	1	2	3	4	5
17	I will frequently use IWEP model if it is offered	1	2	3	4	5
18	I plan to use IWEP model if it is offered	1	2	3	4	5
19	It is important for me to use IWEP model if it is offered	1	2	3	4	5
20	I have strong intention to use IWEP model if it is offered	1	2	3	4	5
21	I will strongly recommend IWEP model to others	1	2	3	4	5
22	I will definitely opt for IWEP model in the future	1	2	3	4	5

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