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Farmers' intention and decision to adapt to climate change: A case study in the Yom and Nan basins, Phichit province of Thailand

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ABSTRACT

Adaptation at farm level is an effective measure to cope with global climate change. The study aims to clarify farmers' intentions and decisions regarding global climate change adaptation. Logistic regression models were used to examine the influences of socioeconomic factors and climate adaptation communication processes on farmers' decision to apply adaptation strategies against drought and flood. Specifically, for a thorough understanding of non-adapting farmers, the theory of planned behavior was incorporated, to assess these farmers' intention to adaptation. Results showed that farmers' perceptions were consistent with the weather data over a short period, reporting a rise in temperature and a greater decrease in precipitation. Agricultural experience, farm income, training, social capital, and effective climate adaptation communication were statistically significant in increasing the probability of farmers' adaptation. For farmers who do not perceive climate change but adapted nonetheless, social capital played a major factor, driving their belief in, and behavior to adaptation, of which the most important aspects were neighbors and peer groups. Farmers' intention to adapt was mostly affected by perceived behavioral control factors, followed by attitude and subjective norms. Therefore, successful policies to enhance farmers' perceptions and adaptive capacity can encourage both actual and intended adaptation farmers. Adaptation strategies require the participation of multiple players from all related sectors engaging with local communities and farmers.

1. Introduction

Climate change damages farming productivity and the success of agricultural initiatives (Mikhail et al., 2010). In particular, precipitation, and temperature changes present the main risk, increasing extreme climatic events, such as floods and droughts worldwide (Petley, 2012). Southeast Asian countries, such as Thailand, are already experiencing climate change and the increased frequency of climate-related hazards, like droughts and floods, which have resulted in substantial impacts in many areas (Ono et al., 2010). In 2010, Thailand faced its worst drought in the past 20 years, leading to the lowest water level of the Mekong River in 50 years (Marks, 2011). In 2011, the greatest flood recorded in Thailand struck the Chao Phraya basin and caused tremendous damage in northern and central Thailand (Komori et al., 2012). Empirical evidence proves that climate change adaptation enables a reduction in its impacts, the protection of poorer farmers' livelihoods, and the enhancement of possible potential advantages (Gandure et al., 2013). Consequently, appropriate adaptation strategies and support policies are crucial to anticipate the nature of expected changes, and to understand how climate change and its associated hazards are perceived, experienced, and responded by local farmers.

Farmers' adaptation to climate change, behavior and decision making can be affected by socioeconomic factors, which have been investigated in various countries (Beermann, 2011; Mariano et al., 2012; Figueiredo and Perkins, 2013; Tessema et al., 2013; Wamsler et al., 2013; Duan and Hu, 2014; Obayelu et al., 2014;

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Uddin et al., 2014; Abid et al., 2015; Bahinipati and Venkatachalam, 2015; Komba and Muchapondwa, 2015; Wang et al., 2015; Masud et al., 2016). Although these factors have been highlighted and explained well in previous studies, communicating adaptation to climate change (CACC) is gaining an increasingly crucial role in promoting functional adaptation (Baowei, 2011). Also, it has been widely reported that farmers' behavior potentially influences the decision-making process; namely, socio-psychological factors (Epstein, 1994; Grothmann and Reusswig, 2006). In the context of the Thai society, climate change adaptation was based on local case studies, using a qualitative method to analyze vulnerability, risk assessment, adaptation techniques, and management used (Kerdsuk et al., 2011; Kansuntisukmongkol and Boontun, 2012; Kasemsap et al., 2013; Kerdsuk et al., 2013; Konisranukul, 2013; Panyakul et al., 2013; TEI, 2013; Thitiwate and Promburom, 2013; Suta et al., 2014). However, no studies have been carried out on climate adaptation communication processes and farmers' behavior, along with socioeconomic factors, particularly in Thailand. Importantly, farmers who do not adapt at present have puzzled policymakers when generating policy options. There is, therefore, an urgent need to successfully initiate key steps for comprehensive climate adaptation strategies at both national and local levels. Furthermore, understanding the current farmers' action in their socioecological context is paramount to identify the types and boundaries of planning policies in the future.

This study aims to clarify farmers' intention and decision to adapt to global climate change. Specifically it examines the influence of socioeconomic and CACC characteristics on farmers' decision to apply adaptation strategies against drought and flood, using an econometric approach. For a thorough understanding of current non-adapting farmers, the socio-psychological approach using the theory of planned behavior (TPB) was also incorporated, to assess these farmers' intention to adapt. This research intends to not only advance knowledge of Thai farmers' perception and intention to adapt to climate change but to also contribute to the international literature on these issues.

2. Literature review

2.1. Empirical specification of econometric approach variables

Adaptation to climate change is defined as the decision-making process and a set of actions undertaken for maintaining the capacity to cope with current or future predicted change (Nelson et al., 2010). It is a dynamic process shaped by institutional, cultural, and socioeconomic contexts (Amaru and Chhetri, 2013). Adaptation strategies are not only actions that reduce or avoid the effects of specific environmental changes but also take advantage of opportunities for well-being and survival (Cooper et al., 2008). There are three main types of adaptation: anticipatory adaptation, which takes place before the impact of climate change; autonomous adaptation, by which the action does not constitute a conscious response to climatic stimuli, but rather chooses to adapt autonomously; and planned adaptation, which is the result of a deliberate policy decision. Adaptation is required to return to, maintain, or achieve the desired state based on an awareness that conditions have changed or will change (Thornton and Manasfi, 2010).

The main factors influencing farmers' adaptation to climate change have been researched in various countries and have both positive and negative influence. The specific positive variations include: being male and/or head of the household; having a high education; having a high farm and non-farm income; having a large household and farm size; better access to credit; close relationships among farmers; owning a cultivated area; and attending training courses (Mano et al., 2003; Maddison, 2006; Quan, 2006; Yirga, 2007; Buyinza and Wambede, 2008; Gbetibouo, 2009; Deressa et al., 2011). The further the distance from farms to agriculture inputs and output markets is a specific negative variation (Mano et al., 2003). Therefore, all of these factors should be examined to understand farmers' adaptive behavior.

2.2. CACC

The communication factor should be considered to enhance more effective adaptation to climate change, as suggested by Moser (2010) and Baowei (2011). Regarding communication theory, the "5W model" of Lasswell (1948) can be used as a guide for analyzing all elements of adaptation communication thoroughly. This model consists of the five basic elements of the communication process: sender (who), content (says what), media (in which channel), audience (to whom), and effect (with what effect). Therefore, CACC characteristics should include receiving information from trusted senders, with a proper and visualized message of adaptation techniques, through accessible communication channels, being satisfied with the adaptation techniques, and receivers (farmers) being convinced regarding adaptation (FAO, 2010; Pfefferkorn, 2013; Corner and Clarke, 2014). The effect of communication can be proved from the response of local farmers while collecting data.

2.3. TPB

TPB is one of the socio-psychological approaches, which is widely used to identify farmers' intention and behavior (Borges et al., 2014). The TPB is an extension of the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), which predicts the intention to perform a particular behavior, based on three factors. These are attitudes towards the behavior (ATT), which can be either positive or negative; subjective norms (SN) i.e. social pressure to adhere to the certain conduct, and perceived behavioral control (PBC) i.e. to what extent the individual perceives they have control over engaging in the behavior. According to the TPB, people perform a behavior with positive environmental outcomes if they have a positive attitude towards them, if other people expect them to act in that way and support them in doing so, and if they perceive themselves as being able to implement their intentions (Klöckner, 2013; Chen, 2016; Chin et al., 2016).

3. Methodology

3.1. Conceptual framework

The assumption of this study is inspired by farmers' perceptions on climate change, focusing on temperature and precipitation changes from droughts and floods encountered over the past 10 years. Some farmers perceive change, while others do not. Likewise, not all farmers adapt to climate variability. The drivers behind their responses may be due to both internal and external factors influencing their adaptation behavior, which seem to be complex in their decision-making processes. Consequently, understanding farmers' perceptions and intentions to adapt to climate change, by integrating socioeconomic and CACC factors, need to be investigated and publicized worldwide. This occurrence will lead to a more conspicuous social desirability, obtain more valuable information, and improve the understanding of farmers' behavior. Enhancing the adaptive capacity to climate change from a global perspective requires a supporting policy to promote farmers' perception and behavior to adapt to climate change. This is crucial

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