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Investigating farmers' knowledge about climate change in Iran

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Abstract

Climate change is a reality, one of the most threatening global environmental changes and a gravest challenge for the mankind in the present century. Climate change poses severe threats to agriculture sector, rural livelihoods and food security particularly in developing country. Mounting evidence has revealed that farmers can effectively manage this negative impact by adapting their farming practices to climate change. However, it is a common belief that more information and knowledge about climate change will lead to a better understanding of the phenomenon and adaptation options. Therefore, farmers need to refresh and continually update their knowledge about climate change to raise their potential capacity and output in the facing of climate change impacts. As such, an in-depth understanding of the various layers of factors that shape farmers' knowledge and their adaptive responses is a prerequisite for well-targeted agricultural adaptation planning. Therefore, the aim of this study was to investigate factors affecting knowledge of wheat growers about climate change and the associated impacts in Kermanshah County in western Iran. To achieve this study goal a quantitative study (survey methodology) was used. A multi-stage random sampling technique was used to select 350 farmers to data gathering. Data were collected through a questionnaire with confirmed internal reliability and validity. The present study provides a justification for programs that intend to encourage farmers' adaptation behaviour against climate change impacts.

Keywords: Climate Change, Knowledge, Agriculture Sector, Structural Equation Modeling

Introduction

Climate change is a reality (Granderson, 2014), one of the most threatening global environmental changes (Salehi et al., 2016). Climate change has affected all sectors and levels of society and ecosystems worldwide (Azadi et al., 2019a, b; Bozorgparvar et al., 2018). Therefore climate change has become a key issue among policymakers, businesses, industries, researchers, and the general public in many countries (Cismaru et al., 2011).

Climate change poses a severe threat to agriculture and rural populations around the world, with the potential to devastate lives and livelihoods (Zobeidi et al., 2016; Boazar et al., 2019; Yazdanpanah et al., 2011). Findings by Nelson et al (2009) have indicated that climate change may cause yield losses ranging from 3 to 30%, and the extinction of 15–37% of land plants and animal species by 2050. According to the 2007 IPCC report, rain-fed crop yields will decline by 10–20% by 2050, and crop revenue may decrease by 90% by 2100. Furthermore, the 2008 IPCC report (Bates et al., 2008) confirms that climate change has led to a decrease in the production of cereals such as rice, maize, and wheat in many parts of Asia. Farmers need to adapt their farming methods and land management decisions to reduce the negative consequences associated with

climate change. Understanding farmers' beliefs and perceptions regarding climate change is a good starting point for addressing current and future policy.

Knowledge may cause a reduction in fear because people get more acquainted with the risk. On the other hand, understanding the hazard and its consequences may intensify risk perception (Bosschaart et al., 2013). Various studies have shown that people with higher levels of hazard knowledge are more likely to adopt hazard adjustments (Bosschaart et al., 2013). Therefore, a key factor regarding farmers' adaptation with climate change is knowledge about climate change. Kabir et al (2016) have argued that knowledge of climate change is a necessary precursor for people to adapt appropriately. According to a U.S. survey, accurate knowledge of global warming was the strongest single predictor of behavioral intentions (Sundblad et al., 2009). Baptiste (2018) has argued that knowledge are important elements for encouraging climate change behaviors. He added that the most common reason for the lack of adaptation is inadequate knowledge. This refers to knowledge in terms of what the appropriate measures for adapting to the perceived and observed threats of climate change are (Baptiste, 2018). Therefore, the aim of this study was to investigate factors affecting knowledge of wheat farmers about climate change and the associated impacts in Kermanshah county in western Iran.

Factors influencing knowledge

Salehi et al., (2016) have argued that environmental attitude, trust and personal efficiency have influence on their knowledge of climate change. Studies have shown a positive association between environmental knowledge and self-efficacy (Milfont, 2012). Heath and Gifford (2006) and Bord, O'Connor, and Fisher (2000) examined the effect of the New Environmental Paradigm on the understanding of climate change. Their results indicate that environmental attitude has an impact on the understanding of complex environmental issues such as climate change. As stated by Karimi (2006) in Salehi et al., (2016) "Environmental attitudes are conceptualized in terms of attitude theory as being composed of beliefs and affect toward an object". Aksit et al (2018) have argued that trust toward scientists may play a significant role in shaping people's understanding and perceptions about climate change. Milfont (2012) has argued that there is an association between knowledge and concern. The independent variables that may affect farmers' knowledge regarding climate change are presented in Figure 1.

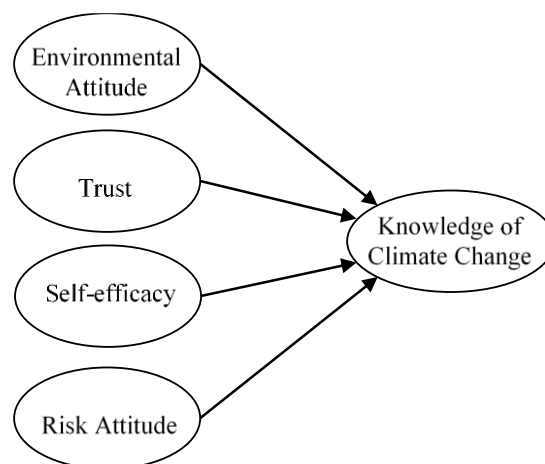


Figure 1. Theoretical framework of the research.

Material and Methods

In this study a survey research method was used and the main tool for data collection was a questionnaire. Study population was all wheat growers of Kermanshah County (N=30000). Statistical sample was 380 wheat growers as determined by Krejcie and Morgan table. A Multi-Stage Cluster Sampling was used to collect data from growers using questionnaire. A panel of

experts confirmed the face validity of the questionnaire. The questions were scored on a 1–5-point scale (very low, low, moderate, high, and very high). Moreover, Cronbach’s alpha reliability coefficients for the pilot study assessment were employed to refine the questions to be prepared for the final questionnaire (0.785 to 0.905).

Results and Discussion

Regarding demographic variables, the age of the participants ranged from 25 to 84 with a mean value of 48.67 years (S.D. = 12.47). The sample consisted of 13 female farmers (3.7%) and 337 male farmers (96.3%). The majority of the participants (26.6%) had a high school equivalent degree. Some (25.1%) had primary education, 19.4 percent high school, 8.6 percent had a college degree and 20.3 percent had no education. The mean farm size for rain fed farmer and arable farmland farmer respectively was 7.49 and 2.59 hectares.

To test the hypotheses between variables in our proposed model a structural equation modeling (SEM) using AMOS 22 was conducted. The results of SEM revealed that the (standardized) path coefficients indicate the strengths of relationships between the variables (Figure 2).

Knowledge of climate change was selected as the dependent variable and environmental attitude, trust, self-efficacy, and risk attitude as independent variables and entered into the SEM (Fig. 2). Path relationships revealed that the environmental attitude, trust, and risk attitude are significant predictors of the knowledge of climate change. These variables predicted about 25% of the variance in knowledge of climate change. Environmental attitude appears to contribute most to the model ($\beta=0.31$, $p < 0.0001$), followed by risk attitude ($\beta=0.18$, $p < 0.002$) and trust ($\beta=0.14$, $p < 0.013$). Paths from self-efficacy to knowledge of climate change were not significant.

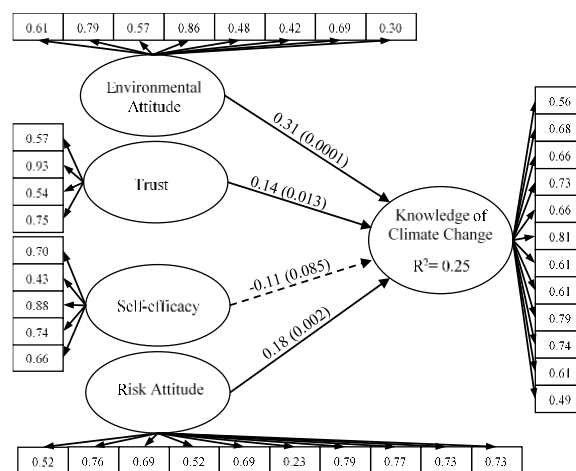


Figure 2. Structural equations modelling and path coefficients.

Conclusions and Outlook

This study contributes to the growing body of literature on farmers’ knowledge about climate change and factors affecting their knowledge about climate change. We used SEM analysis to determine factors that influenced farmers’ knowledge. Our results revealed that environmental attitude is very important on explaining farmers’ knowledge, follow with trust and risk attitude. Findings from this study will help policymakers and agriculture extension researchers implement policies that can help to improve farmers’ knowledge about climate change (Yazdanpanah & Feyzabad, 2017). Policymakers need to pay attention to the various factors that influence farmers’ knowledge about climate change. From a practical point of view, the present study provides a justification for using environmental attitude, trust and risk attitude dimensions in policies and programs that intend to improve farmer’s knowledge about climate change.

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