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Original Research Article

An empirical analysis of effective factors on farmers adaptation behavior in water scarcity conditions in rural communities

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ABSTRACT

This paper investigates the effect of factors on Farmers Adaptation Behavior in Water Scarcity Conditions in Rural Communities of Sabzevar, Iran. A survey questionnaire was used for collecting data, the study population was 120 farmers in rural Sabzevar County selected based on the Cochran formula. A questionnaire was designed for the target group for the measurement of on farm adaptation behavior in water scarcity conditions. Research models were drawn using structural equation modeling and the relationships between latent variables and indicators. The findings indicate that there is a significant relationship between awareness and adaptation behavior. Meanwhile, there is a significant relationship among network and media on farmer's perception about water scarcity and their activities toward better management of water in the critical condition. There are also significant relationships among perception and awareness with intention however, intention do not effect on adaptation behavior strongly. In other words, even the that means farmers had information about crisis, they are not able to have not operational plans to confront the water scarcity conditions.

1. Introduction

Water is considered a vital source because of its impact on the ecological functions (Hurlimann, Dolnicar, & Meyer, 2009), its role in economic-social development programs (Abdullaev, Kazbekov, Manthritilake, & Jumaboev, 2009; Allan, 2005), inclusion of cultural and religious values (Foltz, 2002), inclusion of aesthetic and intrinsic value (Molle, Mollinga, & Meinzen-Dick, 2008), and finally its constant amount in the world (OhIsson, 2000). It is predicted that water will be as valuable as oil in the current century (Qadir, Boers, Schubert, Ghafoor, & Murtaza, 2003). Therefore, water conservation, which means more productivity per unit of water consumption, is considered a key factor in order to maintain life and food security (Ratnakar & Das, 2006). Water dependency is not limited only to a specific group or community; however, water plays a very important role in the rural development due to the high dependence of rural population on the agricultural production or activities (Ward, Dargought, Minasyan, & Gambarelli, 2005). The proper management of water resources is essential due to the geographical location of Iran on the earth and its arid and semi-arid climate, and its average rainfall which is lower than the average rainfall of earth (Soleimani, SayarIrani, Sabbaghi, & Faridi, 2009). According to the statistics, the highest amount of water is consumed in the agriculture in all countries. Due to the increase in the population, it is expected that the water consumption will be increased in the agricultural sector; and this will lead to the competition and conflict to access to water resources along with industrial development and rapid population growth (Hartley, 2006). More than 90% of exploited water of Iran is consumed in the agricultural sector (ZareiDastgerdi, MokhtariHesari, & Shabanalifami, 2006).

Since the beginning of human civilization, the drought has had severe and sometimes catastrophic effects on the biological human activities throughout the world. Drought in itself is not considered as a disaster, but its impact on the people and the environment determines whether it is catastrophic or not, so understanding its natural and social dimensions is the key point in understanding the drought. According to the conducted studies, Iran is constantly exposed to the natural disasters so that 31 out of 40 disasters in the world occur in Iran. In this regard, the drought is among the major natural disasters which lead to the huge losses for water resources. It is argued that the drought is more complicated than the other natural disasters since it covers a wider range. On the other hand, this creeping disaster affects more population, and is in fact the most costly natural disaster in terms of reduced agricultural production and than the other unexpected natural disasters in Australia from 1945 to 1975. Furthermore, all

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expenses caused by the drought are not specified and defined. We should better know the social effects of drought and its expenses and influence throughout the community, and ultimately whom it affects. The drought losses are much more than its direct losses, but it is difficult to identify and evaluate them because of their dispersed and inconspicuous nature, and thus they often remains unknown (YahyaAbadi & Rezayi, 2001). Nowadays, the drought is not only considered as an undesirable physical process, but also as an undesirable social process (Owens, Hoddinott, & Kinsey, 2003). It is expected that the number and severity of droughts will be increased in the future due to the increasing demand for water, limited resources and climate changes (Jafari, Shabanalifami, & DanshvarAmeri, 2012).

According to the reports of Food and Agriculture Organization of the United Nations (FAO) and the World Bank (FAO, 2005; World Bank, 2005), the reduced water resources and inefficient use of it have led tothe negative impact on the rural economy and undermined its basis. Some of the most important consequences of water crisis in Iran are the unemployment, immigration, insecurity and regional ground subsidence. According to an overview of the issue, water crisis losses can include social issues, economic and political issues which will lead to serious consequences if they are not properly managed. There are two overall strategies namely the increase in the water supply including the small and big-scale water supply and use of new water resources and water recycling from wastewater (Allon & Sofoulis, 2006), and the decrease in demand including the increased productivity of tools and limited water consumption or conservation (Hurlimann et al., 2009) in order to reduce the imbalance between the demand and capacity of water resources. The lack of acceptance by the public is the main obstacle to implementation of these mechanisms (Hurlimann et al., 2009). Therefore, it is very important to understand the mechanisms, under which the people support these activities and have adaptive behavior based on the stability, in this research according to the water scarcity and limited extracted water on the one hand, and the high levels of water consumption in the agricultural sector on the other hand.

2. Research theoretical framework

Environmental issues such as water scarcity generate a series of social views. Social studies should be conducted to achieve the correct knowledge and understanding of these issues at the level of individuals and groups in the society. (Lipchin, 2003). However, these behavior changes occur by changes in awareness and perception.

The *perception* is our sensory experience of surrounding world and entails recognizing the environmental stimuli and reaction to these stimuli. We obtain information about the environmental elements, which are crucial to our survival, through perceptual processes. The perception not only draws our experience of the surrounding world, but also allows us to take action in the environment. In short, the perception is the complex process of identifying the sensory information and understanding them. Furthermore, perception is a process through which individuals set and interpret their notions and interpretations of their environment, and thereby give them meaning (Robbins, 2007). Perception is a process which is at the center of any environmental behavior because the environment is the source of the information. The environment stimulates all senses and encounters the person with information over his processing power; hence, nothing is like feeling, but it is the result of individual processing through his cognitive experience (Mortazavi, 2002).

Habiba et al. conducted research entitled the "farmers' perception of drought in northeastern Bangladesh". The results indicate that the farmers have properly understood the climate changes and drought in the past twenty to thirty years. They believe that the temperature of earth is constantly changing. Most of them believe that the duration of rainfall and the number of rainy days and amount of rainfall are reduced. Furthermore, the increase in day length in the summer and decrease in day length in the winter are considered as climatic changes (Habiba, Shaw, & Takeuchi, 2012). These results are similar to the results of other researchers in different regions. For instance, Madison points out that a considerable number of farmers in eleven African countries believe that the temperature is increasing and rainfall is reducing (Maddison, 2007).

Dessai et al. studied farmers' perception of drought and climatic change in southeast England. According to the results, a majority of farmers believe that they have understood the risk of increased drought. In general, 48% of respondents believe that the precipitation is unchanged in their areas. Most of the farmers found the climatic changes such as reduced rainfall, shortened rainy season and winter (Dessai & Sims, 2010).

The *awareness* refers to the concern for environmental problems. In other words, an aware person realizes dangers and difficulties and knows that he may suffer from the consequences of the problem, so he is worried about it. When an environmental problem is realized, the awareness will improve and increase the understanding. A farmer is aware of water scarcity because it may affect productivity (Sudarmadi et al., 2001). Bayard et al. studied the Haitian farmers' knowledge and perception of land degradation as an environmental behavior. They utilized the theory of rational behavior in their study. According to the results, the perception of land degradation severity affects the determination of farmers' attitude to the environment, so that it probably plays an important role in inducing the farmers' awareness and changing their attitude. Much awareness of the environmental degradation has changed the farmers' incentives to change the behavior. This study clarifies the intermediate role of awareness in explaining the relationship between the farmers 'perception of sensitivity to land degradation and their perception of and degradation severity and their environmental behavior (Bayard & Jolly, 2007).

According to research entitled the "Adoption of soil conservation technologies in Zarrin-Gol Basin of Golestan province in Iran" by Mahboubi et al., there is a significant relationship between the awareness of effects by the soil conservation practices, the number of educational courses attended by the farmer, the amount of conservation information obtained from Radio and educational pamphlets with the adoption of soil and water conservation practices (Mahboubi, Irvani, Rezvanfar, Kalantari, & MohseniSaravi, 2005).

Nordlund and Garvill (2002) studied environmental behavior by investigating the effects of factors such as personal norms, awareness, issues and values on the environmental behavior. According to their results, there is a significant positive correlation between the personal norms and awareness of issues with environmental behavior. Furthermore, the environmental value has a significant positive impact on the personal norms and awareness, but the human-based value has a negative impact on the awareness of issues (Nordlund & Garvill, 2002).

The *intention* is a sign of individual's readiness for behaving and it is called as a quick context for behavior. The intention of attitude toward the behavior, subjective norm, perceived behavior control with any weighted predictor for it and their importance is related to the public behavior and interest.

The intention is a strong predictor of behavior. The general motives (A, SN, PBC) are the predictors of intention. Fishbein and Ajzen define the intention as follows:

According to the basic psychological principle of relationship