Analyzing the Barriers and Challenges against Optimized Water Consumption in the Agriculture Sector at Gonbad-e-Kavus Rural Areas

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Extended Abstract

1. Introduction

The reduction of water supplies and unprincipled consumption coupled with lack of attention to its resulting challenges have brought about numerous issues for agriculture and the economic status of Iranian rural residents at a macro scale. Accordingly, paying attention to the management of water consumption has shifted from a secondary issue to a substantial problem (FAO, 2055, p. 56). According to UN reports, 72.3% of water supplies in Iran has already been used, placing the country under severely critical conditions; subsequently, water shortage is considered as an ecological reality in the agriculture sector. Therefore, given the population growth and increasing demand for water resources, it is vital to seek out solutions in line with optimized water consumption which is addressed in the present study.

2. Review of Literature and Theoretical Framework

Considering the 1170 m^3 of water per capita in Iran (one seventh of the global average), the country is faced with severe water crisis; in this regard, water supplies have shrunk from 220 billion m^3 in 1961 to less than 90 billion m^3 and 149 billion m^3 in 2015 and 2017-18, respectively. Certain researchers believe that Iran currently suffers from "water bankruptcy", pointing out seventeen factors as the main accelerators of the current issues in the area of water supplies which include: rapid population growth, expansion of immigrations and urbanization, inadequate infrastructure for water distribution, declining levels of groundwater supplies, inefficient agriculture, the aspiration for food self-sufficiency, increased demands for water, water and cheap energy, construction of dams and unregulated digging of deep wells, drought, flood, climate change, thirst for development, unfinished hydraulic missions, sanctions and economic instability, unsuitable structure in governance over water, and low levels of environmental

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awareness. As a result, it can be observed that aside from climate change and frequent droughts, the status quo of water supplies in Iran is the result of years of mismanagement and incorrect understanding of the concept of development. Through this perspective, the current drought in Iran can be considered as "human drought" or "socioeconomic drought" (Madani et al., 2016); moreover, it is apparent that water supplies in Iran have not been utilized in a principled, developmental manner (Khashe'ei Siouki, 2011). Subsequently, this sector is now faced with severe limitations which, according to the documents on the fourth, fifth, and sixth Socioeconomic and Cultural Development Programs of Iran, involves natural, social, economic, and administrative factors and barriers. The present study is an attempt identify and compare the most important barriers and factors against optimized water consumption in the agriculture sector using the views of experts and operators in the region of the study. Furthermore, a number of suitable strategies are presented in line with mitigating these challenges.

3. Method

The purpose of this study is to identify the barriers and challenges against optimized water consumption in the agriculture sector. It is an applied study conducted using the exploratory and descriptive-analytical methods. The required data were collected by seeking the opinions of 56 experts working in Gonbad-e-Kavus executive and educational bodies on the field of water and agriculture as well as 405 farmers from 6 villages in this town; sample population was indicated using Cochran's formula. The collected data were analyzed using softwares including SPSS and SMART-PLS (structural equations and least squares).

4. Results and Discussion

Given the obtained results, the most important challenge that affects optimized water consumption from the view of experts was identified as "the social factor"; it consists of farmers' low literacy levels, inadequate presence of farmers' representatives in water-related affairs, farmers' willingness to cultivate products with high water requirements, farmers' lack of attention to cultivation with short-term farming periods, farmers' low level of awareness on products with early returns, farmers' unwelcoming attitude towards accepting and implementing modern irrigation methods, farmers' unacceptance of cultivation patterns, farmers' lack of awareness on the low efficiency of conventional irrigation, and their general lack of knowledge to subjects related to water and agriculture. The second effective factor that prevents optimized water consumption was identified as "the administrative factor" which entails lack of fair distribution of water in rivers and ponds' sub streams, weak integration of agricultural lands, eroded water transfer and distribution channels, expansion and digging of deep wells during previous decades, absence or erosion of water drainage systems and lack of serious attention to dredging of irrigation canals, absence of comprehensive plans for optimized water consumption in areas of regional water supplies and Jahad-e-Keshavarzi, vastness of the geographical region for water-related activities in Gonbad City, absence/inefficiency of rules and policies in the area of water and agriculture, lack of human resources in strict supervision over the activities of farmers and weakness in presentation of a comprehensive calendar plan as an administrative sub-index.

"Economic" and "Natural" factors were identified as the third and fourth effective factors. Meanwhile, farmers believe that the most important barriers and challenges respectively include "administrative", "economic," "social", and "natural" factors. Consequently, a significant difference was shown between the views of experts and farmers on barriers against optimized consumption of agricultural water with farmers expressing the "administrative" factor as the most important barrier.

5. Conclusion

The overall results obtained from structural equations suggest the model's strong fitness (GOF=0.55). Examination and analysis of various dimensions of challenges against optimized water consumption from the experts' perspective showed that the most important and effective barriers include social and administrative factors, respectively. Accordingly, the coefficient of determination for said factors were obtained as 0.802 and 0.513; economic and natural factors were identified in subsequent positions. Results obtained from structural equations were significant at 95% confidence level. It was also shown that the priority indicated by experts and farmers on the effectiveness of barriers and challenges against optimized water consumption were different; accordingly, farmers believe that the most important barriers respectively include administrative, economic, social, and natural. Meanwhile, experts placed the social factor and farmers' exclusive issues at the first position. There is also a significant difference in spatial-locational terms regarding the challenges against optimized water consumption. Results obtained from water efficiency index showed that despite their higher cultivation levels, the common products of the town including wheat, rye, and rice have lower efficiency and profitability (10.5%). Therefore, the current cultivation pattern of this city is not optimized, with a drastic difference in economic terms when compared to alternative scenarios. The results of this study is more consistent with those of studies by Taherabady et al. (2016).

Keywords: Challenges and Barriers against Optimized Water Consumption, Agriculture Sector, Rural Areas, Gonbad-e-Kavus Town

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