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Research Article

INFLUENCING FACTORS ON ADOPTION OF DRIP IRRIGATION FROM THE PERSPECTIVE OF HORTICULTURISTS IN IRAN

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ABSTRACT
The aim of this study was to determine influencing factors on adoption of drip irrigation in Iran. The methodological approach of this study was descriptive- correlative. The research population consisted of 3612 horticulturists, which was selected using stratified randomizing sampling method (n=331). Validity of the instrument was established by a panel of experts consisting of senior faculty members and research committee advisors. Reliability analysis was conducted by using and Cronbach alpha formula and result was 0.89. Variables of age, experience, garden acreage, orange garden acreage, yield, age of garden, number of garden piece, connect to experts, cost-benefit, social status, social participation, effect of extension- education activities and all of innovation characteristics with adoption of drip irrigation had been relationship of positive and significant. The results of the multiple regression analysis (stepwise method) revealed that the variables of garden acreage, number of garden piece, age of garden, age, connect to experts, social status, cost-benefit and yield in eight steps explained a variation of 51.8% of adoption of drip irrigation.

Keywords: *Adoption of Drip Irrigation, Horticulturist, Iran*

INTRODUCTION
Earth have 1400 million cubic kilometers of water is generally. Only 35 million cubic kilometers of water (2.5 percent) is fresh water. However, the agricultural sector accounted for the highest consumption of fresh water (Gumbo, 2011). In Iran, average annual rainfall of about 250 mm of rainfall in the world (860 mm) is much lower. The rainfall distribution is very disproportionate (Moussavi *et al.*, 2008). The efficient use of water resources is of major programs in different countries. In arid and arid countries, stability of aqueous systems requires the application of principles and planning is more accurate (Joanne *et al.*, 2010). Since the maximum amount of water used in agriculture and the highest rate of water shortage in this section are, therefore the need for efficient use of water resources in this section. In other words, agricultural water management is inevitable. Agricultural water management is a set of tasks between the four sectors of economic development, rural development, agriculture, water supply and environmental management (Soleimani and Bozer, 2012). Iran is located in a very sensitive position from the different views in the basis of the management of water sources. During the last three decades, this country has invested a lot in basic constructions, which apply 100 dams with saving capacity of 30 billion cube meters and irrigation networks for watering and providing drinkable water for urban areas (The Executive Branch of Agricultural Organization Project, 2009). After one period of fast extension of watery territory in the world that took place between 1950S until the beginning of 1980S (Kahrizi and Sangdel, 2001). Suresh and Kullkarni (2013) showed that integrated water resource management for efficient, equitable and environmentally sustainable, transparent and inclusive participation of all stakeholders is needed. Efficient and effective water management requires that all stakeholders in joint operations, management and protection of water resources take.
Maghsoudi *et al.*, (2013) in their research in Iran in the case of sustainable agricultural water management was concluded Plans and programs of the advantages of stability in rural communities through irrigation development projects do not have much information. Furthermore, increasing knowledge and skills related groups has a positive impact on the development and continuation of successful development. The second factor influencing the results of their research, budget, finance and funding mechanisms for the maintenance of water supply networks have been announced.

This Ponce Hernandes (2012), based on the factors affecting the management of resources showed that promote social capital, physical capital, alongside financial and human capital could influenced on improve water and soil productivity.

Domench and Ringler (2013), in their research in South Africa have concluded irrigation on health, nutrition, environmental sustainability and poverty reduction, and therefore has an important role due to the increased production of food irrigation programs to reduce poverty in an integral component of strategies has become.

Mohammadi *et al.,* (2013) concluded that more than %70 of farmers was faced with water shortage. There are significant negative relationships between farmers' perception of water scarcity and variables such as depth of water in wells and also there are significant positive relationship between these variables and challenges such as water conveyance channels and water volume. Hosseini *et al.,* (2011) showed the factors influencing the adoption of indigenous knowledge in agriculture water management. These factors, on the amount of their impact, are classified into four groups, namely, social factors, educational factors, economical factors and administrative factors.

Ommani (2011) showed the expanding role in promoting the realization of sustainable water resource management in agriculture. %52.8 of respondents said they were very important to protect water resources in support of sustainable water resources management in agriculture. Hosseini *et al.,* (2010) concluded that seeing other farmers using indigenous knowledge will affect them.

They also said that farmers would prefer to see sample farmers to adopt irrigation techniques. Management factors contribute to the adoption of indigenous knowledge in agriculture water management, too.

Fraiture and Wichelns (2010) expressed that while at the same time in different areas of water scarcity in agriculture is rising, water demand by the users is extremely competitive to get water. Narayan (1995) showed that in all cases, community empowerment, capacity building, enhancing skills and awareness and interested groups with regard to their participation in water management and how to achieve it, have a positive impact on the development and maintenance of cooperative activities of water users.

And also according to Tabrai *et al.,* (2011) transfer of operational management and maintenance of irrigation and drainage network extraction reduce the area of water resources and improve agriculture statues. They also expressed that the major problem about the management transfer is water shortages and lack of planning for the optimal use of water resources. Mahmoodi (2009) showed in a research that there is a significant relationship between the educational level of farmers, incomes satisfaction levels, social status, the ability to predict the results of participation, history of agriculture, understanding the benefits of participation, extent of land and overall service satisfaction with the rate of participation in irrigation network management and extension programs.

Moradi and Tavakoli (2008) showed skyrocketing costs of operation and maintenance of irrigation and drainage networks and also inadequacy of water fees for the costs was the first motivation for participation in the management of irrigation and drainage networks. Additional factors such as utilization management and poor, improper maintenance, failure to satisfy farmers, lower performance and accelerating the erosion process network make governments more determined to transfer network management to farmers. Azizi (2007) showed that devolution of irrigation management not only helps to reduce the financial burden of government but also improve network management system. It results in increased productivity and enhanced sensitivity to the maintenance and conservation network. This will have great benefit for farmers.

This study was aimed at investigation of effective factors on adoption of drip irrigation in Iran viewpoint of horticulturists. In order to achieve this objective, specific objectives are presented as below:

- Study of Status of adoption of drip irrigation
- Study of relation of horticulture's personal, farming, social, economical, communicational-educational and innovation characteristics with adoption of drip irrigation
- Role of horticulture's personal, farming, social, economical, communicational- educational and innovation characteristics on adoption of drip irrigation

MATERIALS AND METHODS

Research Method

In relation to objective, this research is functional, since the results can be employed by programmer and policy makers. In order to reach precise and reliable data we used quantitative method. Because this research simply investigates existed conditions and defines them and there is no possibility to control or manipulate the variables, it is descriptive. Because the gathering of information about the views, beliefs, thoughts and behaviors or group characteristics of a society is statistical and also it is under recognition, so it is measuring. Furthermore, because it investigates and analyzes the relations between independent and dependent variables, it is correctional.

Statistical Population

The research population consisted of 3612 horticulturists, which was selected using stratified randomizing sampling method (n=331). Finally, 317 questionnaires were analyzed.

Validity and Reliability

Validity of the instrument was established by a panel of experts consisting of senior faculty members in agricultural extension and education department, and research committee advisors. Also a pilot test was conducted to determine the reliability of the survey instrument. In this test, the mentioned questionnaires were given to 30 horticultures which were similar to statistical society in regional, economical, cultural and social conditions. After gaining the data concluded the Cronbach alpha coefficient for all the variables with degree scale of 89%.

Variables

The independent variables included personal characteristics of the respondent horticulturists (age, work experience), farming characteristics (garden acreage, number of pieces garden, age of garden and agro ecological situation), economic characteristics (yield, cost-benefit ratios), communicational- educational characteristics (contact with experts, effect of extension- education activities, Use of information sources), social characteristics (social participation, social status), characteristics of innovation (relative advantage, compatibility, testable, visibility and complexity). The dependent variables was adoption of drip irrigation

RESULTS AND DISCUSSION

Status of Adoption of Drip Irrigation

In this study, the drip Irrigation acreage was indicative of the adoption of drip irrigation. The status of adoption of drip irrigation viewpoint of the respondents showed in Table 1. According to the mentioned table, 67.5, 24.9 and 7.6 percent of horticulturists expressed situation of adoption of drip irrigation were low, moderate and high respectively.

Table 1: Status of adoption of drip irrigation viewpoint of the respondents

Drip irrigation acreage (Hectare)	Frequency	Percent of frequency	Cumulative percentage
low(0.4-1)	214	67.5	67.5
Moderate (1.1-2)	79	24.9	92.4
High (2.1-3)	12	3.8	96.2
Very high(3.1-4)	12	3.8	100
Total	317	100	-

M = 1.2 *SD = 0.76*

Relation of horticulture's personal, farming, social, economical, communicational- educational and innovation characteristics with adoption of drip irrigation

Table 2 showed intensity, relation orientation and a meaningful level of horticulture's personal, farming, social, economical, communicational- educational and innovation characteristics with adoption of drip irrigation. As the table shows variables of age, experience, garden acreage, orange garden acreage, yield,

age of garden, number of garden piece, connect to experts, cost-benefit, social status, social participation, effect of extension- education activities and all of innovation characteristics with adoption of drip irrigation had been relationship of positive and significant.

Table 2: The relation of horticulture's personal, farming, social, economical, communicational-educational and innovation characteristics with adoption of drip irrigation

Variables	Pearson correlation coefficient	Significant level
Age	0.149*	0.008
Experience	0.255**	0.000
Garden acreage	0.643**	0.000
Agro ecological situation	0.027	0.632
Age of garden	0.306**	0.000
Number of pieces of garden	0.220**	0.000
Yield	0.339**	0.000
Cost-benefit ratio	0.234**	0.000
Connect to experts	0.168**	0.003
Effect of extension-education activities	0.237**	0.000
Use of information resources	0.010	0.860
Social participation	0.146**	0.009
Social status	0.251**	0.000
Relative advantage	0.243**	0.000
Compatibility	0.132*	0.019
Testable	0.148**	0.008
Visibility	0.199**	0.000
Complexity	0.144*	0.010

**p<0.05* ***p< 0.01*

The role of horticulture's personal, farming, social, economical, communicational- educational and innovation characteristics on adoption of drip irrigation

In order to predict the role of research variables on adoption of drip irrigation, we used step by step regression. Analyzing the regression enables the researcher to predict the variance of dependent variable through independent variables and determine the role of every independent variable in explanation of dependent variable. In step by step method, the strongest variables enter the equation one after another. This process goes on until the errors of meaning exam reaches to 0.05 errors. Results showed garden acreage, number of garden piece, age of garden, age, connect to experts; social status, cost-benefit and yield enter the equation in eight steps, respectively. This means that garden acreage have the highest influence on adoption of drip irrigation. This variable alone explained 41.3 percent of variance in dependent variable. S garden acreage and number of garden piece communally explained 43.4 percent of variance in dependent variables, in step two.

Table 3: Analyzing the regression of adoption of drip irrigation

Step	R	R Square	Adjusted R Square	F	sig
1	0.643	0.413	0.411	221.78	0.000
2	0.658	0.434	0.430	120.15	0.000
3	0.669	0.448	0.443	84.65	0.000
4	0.684	0.467	0.461	68.44	0.000
5	0.698	0.487	0.479	59.05	0.000
6	0.706	0.499	0.489	51.39	0.000
7	0.712	0.507	0.496	45.47	0.000
8	0.720	0.518	0.506	41.38	0.000

In final, garden acreage, number of garden piece, age of garden, age, connect to experts, social status, cost-benefit and yield in eight steps explained a variation of 51.8% of adoption of drip irrigation.

Table 4: The standardized and non- standardized coefficients of adoption of drip irrigation

Variables	B	Beta	t	Sig
Drip irrigation acreage	0.54	0.70	13.51	0.000
Number of pieces of garden	-0.21	-0.33	6.29	0.000
Age of garden	0.026	0.35	4.65	0.000
Age	-0.013	-0.23	4.11	0.000
Connect to experts	0.089	0.14	3.18	0.002
Social status	0.016	0.08	1.93	0.050
Cost-benefit ratio	-0.086	-0.31	3.79	0.000
Yield	0.018	0.27	2.72	0.007
Constant	0.47	-	2.46	0.014

According to the amount of beta in table 4, we can write the regression equation as follows:
Y = 0.7X1 - 0.33X2 + 0.351X3- 0.23X4+ 0.14X5+ 0.08X6- 0.31X7+ 0.27X8
X1 = Drip irrigation acreage
X2 = Number of pieces of garden
X3 = Age of garden
X4 = Age
X5 = Connect to experts
X6 = Social status
X7 = Cost-benefit ratio
X8 = Yield

Conclusions and Suggestions

This study aimed at studying the adoption of drip irrigation, indicated that more of the respondents (67.5 percent) believed that adoption of drip irrigation was low. Results from analyzing the Pearson correlation showed that age, experience, garden acreage, orange garden acreage, yield, age of garden, number of garden piece, connect to experts, cost-benefit, social status, social participation, effect of extension-education activities and all of innovation characteristics with adoption of drip irrigation had been relationship of positive and significant.

This means that the older and more experienced horticultures and the acreage and yield well and number of garden piece, more land has been under drip irrigation. Also horticultures have been high social participation, social status and communication and use of resources in its own land more than are covered by drip irrigation. Of course Intensity correlation in relate garden acreage was high and in others variables the Intensity correlation is low and very low. These results conform to the researches of (Lipchin, 2003); (Cramb, 2004); (Illukpitiya and Gopalakrishnan, 2004); (Suresh and Kullkarni, 2013); (Soleimani and Bozer, 2012); (Maghsoudi *et al.*, 2013); (Domench and Ringler, 2013). Furthermore, the results of step-by- step regression illustrated that garden acreage, number of garden piece, age of garden, age, connect to experts, social status, cost-benefit and yield in eight steps explained a variation of 51.8% of adoption of drip irrigation. These results conform to the researches of (Lipchin, 2003); (Cramb, 2004); (Illukpitiya and Gopalakrishnan, 2004); (Suresh and Kullkarni, 2013); (Soleimani and Bozer, 2012); (Maghsoudi *et al.*, 2013); (Domench and Ringler, 2013).

- To improve the adoption of drip irrigation was suggested extension activities among horticultures that more garden acreage and lands was consolidate.
- To improve the adoption of drip irrigation was suggested relationship between horticultures and experts increasing. Also the sources further information on the adoption of drip irrigation use.
- To improve the adoption of drip irrigation was suggested among the horticultures to increase the performance and profitability.

- To improve the adoption of drip irrigation was suggested Educational activities to be more practical and more tangible, and to improve the farmers' awareness and literacy.
- It is recommended to improve adoption of drip irrigation, innovations of drip irrigation be compatible with the values and culture of horticulturists. Also these innovations can be observed and tested in the garden and have been a bit of complexity to making them easier to use.

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