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Original Article

Influential Factors on Greenhouse Manager Attitudes Toward Producing Healthy Products in Alborz Province

Fatemeh Lashgary[1*]

[1]Master of Agricultural Management, University of Mohaghegh Ardebili, Ardebil, Iran.

Correspondence: Fatemeh Lashgary, Master of Agricultural Management, University of Mohaghegh Ardabili, Ardabil, Iran. fateme.lashgary@gmail.com

ABSTRACT

This survey was done with the goal of determining effective factors on greenhouse managers' attitudes towards producing healthy products in Iran. The research was applied its data by utilized a statistical population of a census of 150 greenhouse producers of vegetables and strawberries. The research instrument was a questionnaire whose validity was confirmed by the faculty members and its reliability was confirmed by using Cronbach's alpha. By using ISDM, greenhouse managers' attitude toward producing healthy products with frequency of 50.7 % was positive. By SPSS, Correlation results showed a positive and significant relationship between age and the use of an extension expert with the production of healthy product. The result of multiple regressions showed age with coefficient of Beta 0.199 and the use of extension expert with coefficient of Beta 0.169 have a positive and significant effect greenhouse managers' attitude towards healthy products. The results of the exploratory factor analysis with the KMO value of 0.721 revealed four factors: Economic, Environmental, Health and Awareness that the economic factor with the highest specific value of 3.486 was the most important factor influencing the greenhouse managers' attitude towards the producing healthy products.

Keywords: Manager, Attitude, Greenhouse, Healthy, Products, IPM

Introduction

After green revolution, thinking about increasing yield per unit area by promoting the widespread use of high yielding cultivars, pesticides and chemical fertilizers are expanded [1]. Especially in greenhouse, a controllable environment in order to increase yield in a short time, usages of chemical inputs have increased for daily production. Across the European Union, the receipt of agricultural subsidisation is increasingly being predicated on the delivery of public goods. [2] Therefore, Lack of attention to the correct use of chemical pesticide has led many problems in the world, also in Iran. Thus, according to the World Health Organization (WHO), Iran's Health Rank between 192 countries was 123 and raised to 93 in 2016 [3, 4], which it has improved but unfortunately is still low. In addition, the emergence of congenital defects, low birth weight babies, abortions, early maturity, changes in the metabolic system, impaired endocrine system, muscle weakness, memory loss, damage to the nervous system and the brain, reducing the effectiveness of the body's defense system and cancer were another results of chemical pesticides [5]. Based on this, the goal of proper use policy of land is to reduce the use of fertilizers and pesticides to achieve this goal should encourage farmers to cultivate healthy and organic crops [6]. In recent years, there is a tendency for consumers to focus on healthy diets with safe, high quality foods and high nutritional compounds from unpolluted areas [7]. Therefore paying attention to product healthy greenhouse products, which in their production process have controlled chemical inputs and corrective methods in non-hazardous so that there has less risk for consumers [8] is an important step in moving towards sustainable agriculture and the health community [9-11]. There are four standards for producing healthy product, including IPM (Integrated Pest Management), GAP (Good Agricultural Practices), HACCP (Hazard Analysis Critical Control Point) and GHP (Good Handling Practices) [12]. Since 1997, the world of healthy products has begun based on the Good Agricultural Practices (GAP) and the application of the Integrated Pest Management System (IPM) [13]. In Iran, since 1994, the form of Integrated Pest Management programs (IPM) began with reducing the use of agronomic chemical pesticides and turning attention to low-risk concepts and methods of pest control such as the biological approach [14]. However, the statistics showed

that about 25 million liters of chemical pesticides are applied annually in fields and gardens in the country. Considering the fact that products of this sector are consumed by 75 million people in the country, on average three people use one liter of poison in the production of agricultural products, especially fruits and vegetables [15]. Now, the question is why the amount of usages chemical pesticides is not decreased. There are many factors, which can influence it. According to Terano and *et al.* (2015) in a study of factors that influence the willingness to accept sustainable operations among farmers in Malaysia's Cadai based on good agricultural practices and integrated pest management showed, that attitude [16], mental norms, perceived behavior control, and characteristics of individuals such as age, knowledge and awareness are the most important factors affecting the willingness to use sustainable agricultural technology. The majority of researchers believe that attitude is the main factor in changing behavior, and if the attitude of individuals can be changed, behavior will change [17]. These activities and decisions of individuals towards any phenomenon are influenced by their attitude and perceptions. Therefore, in this case, I tried to measure the greenhouse managers' attitude toward healthy greenhouse production in Alborz Province, a main pole of greenhouse products in Iran. Most important factors were the responsibility about individuals in society, knowledge about nutrition and flavor of healthy product, environmental effects in water and soil, the ways of production, economical factors like price, income, cost, and laws of import. The factors that can influence the attitude has selected by researchers like Lashgary and *et al*. (2021) by investigation of effective managerial [18], economic, social and technical factors on the production of healthy greenhouse products showed that technical skills, programming skills, implementation skills have a positive and significant effect on production of healthy greenhouse product. Moaref and *et al.* (2019) by using structural equations [19]. It was shown that the variable of intention had the greatest impact on behavior and the variables of relative adornment, adaptation, attitude, perceived behavioral control, perceived benefits and threat had a positive and significant effect on intention and behavior of growing healthy crops. Eshaghi and *et al.* (2017) obtained the results that among the dimensions of innovation acceptance including compatibility [20], visibility, acceptance test, comparative advantage and complexity and biological attitude Environmental, respectively, adaptability, visibility, complexity and environmental attitudes and comparative advantage have an impact on the occurrence of environmental behavior of villagers. Allahyari and *et al.* (2017) that showed people with higher education have higher knowledge and a better attitude about sustainable agriculture [21]. In addition, experts who have completed more training courses have a better level of knowledge regarding the about application of sustainable agriculture. However, there is no significant difference between the age groups of experts regarding the components of sustainable agricultural literacy. Stabler and *et al*. (2006) concluded in their research that attitude to healthy and organic agriculture is influenced by factors such as age [22], marital status, education, post-graduate education and income. Sandoghi and *et al*. (2015) in a study evaluating effective factors in cucumber and tomato greenhouse managers' attitude toward the healthy products showed that there is positive effect between the government's economic and technical support [23], awareness organization, improving marketing and marketing of healthy products and media with producer's attitudes. In addition, there is negative effect with age and attitude of producers regarding the production of healthy products. Ghasemi *et al*. (2009) in a study entitled Attitudes and behaviors of greenhouse owners in Fars province towards the use of chemical pesticides in greenhouses showed that the variables of age [24], position, work experience and distance from the greenhouse to the place of residence have not a direct impact on their behavior but it indirectly affects people's behavior by influencing their attitudes. Education also has the most direct and significant effect on the protective behavior of greenhouse owners regarding the use of chemical pesticides. As a result of these previous researches, I selected some factors such as age, greenhouse experience, levels of education, communication skills, cost of chemical pesticides, greenhouse income and greenhouse area, as an influences factors to their attitude in the order to product healthy greenhouse production.

Materials and Methods

In terms of purpose, the present study is among the applied research and its information has been collected in the greenhouse and survey in Iran, in Alborz province and in the three areas of Nazarabad, Chaharbagh and Hashtgerd, which consists of three main poles of production of greenhouse products. The statistical population of this study consisted of 150 greenhouse cultivators whose products are vegetables and strawberries was selected by random. The main instrument was a researcher-made questionnaire by close sentences in term of Likert scale. The validity of the questionnaire was confirmed by the faculty members of the Agricultural Management Department of Mohaghegh Ardabili University and University of Tehran. The reliability of the questionnaire was confirmed by using Kronbach's alpha of 0.71. Data was analyzed by using SPSS software included multiple correlations to determine relationship between independent variables with dependent variable and multiple regression analysis to define amount of influence between variables, also I used exploratory factor analysis with the KMO value to categorize variables which have influenced greenhouse manager's attitude.

Results and Discussion

According to the results of this study, 36% of greenhouse is in Nazarabad region, 20% in Chaharbagh region and 44% in Hashtgerd area. Accordingly, 92% of them were male and 8% was female. Regarding the level of education, 22.7% had a diploma and lower and 77.3% had university education, which

indicates high level of education in the sample population, that 62% had a college degree in agricultural majors. The average age of greenhouse managers is 43.83 years. The least of them is 28 years and the oldest is 70 years. Also, the average greenhouse experience is 10.48 years, the lowest is 2 years and the highest is 30 years of greenhouse activity, which reflects a record of almost high experience of greenhouse in the studied areas. To measure the greenhouse managers' attitude towards healthy products, 19 items were selected as indicators of measurement, which are shown in **Table 1**. contain "I am responsible for the community's health" and "Increasing use of chemical pesticides threatens the health of people" and " Healthy products have a higher nutritional value than conventional products " with averages of 4.50, 4.46 and 4.9 ranked first to third score.

Table1. Average and frequency of research attitude phrase

Phrase	Completely Disagree	Disagree	Indifferent	Agree	Completely Agree	Average	Standard deviation	CV	Rank
I am responsible for the health of the community.	0	0	1.3	47.3	51.3	4.50	0.528	11	1
Increasing the use of chemical pesticides threatens people's health.	0	0.7	1.3	49.3	48.7	4.46	0.563	12	2
Healthy products have a higher nutritional value than conventional products.	0	1.3	8	50	40	4.29	0.870	21	3
Cultivation of healthy crops reduces water contamination.	0	2.7	12	55.3	30	4.13	0.717	17	4
Healthy products have better flavor than conventional products.	0.7	6.7	9.3	49.3	34	4.09	0.870	21	5
Cultivation of healthy products maintains soil fertility.	0	3.3	17.3	50.7	28.7	4.05	0.771	19	6
For me, the proceeds from production are more important than the health of the products.	3.3	22.1	6	51.3	17.3	3.57	1.113	31	7
Healthy products have better quality than conventional ones.	3.3	29.3	20	25.4	22	3.33	1.208	36	8
Producing healthy products will earn more in the long run.	10	17.3	20	42.7	10	3.25	1.160	35	9
Cultivation of healthy crops increases greenhouse gas revenues.	12	36.7	15.3	25.3	10.7	2.86	1.232	43	10
Healthy products have higher prices on the market than conventional products.	16.6	26.7	24	26.7	6	2.79	1.185	42	11
Performance per unit area is higher than normal products.	11.3	43.3	20	20.7	4.7	2.64	1.076	40	12
The cultivation of greenhouse products is reduced without the use of chemical pesticides.	16	45.3	8.7	22.7	7.3	2.60	1.210	46	13
The possibility of obtaining export licenses for healthy products is low.	14	36.7	31.3	14	4	2.57	1.025	39	14
It is easier to market healthy products than conventional products.	12.7	43.3	25.3	12.7	6	2.56	1.059	41	15
Cultivation of healthy products reduces production costs.	20	38	13.3	25.3	3.3	2.54	1.168	45	16
Implementing expert advice in producing low-cost health products.	20	44.7	15.3	16	4	2.39	1.098	45	17
The possibility of financing for the production of healthy products is low.	20	43.3	24.7	8.7	3.3	2.32	0.999	43	18
The familiarity of the greenhouses with the healthy production methods is low.	21.3	52	10	11.3	5.4	2.27	1.086	47	19

Table 2 shows the result of the frequency distribution of the studied greenhouse managers' attitude toward production of healthy products Based on this table by using ISDM, the greenhouse managers' attitude is divided into four categories. It is concluded that the highest frequency (38%) belongs to the class of relatively positive attitude towards healthy products. About 34% have a relatively negative attitude, 15.3% have a negative attitude towards producing healthy products and 12.7% have a positive attitude.

Table 2. frequency of greenhouse manager's attitude toward healthy product

Grouping	ISDM		Abundance	Frequency (%)
Negative	Min≤A<Mean-Sd	0.31≤A<0.57	23	15.3
Relatively negative	Mean-Sd≤B<Mean	0.57≤B<0.64	51	34
Relatively positive	Mean≤C< Mean+Sd	0.64≤C<0.71	57	38
Positive	Mean+Sd≤D<Max	0.71≤D<0.87	19	12.7
Total	-	-	150	100

To analyze and investigate the relationship between research variables and greenhouse managers' attitudes toward producing healthy products according to variables scale, Pearson correlation coefficient and Spearman correlation coefficient were used. As shown in **Table 3**, there is positive and meaningful relationship between the independent variables of age (rs = 0.221) and use of the extension expert (rs = 0.275) with the dependent variable of the study, the greenhouse manager's attitude toward the production of healthy product. In addition, there is a negative and significant relationship between the variables of experience in greenhouse (rs = -0.200), education level (rs = -0.165) and relationship with agricultural inputs supplier (rs = -0 165) with greenhouse manager's attitude toward healthy product. There is no significant relationship between the cost variables of chemical pesticides, greenhouse income, greenhouse area and the relationship between plant protection clinics and greenhouse managers' attitudes towards the production of healthy greenhouse products.

Table 3. Correlation between independent variables with dependent variable (greenhouse managers' attitude towards producing healthy greenhouse products)

Row	independent variable	Scale type	Test type	correlation coefficient	sig
1	Age	Relation	Pearson	**0.221	0.007
2	Level of Education	Sequentially	Spearman	*-0.165	0.044
3	Experience in greenhouse	Relation	Pearson	*0.200-	0.014
4	Greenhouse income	Relation	Pearson	0.005-	0.954
5	Greenhouse area	Relation	Pearson	0.012	0.886
6	use of an extension expert	Sequentially	Spearman	0.275**	0.001
7	Relationship with plant protection clinics	Sequentially	Spearman	0.140	0.088
8	Relationship with Agricultural inputs supplier	Sequentially	Spearman	0.165*-	0.043
9	The cost of chemical pesticides	Relation	Pearson	-0.016	0.843

Multiple regressions have been used for determining factors influencing the greenhouse managers' attitude. **Table 4**. shows there is no significant effect on the greenhouse managers' attitudes towards the production of healthy greenhouse products variables of the relationship with plant protection clinics, greenhouse education level, greenhouse income, cost of chemical pesticides and greenhouse area. On the other hand, the age and use of extension experts have a positive and significant effect with 95% confidence level on the greenhouse managers' attitude towards producing healthy products. Therefore, when one percent of age get increased greenhouses managers' attitude raise to 19.9 percent and a one percent increase in use of extension experts get increased the greenhouse managers' attitude to 16.9 percent toward the production of healthy products. There are negative and significant effects between the experiences in greenhouse, also their relationship with agricultural inputs supplier, with the greenhouse managers' attitudes towards the production of healthy products. Therefore, with a 1% increase experience in greenhouse, 17.2% and with a 1% increase in the relationship between greenhouse and agricultural inputs supplier, 16.6% has decreased greenhouse managers' attitude towards healthy production. This effect of independent variables obtained from the dependent variable of the research by using the standardized coefficient (Beta).

Table 4. Effect of independent variables on the dependent variable of the research (greenhouse managers' attitude toward producing healthy greenhouse products)

Independent variables	Unstandardized coefficients B	standardized coefficients Beta	t	sig
Age	0.002	0.199	2.464	0.015
Experience in greenhouse	-0.003	-0.172	-2.136	0.034
The rate of using an extension expert	0.008	0.169	2.065	0.041
Relationship with Agricultural input supplier	-0.012	-0.166	-2.166	0.036
Relationship with plant protection clinics	0.005	0.091	1.136	0.258
education level	-0.008	-0.088	-1.060	0.291
Greenhouse income	5.794	0.043	0.507	0.610
The cost of chemical pesticides	-3.272	-0.018	-0.198	0.843
Greenhouse area	2.514	0.012	0.130	0.897
Constant factor	0.657	-	12.450	0.000

Exploratory factor analysis used to categorize factors influencing the greenhouse managers' attitude. The KMO value for the analysis was 0.721, which indicates that the data are suitable for factor analysis and the result of the Bartlet test is significant. In **Table 5**, the components were explained in 4 factors with a specific amount, the percentage of variance and their percentage of cumulative variance. As a result, it can be concluded that effective factors on the greenhouse managers' attitude toward producing healthy products were extracted based on the specific value and extracted into four factors. The four factors explained 58.35% of the total variance of variables. After reviewing the relevant items for each agent, the factors were named as follows: 1. Economic Factor, 2. Environmental Factor, 3. Factor of Awareness, and 4. Factor of Health. In addition, the economic factor with the highest special value (3.486) is identified the most

important factor influencing the greenhouse managers' attitude towards the production of healthy products.

Table 5. Results of Factor Analysis of Research Attitudes

Factors	component	value	Extraction Sums of Squared loading		
			Total	% of variance	Cumulative %
Economic Factor	Cultivation of healthy crops increases greenhouse gas revenues.	0.617	3.486	23.241	23.241
	It is easier to market healthy products than conventional products.	0.627			
	Performance per unit area is higher than normal products.	0.628			
	Implementing expert advice on low-cost health products.	0.651			
	Healthy products have higher prices on the market than conventional products.	0.544			
	Producing healthy products will earn more in the end.	0.645			
Environmental Factor	Healthy products have better flavor than conventional products.	0.543	2.641	17.603	40.844
	Healthy products have better quality than conventional ones.	0.549			
	Increasing the use of chemical pesticides threatens people's health.	0.514			
	Cultivation of healthy products reduces water contamination.	0.778			
	Cultivation of healthy products maintains soil fertility.	0.564			
Factor of Awareness	Healthy products have a higher nutritional value than conventional products.	0.649	1.395	9.303	50.174
	The familiarity of the greenhouses with the healthy production methods is low.	0.686			
	The possibility of obtaining export licenses for healthy products is low.	0.564			
Health Factor	I am responsible for the health of the community.	0.507	1.232	8.213	58.359
	Healthy products have better quality than conventional ones.	0.574			

Conclusion

The production of healthy products depends on the use of less chemical substances and according to this, the attitude of producers and consumers to purchase and to product these production is one of the most important influential factors. In this study, the attitude of greenhouse manager in Alborz province was measured, which showed that 15.3% have a negative attitude, 34% have a relatively negative attitude, 38% have a relatively positive attitude and 12.7% have a positive attitude. Therefore, it can be said that attitude of greenhouse mangers towards healthy products is relatively positive and their relationship with their colleagues in the region has led to increased awareness in this area and they have realized the need to produce healthy products.

In fact, this relatively positive attitude will be an effective step to increase production of healthy products because a person's behavior is a function of his attitude. The results of correlation and regression tests showed that there is a positive and significant relationship between age and the use of extension experts with greenhouse managers' attitude. There is a negative and significant relationship between greenhouse experience, level of education and relationship with agricultural input supplier. The income from the greenhouse, the cost of chemical pesticides and the area of the greenhouse do not have a significant effect on greenhouse managers' attitudes. These results are supported by Allahayari *et al*. (2017), Stabler (2006), Karami and Ghasemi (2009) and are in contrast with the results of Sandoghi *et al*. (2015) [21-24]. The results of exploratory factor analysis showed that among the four factors, the economic factor was the most important factor on the attitude of greenhouse managers towards the production of healthy products because it has a high specific value.

According to the results of this survey, I want to offer some recommendation in three level of analysis: the first is macro level, which related to political and national activities of the government, which includes laws and regulations. In Iran, due to the lack of specific government policies in plan for healthy products, there is little potential to product organic and healthy products. So government agencies and policy makers should predict special policies such as: allocation of funds for infrastructure development Organic production, bedding and government support to attract buyers, increase the market for the sale of healthy products, allocation targeted credits for the construction of greenhouses for cultivation Organic product. In fact, it makes the producers to find their profits of cultivating healthy greenhouse product and increase the motivation of the producer. The second is Intermediate level, which can focus on institutions such as NGOs, Development Organizations. In this level, the focus on educational services plays a role. If a person understands that the result of doing a behavior is positive, he will have a positive attitude towards doing the behavior. On the other hand, if others consider the behavior to be positive and if the person is motivated to meet the expectations of others, a positive attitude is expected. So according to this survey, the educational levels of the greenhouse managers had collage degree, therefore the institutions with new communication's ways, advertisement in the media and internet and creating new campaign to educate the greenhouse manager can change their attitude to be positive. The third is micro level, which focuses on identifying the specific needs and priorities of the users. In this article, communication with extension experts is one of the positive factors affecting the

attitude of greenhouse managers. Therefore, meeting the needs of greenhouse managers in this way and having a close relationship with experts, which itself requires the employment of experts by Jahad Keshavarzi, can increase the desire of greenhouse managers to produce healthy products.

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