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Specialists' Perception Regarding Effective factors in Development of Organic Agriculture in Ardabil Province

Leila Karpishe
Department of Agriculture, Pars Abad Moghan Branch, Islamic Azad University, Pars Abad Moghan, Iran. karpisheh2003@yahoo.com

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Abstract

Organic agriculture (OA) includes a comprehensive production management system that is considered as one of the strategies to reduce negative impacts of industrial agriculture in many countries. This research was identifying factors affecting the development of OA in Ardabil province. A descriptive– correlation survey approach was used in this study. Participants were agricultural specialists of Jihad Keshavarzai organization in the province of Ardabil- Iran (N=313). Research samples was selected using randomly stratified method with using Cochran formula (n= 126). Questionnaire reliability was determined by pilot test out of the main sample (Cornbach's alpha). Validity of instrument was determined by investigating the attitudes of agricultural specialists in universities of Tehran and Ardabil. The results showed that Specialists' attitude toward organic agriculture was positive. The results of factor analysis led to the identification of four factors (governmental and policy, infrastructure, extension and education, and economic), accounted for cumulative variance of 62.74 percent.

1. Introduction

By 2050, the world population will reach to 9 billion people, therefore, increased demand for food products can lead to excessive pressure on scared agricultural resources (FAO, 2013). In this regard, agricultural sector has to produce enough foods as well as conserve the environment. Whereas, the modern agriculture based on using high chemical inputs has aimed to increase agricultural production, a large number of studies demonstrated the destructive impacts of using such inputs on the environment and also their negative impacts on producers and consumers' health (Röös et al., 2017, Gracia and de Majistris, 2013). Some of these problems include the contamination of water sources, declining the soil's health, and decreasing absorbable amount of some micronutrients such as zinc, iron and copper leading to the loss of biological balance of ecosystems, consequently, pests' resistance to pesticides and a rise in new pests, as well as reducing the quality of agricultural products (Malek-Saeidi et al., 2012). As such, a huge concern has raised regarding the effects of some agricultural activities on environment and society in recent years. Thus, agricultural policies in many countries have moved toward a staunch friendship with nature. To this aim, the organic agriculture (OA) has been considered as one of the most important alternative agricultural systems to produce healthy food without any chemicals (Klockner 2013).

The goal of OA is to give priority to long term ecological health, such as conserving biodiversity and soil quality, rather than short term productivity gains. Increasingly, writers are referring to OA as a "new paradigm" in agriculture (Dimara et al 2003, Abidoo and Dickinson 2002, Beus & Dunlap 1990, Dahlberg 1986) challenging the status quo of conventional agriculture. Although Macilwain and Gewin (2004), Mäder et al., (2002), Stolze et al., (2000) and O'Richard and Cobb (2001) have detailed scientific evidences on the environmental, economic and health benefits of organics, many professionals still question OA's financial viability, environmental

credentials and overall efficiency and productivity, and reject it as an alternative farming system (i.e. Avery 1995). Nonetheless, scientists are increasingly referring to OA as a "new paradigm" in agriculture (Dimara et al., 2003, Abidoo and Dickinson 2002, Beus & Dunlap 1990, Dahlberg 1986) which challenging the status quo of conventional agriculture.

Several studies have quantitatively illustrated the important contribution of change agents in diffusing agricultural innovations and agricultural research outcomes to farmers (Fuglie and Kscak, 2001, Marsh et al., 2000, Kromm and White, 1991, Van den ben and Hawkins, 1988, and Feder and Slade 1984). However, organic farming must be accepted and introduced as a sound innovation in four broad contexts namely research, extension, farmers and consumers, therefore, agricultural specialists play an important role to develop organic farming (Padel et al., 2015)

Although many studies have been conducted to investigate the attitude towards organic farming among farmers, consumers and adolescents (Gotschi et al., 2007; Stobbelar et al., 2006; Anderson et al., 2003), a few studies have been done to identify the experts towards this agricultural system of cultivation.

Wheeler's study (2008), which is one of a few studies to identify professionals' attitude, showed that by increasing knowledge of organic farming professionals show positive beliefs regarding the net benefits produced by organic farming. However different studies revealed that individuals' attitude towards any subject could be influenced by their knowledge about that (Pieniak et al., 2010; Wheeler, 2007; Fabrigar et al., 2006; Stobbelar et al., 2006). Wheeler (2008) also used an ordered profit model to evaluate the factors influencing overall views towards organic farming. She emphasized that several variables had a positive influence on professionals' overall attitudes toward organic farming including age, agricultural experience, years of tertiary education, organic farming knowledge, belief in the environmental superiority of organic farming, belief in the financial profitability of organic farming, and belief in the superiority of organic food. Gotschi et al., (2007), Stobellar et al., (2006), and Cock et al., (2000) also found that concerns about community and individual health and idea that organic foods are healthier and taste better than conventional agricultural crops have played a central role in shaping the sustainable agriculture movement.

Malek-saeidi et al., (2012) concluded from their research that the correlation between general attitude towards the environment, nutrient attitude, health attitude, knowledge of organic farming with attitude towards organic farming is significant. These findings are in accordance the results of study done by Stobbelaar et al., (2006).

The results of study by Sadati et al., (2010) showed that there was a positive correlation between participation in extension courses, farmer's off-farm income, and farmer's knowledge about sustainable agriculture with extension contacts, and a negative correlation between age, experience in agricultural activities with attitude toward sustainable agriculture.

Kouhestani et al., (2015) investigated and analyzed the effective factors influencing on organic farming development in Systan and Balouchestan Province, Iran. Their findings revealed that from the viewpoint of agricultural experts, four variables of Supportive, infrastructure, environmental and cultural factors determined a 62.7% of the total variance of dependent variable.

In a study, Hosseini et al., (2012) investigated the perception of agricultural specialists in Kermanshah province about factors affecting the adoption of organic farming. They found that the extension/education and economic factors explained 31% of the total variance of the respondents' perception regarding adoption of organic farming by farmers.

Rajabi et al., (2013) conducted a study to investigate the factors influencing the acceptance of organic crops and products by consumers (a case study in Karaj Township, Iran). Using the factor analysis, they recognized four factors as the effective factors to accept organic products. These factors included informing and educating, improving access, improving the quality of the product, and providing the supportive facilities which could explained 26.60%, 23.61%, 9.41%, and 8.8% of the total variance of farming crops' acceptance, respectively.

Moradi et al., (2013) in a study entitled as the "recognition of the necessities to apply Integrative Pest Management (IPM) in garden crops from the agricultural experts' viewpoints" found that the requirements of applying integrative pest management were divided into five factors. These factors encompassed involved educational-extension activities, economic planning, policymaking, technical supervision and planning. These factors determined 66% of the total variance of the acceptance of IPM.

Despite many benefits of organic agriculture, official statistics demonstrate that only 5% of farmers in Iran cultivate crops organically which is highly disappointing (Masoud, 2017). However, the area under organic cultivation in the world is 57.8 million hectare in 2016. (FIBL-IFOAM, 2018 cited in Rasouliazar et al., 2015). However, despite the high potential capacity of

attendance into the global markets, Iran's share of this area is highly low. The last statistics about organic cultivation in Iran in 2014 is 34450 ha (Damghani, 2016 cited in Fatemi & Rezaei-Moghaddam, 2020). Given this issue, Iran, by relying on its potential capacities, should move toward sustainable agriculture through organic activities seriously, and this movement is not possible without contributing all involved factors (Fatemi & Rezaei-Moghaddam, 2020).

Considering the above, therefore, this study aimed to analyze the effective factors influencing the expansion organic agriculture (or farming) among Iranian farmers.

2. Materials and methods

This study was a quantitative study from a philosophical point, an applied study in terms of goals, and descriptive- correlation in terms of method. In this regard, the Agricultural specialists of Jihad-Keshavarzi Organization in Ardabil province, Iran were the target population that have been selected by using stratified randomization method (n= 126). From review of literature, a questionnaire was developed to collect data. Content and face validity of instrument were established by investigating the attitudes of agriculture specialists in universities of Tehran and Ardabil. A pilot study was conducted with 25 respondents. Questionnaire reliability was estimated by calculating Cornbrash's alpha. Reliability for the overall instrument was estimated at 0.81.The final questionnaire covered three areas: 1) demographic characteristics such as age, gender, level education. 2) Attitude toward organic agriculture development which were measured on a five point Likert- Type attitude scale which ranged from 1 (Strongly disagree) to 5 (strongly agree). 3) Factors strengthening the OA in Ardabil province which were measured five point scale. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS). Appropriate statistical producers for decision (frequencies, percent, means, and standard deviations) and inference (bivariate correlation test and factor analysis) were used.

3. Results and discussion

3.1 Demographic characteristics

Agricultural specialists who participated in the study ranged in age from 32 to 65 years. The mean age of respondents was 35.9 years. The majority of respondents (82%) were male. In terms of education level, 69.3 percent of the respondents had a BS degree, 24.5 percent had a M.S and only 6.2 percent had a PhD degree.

3.2 Attitude about the development of organic agriculture

Attitude toward organic agriculture development measured using a five item, Likert-Type attitude scale (Table1). All item means were above the median score of 3. These findings show that Specialists' Attitude about the development of organic agriculture was good.

3.3 Relationship between specialists' attitudes toward organic agriculture development and selected variables

In order to investigate the relationship between specialists' attitudes and selection variables, considering the scale of variables and normal distribution of data, Pearson correlation coefficient was used. The results are presented in table 2.

As table 2 shows, among the 8 scale (measurement level) variable selected as factors, five variables(Agricultural experience, Attitude towards environment, Attitude toward health, Attitude toward nutrition, Knowledge about organic agriculture) had a positive and significant relationship ($P<0.05$) with specialists attitudes toward organic agriculture development. Knowledge about organic agriculture showed the highest correlation with specialist attitudes.

The obtained results indicate that the following variables: Job background, Education level and Age did not show any significant correlation with specialist attitudes towards organic agriculture development.

Factor analysis of factors affecting on the development of OA

Factor analysis is used mostly for data reduction purposes: To get a small set of variables (the items) to a smaller set (that factors).In order to find out the factors that effect on the development of OA in Ardabil province, the exploratory Factor analysis with summarizing approach of the data was used. Factor analysis was conducted on 28 items for data reduction. This led to the identification of four factors, which accounted for cumulative variance of 62.74 percent (Table 5).

Principal component matrix was used for factor analysis and a Varimax rotation with Kaiser Normalization was used for rotation (Table5). The alpha coefficient was calculated to find out the internal consistency of the items on the scale. It was found to be 0.84 which indicated that the internal consistency of 28 items was quite high. High value of Kaiser-Mayer-Olkin (KMO) test of sampling adequacy indicates that the correlation between the pairs of variables explained by other variables and the appropriateness of factor analysis in the model (Gnanadhas and Jesurajan, 2011). The value of

Kaiser-Mayer-Olkin (KMO) ranges between 0 and 1. A value of 0 indicates that the sum of partial correlation is large relative to the sum of correlations (hence, factor analysis is likely to be inappropriate).

A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Values greater than 0.5 KMO can be accepted (Field, 2005). For these data the value was 0.735 which fell in to the range of good, so that factor analysis is appropriate for these data. Bartlett's measure tests are a significant test. For these data the significance Value is 0.000. Since significance value is less than 0.05, the data were highly significant. Bartlett's test is highly significant, for that reason factor analysis was appropriate (Table 3).

Table 1. Attitude toward organic agriculture development: n, N=126

Statement	Mean	SD	CV
Development of organic farming should be considered along with the human cultural, economic and political development.	4.34	0.63	1
Development of organic farming is a powerful tool for achieving of a sustainable development.	3.99	0.63	2
Developing the organic farming will improve farmers' economic status	4.03	0.69	3
Development of organic farming will result in conserving the national and natural resources.	4.16	0.75	4
Food security can be achieved by developing the organic farming.	4.06	0.76	5
Development of organic farming increases agro ecosystem health considering biodiversity, soil microbial and biological activities.	4.11	0.80	6
Development of organic farming produces crops which characterized as higher quality and better taste products.	3.83	0.94	7
Development of organic farming reduces agricultural wastes due use of them in preparing compost.	3.81	1.00	8
Development of organic farming improve the quality and taste of products	3.68	1.08	9
Development of organic farming improves farmers' income	3.51	1.1	10
Development of organic farming is one of the solutions which help to take advantage from indigenous knowledge during the production process.	3.57	1.14	11
By developing organic farming, labor forces will be more useful in agriculture.	3.31	1.15	12

Responses weighted 1-5 from strongly disagree to strongly agree.

Table 2. Correlation between specialists' attitudes and selected variables

Variables	r	P
Agricultural experience	0.154	0.009
Job background	0.080	0.201
Attitude towards environment	0.207	0.001
Attitude towards health	0.188	0.003
Attitude towards nutrition	0.222	0.014
Knowledge about organic agriculture	0.252	0.000
Education level	0.089	0.154
Age	0.152	0.161

Table3. KMO and Bartlett s' test

Sets to be analyzed	KMO value	Bartlett's value	Significance level
Affecting factors on development of OA	0.735	759.345	0.000

Table4. Obtained factors along with special values, variance percentage and cumulative variance percentage

Factors	Eigen value	Percentage of variance	cumulative variance percentage
First	2.364	16.88	16.88
Second	2.326	16.61	33.49
Third	2.07	14.78	48.27
Fourth	2.028	14.48	62.75

The four factors that emerged out of the analysis were "governmental and policy factor", "infrastructure factor", "extension and education factor" and "economic factor". The first factor was referred as "governmental and policy factor" with 16.88 percent of variance and 2.364 Eigen value, this factor had a major role in description of variables. After that, the "infrastructure factor", "extension and education factor" and "economic factor" were respectively ranked in the next classes. The number of each obtained factors along with Eigen value, percentage of variance and cumulative variance percentage of each factors are shown in the table(4).

The position of the variables in the factors value with the relevant factor in accordance with the results obtained from the rotation presented in table 3.The results revealed that 8 variables had load on the first factor, 7 variables on the second factor, 9 variables on the third factor, and 4 variables on the fourth factor After the rotation of the factors, the conceptual inference should be done by assigning variables to factors, i.e. a common concept should be determined for each set of variables which belong to a factor so that they can be interpreted. According to the findings, the determined factors were named on the basis of the loaded variables on them (table 5).

Table 5. Factors and accompanying items related to development of organic agriculture coefficients

Factor name	Variables	Factorial load
Governmental and policy	Providing urgent facilities and possibilities to develop and launch research projects on organic farming	0.653
	Recognition and analyzing the weaknesses of organic farming methods in our country in order to eliminate them	0.724
	Extensive, comprehensive and long-term planning	0.737
	Providing long-term loans with low interest to farmers	0.660
	Developing necessary policies and legal framework on organic farming to improve international markets	0.544
	Emphasizing on organic farming into the developmental macro plans	0.760
	Investing in infrastructural development of organic farming by government	0.531
	Developing cooperation between the related organizations (e.g. Customs department, Ministry of Commerce, International Trade Committee) in order to implement initiate the export of organic products.	0.716
Infrastructure	Establishing the cultural centers to improve the people's acceptance rate of organic crops (farming etc.)	0.719
	Creating Information and Marketing Centers	0.750
	Creating specific insurance centers for organic products	0.778
	Creating specific custom districts	0.832
	Certain standard and criteria-setting centers for issuing organic products certificates	0.564
	Establishing field farmer schools	0.625
	Establishing science and technology park	0.641
Extension and education	Reflecting the farmers' needs of farmers to country's research domain	0.771
	Dissemination of studies' results and research achievement regarding organic farming	0.675
	Training progressive farmers and early adopter farmers to accept (or use) and develop the organic farming	0.703
	Notification and dissemination of information about on organic farming	0.796
	Informing farmers and public regarding (or about) the importance of consuming healthy foods which are free of chemical matters	0.673
	Informing farmers and public regarding (or about) the disadvantageous of using pesticides and chemical fertilizers in production of agricultural crops	0.871
	- Publication of specialized journals and the field of agriculture and organic products	0.722
	Holding exhibition regarding organic crops at the province level	0.832
	Holding workshops for farmers on the benefits of consuming organic products	0.799
Economic	Providing enough financial sources for doing research studies in the field of organic farming at farm level	0.794
	Providing convenient and adequate credits to produce organic crops by farmers	0.674
	Providing appropriate financial incentives such as subsides for farmers in order to produce organic crops	0.768
	Establishing and developing international and national markets for organic products	0.748

4. Conclusions and recommendations

The agricultural specialists are responsible for informing farmers and the public by education and extension efforts. Therefore, understanding their attitudes towards OA is necessary. Based on this research, there was a positive and significant correlation between variables such as Agricultural experience, Attitude towards environment, Attitude toward health, Attitude toward nutrition, Knowledge about organic agriculture and General specialists, attitude towards OA. Therefore, encouraging agricultural specialists to acquire correct knowledge of this agricultural system should be priority with the organizations of education and extension institutes. Also, this result emphasizes the role of extension programs for OA and communicative media to increase public information and especially agricultural specialists, information on environmental problems and negative consequences of conventional. This was in line with the opinions of Wheeler (2008); Sadati et al., (2010) and Malek-Saeidi et al., (2012).

The first factor was named as "Governmental and policy factor" The items classified under this factor are; Providing urgent facilities and possibilities to develop and launch research projects on organic farming, Extensive, comprehensive and long-term planning, Providing long-term loans with low interest to farmers Developing necessary policies and legal framework on organic farming to improve international markets, Emphasizing on organic farming into the developmental macro plans, Investing in infrastructural development of organic farming by government and Developing cooperation between the related organizations (e.g. Customs department, Ministry of Commerce, International Trade Committee) in order to implement initiate the export of organic products. This factor explains16.88percent of variance and the Eigen value was 2.364. The government can play more active role in providing financial supports and credits in order to drive and encourage private sectors to invest more efficiently in organic area of agriculture crop production. As such, input costs and production risks may be diminished for private sectors and individual farmers. In order to develop of organic agriculture, the need for rational government support is essential. This finding was in confirmation with the findings of Kouhestani et al., (2015); Modiri et al., (2013); and Rajabi et al., (2013).

The second factor was referred as "Infrastructure factor". It contains the following determinants: Establishing the cultural centers to improve the people's acceptance rate of organic crops (farming etc.), Creating Information and Marketing Centers, Creating specific insurance centers for organic products, Creating specific custom districts, Certain standard and criteria-setting centers for issuing organic products certificates, Establishing field farmer schools, Establishing science and technology park. This factor accounts for 16.61percent of variance.

The third factor was named as "Extension and education factor". This factor has relatively high load on the following determinants : Reflecting the farmers' needs of farmers to country's research domain, Dissemination of studies ' results and research achievement regarding organic farming ,training progressive farmers and early adopter farmers to accept (or use) and develop the organic farming, Notification and dissemination of information about on organic farming, Informing farmers and public regarding (or about) the importance of consuming healthy foods which are free of chemical matters ,farming farmers and public regarding (or about) the disadvantageous of using pesticides and chemical fertilizers in production of agricultural crops, Publication of specialized journals and the field of agriculture and organic products, Holding exhibition regarding organic crops at the province level, Holding workshops for farmers on the benefits of consuming organic products. It accounted for 14.78 percent of cumulative variance. Based on this factor, more attention and concentration should be paid on extension and educational activities in the area as an information source in the field of organic agriculture The results of this section of the study were agreement with the findings of Rajabi et al., (2013); Hosseini(2012) and Sadati et al., (2010) .

Finally "economic factor" was the fourth factor, which includes the following determinants; Providing enough financial sources for doing research studies in the field of organic farming at farm level, Providing convenient and adequate credits to produce organic crops by farmers, providing appropriate financial incentives such as subsides for farmers in order to produce organic crops, Establishing and developing international and national markets for organic products. This factor accounts for 14.48 percent of variance. In regarding to this factor, the audience access to required resources and facilities for implementing the organic techniques should be regarded and facilitated. This was in line with the opinions of Modiri et al., (2013); Rajabi et al., (2013); Hosseini(2012) and Sadati et al., (2010). Finally, regarding the findings of the present study about the effective factors in development of organic agriculture, the following suggestions were offered:

By determining clear rules and standards as well as providing necessary infrastructures, organic farming methods can be supported and developed more.

By providing new on-service training courses or improving current courses regarding organic farming, change agents can be equipped to new body of knowledge and consequently, extension programs will be implemented faster and easier.

By providing related inputs and making them accessible for interested farmers, as well as supporting those farmers by specific subsidies, developing internal and external special markets, and holding exhibition in national and international levels, farmers will promoted to cultivate crop organically.

By providing some possibilities such as infrastructural, communication, educational, advertising facilities, farmers and other interested groups of crop production chain will be motivated to organic farming and organic crops.

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