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Full Length Research Paper

Determine of factors associated with the adoption of organic agriculture among small farmers in Iran

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The principal factors might play an important role in adoption of organic farming among farmers. A broad range of factors which exercise influence on adoption are covered including the socio-economic characteristics of the farmer, the characteristics of the farm, sources of information, membership of organizations, the farmer's attitudes, etc. This study hopefully captures the state of research with respect to the different determining factors of organic agriculture adoption among small farmers in Iran. The study was carried out in Ravansar County, Kermanshah Province of Iran. The data for the research were obtained from two different groups using random sampling technique: one from a sample of 51 organic farmers and one from a sample of 50 farmers, who as far as could be ascertained, have not made the conversion to organic farming. Through designed instruments, respondents rated multiple statements about their practices as well as their knowledge, awareness, motivation and attitudes regarding organic agriculture. Findings of the study points out that farmers' attitude was significantly and positively correlated with some of the adoption variables that is prevention of detrimental factors to farms, mechanical-physical control and cultural control. Our findings suggest that farmers' motivation and perceptions about organic farming, social attitude, ecological attitude and participation in extension activities are the main determinants of adoption of organic farming among small farmers.

Key words: Organic agriculture, adoption, barriers, small farmers, regression analysis.

INTRODUCTION

Modern high-input agriculture has produced great increases in crop yields but social and environmental costs have been high. Over the past decades, sustainability has become more and more of a guiding principle in agriculture. Organic agriculture can be seen as one approach to conferring sustainability on agricultural systems. It has its own specific principles and practices, from production at the farm level to marketing the products (Demiryürek et al., 2008). Organic agriculture is a human and environmentally friendly production system which abolishes the use of chemical inputs completely or as much as possible (Lampkin and Padel, 1994) and is oriented towards re-establishing the natural balance that has been upset as a result of faulty applications (Lampkin, 1990). Organic agriculture is also defined as a system which protects the balance of nature, sustains not only soil fertility but also the continuity of creatures in nature by bringing diseases and pesticides under control and which makes the use of natural resources and energy at their optimum possible (Bozzini, 1990). In this context, organic farming became recognized by farmers, policy makers and consumers as one of the possibilities for the farmer to farm in a more sustainable way (De Cock, 2005). It is a form of farming that has benefited greatly from a reorientation of society's goals, where it has gone from being an extremely small fringe activity to a much more accepted and supported form of farming. It is now one of the largest forms of sustainable agriculture worldwide. It is true that world organic production is soaring, driven by increasing demand by consumers concerned with their health and

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"post-materialist" values, such as environmental sustainability and the preservation of rural culture and society (Conner, 2004; Guthman, 2004). This in turn implies an increase in new market opportunities for producers and retailers.

It is currently practiced on about 31 million ha of land on 635,000 organic farms in about 120 countries worldwide (Yussefi and Willer, 2007). There is a wide disparity between the share of organic farming in countries around the world, with Oceania having the largest area of farmland converted to organics (12.2 million ha), followed by Europe (6.5 million ha), Latin America (6.4 million ha), Asia (4.1 million ha) and North America (1.4 million ha) (Willer and Yussefi, 2006). In a lighter vein, organic sector in developing countries such as Iran is at a different place in its development from the mature markets of other countries. Demand from the market is only beginning to expand. However, the recent development of organic agriculture around the world seems to be a success story and has had numerous positive consequences. The wider interest in organic agriculture has been influenced by factors such as concerns over the environment, health and socioeconomic conditions. In general terms, a substitution of conventional agricultural production by organic production benefits the environment (Best, 2008). To the extent that it promotes more erosion control, soil fertility and cover, biodiversity (especially forest cover) and a reduction in the use of toxic chemicals over conventional or traditional agriculture, it provides downstream communities with a cleaner, healthier and more-abundant water supply and neighboring communities with all the advantages of a healthier, less-polluted environment (IFAD, 2003).

Additionally, the growth of organic production is accompanied by an opening of the market to new customers (e.g., by the sale of organic products in conventional supermarkets or the rise of organic supermarket chains). Moreover, the growth out of the niche may help to reduce barriers to the adoption of organic farming by conventional farmers, as its image becomes less arcane and as interpersonal information on organic farming becomes more easily available to farmers (Best, 2008).

Hence, the great potential of organic farming justifies the interest in the present study in Iran, which falls within the paradigm of the diffusion of innovation. This study hopefully captures the state of research with respect to the different determining factors of organic agriculture adoption in Ravansar County, Kermanshah, Iran. This study concerns with explaining the determinants of factors associated with adoption organic farming practices among small scale farmers. Here, a wide range of factors which exercise influence on adoption are covered including the socio-economic characteristics of the farmer, the characteristics of the farm, sources of information, membership of organizations, the farmer's attitudes, etc. The literature associated with reasons for adoption and non-adoption of organic farming is fairly extensive and it identifies a broad range of factors associated with adoption and non-adoption of organic farming techniques (Padel, 2001; Rigby et al., 2001; Duram, 2006). The principal factors associated with adoption of organic farming include environmental factors, including better land stewardship and concern for the environment; personal reasons, including a desire to protect farmers' and farm workers' health by reducing or avoiding contact with toxic inputs; economic considerations, including price premiums, increased market share, higher quality products and lower input costs; and pragmatic concerns, generally in response to more restrictive regulations governing air, soil and water quality, pesticide use, etc (Duram, 2006). For further deepening, Lopez and Requena (2005) analyzed grower characteristics (age, possession of formal or informal education and training, dedication to agriculture, access to information channels, opinions and attitudes toward organic farming, etc.) and farm characteristics (size, yield, varieties, irrigation, slope, etc.) to see which are related to the adoption of organic practices (Lopez and Requena, 2005). Their results indicate that diffusion spreads with an autonomous pattern and is also motivated to a small extent by external factors.

Padel and Lampkin (1994) identify lack of formal and informal advice and information as key barriers to conversion. Institutional barriers such as conventional agricultural advisory services which may be unhelpful or disparaging, may result in farmers choosing to ignore the agricultural extension agency and obtain their information from other sources (Padel and Lampkin, 1994). From another point of view, the disadvantages or constraints inherent in small-farmer adoption of organic agriculture were seen to include:

1) The limited amount of truly scientific research on organic technologies, especially under small-scale farming conditions;
2) The often difficult access to needed plant material, animal breeds and plant-protection inputs;
3) Lessened ability to react to unforeseen external factors, such as the sudden arrival of new pests or diseases;
4) The high cost of certification;
5) The difficulty farmers have in negotiating contracts with buyers;
6) Inaccessibility of organic markets to most farmers; and
7) The bias of most nations' legal structures in favor of conventional agriculture (IFAD, 2003).

Darnhofer et al. (2005) has indicated that Austrian farmers did not adopt organic practices for the following reasons:

1) No compensation payments for organics; and
2) No willingness to forego net income for benefits of

environmentally friendly farming (Darnhofer et al., 2005).

METHODOLOGY

The population of interest consists of the Ravansar County, Kermanshah Province of Iran farmers who are benefiting from the technical cooperation of Japan International Cooperation Agency (JICA) in the field of promoting agricultural and social development in Iran. The Ravansar County is an organic farming area in Kermanshah State, as a result of a high percentage of small farmers under bilateral project between the Ministry of Agriculture of Iran and the Japan International Cooperation Agency (JICA). Since Iranian agricultural policy is regulated at the level of the county region, the sample was drawn from the Ravansar County, to account for the potential influence arising from the project. However, two groups of small farmers were chosen at random in each sub-group of those covered and not covered by project. From each group a complete list of all small farmers in their territory was obtained. As a result of their lack of relevance for organic farming, organic farmers and conventional farmers were withdrawn from the list.

Finally, the data for the research were obtained from two different groups using random sampling technique: one from a sample of 51 organic farmers and one from a sample of 50 farmers who, as far as could be ascertained,did not make the conversion to organic farming. Following an intentionally broad literature review on organic agriculture, the questionnaire was developed. The pilot questionnaire contained several sections, each comprising multiple statements with different units of measurement, and/or differing precision. Most statements were in the Likert scale format with five response choices. Agreement statements had the following response options:

(1) Strongly disagree;
(2) Disagree;
(3) Neutral;
(4) Agree; and
(5) Strongly agree.

Respondents were asked to choose the response options that best fit their agreements or endorsements of the statement. Also, the frequencies of occurrence of events and practices were rated in five response options:

(1) Never;
(2) Rarely;
(3) Sometimes;
(4) Almost always; and
(5) Always.

In general, through these instruments, respondents could rate multiple statements about their practices as well as their knowledge, awareness, motivation and attitudes regarding organic agriculture. To ensure construct validity, experts reviewed and helped revise the questionnaire. A pilot questionnaire was administered to a sample of farmers and discussions were held about the content, comprehension and structure of the questionnaire with pilot survey participants.

This helped ensure face validity and enhanced comprehension. The final questionnaire was administered to a random sample of 101 farmers. Each of the areas was assessed for precision of measurement using Cronbach's alpha (α), a measure of internal consistency reliability with values of ≥ 0.7 considered acceptable precision. Data analysis has been done in two areas, descriptive and inferential statistics. Descriptive statistics such as mean, frequency and percentage were used in the descriptive part. Correlation coefficient and multiple regression analysis were used in the inferential analysis.

RESULTS AND DISCUSSION

Organic farmers, on average, were younger than their conventional counterparts. The conventional farmers were better educated than organic farmers. A great proportion of organic farmers and their counterparts were male. 58.8% of organic farmers and approximately 60% of conventional farmers were members of different organizations. Organic farms are shown to employ more people than their counterparts. Additionally, conventional farmers have spent fewer years (21 years) dedicated to agriculture compared to their organic counterparts (22.3 years) (Table 1).

Adoption of organic practices

To study the adoption level of two groups of farmers that is 1) conventional farmers and 2) organic farmers; a list of organic practices which have been classified into five categories including prevention of detrimental factors to farms, elimination of sources of pollution, biological control, mechanical-physical control and cultural control was prepared and farmers were asked to rate the items. Considering the aforementioned categories of organic practices, Table 2 depicts that most of the organic farmers belong to a high category of adoption.

Correlation analysis among adoption level of practices and selected variables

As Table 3 points out, farmers' attitudes are significantly and positively correlated with some of the adoption variables that is prevention of detrimental factors to farms, mechanical-physical control and cultural control. This result is in accordance to the results of an earlier Lopez and Requena study (Lopez and Requena, 2005). There was a positive and significant correlation between farmers' motivation, with prevention of detrimental factors to farms. Also, the mentioned variable correlated significantly and positively with cultural control. A similar result was found about the relationship between communication channels and cultural control. Other studies strengthen this finding (Lopez and Requena, 2005). The results of the study revealed that farmers' perception was correlated with the variable "prevention of detrimental factors to farms". Transportation and institutional constraints were both correlated significantly and positively with the adoption of organic practices regarding elimination of sources of pollution. This is in line with the results of a study by Norse and Tschirley (2003).

Table 1. Socioeconomic characteristics of samples.

Categories	Organic farmers			Conventional farmers		
	Frequency	%	Mean	Frequency	%	Mean
21-30	18	35.3	40	17	34.7	39.5
31-40	10	19.6		10	20.4	
41-50	8	15.7		14	28.6	
51 and above	15	29.4		8	16.3	
Male	50	98	-	49	98	-
Female	1	2		1	2	
Illiterate	12	23.5	-	8	16.3	-
Primary education	9	17.6		12	24.5	
Secondary education	11	21.6		10	20.4	
Tertiary education	18	36.3		19	38.8	
Yes	30	58.8	-	29	59.2	-
No	21	41.2		18	36.7	
Yes	10	19.6	-	5	10.2	-
No	40	78.4		40	81.6	
No response	1	4		4	8.2	

Table 2. Frequency distribution of the respondents considering adoption of organic practices.

Variable	Organic farmers				Conventional farmers			
	Group	Scale	Frequency	%	Group	Scale	Frequency	%
Prevention of detrimental factors to farms	Low	22-32	13	31.7	Low	15-28	6	15
	Medium	33-43	13	31.7	Medium	29-40	9	22.5
	High	44-54	15	36.6	High	41-54	25	62.5
Elimination of sources of pollution	Low	4-10	13	28.9	Low	9-13	5	12.2
	Medium	11-17	10	22.2	Medium	14-19	17	41.5
	High	18-24	22	48.9	High	20-24	19	46.3
Biological control	Low	7-18	10	23.3	Low	7-19	9	2.5
	Medium	19-30	14	32.6	Medium	20-31	14	38.9
	High	31-42	19	44.2	High	32-42	13	36.1
Mechanical-physical control	Low	16-22	8	18.6	Low	6-16	7	18.4
	Medium	23-29	9	20.9	Medium	17-26	11	28.9
	High	30-36	26	60.5	High	27-36	20	52.6
Cultural control	Low	17-30	3	6.7	Low	30-38	5	12.5
	Medium	31-44	10	22.2	Medium	39-46	11	27.5
	High	45-54	32	71.1	High	47-54	24	60

Regression analysis

Stepwise multiple regression analysis was used to determine the links between a range of independent variables and adoption of organic practices. As shown in Table 4, farmers' motivation and perception were entered into a regression equation and could explain 32.7% of variation in farmers' adoption of practices regarding

Table 3. Correlation analysis among adoption of organic practices and selected variables.

Variable	Prevention of detrimental factors to farms		Elimination of sources of pollution		Biological control		Mechanical-physical control		Cultural control	
	Correlation coefficient	Sig.	Correlation coefficient	Sig.	Correlation coefficient	Sig.	Correlation coefficient	Sig.	Correlation coefficient	Sig.
Attitude	0.401	0.01*	0.123	0.433	0.116	0.508	0.431	0.005*	0.395	0.009*
Motivation	0.533	0.000*	0.112	0.167	0.216	0.17	0.174	0.165	0.438	0.003*
Goals	0.135	0.401	-0.024	0.878	0.043	0.785	0.059	0.711	0.223	0.146
Perception	0.475	0.002*	0.002	0.143	0.157	0.316	-0.12	0.444	0.171	0.26
Production constraints	-0.13	0.424	0.237	0.121	-0.107	0.5	-0.002	0.99	0.018	0.905
Transportation constraints	0.089	0.582	0.005*	0.968	-0.001	0.994	-0.06	0.712	-0.032	0.84
Institutional constraints	0.296	0.06	0.328	0.025*	0.119	0.453	-0.19	-0.20	-0.1	0.50
Participation in extension activities	0.039	0.8	0.049	0.75	0.033	0.83	-0.22	0.15	0.07	0.63
Communication channels	0.36	0.829	0.02	0.93	-0.12	0.445	-009	0.56	0.308	0.405*

Table 4. Regression analysis explaining variations in adoption of organic farming practices.

Dependent variable	Independent variable	B	SEB	Beta	t	Sig.	R	R^2
Prevention of detrimental factors to farms	Motivation	1.43	0.52	0.401	2.74	0.01	0.365	0.327
	Perception	0.288	0.122	0.344	2.35	0.025		
	Constant	-2.17	9.67		-0.225	0.82		
Elimination of sources of pollution	Institutional problem	1.35	0.288	0.697	4.69	0.000	0.443	0.410
	Attitudinal problem	-0.355	0.083	-0.638	-4.29	0.000		
	Constant	21.48	4.09		5.24	0.000		
Mechanical-physical control	Social attitude	1.07	0.224	1.09	4.79	0.000	0.491	0.443
	Ecological attitude	-1.6	0.455	-0.812	-3.53	0.001		
	Extension services	-0.492	0.152	0.419	3.23	0.003		
	Constant	22.84	6.26		3.64	0.0001		
Cultural control	Motivation	1.58	0.388	0.568	2.93	0.006	0.303	0.323
	Constant	19.85	6.77		4.08	0.000		

R = 0.365, Adjusted R^2 = 0.327, F = 9.49, sig = 0.001; R = 0.443, Adjusted R^2 = 0.41, F = 13.5, sig = 0.001; R = 0.491, Adjusted R^2 = 0.443, F = 10.27, sig = 0.000; R = 0.323, Adjusted R^2 = 0.303, F= 16.67, sig = 0.000.

prevention of detrimental factors to farms, thus the following model was estimated:

$Y_1 = -2.175+1.43 (X_1) + 0.288 (X_2)$

Where Y_1 is the dependent variable of adoption, and X_1, and X_2 are the independent variables that is farmers' motivation and perception which exert influence on adoption.

On the other hand, results showed that institutional problems and attitudinal problems entered to regression equation and explained 41% of variation in adoption of practices regarding elimination of sources of pollution and the following model is expressed:

$Y_2 = 21.48+ 1.35(X_1) - 0.355 (X_2)$

Where Y_2 is the dependent variable, X_1 and X_2 are institutional problems and attitudinal problems respectively that affect adoption.

In terms of adoption of mechanical-physical control practices, social attitude, ecological attitude and participation in extension activities were entered into the regression model. These variables could explain 44.3% of the variation in the dependent variable. In this regard, the following model was estimated:

$Y_3 = 22.84+1.07 (X_1)-1.6(X_2)-0.492 (X_3)$

Where Y_3 is the dependent variable of adoption; X_1, X_2 and X_3 are social attitude, and ecological attitude and participation in extension activities respectively which have influence on adoption.

Finally, results revealed that 32.3% of the variation in dependent variable of organic practices adoption regarding cultural control was explained by farmers' motivation thus, the following model was estimated:

$Y_4 = 19.85+1.58(X1)$

Where Y_4 is the dependent variable and X_1 is farmers' motivation.

Conclusion

The study reported here is concerned with explaining what determines whether a farmer adopts organic practices or not. Here, a wide range of factors which exercise influence on adoption are covered including the socio-economic characteristics of the farmer, the characteristics of the farm, sources of information, membership of organizations, the farmer's attitudes. In an effort to shed light on different aspects of the organic farming adoption, a myriad of factors which were determined as influencing ones have been tested regarding correlation. Additionally, stepwise regression analysis was run. Findings of the study points out that farmers' attitude was significantly and positively correlated with some of the adoption variables that is prevention of detrimental factors to farms, mechanical-physical control and cultural control. On the basis of the results, some suggestions and recommendations for supporting organic farming should be included in the area.

So, it can be suggested that farmers' attitude towards organic farming should be improved positively by connecting organic farmers and distributors of information and knowledge through creation of networks such as mass media, magazines, data bases, cooperatives and non profit information distributers. At the same time, it can be suggested that activities of community based organizations should be extended by extension and development agents of the organic farming sector. Undoubtedly, these activities cause to increase adoption of organic farming among small farmers. Finally, it could be said that policies and regulations should be supporting organic farmers to overcome the constraints they face along the path of conversion and promoting other incentives promoting organic conversion. In general terms, a wide range of factors, policies, institutions and organizations should be orchestrated in order to work collaboratively to develop an effective approach to addressing the dynamic sector of organic agriculture.

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