

Original Research

Factors Affecting Wheat Farmers' Attitudes toward Organic Farming

Ali Shams*, Zahra Hooshmandan Moghaddam Fard

¹Department of Agricultural Extension, Communication, and Rural Development,
University of Zanjan, Iran

Received: 29 January 2017

Accepted: 12 March 2017

Abstract

In recent years the focus on organic farming has been emphasised because of the negative effects of conventional farming. Any persuasion geared toward making farmers adopt organic farming methods requires an investigation of their current attitude toward organic farming. The main purpose of this descriptive-correlational study was to investigate the effective factors that determine farmers' attitudes toward organic farming. The statistical population consisted of all the wheat farmers in the Khodabande township (N = 24,350), of whom 275 were identified based on Cochran's sampling formula and through a stratified, randomised sampling method. The research tool was a researcher-made questionnaire (whose validity was verified by a panel of experts in related fields); to check its reliability, a Cronbach's alpha coefficient was calculated to equal 0.78. The results showed that the attitude of the majority of respondents toward organic farming, at 50.9 percent, was positive, and the attitude of the other 49.1 percent was neutral. Correlation analysis revealed that age, family household number, and experience had a negative meaningful correlation with the farmers' attitude, but education, income, and knowledge of organic farming had a positive meaningful correlation. Comparison analysis showed that there were significant differences between farmers' attitudes toward organic farming based on the different cultivation methods as well as the use of pesticides and herbicides. Logistical regression analysis revealed that the factors that significantly ($p < 0.05$) affected farmers' attitudes toward organic farming included the farmer's experience, income, and their knowledge of organic farming.

Keywords: organic farming, wheat farmers, attitude, Iran

Introduction

For decades, the most important role of agriculture in any nation was to fulfil the need for food production [1-2]. Of course, agriculture has other important roles, including job creation and the production of raw materials

for industries [3]. However, due to rapid population growth and an increasing demand for food over the past century, changes in the quality of the soil, air, and water have occurred [4], which are associated with numerous harmful effects on human health [5-6]. Therefore, in response to the negative consequences that conventional farming is associated with, various countries have been forced to seek alternative systems to produce foodstuffs that are free of harmful chemicals [7-8]. In recent years, with the rise of environmentally friendly methods

*e-mail: Shams@Znu.ac.ir

of farming, such as the use of pesticides with low residual effects and biological insecticides, integrated pest management (IPM), and other non-chemical methods such as crop rotation and green manure for soil fertility enhancement, the passing of effective laws governing the control of chemical inputs has become more rational in developed countries, which motivate farmers to accept organic production [9]. In this context, many researchers consider organic farming – a system to produce food with minimal harm to ecosystems, animals, and humans – as a solution; it is seen as a strategy for ensuring food security, biodiversity, and the sustainability of the environment while countering the negative impacts of conventional agriculture [10-11]. Organic farming aims at conserving water and soil, and it requires the use of natural manure, avoiding the employment of fertilizers and pesticides in the production process; specialists argue that organic products are richer in vitamins, nutrients, and antioxidants, which are beneficial for health [9, 11-13].

The benefits of organic farming have been considered by Iranian policy makers, researchers, and extension workers [14]; however, the expansion of organic farming in developing countries such as Iran has been much slower than in the developed world. In 2010, Iranian organic farming lands comprised 7,256 hectares, and wheat – the key organic product in Iran – consisted of 1,156 hectares of farmland. These values indicate that despite all benefits of organic farming, Iranian farmers have not entirely adopted organic farming [10]. What is more important in this regard is to encourage these farmers to adopt organic farming [9]. Several factors have affected farmers' decisions to adopt organic farming, including economic, social, structural, and institutional considerations [15]. However, the attitude of farmers is also an important factor that can have a significant impact on farmers' decisions [16-18]. Previous studies have shown that various factors have been associated with the attitudes of farmers toward organic farming, such as their age [19]. Karki et al. [20], Dunlap et al. [21], and Alzaidi et al. [22] have shown that older farmers have a better attitude toward organic farming. According to some researchers in Iran, older farmers have a more positive attitude toward organic farming [23-24]. However, other studies have indicated that there is a negative or non-significant correlation between age and attitude toward organic farming practices among farmers [15, 17, 25-26]. This means that younger farmers have a better attitude for accepting organic farming as a new innovation; perhaps this is due to the willingness of younger farmers to take risks [10, 27].

Several studies have shown that the educational level of farmers has a positive correlation with their attitudes toward organic farming [17, 21-22, 25, 28-31]. In contrast to these studies, [13, 32] show that the education levels of farmers have been found to have no significant effect on the probability of adopting organic farming practices. According to previous studies, organic farming has a greater need for labour in comparison to conventional farming [33]. Household size is another

variable that affects a farmer's attitude toward organic farming; it shows a positive correlation [11, 18, 34]. This implies the importance of large family size in the production and maximization of profits in their farming enterprise [11].

Farming experience is another important variable that has shown a positive effect on attitudes toward organic farming in many previous studies [11, 17, 19, 30-31, 34]. This shows that farmers with higher agricultural experience have a more favourable attitude toward organic farming practices in comparison with farmers who have less agricultural work experience. One of the most important factors influencing the attitudes of farmers toward organic farming is household income. For example, Sarker et al. [18] and Iranian researchers such as Sadati et al. [27], Ghorbani et al. [35], and Ghorbani et al. [36] have shown that farmers with higher income have favourable attitudes toward organic farming and, therefore, are more likely to adopt organic farming. In contrast, Wheeler [31] indicated that household income has no relationship with attitudes toward organic farming. Income is associated with the amount of owned land as it is one of the resources for agricultural production. According to Zingore et al. [37], wealthier farmers own more land. Some studies such as Oluwasusi [11], Cukur [13], Karki et al. [20], Chouichom and Yamao [30], and Adebayo and Oladele [34] show that the attitude toward organic farming has a positive correlation with farm size. However, Alzaidi et al. [22] and Khaledi et al. [32] indicate that an inverse relationship exists between farm size and the attitudes of the farmers toward organic farming. This means that farmers who own smaller lands have a better attitude regarding the use of organic farming practices. Having information and being familiar with organic farming is an important factor that influences the attitudes of farmers [11, 26].

Cukur [13] and Laple [25] reported that a positive relationship exists between being informed about organic farming and farmers' decisions to produce organic milk. Therefore, access to information, which is one of the most important factors creating a positive attitude toward organic farming, has been mentioned across many studies. Sarker et al. [18] has shown that access to extension services was strongly associated with decisions to adopt organic farming. The result of a study conducted by Wollni and Andersson [12] has shown that farmers, who believe in acting in accordance with their neighbours' expectations within a neighbourhood network that has a greater availability of information, are more likely to adopt organic farming. Oluwasusi [11] has shown that a source of information has a positive relationship with the attitude that farmers adopt toward organic farming practices. Adebayo and Oladele [34] indicated that the frequency of extension contacts had a significantly positive relationship with attitudes toward organic farming practices. Wheeler [31] found that one of the significant key influences on attitudes toward organic farming were informational factors. Since no prior studies have been conducted exploring the current attitude of farmers toward

organic farming, the aim of this study is to investigate the effective factors that influence these attitudes.

Material and Methods

This study is an applied research carried forward by adopting the surveying method. The statistical population included 27,230 wheat farmers (living in 18 villages) in the Khodabandeh Township in Iran. Cochran's formula [38] was adopted to acquire the appropriate sample size for this research, which involved 275 farmers engaged in wheat cultivation. Wheat farmers were randomly selected using a stratified sampling method. Data was collected using a researcher-made questionnaire, which was filled out by face-to-face interviews with farmers in their homes or on their farms. The questionnaire consisted of demographic and farming characteristics, and the expressed attitude toward organic farming. Farmers' use of information was assessed for 15 resources on a four-level Likert scale (containing the following categories: 'no use,' 'low,' 'moderate,' and 'high'). To assess the attitude of the farmers toward organic farming, a composite index of 16 items on a five-level Likert scale (containing the following categories: 'strongly disagree,' 'disagree,' 'neither agree nor disagree,' 'agree,' and 'strongly agree') was used. In order to ensure face validity, a group of experts and researchers were asked to give their comments about the questionnaire. Furthermore, Cronbach's alpha coefficient was used to examine the reliability of the questionnaire. The value of this coefficient was higher than 0.7 for the various sections of the questionnaire, which indicated valid internal consistency scales in the individual components of the questionnaire. Data collected were analyzed using SPSS₂₁ software based on descriptive statistics such as frequency count, percentage, mean, standard deviation, the coefficient of variation (CV), and inferential statistics such as correlation coefficient and binary logistic regression. First by using the correlation coefficient we find that those variables do correlate with the attitude, and then we use this information to run a binary logistic model to assess the effect of selected independent variables on wheat farmers' attitudes toward organic farming. Logistic regression analysis was chosen over linear regression analysis because the wheat farmers' attitude scores were nonparametric, and remained so after several different transformations. In the model, the wheat farmers' attitudes score was transformed into a two-point categorical scale and the model calculates the probability of being in a neutral category of attitude compared to a favorable better one. Generally, logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables [39]. The independent variables that were entered into the model were farming experience, income, knowledge of organic farming, educational level, household size, farm size, and the use of information resources, the extent of which the first three variables were identified as being

meaningful in the model. This research was carried out in June 2016 following a pre-test conducted in May 2016.

Results and Discussion

All participants (wheat farmers) were male and middle-aged ($M = 43$ years, $SD = 12.21$). The majority of farmers were married (93.5%), while 6.5 percent were single. The results indicated that a majority of farmers (77.8%) had a household size of less than five members. Literacy level among respondents was generally low as the majority (71.3%) had some formal education (which included primary and secondary education), while 14.9% were illiterate. The average farming experience of respondents was about 19 years. Data indicated that the average annual income for each household was 122.56 ± 62.69 million Rials.

Regarding their familiarity with organic farming, results revealed that the majority of farmers surveyed (59.3%) had low and very low familiarity, 34 percent were moderately familiar, and only 7.8 percent were highly or very highly familiar with organic farming. The extent to which farmers used the sources of information in the field of farming were ranked according to their mean; where their mean was equal, the small coefficients of variation (CV), were used (Table 1). The results revealed that the most important source

Table 1. Frequency distribution of farmers in terms of the source of information.

Source of Information	Mean	Sd	CV
Neighbours and relatives	1.91	0.90	0.47
Community TV	1.87	1.01	0.54
National TV	1.85	0.55	0/30
Wheat buyers and dealers	1.52	0.69	0.45
Experts of the sale centres (machinery and plant protection)	1.42	0.69	0.48
Experts of technical consulting cooperatives	1.17	0.69	0.59
Experts of local agriculture service centre	1.15	0.70	0.61
Newspaper\Magazine\Brochure	1.13	0.81	0.71
Internet	1.12	0.80	0.71
Experts of agricultural jihad organization	1.09	0.71	0.65
Radio	1.08	0.81	0.75
Film\CD\DVD	0.83	1.08	1.30
Researchers and university professors	0.75	0.94	1.25
Satellite programs (TV)	0.72	1.17	1.62
Mobile phones	0.68	1.26	1.85

of information for farmers came from neighbours and relatives ($M = 1.91$), community TV ($M = 1.87$), and national TV ($M = 1.85$). The most underused sources of information included mobile phones, satellite programs, and university professors.

To record the total use of these resources, first all the scores were summed and then recorded in three levels of use: namely low, medium, and high. As shown in Table 2, the use of these resources by the majority of farmers (67.6 %) was low, 7.3 percent medium, and 25.1 percent high. As explained in the 'Material and Methods' section, the farmers' attitudes toward organic farming were assessed by 16 items on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree) and the scores of negative items reversed. Considering the mean of the scale ($M = 2.5$), the items' mean greater than 2.5 denoted a positive attitude while a mean less than 2.5 denoted a negative attitude toward organic farming. In general, these results revealed an overwhelmingly positive attitude shown by the respondents toward organic farming. All the means of the 16 attitudinal statements were above the cut-off point of 2.5.

To report the general attitude of farmers, first all the scores were summed up and then recorded within three categories: 'favourable,' 'middle' (neutral), and 'unfavourable.' 50.9 percent of farmers had a favourable attitude and 49.1 percent of them had a neutral attitude toward organic farming; there was no one with an unfavourable attitude. This is similar to the findings of Oluwasusi [11], Alzaidi et al. [22], and Adebayo and Oladele [34]. According to the results of the correlation coefficient (Table 3), there was a significant negative correlation between the age of farmers and their attitudes toward organic farming. The present results support the findings of Jayawardana and Sherief [17], Peterson et al. [15], Laple [25], and Laple and Van Rensburg [26], which assert that older farmers have negative attitudes toward organic farming in comparison with younger ones. This means that younger farmers have an inclination to accept organic farming as an innovative practice. One of the reasons behind this phenomenon is that younger farmers are more willing to take risks [10, 27] and are interested in experimenting with new technology in comparison to older farmers [40]. However, the findings of the current study do not support the previous research conducted by Karki et al. [20], Dunlap et al. [21], Alzaidi et al. [22], Dinpanah et al. [23], and Ghane et al. [24]. The second variable with a positive significant correlation was educational level. This implies that being more educated influences attitudes toward organic farming and farmers that are more educated have a better attitude toward organic farming. This finding has been underscored by Jayawardana and Sherief [17], Dunlap et al. [21], Alzaidi et al. [22], Laple [25], Omani and Chizari [28], Razzaghi-Borkhani et al. [29], Chouichom and Yamao [30], and Wheeler [31]. Since information is the centrepiece of education, the facilities to access information and the ability to comprehend it would contribute toward making

Table 2. Ranking items related to the attitude of farmers toward organic farming.

Statement of Attitude index	Mean	SD	CV	Rank
The use of chemical pesticides cause some damage to human and natural resources.	4.24	0.74	0.17	1
Chemical pesticides are harmful to human and animal health.	4.11	0.68	0.17	2
Farmers could use organic fertilizers such as animal manure and crop residues to increase soil fertility.	4.11	0.84	0.21	3
Organic farming reduces environmental pollution.	4.01	0.70	0.170	4
Every Informed farmer should encourage other farmers to use organic farming practices.	3.96	0.73	0.18	5
Chemical fertilizers are harmful to human and animal health.	3.94	0.78	0.20	6
Consumption of organic farming products is beneficial to human health.	3.89	0.90	0.23	7
The nutritional value of organic products is more than conventional ones.	3.89	0.71	0.18	8
Organic farming helps maintain soil fertility.	3.77	0.67	0.18	9
In organic products, there is little or no pesticide residue.	3.70	0.99	0.27	10
Organic farming causes production quantity and income of farmers to decline.*	3.61	0.94	0.26	11
I would like to use natural fertilizers instead of chemical fertilizers.	3.58	0.95	0.27	12
Some diseases and pests can be controlled without the use of chemical pesticides.	3.32	1.03	0.31	13
In organic farming, production costs increase.*	3.23	1.04	0.32	14
I would like to produce fewer but healthier products without the use of fertilizers and pesticides.	3.01	1.09	0.36	15
Despite the higher price of organic products compared to conventional products, people still prefer buying organic and healthy products.	2.54	1.06	0.42	16

Scale: strongly disagree = 1 to strongly agree = 5* negative statements

Table 3. Correlation between the studied variables and attitudes toward organic farming.

Variables	r	p	Correlation Coefficient
Age	-0.241**	0.000	Pearson
Educational level	0.204**	0.000	Pearson
Household size	-0.239**	0.000	Pearson
Farming experience	-0.209**	0.000	Pearson
Income	0.310**	0.000	Pearson
Farm size	0.009	0.888	Pearson
Knowledge about organic farming	0.291**	0.000	Spearman
Use of information resources extent	0.290**	0.000	Pearson

**Correlation is significant at the 0.01 level (two-tailed).

farmers better informed, and assist them in taking decisions to adopt new technology [40]. Education allows farmers to understand the concepts of organic farming more comprehensively [41]. Furthermore, educated farmers can acquire technical information more easily [42]. As a result, the acceptance rate of agri-environmental policies among educated farmers is higher than their poorly educated counterparts [43]. Thus, the evidence of the positive effect of education on attitudes toward organic farming is indisputable. The findings of this study are, however, inconsistent with that of Cukur [13] and Khaledi et al. [32]. The literature review has a unanimous agreement with respect to the assertion that larger households have a better attitude toward organic farming in comparison to smaller households [11, 18, 34]. These findings were based on the fact that farm households rely on family members for non-mechanized farm operations in many developing countries, and large household sizes reduce labour limitations, leading to increased production. The results of this study provide contrary evidence, that is, smaller households have a better attitude toward organic farming. The findings of this study are, however, consistent with that of Djokoto et al. [40].

Some studies show that farmers who have engaged in agriculture over a long period of time are more interested in acquiring more experience about the successes and failures of the technology employed to turn out products [10, 40]. For example, Isin et al. [19], Jayawardana and Sherief [17], Oluwasusi [11], Adebayo and Oladele [34], Wheeler [31], and Chouichom and Yamao [30] indicated that farming experience has a positive effect on attitudes toward organic farming. The results of this study are in line with the study by Hattam and Holloway [44], which shows contrary evidence. According to this study, more experienced farmers were less interested in organic farming. Farmers with more experience in farming are used to the old way of farming and are not particularly interested in learning new methods and vice versa (the

negative sign specifically establishes that farmers with fewer years of experience in farming have better attitudes toward organic farming). This implies that less farming experience leads to the probability of a better attitude toward organic production because less experienced farmers may be more amenable to taking risks in line with the learning curve. The finding of this study is consistent with the conclusions of Djokoto et al. [40], Thapa and Rattanasuteerakul [45], and Hattam and Holloway [44]. Farmers who adopt organic farming encounter an increase in their production costs because of the use of labour-intensive technologies [46]. In addition, these farmers face new costs related to transportation and certification. Therefore, wealthier farmers have greater access to resources and may be better equipped to take risks [42]. According to previous studies, one of the constraints of the adoption of organic farming has been economic barriers such as household income [32]. Therefore, higher income might facilitate the adoption of organic practices by farmers with more favourable attitudes toward it. In this study, consistent with Sarker et al. [18], and like-minded researchers in Iran (for example: Sadati et al. [27], Ghorbani et al. [35] and Ghorbani et al. [36]) who reported positive and statistically significant correlations between the annual income of farmers and their attitudes toward organic farming, demonstrated that farmers with a higher income have a better attitude toward organic farming than farmers with a lower income. This finding calls for the strengthening and the increased access to credit services for farmers in order to motivate them to adopt organic farming practices. This may be facilitated by extension organization services. In contrast to earlier findings, however, there was no meaningful correlation between farm size and the attitudes of farmers toward organic farming. Studies such as Zingore et al. [37], Cukur [13], Karki et al. [20], Oluwasusi [11], Adebayo and Oladele [34], and Chouichom and Yamao [30] showed a positive correlation, and other studies, for example, Alzaidi et al. [22] and Khaledi et al. [32], reported a negative correlation between the attitude toward organic farming and farm size.

It seems that having related knowledge of environment by people (regarding principles, values, ecology, and health) influence their attitudes toward the environment [47]. Therefore, a lack of knowledge and understanding is reported by many researchers as a barrier of intention to adopt organic farming [10, 48-49]. As noted in the review, farmers who have more knowledge about organic farming have a better attitude toward it. The findings of this study, consistent with the aforementioned studies as well as the studies of Cukur [13] and L apple [25], report the positive relationship that exists between being informed about organic farming and farmers' attitudes toward it.

There was a positive meaningful correlation between the extent of information resources used by farmers and their attitudes toward organic farming. In previous studies like Djokoto et al. [40], Wollni and Andersson [12], Oluwasusi [11], Adebayo and Oladele [34], Sarker et al. [18], Tatlidil et al. [41], and Wheeler [31], the marginal effect of access to sources of information was statistically

Table 4. Logistic regression of the factors affecting the attitude of farmers.

Sig	Wald	SE	B	Variable
0.035	4.470*	0.015	-0.031	Farming experience
0.000	25.263**	0.193	0.972	Knowledge about organic Farming
0.000	45.518**	0.023	0.155	Income
0.000	15.326**	0.897	3.512	Constant

significant positive, and farmers with increased organic farming knowledge were more likely to think favourably about it. Farmers who have access to relevant information resources can be familiar with new techniques and, therefore, share their experiences and knowledge with each other. In this regard, Bello [50] believes that farmers in many developing countries lack technical information and knowledge about farming practices and marketing methods such as competition strategies, choosing which products to grow, distribution channels, access to marketing services, and the resources to identify different markets. Since neighbours and relatives, community TV, and National TV were the most prevalent sources of information for farmers in the region, information on organic farming can be provided through these sources.

As described above, all the farmers were classified into two categories, which include favourable and neutral attitudes toward organic farming. Binomial logistic regression was used to determine the factors affecting wheat farmers' attitudes toward organic farming. The logistic regression model was statistically significant: $\chi^2 = 149.622$, $p = .000$. The model explained 46.5% (Nagelkerke R^2) of the variance in the farmers' attitude and correctly classified 82.3% of these cases.

The logistic regression results are shown in Table 4. A negative coefficient (B) indicates a reduced likelihood of favourable attitude, while a positive coefficient indicates an increased likelihood of favourable attitude. Entry and exit of variables were specified by the Wald statistic, with probabilities of 0.05 and 0.1, respectively (* $P < 0.05$, ** $P < 0.01$). The results of the binomial logistic regression suggested that higher farm experience decreased the likelihood of a favourable attitude toward organic farming and, in contrast, a high income and knowledge on organic farming increased the likelihood of the farmers' attitude to be favourable to new farming alternatives.

Conclusions

This study investigated the attitudes of wheat farmers (from the Khodabandeh township in Zanjan province, Iran) toward organic farming and the factors responsible for these attitudes. We can conclude from this study that nearly half of them (50.9%) had a favourable attitude. Farmers with a high educational level, a high income, a

high farm size, more knowledge about organic farming, and greater access to information resources had a favourable attitude toward organic farming; in contrast, older farmers with high household sizes and longer farming experience had a neutral attitude. According to the regression model, farming experience, knowledge about organic farming, and income explained 46.5% of likelihoods of the dependent variable. Since the majority of farmers (59.3%) had a low level of knowledge, an improvement in the farmers' level of knowledge regarding organic farming has been suggested. As farmers of the village are the primary source of information for other farmers, hosting proper training workshops by responsible experts and organizations in order to familiarize these farmers with the problems of conventional farming and the advantages and benefits of organic farming methods could be beneficial. In addition, the potential use of TV programs (both at the local and national levels) in disseminating information related to organic farming to farmers is suggested.

Acknowledgements

The authors gratefully acknowledge funding from the University of Zanjan/Iran.

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