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Effective Factors on Application of Sustainable Agricultural Practices by Paddy Farmers (Case of Rural Production Cooperatives Members)

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Abstract

One of the central duties of rural production cooperatives is to promote the adoption and application of sustainable agricultural practices by farmers, which hinges on several factors. Therefore, the study intends to evaluate the factors influencing the application of sustainable agricultural practices by paddy farmers. The research population included from all includes all paddy farmers as members of the production cooperatives in rural areas of Sari County, Iran (N=4160). A total of 162 farmers were selected through stratified sampling technique. The data was gathered through questionnaires, that its face validity was verified by a panel of experts, and its reliability was obtained through a pilot test (Alpha Cronbach coefficient, 0.93). The results showed that the application of sustainable agricultural practices was generally good. Moreover, the findings showed that there was a positive and significant relationship between the age, using information sources, family members, cultivating area, production amount, social status, access to inputs, participating in extension training courses and economic factors with the application of sustainable agricultural practices. The stepwise linear regression analysis results showed that the variables of cultivating area/hectare, economic facilities, participating in extension training courses and age can determine 61.8% variation of the application of sustainable agricultural practices by paddy farmers as members of rural production cooperatives.

Keywords:
Sustainable agriculture, Agricultural practices, Rural cooperative

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INTRODUCTION

The evaluation of population growth trends shows that the world population of six billion people in 1998 has grasped an upward trend of about to 1.8% per year and it is expected to reach 8 and 9.4 billion people in 2025 and 2050, respectively (Ahlander, 1994). Regarding the population growth and the needs for lots of food products, basic and traditional farming methods with low efficiency no longer meets these requirements. In recent years, deforestation and destruction of grasslands have significantly increased the cultivating areas and these requirements have been partly overcome by the application of industrial technologies and new ways of farming, also applying modified seeds, fertilizers, and chemical pesticides. However, lack of knowledge and technical expertise among farmers led to inefficient application of these inputs as the existing evidence suggests that the overuse of agricultural inputs not only failed to increase production, but also reduced the production in the long run (Omani, 2001). Moreover, it brought about loss in soil organisms, low quality of products, and reduced soil productivity, (Saad, 2007); also it caused the destruction of the natural environment and endangered the agricultural commodities consumers' health. Excessive consumption of pesticides not only made pests resistant and caused the emergence of new pest's generations, but also endangered the sustainability of the environment and human health (Oskou *et al.*, 2007). Thus, although the application of mechanical and chemical methods flourished agriculture, many disadvantages were obtained regarding issues on sustainable agriculture (Pishro and Azizi, 2009). Agriculture becomes sustainable when natural resources management such as the lack of pollution and land degradation, climate and giving priority to agricultural and rural communities to encourage existing communities for agricultural activities as part of the agreement on productive life are improved along with the economic efficiency and profitability. In fact, sustainable agriculture puts emphasis on the economical, ecological and rural culture balance with each other (Alipour *et al.*, 2008). Thus, the concept of sustainable agriculture features such factors of long-term protection of natural resources, optimal production with minimum production inputs, engendering sufficient income from each operation unit, and meeting all the demands of the rural population and other inevitabilities (Brown, 1987). One of the strategies of different countries, both developed and undeveloped, to increase the quantity and quality of production and achieve food security and environmental sustainability in overcoming problems, such as small units of agricultural production, environmental degradation and unsustainable production, is establishing agricultural cooperatives in different production fields because the agricultural production cooperatives can settle and resolve the abnormalities caused by the presence of small land area, scattered and heterogeneous arable land and many other problems of smallholder farmers and play an important role in rural development and sustainable development (Alizadeh and Omani, 2011). Achieving the objectives of increasing the quality and quantity of production, sustainable agriculture and environmental protection, the production cooperatives were established in Iran. The presence of such cooperatives is considered as one of the manifestations of a common corporate culture of partnership and assistance in meeting the needs of community members and resolves their social problems and human activities in removing the barriers to sustainable agriculture in society. Hence, one of the aspects that determines the achievement and attainment of sustainable agriculture in cooperatives is the evaluation of the application of sustainable agricultural practices by rice farmers as members of rural production cooperatives. Accordingly, the current study intends to answer the question on the status of the application of sustainable agricultural practices and to determine the factors influencing such status. What follows is the research conducted in this area. In their study on the role of ICT in developing sustainable agricultural practices, Afrukhteh and Saraie (2013) demonstrated that there was a significant relationship between rice famers' practices of sustainable agriculture and their access to ICT. Shiri *et al.* (2013),

using correlation analysis in their study, showed that there was a significant positive correlation between the variables of agricultural land size, the annual income, farmers' educational level, total participation in the participating in extension training courses, using resources and communication- information channels, having knowledge on conservation practices and attitudes towards soil conservation practices and adopting soil conservation practices. Moreover, the results of the stepwise multiple regression analysis showed that three variables of attitude towards soil conservation practices, total participation in the educational extension classes, and the agricultural land size explained 56.2% of the dependent variable variance of soil conservation practices adoption by farmers. Using regression analysis, Sharifi *et al*. (2011) in their study on factors affecting the greenhouse cultivation system sustainability in Jiroft and Kahnuj demonstrated that 5 variables of sustainable agriculture knowledge, education level, attitude towards sustainable agriculture, participating in extension training courses, and greenhouse work experience explained 53.9% of sustainability in greenhouse cultivation system. Motieilangeroudi *et al*. (2010) in their path analysis to explain the causal factors affecting the sustainability of operation system showed that the 6 variables of capital investment, farmers' age, participation level, the agricultural land size, access to the inputs, and machineries have direct effects and variables of using agricultural resources and farmers' literacy level have indirect affect on the sustainability of farming operation system. In a study on evaluating and explaining the sustainable activities of corn farmers in Khuzestan conducted by the Enayatirad *et al*. (2009), the results showed that the majority of farmers used crop rotation and micronutrient fertilizers to fertilize their farm. Using green fertilizers, animal manures, using legumes in crop rotation when cultivating corn and using a combination of approaches to fight weeds were low and insignificant. The results showed that age, number of children, the amount of pesticides used and the farmers' ownership type had a significant negative relationship with their sustainability activities. Multivariate regression analysis showed that the use of pesticides, having access to extension services, the use of animal manure and corn yield explained 28% of the variation in sustainable activities. Shahrudi *et al.* (2009) in a study on beet farmers' knowledge, attitudes and skills in Khorasan Razavi province towards sustainable soil management practices showed that education, information resources, the use of technology in soil management, agricultural soil quality, extension contact, land area, age, and social status as the main distinguishing factors of farmers' behavioral classes have properly classified a total of 66.9% for all respondents on the basis of diagnostic functions. Chaharsooghiamin and Mirdamadi (2008) in their study showed that there was a positive and significant correlation between the age, history of rice growing, rice production, the amount of cultivated land (paddy field), social participation, the annual income from the sale of rice and ecological awareness with sustainable agriculture. Furthermore, they added that there was a significant negative correlation between the number of household members and participating in rice cultivation with sustainable agriculture. The results of the study by Lashgarara and Asadi (2008) showed that the adoption of sustainable agricultural practices among wheat farmers in Lorestan Province was at a relatively low level and there was a significant positive correlation between education, social participation, market access, using communication tools, participation level in courses and farmers' attitude and knowledge towards the adoption of sustainable agriculture. In their study on factors affecting the sustainable agriculture adoption in wheat farmers in Semnan, Korkehabadi (2005) came to the conclusion that sustainable agriculture adoption was at a relatively low level and there was a significant positive relationship between the education level, wheat farmers' green manure application, social participation, educational activities, market access, the means of communication and participating in extension training courses, recommendations compatibility given on sustainable agriculture and farmers' attitudes towards agriculture with the adoption of sustainable agriculture. On the other hand, there

was a significant negative relationship between the wheat farmers' age, use of fertilizers and chemical pesticides with sustainable agriculture. Shariatzadeh-Joneidi (2012), in their study on factors affecting the sustainability of agricultural production systems in the country, indicated that 66.78% of production cooperatives were classified as relatively sustainable. They also showed that there was a significant positive relationship between age, farming experience, social status, using communication resources, participation in extension training courses, training activities compatibility, positive attitude towards sustainable agriculture, product type, being satisfied with the input prices, the area of the land, the total area of agricultural land, sales income, performance, using farm workers, adequate farm loans, sustainable agriculture knowledge with sustainable agricultural production systems.

Reviewing the previous studies shows that the majority of studies are associated with the adoption of sustainable agriculture and there is

Table 1: Variables of extracted from studies

Authors	Variables													
	Age	Education Level	Number of family members	Area under cultivation	Work experience	Production Production amount	Economic factors	Accessing the inputs	Using information sources	Social involvement	Social status	Participating in extension training courses	Attitude towards sustainable agriculture	Knowledge towards sustainable agriculture
Shiri *et al.*, 2013.	•	•		•	•		•		•			•	•	•
Afrukhteh and Saraie, 2013									•					
Shariatzadeh-Joneydi, 2012.	•			•	•	•	•		•		•	•	•	•
Korkehabadi, 2004.	•	•							•	•		•	•	
Charsoughiamin and Mirdamadi, 2008.	•		•	•	•	•	•			•		•		•
Shahrudi *et al.*, 2009.	•	•		•					•		•	•		
Enayatirad *et al.*, 2009.	•		•			•						•		
Motieilangrudi *et al.*, 2009.	•	•		•				•	•	•				
Sharifi *et al.*, 2010.		•			•							•	•	•
Lashgarara and Asadi, 2008.		•							•	•		•	•	•

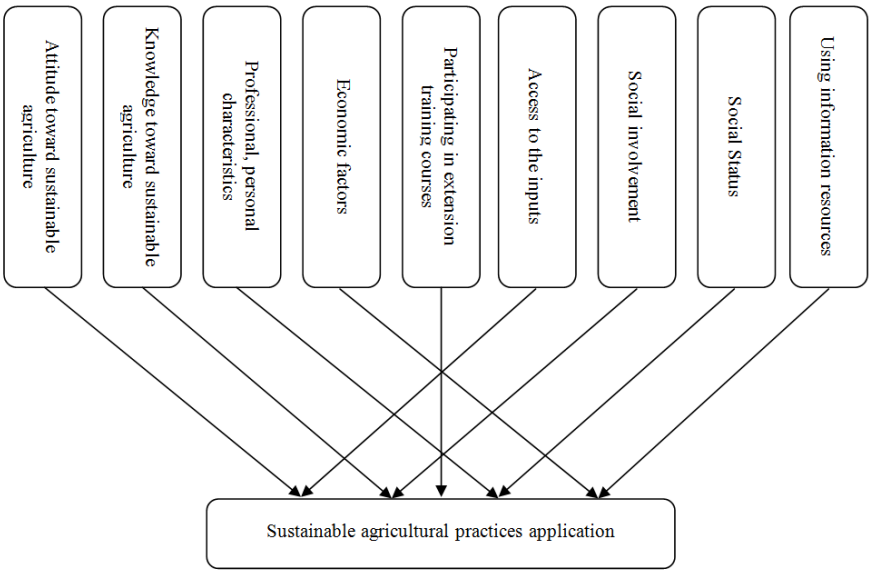

Figure 1: Research theoretical framework

no research about the application and implication of sustainable agricultural practices by farmers. Because of the importance of this subject, current study intends to answer the question on the status of applying sustainable agricultural practices and to determine the factors influencing such status by farmers as members of rural production cooperatives in Sari, Iran.

We conducted a detailed study of the research and extracted the significant relevant variables as shown in Table 1.

Based on data extracted from the literature review, the theoretical framework is given in Figure 1.

Regarding the research question and the literature, the main goal of the present study was to investigate the factors influencing the application of sustainable agricultural practices by rice farmers as members of rural production cooperatives in Sari County, Iran. The research objectives were as follow:

1. Evaluating the personal and professional characteristics of paddy farmers
2. Evaluating the application of sustainable agricultural practices by paddy farmers

MATERIALS AND METHODS

This applied study adopted a descriptive-causative field approach as the study procedure. The research population includes all rice farmers as members of the production cooperatives in rural areas of Sari, Iran (N=4160). 162 farmers were selected through stratified sampling technique in Cochran formula. The size of the target population for each cooperative is shown in Table 2.

To measure the dependent variable (application of sustainable agricultural practices), 12 open-ended questions were used (Table 5). Independent variables included demographic and professional characteristics of rice farmers (the open-ended and closed-end questions), using information resources (16 items), social status (5 items), social participation status (6 items), having access to inputs (5 items), the participation in extension training courses (5 items), the economic factors (8 questions), knowledge of sustainable agriculture (21 items), and attitude towards sustainable agriculture (18 items). It should be noted that the Likert scale was used as variables measurement from the very low=1to very high=5 and (strongly disagree=1 to strongly agree=5 as the attitude scale). In order to describe the independent and dependent variables of the study qualitatively, the Interval of Standard Deviation from the Mean (ISDM) was used (Sadighi and Ahmadpour Kakhak, 2005). Using such approach, the acquired score conversion into four levels were estimated as follows:

A = Poor: A <Mean- Sd
B = Average: Mean- Sd <B <Mean
C = High (Good): Mean <C <Mean + Sd
D = Very high: Mean + Sd <D

The data was gathered through questionnaires, which face validity was verified by a panel of experts, and its reliability was obtained through a pilot test (Alpha Cronbach coefficient: 0.93). Then, the data was analyzed through SPSS software (Version 16). Finally, correlation analysis and regression model were applied to understand the cause and effect relationship between the dependent variable (application of sustainable agricultural practices) and independent variables.

Table 2: The separate population and sample size for rural production cooperatives

Rural production cooperatives	Production cooperatives population	Statistical sample size	Returned questionnaires
Sahele Sabz Seyed Mahaleh	520	22	22
Bahar Gostar Chukela	573	24	22
Sarsabz Miarkola	322	13	13
Falahat Asram	750	31	26
Tallaie Sefid	1200	50	46
Chatre Sabz Surak	700	29	29
Darabkola	95	4	4
Total	4160	173	162

Table 3: The frequency distribution of rice farmers' general characteristics

Variables	Group	Frequency	%	Mean	SD
Age (year)				43.90	11.71
Education level	Illiterate	12	7.5	-	-
	Ability to read and write	18	11.3		
	Junior degree	24	15.1		
	Diploma	43	27.0		
	Bachelor degree	54	34.0		
	Post graduate	8	5.0		
Gender	Female	12	7.5	-	-
	Male	149	92.5		
Marital status	Married	144	89.4	-	-
	Single	17	10.6		
Rice farming experience (year)	-	-	-	26.65	13.05
Land under cultivation (hectare)	-	-	-	1.65	1.04
Rice production (ton)	-	-	-	4.70	2.49
Membership in cooperatives (year)	-	-	-	8.85	5.18
Family member (person)	-	-	-	4	-

RESULTS

Rice farmers' general characteristics

Table 3 shows the general characteristics of rice farmers. According to Table 1, the average age of farmers' was 43.9 years old. Most of the farmers had Bachelor's degrees (34%). About 93% of the respondents were men and just 7% of them were women, and 89.4% were married. The agricultural work experience of the farmers was about 21 years on average. The average rice cultivation was 1.65 hectare. The mean years of membership in the production cooperative and the number of family members were 9 years and 4 people, respectively.

Qualitative description of independent variables

Table 4 illustrates the frequency distribution of independent variables. According to Table 4, 38.9% of the paddy farmers are at the good level of information sources use, and 29% are at the average level, 39.5% of rice farmers are at the good level of social status, and 30.2% are at the average level. 35.8% of the participants had an average social participation and only 16.7% are at the highest level. Considering the access to agricultural inputs, 38.8% were at the average level. Pointing to the participation in extension training courses, 38.3% of the rice farmers considered it at highest level. Regarding the economic

Table 4: The frequency distribution of independent variables

Variables	Variable level	Poor	Average	Good (high)	Very good
Using information resources	Frequency	32	47	63	20
	%	19.8	29.0	38.9	12.3
Social status	Frequency	27	49	64	22
	%	16.7	30.2	36.5	13.6
Social participation	Frequency	29	58	48	27
	%	17.9	35.8	29.6	16.7
Access to agricultural inputs	Frequency	22	58	49	33
	%	13.6	38.8	30.2	20.4
Participating in extension training courses	Frequency	32	51	62	17
	%	19.8	31.5	38.3	10.5
Economic situation	Frequency	37	61	26	38
	%	22.8	37.7	16.0	23.5
Knowledge (towards sustainable agriculture)	Frequency	34	53	37	38
	%	21.0	32.7	22.8	23.5
Attitude (towards sustainable agriculture)	Frequency	26	56	52	28
	%	16.0	34.6	32.1	17.3

Table 5: The frequency distribution of the questions related to the sustainable agricultural practices application

Variables	Mean	SD	Minimum	Maximum
Organic Fertilizer consumption (kg/ha)	96.22	258.28	0	2000
Compost and manure application rate (kg/ha)	498.15	2527.05	0	30000
Herbicide consumption rate (liter/ha)	3.327	1.53	0	7
Using tillage and plowing to remove weeds (ha)	1.20	1.28	0	6
Using grazing for weed control (ha)	0.78	1.28	0	6
Using mechanical operations to remove weeds instead of herbicides (ha)	0.96	1.24	0	6
Burnt remains of plants after harvest (ha)	0.74	1.13	0	4
Area of crop rotation to control pests and diseases (ha)	0.84	1.25	0	6
Area of crop rotation to control weeds (ha)	0.81	1.23	0	6
Area of crop rotation for soil fertility (ha)	0.84	1.24	0	6
Conservation tillage area (ha)	0.75	1.10	0	4
Changing the date of planting crops for pest control (ha)	0.83	1.26	0	6

aspects, 37.7% considered it at the average and 23.5% at the highest level. Considering rice farmers' knowledge towards sustainable agriculture, 32.7% are at the average. On rice farmers' attitude towards sustainable agriculture, 34.6% considered it at the average and 32.1% at the highest level.

Evaluating the application of sustainable agricultural practices by paddy farmers

Based on table 5, the average consumption of fertilizers among rice farmers was 96.22 Kg/ha (SD=258.28). The average use of compost and manure by rice farmers was 498.15 kg/ha (SD=2725.08). The average consumption of herbicides was 3.327 liters per hectare (SD=1.53). Using the plowing and tillage to remove weeds by rice farmers was 1.20 hectare with the standard deviation of 1.28. The average area of grazing for weed control was 0.78 hectare (SD=1.28). Average area of using mechanical operations to remove weeds instead of herbicides was 0.96 ha (SD=1.24). The mean and the standard deviation of the burnt remains of plants after harvest, the area of crop rotation to control pests and diseases, and the area of crop rotation to control weeds, the area of crop rotation for soil fertility, conservation tillage area and changing the date of planting crops for pest control had the respective values as showed in table 5.

Considering the fact that the application of sustainable agricultural practices questions were open-ended and had different scales and directions, and in order to classify and evaluate the implementation of sustainable agricultural practices, the following steps will be followed:

1. Homogenization: due to the fact that various items may be positive or negative and in order to align the items, attempts should be taken to homogenize them. Since the research questions on herbicide consumption liters/ha (greater use stands on negative performance in sustainable agriculture) and an area of burnt remains of plants after harvest (ha) (more area means negative performance in sustainable agriculture) were not homogeneous with other questions (questions or more area meaning taking positive in sustainable agriculture) and in order to homogenize the given questions, a division was conducted on the questions.

2. Standardization: after conducting the homogenization and as the items are not aligned in terms of measurement units (liters/hectare, kg/ha, ha), the questions were standardized to conduct the same unit of measurement.

3. After homogenization and standardization, the variables were computed. Then, the rate of applying sustainable agricultural practices was classified through the Interval of Standard Deviation from the Mean.

As Table 6 illustrates, the application of sustainable agricultural practices by rice farmers' are as follow, 61.7% is at average level, 21.6% is at high levels, 13.6% is at very high-level, and 3.1% at poor level.

Evaluating the correlation between independent variables and application of sustainable agricultural practices

Based on Table 7, the results showed that

Table 6: The frequency distribution of the questions related to the sustainable agricultural practices application

Sustainable agricultural practices application	Frequency	Valid Percentage	Cumulative percent
Poor	5	3.1	3.1
Average	100	61.7	64.8
High (good)	35	21.6	86.4
Very high	22	13.6	100.0

Table 7: Correlation between independent variables and sustainable agricultural practices application

Independent variables	Correlation test	r	p-value
The extent of paddy field	Pearson	0.674**	0.000
Rice production	Pearson	0.615**	0.000
Participating in participating in extension training courses	Pearson	0.450**	0.000
Social status	Pearson	0.365**	0.000
Number of family members	Pearson	0.358**	0.000
Economic factors	Pearson	0.356**	0.000
Knowledge (towards sustainable agriculture)	Pearson	-0.253**	0.001
Accessing agricultural inputs	Pearson	0.227**	0.004
Age	Pearson	0.172*	0.035
The use of information sources	Pearson	0.165*	0.036
Attitude (towards sustainable agriculture)	Pearson	0.120	0.128
Membership in the production cooperative	Pearson	0.118	0.151
Education Level	Spearman	-0.109	0.171
Social participation	Pearson	0.058	0.460
Work experience	Pearson	-0.048	0.549

*p<0.05 **p<0.01

Table 8: Regression model (dependent variable: Application of sustainable agricultural practices)

Independent variables	B	Beta	t	p-value
Constant value	-15.980	-	-	-
Cultivating area /ha (x_1)	2.419	0.372	5.293	0.000
Economic factors (x_2)	1.145	0.409	5.918	0.000
Participating in extension training courses (x_3)	0.276	0.158	2.554	0.012
Age (year) (x_4)	0.077	0.126	2.059	0.042

R= 0.786 R^2= 0.618 F= 51.276

there was a significant positive correlation with 95% confidence level between age and the use of information sources and the application of sustainable agricultural practices. There was a significant positive relationship between the number of family members, the rice cultivation area, production amount, social status, accessing the inputs, economic facilities and participation in extension training courses with the application of sustainable agricultural practices at 1% level. Accordingly, the results showed that there was a significant negative correlation between rice farmers' knowledge towards sustainable agriculture and sustainable agricultural practices application. But there was no relationship between the other variables and the application of sustainable agricultural practices.

Factors influencing the application of sustainable agricultural practices by rice farmers

Regression model was used to investigate cause-and-effect relationship between the dependent and independent variables. The stepwise linear regression analysis was conducted to investigate the factors influencing the application of sustainable agricultural practices by rice farmers in production cooperatives. Having entered all of the independent variables with significant correlation, variables of the land area/ha,

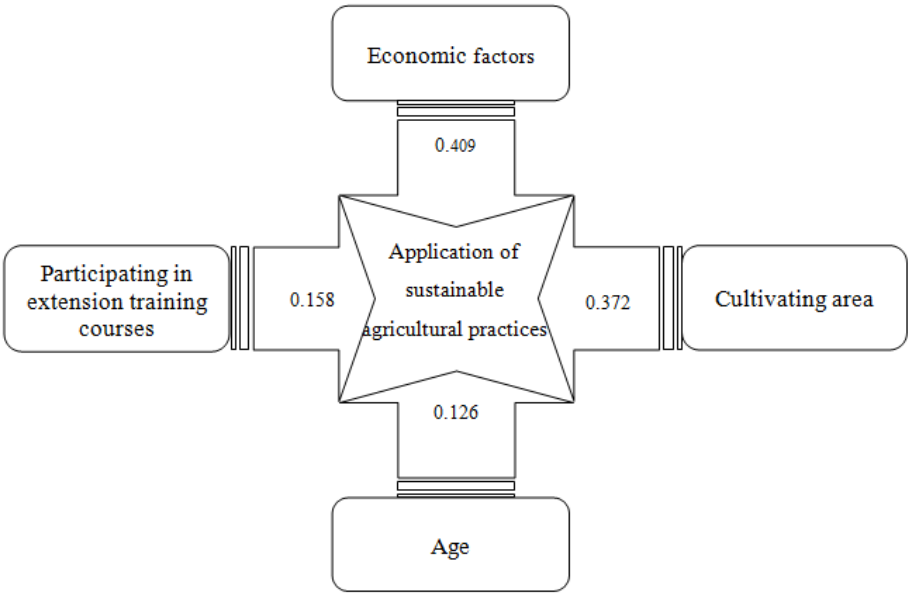

Figure 2: Factors influencing the application of sustainable agricultural practices

economic factors, participating in extension training courses and age remained in the model, these variables were able to determine 61.8% of the variation in the application of sustainable agricultural practices (Table 8).

CONCLUSION

Sustainable agriculture involves the fertility and productivity of soil, fertilizer, and pesticides control, management strategies, human needs, the potential economic viability, social acceptance, ecological capacity, time potentiality and philosophical ethics (implying moral satisfaction and goals). One of the institutions that could play a major role in the development of sustainable agriculture is production cooperatives working in rural areas. Such public institutions provide rice farmers services like sustainable agriculture, which can influence the behavior of rice farmers using sustainable practices. Therefore, evaluating rice farmers' application of sustainable agricultural practices in production cooperatives, and assessing the factors in the development of sustainable agriculture are critically important. Based on the data collected, there was a significant positive relationship between the application of sustainable agricultural practices and age (being consistent with the studies by (Chaharsooghiamin and Mirdamadi, 2008; Motieilangeroudi *et al.*, 2010; Shahrudi *et al*., 2009; Shariatzadeh-Joneydi, 2012; but inconsistent with researches by Enaiatirad *et al.*, 2009; Korkehabadi, 2005) and using information sources (based on the studies by Afrukhteh and Saraie, 2013; Korkehabadi, 2005; Motieilangeroudi *et al*., 2010; Shahrudi *et al.*, 2009; Shariatzadeh-Joneydi, 2012; Shiri *et al.,* 2013) at 5% at the confidence level of 5%. In other words, the older rice farmers had acceptable behavior in terms of sustainable agriculture. And the more rice farmers use the information resources, the more acceptable their behavior would get towards sustainable agriculture. There was a significant positive relationship between the number of family members (inconsistent with research by Chaharsooghiamin and Mirdamadi, 2008), the extent of rice growing land (consistent with Chaharsooghiamin and Mirdamadi, 2008; Motielangeroudi *et al*., 2010; Shiri *et al.*, 2013; Shahrudi *et al.*, 2009; Shariatzadeh-Joneydi, 2012) production amount (compatible with the research by Chaharsooghiamin and Mirdamadi, 2008; Shariatzadeh-Joneydi, 2012), social status (according to the studies by Shahrudi *et al.*, 2009; Shariatzadeh-Joneydi, 2012), the access to agriculture inputs (in line with the research by Motieilangeroudi *et al.*, 2010), the participation in extension training courses (consistent with the research by Enaiatirad *et al.,* 2009; Korkehabadi, 2005; Shahrudi *et al.,* 2009; Sharifi *et al.,* 2011; Shariatzadeh-

Joneydi, 2012; Shiri *et al.,* 2013) and economic factors (compatible with the research by Shariatzadeh-Joneydi, 2012; Shiri *et al*., 2013) and the application of sustainable agricultural practices at 1%. In other words, increase in number of rice farmers' family member; rice growing land and production amount; improving the social status and rice farmers' access to agricultural inputs; increase in the participation of extension training courses, and economic factors have led to higher application and implication of sustainable agricultural practices by rice farmers.

There was a significant negative correlation between rice farmers' knowledge in sustainable agriculture (as opposed to related research by Chaharsooghiamin and Mirdamadi, 2008; Lashgrara and Asadi, 2008; Shiri *et al.,* 2013) and the application of sustainable agricultural practices. In other words, knowledge is not effective in the application of sustainable agricultural practices. The results of the stepwise linear regression analysis showed that the four variables of paddy field area / hectare, economic factors, participating in extension training courses and age could explain 61.8% of the total changes in the application of sustainable agricultural practices by rice farmers as members of rural production cooperatives. Regarding the standardized coefficients, it was determined that economic factors (40.9%) had greater contribution than other factors in explaining the application of sustainable agricultural practices.

Considering the results of the study, the following suggestions are offered:

1- Considering the relative contribution of economic factors as the most important factor in explaining the application of sustainable agricultural practices, it is suggested that the produced rice should be favorably priced by practitioners and should be purchased from rice farmers in a simple process with no complicated paperwork to achieve relative satisfaction of farmers. Also, farmers should be helped to use rice production inputs and their related tools by providing them the necessary and required mechanism. Considering such issues, a long step can be taken towards the application of more sustainable agricultural practices.

2- Considering the relative contribution of land area of paddy field/hectare (37.2%) as the second most important factor in explaining the application of sustainable agricultural practices, it is recommended that in order to implement sustainable practices and sustainable agricultural development, experts and especially agriculture extension agents initially focus on rice farmers with more agricultural land to consider more application of sustainable agricultural practices and such desired behavior (using sustainable agricultural practices) will be extended to other rice farmers.

3- Another important factor in the application of sustainable agricultural practices, is the participation in extension training practices which had an important role. Accordingly, it is suggested that more favorable conditions for farmers' participation in extension training activities should be provided by the authorities.

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