Identification of Influencing Factors on Adoption of Sustainable Agriculture among Wheat Farmers of Lorestan Province, Iran

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ABSTRACT

The purpose of this paper is to investigate and identify the factors that influence on adoption of sustainable agriculture among wheat farmers of Lorestan province in Iran. This research was kind of descriptive-correlation. The population of this study includes 862 wheat farmers. Sampling method is random stratified that there is selected a sample by 140 individuals. The research tool was questionnaire. The data of research are analyzed by SPSS/13 software into two descriptive and analysis sections. In order to validity of research instrument, designed questionnaire was given to some scholars of Teheran University and some of the agricultural extension specialists, that after necessary correction and changing some questions, questionnaire validity is approved. For testing research realibity, 30 questionnaires were fulfillment by wheat farmers and Cronbach Alfa was calculated ($\alpha=0.81$) that it was an adequate reliability coefficient. The results showed that adoption of sustainable agriculture among wheat farmers of Lorestan province was in relatively low level and there were positive and significant relationship among variables such as education, social participations, access to market, rate of using mass media, participation into extension classes, knowledge and attitude about sustainable agriculture with adoption of sustainable agriculture. The results of factor analysis also showed that about 79 percent variance of adoption of sustainable agriculture is determined based on five factors, namely farming-economic factors, characteristics of innovation, individuals’ characteristics, communication channels and educational participation.

Key words: sustainable agriculture, adoption, wheat farmers

Introduction

By destroying the environment and converting forests to farming lands and soil erosion and pollution of waters, also utilizing of sources inordinate, according to rapid growing of population, we will be faced to an abnormal social system for producing foods and also starvation. Theses items are so important for sustainable development, we know that the importable section of sustainable development is sustainable agriculture, of this process the users play an important role that indeed, they should be considered as sustainable agriculture executors [1].

Sustainable agriculture includes a set of activities that leads to protect the biological sources and least hazards for environment. Also it leads to achieve adequate profit by minimum using the agricultural factors in a farm [2].

Low [3] defines that the sustainable agriculture as a system that is economic and dynamic which leads to improvement the environment and optimizes using of sources and it can play an important role to supply foods and improve the quality of life of humans.

Traditional apprehension of innovation process...
that is named “adoption”, first has been introduced in 1955 by a rural sociologists committee that includes 5 stages:

- awareness, interest, assessment, examination and adoption [4].

As the factors that influenced on adoption as theoretical and potential are various, so we prefer to focus on more important factors.

We can analysis these factors by two aspects as individual aspect and structural aspect:

(A) Individual aspect: personality characteristics (age, sexuality and ...), individual factors (knowledge, experience and ...), economic state (area of the farm, income and ...), reference group, norms, needs and motivation.

(B) Structural aspect: these are environmental factors that influence the individuals are included: environmental requirements (way, population and ...), social-economic conditions (utilization system, distribution, credits and ...) and communicative systems (communication medias).

Itharat [5] in a study of adoption of new ideas about agriculture in Thailand understood that there was a positive correlation with adoption of innovation by the farmers under variables such as participating in social activities, civilization, using the mass media, contact with information sources and advertisers and so on. Also the farmers who had the larger fields were more experienced and innovative.

Igoden & Patric [6] in a study about instructions of adoption of agriculture technologies understood that there was a positive correlation with adoption of innovation by the farmers under variables such as formal and informal education levels, farmers’ cooperation, access to information sources and connect with advertisers.

Souza and colleagues in a study about effective factors to adopt the sustainable agricultural activities understood that there was a positive correlation with adoption of innovation by the farmers under variables such as age, education, employment, sales, state programs and debts of the farmers and these variables showed that the adoption of agricultural activities has a significant and negative relation with age and employment and has a positive and significant relation with education level and has no relation with other variables [7].

Alang & Martin [8] in a study about evaluation of sustainable agriculture activities adoption reviewed the relation between adoption of sustainable agriculture by Iowa with variables such as age, education, records, area of the farm, access to information sources and understanding the innovative accepting. The results showed that the adoption of sustainable agriculture had a significant and positive relation with access of farmers to information sources, education and understanding the innovation.

Salomon [9] in a study about effective factors of adoption of the sustainable agricultural systems understood that there is a positive and significant relation between adoptions of the sustainable agricultural systems and religious activities and extension cooperative services.

Rousta [10] understood that there is a positive and significant relation between services of agriculture center, technical knowledge, production and the type of agricultural systems and the sustainable agriculture.

Mahboubi [11] in a study under title “analysis the effective factors on the adoption of technologies for the soil protection in Golestan province” understood that there is a positive and significant relation between relative advantages, compatibility, triability, complexity of soil protection, total of ownership fields, rate of received loans and adoption of protection operations of the soil.

Nowadays, not only wheat is a basic and important foodstuff, but also of political aspect it is as important as oil even more important than oil.

It must be said that wheat weapon is more powerful than military [12].

Lorestan province has about 9581500 hectare area equal 5.87% of area of Iran. In this region, more significant agricultural productions are produced because of its characteristics, climate and geographical capabilities. The area that there wheat is cultivated is about 41842 hectare that of this rate about 34420 hectare is under irrigation cultivation and the other remains is about 7422 that is cultivated by dry farming. The production rate of wheat 136859 tons that about 126754 tons of it is irrigational and about 10105 tons is cultivated by dry farming. Average of wheat which is under irrigation cultivation is about 3682.7 Kg and average of cultivating by dry farming is about 1361.53 Kg [13].

Regarding to that about 30% of Iran’s population are farmers, rendering them the agricultural education and extension related to sustainable agriculture can increase their potential to adopt the sustainable agriculture.

Agriculture Organization of Lorestan had considered this subject for many years, according to high costs for it, it is necessary to analysis the factors that influences on adoption of sustainable agriculture among wheat farmers. So this paper has analyzed this subject and it can play an important role to adopt the sustainable agriculture effective there.

The purpose of this paper is to analysis and clarifies the factors that influence on adoption of sustainable agriculture among wheat farmers of Lorestan province. Objectives are as follow:

- Review of individual & professional characteristics of studied wheat farmers
• Determine the rate of adoption of sustainable agriculture
• Determine the relation between research variables and adoption of sustainable agriculture
• Determine the factors that influences on sustainable agriculture

Materials and methods

As purpose of this paper is to analysis and clarifies the factors that influence on adoption of sustainable agriculture among wheat farmers of Lorestan province, this is a descriptive-correlation analysis. The tool to collection the data is questionnaire. To analyze the validity of research tools, the insights of some scholars of agricultural extension are considered and to examine reliability of tool, about 30 questionnaires were fulfillment by wheat farmers of Lorestan, Cronbach alfa was accounted that it was an adequate reliability coefficient \(= 0.81\). The population includes 862 wheat farmers. The sampling method is random stratified that there is selected a sample 140 individuals by using \textit{Cronbach alfa} formula. The variables are: age, education, records of farming, compatibility, relative advantage, mass media using, social participation, knowledge, attention to sustainable agriculture and so on that were analyzed for adoption of sustainable agriculture. To analysis the data, SPSS /win software is used.

Results and discussion

Review of individual & professional characteristics of studied wheat farmers

- Age: the results shows that the average age of the farmers is 47. The most frequency is related to individuals have more than 50-years old (31%) and the least frequency is related to individuals have less than 30-years old (21.4%). The minimum age was 23 and maximum age was 71.
- Educational levels: only 10% of responders were uneducated and about 31% of them had been educated up to guidance school that it included the most percent.
- Records: About 32 % of them have been farming for 10-20 years. And about 35% of them have been farming more than 20 years. The min. record was 7 years and max. record was 52 years. The average was 14 years.
- Determine the rate of adoption of sustainable agriculture

According to table 1, adoption by majority of farmers (about 52%) is in a relatively low level. About 14% is in average level and only about 7% is in high level.

The correlation of variables is considered that there is a significant relation between adoption of sustainable agriculture and education, social participation, rate of using mass media, knowledge rate, and attitude of wheat farmers (99%). And other variables have no significant relation with adoption of sustainable agriculture (Table 2).

Determine the factors that influences on sustainable agriculture

To decrease the number of research variables and determine the share of each factors for adoption of sustainable agriculture, the factor analysis is used. The results showed that cohesion of internal data were adequate (KMO=0.813) and the \textit{Bartlet} statistics was significant in level 1%. According to Kaiser, five factors that are achieved have higher eigenvalue (table 6). After factor rotation by \textit{varimax} method, the variables of analysis were categorized. The constitutive variables of each factor are achieved as follow (Table 3):

A-First factor:

Seven constitutive variables of first factor are as follow in sequence of factor loading:
Area of land which is property of farmer (X7), production rate of wheat (X8), rate of access to market (X9), type of seed (X10), the method of wheat cultivation (X11), type of ownership of land (X13) and average of operation (X16).

According to nature of effective factors for adoption sustainable agriculture that form first factor, the first factor named as \textit{economic-agricultural factor}. According to its eigenvalue (4.84), this factor is more than other factors and is up to 23 percent of total of variance.

B-Second factor:

Five constitutive variables of second factor are as follow in sequence of factor loading:
compatibility (X17), relative advantage (X18), triability (X19), observability (X20), and complexity (X21).

Regarding to nature of above variables, second factor is named as \textit{characteristics of innovation}. This factor covers about 17 percent of adoption variance, regarding to its eigenvalue (3.5).

C-Third factor

Four constitutive variables of third factor are as follow in sequence of factor loading:
Education (X3), records of farming (X2), records of wheat cultivation (X1) and age (X4).

Regarding to nature of these four variables, the third factor is named as \textit{individual's characteristics}. Its eigenvalue was (3.17) and covers about 15
percent of total adoption variance.

D-Forth factor:

Three constitutive variables of forth factor are as follow in sequence of factor loading:
Rate of using mass media (X5), the time of using mass media (X6) and rate of achieved information from media in field of sustainable agriculture (X12).

According to characteristics of variables which affects on adoption of sustainable agriculture that formed forth factor, this factor is named as communicative channels.

This factor covers about 13 percent of adoption variance, regarding to its eigenvalue (2.74).

E-Fifth factor:

Two constitutive variables of fifth factor are as follow in sequence of factor loading:
Rate of participation to educational courses (X14), the number of educational courses that are related to sustainable agriculture (X15).

According to characteristics of variables which affects on adoption of sustainable agriculture that formed fifth factor, this factor is named as educational participation.

This factor covers about 11 percent of adoption variance, regarding to its eigenvalue (2.33).

As factor loading of variables as social participation (X22), knowledge (X23) and attitude to sustainable agriculture (X24) was lower than 5%, among 24 variables there were selected 21 variables and the others were eliminated.

### Table 1: frequency distribution of adoption of sustainable agriculture among wheat farmers of Lorestan (n= 140)

<table>
<thead>
<tr>
<th>Rate of Adoption of sustainable agriculture</th>
<th>Frequency</th>
<th>Percent</th>
<th>cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>28</td>
<td>16.47</td>
<td>16.47</td>
</tr>
<tr>
<td>Relatively low</td>
<td>88</td>
<td>51.76</td>
<td>68.23</td>
</tr>
<tr>
<td>Moderate</td>
<td>24</td>
<td>14.11</td>
<td>82.34</td>
</tr>
<tr>
<td>Relatively high</td>
<td>18</td>
<td>10.61</td>
<td>92.95</td>
</tr>
<tr>
<td>High</td>
<td>12</td>
<td>7.05</td>
<td>100</td>
</tr>
</tbody>
</table>

Mode: relatively low

### Table 2: Relation between variables and adoption of sustainable agriculture

<table>
<thead>
<tr>
<th>Variables</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level</td>
<td>0.255**</td>
<td>0.000</td>
</tr>
<tr>
<td>Social participation</td>
<td>0.223**</td>
<td>0.000</td>
</tr>
<tr>
<td>Access to the market</td>
<td>0.243**</td>
<td>0.000</td>
</tr>
<tr>
<td>rate of using mass media</td>
<td>0.311**</td>
<td>0.000</td>
</tr>
<tr>
<td>Participation in extension classes</td>
<td>0.371**</td>
<td>0.000</td>
</tr>
<tr>
<td>Knowledge</td>
<td>0.202**</td>
<td>0.000</td>
</tr>
<tr>
<td>attitude</td>
<td>0.314**</td>
<td>0.000</td>
</tr>
</tbody>
</table>

** P< 0.01

### Table 3: Achieved factors with eigenvalue of variance after factor rotation

<table>
<thead>
<tr>
<th>Row</th>
<th>Factors</th>
<th>Eigenvalue</th>
<th>Variance percent</th>
<th>cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st</td>
<td>4.84</td>
<td>23.07</td>
<td>23.07</td>
</tr>
<tr>
<td>2</td>
<td>2nd</td>
<td>3.57</td>
<td>17.023</td>
<td>40.093</td>
</tr>
<tr>
<td>3</td>
<td>3rd</td>
<td>3.17</td>
<td>15.114</td>
<td>55.207</td>
</tr>
<tr>
<td>4</td>
<td>4th</td>
<td>2.74</td>
<td>13.069</td>
<td>68.276</td>
</tr>
<tr>
<td>5</td>
<td>5th</td>
<td>2.33</td>
<td>11.077</td>
<td>79.353</td>
</tr>
</tbody>
</table>

### Table 4: The constitutive variables of each factor

<table>
<thead>
<tr>
<th>Variables</th>
<th>1st factor</th>
<th>2nd factor</th>
<th>3rd factor</th>
<th>4th factor</th>
<th>5th factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>X7</td>
<td>0.799</td>
<td>X17</td>
<td>0.764</td>
<td>X3</td>
<td>0.792</td>
</tr>
<tr>
<td>X8</td>
<td>0.789</td>
<td>X18</td>
<td>0.732</td>
<td>X2</td>
<td>0.784</td>
</tr>
<tr>
<td>X9</td>
<td>0.712</td>
<td>X19</td>
<td>0.682</td>
<td>X1</td>
<td>0.714</td>
</tr>
<tr>
<td>X10</td>
<td>0.693</td>
<td>X20</td>
<td>0.641</td>
<td>X4</td>
<td>0.674</td>
</tr>
<tr>
<td>X11</td>
<td>0.635</td>
<td>X21</td>
<td>0.631</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X13</td>
<td>0.628</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X16</td>
<td>0.584</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As figure 1 shows, the five above factors cover about 79 percent of variance of all variables and only 21 percent of variance is related to other factors which are not estimated here.

The first to fifth factors cover about 23%, 17%, 15%, 13% and 11% of variance of adoption of sustainable agriculture respectively.
Discussion & Conclusion:

This study that its purpose is to analysis and clarifies the factors that influence on adoption of sustainable agriculture among wheat farmers of Lorestan province showed that variables such as rate of education of farmers, social participation, access to markets, using the mass media, participation in extension classes, knowledge and attitude of farmers have significant and positive relation to adoption of sustainable agriculture. In addition, adoption of sustainable agriculture among wheat farmers of Lorestan province was in a relatively low level. In factor analysis there were 5 factors that affect on adoption of sustainable agriculture that are economic-agricultural factor, characteristics of innovation, individual’s characteristics, communicative channels, educational participation that from first to fifth factors cover about 23%, 17%, 15%, 13% and 11% of variance of adoption of sustainable agriculture respectively. Also suggested that:

According to important role of the first factor (agricultural-economical characteristics) to adopt the sustainable agriculture, suggests that those farmers who have extent lands, more productions and more access to market are considered more than others. According to role of the second factor (innovative characteristics) suggests that the subjects related to sustainable agriculture render to farmers that be compatible with their experiences, knowledge and values.

Regarding to role of third factor (individual’s characteristics), there will consider those farmers who are more educated.

Regarding to role of the forth factor (communication channels) recommend that the facilities for using more mass media and communication devices are rendered to farmers by programmed culturization and rendering effective communicative devices.

Finally, according to role of fifth factor recommend that the farmers shall be encouraged to participate in educational-extensive courses related to sustainable agriculture.

References
