Identifying Factors Affecting on Ability of Risk Management in the Greenhouse Production Units (Case study: Greenhouse cucumber production in Isfahan province)

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ABSTRACT

The purpose of the present study is identifying the factors affecting the ability of risk management in greenhouse production units in Isfahan province. The kind of study is the survey, and a questionnaire was used for collecting the data, and the reliability of the scale is greater than 0.7, then it is approved. The population of the study was 432 persons whom are owners of greenhouses, and with using Cochran formula, 15 persons were chosen as a sample, with proportional sampling and data collected of them. The dependent variable is the ability of managers in greenhouse cucumber production units at risk management. Independent variables include individual characteristics, unit characteristics, risk perception, and level of attending in training courses. Analysis of the data has done both in descriptive and inferential (analytical) ways, with using SPSS software version 17. Results of path analysis showed that variables related to risk exposure, risk perception, the experts, and the use of expert's comments and consultant, have a direct impact on risk management abilities.

INTRODUCTION

According to the extent of the border zone of country, and climatic diversity of the various regions, it's indicating the importance of achieving an appropriate cropping pattern, so as to factors and inputs for the maximum utilization of the sources, in particular the limiting water factor, and this is an undeniable and inevitable necessity. It should be noted that there are many definitions of cultivation pattern, which seems to be the most comprehensive definition would be: Cropping pattern is determined by a system of agriculture, the economic benefits of sustainable based on its macro policy, indigenous knowledge, farmers, and optimal utilization of regional potential, physiological principles of agricultural production, in order to protect the environment. The definition mentioned above shows that in many of regions, crops, garden, or exploitation of pastures and forests, are proportional to the potential of regional and factors of production, and given the limitations of current climate, and the negative balance of plain water, as needed sustainable products, so all of which require us to move to help improve the groundwater, and increasing water use efficiency.

According to the FAO, 40 accidents recorded in the natural world, that among them 31 items are possible occurrence in Iran [15]. Iran is located in a region of the world with the geopolitical privileged, and is the bridge between three continents, dominating the world's largest energy reserves in the south and the north, adjacent to the largest lake in the world, and endless resources, however Iran is subject to many natural hazards. As in every year, the direct losses incurred to crops are estimated at over 30 trillion rials [2]. The change in the prices of agricultural raw materials, the instability of commodity prices (nationally and internationally), government policy uncertainty and instability of their credit problems and social risks [16], in addition to uncontrollable factors, including climatic factors, pests and diseases, all of them make agriculture a risky activity. Thus it can be said that the production of the agricultural sector is very different to other commercial fields [3].

Risk and uncertainty are integral components in agriculture area which surround the its environment, and hence how to understand the risks and uncertainties in agricultural units are the most difficult aspects of management and planning for these production units [9]. Agriculture, especially in less developed countries, is considered a risky activity, and operational decisions and activities also are affected by this phenomenon and its
different aspects. On the one hand, agricultural is one of the most important economic sectors, which have
developed in the process and have a major role in providing for the needs of other sectors, including industry.

For this reason, correct management and optimization of agricultural unit, has a special role in this area

Given the weather situation in Iran, as well as population growth, and government policies to meet the
consumption needs of the population, in recent years the greenhouse cultivation has considered as a main
strategy via authorities in order to increase agricultural production, as well as the efficient use of soil and water
resources, and the creation of productive employment in agriculture field, and for development of this important
sector of the economy [9]. Thus, according to the new issue of greenhouse cultivation in the country, and the
necessity and importance of this sector in terms of investment in recent years, as well as the importance of
agricultural development and job creation (employment), this study attempts to construct effective risk
management reviews as one of the most important factors affecting the production of greenhouse production.

Production in agriculture has some differences with other areas of manufacturing and trading, and it is too
much reliance or dependence on the nature of the activities and dealing with environmental changes (risks,
natural disasters such as flood, hail, frost and heat, pests and plant diseases, etc.) [7]. On the other hand, there is
only part of the risks of natural disasters in agriculture, so that this sector can be epileptic as having the highest
risk in economic activities. Unlike other features of the agricultural production activities, farmer cannot
accurately estimate the amount of production. In other words, he is faced with the risk of something that is
affected by weather conditions, pests, diseases etc. Changes in input and output prices are the main source of
market risk in the agricultural sector, which is influenced by factors inside and outside these areas. A portion of
farming market risks are those related to delivery, especially in the case of perishable goods, which is a more
serious problem. This type of risk is affected by infrastructure problems too. Some of the risks of the
agricultural sector can be categorized in terms of risk financing. This is true whether by the initial capital costs
and the provision of liquidity, according to relatively long period of production in agriculture which is very
important. The other risks related to agriculture can be pointed as institutional and technological risks. On the
other hand, the globalization of agricultural markets and the low prices of agricultural products, changes the
risks for farmers [4,7], that the final result is the instability of income for producers [12].

United States department of Agricultural has classified risks in the agricultural sector into five categories:
production risk, price or market risk, institutional risk, financial risk, and human or personal risk [14]. Those
agricultural risks can be divided into four categories: production risk, financial risk, price (market) risk, and
human resource risks [9]. That most important risks that farmers face with them will classify as follow: financial
risk (pre-market and post-market), social risks, natural risks, market risks (sources risk, manufacturing risks,
physical risks, financial risks and other risks). In one other categorization, these can be sources of risk in
agriculture as:

1) Production risk,
2) Market or price risk,
3) Financial risk,
4) Institutional risk,
5) The risk posed by the presence or lack of confidence in the government activities in the agriculture area,
and human risk [1]. The role and importance of each source of risk is different which is depending on situational
and timing terms of government policies in each country [10].

For effective risk analysis on greenhouse production, the following steps should be taken:
- Identifying the nature and importance of the various sources of risk (for example, production, marketing,
finance, legal, environmental and human), which may be affected by the greenhouse. In other words, identifying
what matters in a greenhouse would lead less profit or loss rather than a profit.
- Evaluating the risk management strategies (e.g., training programs for workers, the use of security tools
applications, diversity, organizational change, mitigation of risk factors, alternative communication
channels, liquidity, etc.)
- Determining the cost effectiveness of risk management methods
- Assessing the impact of different types of risk-based decision making and performance, and its impact on
the efficiency and profitability of the greenhouse [5].

That farmers have limited themselves to use of traditional remedies, such as using of chemical fertilizers.
There are variables which have the greatest variance in the use of risk management strategies, including age, the
amount of farmer's land, and the farmer's income [8]. Those farmers are most familiar with the use of pesticides
disease strategies, diversification of production and use of herbicides to combat weeds [13].

that education of users or beneficiaries using extension classes and experienced trainers, using teaching
aids, accurate information on market conditions via means such a national and local mass media like television
and radio, local newspapers and organizations, taking advantage of modern technology, especially the Internet,
and create a web site that farmers can use to obtain information about prices, following crops and weather
forecasts, all of them would help to eliminate many risks that related to production units [10].
That among various variables such as history of agriculture experience, amount of land under cultivation, total area of agricultural land, the communication with expert's work in progress, and close association with agricultural service centers, etc., have a significant and positive correlation with risk of farmers [9].

That the management of risk by diversification of products and activities has a great importance in the risk aversion of farmers and producers. According to his studies, when the degree of the risk aversion of farmer is higher, the greater the degree of either diversity of his activities and products, as well as the influence of other factors such as culture methods and access to inputs [4].

That the key elements of successful risk management must be considered in identifying sources of risk, measuring risk, evaluate the impact of risks on the entire unit, evaluation of unit ability to planning for the management of risk, measuring the management risk and, select of appropriate tools and effective risk management [6].

In this study, the components of risk management including technology risk, inputs quality risk, climate risk and climate change, the risk of pests and diseases, biotechnology risks, market risk, risk of human resources, and institutional and legal risk, should be considered as important components of risk management in greenhouse production units.

Methodology:

The aim of the present study is applied, because it is based on the development of practical knowledge in the field of risk management component for greenhouse production units. Also, the present study is the field study via monitor and control degree, such as that all of the interest variables of investigate are their natural state. The present study is a descriptive and non-experiential for collecting data. In this study, we used two types of survey and solidarity to achieve specified objectives. Dependent variable of study is defined as the ability of greenhouse production managers to manage risk. Independent variables include individual characteristics, unit characteristics, risk perception, and the presence or participation in training courses. In the present study, the statistical sample is made up of all greenhouse units active in the Isfahan province in 2013, which is equal to the total number of 432 units. The amount of production, yield and area under cultivation are shown in Table 1, respectively. In the present study, in order to estimating sample size among owners of greenhouses in the Isfahan province, after compiling and preparing the questionnaires, conducting a pre-test, and 30 questionnaires completed by owners of greenhouses, the variance of the dependent variable in research has calculated (risk management abilities), and with using of Cochran's formula, has determined by the number of samples in the greenhouse owners in the Isfahan province. With regard to the number of the sample, and the variance of the dependent variable in the pre-test and Cochran's formula, the number of samples of the population has determined 150 persons. In the present study, after determining the sample size and for that the selected sample can be reflect the characteristics of the sample of this research, the probabilistic sampling proportion method was used. In this case, after determining the sample size, according to the number of greenhouses in each city, the questionnaires were distributed and then collected.

Table 1: Performance, production and cultivation level of the tree cucumber in Isfahan province

<table>
<thead>
<tr>
<th>City</th>
<th>Level (Hectare)</th>
<th>Production (Tons)</th>
<th>Performance (Kg per hectare)</th>
<th>City</th>
<th>Level (Hectare)</th>
<th>Production (Tone)</th>
<th>Performance (Kg per hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aran and Bldog</td>
<td>5.8</td>
<td>496</td>
<td>85517</td>
<td>Shahinshahr</td>
<td>40</td>
<td>8410</td>
<td>210250</td>
</tr>
<tr>
<td>Isfahan</td>
<td>87.5</td>
<td>244000</td>
<td>278857</td>
<td>Shahr Ezra</td>
<td>35.6</td>
<td>6571</td>
<td>185579</td>
</tr>
<tr>
<td>Barkhar</td>
<td>8</td>
<td>1280</td>
<td>160000</td>
<td>Fereidooshahr</td>
<td>5.0</td>
<td>6571</td>
<td>139000</td>
</tr>
<tr>
<td>Tiran and Kerun</td>
<td>36.5</td>
<td>8460</td>
<td>231781</td>
<td>Felavarjan</td>
<td>414.6</td>
<td>68596</td>
<td>165451</td>
</tr>
<tr>
<td>Chedegan</td>
<td>3.0</td>
<td>70</td>
<td>233333</td>
<td>Kashan</td>
<td>10.4</td>
<td>1507</td>
<td>144904</td>
</tr>
<tr>
<td>Khomeini Shahr</td>
<td>3.5</td>
<td>484</td>
<td>138286</td>
<td>Golpayegan</td>
<td>3.1</td>
<td>487</td>
<td>157097</td>
</tr>
<tr>
<td>Dehaghan</td>
<td>81.3</td>
<td>13716</td>
<td>168708</td>
<td>Mobarake</td>
<td>160</td>
<td>30330</td>
<td>189563</td>
</tr>
<tr>
<td>Semirion</td>
<td>0.7</td>
<td>130</td>
<td>185714</td>
<td>Najaf Abad</td>
<td>17.5</td>
<td>2505</td>
<td>143143</td>
</tr>
<tr>
<td>Natanz</td>
<td>5.4</td>
<td>773</td>
<td>143148</td>
<td>Province</td>
<td>910</td>
<td>168283</td>
<td>184784</td>
</tr>
</tbody>
</table>

Table 2: Number of obtained samples in each city

<table>
<thead>
<tr>
<th>City</th>
<th>Number of greenhouses</th>
<th>Number of samples</th>
<th>City</th>
<th>Number of greenhouses</th>
<th>Number of samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aran and Bldog</td>
<td>5</td>
<td>2</td>
<td>Shahinshahr</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>Isfahan</td>
<td>79</td>
<td>27</td>
<td>Shahr Ezra</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Barkhar</td>
<td>6</td>
<td>2</td>
<td>Fereidooshahr</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tiran and Kerun</td>
<td>7</td>
<td>3</td>
<td>Felavarjan</td>
<td>145</td>
<td>51</td>
</tr>
<tr>
<td>Chedegan</td>
<td>1</td>
<td>1</td>
<td>Kashan</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Khomeini Shahr</td>
<td>4</td>
<td>1</td>
<td>Golpayegan</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dehaghan</td>
<td>6</td>
<td>2</td>
<td>Mobarake</td>
<td>90</td>
<td>32</td>
</tr>
<tr>
<td>Semirion</td>
<td>1</td>
<td>1</td>
<td>Najaf Abad</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Natanz</td>
<td>4</td>
<td>1</td>
<td>Province</td>
<td>432</td>
<td>130</td>
</tr>
</tbody>
</table>
The measuring tool is a mean for collecting data from the study population. The study tool is a questionnaire, which was developed by the researcher based on theoretical studies, and the results have been reviewed by masters and experts in collaboration and consultation with the experts of the Department of Agriculture. The questionnaire was developed according to the goals of the research and information needed to answer the questions posed in the study. In this study, to determine the reliability of the measuring instruments, Cronbach's coefficient alpha has been used. Cronbach's alpha is equal to 0.83 for the questionnaire that shows the reliability of the survey instrument is appropriate. In this study, to validate and make necessary revisions, the questionnaire was presented to academic experts as well as experts of the Department of Agriculture in Isfahan province, and after obtaining their viewpoints, the final questionnaire was prepared.

**Finding:**

Path analysis is a technique that allows us to assess the direct and indirect links of variables, and by the way, it helps to understand the mechanism of the variables. The purpose of the path of tests is a single model which would result to our analytical model in order to study the theoretical framework of the research. Indeed path analysis is a complementary for regression analysis, which assesses the direct and indirect effects on the dependent variable.

Path analysis technique is based on a series of multiple regression analysis, and is based on the assumed relationship between the dependent and independent variables. This is a special emphasis on innovative use of visual graphs, which is known as the path diagram. Diagram path is used to visual represent relationships between sets of variables in path analysis. This diagram is usually a combination of internal and external variables (Kalantari, 2006).

In the present study, to examine the path coefficients between each of the independent variables and variables related to risk management abilities, based on a model drawn from the framework developed in Chapter II, as well as multiple regression analysis, each of the independent variables are considered as the dependent variable in each stage, and after the test, the coefficient indicates the direction that total direct and indirect effects (beta values) are related to the independent variables and the dependent variable. The results of regression analysis are shown in table (3).

As shown in table (3), the greatest impact is related to area of greenhouse variable on the risk management abilities (0.415). The variable of risk perception factors with beta values equal to 0.41, and level of education equal to 0.244 are placed in next orders.

**Table 3:** The direct and indirect effects of variables on risk management abilities

<table>
<thead>
<tr>
<th>Row</th>
<th>Variable</th>
<th>How impact on the dependent variable</th>
<th>Amount of total impact (Beta value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exposure to risk</td>
<td>0.168</td>
<td>0.168</td>
</tr>
<tr>
<td>2</td>
<td>Gross income</td>
<td>0.298</td>
<td>0.31</td>
</tr>
<tr>
<td>3</td>
<td>Risk perception</td>
<td>0.410</td>
<td>0.41</td>
</tr>
<tr>
<td>4</td>
<td>Greenhouse floor area</td>
<td>0.160</td>
<td>0.415</td>
</tr>
<tr>
<td>5</td>
<td>Number of experts</td>
<td>0.243</td>
<td>0.243</td>
</tr>
<tr>
<td>6</td>
<td>Education level</td>
<td>0.243</td>
<td>0.244</td>
</tr>
<tr>
<td>7</td>
<td>Amount of using expert opinions and advice</td>
<td>0.196</td>
<td>0.196</td>
</tr>
<tr>
<td>8</td>
<td>Involvement of family members</td>
<td>-</td>
<td>0.30</td>
</tr>
<tr>
<td>9</td>
<td>Greenhouse age</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>10</td>
<td>Capital Fixed Rate</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>11</td>
<td>Distance from residence to house</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>12</td>
<td>Land area within the greenhouse</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>13</td>
<td>History of greenhouse activities</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>14</td>
<td>Relationship between education and work</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>15</td>
<td>the extent of contact with educators</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>16</td>
<td>Membership in the cooperative</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>17</td>
<td>Attendance in educational courses</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>18</td>
<td>Attendance in risk management courses</td>
<td>-</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Based on the results of path analysis, the variables of level of exposure to risk factors, risk perception, number of experts, and amount of using the opinions of experts and consultants, have a direct impact on the ability to manage risk; and variables related to the participation of family members, age of greenhouse, equity fixed investment, distance of residence to the greenhouse, greenhouse floor area, greenhouse activities experiences, relationship between education and work, contact with education providers, history of membership in the cooperative, amount of attendance in training courses, and amount of participate in risk management courses, have a direct impact on the risk management abilities. Also, variables relating to gross income, greenhouse floor area and education level have direct and indirect effects on the risk management abilities.
Conclusion:
According to the result of path analysis, variables related to risk exposure, risk perception, number of experts, and the use of expert and consultant advice, have a direct impact on the ability to manage risk; and variables related to the participation of family members, greenhouse age, equity fixed investment, distance of residence to the greenhouse, greenhouse floor area, greenhouse activities experiences, relationship between education and work, contact with education providers, history of membership in the cooperative, amount of attendance in training courses, and amount of participate in risk management courses, have an indirect effect on the risk management abilities. Also, variables relating to gross income, greenhouse floor area and education level have direct and indirect effects on the risk management abilities.

- Being risky of agriculture activities are among the factors that necessitated the need for government intervention in the agricultural sector. Given to the risk of greenhouse products are mainly associated with areas of market and price, it is recommended that price guarantee policy of the government will also be considered for implementing in greenhouse products.

- Grant of subsidies to agricultural insurance, as one of the policies implementing by the government in order to support producers and manufacturers, will create a sustainable system along with efficiency in this sector. Given the importance of agricultural insurance in risk management and stabilizing farmers' incomes, the use of subsidies in this field is extremely important, and the large proportion of these subsidies in developed countries indicating the importance of this issue.

- One of the ways to minimize risk is increasing farmers' awareness and knowledge about scope and extent of the risk, and familiarity with the ways for dealing with them. The most useful asset that can help a farmer in the risk management is obtaining appropriate information. Therefore, it is recommended that the promotion system with training classes by correct mechanism would help to greenhouse owners to become familiar with the various aspects of risk, and they being able to deal with these risks and have good response against them.

- Greenhouse owners are recommended to use the risk-reducing inputs, good allocating resources to meet the needs of financial credit activities, make diversifying in assets, and change assets into cash with immediately conversion ability, and finally the Investment with information and knowledge, setting ground for reducing risk.

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