

Perception of Greenhouse Owners About Factors Influencing the Development of Sustainable Agriculture in Iran

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Abstract: The perception of greenhouse owners about factors affecting the development of sustainable agriculture is discussed in this study. The methodology used in this study, involved a combination of descriptive and quantitative research and included the use of correlation and descriptive analysis as data processing methods. The target population for this study, consisted greenhouse owners in the province of Tehran (N = 1787). By multi-stage cluster sampling technique, about 306 respondents were selected. Data were collected through interview schedules. The results demonstrated that farming factors were the most important factors affecting the development of sustainable agriculture. It is also reported that there were relationship between perception of respondents about development of sustainable agriculture as dependent variable and the farming, economic, social, policy making and extension and education factors as independent variables. The results of confirmatory factor analysis and structural equation model show that factor improving the quality of water resources have influenced the perception of respondents about sustainable agriculture more than other factors.

Key words: Sustainable agriculture, greenhouse, development, sustainable, multi-stage, Iran

INTRODUCTION

Agriculture is considered as a critical sector in the world economy. It contributes 24% of global gross domestic product and provides employment to 1.3 billion people or 22% of the world's population (Smith *et al.*, 2007). In many of the developing countries increasing agricultural production has been one of the most important priorities for agricultural development programs (Subedi *et al.*, 2009).

In many developing countries, the emphasis has been on achieving higher agricultural productivity with little regard for sustainability (Brady, 1990; Pretty, 1995). This resulted in increasing production without any attention to preserving basic and natural resources. Therefore, large areas of the world have faced severe soil degradation, water erosion, groundwater pollution and natural resource depletion (Hurni, 2000; Rigby *et al.*, 2001; Rasul and Thapa, 2004; Roling, 2005). This condition is more obvious in poor and developing countries which rely on a large extent on agriculture and natural resources for their living (Subedi *et al.*, 2009). Economic changes, significant rises in agricultural productivity, globalization and exposure to world markets have impacted agriculture

sector in Iran. In Iran developing countries, the emphasis has been on achieving higher agricultural productivity with little regard for sustainability (Brady, 1990; Pretty, 1995). This resulted in increasing production without any attention to preserving basic and natural resources. Therefore, large areas of the world have faced severe soil degradation, water erosion, groundwater pollution and natural resource depletion (Hurni, 2000; Rigby *et al.*, 2001; Rasul and Thapa, 2004; Roling, 2005). This condition is more obvious in poor and developing countries which rely on a large extent on agriculture and natural resources for their living (Subedi *et al.*, 2009). One solution that has been offered for this problem is that the farmers change their methods of farming which can augment their production level and allow them to continue to live on the land. It is this solution of farmers becoming more sustainable oriented that is the focus of this study.

The purpose of this study is 2-fold. First, it determines the key factors that influence the development of sustainable agriculture in Iran. Secondly, it provides suggestions for policy recommendations.

Iran: Agriculture comprises a considerably high percentage of production and employment in Iran. It

provides employment to about 25% of the labor force, accounts for 25% of the Gross National Product (GNP), contributes over 4/5 of total domestic food supply, 1/3 of non-oil exports (excluding carpet exports) and 9/10 of the raw material demand of national industries (Karbasioun, 2007). Iran like other developing countries, depends on agriculture sector to fulfill demand for more foods. In order to increase production, a large amount of chemical inputs have been used by farmers in Iran (Allahyari, 2008). This problem particularly is very serious in production of greenhouse products. Currently, greenhouse producers are consuming >64 type of chemical pesticide for producing cucumber, tomato, strawberry and other products (Baniameri and Sheikhi, 2006).

Government of Iran in response to the adverse environmental and economic impacts of high chemical usages has proposed several strategies and among them has recommended the adoption of low input sustainable agriculture.

Context: Sustainable agriculture as a practice that meets current and long-term needs for food, fiber and other related needs of society while maximizing net benefits through conservation of resources to maintain other ecosystem services, functions and long-term human development (Rao and Rogers, 2006). Agricultural sustainability is not about technical fixes and expertise. It is development processes that need to integrate ecological and societal knowledge through changes in policy, institutions and behavior (Saifi and Drake, 2008). The 3 main goals of agricultural sustainability are economic efficiency, environmental quality and social responsibility (Fairweather and Campbell, 2003). The concept of sustainable agriculture is strongly related to the multifunctional role, either explicitly or implicitly, recognized to the primary sector (Parra-Lopez *et al.*, 2008). This sustainability approach comprises a social, an environmental and to a lesser extent, an economic dimension.

It takes into account the needs of rural communities and food safety for consumers as well as the impact of agricultural practices on local ecosystem services and the global environment (Aerni *et al.*, 2009). Despite the diversity in conceptualizing sustainable agriculture, there is an aspect commonly pointed out which is its multiple dimensional characteristic including economic, environmental and social aspects (Schaller, 1993; Conway, 1994; Rossing *et al.*, 1997; Berentsen *et al.*, 1998; Legg, 1999; Cobb *et al.*, 1999; Pretty and Hine, 2001; Pacini *et al.*, 2004; Vandermeulen and van Huylenbroeck, 2008; Peacock and Sherman, 2010). In all aspects, agriculture is well suited to the concept of sustainable

development. On the one hand, agriculture deals with climate, soil, land, water, forests and biodiversity through the production of crops and animals. On the other hand, agriculture is related to farmers, rural communities, poverty and other social problems. Especially in developing countries, agriculture always plays more roles than just a way of earning income from farm production. Agriculture is a way of life for people in rural society. The sustainability of agriculture therefore, affects not only food production and the use of natural resources and environment. It also influences the social welfare of people in the agricultural sector and in society as a whole.

A wide range of economic, social, physical and technical aspect of farming influences adoption of agricultural production technology. Wheeler citing Rogers and Pannell pointed the factors which influence the adoption of new innovations by farmers. She mentioned factors such as perception about risk and profitability; uncertainty and certainty about adoption; amount of required information and attitude about risk and uncertainty (Rao and Rao, 1996). Several parameters have been identified as influencing the adoption behavior of farmers and social scientists investigating farmers who adopt the new technology showing the demographic variables, technology characteristics, information source, knowledge, awareness, attitude and group influence affect adoption behavior (Oladele, 2005).

The adoption of sustainable agricultural depends on several factors and policies that enhance the ability of farmers to have access to these technologies. Factors that contribute to adopting the biotechnology are as following:

- Socio/cultural
- Economic
- Regulatory
- Educational
- Environmental

Rao and Rao (1996) found a positive and significant association between age, farming experience, training and socio economic status, cropping intensity, aspiration, economic motivation, innovativeness, information utilization, information source, agent credibility and adoption. However, the development of sustainable agriculture in Iran faces challenges and obstacles. There is no single appropriate way to introduce and promote biotechnology in the developing countries; constraints and opportunities vary from country to country and therefore, require location-specific approaches. The current situation in agriculture sector in Iran can not respond to the growing needs for food production. The

majority of farmers in Iran are subsistence farmers and the main barrier to empowering them is their lack of knowledge of new methods and technologies.

Evidence shows that even small efforts to informing producers and increasing their knowledge about the sustainable agriculture can have big results. However, the promise has yet to be realized due to the lack of information about sustainable agriculture among producers. Little substantive research has investigated the beliefs and motivations that drive farmers' decisions about adoption of sustainable agricultural practices (Karami and Manosoorabadi, 2008). Therefore, it is necessary to examine factors that influencing producers about sustainable agriculture to enable the spread of the related technologies.

The research question for this study is what are the perceptions of greenhouse owners about the factors which influence the development of sustainable agriculture in Iran? The study attempts to address the following objectives; to find out the personal characteristics of greenhouse owners; to determine the perception of greenhouse owners about factors influencing the development of sustainable agriculture in Iran and to determine the relationship between factors and development of sustainable agriculture.

MATERIALS AND METHODS

The methodology used in this study, involved a 3 stage combination of descriptive and quantitative research. Stage one involved a series of in-depth interviews with some senior experts in the Ministry of Agriculture to examine the validity of questionnaire. A questionnaire was developed based on these interviews and relevant literature. Content and face validity were established by a panel of experts consisting of faculty members at Science and Research Branch, Islamic Azad University and some specialists in the Ministry of Agriculture. Minor wording and structuring of the instrument were made based on the recommendation of the panel of experts. Measuring greenhouses' attitudes towards the factors influencing the development of sustainable agriculture has been achieved largely through structured questionnaire surveys. The usual questionnaire approach to measure attitude is to include a range of semantic differential (with good/bad options for example) and Likert items (ranging from 1 as strongly disagree to 5 as strongly agree) to operationalize the attitude construct. The final questionnaire was divided into several sections. The 1st section was designed to gather information about personal characteristics of respondents.

Table 1: Variables and their measurement scale

Variables	Measurement scale	Cronbach alpha
Attitudes about development of sustainable agriculture	5-point Likert	93.2
Farming factors	5-point Likert	90.2
Economic factors	5-point Likert	88.7
Social factors	5-point Likert	84.8
Extension and education factors	5-point Likert	83.5
Policy making factors	5-point Likert	92.9

The 2nd section was designed to measure the attitudes of greenhouse owners about the factors influencing the development of sustainable agriculture. The respondents were asked to indicate their agreements with statements by marking their response on a 5 point Likert-type scale. The variables and their measurement scale are shown in Table 1.

Stage two involved a pilot study with thirty greenhouse owners who had not been interviewed before the earlier exercise of determining the reliability of the questionnaire for the study. Computed Cronbach's alpha score was 88.8% which indicated that the questionnaire was highly reliable (Table 1). Dependent variables in the study included development of sustainable agriculture which was measured by perception of respondents. The independent variables in this research study were the knowledge of respondents about farming, economical, social, policy making and extension and education factors. Stage 3 involved a survey held in May 2010. The research population included all greenhouse owners, i.e., those owners who were registered in the Ministry of Agriculture as the owners of greenhouse in the provinces of Tehran (N = 1787). By multi-stage cluster sampling technique, about 306 were selected by using Cochran formula. Data were collected through interview schedules.

For measurement of correlation between the independent variables and the dependent variable correlation coefficients have been utilized and include spearman test of independence.

RESULTS AND DISCUSSION

It is reported that the average age of respondents were 43.8 years and slightly >39% were between 30-39 years old. The findings also show that nearly 60% of respondent were >40 years old. About >46% of the respondents did not have any diploma from high school. Of those who responded to question, 12% had earned bachelor. The results show that average working experience of agricultural professional was 5.86 years. Majority of respondents produced vegetable in the greenhouses and >85% were owners of the greenhouses. In regard to perception of respondents about extensional/

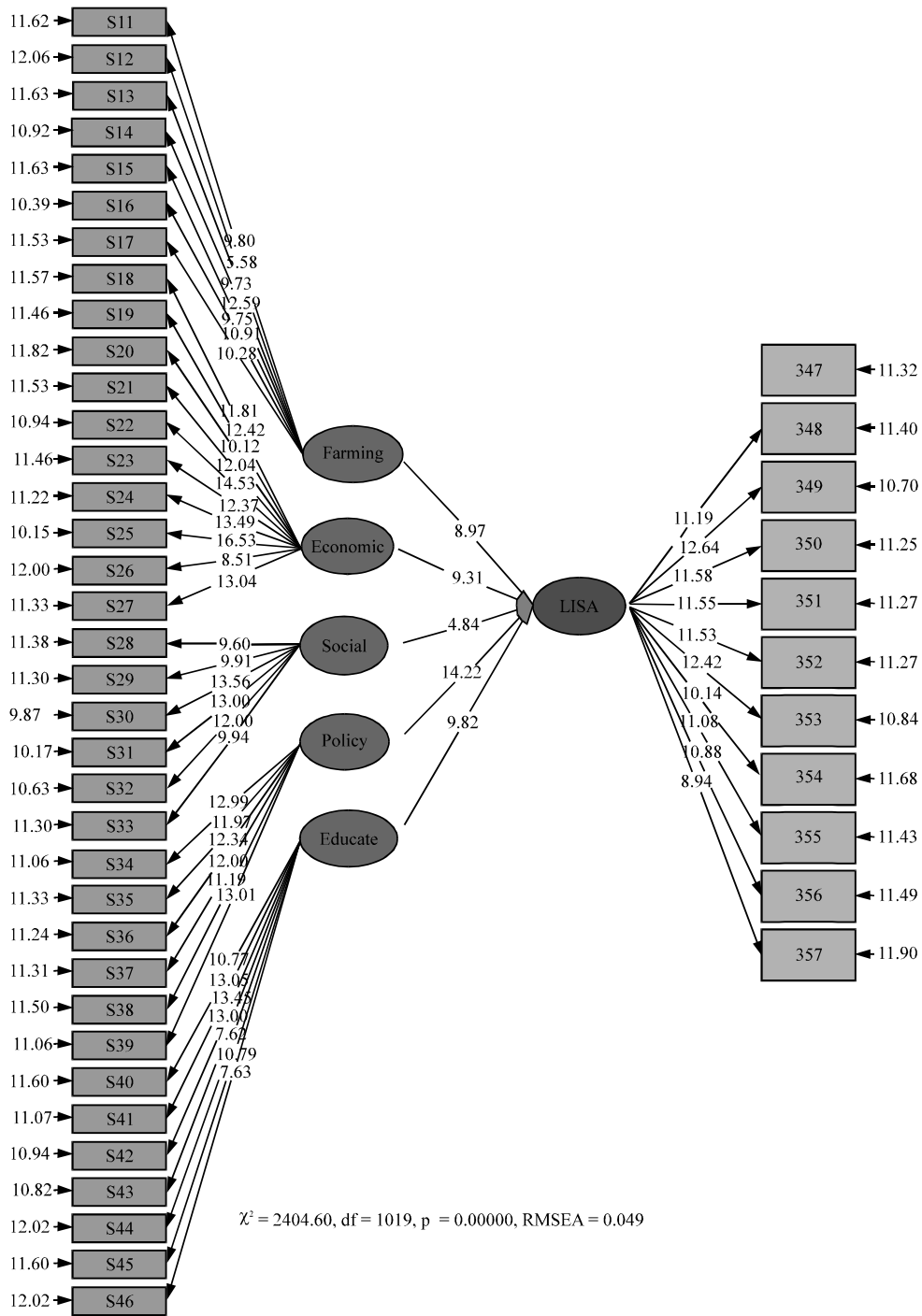


Fig. 1: Structural equation model

educational factors which influence the development of sustainable agriculture, the highest mean refers to increasing the knowledge and skills of greenhouse owners about sustainable management skills (CV = 0.192, SD = 0.805) and the lowest mean to changing the attitudes and belief of respondents about sustainable agriculture

(CV = 0.263, SD = 1.031). In regard to perception of respondents about economic factors, majority of them (n = 306) agreed that determining the appropriate price would encourage them to adopt sustainable agriculture methods. The results show that the highest mean number for economic factors refers to development of agro

processing industries (CV = 0.178, SD = 0.75)) and the lowest mean number refers to private sector investment (CV = 0.269, SD = 1.05). The perception of respondents about social factors which influence the development of sustainable agriculture shows that the highest mean number refers to collective actions by greenhouse owners (CV = 0.270, SD = 0.984) and the lowest mean number was for accepting risks by producers (CV = 0.362, SD = 1.201). In regard to policymaking factors, more than two to third of agricultural professionals (n = 226) indicated that supportive rules and regulation by government would influence the producers to adopt the sustainable agriculture methods.

The results show that the highest mean number for policymaking factors refers to development of necessary infrastructure (CV = 0.196, SD = 0.78) and the lowest mean number refers to establishing standards and regulations to use pesticides and herbicides (CV = 0.251, SD = 0.98). In regard to their perception about role of farming factors on adopting the sustainable agriculture, slightly more than two to third (n = 236) agreed that the replacing chemical inputs by organic inputs would influence the adoption of sustainable agriculture.

The highest mean was for replacing chemical inputs by organic inputs (CV = 0.160, SD = 0.69) and the lowest mean refers to application of solar energy instead of fossil energy (CV = 0.300, SD = 1.11). In order to finding the perception of respondents about their attitudes about farming, economic, social, policy making and extension and education factors influencing the sustainable agriculture, they were asked to express their views. Table 2 shows the respondents' means about the 5 factors. As can be seen the highest mean number refers to the economic factor (mean = 4.21) and lowest mean number refers to social factor (mean = 3.83). Spearman coefficient was employed for measurement of relationships between independent variables and dependent variable.

Table 3 shows the results which show that there were relationship between perception of respondents about development of sustainable agriculture as dependent variable and the farming, economic, social, policy making and extension and education factors as independent variables.

The results of confirmatory factor analysis and structural equation model show that factors improving the quality of water resources, securing food needs of producers and consumers, improving production level, financial sustainability of producers, improving the quality of products, improving the health of producers and consumers, improving the quality of soil, reducing drisks, increasing self confidence and self reliance, equity

Table 2: Means of respondents' views about the factors influencing the sustainable agriculture (1 = strongly disagree; 5 = strongly agree)

Factors	Mean	SD
Farming	3.98	0.66
Economic	4.21	0.64
Social	3.83	0.87
Policy making	4.03	0.70
Extension and education	3.97	0.71

Table 3: Correlation coefficient measures between independent variables and depended variables

Independent variables	Depended variables economic aspects
Farming factors	0.67**
Economic factors	0.45**
Social factors	0.29**
Policy making factors	0.83**
Extension and education factors	0.46**

**p<0.01

and improving the well being of producers have influenced the development of sustainable agriculture by greenhouse owners, respectively (Fig. 1).

CONCLUSION

The perception of greenhouse owners about the factors influencing the development of sustainable agriculture is discussed in this study. The results demonstrated that economic factors are the most important factors influencing the development of sustainable agriculture.

Successful adoption of sustainable agriculture by greenhouse owners in Iran will depend on the economic, social, farming, extension/ education and policymaking factors, respectively. The results of this study show that farming factors influence the development of sustainable agriculture and findings is in accordance with studies done by Cox *et al.* (1997), Kochaki *et al.* (1995) and Mazaheri and Hosseini (2008).

Economic factors also contribute to sustainability and it is consistent with the results of study by Ommani *et al.* (2009) that income level of farmers and their poverty would affect sustainability in rural areas of Iran. Developing countries have to invest in the sustainable agricultural related technologies and meanwhile considering whether the target audience are effectively reached or are interested in the technology. The findings show that other factors such as social and policy making should be considered. Innovation is not only based on the technology's agronomic suitability to specify environments. Ommani *et al.* (2009) also cited the research by Chizari *et al.* (2001) that major barriers hampering adoption of sustainable agriculture practices included limited financial returns for farmers, limited farmer knowledge of sustainable agriculture principles and methods, low levels of farmer education, government rules

and regulations, problems with soil erosion and lack of water and a low level of extension agent knowledge with respect to sustainable agriculture.

RECOMMENDATIONS

Developing countries should have policies which ensure the development of sustainable agriculture for small farmers. Poor people should be included directly in the debate and decision making about technological change, the risk of that change and the consequences of no change or alternative kinds of change. Poursaeed *et al.* (2010) recommended that one way to accelerate the development of sustainable agriculture is to increase the awareness of farmers. The results demonstrated that opinion and attitudes toward sustainable agriculture to a great extent depend upon farming, economic, social, policymaking and extension/ education factors. There is need for more training and education of farmers about the role of these factors in promoting sustainable agriculture. Government should explore ways to increase the participation of farmers in planning, implementing and evaluating programs related to sustainable agriculture.

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