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Factors Influencing the Gardening Management Skills among Citrus Farmers (Case of Iran, Sari)

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Abstract

Production management is the best and foremost factor in exploiting the production factors more desirably and advantageously. Accordingly, the present study sought to evaluate the factors affecting the gardening management skills among citrus farmers in Sari, north of Iran. The statistical population for the study was 12,800 people. The stratified random sampling using the Cochran test was applied, and 250 subjects were selected for the study. The research instrument was a researcher-made questionnaire, the content validity of which was confirmed by the agricultural and extension experts and its reliability was estimated by Cronbach's alpha as to be 0.94. The data analysis results showed that the respondents' gardening management skills was at high (41.6%) and average levels (54.1%). Considering the research findings, there was a significant positive correlation at the one percent level between citrus farmers' gardening management skills and social, knowledge, attitude, educational factors, the total cultivated area and gardening experience. Also, there was a significant positive correlation at the five percent level between citrus farmers' gardening management skills and the garden area, citrus annual income and the distance of the garden to the agriculture center. Considering the stepwise regression results, 45.7% of the variation in respondents' gardening management skills was accounted for by three variables of knowledge, educational factor and the total area of cultivated land, serving as the best predictor of citrus farmers' gardening management skills in Sari.

Keywords:
Skill, Gardening management, Citrus farmers, Sari

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INTRODUCTION

Agriculture is the most dynamic economic sector enjoying a distinctive niche in the socioeconomic development of the country, and like other sectors of the economy, requires people who are good managers and experts in productive activities. In order to augment the production besides providing the materials, machinery and other investments, it is required to consider the production management as the most important factor in more appropriate and more profitable use of the production factors (Soltani *et al*., 1998). The management – along with three main factors of production including land, labor force and investment – can increase production (Nuthall, 2006). Management can be defined as the art or knowledge that combines the ideas, methods and resources to produce and sell the product more profitably and favorably (Borimnejad, 2006). The farmer's success as the production manager depends on the farmer's management ability (FAO, 2003) that cannot benefit from the economic activity associated with success without proper knowledge, skills and a rational management (Dehghanian, 2002). Rolls (2001) argues that farm management is the knowledge and ability to organize, control and maintain the desired specific resources in a way that benefits the farmer to maximize the profits and continuous return. The Britannica Encyclopedia defines farm management as the adoption and implementation of the decision in the organization and applying them in farms to maximize production and profit (Borimnejad, 2006). In general, farm management is a skill set allowing farmers to make sensible decisions and enable them to implement changes that will move operations toward predefined and expected objectives (Balasubramanian *et al.,* 1999).

The new farm management levels enable farmers and researchers to collectively apply the resources, implement the applicable innovations, and increase the efficiency and research effectiveness on the field (Dorward *et al*., 2003). It should be noted that the extent to which farm management practices are implemented by farmers is referred to as garden management adoption (Shabanalifami, 2013). However, it seems that gardening management skills have not been adopted, and the burden is on the extension agents' and department shoulder to encourage farmers to adopt them (Asadi *et al*., 2009). It is worth mentioning that various studies have been conducted on farm management skills, some of which will be referred to in the following paragraphs.

In a study on determining the factors affecting the adoption of farm management skills among rice farmers in Savadkouh, Hasani (2013) showed that 28.7% of the variation of respondents' adoption of farm management skills was accounted for by three factors of knowledge, planting pattern, and the seed types which are the best predictor of farm management skills adoption. Carli and Canavari (2013) conducted a study on introducing direct costing and activity based costing in a farm management system: a conceptual model. The results of the study indicated that this system offers precise information about crop costs with general costs allocation procedures based on the consumption of activities and enables sensitivity analyses.

Lantzosa *et al*. (2013) conducted a study on Farm Manager: an Android application for the management of small farms. Farmers working on small farms are now able with a low cost smart phone and the specialized software (in our case Farm Manager) to obtain facilities that could not have had on their hands before. The use of the Farm Manager software in a smart phone can overleap the grave difficulties of farm management requirements which had stood as obstacles for many years so far. Tasks such as field definition, task operations, listing and reporting and virtually, all farming data use can be submitted and carried on together in a smart phone at any farm working condition. In this paper, we present the Farm Manager which is an Android smart phone application and how it creates the management basis for recording and browsing the ground fields, field relations (occupied or rented land), cultivation and its tasks, equipment, employees and European cultivations reports and all of them to be performed by simply touching smart phone screen button. The software is currently available free of charge and there are more than one thousand farmers

using it in Greece.

Oenemaa *et al*. (2011) conducted a study on participatory farm management adaptations to reduce environmental impact on commercial pilot dairy farms in the Netherlands. From 1998 to 2002, average nutrient surpluses on the pilot farms were decreased by 33% for nitrogen (N) and 53% for phosphorus (P). Important measures include reducing the use of inorganic fertilizer, optimizing the use of home-produced organic manure, reducing grazing time, reducing the number of replacement stock, and lowering crude protein content in the ration. Over the years, variation in N surpluses among farms (inter-farm variation) remained almost constant. Differences in farm management strategy could not unequivocally be related to farm typology (high/low N surplus; high/low production intensity). It was concluded that decisions by individual farmers on farm development are not always based on 'rational' arguments, but are co-determined by 'emotional' perceptions. In a study on analyzing farm management skills adoption in poultry production enterprises in Iran, Allahyari *et al.* (2011) concluded that among the studied management skills, marketing skill was placed as the least ranking means. In addition, poultry production operators had the best ability in technical skills. The average ability rate of poultry production operators in technical area was 4.08 indicating the high to very high ability rate of respondents in this area. According to the results, it is necessary to improve the marketing and farm management skills of farm operators through extension and participation in training activities.

Veisi *et al*. (2010) categorized factors affecting farmers' behavior in integrated management technology into four groups of farmers' personal and family characteristics, farm biological and physical properties, financial aspects of farm management, and external factors. In a study on the effectiveness of management in agricultural production in Kenya, Onyuma *et al.* (2006) indicated that establishing incentives, attending educational classes, and empowering small-scale farmers would improve their managerial skills. Using a two-stage cluster sampling, interviews and questionnaires, Mohammadi (2001) analyzed the production management factors in corn farmers' farms in Fars province, and concluded that socio-structural factors such as the type of ownership, number of owned land, level of experience, education and the area under cultivation were the most important factors affecting the differences in performance among corn farmers.

Considering the above-mentioned facts, it can be stated that the main and key challenges in the agriculture, especially in horticulture sector rests on the lack of proper gardening management, and if such an important factor is maintained and stressed, many developments in agriculture will be resulted. To increase citrus production and ensure maximum sustainability as one of the strategic products, it is required to adopt management skills. Therefore, the study was carried out on factors affecting the gardening management skills among citrus farmers in Sari, Iran.

MATERIALS AND METHODS

Study area

The research geographical location refers to Sari Township. Sari is located to the north of Iran and to the South of the Caspian Sea and occupies an area of ca. 3,923 km^2. It has a population of 255,396 making it the biggest city in Mazandaran. The climate of Sari is generally temperate (Figure1).

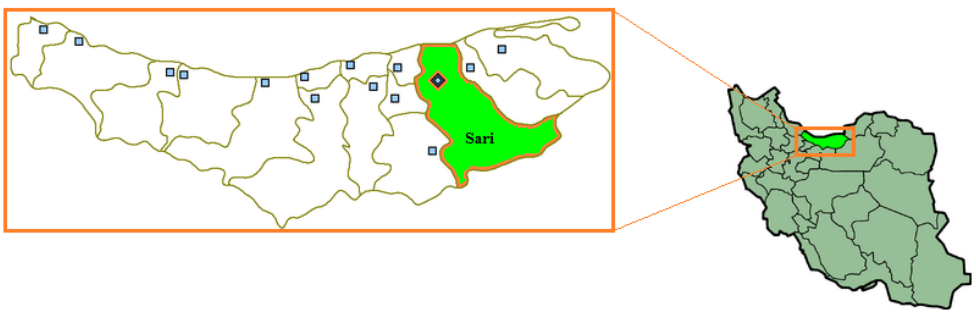

Figure 1: The geographical locations of the study area, Sari Township, Iran

Methods

The research adopted an applied, descriptive-correlation approach. The statistical population consisted of all Sari citrus farmers (four areas: Holar, Panbezarkiti, Semeskandeh, and Aboksar) in 2015 (N = 12,800). Using statistical sampling in a stratified randomization method, 250 citrus farmers were selected and finally, 233 questionnaires were returned and analyzed.

$$n = \frac{N(ts)^2}{Nd^2 + (ts)^2}$$

where,
N= 12800
t=1.96
S=1.32

$$d = t.\ \frac{s}{\sqrt{n1}}$$

d=0.507 ÷3=1.69
n=230

A field study was used in order to obtain the required data by a researcher-made questionnaire. Data collection tool was a questionnaire with four sections. Section one was related to demographic information of the participants including age, work experience (gardening) and family member. Section two (six items) was designed to identify job-related factor (including total cultivated area, the distance of the garden to the agriculture center, yield performance, number of owned gardens, garden area, and citrus annual income). Section three was designed to determine the social (eight items), educational (11 items), knowledge (21 items), and attitudinal (12 items) factors. Section four (28 items) was designed to determine the gardening management skills. Three sections of the questionnaire were assessed on a five-point Likert-type scale ranging from very low (1) to very high (5). The content validity was confirmed by experts and agriculture extension experts and researchers. To estimate the reliability of questionnaire, a pilot test was carried out by distributing 30 questionnaires in a statistical population similar to the studied statistical society (Citrus farmers in Ghaemshahr), and then, Cronbach's alpha coefficients were estimated by SPSS Software Package as to be 0.94.

Analysis of data

The results were assessed through inferential and descriptive statistics. The Spearman correlation coefficient was used to show the relationship between the variables, and the stepwise multiple regression coefficients was used for the correlation of the independent variable on the dependant variable.

RESULTS

Demographic features

Based on the results of the questionnaire and Table 1, the demographic characteristics of the respondents revealed that the majority of the subjects were male with the average age range of 45.97 years representing middle-aged farmers. The respondents' average annual income was about 330.49 million IRR, showing a good income level, and the gardening experience average was 22.84 years.

Ranking of the research factors

As is evident in Table 2, the variation coefficient was used to prioritize the constituting questions on the variables from the respondents' viewpoints. Regarding items ranking the gardening management skills, the estimating citrus cost, soil drainage to improve soil quality, and mechanized spraying and fertilizing had the highest priorities. Wholesale purchase of gardening inputs for discounts, labor recruitment, and crop insurance had the lowest priority.

Table 1: Demographic features of the respondents

Variable	Mean	Minimum	Maximum	SD
Age (year)	45.97	24	70	10.86
Gardening experience (year)	22.84	1	40	9.73
Yield performance (tons)	37.51	2	100	15.39
Garden area (ha)	1.75	0.4	10	1.46
Citrus annual income (million IRR)	330.49	20	1800	320.53

Table 2: Ranking of the variables based on the respondents' viewpoints

Variable	M[1]	SD[2]	CV[3]	R[4]
Estimating citrus cost	3.78	0.65	17.18	1
Soil drainage to improve soil quality	4.05	0.71	17.58	2
Mechanized spraying and fertilizing	3.94	0.76	19.17	3
Proper use of recommended fertilizers	4.13	0.82	19.77	4
Applying pruning for aeration	4.08	0.92	22.44	5
Using agricultural practices such as deep plowing (tiling) and weeding	3.74	0.85	22.65	6
Monitoring and controlling working conditions	3.48	0.82	23.73	7
Spotting a proper place for planting seedlings	3.79	0.94	24.78	8
Applying biological control approaches	3.88	1.01	25.93	9
Limited application of pesticides to control weeds in the garden	2.91	0.81	27.86	10
Recording the gardening affairs	3.55	1.10	30.97	11
The use of non-chemical fertilizer and livestock manure	3.25	1.01	31.00	12
Using machinery to reduce costs	3.64	1.14	31.48	13
Choosing the best time to sell a product	3.79	1.21	31.99	14
Estimating production costs and the income from production	3.42	1.15	33.49	15
Maintaining financial and garden records	2.87	0.97	33.77	16
Using spaced planting records	3.40	1.22	35.90	17
Applying garden soil and water testing	2.98	1.10	36.72	18
New data analysis for planning	2.63	1.00	37.97	19
Collecting information on seeds, fertilizers and pesticides price	3.54	1.40	39.52	20
Using standard, resistant and improved varieties	2.92	1.20	41.27	21
Repairing machineries and equipment	3.22	1.43	44.31	22
Analyzing the products demand, supply, pricing and marketing	2.45	1.09	44.64	23
Health behavior	2.77	1.27	45.71	24
Water Saving	2.57	1.18	45.94	25
Wholesale purchasing of gardening inputs for discounts	2.73	1.32	48.34	26
Labor recruitment	2.48	1.25	50.41	27
Crop insurance	2.03	1.21	59.55	28

1- Mean 2- Standard Deviation 3- Coefficient of Variation 4- Rank
Likert scale: very Low (1), low (2), average (3), high (4), very high (5)

The dependent variable of gardening management skills is comprised of 28 questions. As is seen in Table 3, the results showed that 54.9 % of respondents considered their gardening management skills at an average level and that 41.6 % reported their gardening management skills at a high level.

Normality test

Based on the results of Table 4, the results of Kolmogorov–Smirnov test (K–S test) test were significant for all variables. Therefore, the non-parametric test was used.

Correlation coefficient

The Spearman correlation coefficient was used to determine the relationship between the selected research variables and the respondents' gardening management skills. As shown in Table 5, there was a significant positive correlation at 1% error level between gardening management skills and farmers' social, knowledge, attitude, educational factors, the total cultivated area and gardening experience. Also, there was a significant positive correlation at 5% error level between the respondents' gardening management skills and the

Table 3: The respondent's frequency distribution based on gardening management skills

Gardening management skills	Frequency	Valid percent	Cumulative percent
Age (year)	45.97	24	70
Gardening experience (year)	22.84	1	40
Yield performance (tons)	37.51	2	100
Garden area (ha)	1.75	0.4	10
Citrus annual income (million IRR)	330.49	20	1800

Table 4: Determining the normal distribution of the variables by the Kolmogorov–Smirnov test (K–S test)

Variable	M	SD	K-S test	p-value
Gardening management skills	91.9871	10.71676	1.221	0.011
Social factor	23.9736	6.40249	1.582	0.013
Education factor	24.1189	7.74718	3.709	0.000
knowledge factor	81.1057	13.09388	1.809	0.003
Attitude factor	60.7372	5.33024	1.859	0.002

garden area, citrus annual income and the distance of the garden to the agriculture center. Therefore, the null hypothesis was rejected.

Regression

The stepwise linear regression was used to determine the of different factors in respondents' gardening management skills. Among all the selected variables included in regression, the knowledge, total cultivated area, and education were put in three steps in the regression equation. The results revealed that 45.7% of the variation of the respondents' gardening management skills was determined by the factors knowledge, total cultivated area, and education and all the other changes were accounted for by the other factors which were not mentioned in this study. Regarding the coefficient in Table 6, the multiple linear regression equation in the final step would be measured through the following formula:

$Y=46.826+0.477x_1+1.217x_2+0.169x_3$

DISCUSSION

Data analysis results showed that the respondents' gardening management skills were at high and average level (96.5%). A significant positive correlation was found between respondents' gardening management skills and their social factor at 1% error level meaning the greater the social features, the more the gardening management skills and vice versa. This finding is consistent with the results reported

Table 5: Correlation between the selected research variables and the respondents' gardening management skills

Variables	Correlation coefficient	p-value
Social factor	0.172**	0.008
Education factor	0.341**	0.000
Knowledge factor	0.561**	0.000
Attitude factor	0.171**	0.009
Total cultivated area	0.224**	0.002
Gardening experience	0.190**	0.009
Garden area	0.158*	0.032
Citrus annual income	0.178*	0.017
Distance from the garden to the agriculture center	0.146*	0.048
Age	0.056	0.446
Family member	0.037	0.614
Number of owned garden	-0.044	0.554
Performance	0.104	0.157

*p<0.05, **p<0.01

Table 6: The variables coefficient on regression equation

Variable	B	Beta	t	p-value
(Constant)	46.826	-	12.374	0.000
Knowledge factor	0.477	0.572	9.432	0.000
Total cultivated area	1.217	0.188	3.283	0.001
Education factor	0.169	0.124	2.071	0.040

Sig= 0.000 F= 51.133** R^2_{AD}=0.457 R^2=0.466

by Hasani (2013) and Mohammadi (2001). There was a significant positive correlation between the educational factor and gardening management skills at 1% error; that is, the higher the educational level, the more the gardening management skills and vice versa. The result of the study conducted by Allahyari *et al.* (2011), Lantzosa *et al*. (2013) and Onyuma *et al*. (2006) is consistent with the results of this study. There was a significant positive correlation between the knowledge factor and gardening management skills at 1% error; that is, the higher the knowledge factor, the more the gardening management skills and vice versa. The result of the study conducted by Hasani (2013) and Veisi *et al.* (2010) is consistent with the results of this study. There was a significant positive correlation at 1% error between attitudinal factor and gardening management skills; i.e., the higher the attitudinal factor, the more the gardening management skills and vice versa. It is in agreement with Hasanpour (2010). A significant positive correlation was observed at 1% error between total cultivated area and gardening management skills; in other words, the higher the total cultivated area, the more the gardening management skills and vice versa.

Given the results of stepwise regression, 45.7% of the variation in respondents' gardening management skills was explained by three variables of knowledge, educational factor and the total area of cultivated land serving as the best predictor of citrus farmers' gardening management skills in Sari.

RECOMMENDATIONS

Regarding the results of descriptive and inferential statistics, following recommendations are drawn:

Given the results of the study, the total area of cultivated land had a positive impact on the gardening management skills which seems necessary to be observed. It is worth noting that knowledge with highest regression had the highest influence on gardening management skills. So, to promote citrus growers' knowledge, it is recommended that agricultural organizations organize training courses and Farmer Field Schools (FFS) as the first priority on issues such as citrus irrigation in a timely manner, removal of weeds in citrus garden, and proper planting of the citrus seedlings. Also, due to the impact of educational features on gardening management skills, it is suggested that agriculture organizations in a mutual cooperation with the public television organization communicate experts' or extension agent' recommendation to citrus growers through radio broadcasting media to enable farmers to use them and encourage the farmers to transfer their knowledge to other farmers by training farmers. Also, the extension agents and agricultural experts are required to establish contact with citrus growers and address their management problems in the center.

Based on the gardening management skills items ranking, it is proposed to agriculture organizations to establish training courses to estimate the cost of citrus and teach citrus growers to biologically combat weeds and to hold Farmer Field School (FFS) classes to teach soil drainage to improve soil quality and practically teach farmers on mechanized spraying and fertilizing, proper application of recommended fertilizers and applying pruning for aeration. Also, some training should be provided to farmers on observing health factors to prevent the diseases and their contamination and how to conserve water during practical training. Correspondingly, training classes should be provided to encourage farmers on doing the gardening inputs purchasing to reduce the cost, labor force recruitment, and products insurance.

Also, it is recommended to establish a farmers' production management system (collecting information about the price of seed, fertilizer and pesticide, recording the gardening affairs, estimating production costs and the income from production, maintaining financial and garden records, new data analysis for planning, and analyzing the products demand, supply, pricing and marketing) by applying ICT for structures and smart phone applications (such as farm manager) due to its lower cost and higher availability.

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