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The Role of Non-Farming Activities in the Sustainability of Peasant Farming Systems: A Case in Osku County

Hossein Shabanali Fami [a,], Mohammad Shokati Amghani [b], Moslem Savari [c], Mahnaz Mohammadzadeh Nasrabadi [d] and Mahsa Moetaghed [e]*

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Abstract

This research was carried out to investigate the role of non-farming activities in the sustainability of peasant farming systems in Osku County, Iran by a descriptive-correlational research method. The research population consisted of peasant farmers in Osku County (N =1400), out of whom 300 people were sampled based on Krejcie and Morgan's table for sample size determination using the proportionate stratified sampling technique. Data were analyzed by SPSS win18 software. The main instrument of data collection was a questionnaire whose validity was confirmed by experts. The reliability of the main scales of the instrument was confirmed by Cronbach's alpha coefficient, which was in the range of 0.82-0.87. The results of analyzing three dimensions of sustainability showed that, in total, 29.3 percent of the farming units were "unsustainable", 41.7 percent were "semi-sustainable", and 28.9 percent were "sustainable". Based on the regression analysis, the variables of the number of people employed in the non-farming sector, the use of non-farming income in the agricultural sector, and household income out of non-farming activities accounted for 54.2 percent of the variations in sustainability level of the peasant farming systems.

Keywords:
Non-farming activities; Osku County; peasant farming systems; sustainability

[a] *Professor, Department of Agricultural Development and Management, University of Tehran, Tehran, Iran*
[b] *PhD Graduate of Agricultural Development, Department of Agricultural Development and Management, Faculty of Agricultural Economics & Development, University of Tehran, Karaj, Iran*
[c] *Assistant Professor, Department of Agricultural Extension and Education, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran*
[d] *Assistant Professor, Payam Noor University, Iran*
[e] *Ph.D. Scholar, Agricultural Development, University of Tehran, Tehran, Iran*

** Corresponding author's email: hfami@ut.ac.ir*

INTRODUCTION

The farming system is a key factor in sustainable agricultural development and plays an important role in enhancing productivity and performance management of farming activities. Sustainable development of agriculture means creating a qualitative and fundamental change in the agricultural structure, which occurs by the recognition and establishment of optimal and appropriate farming systems (Chappell and LaValle., 2011). Nowadays, the transformation of farming systems is inevitable, and it should be managed and directed to the proper path with more resilience (Abdollahi, 1998; Dixon et. al., 2014; Houssou et al., 2018). On the other hand, a farming system is a multifaceted system whose survival is subject to continuous transformation and adaptation with the evolution in the peripheral environment (Adrian & Green, 2001). This dynamism will be effective just when it is targeted, systematic, planned, and based on sustainability considerations at different economic, social, and environmental aspects (Haverkort, 1998). Therefore, many agricultural investments have been directed into infrastructure, mechanization, and other agricultural development programs to prevent migration from the rural regions to urban areas or neighboring countries (National Agricultural Policy Center, 2008).

Since agriculture alone cannot meet all the expectations of rural employment program, although it still plays a major role in ensuring income, employment, and food security in rural areas, it has undergone a major transformation over time, one of the most important of these developments has occurred due to diversifying agricultural activities inside farming systems (Šťastná et al. 2019), as well as the potential of and changes in non-farming activities, which has played a complementary role in some cases and a successor rule in others. Hence, the status and strategic role of the agricultural sector in meeting the food needs of the community and the national development goals have created the necessity of establishing a framework of long-term scientific planning for the agricultural sector through the recognition of its mutual relationship with the non-farming sector (Mohammadi, 2005). The basic point to be addressed here is to guide the development of the farming and non-farming sectors towards a balanced development and optimally integrate these activities in the rural economy. In line with this strategy, different farming systems and, above all, peasant farming systems have long played an important role in agricultural development and have always been considered one of the basic components of agricultural systems for the efficient use of resources, such as water and soil. More importantly, the type of farming system and its level of sustainability can be effective in the amount of production, allocation of resources, optimal use of agricultural techniques, equipping infrastructure, utilizing machinery, and optimally using resources with proper returns (Kamali, 2005). Studies on small-scale farming systems consider the strategy of diversifying and developing the non-farming sector as the most important basis for the sustainability of the rural economy and peasant systems (King, 2011; Rashipour, 2012; Carr, 2013; Carr, 2014). A non-farming activity is defined as a process based on which households use a diverse range of social support activities and capabilities to survive and improve their living standards from non-agricultural activities. For example, rural households can combine a set of activities to generate income or fulfill their livelihood needs (Lashgarara, 2009; Sharafkhani et al., 2011).

In developing countries, the share of incomes from non-farming activities in rural households has significantly grown (Shabanali Fami and Mohammadzadeh Nasrabadi, 2011; Tandel, 2016). According to the research, rural non-farming activities account for 42 percent of rural households' income in Africa, 40 percent in Latin America, and 32 percent in Asia (Reardon, 2010). Therefore, the development of rural non-

farming activities is expanding throughout the world due to its potential to create more income sources and job opportunities (Haggblade et al., 2010). The balanced development of rural non-farming activities can play a crucial role in rural development by increasing rural production, creating new job opportunities, increasing labor productivity, providing basic needs of villagers, and establishing a proper link with agriculture (Radpear, 2008). For example, non-farming activities, such as handicrafts, as an appropriate source of income are among the most economically viable rural areas that are complementary to agriculture, and rural households can rely on them to cope with the unemployment problems (NAPC, 2008). The importance of this study lies in the fact that it investigates and determines how non-farming activities are interlinked with the sustainability of farming systems. The study will show that the two aspects of rural life viz., farming and non-farming activities are integrated and cannot be improved unless both of them have to be taken into account. The results will provide a solution for improving the sustainability of the peasant farming system through strengthening the non-farming sector.

Literature review

A sustainable farming system supports the rural economy and enhances farmers' livelihood. Zahedi (2007) found that in general, the cropping pattern is not sustainable in Iran, farming systems are unstable, and the whole system moves towards more unsustainability. Also, Azkia and Firoozabadi (2008) found that participation, cooperation, and the desire for teamwork, modernization, and productivity were weak in the peasant farming system as compared to the production cooperatives. A study in Tehran indicated that 46.7 percent of farming units suffer from factors increasing unsustainability (Iravani & Darban Astane, 2004). Moreover, Hosseini et al. (2005) investigated the ecological sustainability of the smallholder farming system in the Salih Abad district of Hamadan. The results indicated that in terms of sustainability, the farming systems of the region were in a critical condition so that 67.7% of them were highly unsustainable followed by 22.9% unsustainable, 7.3% relatively sustainable, and only 2.1% sustainable. In addition, Motiei-Langroudi et al. (2010), in a study found that 14.7% of the studied farming systems (either cooperative or family-based) were in a very unsustainable status followed by 42.1% in unsustainable, 22.1% in moderately sustainable, 20.3% in sustainable and only 0.9% in a very sustainable situation. Avazzadeh and Karami (2015) revealed that the peasant farming system in rural areas in the central district of Boyerahmad County in Iran was economically unsustainable and socio-environmentally semi-sustainable. Hence, there is a need to find solutions to improve the sustainability of the peasant farming system.

These findings reveal the need for solutions to improve the status of farmer's life. Non-farming activities seem to be an essential means to improve the sustainability of the peasant farming system as well as livelihood, quality of economic life, and food security of rural households through diversifying income sources (Pritchard et al., 2019; Odoh et al.,2019; Parveen and Reza Cheema, 2018; Sojasi Qaidari et al. 2014). According to Asgari et al. (2004), their research concluded that rural industries as one of the non-farming sectors played an important role in providing economic income to the villagers. Also, Carr (2014) concluded that diversity and access to non-farming activities had a positive and significant role in improving the livelihoods of households. Oladimeji et al. (2015) found that the focus on non-farm activities was mainly used either for consumption (34.5%) to minimize the income fluctuation or to supplement the working capital (26.5%) for their primary occupation through the purchase of farm inputs. Curseu and Schruijer (2017) revealed that the diversity of income-generating activities had a positive impact on the sustainability of farm-

ing systems in societies and prevented immigration.

Diversification of income sources is a strategy to improve rural people's life. In a study in Bangladesh, Pravakar et al. (2013) showed that the farmers who combined fish farming with crop farming had more sustainable farms. Demurger et al., (2010) in Northern China found that access to land and agricultural activities was not enough for rural residents to achieve a sustainable livelihood. They found that villagers need to get also involved in non-farming activities. Kermani et al. (2008) in their study concludes that there should be a balance between the growths of non-farming activities and farming activities, otherwise sustainable livelihood goals would not be achieved. In research in Khorasan province", Pasban (2007) found that investment, income, and age were influential on the probability of choosing non-farming jobs.

Campesina (2010) concluded that sustainable peasant agriculture depended on the recovery and revitalization of traditional peasant farming combined with innovation on new ecological practices. The work of Dixon (2001), published by the World Bank, emphasizes the importance of the family farming system and that in many European countries, like France, the yield per unit area in the family farming system is higher and their production costs are relatively lower.

In recent years, the necessity of addressing this issue and paying attention to the criteria and principles of sustainable agricultural development has been emphasized in the post-revolution economic, social, and cultural development programs of the Islamic Republic of Iran. Although different plans and measures have been taken into consideration, it is necessary to precisely evaluate the sustainability of peasant farming systems, their main dimensions, and the related factors and design a desirable situation. In this regard, the present study aims to investigate the role of non-farming activities in the sustainability of peasant farming systems in the county of Osku. In recent years, some farmers in the villages of the Osku area have shifted a part of their economic activities from farming to non-farming activities. For example, in the villages of tourism destinations in Osku County, such as Kandovan village, farmers have begun to abandon parts of farming practices due to the new opportunities and prosperity in the rural tourism sector. Some of them have changed parts of their agricultural land use to tourism. Therefore, this research, it is attempted to evaluate the role of non-farming activities, such as tourism and handicrafts, on the sustainability of the farming sector. This study was carried out to find solutions for a balanced development of these sectors by specifically investigating the following:

The socio-economic demographic of peasant farmers,

The impact of non-farming activities on living expenses of farmers in the county of Osku,

The estimation of the sustainability level of peasant farming systems,

The factors affecting the sustainability of peasant farming systems, and

The factors affecting farmers' involvement in non-farming activities.

METHODOLOGY

This research was quantitative in terms of the nature of the paradigm, applied in terms of objective and descriptive in terms of data analysis. The statistical population consisted of all peasant farmers operating in Osku County in Iran (N=1400). Using Krejcie and Morgan's table (1970) tables, 300 people were selected as a sample by the proportionate stratified sampling method. The main research tool was a researcher-made questionnaire that was tested by a pilot study. The questionnaire consisted of three parts. The first part measured the individual, social, and economic characteristics of the respondents, the second part included 25 indicators for investigating the farms' sustainability status, and the third part consisted of 16 items for measuring the factors affecting farmers'

involvement in non-farming activities. The validity of the questionnaire was checked by a panel of experts including experts of agricultural extension and education and experts of agricultural management and development in the University of Tehran and based on their ideas and suggestions, necessary modifications were made to the questionnaire. The reliability of the questionnaire was tested by Cronbach's alpha coefficient, which was estimated at higher than 0.7, so the questionnaire had good reliability for doing research. The Cronbach alpha coefficients for the three scales of the questionnaire are presented in Table 1.

Table 1
Cronbach's Alpha Coefficient for the Main Scales of the Questionnaire

Scale	Cronbach's alpha coefficient
The effects of non-farming activities on living expenses	0.85
The factors affecting the sustainability of peasant farming systems	0.87
The factors affecting non-farming activities	0.82

To classify the farmers based on the extent of their farms' sustainability, the distance of standard deviation from the mean (ISDM) introduced by Gangadharappa et al. (2007) was used as follows:

Low: A<Mean- $\frac{1}{2}$Sd

Medium: Mean- $\frac{1}{2}$SD<B<Mean+ $\frac{1}{2}$Sd

High: C>Mean+ $\frac{1}{2}$Sd

SPSS software version 18 was employed to analyze the data descriptively and inferentially. For this purpose, frequency, percentage, mean, and standard deviation were estimated in the descriptive statistics section, and correlation analysis, regression, and exploratory factor analysis were applied in the inferential statistics.

RESULTS

Socio-economic characteristics of peasant farmers

The results showed that the mean age of the respondents was 58.02 years with a standard deviation of 13.11 and a range of 25-85 years. They hold an average of 1.88 arable lands (Sd=1.21). The average experience of the respondents in the non-farming sector was 33.2 years. About 56 percent of the respondents were involved in non-farming activities, and 44 percent of them were not active in this field. The average number of people per household employed in the non-farming sector was 1.12. Besides, the findings showed that 33.3 percent of the respondents were illiterate, 36.7 percent had a degree from elementary schools, 16.3 percent had a degree at the middle school level, 13 percent had diploma degrees, and 0.7 percent had a B.Sc. degree.

Impact of non-farming activities on securing living expenses of farmers in Osku County

In examining the effects of non-farming activities on living expenses, the results showed that the greatest impact of non-farming activities was on improving home construction and providing agricultural expenditures (Table 2).

Assessment of sustainability level of peasant farming units in Osku County

This section investigates the status of the sustainability of *peasant farming units*. To calculate the composite sustainability index, the

Table 2

Ranking the Impact of Non-Farming Activities on Living Expenses

Rank	Item	CV	SD	Mean
1	Improving home construction or buying\constructing a new building	0.144	0.665	4.59
2	Providing capital for agriculture and farming activities	0.183	0.723	3.95
3	Providing agricultural equipment and renting tractors	0.208	0.845	4.06
4	Buying home appliances	0.227	0.847	3.73
5	Providing education and marriage costs for children	0.350	1.28	3.65
6	Providing public expenditure of life such as clothing	0.353	1.10	3.11
7	Provision of essential healthcare costs for the household	0.394	1.18	2.99
8	Providing travel expenses	0.483	1.02	2.11
9	Providing costs of public services	0.500	1.17	2.34

Scale: 1-very low, 2-low, 3-medium, 4, high, 5-very high

Table 3

Sustainability Indicators and Their Estimated Weights

Sustainability indicators	Indicator's weights	Sustainability dimensions
Financial resources	0.325	Economic
Number of labors	0.452	
Crop diversity	0.365	
The diversity of non-farming jobs	0.452	
Indebtedness to bank	0.452	
Number of farming implements	0.635	
Access to production inputs	0.552	
Landholdings	0.452	
Social trust	0.588	Social
Dependence on village	0.663	
Information exchange	0.522	
Attendance in training courses	0.488	
Linkage with governmental organizations	0.655	
Decision-making on rural affairs	0.366	
Social capital	0.411	
Innovativeness	0.422	
Drained lands	0.552	Environmental
Application of phosphate fertilizer	0.366	
Manure application	0.452	
Cultivation of bred seedlings	0.352	
Sloppy lands	0652	
Crop rotation	0.521	
Application of nitrate fertilizer	0.355	
Soil test	0.402	
Use of Fungicide	0.533	

Table 4
Status of Sustainability of Farming Units in Osku County

Level of sustainability	Frequency	Percent
Unsustainable	88	29.3
Semi-sustainable	125	41.8
Sustainable	87	28.9

Table 5
The Status of Sustainability in Peasant Farming System in the Different Rural Districts (Dehestans) in Osku County

Rural district (Dehestan)	Southern Shoorkat	Jazireh Eslami	Sahand	Bavil	Range
Social sustainability	4.01	3.32	4.21	3.66	1-5
Economic sustainability	5.25	6.07	7.01	6.21	1-10
Environmental sustainability	11.02	9.32	10.64	10.26	1-15
Totalsu stainability	20.28	18.71	21.86	20.13	1-30

indicators were standardized by dividing by the mean method. Therefore, to calculate the composite index, the negative indicators were converted into positive ones by the fraction method to the fixed number. The weights obtained from the principal component analysis method were multiplied by the values of the indicators that had become scale-free by dividing by the mean, and then the composite sustainability index was obtained. Indicators for composite sustainability measures with their weights are presented in Table 3.

After standardizing the selected indexes to determine the current status of sustainability, the results of the three levels of sustainability for 300 farmers from four rural districts (*Dehestan*) are presented in Table 4. About 29.3 percent of the peasants farming units were found to be unsustainable, 41.8 percent were semi-sustainable, and 28.9 percent were "sustainable.

The results of comparing the sustainability status of farming units in the rural districts of Osku showed that in terms of the economic aspect, Sahand Dehestan had the highest level of sustainability and the South Shoorkat Dehestan had the lowest level of sustainability. In the social dimension, the highest and lowest levels of sustainability were in Sahand and Jazireh Eslami Dehestans, respectively. From the environmental point of view, the farming units of South Shoorkatat Dehestan and Jazireh Eslami Dehestan had the highest and lowest levels of sustainability, respectively. In terms of composite sustainability measure (total sustainability), Sahand Dehestan had the highest sustainability level, and Jazireh Eslami Dehestan showed the lowest level of sustainability (Table 5 and Figures 1 and 2).

The results of the comparison of the means of peasant unit's sustainability measure (ANOVA test) also showed a significant difference between the rural districts (Dehestan) in Osku County in terms of overall sustainability so that there were significantly different (at the 5% level). In other words, the level of total sustainability in Jazireh Eslami Dehestan was significantly lower than that in the other rural districts (Dehestan). Moreover, there were no significant differences between the other rural districts in terms of the overall sustainability of their farming units (Table 6)

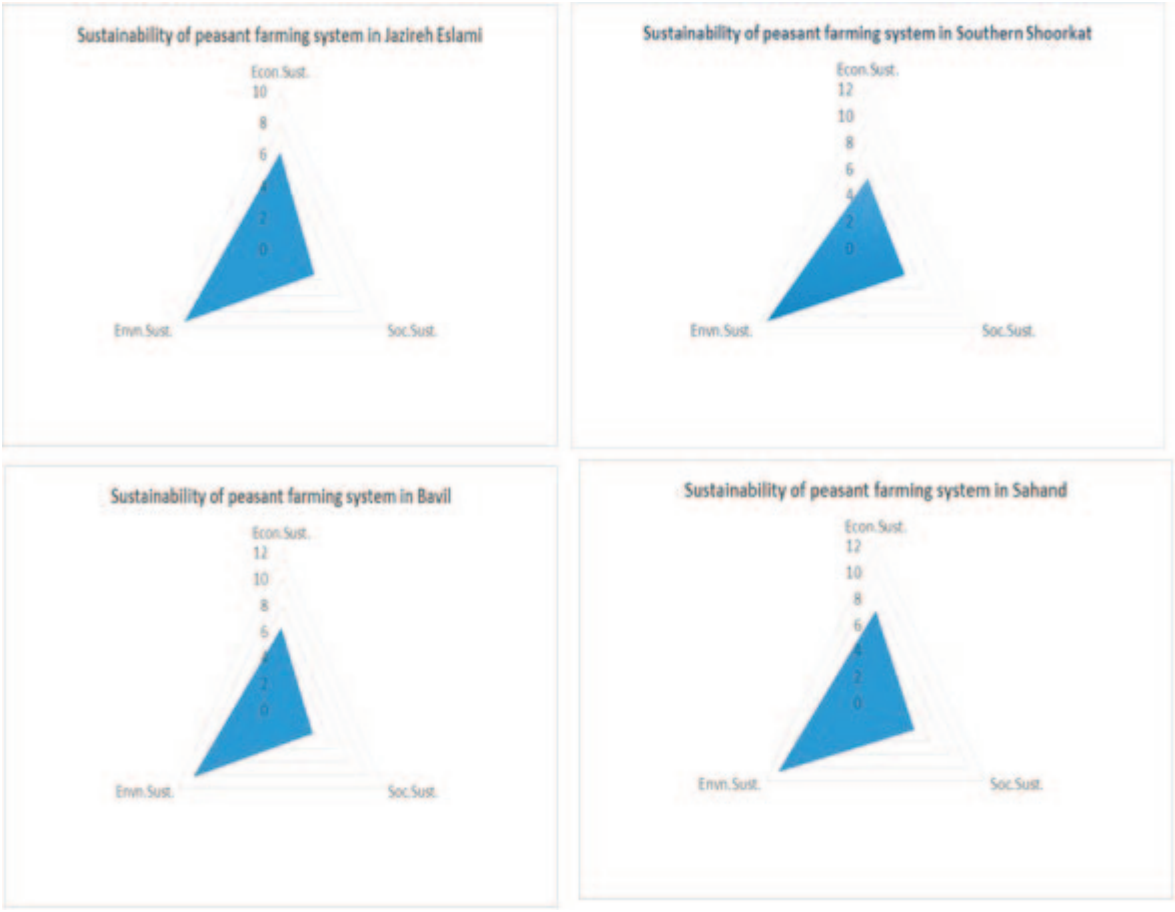

Figure 1. Status of Sustainability Dimensions in Farming Units in the Rural Blocks of Osku County

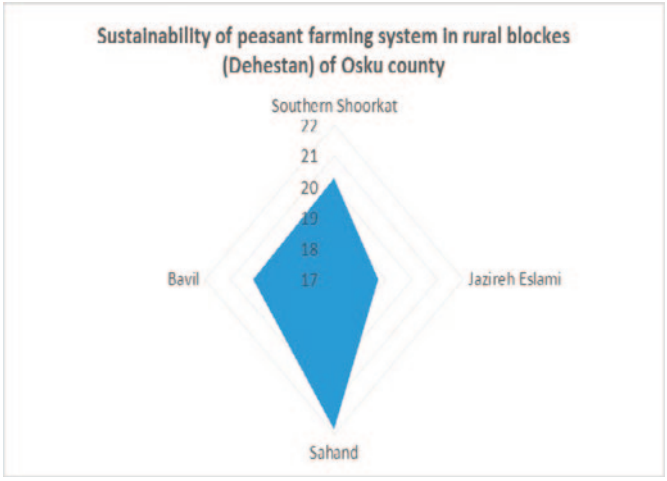

Figure 2. Sustainability of Farming Units in the Rural Districts of Osku County

Factors affecting the sustainability of peasant farming units in Osku County

Correlation coefficients were used to study the relationship between random variables and the sustainability of peasant farming units. The results of this section are presented in Table 7.

The results in Table 7 show that among different variables, the number of employed in the non-farming sector, the use of non-farm-

Table 6

Comparison of Peasant Units' Sustainability among Different Rural Districts in Osku County

F	First district	Mean	Other districts	Mean	Mean difference	Standard error	p-value
8.12**	Jazireh Eslami	18.71	Bavil	20.13	-1.44*	0.38	0.001
			Sahand	21.86	-2.36*	0.44	0.001
			Southern Shoorkat	20.28	-2.12*	0.45	0.001

** p <0.01, * p<0.05

Table 7

Correlation between Random Variables with Sustainability of Peasant Farming Units

Random variable	Sustainability	
	r	p-value
Experience in non-farming activities (Years)	0.521	0.124
Number of people employed in the non-farming sector (Number)	0.452**	0.001
Using non-farming income in the agricultural sector (Rials)	0.655**	0.002
Number of days involved in the non-farming sector (Days)	0.441	0.234
Number of family labor involved in the non-farming sector (Number)	0.332*	0.044
Percentage of family income earned from the non-farming sector (Percent)	0.488**	0.000
The share of the non-farming sector in securing family cost (percent)	0.354*	0.036

** p <0.01, * p<0.05

ing income in the agricultural sector, the number of family labor in the non-farming sector, the percentage of household income from the non-farming sector, and the share of non-farming activities in providing living expenses of farming households have a positive and significant relationship with the sustainability of peasant farming units. However, there is no statistically significant relationship between overall sustainability and experience in non-farming activities and the number of days involved in non-farming activities. The effect of studied variables on the sustainability of peasant farming units was determined by stepwise multiple regression analysis. The step-by-step approach is a method in which the strongest variables are included in the regression equation. In this analysis, all variables that had a significant relationship with the sustainability of peasant units, as well as some dummy variables (with a virtual code of zero and 1) as predictor variables, were included in the regression model up to three steps. The results of this section are presented in Table 8.

The results presented in Table 8 show that in the first step, the variable of the number of employed in the non-farming sector was included in the equation. The value of the multiple correlation coefficients (R) was 0.345, and the coefficient of determination (R^2) was equal to 0.245. In other words, 24.5 percent of the variance in the dependent variable (sustainability of peasant farming units) is accounted for by this variable. In the second step, the variable of using the income of non-farming activities in the agricultural sector was included in the equation. This variable

increased the multiple correlation coefficients (R) to 0.447 and the coefficient of determination (R^2) to 0.401. In other words, about 15.6 percent of the variance in the dependent variable (sustainability of peasant farming units) was captured by this variable. In the third stage, the variable of the percentage of household income from the non-farming activities was entered into the equation for which the multiple correlation coefficients (R) was 0.542 and the coefficient of determination (R^2) was equal to 14.1 percent. Based on the results, these three variables could account for 54.2 percent (R^2 = 0.542) of the variance in the dependent variables, and 45.8% of the remaining variance was due to other factors, which were left unidentified in this research.

According to the above description and the results in Table 9, the linear equation derived from the regression is as follows:

$$Y= 12.365 + 2.251\ X1 + 2.251 X2 + 1.041 X3$$

The significance of the F and t-tests indicates the significance of the regression model. However, the regression equation does not imply anything about the relative importance of the independent variables in predicting the variance in the dependent variable. To determine the relative importance of the independent variables in the prediction of dependent variables, the standardized regression coefficient or beta (β) should be taken into consideration. This statistic shows the impact of each independent variable apart from the impact of other independent variables on dependent variables. Accordingly, the most influential independent variable on the dependent variable (sustainability of peasant farming units) is the number employed in the non-farming

Table 8

The Measures of Step-Wise Multiple Regression in Assessing Factors Affecting Sustainability of Peasant Farming System

Step	Independent variables	R	R^2	R^2 Ad	*p*-value
1	Number of employed people in the non-farming sector(x1)	0.345	0.245	0.245	0.001
2	Use of income gained from the non-farming sector in agriculture (x2)	0.447	0.401	0.398	0.001
3	Percent of household income from the non-farming sector (x3)	0.542	0.542	0.487	0.001

Table 9

Significant Regression Coefficients in Assessing Factors Affecting Sustainability of Peasant Farming units (Y)

Independent variables	Unstandardized B Coefficient	Standardized Beta coefficient	t	*p*-value
Constant	12.365	-	6.362**	0.001
Number of employed people in the non-farming sector(x1)	2.251	0.652	2.324**	0.001
Use of income gained from the non-farming sector in agriculture (x2)	2.321	0.601	1.523**	0.001
Percent of household income from the non-farming sector (x3)	1.041	0.423	1.252**	0.003

** p <0.01

sector, whose beta value is about 0.652. That means that a unit of change in the standard deviation of the variable of the number employed in the non-farming sector will create 0.652 units of improvement in the standard deviation of the dependent variable. Another variable that affects the dependent variable is the use of income from the non-farming sector in agriculture with a beta value of 0.601 and the beta value for the percentage of household income from the non-farming sector is equal to 0.423.

Factors affecting farmers' willingness to get involved in non-farming activities

The results showed that based on the opinion of the respondents, the most important factor affecting their willingness to get involved in non-farming activities was access to more opportunities and income in life. The detailed results of this section are presented in Table 10.

To analyze the effective factors on activity in the non-farming sector, exploratory factor analysis was used with a KMO value of 0.785. Besides, the Bartlett test value was significant (8536.258; p = 0.000) at the one percent level, indicating that the data are suitable for factor analysis. In this analysis, four factors with Eigenvalues of higher than one were extracted, which accounted for 59.28 percent of the total variance in all factors, and 40.72 percent of the remaining were related to the factors that were not identified in the analy-

Table 10

Factors Affecting Farmers' Willingness to Expand Their Non-Farming Activities

Items	Mean	SD	CV	Rank
Access to more opportunities	4.6	0.566	0.123	1
Access to more income	4.39	0.577	0.131	2
The high efficiency of capital in the non-farming sector	4.56	0.609	0.133	3
High efficiency of labor in the non-farming sector	4.11	0.659	0.160	4
The low potential of the farming sector to cover increased living expenses	4.47	0.760	0.170	5
Low efficiency of crop insurance	3.42	1.16	0.339	6
Lower risk in the non-farming sector	3.04	1.15	0.378	7
Water shortage	3.60	1.38	0.383	8
Higher risks and uncertainty in the farming sector	3.23	1.25	0.386	9
Reduction of the fertility of arable lands	3.13	1.22	0.389	10
Reduction of crop yields	3.09	1.21	0.391	11
Limited access to more arable lands	3.68	1.68	0.454	12
Growth of rural population	1.74	0.81	0.465	13
The existence of more natural disasters in the farming sector	2.89	1.35	0.467	14
The inefficiency of financial and credit markets in villages	2.22	1.10	0.495	15
Lack of access to agricultural inputs market	1.89	1.07	0.566	16

Table 11

Number of Extracted Factors and Their Contribution in Capturing Variances

Factor	Eigenvalue	Variance percent	Cumulative variance percent
1	5.22	18.32	18.32
2	5.01	16.11	34.43
3	4.36	13.11	47.54
4	3.52	11.74	59.28

sis. Taking Eigenvalues into account as depicted in Table 11, the first factor had the highest share (5.23) and the last factor (4th) had the lowest share (3.52) in explaining the variance in total factors.

After rotation by the Varimax method, the factor loadings of all variables were obtained as presented in Table 12. After the analysis of the items (variables) of each factor, the factors were named as follows: (1) high economic returns from the non-farming sector, (2) limitation of production resources to develop agriculture, (3) uncertainty and risk in the farming sector, and (4) the inefficiency of supportive services in agriculture. These are the factors that influence the decisions of the respondents to enter the non-farming sector.

Table 12

The Extracted Factors with Factors Loadings

Factor	Items	Factor Loadings
Higher economic return from the non-farming sector	Higher labor productivity in the non-farming sector	0.885
	Higher capital return in the non-farming sector	0.745
	Access to more income in the non-farming sector	0.725
	Demand for more income due to the increase in farmers households' expenses	0.658
Limitation of production resources to develop agriculture	Reduction of crop yields	0.702
	Water scarcity for agriculture	0.685
	Low fertility and productivity of arable lands	0.740
	Constraints to accessing appropriate arable lands	0.666
	High population growth in rural areas	0.542
Uncertainty and risk in the farming sector	Lower risks in the non-farming sector	0.639
	Higher production risks in the farming sector	0.766
	Higher natural risks in the farming sector	0.562
	Low efficiency of agricultural products insurance	0.468
The inefficiency of supportive services in agriculture	Lower economic opportunity in agriculture	0.668
	Lack of proper access to agricultural inputs' market	0.563
	The inefficiency of agricultural credits and financial markets	0.654

DISCUSSION

In the development literature, particular attention has been paid to non-farming income as one of the most important sources of sustaining rural livelihoods and, consequently, their food security, because it allows them to have more access to food resources. Moreover, non-farming activities provide more cash for farmer families so that they can invest more in agriculture and, consequently, gain higher productivity (Wang et al., 2011). It can also provide farmers with more access to diverse food resources by providing opportunities for investment in agricultural activities (such as food-processing industries). Finally, the development of the non-farming sector leads to the flourishment of sustainable agricultural activities and faster and more balanced and sustainable growth of the agricultural sector. In this regard, this research was conducted with the general objective of investigating the role of non-farming activities on the sustainability of peasant farming systems in the county of Osku. The results of analyzing three dimensions of sustainability showed that the majority of peasants farming units were semi-sustainable. The result is in line with the findings of Rashipour (2012). The results of ANOVA indicated that the farm's sustainability is significantly different among rural districts in Osku County. Besides, the results showed that

there was no significant difference among farming systems based on the variable of having the second job by farmers, but there was a significant relationship between the level of sustainability and farmer' second job so that the farmers who had a second job had a higher level of sustainability in their farms. Furthermore, the results of the correlation analysis indicate that among the variables of the number of employed people in the non-farming sector, the use of non-farming income in the agricultural sector, the number of family labor in the non-farming sector, the percentage of household income from the non-farming sector, and the impact of non-farming activities in providing living expenses have positive and significant relationships with the sustainability of peasant farming systems. These findings are consistent with those of other studies (Adepoju and Obayelu 2013). However, there is no statistically significant relationship between farmers' experience in non-farming activities and the number of days involved in these activities. The effect of the studied variables on the sustainability of peasant farming systems was determined by stepwise multiple regression analysis. The equation went up to three steps and included the variables of the number of people employed in the non-farming sector, the use of income in the agricultural sector, and the percentage of household income from the non-farming sector, which accounted for about 54.2 percent (R^2 = 0.542) of the variance in the dependent variable. The exploratory factor indicated that the four following factors played a major role in encouraging farmers to get involved in non-farming activities: (1) high economic returns in the non-farming sector, (2) restrictions of production resources in agriculture, (3) uncertainty and high risk in the agricultural sector, and (4) lack of appropriate supportive systems in agriculture. These four factors accounted for 59.28 percent of the variance in the total factors. This result conforms to the findings of Oladimeji et al. (2015). Hence, the findings revealed that strengthening income generation and employment plans in rural areas and expanding job opportunities in the non-farming sector were correlated with the sustainability of peasant farming systems. This shows how the farming and non-farming sectors are interlinked and managed by farmers as two correlated components of households' economic schemes. This result indicates that the farming and non-farming sectors are not two isolated economic sections and the development of one part affects the other one. These findings are consistent with those of other studies (Einali et al., 2019; Karimzadeh et al., 2019).

Therefore, it is concluded that diversification of economic activities of farmers and their involvement in the non-farming sector will result in increasing their income and sustainability of their farms. Therefore, to diversify the production and processing of products at the household level in farming communities, the following approaches are suggested:

The development of local markets has the potential to reinforce the non-farming sector and strengthen the sustainability of farming systems at the same time. An efficient market infrastructure will eventually lead to high income for the villagers and the viability of peasant farming systems.

Since the development of the non-farming sector was found to be a driver for the sustainability of farming systems, strengthening the technical vocational education and training entrepreneurial skills to create new business opportunities in non-farming sectors is recommended as a means to cope with the problems of unsustainability in the region.

Appropriate support from the government to set up new entrepreneurial non-farming activities for the educated people in the rural environment could be seen as a solution to tackle the diverse impact of unsustainability in the farming system.

Developing infrastructure for different production activities such as carpet weaving, handicrafts, mushroom production, animal rising to improve farmers' economic ability,

etc. is a way to improve the income-generation platform for the villagers. The increased income is hoped to be invested in the farming system as per the result.

The results indicated that more job opportunities in the non-farming system were correlated with the sustainability of farming systems. Hence, providing employment opportunities in rural and agro-food processing industries through government support, especially in packaging agricultural products and other non-farming activities, should be taken into account.,

According to the findings, income is correlated with spending more money in the farming sector, so encouraging rural youth to set up professional organizations to improve the value chain of the non-farming products and services and to protect and safeguard household livelihoods is a substantial solution to raise the income of farming households.

Providing necessary conditions for the investment of the private sector in the non-farming sector will strengthen farmers' capacity to improve their farming conditions.

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REFERENCES

Abdollahi, M. (1998). *Farming systems: A comparative study and evaluation of farming systems in Iran.* Tehran: Ministry of Agriculture, Department of Farming Systems, Bureau of Farming Patterns, 391.

Adepoju, A. O., & Obayelu, O. A. (2013). Livelihood diversification and welfare of rural households in Ondo State, Nigeria. *Journal of Development and Agricultural Economics,* 5(12), 482-489.

Adrian Jr, J. L., & Green, T. W. (2001). Agricultural cooperative managers and the business environment. *Journal of Agribusiness,* 19(345-2016-15197), 17-33.

Asgari, A., Hajinejad, A., Asgharpoor H., & Mohammadzadeh, P. (2004). Productivity of rural industries in Iran. *Journal of Economic Researches*, 14*,* 33-57 (In Persian).

Avazzadeh, S.A., & Karami, A. (2015). Determination of sustainability peasant and smallholder farming systems: A case study in Markazi District, Boyerahmad County. *Journal of Rural Development Strategies*. *2*(1), 27-41 (In Persian).

Azkia, M., & Firoozabadi, S. A. (2008). Investigating social capital in different land exploitation systems and factors affecting the transformation of peasant farming system into a cooperative. *Annually Nameh-Ye Olum-E-Ejtemai*, No. 33, (In Persian).

Campesina, La., Via. (2010). Sustainable Peasant and Family Farm Agriculture Can Feed the World. Available at https://viacampesina.org

Carr, E. R. (2014). From description to the explanation: Using the Livelihoods as Intimate Government (LIG) approach. *Applied Geography*, 52, 110-122. Available at: http://dx.doi.org/10.1016/j.apgeog.2014.04.012.

Carr, E.R. (2013). Livelihoods as intimate government: Reframing the logic of livelihoods for development. *Third World*, *34*(1), 77-108.

Chappell, M. J., & LaValle, L. A. (2011). Food security and biodiversity: Can we have both? An agroecological analysis. *Agriculture and Human Values*, 28(1), 3-26.

Curşeu, P. L., & Schruijer, S. G. L. (2017). Stakeholder diversity and the comprehensiveness of sustainability decisions: the role of collaboration and conflict. *Current Opinion in Environmental Sustainability,* 28, 114-120, doi:https://doi.org/10.1016/j.cosust.2017.09.007.

Demurger, S., Fournier, M., & Yang, W. (2010). Rural households' decisions towards income diversification: Evidence from a Township in northern China. *China Economic Review*, 21, 32-44.

Dixon, J. (2001). *Farming systems and poverty*. FAO and World Bank, Washington D. C.

Dixon, J., Stringer, L., & Challinor, A. (2014).

Farming system evolution and adaptive capacity: Insights for adaptation support. *Resources*, 3(1), 182-214.

Einali, J., Mohammadi Yeganeh, B., & Ghasemlou, H. (2019). The role of creative tourism in the sustainable development of rural areas (Case study: Historic-Cultural Villages in North-West of Iran). *Journal of Research & Rural Planning*, 8(2), 19-39.

Gangadharappa, H., Pramod, K., & Shiva, K. H. (2007). Gastric floating drug delivery systems: A review. *Indian Journal of Pharmaceutical Education and Research*, 41(4), 295-305.

Haggblade, S., Hazell, P., & Reardon, T. (2010). The rural non-farm economy: Prospects for growth and poverty reduction. *World Development*, 38(10), 1429-1441.

Haverkort, A. (1998). Knowledge systems agricultural development, *16-page booklet for workshop Wageningen University: International Agricultural Center*, (7-10).

Hosseini, S. M., Naderi, K., & Kalantari, K. (2005). A study of ecological sustainability in farming systems of Saleh Abad District, Hamadan. *Iranian Journal of Agricultural Science*, 2 (37). (In Farsi).

Houssou, N., Johnson, M., Kolavalli, S., & Asante-Addo, C. (2018). Changes in Ghanaian farming systems: Stagnation or a quiet transformation. *Agriculture and Human Values*, 35(1), 41-66

Iravani, H., & Darban-Astaneh, A. R. (2004). Measurement, analysis, and exploitation of the sustainability of farming systems (Case Study: Wheat Production, Tehran Province). *Iranian Journal of Agricultural Science*, 35(1). (In Persian).

Kamali, H. (2005). *Problems and challenges of small and peasant cropping systems in Tehran province. Small and Peasant Farming Systems Conference. Deputy of Extension and Farming Systems*. Ministry of Agri-Jihad Tehran. (In Persian).

Karimzadeh, H., Hosseini Shahpariyan, N., & Hosseini Kahnoj, S. R. (2019). Sustainability evaluation of rural settlements in South Donbaleh Roud Dehestan of Izeh County using v-promethee technique and fuzzy inference. *Journal of Research & Rural Planning*, 8(2), 59-76.

Kermani, M., Behravan, H., & Azkia, M.) 2008(Investigating Socio-economic changes in rural living style to establish industry in rural areas, *Journal of Social Sciences, Faculty of Human Sciences and Literature*, 2(2), 179-214. Available at: https://10.22067/JSS.V0I0.8743 (In Persian).

King, B. (2011). Spatializing livelihoods: Resource access and livelihood spaces in South Africa. *Transactions of the Institute of British Geographers*, 36(2), 297-313. Available at: https:// 10.1111/j.1475-5661.2010.00423.x

Krejcie, V., & Morgan, W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607-610.

Lashgarara, F., Mirdamadi, M., & Hosseini, F. (2009). The analysis influencing competencies of information and communication technologies in improving the food security of Iranian rural households. *American-Eurasian Journal of Agricultural and Environmental Science,* 6(2), 206-214.

Mohammadi, H. (2005). *Study on the economic efficiency of agricultural farming systems with a focus on the role of agricultural production cooperatives.* Department of Extension and Farming Systems. Ministry of Agri-Jihad. Tehran. (In Persian).

Motiei-Langroudi, S. H., Rezvani, M., Faraji Sabokbar, H. A., & Khajeh Shahkouhi, A. (2010). Analysis of sustainability of family and rural production cooperative farming systems (Case Study: Agh-Ghala Township: Golestan Province). *Iranian Journal of Agricultural Economics and Development Research*, 2 (3), 323-333. (In Persian).

National Agricultural Policy Center. (2008). Non-Agricultural activities in rural areas and their impacts on agriculture in selected Areas of Syria, the ministry of agriculture and agrarian reform, the national agricultural policy center. NAPC. Available at http://www.napcsyr.gov.

Odoh, N. E., Nwibo, S. U., Eze, A. V., & Igberi, C.

O. (2019). Farm and non-farm income diversification activities among rural households in the southeast, Nigeria. *Journal of Agricultural Extension*, 23(2), 113-121.

Oladimeji, Y. U., Abdulsalam, Z., & Abdullahi, A. N. (2015). Determinants of participation of rural farm households in non-farm activities in Kwara State, Nigeria: A paradigm of poverty alleviation. *Ethiopian Journal of Environmental Studies and Management*, 8(6), 635-649.

Parveen, S., & Raza Cheema, A. (2018). The rural non-farm economy and poverty alleviation in Tehsil Sillanwali, District Sargodha. *European Online Journal of Natural and Social Sciences: Proceedings, 7*(3), 46-64.

Pasban, F. (2007). *Investigating factors affecting non-farming employment in Khorasan Province.* The Sixth Conference on Agricultural Economics, 30-31 October, the Ferdowsi University of Mashhad, Iran (In Persian).

Pritchard, B., Rammohan, A., & Vicol, M. (2019). The importance of non-farm livelihoods for household food security and dietary diversity in rural Myanmar. *Journal of Rural Studies,* 67, 89-100.

Pravakar, P., Sarker, B., Rahman, M., & Hossain, B. (2013). Present status of fish farming and livelihood of fish farmers in Shahrastiupazila of Chandpur District, Bangladesh. *American-Eurasian Journal of Agriculture and Environmental Science*, 13(3), 391-397.

Radpear, G. (2008). *Rural Planning (New Approach*). London: Blackwell.

Rashidpour, L. (2012). A study on the role of non-farm activities on rural sustainable development in West Azerbaijan Province of Iran. *African Journal of Agricultural Research*, 7(3), 475-481

Reardon, T., Stamoulis, K., Balisacan, A., Cruz, M. E., Berdegué, J., & Banks, B. (1998). Rural non-farm income in developing countries. *The state of food and agriculture*, 1998, 283-356.Available at: https://www.researchgate.net

Shabanali Fami,H., & Mohammadzadeh Nasrabadi, M. (2011). *Rural Industries*. Payam Noor Publication, Tehran (In Persian).

Sharafkhani, R., Dastgiri, S., Gharaaghaji Asl, R., & Ghavamzadeh, S. (2011). Factors influencing household food security status. *Food and Nutrition Sciences*, 2, 31-34.

Sojasi Gheidari, H., Shayan H., & Noorbakhsh Razmi, Z. (2014) Analysis of entrepreneurship role of non-farming activities in enhancing the living standard of rural people in Shanddiz District of Binalood County. *Journal of Rural Development and Space*, *4* (2), 55-76(In Persian).

Šťastná, M., Peřinková, V., Pokorná, P., & Vaishar, A. (2019). A new approach to sustainability in rural areas comprising agriculture practices–analysis of demonstration farms in the Czech Republic. *Sustainability,* 11(10). Available at: https://doi.org/10.3390/su11102906

Tandel, Varsha K. (2016). A case study of the growth & challenges of non –farm activities in Gujarat. *IOSR Journal of Economics and Finance (IOSR-JEF),* 7, I(6) 73-79, www.iosrjournals.org.

Wang Y., Wang Ch., and Suwen P. (2011). The impact of nonfarm activities on agricultural productivity in Rural China, Agricultural & Applied Economics Association's *AAEA & NAREA Joint Annual Meeting*, Pittsburgh, Pennsylvania, July 24-26.

Zahedi, S. (2007). *Sustainable development*. Samt Publication. Tehran (In Persian).

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