



## ORIGINAL ARTICLE

# The Evaluation of indices and dimensions of sustainability of agricultural system in rural regions of Doroud, Iran

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### ABSTRACT

*The main object of this research is evaluation of sustainable agriculture indices and determining effective dimensions in rural regions of Iran which performed as a case study in Doroud rural regions. The research is survey and descriptive-analytical, using collected data and information obtained through field method. The statistical people of this research are all the heads of rural households in Doroud villages which were randomly selected and questioned through using Cochran's formula to a sample size of 188 cases. The Cronbach' alpha coefficient were calculated to determine reliability of questionnaires in which obtained for three parts of questionnaires 0.77, 0.84, 0.81 percent, therefore it's indicate proper research tools. The results of statistical analysis in SPSS software show that agricultural region is not in suitable conditions in environmental dimension. For purpose of social dimension and economic, agricultural region is in suitable conditions.*

**Key words:** development sustainable, agriculture, rural regions of Doroud.

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### INTRODUCTION

Sustainable development in current world has appeared by looking at the twenty-first century, and in this debate the economy, politics culture, environment, security, instruction, sanitation, morality and etc have been considered together. Considering that the agriculture plays a vital role in economy, there is concern about the ability of this section to reduce poverty in rural area and food security as a stable income for farmers and rural people. These raised concerns are because of agricultural environment and rural areas which has faced unprecedented problems especially in the past two decades [1]. In Iran like other development countries, agriculture is one of the most important economic sectors which encompass high percentage of the production and employment [2]. Specially the immethodical use of pesticides and chemical fertilizers in Iran have been resulted in severe damage to soil and water resources, loss of land, environmental pollution, damage of cycle environmental and health problems for humans, animals and nature [3]. Sustainable agriculture is one of the important aspects in sustainable development. Basically agricultural sustainability does not have a single meaning [4, 5, 6]. Some are considered sustainable agriculture in a particular time and space [7,5]. D'silva and his partners believe that sustainable agriculture ensures economic, social and ecological stability which is called based on an equal model [8]. Thus without losing the social aspects (like: family, welfare society, quality of life, human health, labor, and management requires and etc.) Therefore economic efficiency, environmental quality and social responsibility are the three main objectives of sustainable agriculture [9]. Agricultural sustainability depends on achieving a fundamental change in the overall agricultural structure, management and optimum utilization of resources, also organizing and conduction activities in rural regions. Because of the development and sustainability of agriculture, the village and rural development should take into consideration so it will be found true identity and real mean.

In this regard, because of proper climatic condition and geographical regions with farming as the main source of income and employment opportunities, rural regions of Doroud has provided a good platform in order to rural development of this region. Given the importance to agricultural activities and its close relationship with rural development, it's being questioned that how is the sustainability of agriculture in

rural regions of Doroud? Therefore first the objective of this research is study the situation of agricultural sustainability and analysis sustainable agriculture indices.

Muller [10] is assessed agricultural sustainability in three levels: plots, farmer's household and catchment in Costa Rica. The approach analysis shows reversible and biodiversity indicators were in unstable situation. Praneet vatakul use the analysis method of sustainable indicators to assess agricultural sustainability in northern area of Thailand [11]. They assessed the agricultural sustainability in three different levels: household, village and catchment. The findings have shown that the quantity of food was the most sustainable indicator and the size of each household's land, land ownership and inadequacy of water were the most unsustainable agricultural indicators. Mahdavi Damghani has studied the ecological farming sustainability of wheat-cotton system in Khorasan Province [12]. They analyzed agricultural information system as: social-economic measures, production of crops and livestock, fertilizer and chemicals, crop residue management, water & irrigation, tillage & mechanization, species diversity of agriculture and weed management. The livestock and crops production and water & irrigation management factors were at improper conditions based on the results of the study measures. Due to the complexity of the sustainable agriculture concept as a goal, many experts argue about involving a range of guidelines of sustainable agriculture [13]. Due to multiple definitions for the sustainable agriculture concept, some experts and specialists of this technology have introduced and tested different indicators and criteria to assess the sustainability of agricultural activities [10,14,15].

## RESEARCH METHOD

This research is application and its way of study is descriptive-analytical and also measurable. The main tool of this research is a questionnaire which its content validity finally has been approved and reform by the experts of promoting agriculture, Irrigation and agriculture of Doroud Agricultural Jihad Management. The statistical society of the research is the heads of rural regions households (8257 people). Hence for an initial estimate of research obvious trait, (agricultural beneficiary) and access to the logical volume of the sample and checking the reliability of the questionnaire, 30 questionnaires were distributed and completed as part of a pilot study in two villages within the study sample which were not included in the statistical community. Then the Cochran's formula was used to achieve a reasonable volume of the sample. In Doroud rural region due to the volume of statistical community which compose of 8257 rural households, it was determined 200 the head of households to answer the questions as a sample.

## RESULTS AND DISCUSSION

The results of descriptive findings show that the average age of subjects is 40.2 years. The average of per capita of respondent's agricultural land is 6.2 hectares, which irrigated farming land, is 3.5 hectares and dry farming land, is 2.7 hectares. Table 1 shows other descriptive characteristics of the research.

**Table 1:** descriptive findings of research

<i>Variable</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Age(year)	40.28	10.33	24	66
Education(year)	5.71	2.11	0	13
Number of household	5.63	1.86	2	11
Agricultural history(year)	22.47	9.52	3	36
Total amount of lands(hectare)	6.20	1.94	1	22
Lands under irrigated farming(hectare)	3.50	1.09	1	14
Revenue from crops(10,000 RIs)	265.18	20.16	140	570
Number of disposal lands(piece)	2.76	1.59	1	9
Average of land's size(hectare)	3.01	1.19	1	7

The results (Table2) shows that in economic dimension "Access to market for agricultural product" index the highest score are allocated. In social dimension is the highest score for "Assigned location" index and in environmental dimension is the highest score for "Use of fallow" index.

**Table 2:** Assessment of agricultural sustainable development in three dimensions

	<b>Indicator</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
<b>Economic dimension</b>	Access to market for agricultural product	4.03	1.02	1
	Investment in agriculture	3.82	0.97	2
	Access to all types of seeds	3.51	1.11	3
	Access to warehouse, cold storage & silos	3.37	1.17	4
	Access to the types of fertilizers	3.18	1.13	5

**Bosshaq and Raadmanesh**

	Access to bank loans and credits	2.81	1.09	6
	Access to farm machinery	2.63	1.21	7
<b>Social dimension</b>	Assigned location	4.12	1.12	1
	Community participation in village activities	3.97	1.18	2
	Satisfaction of farming job	3.74	1.25	3
	Rate of participation in promotional & training course	3.46	1.07	4
	Satisfaction of job's future	3.20	1.22	5
	Use of communication channels	3.04	1.26	6
	Sense of no deprivation	2.77	0.96	7
	Rate of tend to insurance of lands	2.73	1.10	8
	Rate of satisfaction of authorities	2.58	1.23	9
<b>Environmental dimension</b>	Use of fallow	3.87	1.24	1
	Timing of planting & harvest for pest control	3.83	1.16	2
	Performance of crop rotation	3.59	1.19	3
	Using the combining campaign	3.44	1.17	4
	Use of animal manure to reinforced soil	3.38	1.28	5
	Consumption of micronutrient fertilizers	3.15	1.26	6
	Plowing perpendicular to the slope in order to prevent erosion on steep lands	2.98	1.11	7
	Utilizing of combination of animal & plant	2.84	1.29	8
	No use of chemical fertilizers	2.78	1.05	9
	Planting green manure to improve & increase lands fertility	2.70	1.20	10
	No use of chemical pesticides	2.67	1.12	11
	Using farm forestry	2.63	1.25	12
	No burning of straw left after harvest	2.41	1.03	13
	Proper use of the recommended amount of fertilizers	2.26	1.09	14
	Better protection of water quality and quantity	2.24	1.21	15

After reviewing descriptive indices, all the indices in each dimension are combined and by single-sample t test were evaluated. The results (Table3) show that agricultural region is in suitable conditions in social and economic dimensions but there is in environmental instability conditions in agricultural region.

**The evaluation of dimensions of agricultural sustainability Table 3:**

dimensions		Test Value = 3				
		T	Sig	Mean Difference	Lower	Upper
<b>sustainable agricultural</b>	Economic	5.71	0.000	0.365	0.24	0.49
	Social	4.45	0.000	0.325	0.18	0.47
	Environmental	-3.93	0.000	-0.285	-0.37	-0.63

## CONCLUSION

In this research, indices and dimensions of agricultural sustainability were considered. The reviews show that most indices in environmental dimension have been in less than average. So that 9 indices out of total 16 indices have lower than average. This has resulted in the total environmental dimension of agricultural sustainability is in unsuitable conditions in the region. Since the sustainability of agricultural system according to three dimensions of environmental, social and economic have importance. Therefore, it should be special attention to environmental dimension in the region in order to move towards sustainability in agriculture. As well as agricultural system in the region is in suitable condition in economic and social dimension.

## REFERENCES

1. Tatlidil, F. F., Boz, I., Tatlidil, H. (2009), Farmers' perception of sustainable agriculture and its determinants: A case study in Kahramanmaraş province of Turkey. *Environ. Dev. Sustain.*, Vol. 11, pp 1091-1106.
2. Ommani, A. R., Chizari, M., Salmanzadeh, C., Farj Allah Hossaini, J. (2009), Predicting Adoption Behavior of Farmers Regarding On-Farm Sustainable Water Resources Management (SWRM): Comparison of Models. *Journal of Sustainable Agriculture*, Vol. 33, No. 5, pp 595-616.
3. Sharghi, T., Sedighi, H., Roknoddin Eftekhari, A. (2010), Effective Factors in Achieving Sustainable Agriculture, *American Journal of Agricultural and Biological Sciences*, Vol. 5, No. 2, pp 235-241 .
4. Sadati, S. A., Shaabanali Fami, H., Asadi, A., Sadati, S. A. (2010), Farmer's Attitude on Sustainable Agriculture and its Determinants: A Case Study in Behbahan County of Iran, *Research Journal of Applied Sciences, Engineering and Technology*, Vol. 2, No. 5, pp 422- 427 .
5. Gomez-Limon, J. A., Riesgo, L. (2009), Alternative approaches to the construction of a composite indicator of agricultural sustainability: An application to irrigated agriculture in the Duero basin in Spain, *Journal of Environmental Management*, Vol. 90, pp 3345- 3362 .
6. De Koeijer, T. J., Wossink, G. A. A., Struik, P. C., Renkema, J. A. (2002), Measuring agricultural sustainability in terms of efficiency: the case of Dutch sugar beet growers, *Journal of Environmental Management*, Vol. 66, pp 9-17 .
7. Zhen, L., Routray, J. K., Zoebisch, M. A., Chen, G., Xie, G., Cheng, S. (2005), Three dimensions of sustainability of farming practices in the North China Plain A case study from Ningjin County of Shandong Province, PR China, *Journal of Agriculture, Ecosystems and Environment*, Vol. 105, pp 507- 522 .
8. D'Silva, J. L., Man, N., Hayrol Azril. M. S. (2011), Acceptance of Sustainable Agricultural Practices: The Case of Crop Farmers, *American Journal of Agricultural and Biological Sciences*, Vol. 6, No. 2, pp 227- 230.
9. Bosshaq, M. R. (2011), Analysis of rural development with emphasis on agriculture (a case of study: rural area of Azna County), thesis of MA, rural planning and geographic group, University of Isfahan.
10. Muller, S. (1998). Evaluating the Sustainability of Agriculture, The Case of the Reventado River Watershed, Costa Rica. TÖB Publication No.: TÖB F-V/5e .
11. Praneetvatakul, S., Janekarnkij, P., Potchanasin, C., Prayoonwong, K. (2001), Assessing the sustainability of agriculture, A case of Mae Chaem Catchment, northern Thailand, *Journal of Environment International*, Vol. 27, pp103-109.
12. Mahdavi Damghani, A., Koocheki, A., Rezvani Moghaddam, P., Nassiri Mahallati, M. (2006), Studying the Sustainability of a Wheat-cotton Agroecosystem in Iran, *Asian Journal of Plant Sciences*, Vol. 5, No. 3, pp 559-562.
13. Saltiel, j., Bauder, W, J., Palakovich, S. (1994), Adoption of Sustainable Agricultural Practices: Diffusion, Farm Structure and Profitability, *Journal of Rural Sociology*, Vol. 59, No. 2, PP 333-349.
14. Hua-jiao, Q., Wan-bin, Z., Hai-bin, W., Xu, C. (2007) Analysis and Design of Agricultural Sustainability Indicators System, *Agricultural Sciences in China*, Vol. 6, No. 4, pp 475-486 .
15. Herzog, F., Gotsch, N. (1998), Assessing the Sustainability of Smallholder Tree Crop Production in the Tropics: A Methodological Outline, *Journal of Sustainable Agriculture*. Vol. 11, No. 4, pp 13-37.

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