EVALUATION OF FACTORS AFFECTING AGRICULTURAL LANDS FRAGMENTATION AND APPROPRIATE SOLUTIONS FOR ORGANIZING THEM IN SHUSHTAR TOWNSHIP

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ABSTRACT
This study was aimed at identifying appropriate solutions of fragmented lands organizing in Shushtar Township. This is an applied and, in terms of type of data, quantitative study. Questionnaire was the main tool f data collection; its validity was confirmed by experts panel from face and content aspects, and its reliability was confirmed by calculating Cronbach`s alpha coefficient for its different parts, which was above 0.7 indicating the questionnaire`s suitable reliability. Results indicated that number of family members is the most important factor in land fragmentation and other priorities include the distance of city from village, growth of urban lands, and inheritance law. To evaluate factors affecting the land fragmentation some factors were entered the stepwise regression and results showed that four variables of land size, land price, distance of the land from residence, and number of planted crop explain about 53% of the variance related to the variable predicting agricultural land fragmentation.

Keywords: Land Fragmentation, Land Organizing, Land Consolidation, Land Modification

INTRODUCTION
One of the main impasses of Iran`s agriculture sector, which represents itself as a structural barrier against this sector`s growth and development, is the lack of appropriate utilization system. One reason is the changes and evolutions occurred in this sector from old times, because of historical events, and contemporary years because of executing the land modification program and adopting different strategic policies (Faghihirad, 1995).

One consequence of land modification is more fragmentation of agricultural lands and increase of the number of their uses in small and rural utilization levels. Based on the available statistics, number of agricultural utilization (with or without land) increased from 2384000 units in 1960 to 2993000 units in 1974 and 6223000 units in 1997. These changes occurred in conditions that utilizations are rapidly reduced and the average utilization is increased in developed countries, while in Iran, during the last 30 years, number of utilizations has been increased. Units below 10 hectares have reduced from 5.1 million units to 4.2 million. Average land area has reduced from 6.05 hectares to 5.5 and average land area of each small unit (below 10 hectares) has reduced from 9.2 to 4.2 hectares averagely in 6 separated and fragmented lands (Iran center of statistics, 1975; 2004).

FAO defines lands organizing as a process of forming individual farms, which have no appropriate size, structure and orientation for agricultural exploitation (Kovaces, 2001). Thus, if the issue of lands organizing is considered through integrated measures, there is a little difference between developed and developing countries (Troy, 2000).

Munich act regarding land consolidation as a tool for rural development in eastern and central European countries (2002) explains land organizing as below:

Main goal of land organizing is the optimization of agricultural lands` productivity through concentrating the lands in the minimum possible lands, making roads and necessary infrastructures, environment protection, and improvement of rural living (CEE/CIS, 2002).

In the present study, organizing is the different methods of regulating fragmented agricultural lands in order to prevent resource wastage, which is considered in all national, regional, and local levels of planning (Short, 2000).

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Taleb(1988) stated that in order to counter multiplicity of farmers` lands, even it is resulted from executing land modification programs or being a natural result of inheritance system, there are two ways of, first, exchange, trade-in, purchase and sell, and operations expanding and consolidating the operational units` lands to the optimum level and, second, establishment of agriculture production cooperatives.

Soltani (1983) believed that one way to overcome the problem of production units smallness is the establishment of cooperatives, which includes the whole or a main part of production activities. These cooperatives can purchase the necessary inputs, sell agricultures crops, and, in completed forms, handle all operations.

Bakhshodeh (1988) introduced the methods of land consolidation for fragmented lands organizing as below:

- Exchange of lands by farmers in two ways of exchanging desirable lands with more undesirable lands and exchanging undesirable lands with less desirable lands
- Purchasing and selling lands for land consolidation
- Group agricultural activities such as collective activity by neighboring farmers
- Setting and coordinating the program of plantation and observance of plantation periodicity
- Government`s investment in order to unite lands.

Crecente and Alvarez (2002) believed that during the stages of executing organizing and consolidation projects, the most important stage is agreement.

Alario (1999) considered the agreement stage as the complementary stage of land organizing and consolidation projects. In addition, agreement on determining the value of agriculture lands, which is the most necessary stage to complete the land consolidation operations, should be carried out in this stage. Only fair and exact evaluations can grantee the righteous distribution. Typically, in this stage, three main methods of market price, rental price, and land productivity can be considered for land evaluation.

Shahbazi (1988) did not believe in providing an identical version for all country`s lands organizing and indicated that solving this problem needs the evaluation of reasons and transformation of lands in different regions as well as introducing solutions appropriate for each region`s specific conditions.

Bakhshodeh and Najafi (1991) indicated that the cost of inputs such as workforce, machinery, and consumptive water is increased the fragmentation rate increases and, thus, as a result of fragmentation costs, integrating the agriculture lands consolidation program into the agriculture development policy as a necessity is advised.

Zoghi (1996) believed that the economic structure of the society, selecting development strategies, and rate of being developed or being a developing country in each period of time have an important role on providing the distribution situation of agricultural lands and, given that the orientation of land consolidation strategies is highly affected by government`s policies and programs, Zoghi emphasized on the modification of governmental laws, unified planning and necessity of training and justification for the rural farmers to have more participation.

Asefi (2000) in addition to introduce some fragmentation factors of farmlands such as traditional structure of plantation, historical background, issues such as inheritance law and incomplete land modification, concluded that land consolidation reduces the rate of soil erosion.

Tan *et al.,* (2005) believed that, in China, justice principles in land distribution are the main factor of land fragmentation. They stated that in villages, lands have been divided into two classes and households have gained a share of them both. In addition, a basis of land distribution was the household size so that larger households received more lands than the smaller ones. In addition, they emphasized that nonagricultural income and land rental market have less effect on the agricultural land fragmentation, and risk of fragmentation is more for lands near cities.

Riddell and Rembold (2000) compared the agricultural lands fragmentation and its effect on rural development in four central and east European countries (Bulgaria, Czech Republic, Austria, and Romania) and concluded that although after centuries of shared economy, these countries had important progresses in transferring ownership and stock to private owners in both rural and urban regions, land fragmentation and smallness was a main barrier against privatizing the economy of these countries and

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commercializing their agriculture. Thus, sustainable economic growth and development of rural societies was disturbed. Thus, in less developed regions of central and east Europe countries with an economy, which keeps being agriculture-dependent, negative economic growth, increase of unemployment, rural poverty, and intense socioeconomic rapture as well as a sense of disappointment among stakeholders and local people were observed.

Zhou (1999) believed that it is necessary in a competitive economy that private and public ownership of agricultural fragmented lands become consolidated. Government involvement, public training, and farmers` active participation in this process combined with the process of rural integrated development is necessary and use of satellite remote evaluation pictures and computer technologies are useful.

Chao (1985) believed that in fertile regions of China, size of land is a determining factor in its fragmentation because of the lack of nonagricultural jobs. Based on the justice system, each inheritor, who gets married earlier, will have a share of fertile lands and ones getting the land, because of its high income, do not have any tendency to leave it and work in nonagricultural fields.

Jacoby (1968) believed that land consolidation operations are planned to increase land and workforce productivity. In the case of agricultural lands fragmentation, increase of the efficiency of these production factors will not be possible. As well, in the case of lands fragmentation, rational use of workforce and appropriate agricultural model will be prevented. Only for farmers, a subsistence income will be attained.

MATERIALS AND METHODS

This study, based on objective, is an applied one. In terms of type of data, this is a quantitative study and, in terms of time of execution, it is a combination of retrospective studies. Considering the time criterion, this study is cross-sectional. Given the depth, it is an in-depth strategy and, in terms of executing the research, it is descriptive-correlational. Dependent variable of the present study is the number of agricultural lands. Statistical society of this study includes all agricultural operational units in the city (14000 units). In the present study, cluster sampling was used for all villages having farmers as residents. Sample was selected from 101 villages of 6 rural districts of Mianab, west Shoaybeyeh, Shoaybeyeh, north Mianab, Shahid Modares, and Sardar Abad. First, the list of rural districts was prepared and 3 ones were randomly selected from 6 districts (Mianab, Sarda Abad, and west Shoaybeyeh), and by preparing a list of each rural district`s villages, 10 villages were randomly selected. In the third stage, samples of each village were randomly selected, too. Krejcie and Morgan (1970) table was used to estimate the sample size, which was determined to be 374 ones. Questionnaire was the main tool of data collection and variable measurement, and its validity was determined using content validity method. Cronbach`s alpha coefficient was used to determine the reliability of measurement tool. Obtained coefficient indicated appropriate reliability of the study tool (0/88). Data was analyzed using regression and factor analysis.

Findings

-Respondents` Personal and Professional Characteristics: evaluating the personal characteristics of respondents indicated that average age of respondents is 52.24 years. Minimum age is 19 and maximum is 90. Evaluating the work experience of respondents, average agricultural work experience is 30.25 years. 40.9% of them are illiterate, 25.7% has primary school degree, and 14.7% has guidance school degree. Evaluation of the number of children indicated that average number of children is 3/78 ones and the marital status of the respondents showed that 92.5 % were married and 7.5% were single.

-Respondents` Agricultural Characteristics: Respondents averagely cultivated 2.68 crops each year. Minimum number of cultivated crop is 1 and the maximum is 5. Last year, most of the respondents cultivated 3 crops (31.8%). Evaluating the main crop cultivated, 26.7, 39.3, and 23% of the respondents cultivated barely, Wheat, and rapeseed as main crop, respectively. Evaluation of the type of land ownership indicated that 71.7% of respondents reported a personal ownership and 13.9% reported a rental one. 9.4% of the respondents stated that their land is collective. Evaluation of the distance of land from living place indicated that the average distance is 8.98km. Evaluation of land size showed that the average size is 14.17 hectares. Assessment of land fragmentation indicated that 49.5% of lands are together and

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48.4% are fragmented. Average number of lands at respondents `disposal was 1.88 lands and the maximum number was 6 lands.

-Solutions of Organizing Agricultural Lands: 13 solutions were evaluated. Results indicated that respondents selected the necessary trainings regarding the valuation and comparison of lands by experts as the most appropriate solution. Next priorities include setting governmental rules and regulations of input allocation based on land size, transfer of lands to heirs as collective without permission of fragmentation, transfer of land to the firstborn son to maintain the consolidation and sharing the obtained interest between heirs, and exchanging lands by farmers.

Table1: frequency distribution and prioritization of respondents` ideas in terms of land organizing solutions

Item	Mean	Sd	CV	Rank
setting governmental rules and regulations of input allocation based on land size	3.61	0.640	0.177	2
necessary trainings regarding the valuation and comparison of lands by experts	3.74	0.650	0.174	1
transfer of lands to heirs as collective without permission of fragmentation	3.62	0.800	0.221	3
transfer of land to the firstborn son to maintain the consolidation and sharing the obtained interest between heirs	3.33	0.831	0.249	4
Land consolidation through purchase and selling by related authorities	2.91	1.027	0.353	11
Consolidation through family or relative-oriented production cooperatives	2.81	0.976	0.348	10
Consolidation through rural or regional production cooperatives	3.02	0.981	0.325	8
Purchasing and selling lands just as stocks in a cooperative	3.08	0.957	0.310	6
Exchanging lands by farmers	3.26	0.890	0.273	5
Group activities of neighboring farmers as collective activity	3.08	0.994	0.323	7
Setting regional cultivation model	2.94	1.112	0.379	13
Government's investment in order to unite agricultural lands	2.93	0,973	0.332	9
Selling fragmented lands around a land to its farmer (through granting banking facilities)	2.76	1.038	0.376	12

(1-very low 2- low 3-average 4- high 5- very high)

Factors Predicting the Agricultural Lands Fragmentation: In this section, multiple regression was used to evaluate the effect of independent variables on the dependent one (number of lands). Summary of results is indicated in tables (1) and (2). Results of analysis are as below:

First step: size of land was entered the equation. Value of multiple correlation coefficients (R) and coefficient of determination were obtained to be 0.670 and 0.499, respectively, meaning that 44.9% of the variance of dependent variable of agricultural land fragmentation is explained by this variable.

Second step: price of land was entered the equation. This variable increased the multiple correlation coefficient (R) and coefficient of determination to 0.718 and 0.515, respectively, meaning that 6.63% of the variance of dependent variable of agricultural land fragmentation is explained by this variable.

Third step distance of land from living place, which somehow determines the desirability of land, was entered the equation. This variable increased the multiple correlation coefficient (R) and coefficient of determination to 0.728 and 0.530, respectively, meaning that 1.53% of the variance of dependent variable is explained by this variable. This variable has a negative effect on fragmentation.

Fourth step: number of cultivated crop was entered the equation. This variable increased the multiple correlation coefficient (R) and coefficient of determination to 0.738 and 0.545, respectively, meaning that 1.48% of the variance of dependent variable of agricultural land fragmentation is explained by this variable.

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Table 2: Determination coefficient affecting the fragmentation of agricultural lands

Model	(R)	(R^2)	R^2_{Ad}
Land size	0.67	0.45	0.44
Land price	0.72	0.51	0.51
Distance of land from living place	0.73	0.53	0.52
Number of cultivated crops	0.74	0.55	0.53

Table 3: effect on variables affecting the agricultural lands fragmentation

Independent variables	B	Beta	t	Sig
Constant variable	0.095		4.247	0.005
Land size	0.073	0.469	6.819	0.00
Land price	0.098	0.301	4.671	0.00
Distance of land from living place	-0.016	-0.139	2.285	0.024
Number of cultivated crops	0.123	0.123	2.177	0.031

After entering these four variables, operation was stopped. In fact these four variables explained 55% of variance of the dependent variable of agricultural land fragmentation. Given the explanations above and results of table (3), linear equation resulted from regression analysis is as below:

$$Y = 0.095 + 0.073x_1 + 0.098x_2 - 0.016x_3 + 0.123x_4$$

Beta value indicates the relative importance of the independent variables in explaining the dependent one. Based on the results of beta coefficients (standardized regression variables), it is observed that the variable of land size with beta value of 0.469 has a more effect on the dependent variable of agricultural land fragmentation. This value shows that with one unit change in the standard deviation of the independent variable of land size, 0.469 unit effect will be on the standard deviation of the dependent variable. Next are price of land with beta value of 0.301, distance of land from living place with beta value of 0.139, and number of cultivated crops with beta value of 0.123, which affect the agricultural land fragmentation, respectively. Important point is the little difference of the third and fourth variables` confidents indicating that their effects are close to each other.

Sugesstions below are provided to identify solution for orgnizing and consolidating the agricultural lands:

-Results of multiple regression indicate that the variable of land size has more effect than others on the fragmentaion of agricultural lands, so that large-scale lands are in more danger of being fragmented by hiers (in adition, this is confirmed by the results of factor analysis). Thus, it is sugested that, befor any thing, terms and conditions are set to prevent land fragmentaion through applying changes in the law of inheritance. Note that in some countries, to prevent using this law to fragment the lands, solution are thought, which by a little modification, it is applible in Iran and is inconsistnece with Islamic rules. Undobtedly, approval of laws in the field of optimum size of agriocultural land in different regions or the minimum land size, which can not be fragmented, can be useful in preventing more land fragmentation.

-evaluation of solutions of organizing the agricultural lands showed that respondented repoetrted the necessary trainings on valuation of comparison of different lands by experts as the most approprte solution. Thus, it is sugessted that by training skilled experts and prfoessionals, field of apprioprite valaution of aghricultural land is prepared.

-establishment of cooperatives and farmers` participation is considered a sthe most important solution in organizing agriclyutuarl lands. Thus, providing the field of establishing appropriate cooperatives to organize the lands through conducting fisibility studies and identifuing the experinec of particiaptional activities is suggested.

Conclusion and Discussion

Evaluating items affecting the agricultural lands fragmentation from the point of view of farmers indicates that four factors of land size, land price, distance from living place and number of cultivated crops explain

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about 53% of the variance related to the variables. Results are confirmed by Bafekr (1993), Taleb (1988), Bakhshodeh (1988), and Van (2003).

It is obvious that the structure of rural economy has a determining role in the methods of agricultural land utilization. Results of this factor, according to the facts of the regions, are in consistence with Heydari (1997), Bakhshodeh (1988), and Bafekr (1993). Finally, family factor is the fourth factor affecting the land fragmentation. Results of evaluating this factor confirm the results of Dick (2003), Bakhshodeh (1988), Eftyekhari (1993), and Heydari (1997).

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-Results of multiple regression indicate that the variable of land size has more effect than others on the fragmentaion of agricultural lands, so that large-scale lands are in more danger of being fragmented by hiers(in addition, this is confirmed by the results of factor analysis). Thus, it is suggested that, befor any thing, through applying changes in the law of inheritance,terms and conditions are set to prevent land fragmentaion. Note that in some countries, to prevent using this law to fragment the lands, solution are thought, which by a little modification, it is applicable in Iran and is inconsistnece with Islamic rules. Undoubtedly, approval of laws in the field of optimum size of agricultural land in different regions or the minimum land size, which can not be fragmented, can be useful in preventing more land fragmentation.

-Evaluation of solutions of organizing the agricultural lands showed that respondents reported the necessary trainings on valuation or comparison of different lands by experts as the most proper solution. Thus, it is suggested that by training skilled experts and prfoessionals, field of apprioprite valuation of agricultural land is prepared.

-Establishment of cooperatives and farmers` participation is considered as the most important solution in organizing agricultural lands. Thus, providing the field of establishing appropriate cooperatives to organize the lands through conducting feasibility studies and identifying the experience of participational activities is suggested.

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