



Socio-economical effects of land consolidation in North of Iran (Case study: farms of Masal County)

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Abstract

One of the important issues that come up in recent decades has been the fragmentation of agricultural land and frequency of plots. Fragmentation of plots and being small is one of the challenges and major obstacles in the way of increasing production and ultimately the development of agriculture. In recent years, agricultural production has not been commensurate with the growth of population. On the other hand, small size of agricultural units and their fragmentation had been created some limitations in agricultural production. Limitations such as to equip and prepare the production surface, infrastructure performance and utilization of machines, increasing the quantity and quality of products and increase the efficiency in various fields. Farmlands consolidation means integrating or coordinating all agricultural activities such as land preparation, seeds preparation, fertilizers, pesticides and farm machinery, maintenance and use them correctly, proper farm management and marketing of agricultural products, so that we can lead cultivation and crops type in accordance with the needs of the community while raising power of production. This study used a descriptive - analytical method to investigate the consolidation agricultural land plan in the Masal city and the results show that dispersion of plots and being small is one of the challenges and major obstacles in the way of increasing production and ultimately the development of agriculture. To determine the factors affecting the adoption of land consolidation by rice farmers, the logit regression model was used.

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Introduction

The most important issues in the world today are the issue of food Supply. As in terms of quantity is effective in inhibiting low food and in the perspective of quality, it must well able to overcome malnutrition. Also expanding industries require more raw materials with high quality. In such circumstances in the developing world, soils and water resources are not being used as efficiently. One of the most serious problems in developing countries and in the recent case in our country is the problem of dispersed agricultural lands that reduced significantly the efficiency of all factors of production. Land consolidation is the most correct way to combat land fragmentation problem. It means to combination and re-fragmentation of land in one property or part of a property in a manner that reduced the number of its parts (Singh and Dhillon, 1995). The correct implementation of the objectives and principles of consolidation include: Reduction of land preparation costs, eliminate wasted time in traffic between plots, promptly implementation of improvement plans and sewage system due to increased revenue and capital, pay attention to the natural landscape protection and environmental protection and rural development and the solutions of correct implementation of this project is consider as an starting and legal attempt (Backman, 2002). Cultivation of crops depends on many factors such as access to land, water, labor and capital (Sarker and Quaddus, 2002) and cultivation effect on soil quality and Soil degradation (Ahukaemere *et al.*, 2012; Pietro and Marson, 1991) and this degradation can effect on loss of biological and economic productivity (Agele, 2011). In traditional farming systems, land is often given to farmer as scattered plots. Such an arrangement of the land (the number of plots and an irregular fragmentation) in the traditional system may also be considered as an opportunity or factor influencing in shaping positive functions of traditional systems (Gajendra *et al.*, 2005; Todaro, 1985). Since the problem of agricultural plots fragmentation is not unique to our country and in the landholding system, there are many countries with different ratios, developed countries to keep

pace with developments in other sectors of the economy has special attention to the development of agricultural infrastructure and are considered as a pioneer in the land consolidation (Crecentea *et al.*, 2002). In the formation of new systems in agricultural sector and use of technology and mechanization of different steps of agricultural production (planting -growing and harvesting) irregularly scattered of plots are seen as an inhibiting factor that has led to reduced productivity and increased production costs (Obrie, 1991). Historical background of land consolidation back in the year 1550 in the Republic of Germany that entered into force followed in countries such as Poland, Czechoslovakia, Japan and etc (Eftekhari, 1996). The study of Ebrahimi *et al.* (2012) revealed that the social, instructional, environmental, economic and institutional parameters were five important factors affecting the paddy field consolidation. Social effects were reported to be the most important factor. Since the economical aspects of land consolidation depend on the method of farming, the type and size of machinery used in plots and regarding the variation of social problems in different farming regions, thus the aim of this study is to investigate the effects of some socio-economical parameters on land consolidation in Masal county as a major rice producing region in north of Iran.

Materials and methods

The study area

The study area is Masal city from northern districts of the Caspian Sea. It is located in the northwestern of Guilan province (Figure 1). Masal city is located at 37°15' of north latitude and 48° 43' east longitude. The city currently has an area of 486 square kilometers. In terms of altitude has been established from three area of plain, foothills and mountain. The city has a population of 48,091 people. 31/18 percent constitutes the urban population and 68/82 percent constitutes the rural population. The city has two districts and four rural districts and 98 villages. It has about 70 thousand hectares forest and pasture and 7,250 acres land under rice cultivation and 3983 hectares garden lands.

Table 1. Comparison of the conventional techniques capabilities in agriculture and rural development.

Parameters techniques	New technology (GIS)	Traditional techniques (manual)
Use of machine	Using the machine in the process of forming databases, analysis, and conclusion ...	Limited use of machinery and elementary technology in the stages of information processing
Initial investment (Basic)	High (hardware, software, and training)	Low (field operation, consumables)
Data collection method	Indirect (aerial photographs and satellite), direct (field, library and documentation)	direct (field, library and documentation)
Human Resources Specialist	Necessity of user familiarity with new techniques and how to use it	Lack of necessary knowledge and users use of new techniques and systems
Processing speed	Very High	Time consuming
Accuracy of results	Too much (reviewing possibility and reevaluation of results)	Possibility of high human and operational errors
Information stored	Easy to store with small amounts of information stored in the security file	Maintaining as library and documents with high volume and the possibility of corrupt data

Table 2. Statistical results of social - economical features of rice farmers in consolidated lan.

	Max	Min	SD	Mid	Mean
Age	81	35	15.2	56	60
Education period for farmers	16	0	4.15	6	6
Farming experience	54	9	14	39	40
Number of households	12	2	4.45	2.7	7
Monthly income (Thousand Rials)	600	80	160	190	200
Cultivation area	6	1	1.71	1.5	2

Study the economic effects on consolidation plan in the region

Study the economic effects of consolidation plans that is effective on all farmers' attitudes can better evaluate inside the economic sub-system as follows: Reducing the number of plots. One of the initial results of land consolidation plans is the number of farm plots. The average number of agricultural lands plots in all the villages in the sample before implementing the plan 7890 was plot that after implementing the project 5096 has been reduced to plot. Generally, reduction in the cost of integrated land and the increasing cost of agriculture in scattered land causing to net income in integrated be over than net income in the scattered lands. On the other hand, the increasing crop yield in the integrated land in turn increase the revenue in these lands, while lower efficiency of crops in the

distributed land has been effective on reducing farmers' income.

The fragmentation of land and the need for land consolidation in the area

Studies in the study area show that one of the obstacles to rural development and the transition from one stage to other stage is the fragmentation of agricultural lands which in overall classification, its causes are including social, cultural, economic, physical, and functional factors. Studies indicate that cultural and social factors influencing on the fragmentation and its intensity are factors such as the structure of private property, laws of inheritance, endowments, political decisions, especially land re-fragmentation, cultural traditions and dowry, gifts, dowry, collapsing extended families, population growth and exploitation practices and its changes.

The fragmentation in the various aspects of ecological, social, cultural, economic and practical has been irreparable losses to access rural development and national development. Lack of land consolidation in the study area has the following problems: Loss of opportunity, additional costs resulting from labor, animal relocation and other factors of production, non-rational and economic of agriculture, loss of land, labor, inputs and raw materials, increased production costs, the problem of monitoring the work, inability to complete drainage and other improvements projects, irrigation, increased soil erosion, restrictions on water and soil conservation, increased involvement and disputes and disagreements. As was mentioned before,

agricultural land consolidation is the opposite and alternative to land fragmentation. Thus, it is considered as the fragmentation defects, the benefits and advantages of consolidation. Therefore, a brief mention of the benefits of consolidation is limited to the following: Increasing production and efficiency per unit area, improve social conditions and farm management, improved soil conservation, reduced the rent and labor costs, increased use of improved seeds, increased land values and incomes, better use of machinery, saving water, reduce differences, changing crop patterns, reduce poverty and in turn ease of rural development is considered as the effect of land consolidation.

Table 3. Statistical results of social - economical features of rice farmers in the non-consolidated land.

Cultivation area	Mean	Mid	SD	Min	Max
Age	62	54	18.71	30	85
Education period for farmers	4	3	3.12	0	15
Farming experience	44	25	11.2	20	60
Number of households	6	5	3.14	10	13
Monthly income	190	190.5	1.9	100	500
	2.95	1	1.80	0.5	8

The need to integrate land under agricultural use

In addition to three features about the fragmentation of land under agricultural use that are frequency plots, small size and the distance between them, another feature, that is the non-geometry of the plots shape needed to be mentioned. The last feature that is mainly influenced by land topography has seen in the arrangement of many lands in the country. These characteristics different forms lead to disorders in land use and other factors of production. One of the major problems in this field is being impossible to correct and efficient use of agricultural machinery and new methods of agriculture. Deleterious effects of plots in the transition from traditional to modern agriculture (industrial) were observed gradually and become broader. The dimensions become broader with expanding of the relationship between rural and urban area and formation of national markets.

Inevitably linked with regional and international markets that puts more serious burden on the agriculture in developing countries, makes more difficulties and obstacles to agricultural development. Low productivity, high costs of production, waste of resources and production factors, low-income farmers, lack of new scientific and technological achievements in productive activity and finally rural poverty as indicators of underdevelopment is somehow associated with the dispersion of plots. In some studies, the effects of plots fragmentation in the loss of production factors have estimated more than 50 percent. If the chain and intensive effects of scattering plots also be considered, resources waste and its adverse effects will be greater than mentioned figure. To overcome the difficulties and complications of this phenomenon, logical and effective solutions of consolidation is recommended.

Table 4. The results of logit regression model to determine factors influencing on adoption of land consolidation.

parameters	Estimated coefficients	t-statistics Value	significance level	Change in probability (pull weight variables)
Age	-0.28	-0.98	0.56	0.11
Education	1.09	2	0.0011	0.52
Income	-0.48	1.38	0.17	-0.13
Number of households	-0.52	-2.14	0.34	0.42
Farming experience	0.25	0.89	0.47	0.72
Cultivation area	-0.604	-1.12	0.27	-0.21
Membership in the Rural Cooperative	0.078	0.89	0.45	0.0095
Land quality	-0.95	-1.21	0.57	-0.12
Land position	-0.25	-1.031	0.57	-0.15
Number of plots	-0.45	0.81	0.36	0.15
Training programs	1018	2.4	0.002	0.64
Financial support	0.21	0.58	0.32	0.95
Constant factor	-0.83	-1.06	0.30	-0.32

Results and discussion

Techniques used in the process of land consolidation in the region

Techniques used in the process of land consolidation are two categories: traditional (manual) and modern (mechanized) methods (Table 1). In traditional methods, all phases of implementing the project from ground to information analysis and conclusion are all manually that encompass three issues of speed (time factor), accurate (in all stages of work), and the cost. In this way in the issues related to rural development in general and in land consolidation specifically, because of the huge volume of information that is usually done manually, the project is time-intensive and being carried out during different periods of time. Also, due to human error in the design process, there is the risk of wrong results and since cost is a function of project

performing time, with increasing the duration of the project, the project cost also increases. In traditional methods, map preparation is done mainly through the field harvest. This method not only requires the use of skilled manpower, but also the result of the work compared to new methods has high error percent. In traditional methods, all computations and data analysis is at first time-intensive and

secondly, the chances of wrong are high in them. Thus, traditional techniques are major defects. In the new techniques, the use of tools and machine forming the basis for the study. Due to new and wide technologies and time requirements, range of new techniques is very wide and extensive that among them may be mentioned the MIS and GIS. Due to the application of GIS, some capabilities of this system in the spatial analysis are expressed as follows: Determine the location (place or space) on the basis of certain characteristics: Such as to determine a space that have 200 -300 mm rainfall, slope 2%, 500- 600 m height and Shallow soils. In conclusion we can say that land fragmentation and being small plot under exploitation of farmers in the peasant operation has brought difficulties and problems in the cultivation and social relations in rural society, so that in the current status is consider as a major obstacle in the development of agriculture in rural communities. The main solution to solve these problems is possible only through the integration of dispersed and scattered plots under farmers exploit (farm documents) with implementing soil and water infrastructures operation to reduce the quality difference of the land in this kind of exploitation. Performing such operations, certainly will promise

fundamental change in the structure of agriculture and farmers attitude.

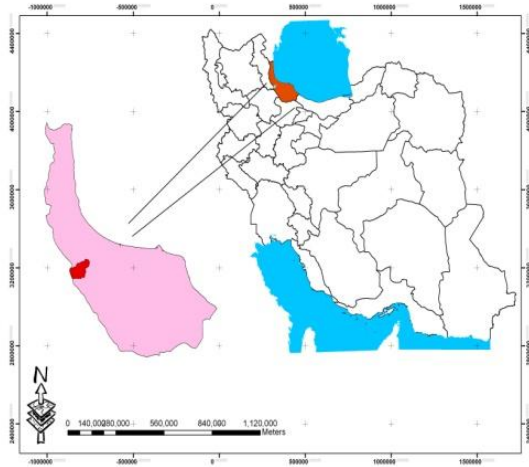


Fig. 1. Position of Masal city in the province of Guilan, Iran.

By implementation of this principle, the loss of water, land, labor, seeds and other production factors significantly reduced. Social aspects of production can be satisfactorily corrected. Conflict and challenges due to land fragmentation will be end and generally, more and better area will be provided for farming and finally the profitability of the agricultural sector will be increased. However, the conditions for investment in more agricultural activities that are typically associated with the use of scientific and technical achievements will provide. In the study area, cultivated land due to natural features in shortage of water resources and suitable climate as well as in terms of social characteristics (high population area) agricultural economics and fragmentation of agricultural lands in small pieces, consolidation of land to build a vibrant local economy and solve the obstacles is necessary.

Social and economic characteristics of farmers in consolidated land

The major variable for study is socioeconomic characteristics of farmers in consolidated land. Efficient use of land cultivated with understanding and using appropriate survey-administrative methods is the main objectives of agricultural development in the region (Table 2). Consolidation

of land is generally in the form of equipment and the modernization of the land and with main objectives such as increasing agricultural productivity and efficiency, raising irrigation efficiency and consequently the establishment of sustainable farming, improve living conditions in rural areas.

After reviewing the completed questionnaires, to determine factors influencing on adoption of land consolidation process, information about the social and economic characteristics of rice farmers are extracted. This information that includes the mean, median, standard deviation, minimum and maximum values of economic - social variables of rice farmers, for rice farmers who adopt the consolidation process for their land come in the above table and for farmers who do not adopt the consolidation process come in the Table 3.

To determine the factors affecting the adoption of land consolidation by rice farmers, the logit regression model was used. The estimation results of the explanatory variables coefficients (effective factors) of the logit regression model, the explanatory variables statistically significant levels and the impact of these variables on the dependent variable of acceptance or rejection of the consolidation process (to determine the factors affecting on land consolidation adoption by rice farmers is in the table 4. According to this table, variables of farmer's education, quality of paddy fields, the interval between paddy fields plots and training program (extension effort) at the significance level of one percent is influenced on the land consolidation adoption by rice farmers of Mazandran province. Also, variables of household size and credit support are influenced on the adopting of this process at significance level of 5%, respectively.

Conclusions

Implementation of consolidation plan with change in agricultural structure of agricultural lands and increasing the size of the exploitation and transfer of

new irrigation methods have positive effects on economic area (increased production efficiency, reduce costs, conserve water, etc.). The most positive effects of consolidation process are to increase the acreage in the study villages. Another positive result of the consolidation plan is to increase product and yield of crops in the study villages. Implementation land consolidation projects, using machinery in various stages of production, particularly to harvest crops such as rice is seen positive development. Changes in the value of agricultural land is evident using land consolidation projects. With agricultural land consolidation project, net income of various products has increased. With agricultural land consolidation project, reducing the cost of crop production is observed.

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