



## The Effects of Land Consolidation and Farmer Satisfaction: Case of Adıyaman Province

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### Abstract

One of the biggest problems of agriculture in Turkey is the small sized, scattered and joint-owned agricultural lands. In order to eliminate this problem, legal arrangements have been made and on the one hand and land consolidation projects have been carried out on the other hand. However, farmers have raised their concerns about some points such as not being able to efficiently benefit from land consolidation activities, parceling, shape, and size, etc. These problems cannot be solved adequately and such problems have been remained unsolved and also implementations vary from person to person. This research has examined the effects of results of land consolidation activities with regard to farmer satisfaction in Adıyaman Province. Research data has been obtained from 97 farmers via a questionnaire in Adıyaman Province where land consolidation activities were realized in 2017. The effects of consolidation practices on the farmers and farmers' satisfaction were analyzed using logistic regression analysis. According to the research results, there has been a decrease in the total land size, the parcel numbers, and the joint-owned parcel numbers; there has also been an increase in the average parcel size and number.

**Key Words:** Land Consolidation, Logistic Regression, Adıyaman

## INTRODUCTION

The land is an important element of capital in agricultural production, especially in vegetable production in Turkey. An important part of the agricultural land cannot be processed because of the land's not being able to be enlarged, the agricultural lands' shifting outside agriculture because of the increasing population on the one hand and urbanization and industrialization, on the other hand, land divided into shares, and migration. They increase the share and importance of the land in the capital used in agricultural production [1], [2]. On the other hand, the agricultural lands in Turkey have a small, divided and shared structure. According to the TÜİK (Turkish Statistical Institute), there are 3.022 million agricultural enterprises and the average enterprise size is 61 decare. The number of parcels of land per enterprise is 4,1. Moreover, 64 % of the total enterprises are smaller than 50 decare and 21,3 % of the agricultural land is processed by these enterprises. The enterprises larger than 500 decare make the 0,63 % of the total enterprises and they make the 11,3 % of the total cultivation area [3]. Besides the agricultural lands' being small and divided, it is seen that their parcels are shapeless and shared. It is also seen that the average number of shareholders is 2,7 people per parcel and this structure continues to be divided because of legacy. The borders of some parcels cannot be known exactly and even some producers process other parcels instead of their parcels unwittingly and the parcels are positioned away from the enterprise. This structure prevents the production to be made in a rational and effective way and it is seen that an important part of the agricultural lands cannot be processed because of these reasons indicated [4], [1], [5]. The agricultural lands which are not processed increase day by day despite the measures taken by the government in order to incite the production (fertilizer, seed, and product support).

Determining the borders of the parcels of land, gathering

them at a place near the enterprise, increasing the average parcel size, making the parcels shaped parcels have come to the fore as important policies. Solving the problems of education and stony land and thus consolidating the land in order to reduce the production expenses, notably, energy and workforce also have come to the fore as important policies. It was started to be applied in 1961 and the consolidated land became 7 million hectares in 2002. The target of 2023 has been determined as 14 million hectares [6].

Despite it is such an important topic, land consolidation has not attracted the expected attention because of the malfunctions in the application [7], [8], [9]. The parcels' not being able to be gathered because of various reasons (legacy, emotional attachment to the land, the concern of changing the land with a less fertile land etc.) affect the farmers' approach to land consolidation negatively. Not being able to correct the shapes and slopes sufficiently, not being able to solve the problem of transport and not being able to provide savings in the production input also affect the farmers' approach to land consolidation. Many studies about the land consolidation and the producers' satisfaction with it and adapting the land consolidation were conducted [10], [11], [12]. However, every region has a different socio-economic structure.

This research was made in order to determine the problems faced by the producers in land consolidation and the factors affecting their satisfaction with the consolidation.

## MATERIALS AND METHOD

The primary data of the research was obtained from totally 97 questionnaires completed with approximately 10 families randomly chosen from each village in 10 villages where land consolidation was made, connected to the province of Adıyaman in 2017. Moreover, the records of institutions and organizations such as GHTB foremost,

scientific studies conducted in the past and the related legislation provisions about the topic were also evaluated as materials.

The research data were given as descriptive statistics, rates, and tables. In the research, logistic regression analysis was used in order to determine the variables effective on the satisfaction of the producers who made agricultural production with land consolidation. The producers' situation of satisfaction with the land consolidation as the dependent variable in the logistic regression was used in the research. According to it, the dependent variable was considered as 1 if the producers were satisfied with land consolidation and it was considered as 0 if the producers were not satisfied with land consolidation [13], [14], [15].

Alternative analysis models in which variables such as age, experience, settlement, size of household, education, the existence of an agricultural consultant, tractors owned before and after the land consolidation. They are also watered land, land owned, public lands owned and the number of parcels before and after the land consolidation were included were tried. These variables were included as the variables which could affect agricultural producers' satisfaction with land consolidation. However, these models were not founded statistically significant. However, only three (3) of these variables gave statistically significant results. They are the number of tractors before the land consolidation, the number of parcels after the land consolidation and the number of parcels with a steady shape.

In this regard, the variables used in the analysis and their characteristics are given in Chart 1.

**Chart 1.** Variables used in Logistic Regression Analysis

Variables	Explanation
Satisfaction with Land Consolidation	Y:1, Satisfied, Y:0, Not Satisfied
Number of Tractors	It is the number of tractors owned by the producer before the land consolidation.
Number of Parcels	It is the number of parcels of the producers after the land consolidation.
Number of parcels with a steady shape	It is the number of parcels with a steady shape in the enterprise after the land consolidation.

## RESULTS AND DISCUSSION

The socio-economic factors which will affect the satisfaction of the producers since they provide the benefits expected from the land consolidation are analyzed below.

**Chart 2.** Dispersion of the Farms According to Their Size

Size of Farm (da)	Number (%)	Area (da)	Property	Rent	Shared	Total
<60	23,7	37,1	64,3	33,0	2,7	100
61-300	45,4	135,8	56,0	21,4	22,6	100
301+	30,9	3.270	91,8	8,1	0,1	100
Average	100	1.147	88,8	11,0	0,2	100

The average age of the agricultural enterprise owners is 54 and their average experience is 38 years. The producers' experience increases as the farm size increases (33-41 years). In the same way, the number of family members also increases as the farm size increases (5,7-8,1 people). They are 7,2 people on average. When it is considered that the average of Turkey is 4,2, the high number of the family members attracts attention. 15,5 5 of the enterprise owners are illiterate. The rate of the enterprise owners who are only literate is 15,6 %. The high number of these two rates indicate the importance of the necessary training about the project in this kind of innovative practices about agriculture at the beginning of the project in the region. 37 % of the producers graduated from primary school, 16 % of them graduated from the secondary school, 10 % of them graduated from high school and 6 % of them graduated from university.

18,6 % of the producers stated that they had a training in agriculture and this training was provided by Public Education or the ministries. 91,4 % of the farmers stated that their real profession was farming. 20 % of the producers have an income source other than agriculture. The rate of finding an income source other than agriculture increases depending on the farm size (%9,5-%25,0). The income sources other than agriculture are office, pension, trade and income obtained from rent 62,2 % of the producers live in villages. The rate of living in villages decreases as the farm size increases, however, the rate of living in districts and province centers increase. Before the project, the producers leaned towards the land consolidation because they thought that their land would be at one place, watering and drainage facilities would be built, agricultural processes would be easier and thus their income would increase. The producers who took a dim view of land consolidation sorted the reasons for it as their lack of knowledge about land consolidation, being satisfied with the present structure of their land and abstaining from the injustice which could occur after the land consolidation. After the land consolidation, the opinions of 24 % of the producers changed positively and the opinions of 20 % of the producers changed negatively. The opinions of 20 % of the producers did not change.

For some of the producers, the reasons for having opinions changed positively after the land consolidation are having the opportunity of learning the actual places of their parcels exactly, decrease in the problems between the farm neighbors, accurate farm borders and their parcels' having roads. For the other producers, the reasons for having opinions changed negatively after the land consolidation are no change in their divided land, a decrease in the area of their land, their parcels placed in the blocks they did not want and beginning to have problems with their parcel neighbors.

**Chart 3.** Change in the agricultural parcel characteristics of the enterprise after the land consolidation (%)

Characteristics	Change
Size of Land	-12,50
Number of Parcels	0,84
Number of Whole Parcels	0,00
Facing the Road	8,07
Direct Transport Road	6,39
Number of Parcels with Steady Shape	19,95

The results of the analysis of the chart are summarized below.

A 12,50 decrease in the lands owned occurred in the analyzed enterprises. This decrease is considered as an obligation for the land consolidation. This decreased area is used for roads and irrigation canals.

The number of parcels which was 17,82 before the land consolidation increased to 19,97 with a 0,84 % increase. This situation is not a result expected from the land consolidation. One of the most important benefits of land consolidation is the increase in the number of parcels, thus an increase in the average number of parcels. Here, an opposite situation actualized. This situation causes a negative result in the adaptation to land consolidation and the popularization of the land consolidation.

No change occurred in the whole parcels owned. The most important advantages provided by the land consolidation in the region is an 8,07 % increase in the number of parcels near the road, a 6,39 % increase in the number of parcels with a road. There was also a 19,95 % increase in the number of parcels with a steady shape.

This situation also affected the result of the logistics analysis made in order to determine the producers' satisfaction with the land consolidation.

Before passing to the summarized data about the model obtained in consequence of the analysis made for the research data, mentioning some differences between logistic regression and multiple regression will be useful because they can affect the interpreting of the results. While the method of ordinary least square is used in the model estimation in multiple regression, the maximum likelihood method is used in logistic regression. Moreover, there is also a difference in the indicators used for the model rapport. There is not an R<sup>2</sup> value in logistic regression but there are indicators corresponding to this value. While the R<sup>2</sup> value is used for the rapport of the model in multiple regression, there is not an R<sup>2</sup> in logistic regression. Instead, the 2LL value (LogLikelihood) which is a model rapport index can be considered like the R<sup>2</sup> value in multiple regression. Moreover, the Cox & Snell R<sup>2</sup> and Nagelkerke R<sup>2</sup> values about the model are important in terms of representing the estimation of the variance explained in the dependent variable by the model from two different ways. They can be interpreted in a way similar to the R<sup>2</sup> in the multiple regression although it does not correspond to the value [16].

On the other hand, the significance of the p-value about the chi-square value is important because it indicates the existence of the correlation between the dependent variable and the combination of independent variables. The summarized data for the rapport statistics made for the logistic regression model made with the data obtained within the scope of the research are given in Chart 4.

**Chart 4.** Summarized Data About the Rapport Statistics of the Model

Step	X <sup>2</sup>	(-2LL- LogLikelihood)	Cox&Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
Model	5,725	29,001	0,251	0,346

When the data about the model are analyzed, it is seen that the chi-square value is 8,362 and the model obtained in consequence of the analysis is generally significant (p<0,05). However, the model rapport index Loglikelihood value which corresponds to the R<sup>2</sup> value in multiple regression is (-2LL) 29,001, the Cox&Snell R<sup>2</sup> value is 0,251 and the Nagelkerke R<sup>2</sup> value is 0,346.

In consequence of the analysis, it was determined that the number of parcels and parcels with steady shape after the land consolidation and the (number of the) tractors owned before the land consolidation were effective variables.

It is seen that the situation of the tractors owned before the land consolidation was statistically significant at 10 % level. The number of parcels after the land consolidation was statistically significant at 5 % level and the number of parcels with steady shape after the land consolidation was statistically significant at 5 % level. While it was determined that the mentioned variables were effective on the satisfaction status of the producers, it was not seen that the other variables were not effective on this probability (Chart 5).

**Chart 5.** Results of Logistic Regression Analysis of The Producers' Satisfaction

Variables	B	S.E.	Wald	Sig.	Exp(B)
Fixed	-2,871	1,474	3,794	0,051**	0,057
Number of Parcels (TS)	-0,337	0,163	4,287	0,038**	0,714
Number of Steady Parcels (TS)	0,541	0,264	4,205	0,040**	1,717
Tractors Owned (TO)	2,329	1,338	3,031	0,082*	10,271
*Significant for 0.10; **0.05 and ***0.01.					

A correlation at 10 % level in the positive direction is observed between the tractors owned by the enterprise owners before the land consolidation and their satisfaction with the land consolidation. The increase in the tractors owned increases the probability of satisfaction with the land consolidation. In the present case, it can be said that the producers' satisfaction with the land consolidation will increase (at least 10,3 times) in case a one unit increase in the tractor variable is experienced depending on the tractors owned.

A correlation at 5 % level on the negative direction is seen statistically between the number of parcels after the land consolidation and the producers' satisfaction with the land consolidation. The probability of the satisfaction of a producer decreases depending on the number of parcels after the land consolidation. In the present case, it is possible to say that a decrease (approximately 1 time) will be experienced in the probability of the producers' satisfaction with the land consolidation in case a one unit increase is experienced in the variable of the number of parcels after the land consolidation.

A correlation at 5 % level on the positive direction is seen statistically between the producers' number of parcels with steady shape after the land consolidation and their satisfaction with the land consolidation. The probability of the satisfaction of the producer increases depending on the number of parcels with steady shape after the land consolidation. In the present case, it is possible to say that an increase (approximately 1,7 times) will be experienced in the probability of the producers' satisfaction with the land consolidation. It will be possible in case a one unit increase is experienced in the variable of the number of parcels with

steady shape after the land consolidation.

In the consideration of these data, it can be said that taking notice of the number of the tractors owned and the structure of the parcels of land in the land consolidation activities which will be made for the producers who do agricultural production in the research region will be useful. It can be said that the producers who own tractors are more satisfied with the land consolidation and the number of parcels after the land consolidation is one of the aspects which affect the satisfaction level negatively. The number of parcels with steady shape makes the producers more satisfied with the land consolidation. In this case, training, publications, and information activities becoming intense about these topics and actualizing special alternative land consolidation plans and projects for these enterprises will be useful in terms of sustainability in the production and be increasing the satisfaction with the land consolidation.

## CONCLUSION

Land consolidation is an important practice which increases the productivity, thus profitability in agricultural enterprises. However, the malfunctions seen in the practice prevent providing the benefits expected from the land consolidation and make a negative example of the subsequent practices. This study conducted in the province of Adıyaman has indicated that the land consolidation caused improvements only in the factors of the number of parcels near the road, the number of parcels which have direct transport roads and the number of parcels with a steady shape. The other advantages provided by the land consolidation do not exist in the sample of Adıyaman.

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