

Land Consolidation in Turkey and Land Consolidation Project at state of Kayseri-Bünyan

Celal BICAKCI and Guler YALCIN, Turkey)

Key words: Land consolidation, parcel size, parcel shape, road network

SUMMARY

In this research, land consolidation projects in Turkey and Bunyan land consolidation project which is close to be finished in time were studied. In that regard, effect of land consolidation on subsurface agricultural services, number of parcel, parcel size, parcel shape, status of share, consolidation ratio and benefit ratio of parcel size, parcel shape were determined before and after land consolidation. By land consolidation, reduction in the number of parcels, increasing in average parcel size, changes in the number of amorphous parcel and percentage reduction, number of newly formed geometrically shaped parcel and changes in the number of parcels with transport before and after consolidation were studied in this research.

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1. INTRODUCTION

Land consolidation has been applied for different objectives concerning agriculture, forestry, development of industry, housing, living environment and other land use needs in different countries. The objectives of land consolidation can be considered from viewpoint of the landowners, other interested parties, society and other interest groups (Vitikainen, 2004).

It can be said that land consolidation is an instrument for rural development. At the initial steps of rural development, it is regarded as agricultural development because of the predominant role of agriculture in the rural areas. It is not only the simple reallocation of parcels to remove effects of fragmentation. It also has a broader social and economic reforms for agricultural areas such as improving the agricultural sector by enabling farms to become more efficient and competitive, encouraging alternative ways of agricultural production, strengthening the rural economy, improving social conditions by promoting employment opportunities, providing increased access to social services, water and sanitation, providing greater protection of natural resources and for their sustainable management, ensuring greater participation in the development process (FAO, 2003). The some of the main shortcomings in rural areas include the small size and irregular shape of the land parcels, the dispersion of parcels, the large potential distance between the parcels and the owner's farmstead, the lack of road access to land parcels in certain areas and issues relating to ownership rights. Land fragmentation is a fundamental rural spatial problem concerned with farms that are poorly organized at locations across space because it hinders mechanization, causes inefficient production, involves large costs to alleviate the adverse effects, results a reduction in farmers' net incomes. Land fragmentation has six relevant factors: the landholding size; the number of parcels belonging to the holding; the size of each parcel; the shape of each parcel; the spatial distribution of parcels; and the size distribution of the parcels. (Demetriou, Stillwell and See, 2013).

Land consolidation studies in Turkey started in Konya in 1961. Between 1961-2008 land consolidation executed very simple steps. Project generation was very slow. Land consolidated area was 30000 ha/year. Later regulation about legal procedures was improved, high technology such as softwares, photogrammetry, GPS..etc was used, education for technical stuff for improving human sources was given, public awareness by using media and extensions was created, new financial sources from National Budget was created. Between 2008-2015 basin based land consolidation projects and then multipurpose land consolidation projects such as ecology, hydrology, historical places, public investment, state investments,.. etc started. In that period project area has been improved to 1 million ha per year. Land consolidation studies scaled up significantly from 2009. Between 2009 and 2014, 225 projects have been launched

and 95 of these were completed, 3205 villages were included in these (Küsek, 2014; Küsek 2015).

This paper takes the land consolidation project in Bunyan, Kayseri and then analyzes and evaluates the agricultural land fragmentation environment in the project area.

2. STUDY AREA BUNYAN-KAYSERI

Kayseri is one of the crowded cities of Turkey, in the middle of Anatolia. It has nearly 1.700.000 ha land. Nearly %40 of it is agricultural area, nearly %40 of it is meadow and grassland, nearly %8 of it is forest and shrubbery (URL1). Kayseri has 16 districts: Akkışla, Bünyan, Develi, Hacılar, İncesu, Kocasinan, Melikgazi, Pınarbaşı, Sarıoğlan, Sarız, Tomarza, Yahyalı, Talas, Özvatan, Felahiye ve Yeşilhisar. *Bunyan* is also a district of *Kayseri* Province in Central Anatolia, Turkey (Figure 1). Bunyan has nearly 540.000 da land area.



Figure 1: Kayseri Province and its districts (URL1)

3. METHODOLOGY

Effect of land consolidation on subsurface agricultural services, number of parcel, parcel size, parcel shape, status of share, consolidation ratio and benefit ratio of transportation networks were determined before and after land consolidation.

The land consolidation project in the study area was carried out by the Land Consolidation and TIGH Department of the Directorate General of Land Reform of the Ministry of Food Agriculture and Livestock . The new parceling plan was carried out by using Nettop module of Netcad, which is widely used for land consolidation projects in Turkey. Standard cadastral map sections and orthophotos with a scale of 1/5000 were used in the project. Information about the

owners of the immovable property in the project area was obtained from Land Registry Offices in the form of a TAKBIS file.

3.1 Information About the Numbers and Sizes of Parcels in the Project Area

Before land consolidation ,Cadastral parcels in the project area are shown on Figure 1 and the project area consisted of 4040 parcels.

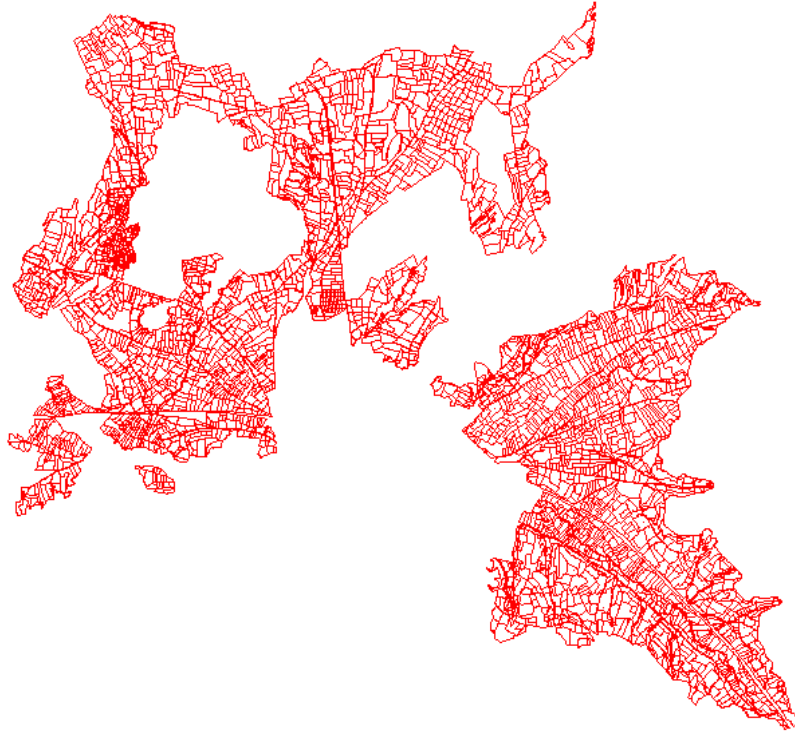


Figure 1 Cadastral parcels in the consolidation area

Parcel sizes before the consolidation in the project are shown on Table 1. A look at Table 1 indicates that the number of parcels smaller than 5000 m² was 1180 in the project area and they represent 29 % of all parcels.

Table 1 Parcel areas before land consolidation

Area m2	Parcel Number	Ratio (%)
0-5000	1180	29.21
5000-10000	936	23.17
10000-20000	1158	28.66
20000-30000	418	10.35
30000-40000	151	3.74
40000-50000	88	2.18
50000<	109	2.70
Total	4040	100

A look at the ownership of the parcels in the project area shows that an overwhelming majority of the parcels are owned by a single person as shown on Table 2 and they represent 81% of all parcels.

Table 2 Ownership state of parcels in the project area

Number of Owners	Number of Parcels	Ratio
Full	3294	81.53
2 Owners	374	9.26
3 Owners	130	3.22
4 Owners	70	1.73
5 Owners	54	1.34
6 Owners	33	0.82
7 Owners	29	0.72
8 Owners	17	0.42
9 Owners	21	0.52
10 and more owners	18	0.45
Total	4040	100

The number of parcel numbers of enterprises cannot be reduced to the desired level during consolidation. The reason is that farmers generally do not want their lands with different ratings to be aggregated in addition to the topographic structure of the land, fixed facilities in the land, and gardens. The number of parcels and the state of parcels with multiple owners after consolidation are shown on Table 3. The number of parcels was reduced to 2844 after the consolidation. Figure 2 shows the new parceling plan and the block plan developed for the study area.



Figure 2 Block and Parcel Plan

Table 3 Number of parcels after land consolidation

Number of parcels	Parcel Numbers	Ratio
Tam	2319	81.5
2 Owners	254	8.9
3 Owners	82	2.9
4 Owners	57	2.0
5 Owners	42	1.5
6 Owners	29	1.0
7 Owners	24	0.8
8 Owners	12	0.4

9 Owners	17	0.6
10 and more owners	8	0.3
Total	2844	100

Table 3 shows that the number of parcels was brought down from 4040 to 2844 after the land consolidation. There was a 29.60 % decrease in the number of parcels in the study area. A look at the parcel areas indicates that the average size of parcels was 15093 square meters before the land consolidation and it went up to 17905 square meters after the land consolidation

3.2 Information About Parcel Shapes on the Project Area

Efforts were made to form the new parcels with straight geometric shapes to the extent possible as shown in Figure 3. Figure 4 shows that the formation of parcels with straight geometrically-shaped parcels was obstructed because of streams and gardens in the study area as well as the development of block plans based on existing cadastral roads.

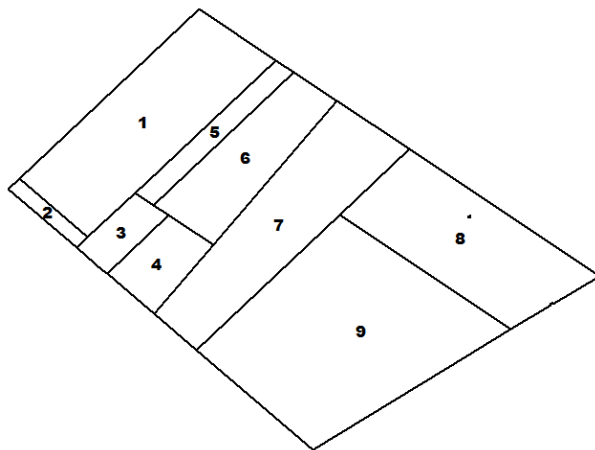


Figure 3 Geometric Shaped Parcels

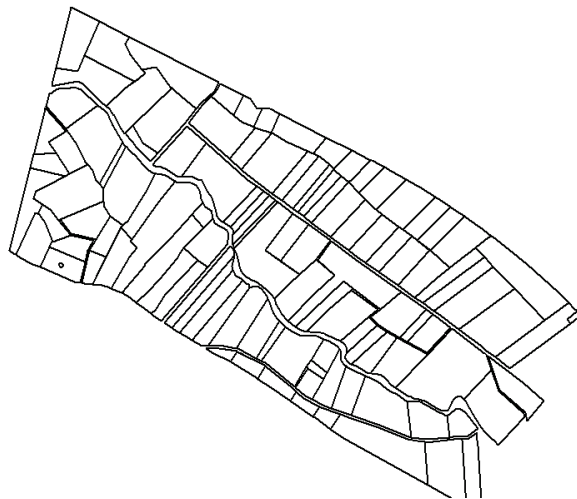


Figure 4 Amorphous Parcels

Despite efforts to form parcels with geometric shapes, parcels without a geometric shapes were formed because of the structure of the land, gardens, and fixed facilities. Of 2844 new parcels created under the project, 1488 do not have a geometric shape while 1356 does.

3.3 Information About Road and Irrigation Network on the Project Area

A look at the existing cadastral status indicates that the cadastral road network shown on Figure 5 is insufficient and all parcels are not accessible by road. The road network shown on Figure 6 was formed through a block-based study area created during land consolidation.



Figure 5 Road network before consolidation

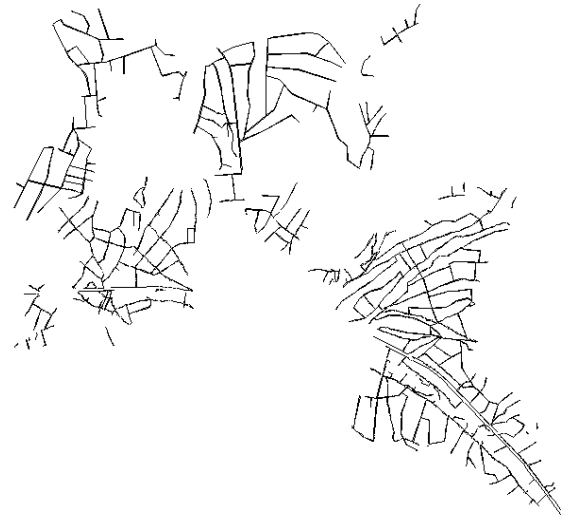


Figure 6 Road network after consolidation

A road network has been created for all parcels through the project. Thus, there is no parcel which is not accessible by road. Roads extending through a small block formed like a blind alley were created for fixed facilities remaining within the internal sections of the blocks and gardens.

The existing irrigation network on the field is very short and insufficient. State Hydraulic Works Administration has created an irrigation network as shown on Figure 7 through the land consolidation project.



Figure 7 Irrigation network

A connection between the parcels and the irrigation lines was formed through the newly formed irrigation network.

4. RESULTS

A land consolidation project was launched in Bunyan county of Kayseri province in order to rearrange small, fragmented, and dispersed lands owned by agricultural enterprises based on modern farm management in order to reduce time, labor, and capital used and to increase the efficiency of farm enterprises and agricultural production by making maximum use of production factors and to raise the life standards of rural population and the project has reached its final phase.

A total of 4040 cadastral parcels were included in the project and 2844 parcels have been formed after the project. While the average size of parcels was 15093 square meters before the land consolidation and it has gone up to 17905 square meters after the land consolidation. The 29.60 % decrease in the number of parcels and the increase in the average parcel size is one of the indicators that the consolidation has achieved its goal. In addition, the road network between existing cadastral parcels was insufficient and the road network was rearranged through land consolidation. This action provided connection between each parcel and the road. While restrictions had been imposed because of land structure, fixed facilities, and gardens, all parcels were reformed. Efforts were made to form straight geometrically-shaped parcels. Existing irrigation network was insufficient and the State Hydraulic Works Administration created new canals and irrigation networks. The newly formed irrigation network provided connection between the parcels and irrigation networks.

REFERENCES

Demetriou, D., Stillwell, J. and See, L., (2013). A new methodology for measuring land fragmentation. *Computers, Environment and Urban Systems*, 39. 71 - 80. <http://eprints.whiterose.ac.uk/76003/2/stillwellpre-publication.pdf>. 19.01.2017.

FAO (2003). *Land Tenure Studies 6: The Design of Land Consolidation Pilot Projects in Central and Eastern Europe*. Food and Agriculture Organization of the United Nations, Rome. <http://www.fao.org/docrep/006/Y4954E/Y4954E00.htm>. (19.01.2018).

Küsek, G., (2015). *Land Consolidation Experiences in Turkey*. http://www.fao.org/fileadmin/user_upload/reu/europe/documents/Events2015/LN7/1.1_en.pdf 19.01.2017.

Küsek, G., (2014). *Land Consolidation Practices in Turkey and Some Results*. FIG Congress 2014, Kuala Lumpur, Malaysia, 16-21 June 2014. http://www.fig.net/resources/proceedings/fig_proceedings/fig2014/papers/TS10I/TS10I_kusek_7416.pdf. 19.01.2017.

Vitikainen, A., (2004). *An Overview of Land Consolidation in Europe*. *Nordic Journal of Surveying and Real Estate Research*, Vol 1, 25-44. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.911.4031&rep=rep1&type=pdf>. (19.01.2018).

URL1: <https://kayseri.tarim.gov.tr/Menu/80/Cografı-Yapı>, 2018.

BIOGRAPHICAL NOTES

Assoc.Prof.Dr. Guler YALCIN

She graduated Anatolia Land Registry and Cadastre Vocational High School, Department of Geodesy and Photogrammetry (Geomatic) Engineering in Istanbul Technical University, Geodetic and Geographic Information Technologies Department in Middle East Technical University for master science degree, Urban and Environment Department in Ankara University for doctoral degree. She studied in General Directorate of Land Registry and Cadastre for nearly 15 years. Now she has been working at Osmaniye Korkut Ata University as Head of Geomatic Engineering Department and Director of Osmaniye Vocational School.

Osmaniye Korkut Ata University
Department of Geomatic Engineering, Karacaoglan, Center.
OSMANIYE
TURKEY
Tel. +90 328 8271000(3700)
Fax + 90 328 825 00 97
Email: guleryalcin@osmaniye.edu.tr
Web site: harita.osmaniye.edu.tr
Ins.Celal BICAKCI

He graduated from Department of Geodesy and Photogrammetry Engineering in Karadeniz Technical University and doing master degree in Çukurova University .He took part in expropriation project and consolidation project. Now he has been working at Osmaniye Korkut Ata University as Head of Architecture and Urban Planning Department and Director Assistant of Osmaniye Vocational School.

Osmaniye Korkut Ata University
Osmaniye Vocational School, Karacaoglan, Center.
OSMANIYE
TURKEY
Tel. +90 328 8271000(5057/5003)
Email: celalbicakci@osmaniye.edu.tr
Web site: omyomimarlik.osmaniye.edu.tr