



## Effect of Land Consolidation of Land Value

Cemal Bahadır Saygılı<sup>1</sup>, Belgin Çakmak<sup>2\*</sup>

<sup>1</sup> Ankara University, Faculty of Agriculture, Department of Farm Structures and Irrigation, Ankara, Türkiye

<sup>2</sup> Ankara University, Faculty of Agriculture, Department of Farm Structures and Irrigation, Ankara, Türkiye

### HIGHLIGHTS

- Land consolidation is an important tool for increasing land value.

### Abstract

In this study, the effects of land consolidation projects on land value were examined and these effects were evaluated with their positive and negative aspects. Land consolidation is an important rural planning strategy that includes objectives such as increasing agricultural productivity, regulating water management and improving infrastructure in rural areas. However, the effects of this strategy on land value are complex and diverse. In addition to the positive effects of the projects, the study also discussed their negative effects such as social inequality, ecosystem changes, water resource imbalances and loss of cultural heritage. The research evaluated the effect of land consolidation on land value in a selected area and determined that land values in the region increased after consolidation. Recommendations were made to mitigate the the negative effects of land consolidation, such as participatory planning processes, environmental impact assessments and the implementation of long-term sustainability strategies.

**Keywords:** Land consolidation; land value; rural planning

### 1. Introduction

Worldwide, population growth, urban expansion and an increase in agricultural demand have brought with them a complex set of issues that put pressure on land use and management. In this sense, land consolidation has emerged as an effective land management strategy, particularly in agricultural areas. Land consolidation aims to transform fragmented and dispersed land ownership arrangements into a more organized, efficient and sustainable land structure. However, there are gaps in the understanding of the effects of these consolidation processes, especially on land value.

"Land Consolidation" is the process of combining, shaping and reorganizing the parcels of land that are fragmented, scattered and deformed in a way that does not allow for economic agricultural activities for various reasons, according to the principles of modern agricultural management and in a suitable way for the development of irrigation services (ATOM 2015).

**Citation:** Saygılı BC, Çakmak B (2024). Effect of land consolidation of land value. *Selcuk Journal of Agriculture and Food Sciences*, 38(2), 265-273. <https://doi.org/10.15316/SJAFS.2024.025>

**Correspondence:** [bcakmak@ankara.edu.tr](mailto:bcakmak@ankara.edu.tr)

Received date: 24/04/2024

Accepted date: 09/07/2024

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According to the Land Consolidation Implementation Regulation No. 30265 (2017), land consolidation refers to preventing the degradation and fragmentation of lands by natural and artificial influences, and in fragmented lands, combining more than one piece of land and creating new parcels that are more functional in economic, ecological and social terms by considering their natural characteristics, integrity of use and property rights, and determining the usage patterns of these parcels by evaluating their land characteristics and area and providing land development services.

Land consolidation refers to an arrangement and planning process that is generally applied to agricultural lands in rural areas (Boyras and Üstündağ 2008). This process aims to transform fragmented and scattered land ownership arrangements into a more organized and efficient structure (Akşit 2013).

A project carried out by the Tennessee Valley Authority in the US focused on water resource management, electricity generation, and the regulation of agricultural land in the early 20th century. This project involved a comprehensive planning and consolidation process to support economic development in the region (Erikli and Bayat 2016).

The European Union implements the Common Agricultural Policy (CAP) to manage agricultural land in a sustainable manner. Within the CAP, agricultural consolidation projects include objectives such as developing rural areas, providing support to farmers and increasing agricultural productivity. These cases illustrate land consolidation projects across the world, tailored to different geographies and needs. Each has been planned and implemented taking into account local conditions and objectives (ABDT 2023).

Land value is a concept that refers to the financial worth of a land or property determined by economic, social and environmental factors. This value often varies depending on market conditions, physical characteristics of the land, environmental factors, regional demands and a range of other factors. According to the American Society of Appraisers, "Land value is a value estimated as of a specific date for a specific intended use, usually realized as part of a financial transaction." This value is based on market conditions and land characteristics.

The value of agricultural land can be affected by a number of factors. Understanding the effects of consolidation on land value is important not only in increasing agricultural productivity, but also in a broad context such as property regulations, regional economic development and environmental sustainability. Land consolidation aims to reduce soil erosion and increase the sustainability of agricultural areas. This protects soil quality by reducing the risk of erosion and supports the long-term use of agricultural land. Afforestation projects that prevent wind and water erosion or agricultural practices that reduce erosion can increase land value by preventing soil erosion (Karakayacı et al. 2016).

Land consolidation is the process of combining and organizing small and fragmented agricultural lands in a region. This process generally aims to increase agricultural productivity, use water resources more effectively, prevent soil erosion, improve infrastructure and support rural development (Takka 1993). Land consolidation is a planning strategy implemented in many countries to increase the sustainability and efficiency of the agricultural sector (Khamrabaeva 2020). However, the effects of this process on land value may vary depending on a number of factors.

The main purpose of this study is to reveal in detail the effects of land consolidation on the value of agricultural lands and to explain how these effects may vary depending on various factors. Land valuation is carried out to provide necessary information for the agricultural sector, local governments, policy makers and land use decision makers. Understanding the impacts of land value should be considered a fundamental step in developing sustainable land management strategies.

This study evaluates the effect of land consolidation on land value within a general framework. A review of previous studies is conducted to better understand the effects of land consolidation on land value. This review will help understand findings from studies in similar contexts and identify the unique contributions of this study.

## 2. Land Valuation Methods

### 2.1. Traditional land evaluation methods

Traditional land valuation methods are techniques that are frequently used by real estate professionals and assessors and are generally intended to determine market value. Some of the traditional land valuation methods are as follows (Khamrabaeva 2020):

- *Comparative Market Analysis (CMA)*: This method makes an assessment by comparing the sale prices of other similar properties with similar characteristics. With this method, market analysis is performed, sales prices of similar properties are analyzed and the value of the property is determined according to similar characteristics. For example, to determine the value of a house, the sale prices of other houses with similar characteristics in the same area are analyzed. A comparison is made with the prices of similar properties based on factors such as the location, size, age and general condition of a property.
- *Cost Approach*: This method is based on determining the cost required to build a property. To determine the value of a property, the materials, labor and other costs required to build a similar property are calculated. To these costs, factors such as wear, age and functional deterioration are added to determine the value of the property. The value of the property is calculated by taking into account the cost of construction, land value and factors such as wear and aging.
- *Income Approach*: This method assesses the income generating potential of a property and determines the value of the property using this income. The value of the property is calculated using rental incomes, return on investment and financial performance analysis. To determine the value of a rental commercial property, rental income and investment returns are analyzed. The value of the property is determined using income capitalization rates and net present value calculations.
- *Decision Tree Analysis*: This method evaluates different valuation scenarios based on combinations of various factors. A decision tree is created that includes variables such as property characteristics, environmental factors and market conditions.
- *Narrative and Research Analysis*: This method makes an assessment based on expert opinions and market research. The value of the property is determined by taking into account local market conditions, environmental impacts of the property and expert assessments. The value of a property is analyzed by considering the general state of the real estate market in a region, future plans and environmental factors. This method usually involves expert opinions and detailed research.
- *Financial Analysis and Square Meter Valuation*: This method determines the property value by analyzing the costs per square meter. The square meter size of the property, building costs and similar factors are examined. Each valuation method is more appropriate for different types of properties and different market conditions. Often a property appraisal may involve a combination of these methods, as each one assesses from different angles and can complement each other.
- *Price per Square Meter*: This method makes an assessment by analyzing the costs per square meter of a property. When determining the value of a plot of land or building, the value of the property is calculated by taking into account the costs per square meter (e.g. construction cost) and the selling prices of similar properties. These traditional land valuation methods are often used in combination. For example, both the comparison method and the cost method can be considered when determining the value of a property. The combination of these methods can provide a more comprehensive assessment of a property.

### 2.2. Modern Land Valuation Methods

Modern land assessment methods have become more precise and sophisticated with technological advances and the use of analytical approaches. Descriptions and examples of some of the modern land assessment methods are as follows:

- **Geographic Information Systems (GIS):** GIS is a technological tool used for the collection, analysis and visualization of geographical data. In land assessment, it is used for the analysis and integration of factors such as land characteristics, location, environmental impacts on the map (Karakayacı 2011). GIS can be used in the assessment of a property by mapping factors such as infrastructure, transportation, green areas around it. For example, when determining the value of a house, GIS can be used to analyze factors such as infrastructure quality and transportation access in that region (Dölek and Avcı 2016).
- **Precision Assessment Models:** By using advanced statistical and mathematical models, it allows for a more precise assessment of various factors. Methods such as regression analysis and artificial intelligence algorithms can fall into this category. When determining the value of a property, a regression model can be used that includes the physical characteristics of the property, environmental factors and economic indicators. This model provides a more accurate estimate by analyzing the factors that affect the value of the property.
- **Artificial Intelligence and Machine Learning:** It has the capacity to make future value predictions by using the ability of computers to learn by analyzing data (Gündoğdu 1993, Küsek 1995). In determining the value of a property, machine learning algorithms can be applied on large data sets such as property characteristics, environmental factors and past sales data. These methods can predict the value of similar properties in the future by learning from data sets.
- **Crowdsourcing:** It is a method of making assessments using feedback and data from a wide range of users over the internet. Real estate evaluation platforms can create a large data set by collecting users' individual property evaluations and feedback, and make value estimates based on this data.
- **Sensitivity Analysis:** It is a method of understanding the impact of various factors on value and making value estimates according to the changes in these factors. In property valuation, sensitivity analysis can be used to understand the effects of factors such as interest rates and economic indicators on value and to make value estimates according to changes in these factors. Modern land valuation methods provide more accurate and detailed assessments based on more data and analytical power than traditional methods.

### 3. Materials and Methods

In this study, the land consolidation project, which was completed by registering to the title deed on 30.10.2023 in Mescit District of Kadı Hanı District of Konya province, was taken as material (Figure 1). In the current project, it was observed that the land consolidation was completed by registering to the land registry on 30.10.2023. In the first stage, it was determined that the parceling plans of the consolidation process were made and put on 1st display.

The peer comparison method was used to determine the effect of land consolidation on land value. In the research conducted in the region according to the peer comparison method, it was observed that the lands, which were in the range of 30-50 TL/m<sup>2</sup> depending on their location and surface area during consolidation, were marketed and sold in the range of 70-80 TL/m<sup>2</sup> after the consolidation was completed. According to the precedent comparison method, random lands were selected in the research area and their value was investigated according to precedents before and after 30.10.2023, and the value change of the same parcel before and after consolidation was examined.

### 4. Results and Discussion

Considering factors such as the zoning status of the real estate subject to appraisal, its location, transportation conditions, the formation of its surroundings, and land structure, it has been learnt that sales are not made through advertisement sites, but were made among the local people themselves, since the region is a region with dense agricultural lands. For this reason, in the comparable research, the sales prices of the

neighborhood where the real estate is located, and the headmen of the nearby neighborhood were learnt and the comparables were examined.



**Figure 1.** Locations of precedent real estates

In the light of this information, the handover price of 10,000 m<sup>2</sup> of agricultural land located on the island parcel taken as an example before 30.10.2023 (Consolidation Date) and its equivalents in the region were examined, and the unit prices of 10,000 m<sup>2</sup> of real estate taken as a sample before consolidation were examined and adapted. According to the precedent comparison method, the value of the same agricultural land before and after consolidation is given in Table 1.

While taking the precedents, the precedents of 2023, the year in which the land consolidation took place, were adapted by taking the precedents before and after the land consolidation. Sales values before and after land consolidation were shown in Table 2 and Table 3. Calculations according to the Peer Comparison method were stated above, and it was determined that the value of the parcel increased significantly after land consolidation. In interviews with local people and real estate agents, it was stated that land values in the region increased after land consolidation, adjusted for inflation, and this situation was confirmed according to peer research. As a result, it seems that there is a significant increase in the value of the regional infrastructure and land size and the lands with irrigation facilities after land consolidation, free from inflation, as a result of the completion of the land consolidation.

Land consolidation is an important rural planning strategy that includes various purposes such as increasing agricultural productivity, using water resources more effectively, and preventing soil erosion. However, debates about the effects of this strategy on land value are inevitable. The positive and negative effects of the land consolidation projects discussed in this study on land value were evaluated.

**Table 1.** Value of the same agricultural land before and after consolidation according to the peer comparison method in the research area

Precedent	Area (m <sup>2</sup> )	Sale price (TL)	Sale date	Unit price (TL/m <sup>2</sup> )	Zoning Legend	Description
Subject Real Estate	10.000	-	-	-	Agriculture	A comparable study was carried out for the real estate located on the same island parcel before and after consolidation.
1	10.000	750.000	After Consolidation 27.12.2023	75	Agriculture	After consolidation in the region where the subject property is located, the m <sup>2</sup> unit prices of fields without boreholes vary between 50.00 TL and 75.00 TL, and the m <sup>2</sup> unit prices of fields with irrigation facilities vary between 75.00 TL and 100.00 TL, depending on the surface area, soil structure, irrigation facilities and location. He declared that it could be sold between. It has been reported that the value of the real estate before consolidation was around 30-40 TL/m <sup>2</sup> , but its value increased rapidly after consolidation. The precedent was taken from the Neighborhood Headman and contact information is not included within the scope of KVKK.
2	10.000	350.000	Before Consolidation (01.01.2023-30.10.2023)	35	Agriculture	In the region where the real estate subject to appraisal is located, the m <sup>2</sup> unit prices of the fields that can be irrigated from the neighboring parcel vary between 40.00 TL and 50.00 TL, and the m <sup>2</sup> unit prices of the fields that can be irrigated vary between 60.00 TL and 80.00 TL, depending on the surface area, soil structure, irrigation possibility and location. It has been declared that. It has been reported that the value of the real estate before consolidation was around 30-50 TL/m <sup>2</sup> , but its value increased rapidly after consolidation. The precedent was taken from the Neighborhood Headman and contact information is not included within the scope of KVKK.
3	10.000	400.000	Before Consolidation (01.01.2023-30.10.2023)	40	Agriculture	In the region where the real estate subject to appraisal is located, the m <sup>2</sup> unit prices of the fields that can be irrigated from the neighboring parcel vary between 40.00 TL and 50.00 TL, and the m <sup>2</sup> unit prices of the fields that can be irrigated vary between 60.00 TL and 80.00 TL, depending on the surface area, soil structure, irrigation possibility and location. It has been declared that. It has been reported that the value of the real estate before consolidation was around 30-50 TL/m <sup>2</sup> , but its value increased rapidly after consolidation. The precedent was taken from the Neighborhood Headman and contact information is not included within the scope of KVKK.
4	10.000	800.000	Meeting	80	Agriculture	It has been declared that the m <sup>2</sup> unit prices of fields that can be irrigated from the neighboring parcel can be sold between 50.00-60.00 TL, and the m <sup>2</sup> unit prices of fields with wells can be sold between 70.00 TL and 90.00 TL, although it varies depending on the surface area, soil structure, irrigation possibility and location in the region where the real estate subject to appraisal is located. It has been reported that the value of the real estate before consolidation was around 30-40 TL/m <sup>2</sup> , but its value increased rapidly after consolidation. The precedent was taken from the Neighborhood Headman and contact information is not included within the scope of KVKK.

**Table 2.** Sales value before land consolidation

Summary of analysis results before land consolidation (30.10.2023 before)	
Appraised Average Unit Value (TL/m <sup>2</sup> )	35
Area (m <sup>2</sup> )	10.000
Achieved Value (TL)	350.000
Final Value Rounded (TL)	350.000

**Table 3.** Sales value after land consolidation

Summary of analysis results after land consolidation (Value on 27.12.2023 after 30.10.2023)	
Appraised Average Unit Value (TL/m <sup>2</sup> )	80
Area (m <sup>2</sup> )	10.000
Achieved Value (TL)	800.000
Final Value Rounded (TL)	800.000

Accordingly, factors such as land consolidation projects, increase in agricultural productivity, water management improvements, infrastructure regulations and reduction of soil erosion can positively affect land value. These projects can increase economic value by ensuring more efficient use of agricultural land in a region. Additionally, infrastructure improvements can increase land value, improving the overall quality of life in the area.

On the other hand, the negative effects of land consolidation projects, such as social inequality, ecosystem changes, water resource imbalances and loss of cultural heritage, cannot be ignored. Following the implementation of these projects, situations such as loss of land by small farmers, damage to local ecosystems and unbalanced use of water resources may reduce the land value in the region.

This study addressed the effects of land consolidation projects on land value in a multifaceted manner. Although some aspects of the projects have an increasing effect on land value, a complex picture emerges when other aspects are evaluated together with the negative effects. Therefore, regional differences, social needs and environmental impacts should be taken into account in the planning and implementation process of land consolidation projects. Recommended measures include a participatory planning process, identifying strategies that take into account the views of local communities, environmental impact assessments and implementation of long-term sustainability strategies. In this way, the positive effects of land consolidation projects can be increased and the negative effects can be minimized. This analysis presented in the study will contribute to future research, planning and policy making on land consolidation.

Land consolidation aims to increase the productivity of agricultural lands, use water resources more effectively, increase irrigation efficiency, optimize irrigation channels, save water, strengthen rural infrastructure, reduce soil erosion, ensure the sustainability of agricultural lands and irrigation, increase agricultural productivity, improve infrastructure and environmental sustainability. It has positive effects. In addition, there are negative effects such as increasing social inequalities, ecosystem changes, decreasing natural habitats, deterioration in soil health, and decreasing soil fertility, which may threaten the sustainability of agricultural lands in the long term.

Water resources are an important factor to be considered in land consolidation projects. Although land consolidation aims to use water resources more effectively, this process may negatively affect the groundwater balance and water basins. Falling groundwater levels or overuse of water resources can lead to environmental imbalances. These impacts emphasize that land consolidation projects must be carefully planned and implemented. A sustainable land consolidation process should aim to both maximize positive impacts and minimize negative impacts. This requires a comprehensive planning and implementation process that takes into account the needs of local communities and environmental sustainability.

## 5. Conclusion and Recommendations

Land consolidation aims to use agricultural lands more effectively. This strategy can combine small and fragmented agricultural lands to create large, organized and unified agricultural lands. This can lead to an increase in agricultural productivity, positively affecting the value of land. Larger plots of land allow modern agricultural machinery to be used and managed more effectively.

Land consolidation generally involves streamlining irrigation systems and using water resources more effectively. This contributes to a more sustainable management of water resources. By optimizing irrigation systems and using water-saving technologies, it can contribute to the protection of water resources by affecting land value.

Land consolidation aims to improve infrastructure in rural areas. Arrangement of roads, irrigation canals, water storage systems and other infrastructure elements can increase the overall land value in the area. These improvements can market agricultural products more effectively, increase trade, and improve the living standards of people living in rural areas.

Land consolidation aims to improve the quality of life in rural areas and support rural development. This strategy can increase overall economic activity in the region, strengthen the agricultural sector, and positively impact land value by providing employment and income to rural communities. However, the effects of land consolidation may vary regionally. The consolidation process may vary depending on local conditions, agricultural practices, government policies and community needs. Therefore, land consolidation projects do not always produce positive results and must be planned carefully.

The uncertainties and debates that may arise on the mentioned issues emphasize that consolidation projects should be planned carefully, adopt a participatory process and take into account the opinions of various stakeholders. Additionally, transparent communication and information sharing during the implementation of projects can also help reduce uncertainties and debates. Therefore, it is important to consider a broad perspective and the principle of sustainability when creating land consolidation strategies.

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**Author Contributions:** Conceptualization, C.B.S. and B.C.; methodology, C.B.S.; resources, C.B.S.; data curation, C.B.S.; writing—original draft preparation, C.B.S.; writing—review and editing, C.B.S. and B.C.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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## References

- Akşit S (2013). Arazi toplulaştırması üzerine çiftçi algısı: Yeşildere Örneği. *The Journal of Academic Social Science Studies* 6(3):1- 19.
- ATOM (2015). Ankara İl Tarım ve Orman Müdürlüğü, Arazi Toplulaştırması. <https://ankara.tarimorman.gov.tr/Belgeler/liftet/arazitoplulastirmasi.pdf>
- ABTD (2023). Avrupa Birliği Türkiye Delegasyonu, Tarım - Ortak Tarım Politikası. [https://www.eeas.europa.eu/delegations/t%C3%BCrkiye/tar%C4%B1m-ortak-tar%C4%B1m-politikas%C4%B1\\_tr](https://www.eeas.europa.eu/delegations/t%C3%BCrkiye/tar%C4%B1m-ortak-tar%C4%B1m-politikas%C4%B1_tr)
- Boyras Z, Üstündağ Ö (2008). Kırsal Alanlarda Arazi Toplulaştırma Çalışmalarının Önemi. *e-Journal of New World Sciences Academy* 3(3): 564-578.
- Erikli S, Bayat B. (2016). Kamu İstihdam Yaratma Programı Olarak “Tennessee Vadi Projesi” Ve Toplum Yararına Çalışma Programının İncelenmesi. *İş ve Hayat* 2(3): 77-88.
- Döle İ, Avcı V (2016). The Use of Geographical Information Systems (GIS) in the Environment and Ecology. *Recent Researches in Interdisciplinary Sciences* 469.
- Gündoğdu KS (1993). Arazi toplulaştırmasında bilgisayar destekli bir dağıtım modelinin geliştirilmesi ve uygulanması üzerine bir araştırma. (Yayınlanmamış doktora tezi). Uludağ Üniversitesi Fen Bilimleri Enstitüsü.
- Karakayacı Z (2011). Tarım arazilerinin değerlendirilmesinde coğrafi bilgi sistemlerinin kullanılması: Konya İli Çumra İlçesi Örneği, Doktora Tezi, Selçuk Üniversitesi Sosyal Bilimler Enstitüsü, Konya.
- Karakayacı Z, Aydın A, Gönül C, Uğur E (2016). Arazi Toplulaştırmasının Arazi Değerine Etkisi; Konya İli Alanözü Kasabası Örneği. *Mustafa Kemal Üniversitesi Ziraat Fakültesi Dergisi* 21(2).
- Khamrabaeva L (2020). Gayrimenkul Değerleme Yöntemleri: Hedonik Fiyat Modeli Üzerine Bir Uygulama. Bursa Uludag University (Turkey) ProQuest Dissertations Publishing,
- Küsek G (1995). Arazi Toplulaştırma Projelerinde Bilgisayardan Yararlanma Olanakları ve Çakırköy Uygulaması” Çukurova Üniv. Fen Bil. Enst. Doktora Tezi, ss:5, Adana.
- Takka S (1993). Arazi toplulaştırması. *Arazi Toplulaştırması Kültür Teknik Derneği Yayınları* No:1, s.2484, Ankara.