Türk Bilim ve Mühendislik Dergisi, 7(1): 75-93, 2025

Araştırma Makalesi / Research Article

Türk Bilim ve Mühendislik Dergisi
Turkish Journal of Science and Engineering

www.dergipark.org.tr/tjse

A Study on Land Consolidation Practices: The Case of Burdur Gölhisar

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ARTICLE INFO

Received: 05/05/2025
Accepted: 13/06/2025

Keywords: *Consolidation rate, Land consolidation, Parcel*

DOI: 10.55979/tjse.1691696

ABSTRACT

The present study examines land consolidation projects carried out in the Gölhisar district of Burdur. Land consolidation represents a pivotal agricultural regulatory instrument, with the objective of enhancing the configuration of land parcels and fostering the development of rural infrastructure through the integration of dispersed and fragmented agricultural territories. The project has been shown to engender a number of advantages, including an increase in agricultural productivity, an improvement in the quality of irrigation and road services, and a reduction in production costs. In the study, a comprehensive analysis was conducted of consolidation rates, loss rates, parcel numbers and parcel sizes in different rural areas. In the examples from Gölhisar, Burdur, a decrease in the number of parcels and an increase in the average parcel size were observed in areas where consolidation rates were high. The findings of this study demonstrate that the reduction of fragmented ownership structures and the enhancement of land use efficiency exert a positive influence on agricultural productivity. The findings indicate that consolidation projects have the capacity to enhance agricultural production and make substantial contributions to the development of rural areas. These studies are of great importance in terms of sustainable agriculture and rural development.

Arazi Toplulaştırma Uygulamaları Üzerine Bir İnceleme: Burdur Gölhisar Örneği

MAKALE BİLGİSİ

Alınış tarihi: 05/05/2025
Kabul tarihi: 13/06/2025

Anahtar Kelimeler: *Arazi toplulaştırması, Toplulaştırma oranı, Parsel*

DOI: 10.55979/tjse.1691696

ÖZET

Bu çalışma, Burdur Gölhisar ilçesinde gerçekleştirilen arazi toplulaştırma projelerini incelemektedir. Arazi toplulaştırması, parçalı ve dağınık tarım arazilerini birleştirerek parsel şekillerini iyileştirmeyi ve kırsal altyapıyı geliştirmeyi amaçlayan önemli bir tarımsal düzenleme uygulamasıdır. Proje, tarımsal verimliliği artırmak, sulama ve yol hizmetlerini geliştirmek ve üretim maliyetlerini düşürmek gibi çeşitli avantajlar sağlamaktadır. Çalışmada, farklı kırsal alanlardaki toplulaştırma oranları, zayiat oranları, parsel sayıları ve parsel büyüklükleri analiz edilmiştir. Burdur Gölhisar'daki örneklerde, toplulaştırma oranlarının yüksek olduğu bölgelerde parsel sayısında azalma, ortalama parsel büyüklüğünde ise artış gözlemlenmiştir. Bu sonuçlar, parçalı mülkiyet yapısının azaltılmasının ve arazi kullanımının daha etkin hale getirilmesinin, tarımsal verimliliği olumlu yönde etkilediğini göstermektedir. Sonuçlar, toplulaştırma projelerinin tarımsal üretimi kolaylaştırdığını ve kırsal kalkınmaya önemli katkılar sağladığını ortaya koymaktadır. Bu çalışmalar, sürdürülebilir tarım ve kırsal gelişim açısından büyük önem taşımaktadır.

1. Introduction

Land consolidation is defined as a project that improves parcel shapes by combining scattered and fragmented parcels. It also enables landowners to develop services such as irrigation, drainage and roads. The enhancement of existing parcel shapes is a salient benefit of land consolidation initiatives (Ertunç, 2021). The initiative has been categorised as a village renewal project, incorporating components such as land consolidation, the integration of disparate agricultural lands, the structuring of rural infrastructure, and the development of socio-cultural facilities (Arslan & Değirmenci, 2024). Land consolidation has been identified as the most effective method of land management for the purpose of preventing the degradation of agricultural land. Land consolidation is of great importance in ensuring the economic sustainability of rural areas, in better managing the environment, and in guiding urban growth in a balanced way (Uyan et al., 2015). Land consolidation projects are a method that has been implemented with the aim of increasing agricultural productivity, improving irrigation infrastructure and preventing erosion. In the context of these projects, the distribution of blocks is of paramount importance. Farmers' satisfaction is a critical factor in the success of the project (İnceyol, 2024). The most efficacious method of rectifying the prevailing deficiencies in the agricultural structure is the undertaking of land consolidation studies. The fragmentation and dispersion of lands have been demonstrated to exert a detrimental effect on yield, thereby complicating the implementation of measures aimed at enhancing productivity (Tanrıvermiş & Seyyar, 2022). Land consolidation has been identified as a key strategy for enhancing the efficacy of investments in rural areas, addressing existing challenges in agricultural

infrastructure, and fostering agricultural development (Köken & Çay, 2019). It has been demonstrated that land consolidation has the capacity to enhance both the financial viability and the operational efficiency of agricultural enterprises. It is evident that these works are of significant importance with regard to the development of agriculture and the assurance of food security (Çay & Satılmış, 2024). It is imperative to acknowledge the potential of land consolidation projects as a pivotal instrument in the pursuit of rural development. Such initiatives have the capacity to enhance agricultural productivity, elevate the standard of rural living, and attain the ambitious goals of sustainable development. In this context, sustainable land management and multi-purpose rural arrangement studies play an important role in protecting agricultural lands and supporting the socio-economic development of rural areas (Akdeniz et al., 2023). The process of land consolidation has been demonstrated to engender a reduction in costs and an enhancement in efficiency within the domain of agricultural production. The harvesting of crops on a large scale has been demonstrated to facilitate the reduction of machine stoppages and restarts, whilst concomitantly decreasing fuel consumption and preventing the loss of time. Consequently, this approach has the dual benefits of accelerating the harvesting process and reducing operating costs. Consequently, land consolidation confers a substantial advantage to producers (Boonchom et al., 2017). The objective of land consolidation projects is to minimise the number of parcels and eradicate land fragmentation by amalgamating dispersed and fragmented parcels. This process serves to enhance agricultural productivity by conserving inputs such as labour, irrigation, and roads (Ertunç & Janus, 2021). The economic benefits provided as a result of land consolidation projects are of great importance for both the agricultural sector and the national economy. In order to disseminate these projects and implement them more extensively across the country, it is essential to comprehensively grasp the economic contributions provided by consolidation (Çay & Satılmış, 2020).

The efficiency and sustainability of agricultural production are influenced by various factors, including access to land, irrigation, drainage systems, and mechanisation. Consequently, it can be posited that land consolidation projects are of significant importance in terms of enhancing agricultural infrastructure and increasing productivity (Eğilmez & Kaman, 2022). It is evident that land fragmentation has a detrimental effect on agricultural productivity, thereby causing difficulties in production processes. Land consolidation projects have been shown to increase mechanisation by combining small and fragmented parcels, thereby improving efficiency and providing significant savings in production costs (Irmaklı & Aydın, 2022). Land fragmentation represents the most significant impediment to the establishment of sustainable agricultural practices (Uyan et al., 2013).

The objective of this study is to examine the land consolidation projects carried out in Gölhisar district of Burdur province and its surrounding villages. The objective of this study is to analyse whether the outcomes of these projects are commensurate with their intended purpose. To this end, a comprehensive evaluation will be conducted, encompassing the loss and consolidation rates, the alterations in parcel numbers prior to and following consolidation, and the disparities in average parcel sizes within the context of the land consolidation initiative.

The present study examines land consolidation projects in the Gölhisar district of Burdur. The overarching objective of consolidation is twofold: firstly, to enhance the quality of parcel shapes, and secondly, to facilitate the development of rural infrastructure by combining fragmented agricultural lands. In the course of the study, a comprehensive analysis was conducted of consolidation rates, loss rates, parcel numbers and sizes. While the number of parcels decreased in regions characterised by high consolidation rates, the average parcel size increased. This phenomenon has been demonstrated to enhance agricultural productivity and contribute to the development of rural areas.

2. Material and Method

The present study has sought to evaluate data from a variety of settlements in order to analyse the effects of land consolidation practices. The data utilised encompasses consolidation practices across diverse rural regions, including Armutlu neighborhood, Çeşme neighborhood, Hisarardı Village, Karapınar Village and Kargalı Village. These data were obtained from the General Directorate of State Hydraulic Works, 18th Regional Directorate (Isparta). For each area, a comparative analysis was conducted of the loss rate, consolidation rate, old and new parcel numbers, and average parcel sizes in Table 1.

The loss rate in land consolidation works is defined as the ratio of the areas allocated from agricultural lands for public services, such as roads, canals, drainage, water structures, and public facilities to the total land during the consolidation process.

The consolidation rate is defined as the rate of decrease in the total number of parcels in an area as a result of the operations carried out within the scope of a land consolidation project. In summary, the measure in question indicates the extent to which the parcels are combined following consolidation, thereby demonstrating the degree to which fragmentation is reduced.

Table 1. Information on consolidation areas
Tablo 1. Toplulaştırma alanlarına ilişkin bilgiler

Consolidation Areas	Casualty Rate	Consolidation Rate	Old Parcel Number	New Parcel Number	Old Average Parcel Size (da)	New Average Parcel Size (da)
Armutlu Neighbourhood	% 5.6859	% 40.04	2785	1670	2.58 da	4.08 da
Çeşme Neighbourhood	% 4.2196	% 42.87	1712	978	5.30 da	8.87 da
Hisarardı Village	% 3.7302	% 44.63	363	201	6.07 da	10.55 da
Karapınar Village	% 3.1429	% 28.40	817	585	10.35 da	14.00 da
Kargalı Village	% 3.6938	% 29.34	392	277	6.22 da	8.49 da
Konak Neighbourhood	% 5.1122	% 38.11	1270	786	5.68 da	8.66 da
Sorkun Village	% 4.4338	% 28.47	562	402	11.16 da	14.42 da
Ulucami Neighbourhood	% 7.6109	% 13.64	689	595	1.84 da	1.97 da
Uylupınar Village	% 4.6359	% 16.67	426	356	7.61 da	8.73 da
Yamadı Village	% 4.0261	% 31.17	616	424	7.33 da	10.24 da

The consolidation works carried out in the Armutlu neighbourhood of the Gölhisar district in the Burdur province were executed at a rate of 40%, resulting in a loss of 5.7%. The total number of parcels decreased from 2785 to 1670, and the average parcel size increased from 2.58 decares to 4.08 decares. The data demonstrate a substantial reduction in the fragmented ownership structure in Armutlu, resulting in enhanced land productivity.

In the Çeşme neighborhood, a highly effective operation was conducted, resulting in a consolidation rate of 42.8% and a low loss rate of 4.2%. The decrease in the number of parcels and the increase in parcel size (5.30 da - 8.87 da) indicate a significant increase in efficiency in this area as well. It is evident that consolidation engenders convenience and productivity in agricultural activities.

It is evident that Hisarardı Village has one of the highest consolidation rates, with a figure of 44.6%. During the course of the application, a loss of only 3.7% was experienced, and the parcel sizes were increased from 6.07 da to 10.55 da. The high rate of transformation with low loss indicates that the consolidation in this village was quite successful.

Despite the fact that the consolidation rate in Karapınar Village remained relatively low at 28.4%, there was an increase in the average parcel size from 10.35 da to 14.00 da. The fact that the parcels were already sizable permitted considerable increases in yield, even with more limited intervention.

In the case of Kargalı Village, the impact of the application is moderate, with a consolidation rate of 29.3% and a loss rate of 3.6%. The mean parcel size increased from 6.22 days to 8.49 days. This finding suggests that an efficient but limited rearrangement occurred.

In Konak neighborhood, the number of parcels was reduced from 1270 to 786, with a consolidation rate of 38.1%, and the average parcel size increased from 5.68 da to 8.66 da. It is evident that the implementation was executed in a balanced and effective manner, as evidenced by the 5.1% loss.

Despite a relatively low consolidation rate of 28.5%, Sorkun Village has achieved considerable success by increasing the average parcel size from 11.16 da to 14.42 da. This increase indicates that land arrangements have had a substantial impact on enhancing production capacity.

The Ulucami neighbourhood has the lowest consolidation rate of 13.6%, yet also exhibits the highest loss rate of 7.6%. The average parcel size exhibited a marginal increase, rising from 1.84 days to 1.97 days. The findings indicate that the implementation was both constrained and ineffectual.

A similarly low consolidation rate (16.6%) is observed in Uylupınar Village. However, a certain level of success in terms of regulation was achieved by increasing the parcel size from 7.61 da to 8.73 da. This result demonstrates that efficiency can be enhanced through the implementation of more comprehensive applications.

Finally, a 31.2% consolidation was carried out in Yamadi Village, resulting in a reduction of parcels from 616 to 424 and an increase in the average size from 7.33 da to 10.24 da. This application, which exhibited a low loss of 4%, signifies a fruitful and balanced transformation process.

As illustrated in Figure 1, the before-and-after comparison of the land consolidation work in Armutlu neighborhood is presented. Prior to the implementation of the consolidation, the configuration of the parcels exhibited characteristics of irregularity, fragmentation, predominantly narrow and elongated dimensions, and the presence of parcels lacking direct road frontage. Following the consolidation, a discernible regularity in the parcels became evident, manifesting in a geometrical arrangement. It was observed that all of the parcels were frontage-bearing to the road. This situation can be considered a favourable outcome of the land consolidation initiative, which was implemented with the objective of enhancing agricultural production efficiency and optimising the provision of infrastructure services.

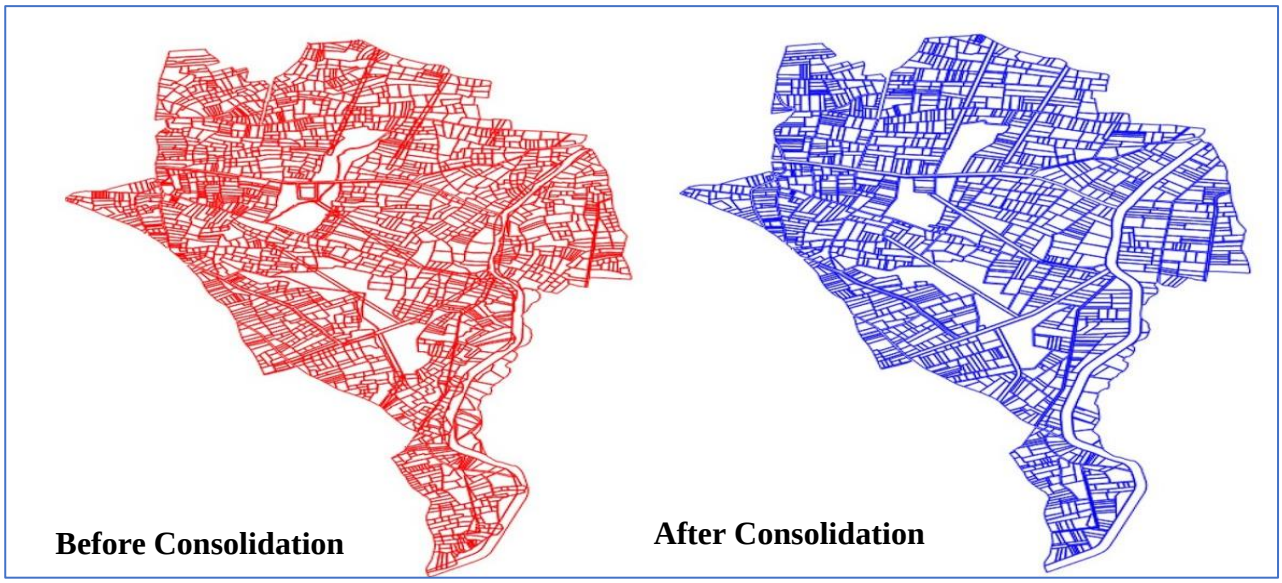

Figure 1. Armutlu neighborhood land consolidation project old and new status
Şekil 1. Armutlu mahallesi arazi toplulaştırma projesi eski ve yeni durumu

As demonstrated in Table 2, the total area subject to regulation in the Armutlu neighbourhood is 7,188,709.62m². A substantial proportion of this area is subdivided into building blocks, with a total surface area of 6,815,821.86m². The area remaining outside the regulation is quite limited, at only 1,952.54m². As indicated by the cadastral data, the total number of parcels is 2,785, and the total number of owners is 3251. The number of blocks is 152, and 1670 new parcels have been created within these blocks. The cadastral parcels exhibit significant variations in size, with the smallest measuring 1.28m² and the largest covering an area of 206,477.12m². Old Average Parcel Size was calculated to be 2.58 decare. New Average Parcel Size was calculated to be 4.08 decare. The data reveal a significant diversity of ownership and parcels in the regulated area.

Table 2. Some information about Armutlu neighborhood land consolidation areas
Tablo 2. Armutlu mahallesi arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	7,188,709.62 m^2
Non-Regulated Area	1,952.54 m^2
Block Surface Area	6,815,821.86 m^2
Total Number of Cadastre Parcels	2785
Total Number of Owners	3251
Total Number of Blocks	152
Total Number of Parcels in Block	1670
Minimum Cadastral Parsel Size	1.28 m^2
Maximum Cadastral Parcel Size	206,477.12 m^2
Old Average Parcel Size (da)	2.58 da.
New Average Parcel Size (da)	4.08 da.

As illustrated in Figure 2, the land consolidation work in Çeşme neighborhood has resulted in notable changes to the area, both before and after the project's completion. It is evident that the parcels that were irregular and did not face the road prior to consolidation underwent a transformation, becoming regular and acquiring frontage on the road post-consolidation.

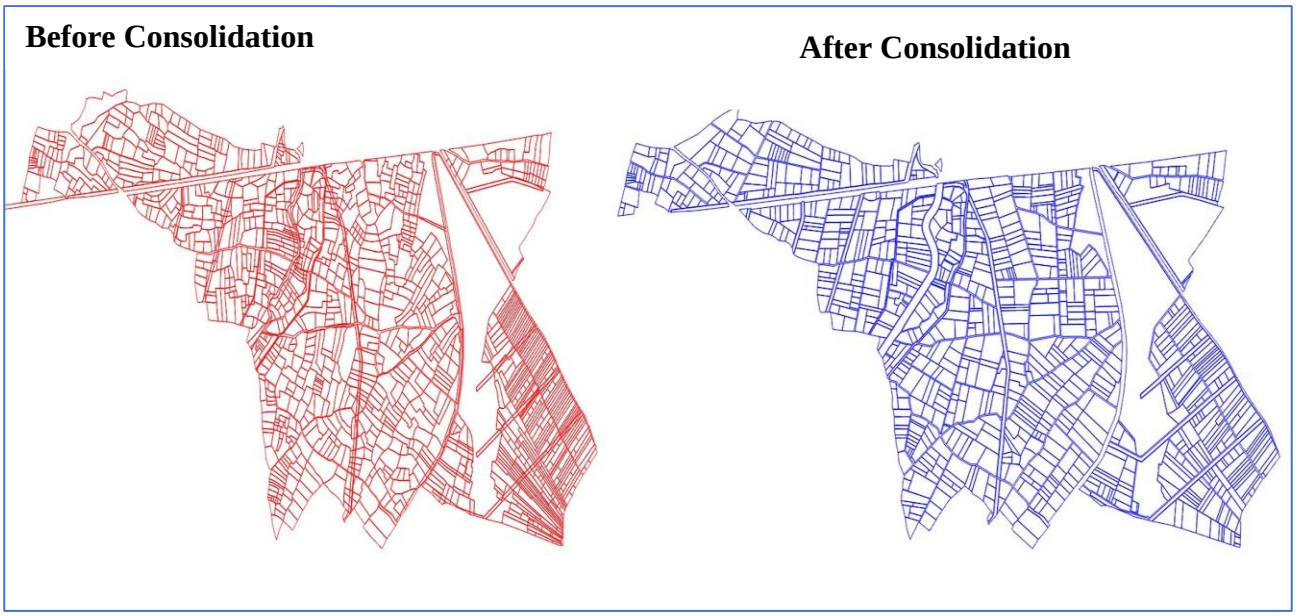

Figure 2. Çeşme neighborhood land consolidation project old and new status
Şekil 2. Çeşme mahallesi arazi toplulaştırma projesi eski ve yeni durumu

As demonstrated in Table 3, a total area of 9,032,192.86 m² was subject to regulation within the scope of land consolidation in Çeşme neighborhood. While 8,674,950.29m² of this area was included in the block surface area, 49,060.80m² was excluded from the regulation. The application area encompasses 1,712 cadastral parcels and 2,175 owners. The total number of blocks is 101, and the number of new parcels created within these blocks is 978. The range of parcel sizes is from 17.41m² to 708,655.89m². Old Average Parcel Size was calculated to be 5.30 decare. New Average Parcel Size was calculated to be 8.87 decare. The data are significant in demonstrating the fragmented nature of the property in the area and the level of block formation after consolidation.

Table 3. Some information about land consolidation areas in Çeşme neighborhood
Tablo 3. Çeşme mahallesindeki arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	9,032,192.86 m^2
Non-Regulated Area	49,060.80 m^2
Block Surface Area	8,674,950.29 m^2
Total Number of Cadastre Parcels	1712
Total Number of Owners	2175
Total Number of Blocks	101
Total Number of Parcels in Block	978
Minimum Cadastral Parsel Size	17.41 m^2
Maximum Cadastral Parcel Size	708,655.89 m^2
Old Average Parcel Size (da)	5.30 da.
New Average Parcel Size (da)	8.87 da.

The situation prior to and following the land consolidation work in Hisarardı village is illustrated in Figure 3. It is evident that the irregular parcels devoid of road frontage prior to consolidation underwent a transformation into a regular configuration with road frontage following the process of consolidation

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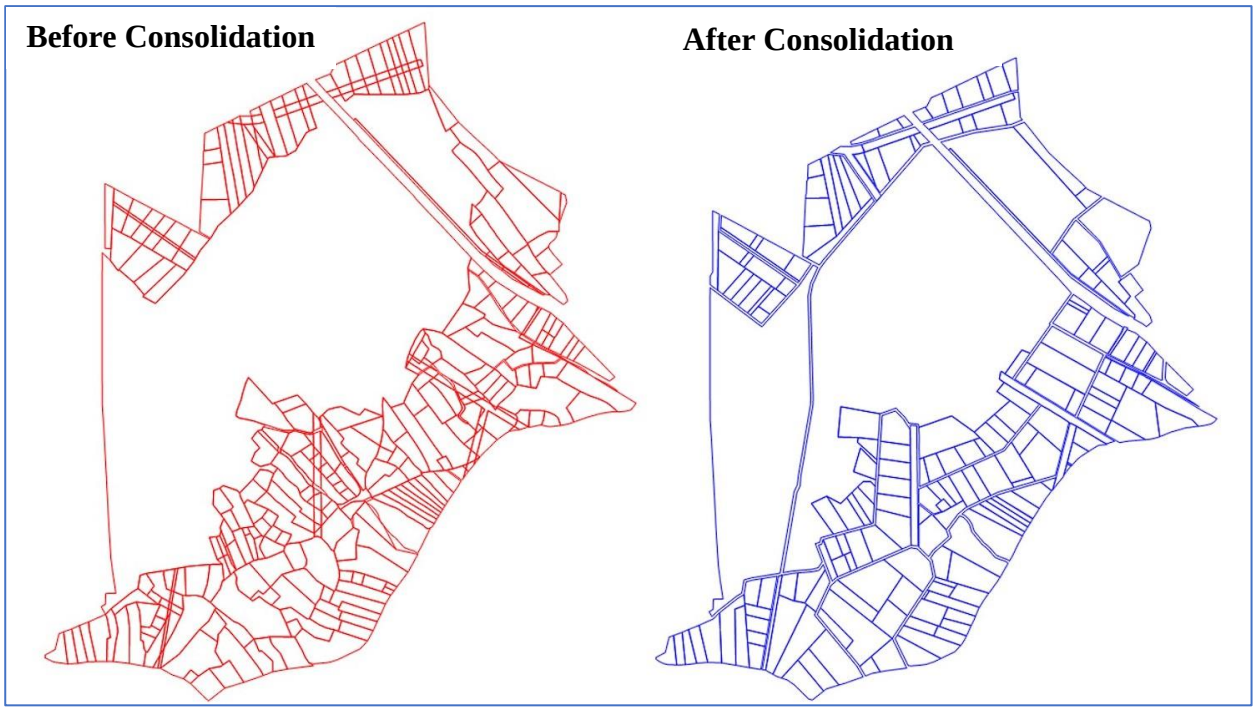

Figure 3. Hisarardı village land consolidation project old and new situation
Şekil 3. Hisarardı köyü arazi toplulaştırma projesi eski ve yeni durum

As illustrated in Table 4, an area totalling 2,201,699.03m² in Hisarardi Village has undergone land consolidation. The area remaining outside the regulation is only 417.84m², and almost the entire application area has been included in the regulation. The total surface area of the block is 2,120,915.42m², and 201 new parcels have been created in 37 blocks. The region is comprised of 363 cadastral parcels and 425 owners. The range of parcel sizes is from 27.00 m² to 922,332.11 m². Old Average Parcel Size was calculated to be 6.07 decare. New Average Parcel Size was calculated to be 10.55 decare. The data demonstrate that the parcel structure has been simplified through consolidation, resulting in the successful formation of blocks.

Table 4. Some information about Hisarardı village land consolidation areas
Tablo 4. Hisarardı köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	2,201,699.03 m^2
Non-Regulated Area	417.84 m^2
Block Surface Area	2,120,915.42 m^2
Total Number of Cadastre Parcels	363
Total Number of Owners	425
Total Number of Blocks	37
Total Number of Parcels in Block	201
Minimum Cadastral Parsel Size	27.00 m^2
Maximum Cadastral Parcel Size	922,332.11 m^2
Old Average Parcel Size (da)	6.07 da.
New Average Parcel Size (da)	10.55 da.

As illustrated in Figure 4, the situation prior to and subsequent to the land consolidation work in Karapınar village is depicted. It has been observed that parcels which were irregular and lacked road frontage prior to consolidation subsequently became regular and possessed road frontage post-consolidation.

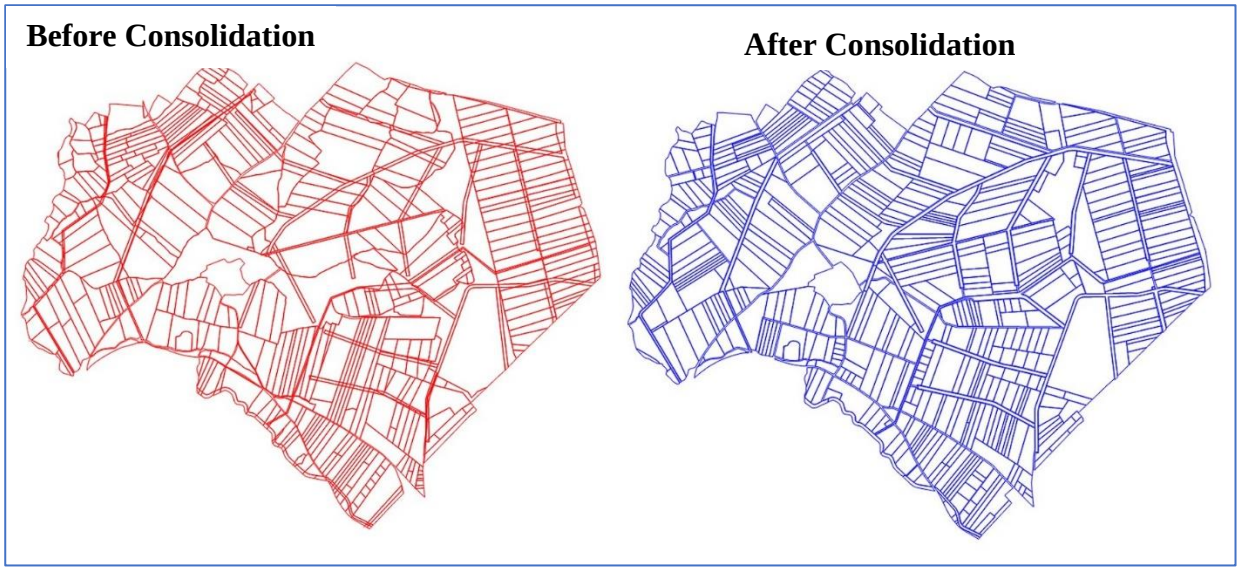

Figure 4. Karapınar village land consolidation project old and new situation
Şekil 4. Karapınar köyü arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 5, an area measuring 8,438,992.15m² was subject to regulation as part of the land consolidation initiative implemented in Karapınar Village. However, a comparatively diminutive area of 14,008.76m² was excluded from the aforementioned regulatory framework. The total block area was determined to be 8,192,044.22m², and 585 intra-block parcels were created within 81 blocks. The application area encompasses 817 cadastral parcels and 1,469 owners. The area of these parcels varies between 39.00 m² and 249,000.00 m². Old Average Parcel Size was calculated to be 10.35 decare. New Average Parcel Size was calculated to be 14.00 decare. The data presented herein demonstrate that the ownership structure in the area is characterised by significant fragmentation, and that substantial block formation has been attained through consolidation.

Table 5. Some information about Karapınar village land consolidation areas
Tablo 5. Karapınar köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	8,438,992.15 m^2
Non-Regulated Area	14,008.76 m^2
Block Surface Area	8,192,044.22 m^2
Total Number of Cadastre Parcels	817
Total Number of Owners	1469
Total Number of Blocks	81
Total Number of Parcels in Block	585
Minimum Cadastral Parsel Size	39.00 m^2
Maximum Cadastral Parcel Size	249,000.00 m^2
Old Average Parcel Size (da)	10.35 da.
New Average Parcel Size (da)	14.00 da.

As illustrated in Figure 5, the situation prior to and subsequent to the land consolidation work in Kargalı village is depicted. It has been observed that parcels which were irregular and lacked road frontage prior to consolidation subsequently became regular and possessed road frontage post-consolidation.

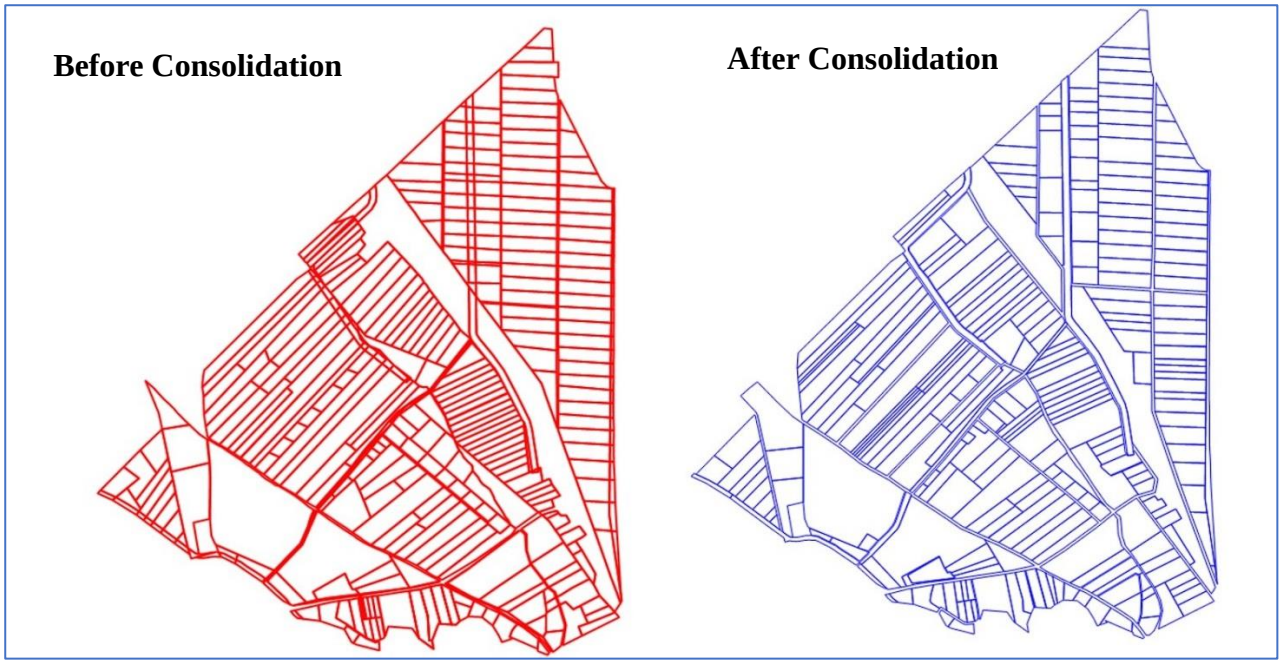

Figure 5. Kargali village land consolidation project old and new situation
Şekil 5. Kargalı köyü arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 6, an area measuring 2,439,206.16m² was subject to regulation within the scope of land consolidation in Kargalı Village. The area remaining outside the regulation is quite limited, at 886.88m². The total surface area of the blocks was determined to be 2,352,851.61m², and 277 new parcels were created within 33 blocks. The application area encompasses 392 cadastral parcels and 476 owners. The range of parcel sizes is from 35.00 m² to 106,963.84 m². Old Average Parcel Size was calculated to be 6.22 decare. New Average Parcel Size was calculated to be 8.49 decare. The data demonstrate that the parcel structure was simplified and that block formation was largely achieved as a result of consolidation in Kargalı Village.

Table 6. Some information about Kargalı village land consolidation areas
Tablo 6. Kargalı köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	2,439,206.16 m^2
Non-Regulated Area	886.88 m^2
Block Surface Area	2,352,851.61 m^2
Total Number of Cadastre Parcels	392
Total Number of Owners	476
Total Number of Blocks	33
Total Number of Parcels in Block	277
Minimum Cadastral Parsel Size	35.00 m^2
Maximum Cadastral Parcel Size	106,963.84 m^2
Old Average Parcel Size (da)	6.22 da.
New Average Parcel Size (da)	8.49 da.

As illustrated in Figure 6, the situation has been examined prior to and following the completion of the land consolidation work in the Konak neighbourhood. It is evident that the parcels that were irregular and lacked road frontage prior to consolidation subsequently became regular and possessed road frontage post-consolidation.

Figure 6. Konak neighborhood land consolidation project old and new situation
Şekil 6. Konak mahallesi arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 7, the total area encompassed within the land consolidation initiative undertaken in the Konak neighbourhood amounts to 7,149,108.94m². The area remaining outside the regulation is 59,522.20m², constituting a negligible proportion of the total area. The total surface area of the block is 6,806,002.63m², and 786 intra-block parcels have been created within 89 blocks. The area is comprised of 1,270 cadastral parcels and 1667 owners. The range of parcel sizes is from 16.14 m² to 249,109.21 m². Old Average Parcel Size was calculated to be 5.68 decare. New Average Parcel Size was calculated to be 8.66 decare. The data presented herein demonstrate that the consolidation implemented in Konak Neighborhood has resulted in the establishment of a regular structure, characterised by a reduction in the number of parcels, thereby simplifying the ownership structure.

Table 7. Some information about Konak neighborhood land consolidation areas
Tablo 7. Konak mahallesi arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	7,149,108.94 m^2
Non-Regulated Area	59,522.20 m^2
Block Surface Area	6,806,002.63 m^2
Total Number of Cadastre Parcels	1270
Total Number of Owners	1667
Total Number of Blocks	89
Total Number of Parcels in Block	786
Minimum Cadastral Parsel Size	16.14 m^2
Maximum Cadastral Parcel Size	249,109.21 m^2
Old Average Parcel Size (da)	5.68 da.
New Average Parcel Size (da)	8.66 da.

As illustrated in Figure 7, the situation prior to and subsequent to the land consolidation work for Sorkun village is depicted. It is evident that the irregular parcels lacking road frontage prior to consolidation underwent a transformation into a regular configuration with road frontage following the process of consolidation

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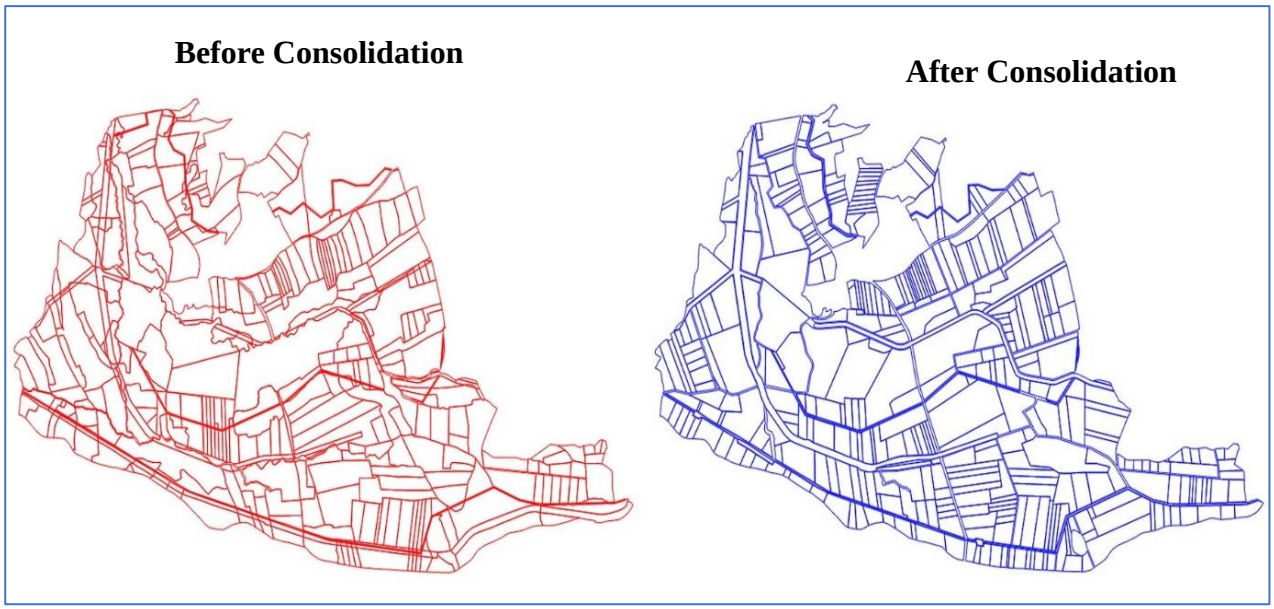

Figure 7. Sorkun village land consolidation project old and new situation
Şekil 7. Sorkun köyü arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 8, an area measuring 6,271,352.31m² has been incorporated into the land consolidation arrangement within the jurisdiction of Sorkun Village. The area remaining outside the arrangement is quite limited, at 17,128.33m². The total surface area of the block is 5,837,125.54m², and 402 intra-block parcels have been created within 52 blocks. The application area encompasses 562 cadastral parcels and 2,082 owners. The range of parcel sizes is from 40.91 m² to 209,425.56 m². Old Average Parcel Size was calculated to be 11.16 decare. New Average Parcel Size was calculated to be 14.42 decare. This situation demonstrates that consolidation in Sorkun Village contributes to both the simplification of the fragmented ownership structure and the creation of large-scale parcel.

Table 8. Some information about Sorkun village land consolidation areas
Tablo 8. Sorkun köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	6,271,352.31 m^2
Non-Regulated Area	17,128.33 m^2
Block Surface Area	5,837,125.54 m^2
Total Number of Cadastre Parcels	562
Total Number of Owners	2082
Total Number of Blocks	52
Total Number of Parcels in Block	402
Minimum Cadastral Parsel Size	40.91 m^2
Maximum Cadastral Parcel Size	209,425.56 m^2
Old Average Parcel Size (da)	11.16 da.
New Average Parcel Size (da)	14.42 da.

As illustrated in Figure 8, the situation prior to and subsequent to the land consolidation work in the Ulucami neighbourhood is depicted. It is evident that the irregular parcels lacking road frontage prior to consolidation underwent a transformation, becoming regular and acquiring road frontage post-consolidation.

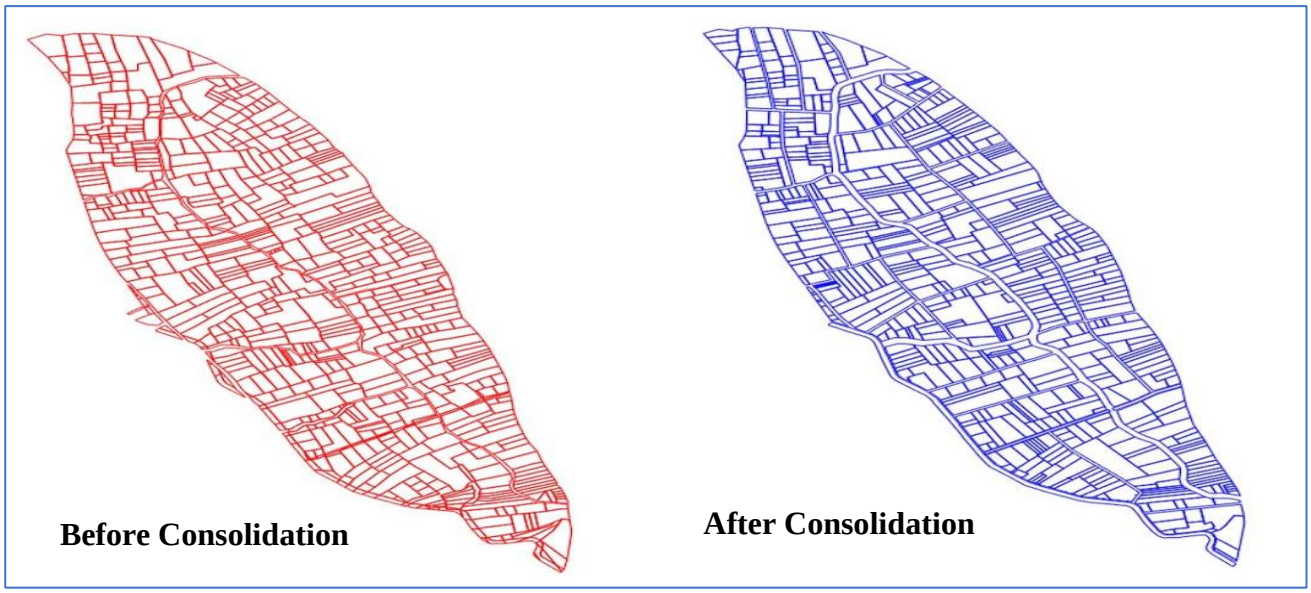

Figure 8. Ulucami neighborhood land consolidation project old and new status
Şekil 8. Ulucami mahallesi arazi toplulaştırma projesi eski ve yeni durumu

As demonstrated in Table 9, the total area of 1,269,037.79m² has been incorporated within the regulatory framework for land consolidation in the Ulucami neighbourhood. In this respect, no area is outside the scope of regulation. The surface area of the block is 1,174,162.74m². The cadastral parcels within the district total 689, and the number of owners is 774. The creation of 595 intra-block parcels was undertaken in 33 blocks. The range of parcel sizes is from 8.53m² to 12,085.91m². Old Average Parcel Size was calculated to be 1.84 decare. New Average Parcel Size was calculated to be 1.97 decare. The data demonstrate that the parcel structure in Ulucami neighbourhood is characterised by small-scale and dense ownership, and that efforts are being made to make this structure more orderly through consolidation.

Table 9. Some information about land consolidation areas in Ulucami neighborhood
Tablo 9. Ulucami mahallesindeki arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	1,269,037.79 m^2
Non-Regulated Area	0.00 m^2
Block Surface Area	1,174,162.74 m^2
Total Number of Cadastre Parcels	689
Total Number of Owners	774
Total Number of Blocks	33
Total Number of Parcels in Block	595
Minimum Cadastral Parsel Size	8.53 m^2
Maximum Cadastral Parcel Size	12,085.91 m^2
Old Average Parcel Size (da)	1.84 da.
New Average Parcel Size (da)	1.97 da.

As illustrated in Figure 9, the situation prior to and subsequent to the land consolidation work in Uylupınar village is depicted. It has been observed that parcels that were irregular and lacked frontage to the road prior to consolidation subsequently became regular and possessed frontage to the road post-consolidation.

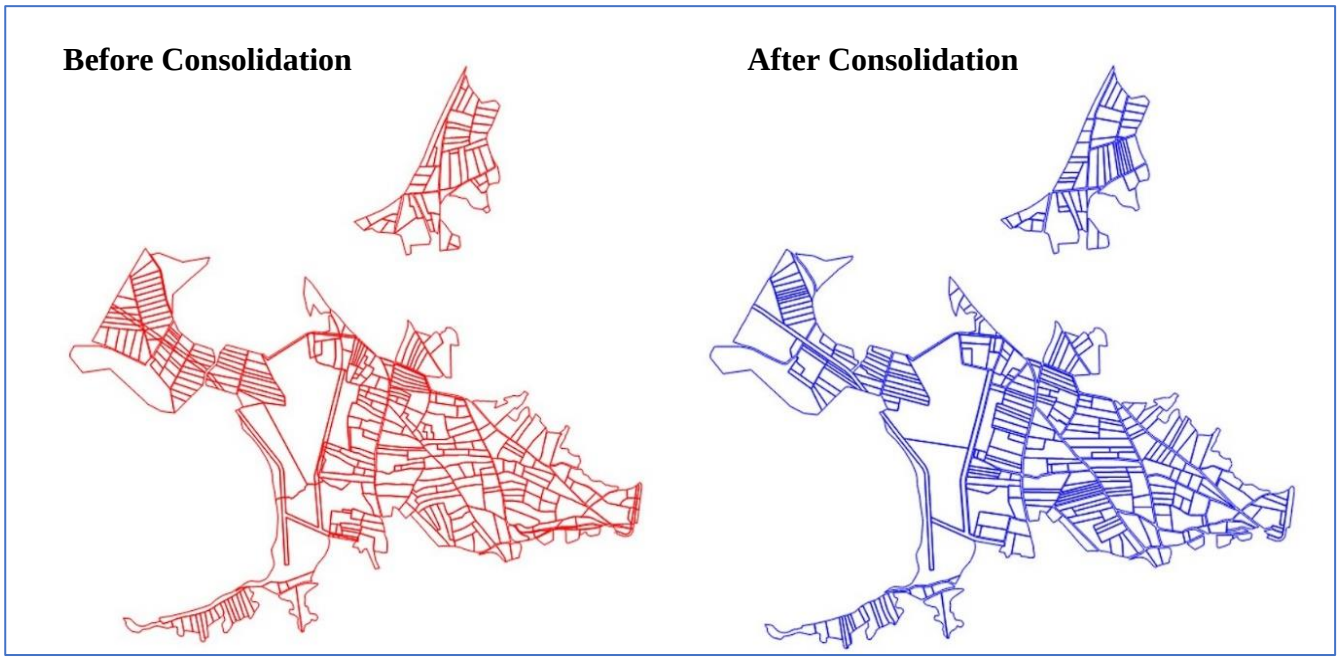

Figure 9. Uylupınar village land consolidation project old and new situation
Şekil 9. Uylupınar köyü arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 10, the total area of 3,233,327.59m² has been incorporated within the scope of the land consolidation initiative undertaken in Uylupınar Village. It is noteworthy that no extraneous area falls outside the purview of this regulation. The total block area is 3,098,217.92m², and 356 intra-block parcels have been created in 62 blocks. The area is made up of 426 cadastral parcels and 832 owners in total. The area of these parcels varies between 71.00 m² and 228,708.00 m². Old Average Parcel Size was calculated to be 7.61 decare. New Average Parcel Size was calculated to be 8.73 decare. The analysis of the data indicates that the parcel structure in the village has become more regular with consolidation.

Table 10. Some information about Uylupınar village land consolidation areas
Tablo 10. Uylupınar köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	3,233,327.59 m^2
Non-Regulated Area	0.00 m^2
Block Surface Area	3,098,217.92 m^2
Total Number of Cadastre Parcels	426
Total Number of Owners	832
Total Number of Blocks	62
Total Number of Parcels in Block	356
Minimum Cadastral Parsel Size	71.00 m^2
Maximum Cadastral Parcel Size	228,708.00 m^2
Old Average Parcel Size (da)	7.61 da.
New Average Parcel Size (da)	8.73 da.

As illustrated in Figure 10, the situation prior to and subsequent to the land consolidation work in Yamadı village is depicted. It has been observed that parcels which were irregular and lacked road frontage prior to consolidation subsequently became regular and possessed road frontage post-consolidation.

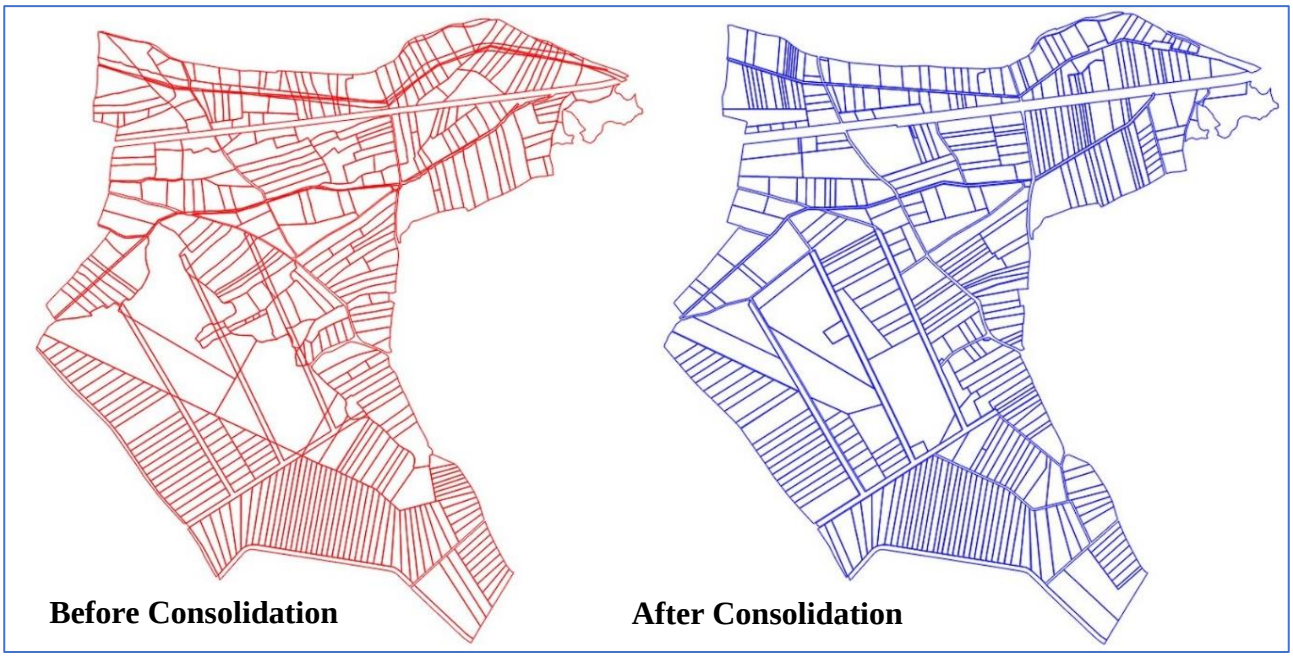

Figure 10. Yamadi village land consolidation project old and new situation
Şekil 10. Yamadi köyü arazi toplulaştırma projesi eski ve yeni durum

As demonstrated in Table 11, the total area encompassed within the land consolidation arrangement in Yamadı Village was 4,509,596.68m², with a residual area of 2,857.09m² remaining outside the scope of the arrangement. The surface area of the block is 4,341,203.99m². The area is comprised of 616 cadastral parcels and 1,255 owners, with 424 intra-block parcels having been created within 39 blocks. The range of parcel sizes is from 27.08 m² to 159,099.24 m². Old Average Parcel Size was calculated to be 7.33 decare. New Average Parcel Size was calculated to be 10.24 decare. The analysis of the data indicates that the process of land consolidation in Yamadı Village has two primary outcomes. Firstly, it leads to the organisation of the parcel structure, and secondly, it results in the creation of larger and more complete parcels. This is achieved despite the high density of owners.

Table 11. Some information about land consolidation areas of Yamadı village
Tablo 11. Yamadı köyü arazi toplulaştırma alanları hakkında bazı bilgiler

Qualifications	**Values**
Area Subject to Regulation	4,509,596.68 m^2
Non-Regulated Area	2,857.09 m^2
Block Surface Area	4,341,203.99 m^2
Total Number of Cadastre Parcels	616
Total Number of Owners	1255
Total Number of Blocks	39
Total Number of Parcels in Block	424
Minimum Cadastral Parsel Size	27.08 m^2
Maximum Cadastral Parcel Size	159,099.24 m^2
Old Average Parcel Size (da)	7.33 da.
New Average Parcel Size (da)	10.24 da.

As illustrated in Figure 11, a comparative analysis is presented of the number of parcels in various settlements both prior to and following the process of land consolidation. A decline in the number of new parcels in all settlements compared to the previous period is evident. This phenomenon exemplifies the process of merging existing parcels to create larger, more regular new parcels. A substantial decline has been observed in the number of parcels, particularly in densely populated areas such as Armutlu and Çeşme. The number of parcels in Armutlu has been reduced from approximately 2750 to around 1700 in the new situation. A similar phenomenon was observed in

Çeşme, where the number of parcels decreased from approximately 1700 to 950. Analogous declines have been documented in other settlements.

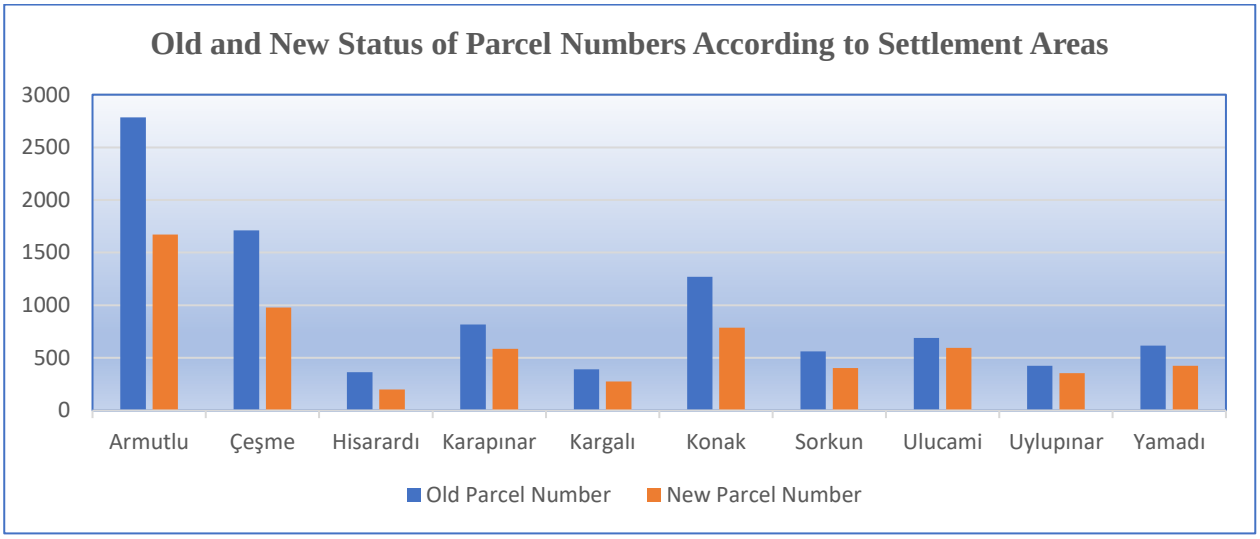

Figure 11. Old and new status of parcel numbers according to settlement areas
Şekil 11. Yerleşim alanlarına göre parsel sayılarının eski ve yeni durumu

As illustrated in Figure 12, the loss rates resulting from land consolidation practices in rural settlements are presented comparatively. The loss rate is defined as the ratio of the area allocated for public infrastructure services, including roads, canals and drainage systems, during consolidation operations to the total area. This rate is a significant indicator in terms of meeting the infrastructure needs in rural areas.

The data indicates that the Ulucami neighbourhood has the highest casualty rate, with 7.61% of casualties occurring there. The Armutlu neighbourhood is in second place, with 5.69% of respondents identifying it as their neighbourhood of residence. The third most popular neighbourhood is Konak, with 5.11% of respondents identifying it as their neighbourhood of residence. This situation demonstrates that more space is allocated for agricultural infrastructure services in these settlements and that more intensive arrangements are made in these areas. The lowest rate of fatalities is observed in Karapınar Village, with a rate of 3.14%.

It is evident that the loss rates typically range from 3% to 8%. However, it should be noted that these rates are subject to variation in accordance with local requirements, the existing road infrastructure, and the dimensions of parcels involved in consolidation operations. Maintaining these loss rates at the current levels is indicative of a balanced application with regard to both the sustainability of public services and the protection of farmers' property rights.

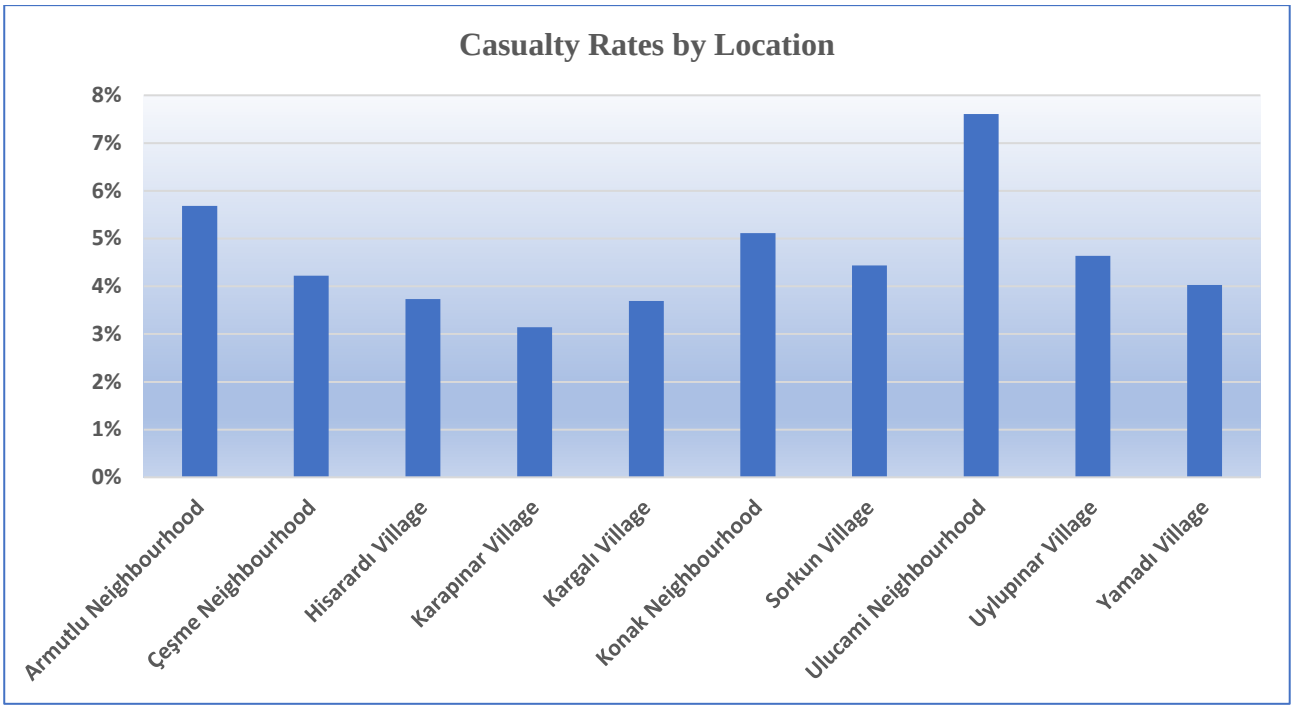

Figure 12. Casualty rates by settlement
Şekil 12. Yerleşim yerine göre zayiat oranları

As illustrated in Figure 13, the comparative analysis of rural land consolidation rates carried out by settlements is presented. The consolidation rate is indicative of the proportion of total agricultural land in a given settlement that has been subjected to consolidation. This rate is indicative of both the width of the physical application area and the magnitude of the consolidation need in that region. As indicated by the data, the most significant consolidation rate is observed in Hisarardı Village, with a percentage of 44.63%. The following neighbourhoods were identified as having the highest concentrations of the target demographic: Çeşme (42.87%) and Armutlu (40.04%). The high consolidation rates observed in Hisarardı Village, Çeşme and Armutlu neighborhoods indicate that the parcel structure in these regions is dispersed, thereby underscoring the necessity for regulatory measures.

It is evident that consolidation rates are relatively low in settlements such as Ulucami Neighborhood (13.64%) and Uylupınar Village (16.67%). This suggests that either the requirement for consolidation is more limited in these areas, or the physical and property conditions are not conducive to the implementation of consolidation.

A general evaluation of the data reveals that the consolidation rates range from 14% to 45%. The aforementioned discrepancy is influenced by a multitude of factors, including the topographic configuration of the settlements, the status of property, the extant dimensions of parcels, and the demands of farmers.

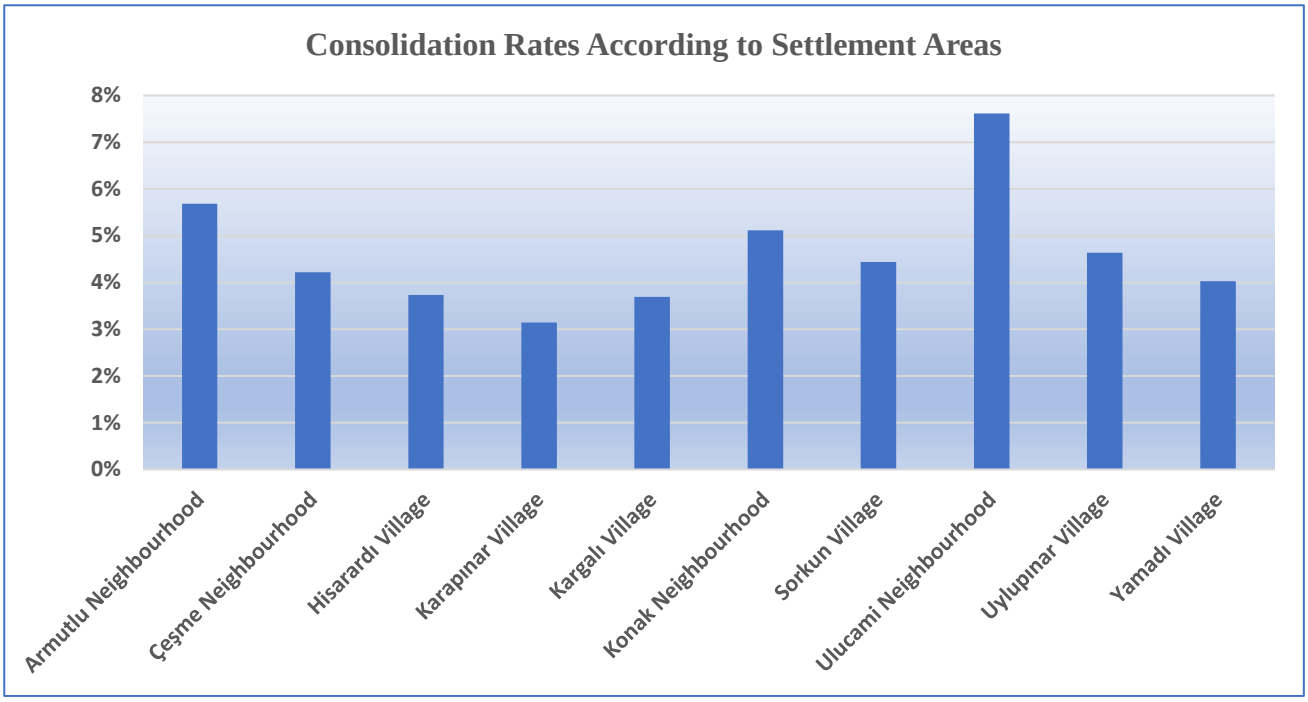

Figure 13. Consolidation rates according to settlement areas
Şekil 13. Yerleşim alanlarına göre toplulaştırma oranları

As illustrated in Figure 14, the study presents a comparative analysis of the mean values of parcel sizes prior to and following land consolidation works in the designated settlements. It is evident from the data that has been collected that the mean size of the new parcels in all settlements has increased in comparison with the mean size of the old parcels. This situation indicates that the land consolidation project has been successful in achieving its objective, thereby enabling a more efficient utilisation of land units.

Sorkun Village and Karapınar Village are distinguished by their notably large average parcel size. An increase of 3.26 decare and 3.65 decare was observed in these settlements, respectively. Concurrently, substantial increases were identified in the Çeşme neighbourhood, Hisarardi village and Yamadi village. Conversely, the increase in parcel size in Armutlu and Ulucami neighbourhoods was comparatively less pronounced in comparison to other settlements.

The findings indicate that substantial progress has been made in the development of larger and more economically viable parcel structures, particularly through the integration of small and fragmented parcels. It is evident that increases in parcel size have a positive effect on agricultural production potential. This is due to the fact that such increases facilitate the use of machinery and reduce production costs.

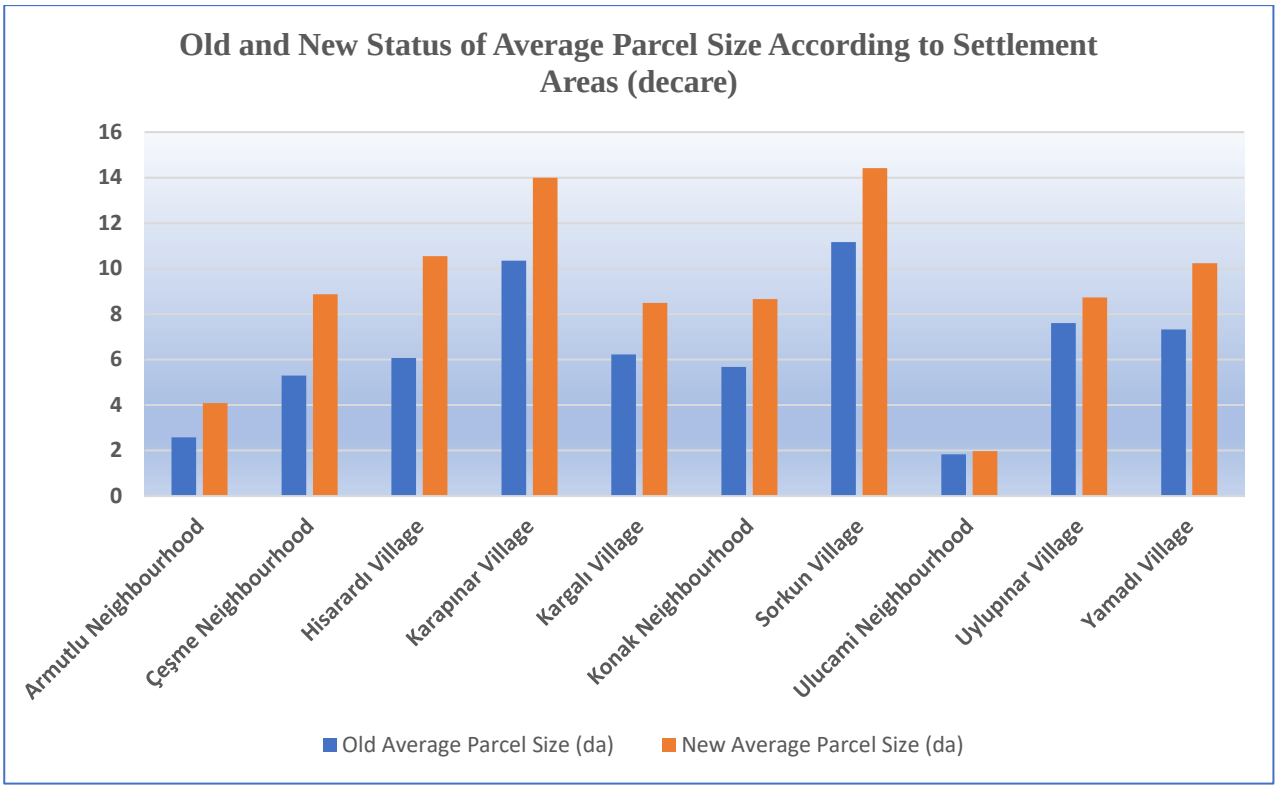

Figure 14. Old and new status of average parcel size according to settlement areas
Şekil 14. Yerleşim alanlarına göre ortalama parsel büyüklüğünün eski ve yeni durumu

3. Results and Discussion

The present study is an evaluative one, in which the effects of land consolidation projects carried out in the Gölhisar district of Burdur province are analysed. In the context of the research project, an analysis was conducted to assess the success level of consolidation applications. The analysis drew upon various indicators, including parcel numbers, parcel sizes, consolidation rates, and loss rates, to provide a comprehensive evaluation of the effectiveness of the consolidation process.

The findings indicate a decline in the number of parcels in all settlements examined, consequent to land consolidation, whilst the average parcel size has increased. This finding indicates that one of the primary objectives of consolidation practices, namely the simplification of ownership structures and the enhancement of agricultural enterprises' effectiveness, has been predominantly accomplished.

In settlements such as Sorkun Village and Karapınar Village, average parcel sizes have increased by 3.26 decares and 3.65 decares, respectively. The adoption of these sizes is conducive to the utilisation of machinery in agricultural activities, thereby reducing operating costs. Concurrently, substantial growth has been documented in Çeşme Neighborhood, Hisarardı Village and Yamancı Village. Conversely, an increase of merely 0.13 decares in the mean area of land in Ulucami neighbourhood has been observed, suggesting that the repercussions of the application have been rather negligible.

Following a thorough evaluation of the loss rates, it was determined that these rates exhibited variation across all application areas, ranging from 3% to 8%. The highest loss rate of 7.61% was recorded in Ulucami neighbourhood, while the lowest loss rate of 3.14% was recorded in Karapınar Village. The observed rates indicate that the areas designated for public services (e.g. roads, irrigation channels, drainage) during consolidation remained within acceptable limits.

The highest rate of consolidation was observed in Hisarardı Village, with 44.63%, followed by Çeşme Neighbourhood (42.87%) and Armutlu Neighbourhood (40.04%). This situation demonstrates that the dispersed ownership structure in these regions has recovered significantly. Conversely, the consolidation rate remained relatively low in settlements such as Uylupınar Village (16.67%) and Ulucami Neighborhood (13.64%). The aforementioned disparities are influenced by factors such as the topographic configuration of the settlements, property density, and user demands.

Tanrıvermiş et al. (2022) in their study, which focused on the analysis of land consolidation works from social and economic perspectives, the researchers asserted that the mean parcel size in Tatlıcak Village was 15.62 decares prior to the implementation of the land consolidation project. However, this figure increased to 23.61 decares following the execution of the project, while the mean number of parcels decreased from 648 to 416.

A general evaluation of the land consolidation projects reveals that they have resulted in a simplification of parcel structures, a realignment of property boundaries, and the

creation of optimal conditions for physical infrastructure (e.g. roads, canals). These developments have contributed to enhancing agricultural productivity. Consequently, substantial contributions have been made not only to agricultural production but also to enhancing the quality of life in rural areas. However, the presence of low-rate and limited-impact practices in select settlements suggests the necessity for a more thorough analysis of regional needs.

4. Conclusion

The objective of this research was to examine the structural effects of land consolidation projects implemented in various villages and neighbourhoods of Gölhisar district of Burdur province. The positive outcomes observed in all settlements pertained to the reduction in the number of parcels and the increase in the average parcel size. These outcomes are considered the primary objectives of land consolidation. This situation demonstrates that the fragmented and scattered ownership structure has been rendered more orderly, and the lands have become more efficiently usable.

The study revealed significant increases in parcel sizes, particularly in settlements such as Sorkun, Karapınar, Hisarardi and Çeşme. Concurrently, the integrity of production areas was ensured. These increases facilitate more systematic and efficient agricultural activities, as well as the development of irrigation and transportation infrastructure. In certain settlements, such as Ulucami and Uylupınar, the observation that consolidation rates remain low and the increase in average parcel size is limited indicates that the application has not achieved uniform success across all areas.

It is evident that the loss rates that occurred during the consolidation process generally remained within acceptable limits. The range of these rates was from 3% to 8%, suggesting a conscientious effort to safeguard private property rights while establishing the necessary areas for public services.

The findings of this study demonstrate that land consolidation projects extend beyond mere parcel arrangements, serving as a pivotal practice that fosters rural development. Consequently, land consolidation projects should not be regarded as merely a technical arrangement; rather, they should be considered a comprehensive development tool that increases productivity in agriculture, reduces costs, improves infrastructure in rural areas and facilitates people's lives.

In future land consolidation studies, it is of great importance to carefully examine the specific conditions of each region. Factors such as land structure, property status and socio-economic conditions have been demonstrated to have a direct impact on the success of consolidation plans. It is therefore recommended that farmers and landowners be involved in the process, and that their views and needs be taken into account in the implementation.

It is imperative to expand the scope of consolidation processes beyond mere parcel arrangements, integrating them with strategic investments in rural infrastructure. The integration of infrastructure components, such as roads, irrigation systems, and drainage networks, in conjunction with consolidation, has been demonstrated to enhance agricultural productivity and facilitate the enhancement of local communities' wellbeing.

Furthermore, it is imperative to meticulously monitor the repercussions of the process post-implementation. Indicators such as changes in agricultural production, reductions in costs and farmers' satisfaction levels should be monitored and evaluated regularly. This approach will ensure the consolidation of benefits, thereby making them permanent.

The most successful example of land consolidation was carried out in Hisarardi Village. The highest consolidation rate of 44.63% was achieved in this settlement, while the loss rate remained at a low level of 3.73%. Furthermore, the mean parcel size exhibited an increase from 6.07 decares to 10.55 decares. The data presented indicates that the consolidation work in Hisarürdü Village is noteworthy in terms of its efficiency and the effectiveness of its implementation.

Conflict of Interest

The author declared that there is no conflict of interest.

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