



An evaluation on the update cadastre legislation in Türkiye

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Abstract

With the settled life of human beings, the use of land has given birth to the concept of property. The linking of the human-land relationship, which has been going on for years, to the legal ground and its technical representation are made with cadastral studies. In Türkiye, this process started in 1912 and still continues today. In terms of cadastral production, the cadastral data produced by many different laws and technical methods have lost their currency over time and the need to be revised has emerged. In this study, the cadastral works of Türkiye are mentioned, and information is given about the legislative studies for the renewal of the cadastral data that are difficult to use. Especially with the concept of "Cadastral Update", which entered into the legislation in 2018, the differences between the previous applications were compared, and the expectations were revealed.

1. Introduction

The cadastre is a means of determining the identity of an immovable property. This identity is the title deed records and plots that are formed as a result of the legal and technical determination of the real estate and the creation of a registry under the guarantee of the state. The task of giving this identity to the immovables has been given to the General Directorate of Land Registry and Cadastre (TKGM).

The purpose of the cadastre is to divide the land surface (and the space above and below it) in such a way that there is no uncertainty about the physical scope of ownership or other existing rights [1].

In Türkiye, cadastral works have started with the "Law on the Restriction and Land Registry of the Property Real Estate" dated February 5, 1912. Cadastre studies were interrupted due to the First World War, and in 1925, with the "Cadastre Law No. 658", it started in big cities such as Ankara, Istanbul, Izmir, Bursa and Konya. With the "Cadastre and Land Registry Law No. 2613" enacted in 1934, cadastral work has begun in all villages and cities. Afterwards, in 1950, this law was started to be implemented only in cities and municipalities, and with the "Law No. 5602 on Land Registry", another law enacted in 1950, it was made in villages and cities (priority villages).

The "Deeds Law No. 5602" was repealed with the "Deeds Law No. 509" enacted in 1964 and remained in force for a short time. In 1966, the implementation of Law No. 509 was terminated with the "Law No. 766 on Land Registry", and until 1987, Law No. 766 in villages and Law No. 2613 in cities were implemented in cadastral works. With the "Cadastre Law No. 3402", which is still in force in 1987, these two laws were completely repealed. 99.55% of the immovable properties in Türkiye (May 2020-TKGM) were registered and legal identity was gained.

Today, cadastral data in most European countries is predominantly available in digital form. As soon as data and information are available and easily accessible (for example via Web portals), customers can use their cadastral information for many different purposes. A cadastral system must therefore provide for the location of a parcel as well as the scope of rights, restrictions and responsibilities related to land and immovable property [2].

In our modern age, where accurate information is important and strategic, it is seen that there is an increasing need for comprehensive spatial information, including cadastral and land registry information, which requires continuous modernization of cadastral systems.

In accordance with the needs of our age, since the establishment of a spatial data infrastructure and the sharing of these data, it was necessary to manage these cadastral data produced by different methods in a single coordinate system. For this reason, the "Land Registry and Cadastre Modernization Project" (TKMP) was initiated by TKGM in 2008.

It is aimed to support the activities carried out by TKMP and TKGM, to increase efficiency and to develop institutional capacity with the procedures, principles and methods applied in the project.

TKMP consists of 5 main components.

- Component 1: Cadastre and Land Registry Renewal and Update,
- Component 2: Improving Service Delivery,
- Component 3: Human Resources and Institutional Development,
- Component 4: Real Estate Valuation,
- Component 5: Project Management [3].

With the "Cadastre and Land Registry Renewal and Update" job, which is the 1st of these 5 main components, the cadastre and land registry data produced according to different legislations and technical methods are in compliance with the European Union Spatial Data Infrastructure (INSPIRE) directives and Turkey National Geographic Information Systems (TUCBS) It aims to modernize it in accordance with the standards established within the scope of the project, and it is aimed to make the spatial infrastructure healthy and usable. In order to update the cadastral and land registry data within the scope of TUCBS, the land management infrastructure project for green and sustainable development was initiated in April 2023.

In order to make all these data ready, cadastral update studies should be carried out in a healthy way and concluded. Cadastre Update formerly known as renewal cadastre, in clause a of Article 22 of Law No. 3402; "Relating to land registry, cadastre or amendment procedures, in places that have been registered and cadastralized in order to re-arrange the cadastral maps that have lost their application quality in order to eliminate the errors arising from limitations, measurements, drawings and calculations, which are insufficient for technical reasons, which are found to be lacking or which do not show the boundaries on the ground in accordance with reality, and to make the necessary corrections in the land registry..."These are the works carried out within the scope of the specified issues and in accordance with the "Cadastre Update Studies Implementation Circular" numbered 2018/13.

Table 1. Number and rates of parcels in need of updating in Türkiye [3]

	Parcel Number	Ratio (%)
Article 3402/22-a "Cadastral Update"	12.027.415	20,71
Article 3402/Annex 1 "Digitization"	6.919.294	11,92
Total (Number of Parcels)	58.067.705	32,63

According to TKGM's November 2020 Spatial Real Estate System (MEGSİS) data, approximately 33% of the cadastral parcels in Türkiye are in need of renewal, as they are not suitable for the coordinate system and bases mentioned in the current laws and regulations, as can be seen in Table 1.

It should be examined whether the cadastral update studies carried out within this scope are sufficient in terms of legislation, and how beneficial it really is in solving the needs for cadastre.

Considering the cadastral production process of Türkiye, is the achievement of the cadastral update studies the creation of the only coordinate system necessary for spatial infrastructure systems? Or is it a process step for solving legal and technical problems?

Of course, the first thing we should look at here is the legislative development process and then the availability of healthy and usable technical and legal data, which is aimed to emerge in the triangle of "purpose-benefit-result".

The quality of cadastral data is highly dependent on the processes (both legal and technical) or methodologies and standards used for obtaining, structuring and updating property data and spatial division of property units [4].

In this context, a new perspective was needed. For this reason, amendments were made in the renewal cadastre legislation. 25.10. As of 2018, an integrated cadastral renewal work, which has been enacted as a "Cadastral Update", has been initiated. It has brought a different dimension to the cadastral works, which have been transitioned from "renewal" to "update" as a concept.

It is aimed to carry out the applications that are seen as incomplete as cadastre and tried to be done piece by piece as a whole at once.

At the International Federation of Surveyors (FIG) congress held in Sydney in 2010, some key components were mentioned to highlight the point where cadastre should come in 2034 from the perspective of Australia. In this context; concepts are expressed [5].

- **"Measurement Accuracy Based Cadastre"**, which foresees high accuracy measurement in the determination of land boundaries for land-sheet harmony;
- **"Object-Based Cadastre"** instead of parcel-based cadastre in order to redefine all rights, limitations and responsibilities related to land use in a way that meets today's needs;
- **"3D and 4D (3D+Time) Cadastre"** for land modeling, management, integration of property data and sustainability analysis;
- **"Instant and Up-to-Date Cadastre"** for continuous updating of cadastral data and instant access to cadastral information;
- **"Regional and Global Cadastre"**, which can be associated with each other in a regional and global sense and allows for interoperability;
- **"Natural Cadastre"** for better modeling of the natural environment;

When we look at the basic 6 principles of the cadastre 2034 vision, the basic principle we need to see is the instant and current cadastre concept. For this reason, the cadastral update study is of great importance. Land and land arrangements should be expanded for cadastral update studies. In order for this work to be carried out with the desired efficiency, it should be well placed on the legal ground.

In this study, the reasons, legislation and events that gave rise to the concept of cadastral update were evaluated. The Cadastre Law No. 3402, which is still in effect, and the update regulations and circulars issued under this law, and the Law No. 2859 on the Renewal of Land Registry and Cadastre Sheets have been examined.

2. Material and Method

The Cadastre Law No. 3402, which is still in effect, and the update regulations and circulars issued under this law, and the Law No. 2859 on the Renewal of Land Registry and Cadastre Sheets are examined and the relevant legislation is shown in Table 2.

Table 2. Legislations allowing technical and legal changes in cadastre plots

Law	Regulations	Circular
Cadastre Law No. 3402 / Article 41	Official Gazette dated 20.04.2006 and numbered 26145 "Regulation on the correction of errors arising from measurement, limitation, ordering and calculations in immovables whose geometrical conditions have been finalized by the operations carried out during or after the cadastre (Article 41)" and the regulation dated 03.08.2019 and numbered 30851 in the Official Gazette change	* "Circular on the correction of errors in the land registry" numbered 2016/2 * "Circular on correction of share errors" numbered 2019/7 * "Circular on the production and control of on-demand transactions and the maps and plans subject to registration" numbered 2019/13 * "Incorrect block and independent partition number corrections" numbered 2019/14
Article 3402/22-a	"Regulation on making changes in the regulation on the procedures and principles to be followed in rearranging the cadastral maps and making the necessary corrections in the land registry", which was formed with the Cadastre Update Regulation dated 29.11.2006 and numbered 26361 and the amendment dated 25.10.2018 and numbered 30576 in the Official Gazette.	"Cadastre update studies implementation circular" numbered 2018/13 (Repealed 2010/18 and 2010/19 numbered "Cadastre Law Article 2/A Article implementation and control circulars"
Cadastre Law No. 3402 / Additional Article 1 "digitization"	Official Gazette dated 24.11.2006 numbered 26356 "Regulation on the digitization of cadastral maps" Amendment to the regulation no. 28425 in the Official Gazette dated 28.09.2012	"Circular on the digitization of cadastral maps" no 2012/15
Law No. 2859 on "Renewal of Land Registry and Cadastre Maps"	Official Gazette dated 21.03.1995 and numbered 22234 "Regulation for renewal of land registry and cadastre maps"	-
Decree Law No. 590 (related to Law No. 2859)	Official Gazette dated 17.05.2000 and numbered 24052 "The regulation on the implementation of annex 1 and annex 2 articles added to the law no 2859 with the decree law no 590	-

Cadastral studies in Türkiye were carried out within the framework of different legislation in villages and cities until 1987, and cadastral data and sheets were produced according to the working procedures and principles of these legislations. Some of these layouts are graphic layouts without any scaled coordinate information, and some are 1/5000 scaled linear photogrammetric sheets created by flight. There are also layouts produced in local systems, which are measured by polar methods and drawn on cardboard or cardboard glued on aluminum. After 1987, cadastral maps drawn on astrolon or polyester substrates were produced by producing coordinates in European Datum-1950 (ED-50) depending on the Country Bed Control (Triangulation) Network, and then, depending on the developments in space and satellite measurements, GPS systems were used and Accordingly, within the scope of the Large Scale Map and Map Information Production Regulation (BÖHHBÜY) issued in 2005 due to the creation of the Turkish National Basic GPS Network, the ITRF96 coordinate system was adopted and all cadastral data began to be produced within this scope. Especially since 2005, the General Directorate of Land Registry and Cadastre (TKGM), which has taken great steps to complete the cadastre on a country basis, has completed this process with the cooperation of the private sector.

2.1. Investigation of reasons requiring cadastre update study

Article 22 of the Cadastre Law No. 3402 In 2005, with Article 6 of the Law No. 5304 "Article 22. - The cadastre or land registry cannot be re-cadastral, by way of determination, registration or limitation. If such places are subject to cadastre for the second time, the second cadastre is deemed void with all its consequences and action is taken in accordance with Article 1026 of the Turkish Civil Law. If a lawsuit is not filed in due time, the second cadastre will be canceled ex officio by the land registry directorate. However;

a) Regarding land registry, cadastral or amendment procedures, in places that have been registered and cadastralized in order to re-arrange the cadastral maps that have lost their application quality in order to eliminate the errors arising from limitations, measurements, drawings and calculations, which are insufficient for technical reasons, which are found to be deficient or which are found to not show the boundaries on the ground in accordance with reality, and to make the necessary corrections in the land registry.

b) In places subject to the provisions of the Law on the Amendment of an Article of the Zoning Law No. 6785, the places to be renewed and some Transactions to be Applied to Buildings Contrary to the "Reconstruction and Slum Legislation" No. 2981, according to the Law No. 2859 on Renewal of Land Registry and Cadastre Sheets,

The provision of the first paragraph does not apply.

The areas to which subparagraph (a) of the second paragraph will be applied are determined with the approval of the General Director of Land Registry and Cadastre and announced at least fifteen days before the start of the work, in the work area, in the regional center and in the city center to which the region is affiliated, by conventional means. It is also announced in the local newspaper. Provisions of articles 2, 4, 14, 17, 19 and 21, and subparagraphs (B), (C) and (D) of article 13 and article 20 are not applicable in the works to be carried out.

The places belonging to the public institutions and organizations that are excluded from the determination in the land registry and cadastre studies are registered.

It has been amended as "Of the forests registered in the land registry, those whose maps comply with the technical legislation are exactly the same, and the others are transferred to the land registry after they are brought into compliance with the technical legislation".

Considering the content of the above article, clause 22/a reveals the reasons for the cadastral update studies. This change brought flexibility to the second cadastral ban.

In fact, the renewal of problematic cadastral maps entered our charter as a separate law in 1983 with the law numbered 2859. With the renewal regulation, which took its final form in 1995, studies were carried out within the scope of the law numbered 2859 [6].

Most of the sheets produced until the Cadastre Law No. 3402, which was enacted in 1987, were photo plans and graphic sheets that did not have any coordinate system defined, or sheets that were independently produced by tacheometric, prismatic or photogrammetric methods based on the position or country coordinate system. It is an unacceptable situation in today's cadastral system and cartography that the maps made with such different methods and with the limited technological possibilities of the period do not meet the necessary conditions in terms of accuracy and precision. Figure 1 shows the number and ratio of sheets according to production methods.

Cadastral is a study that reveals the interests of people in the land. It is equally important to establish spatial infrastructure systems where the data produced by these studies can be used and presented. However, as can be seen in Figure 1, 70% of the produced cadastral maps are incompatible with each other in terms of production and coordinate system.

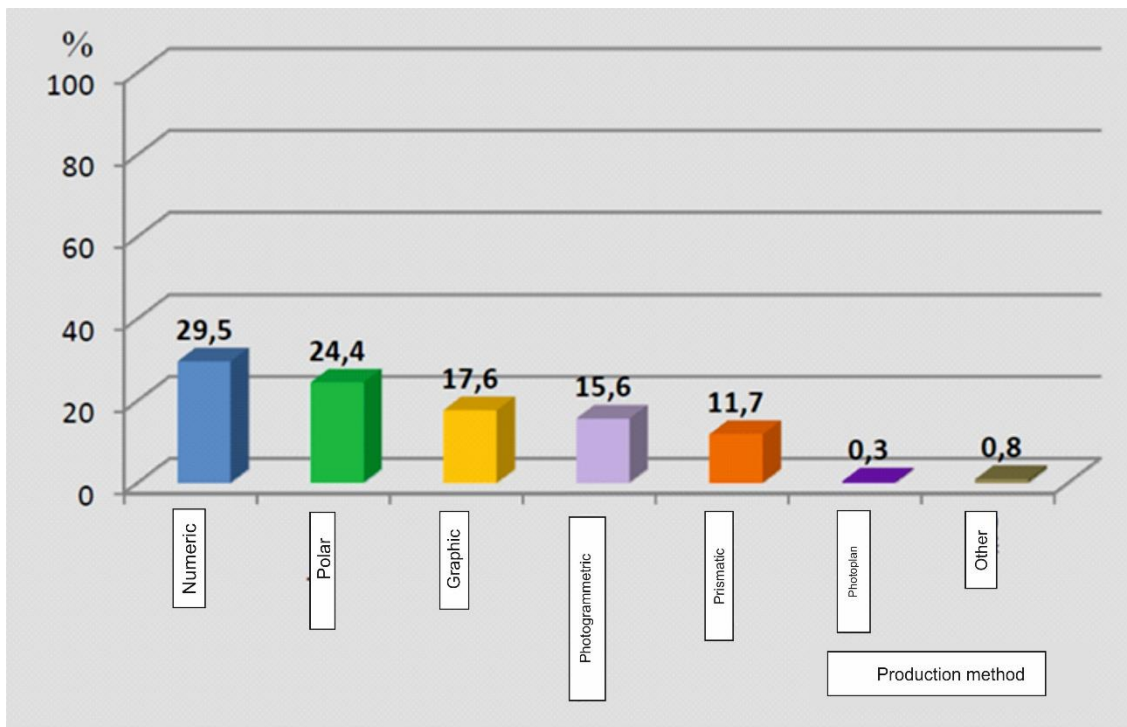


Figure 1. Number of sheets ratio by production method of Turkish Cadastre [7]

In this context, considering the point of view on the concept of ownership in Türkiye, we can list the reasons that require updating the cadastral maps as follows:

- Considering the production time of the cadastral maps, most of the sheets are worn, obsolete and destroyed.
- Calculation of the area of cadastral parcels with old methods (planimetric and triangulation method) and containing calculation errors,
- Lack of ability to apply to the ground due to the uncoordinated graphic layouts and photo plans,
- Disruption of the measurement and control network due to the destruction and disappearance of polygons and triangulation points. In addition, erroneous translations made to the map due to the calculation errors made at these points,

Cadastral maps that do not have the ability to apply to the ground do not contribute to the solution of property disputes,

- Change of parcel boundaries over time based on usage or natural reasons and ownership problem,
- Legally, external sales and divisions of immovables, changes in qualifications and transfers,
- With the cadastral works carried out within the scope of the legislation before the publication date of the Cadastre Law No. 3402, the problems related to the existence and determination of the areas that are not registered have increased,
- Efforts to provide coordinate unity and to create a geographical information systems infrastructure with standard map production within the scope of the Large-Scale Map and Map Information Production Regulation, which was issued in 2005 and updated in 2018.

These are some of the reasons.

2.2. Legislation review

The first legislation regarding the renewal of cadastral plots is the "Law No. 2859 on Renewal of Land Registry and Cadastre Maps", which entered into force with the Official Gazette dated 25.06.1983 and numbered 18088. With this law, it is aimed to renew the land registry and cadastral plots, which are insufficient for technical reasons, lose their implementation quality or have a deficiency and do not show the boundaries on the ground in at least one location or island unit, and make the necessary corrections in the land registry.

With the "Regulation for Renewing Land Registry and Cadastre Sheets", which was published in the Official Gazette dated 21.03.1995 and numbered 22234, technical issues were also detailed and studies were carried out within the scope of the law numbered 2859.

However, although the problem of incompatibility of the cadastral sheets with the ground brought the Renewal Law No. 2859 and the Implementation Regulation into our legislation, it lost its enforcement activity over time, as this law and regulation brought along difficult property rules [8-9]. It has not been possible to go beyond the renewal of the cadastral maps only in technical terms and the elimination of errors arising from geodetic points.

The gap left in the legal sense could not be resolved with the technical solution after the renewal. Changes in the qualifications of immovables, transfers and divisions of ownership, external sales and fragmented land use problems, problems in non-registration areas, etc. continued. Within the scope of 2859 laws and regulations; Since the cadastral works could not be expanded in terms of scope and content, the legal problem continued and the technical solution remained insufficient after a certain stage [10-12]. As it is known, with the entry into force of the Cadastre Law No. 3402 in 1987, the cadastral works carried out within the scope of different laws in cities and villages began to be carried out within the framework of a single law.

When we look at the cadastral legislation, it is seen that the amendments made in the Law No. 5304 and the Cadastre Law No. 3402 have opened new methods in the solution of technical problems.

"Regulation on Correction of Errors Arising from Measurement, Limitation, Transposition and Calculations in Immovable Properties whose Geometric Conditions Have Been Determined by the Transactions Carried Out During or After the Cadastre", which was included in the scope of Article 41 of the Cadastre Law No. 3402 and the "Regulation on the Digitization of Cadastre Maps" issued within the scope of the Annex 1st article of the Cadastre Law No. 3402 can be given as an example.

At the beginning of the most important changes; With the 6th article of the 5304 numbered law enacted in 2005, the 22nd article of the Cadastre Law numbered 3402, which restricts the second cadastre, has been changed and the possibility of cadastre renewal can be shown with the article 3402/22-a. "Relating to land registry, cadastre or amendment procedures; In places that have been registered and cadastralized in order to re-arrange the cadastral maps that have lost their application quality in order to eliminate the errors arising from limitations, measurements, drawings and calculations, which are insufficient for technical reasons, which are found to be lacking, or which are determined to not show the boundaries on the ground in accordance with reality, and to provide the necessary corrections in the land registry," implementation is envisaged. Following this amendment with the Law No. 5304, it entered into force with the Official Gazette dated 29.11.2006 and numbered 26361 and took its final form with the amendment made with the Official Gazette dated 25.10.2018 and numbered 30576, cadastral update studies are carried out within the scope of "Regulation on the Amendment of the Regulation on the Procedures and Principles to be Complied with in Re-arranging the Cadastre Maps and Making the Necessary Corrections in the Land Registry".

Regulation on the Amendment of the Regulation on the Procedures and Principles to be Followed in the Reorganization of Cadastre Maps and Making Necessary Corrections in the Land Registry, which entered into force with the Official Gazette dated 29.11.2006 and numbered 26361 and took its final form with the amendment made with the Official Gazette dated 25.10.2018 and numbered 30576. The situation that is brought with " and gives a new meaning to the 22/a application is stated in article 3402/22. "...The areas to which subparagraph (a) of the second paragraph will be applied are determined with the approval of the General Director of Land Registry and Cadastre and announced at least fifteen days before the start of the work, in the work area, in the regional center and in the city center to which the region is affiliated, by conventional means. It is also announced in the local newspaper. Provisions of articles 2, 4, 14, 17, 19 and 21, and subparagraphs (B), (C) and (D) of article 13 and article 20 are not applicable in the works to be carried out..." the aforementioned issue is not included. The inclusion of these issues is in the cadastral renewal works carried out before the update of the regulation, that is, before the date of 25.10.2018. A study has been carried out in parallel with the Law No. 2859 and the related regulations, and the cadastral renewal works before 25.10.2018 have also created a situation that is partially solution-oriented to technical problems, but is closed to legal and property-related problems.

It took its final form with the amendment made with the official gazette dated 25.10.2018 and numbered 30576. " Regulation on the Amendment of the Regulation on the Procedures and Principles to be Complied with in Re-arranging the Cadastre Maps and Making the Necessary Corrections in the Land Registry " and with the "Cadastre Update Studies Implementation Circular" numbered 2018/13 issued accordingly, the concept of renewal cadastre was removed from the narrow scope and named as cadastral update studies.

With the amendment of the regulation dated 25.10.2018 and numbered 30576, in the 2nd article of the "Cadastre Update Regulation" dated 29.11.2006 and numbered 26361. "This Regulation, regarding land registry, cadastre or amendment transactions; reorganizing cadastral maps that have lost their application quality to eliminate errors arising from limitations, measurements, drawings and calculations, that are insufficient due to technical reasons, that are found to be lacking or that do not show the boundaries on the ground in accordance with reality" and in the land registry. It covers the procedures and principles to be followed in making the necessary corrections and the work of the parcels that need to be processed according to this Regulation in the villages and neighborhood units where digitization studies will be carried out in accordance with the additional article of the Law No. 3402, and the work within the scope of the temporary article 8 of the Law No. 3402.. " issued under this regulation Article 2 of Circular No. 2018/13 "Cadastre update studies; Within the scope of Article 22-a of the Cadastre Law No. 3402, consisting of at least one group of parcels on the basis of an island/location or surrounded by a fixed and/or valid border whose external borders are compatible with the technical documents; Reorganization of the cadastral maps and information that are insufficient due to technical reasons to eliminate the errors arising from limitation, measurement, drawing and calculations, lose their application quality, are found to be deficient or do not show the boundaries on the ground in a realistic manner, and transactions related to

property such as transfer, partitioning, partitioning in the update areas It covers the correction of errors and deficiencies arising from the cadastral and cadastre, and working together on the parcels remaining in the areas to be digitized according to the Annex-1 article of the Law No. 3402 and the areas that need to be processed in terms of cadastre.." The works subject to cadastral update studies are shown in [Table 3](#) in accordance with the.

Table 3. Content of cadastre update legislation

Transactions	3402 S.K. 22/a (cadastral sheet and technical documents)	Property Transactions	3402 S.K. Annex-1	Transactions Regarding Areas Subjected to Processing in Terms of Cadastre
Target Study	Inadequate for technical reasons	Succession	Produced graphically or in different coordinate systems	Undetected areas (areas within the cadastral working areas within the scope of the applications made before the Law No. 3402)
	Losing its application quality	improvisation	Maps resulting from distribution depending on quantity	Areas excluded from detection on the grounds that they are forests
	seen to be lacking	Ifrazen Taksim		Buffer zones (non-cadastral areas outside the cadastral study areas)
	Does not accurately represent the boundaries on the ground	Correction of errors and deficiencies arising from the cadastre (share errors, qualification errors)		Identification of forests and pastures
Aim	Rearrangement of cadastral maps and information	Updating the land registry	Error correction and digitization	Complete cadastre

[Table 3](#) contains some remarkable elements. After the "Cadastral Renewal Regulation" was changed to "Cadastral Update Regulation" in 2018, the circulars numbered 2010/18 and 2010/19, which previously stated the construction methods of the renewal cadastre, were repealed by TKGM and the cadastral update works of the Circular numbered 2018/13 were explanatory on the construction and production method. A different path has been drawn to these studies with its entry into force as a resource.

As it is known, the basic logic of the Cadastre Law No. 3402 is that there is no land or immovable that is not cadastral. In cadastral update studies, both technical correction and legal determination studies can be carried out by acting with this logic. In particular, among the studies we have seen in [Table 3](#) under the headings of "Processes for property" and "Processes for areas subject to cadastral processing", it was not possible to carry out transfer, subdivision, partitioning and cadastre of undetected areas and buffer areas in the renovation works before 2018. New parcels could not be produced except for the parcels that entered the application. In addition, the digitization studies carried out within the scope of the Annex 1st article of the Cadastre Law No. 3402 can be carried out in the cadastral update studies. For this reason, Cadastre Update draws attention as a general study that ensures that all of the above-mentioned transactions are carried out simultaneously by legislation.

3. Evaluation of technical and legal information generated in cadastre update studies

We can name the cadastral border as the line that separates the legal interests of one immovable from the legal interests of another immovable on the land. This limit becomes definite with cadastral studies and it is the legal limit recorded in the cadastral map and land registry in the legal sense. In the closed area formed by this border, the rights and obligations on it are determined and registered.

The end product of cadastral studies has always been the cadastral parcel and its representation cadastral maps. The cadastral parcel can be evaluated in two important parts in terms of technical and legal information it contains.

3.1. Technical part

The geodetic infrastructure (triangulation, polygon, etc.) established for the formation of the geometric shape of the cadastral parcel, The measurement data of the measurements of the border points, the measurement

sketches prepared as a result of the evaluation of the measurement data with the existing information and documents, island reports, surface area calculations, coordinate summary charts and cadastral sheets constitute the technical result product part of this study. As a result of the cadastral update work, the parcels that have been put into practice within the scope of BÖHHBÜY and within the framework of TKGM technical regulations are re-measured and compared with the old production documents. In addition, new parcels are produced as a result of the cadastral processes within the scope of the update legislation. Considerations in Cadastre Update Studies:

- 1-What is used while delimiting the plot (cadastral measurement values, raster image, NGO Map, Aerial photograph, orthophoto, etc. information and documents).
 - 2-Information obtained as a result of the control;
 - 3- Surface area difference (The difference is not due to the change in the parcel boundaries, but the lack of scale of the graphic sheet), the deformation of the sheet,
 - 4-Measurement, calculation, inversion and limitation error, at which point it was an error and how it was corrected,
 - 5- In the case of the title deed registration amount and possession at the border suitable for expansion, how the transaction is made in case of excess amount,
 - 6-Detailed explanation of the boundary definition of each boundary of the parcels, together with the ground conditions,
 - 7-The collection of parcels for which the balancing plan is applied,
 - 8- Easement rights/Expropriation plans, (if there is an error, if there is an error, if an error is detected, the date and number of the letter written to the relevant administration is specified, how the action is taken),
 - 9-Road, stream, arc, etc. places (whether they exist before the cadastre, whether they are registered or not, if they are unregistered, the consent of the parcel owners),
 - 10- Structure and facilities (The status of all structures and facilities (registered, unregistered) on the parcel should be mentioned),
 - 11-Information about declarations;
 - 12-Status of the parcels with objections (Parcels that have objections before the cadastre but cannot be finalized are considered as defendants, The status of the parcels that are objectionable before the cadastre and are finalized with the implementation studies),
- Transactions regarding the property in the updating works (transfer/partition/ifrazen partition),
 - Whether the material errors originating from the cadastre have been corrected,
 - How the parcels formed in the direction of cadastre are formed according to which legislation (such as 3402/Temporary 8, 3402),
 - How the correction is made in forest plots, [13]. These are the technical and legal evaluations made in the cadastral update study.

The cadastral studies carried out during the period from the first time the cadastral studies started in Türkiye until the entry into force of the Cadastre Law No. 3402 in 1987 show us that the presence of many worn cadastral bases in the archives, which are not suitable for technical coordinate system and use, and cadastre that cannot be done as a whole in legal terms. As a result of their studies (such as the forest law, pasture law made within the scope of their own legislation.) forest, pasture, non-registered areas, etc. Some of the problems of today's cadastre are that it is left and missing in terms of property determination. In particular, the implementation of the Cadastre Law No. 3402 and the changes in this law after 2005 led to the cadastral renewal process.

From the point of view of cadastral production, technical and legal data production products are cadastral sheets and land registers. While producing these data, legal, technical and sociological conditions are effective according to the conditions of the period. This rule still applies today.

However, when we consider before 1987, forest, pasture, stony, carpet land etc. The existence of areas excluded from registration with qualifications brought another problem. Studies have been carried out within the scope of Additional Article 5 and Provisional Article 8 of Law No. 3402 in order to identify and re-cadastre these areas. Annex Article 5; Provisional Article 8 is for the determination and cadastre of forests, and for the determination of who owns the areas outside the forest (treasury, private, public goods).

One issue is about ownership. The problem of transfer of the lands, which were determined on the basis of the old land registry records, arising from the owners, the cadastral determinations made on the dead owner, the border changes and sharings in the use of the lands over time.

From a technical point of view, cadastral sheets that are not produced in accordance with today's technology and sensitivity have been tried to be healthy with one of the methods of digitization, renewal, and technical correction of article 3402/41. These applications, which are corrections made according to different conditions in their own way, are incomplete in terms of providing integrity.

Within the framework of the general logic of the Law No. 3402, the idea of not leaving an uncadastral area was reflected in the cadastral update studies. However, there are some areas that are lacking in this sense. According

to the 2/B article of the Forest Law No. 6831, the determination and removal from the forest of the places that have lost the forest quality have been given to the forest cadastral commissions in accordance with the law. Following this, the determination of users is the duty and responsibility of the Cadastre Directorates in accordance with the ANNEX 4th article of the Law No. 3402. The lack of work on the 2/B article of the Law No. 6831 in the update works seems to be a missing aspect.

3.2. Legal part

The cadastral data produced as a result of the updating studies in the cadastre; From the documents that certify the legal ownership of the immovable whose limitation and measurement is made, technical information and documents (measurement-limitation sketch, surface area calculations, maps, triangulation and polygon calculations, measurement cards, etc.) and showing the rights and obligations on it (cadastral suspension notices, cadastral records and land registry). When we look at the whole cadastral legislation process and production results in general, we can say that the cadastral works carried out in Türkiye are included in the legal cadastre concept. It is a system in which the legal identity of the immovable property is established by determining the boundaries of the immovables and determining who owns the property by measuring them.

With the greater availability of cadastral data and information, cadastre is increasingly not used solely for property transactions or taxation purposes. It is also gaining more and more importance in the sense of "multi-purpose cadastre" as part of a national Spatial Data Infrastructure (MVA) and as a cornerstone for e-Government.

In the cadastral update works, the application minutes prepared for each parcel and the amendment in the Update Regulation, restricting the provision in the clause (a) of the 22nd article of the Cadastre Law No. 3402. "The areas to which the subparagraph (a) of the second paragraph will be applied are determined with the approval of the General Director of Land Registry and Cadastre and announced at least fifteen days before the start of the work, in the work area, in the regional center and in the city center to which the region is affiliated, by customary means, and also in the local newspaper, if any. Provisions of Articles 2, 4, 14, 17, 19 and 21 as well as clauses (B), (C) and (D) of Article 13 and Article 20 are not applicable to the works to be carried out." Since the disappearance of these issues allows the production of new parcels and enables the transfer, division and allocation processes to be carried out, the cadastral minutes regarding the determinations made as a result of the cadastral studies made in accordance with the provisions of the Law No. 3402, the suspension announcements and the registrations made in the land registry as a result of all the studies constitute the legal part.

4. Actions and solutions to be done in cadastre update studies

As can be seen in [Table 3](#), procedures are carried out in the update cadastral works carried out within the scope of Article 22/a of the Cadastre Law No. 3042 and the related Cadastre Update Regulation and the Circular No. 2018/13.

When we look at the Cadastre Update studies; After the cadastral parcels, which were previously created within the scope of various cadastral legislation and production methods, were registered in the land registry, many technical and legal changes occurred on these parcels over time. For this reason, the requirements should be analyzed well when updating studies are carried out. An evaluation regarding this is shown in [Table 4](#).

If we make an evaluation based on [Table 4](#), considering the Cadastre Update legislation and the implementations, it is thought that there are some deficiencies. For example, changes in surface area (especially in - direction) are based on the fault and responsibility principles of the state, causing an increase in claims for compensation and undermining the principle of trust. In fact, it is aimed to reorganize the cadastral information and documents with the cadastral update studies and to bring the cadastral applications made in ancient times to the requirements of current technology. However, the change in the boundaries of the immovables also causes a change in the surface area. Here, due to the technical definition of the need area concept and the lack of a precise geodetic coordinate concept, it should be taken into account that the area may change over time, and the controlled area (calculation area) should be used. The concepts of fixed border and valid border in the cadastral update legislation are determined in practice depending on the interpretation, and in this case, it leads to various errors. In particular, a scientific method should be determined for these two boundary definitions, and a detection method should be determined depending on the boundary line change probabilities and point location sensitivity. Another issue is the updating of the land registry (qualification and value concepts). Such as real estate used as an orchard when it was a field, or building on it when it was just a land. If we are using the update concept, these changes need to be re-detected. It should be done ex officio, not optionally. In addition, it is necessary to determine the real estate value needed for a sustainable land management and tax management. Real estate valuation is a very comprehensive and specific application in itself, and an integrated solution should be found in cadastre studies by making method and needs analysis. Again, in order to update the land registry and to solve the property problems (in the aspect of ownership), Article 713 of the Turkish Civil Code and the articles of the Cadastre Law No. 3402 regarding the determination of ownership should be reviewed. It is necessary to solve the legal problems that occur for the owners of non-deed sales, immovables used by their possession for a long time, and immovables that

can be determined according to old land registry records but cannot be transferred or identified. In other matters; zoning, land consolidation, etc. made by other administrations (subject to distribution and interruption). Due to the fact that the technical errors related to the surface area of the immovables in the maps created as a result of the applications cannot be corrected under certain conditions, they are excluded from the scope of the update studies. Although it is the responsibility of the relevant administration to fix such errors, not being able to solve them in the short term creates a technical problem. For this reason, a legislation that can be changed in such cases should be established and a definition should be brought to the concept of surface area.

Table 4. Suggestions for legal solutions and actions that could not be performed in cadastral update studies

Possible studies	Impossible studies	Necessary legal arrangements	Problems encountered
3402 S. K. 22/a (Cadastral sheet and technical documents) Purpose: Rearrangement of cadastral maps and information		The conditions of the principle of state responsibility in Article 1007 of the Turkish Civil Code should be determined. How much responsibility can be found under which conditions should be determined with sharp lines by making legal arrangements. A new definition should be given to the concepts of title deed and account area, and it should not be forgotten that an immovable is a whole with its map and technical documents, and that the area written in the deed depends on the cadastral data. <hr/> In particular, scientific data and statistics should be used in the determination of fixed borders and valid borders, for this, the probability and percentage of change in border lines should be calculated on a line and point basis and placed in the legislation.	1- Compensation lawsuits and recourse sanctions in accordance with Article 1007 of the Civil Code due to its small area. 2- Problems in boundary definitions and applications (fixed boundary and valid boundary definitions depend on interpretation)
Property transactions Purpose: Updating the land registry	Complete gender change Detection of building presence <hr/> Buildings with a building registration certificate within the scope of the Zoning Peace become official <hr/> Updating the existing types of immovables (agricultural ones)	Legal arrangements are currently underway in order to make the genus changes for the transition from floor servitude to floor ownership (29.05.2021). Changes should be made in the Cadastre Update Regulation in order to make the genus changes outside this scope during the studies.	Although it is possible to carry out the transfer processes in the update studies, there is no equivalent in practice.
	Real estate valuation	Laws on the determination of real estate value and the use of this determination, such as the Cadastre Law, the Property Ownership Law, the Real Estate Tax Law, the Law on Real Estate Rents, the Law on Municipal Revenues, the Zoning Law, the Tax Procedure Law, the Capital Market Law, need to be reviewed.	Real estate valuation is very important within the scope of sustainable land management. Therefore, valuation is necessary.
3402 S. K. Annex-1. clause Digitization Purpose: Correction of errors and digitization	Existence of errors that need to be corrected by the administration (subdivision, land consolidation)	Correction legislation should be established to eliminate technical errors (surface differences within/outside the error limit) in practices such as zoning, land consolidation, etc. Since it is not possible to carry out recycling applications by the administration in the short term, it is an urgent situation to finalize the cadastral information and surface area of the real estate.	Failure to rectify if the presence of error is detected
Transactions for areas subject to cadastral processing Purpose: Complete cadastre	In case the title deed owner of the immovable property is dead, it cannot be written in <u>the name of the possessor.</u> <hr/> The fact that immovables purchased with village deed before 1987 cannot be written on behalf of their <u>possessors.</u> <hr/> Identification and transfer difficulties of persons identified according to old <u>records</u> <hr/> 2/B Cadastre	Article 713 of the Turkish Civil Code and Articles 2,4,14,17,21 and 13/b, 20/b,c,d" of the Cadastre Law No. 3402 should be evaluated together, re-detection of ownership and updating the title deed owner should be considered.	1- The possibility of making mistakes in the cadastral works due to the fact that there is a certain time period in the tender processes and the scope of the work is expanded. 2- The lack of knowledge of the logic of the land registry and cadastre studies carried out before the Law No. 3402 prevents the detection and solutions of existing errors in the update works in a short time.

5. Conclusion

Considering the history of cadastral studies carried out in Türkiye, the cadastral renewal, updating and facility works that will be carried out with the Cadastre Update Regulation after 2018 can be partially considered under

the concept of the second cadastre. When these studies are considered in terms of ownership and use, it is important to be able to perform the transfer, allotment, division and allotment transactions, in terms of reflecting the current land use situation and solving the problems of inheritance. However, in the first land registry or cadastre studies, the identity information of the owners who were identified according to the old land registry records could not be determined exactly; For example, the names of the owners such as “Mehmet, son of Ahmet, and Ayşe, wife of Mustafa”, whose owners were determined according to the old land registry, have legally locked these immovables. Acquisitions made through non-deed sales and long-term use of possessions other than the owner of the title deed is another property problem

Another important situation is that the change in the boundaries of the immovable and its re-coordination within the scope of the current legislation cause the first calculated area of the immovable to change. The State shall recourse to the officials who are at fault in causing the damage...” The provision raises a different problem. Changes in the area of the immovables, which came into effect with the cadastral update works, cause various lawsuits to be filed and as a result of these cases, the state to pay compensation to the immovable owner. Is the state responsible for the borders on the map of the immovable or is it the area of the immovable? The question comes to our minds. Can the status of the cadastral charts, which were produced using the old methods with the technically inadequate facilities of the age, be based on the principle of state responsibility? Is the liability to the state justifiable only when the area of the parcel is reduced? Well, in parcels with an increasing area, can the state demand for the increased area in the opposite way? As a matter of fact, although there are parts that cause some debates, cadastral update studies are an important work in terms of creating standard, technical and property data that can be easily used by everyone in accordance with BÖHMBÜY. In terms of producing robust and usable data for two large real estate management related e-government projects such as MEGSİS and Land Registry and Cadastre Information System (TAKBİS), the values obtained more than the missing parts stand out. The basic need here is the creation of a comprehensive property law that will find a solution to the property problems in Türkiye. With this law, a unifying basic property law should be prepared by analyzing the sociological and social conditions from the point of view of property, taking into account the geographical conditions.

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