



# Geographical database for object-oriented land division modelling in Turkey



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## ARTICLE INFO

### Keywords:

Land administration  
Subdivision  
Unplanned areas  
Urban land  
UML  
RRR

## ABSTRACT

In Turkey, the conditions for subdivision of immovable property (real estate) vary based on its location in planned or unplanned areas. For many years, the conditions for unplanned areas had only been discussed in terms of zoning techniques. On the other hand, the inheritance sharing system as established in the Civil Code regulations played an important role in land division. This situation resulted in loss of productivity in agricultural land. For this reason, since the Soil Protection and Land Usage Law (SPLUL) was introduced in 2005, new restrictions on the division of land in unplanned areas have been put into practice. These restrictions are recognised as public restrictions by international standards and stem from the land management laws in Turkey, but are not represented in the Land Registry. There are many aspects to the division of land in unplanned areas in Turkey from the legal and administrative point of view, involving many regulations, organisations and individuals, and the network of their relationships regarding the subject are complex. Hence, it was determined that modelling was needed to clarify these relationships in accordance with the Land Administration Domain Model (LADM) and ISO 1952 geographical standards. These restrictions significantly affect the ownership of land in unplanned areas in Turkey. In this study, an object-oriented model was developed using the unified modelling language (UML). The aim was to contribute to the services of decision-support bodies such as the General Directorate of Land Registry and Cadastre, municipalities and agricultural organisations concerning the subdivision of land in unplanned areas through the application of e-Turkey. Thus, the model will facilitate more effective utilisation of spatial and nonspatial information technologies regarding policies and practices related to land management work.

## 1. Introduction

Property ownership is divided into two types according to the transportability of the property, i.e., whether it is movable or immovable (Bruce, 1998). The subject of movable property by its nature is related to tangible objects. The issue of immovable property (real estate) deals with (1) land, (2) independent and continuous rights recorded on separate pages in the title deed and (3) independent units registered in condominiums (Official Gazette, 2001). Property ownership is a right which is guaranteed by international declarations and agreements. In Article 17 of the Universal Declaration of Human Rights (UDHR) accepted and proclaimed by the United Nations General Assembly on December 10, 1948, it is stated:

‘Everyone has the right to own property alone as well as in association with others. No one shall be arbitrarily deprived of his property.’ (UDHR, 1948)

The ownership right is guaranteed under Protocol 1 of Article 1 of the European Convention on Human Rights:

‘Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law.’ (Council of Europe, 1950)

These regulations regarding the protection of human rights and fundamental freedoms were signed in Rome on November 4, 1950. Turkey has become a party to these international agreements and has accepted these resolutions.

The right of property ownership is similarly secured under Article 35 of the Constitution of the Republic of Turkey, which declares:

‘Everyone has the right to own and inherit property. These rights may be limited by law only in view of public interest. The exercise of the right to own property will not be in contravention of public interest.’ (Official Gazette, 1982)

In addition, Article 683 of the Turkish Civil Code, No. 4721, states:

‘The owner of property may, within the limits of law, use the

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property, deal with it as he pleases, and exclude others from interfering with it in any way.’ (Official Gazette, 2001)

The owners of property are authorised to use their property as they please based on the property rights expressed above. This may include the right of property owners to purchase, sell and subdivide. However, this right might be restricted by law in the case of public interest, as stated in Article 35 of the Constitution. These restrictions, originating mainly from the Soil Protection and Land Usage Law (SPLUL) and the Regulation of Zoning for Unplanned Areas (RZUA), deal with the conditions for subdivision of land in unplanned areas. The abovementioned restrictions constitute the main subject of this study.

The subdivision of land in planned areas in Turkey is determined according to the existing plan decisions, while in unplanned areas, the criteria applied are multi-dimensional. The subdivision of land in unplanned areas is determined by:

- (i) the administrative unit of the land,
- (ii) agricultural area features of the land and
- (iii) public restrictions on the land.

All these criteria are applied in accordance with various legal regulations entering into force at different dates, the first legal regulation being the Regulation of Zoning for Unplanned Areas (RZUA), which came into effect in 1985 (Official Gazette, 1985a). According to this regulation, unplanned areas are classified according to their residential types, i.e., residential (village) areas and non-residential areas. Applications concerning the subdivision of land in unplanned areas in Turkey have long been conducted within the framework of this regulation. However, the agricultural areas have been split up over time due to the inheritance system, which stipulates equal shares of agricultural lands, as well as a result of the unrestricted sale of land divided up for agricultural operations (Ercan, 1970; Aksoy et al., 1995). For this reason, the SPLUL was introduced in order to protect and prevent the fragmentation of agricultural land in Turkey (Official Gazette, 2005). Under this law, agricultural land was classified into various types and new divisibility conditions were established for these classes of agricultural land.

In addition to these two fundamental laws and their regulations, there exists also another legal regulation affecting the subdivision of land in unplanned areas. One of them is Law No. 6360, known as the Metropolitan Municipality Law (Official Gazette, 2012). After this law came into effect, all villages within all metropolitan municipalities were legally transformed into neighbourhoods. This made the divisibility process of land in unplanned areas more complex than before. This legislation along with the complex conditions of all the other regulations resulted in the prolongation of practical bureaucratic operations. Thus, a simple division process required interminable official correspondence to be carried out amongst the Cadastre, Land Registry, Municipality/Special Provincial Administration and Agricultural Organisation offices.

Beginning in the early 2000s, Internet-based services have become increasingly widespread throughout the world, with many public organisations offering web service facilities. These web services are able to present both verbal and graphic data. In Turkey, the number of parcels registered in the land administration system is about 58 million. Almost all of these parcels have been transmitted to the Spatial Immovable System (MEGSIS) in graphics (URL-1, 2016). The deed data related to the parcels are kept in the Land Registry and Cadastre Information System (TAKBIS). All of the 957 country-wide Land Registry directorates are operating within the TAKBIS system (URL-2, 2016); thus, all title deed data are available online with the e-state (e-Turkey). The international development in this field and in Turkey in particular is the product of the Cadastre 2014 and e-Europe+ process started in 1998 (Çoruhlu and Demir, 2015).

Regarding international developments, a novel point of view

concerning the land administration systems was demonstrated with the cadastre report published in 2014, in which the parcel is not perceived as a two-dimensional object, but as a volumetric object (Kaufmann and Steudler, 1998). The steps taken to develop the communication amongst cadastral systems and to provide a standard can be seen in the developments which took place in the following years. During this process, the need for a model having international validity was widely discussed at length. With reference to this need, a study known as the Land Administration Domain Model (LADM) was developed. The model, initially developed under the name of the Core Cadastre Domain Model (CCDM), has two targets: (1) to avoid repetitive applications belonging to the same functions in the cadastral system and (2) to enhance communication amongst cadastral systems by devising a standard unity in accordance with the fundamental ontology predicted by the model (Van Oosterom et al., 2006). This model later became a standard by being adopted by ISO under the name of ISO 19152:2012 Geographic information-Land Administration Domain Model (LADM) (ISO, 2012). Another development was the INSPIRE directive which was enacted in May 2007 to create an infrastructure for European spatial information (URL-3, 2014). The INSPIRE directive, whose full implementation is to become available by 2019, has been applied in various phases. The spatial information taken into consideration within this directive is comprehensive and contains a large variety of actual and technical topics (URL-4, 2014).

In Turkey, the necessity of designing a geographical data model based on land parcels emerged during this period (Coruhlu et al., 2016; Coruhlu and Yildiz, 2017). It was obvious that the inspiration for the design of the Turkish model should be the ISO 19152 Geographic Information-LADM and INSPIRE norms, which would provide a great contribution to the country in the international arena (Aydoğanlı, 2009; İnan, 2010; CBSGM, 2012a,b). In this respect, the LADM, INSPIRE directive and ISO standards played a significant role in accelerating the public services in the country (Çoruhlu and Demir, 2015). As a result of the modelling studies conducted in Turkey according to these standards, Turkey’s National Geographic Information Systems (TUCBS) were established (CBSGM, 2012a,b). Accordingly, some data schemes have been modelled within TUCBS. Research on the ATLAS software and the TUCBS web service has continued to be conducted effectively. However, to date, none has been aimed at ‘land division in unplanned areas’ within TUCBS, which is the subject discussed in this study.

In this study, the division process of land in unplanned areas in Turkey has been described in detail. In this context, first of all, legal and technical conditions regulating the division of land in unplanned areas were investigated and presented with graphics and tables. The unified modelling language (UML), a method frequently used in land administration applications, was utilised. Constraints on the division of land in unplanned areas were examined in accordance with international standards and the relationship of the subject with the LADM and e-Turkey were discussed. Finally, general results of the study were presented which may lead to the development of future proposals.

## 2. Materials and methods

The subdivision conditions of land in unplanned areas in Turkey were established by the RZUA and SPLUL laws. The RZUA generally regulates the requirements of subdivision of land in unplanned areas, while the SPLUL is valid for that considered as agricultural land. In addition to these two fundamental legal regulations, special public restrictions, e.g., for drinking water basins, may be applied to the land. In this section, the legal regulations affecting the subdivision conditions in unplanned areas in Turkey will be summarised by examining the legal and technical aspects.

First, the RZUA was aimed at regulating construction in unplanned areas, in compliance with public works and health and environmental conditions. In accordance with this purpose, it included regulations

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