

Property Rights and 3D Determination

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Introduction

The recent decades show us an increasing interest in utilisation of property rights in space underground and above the ground. More and more situations occur in which the vertical dimension is an important factor in registering the legal status of real estate objects. The important starting point is to clarify why it is becomes so important?

There is a growing concern in the world about the intensive use of land especially in urban areas. In densely populated areas of the world the pressure of human activity on the land has been extremely increased. This causes certain environmental problems as well as intensive competition for spare and valuable space for investment activities' providing.

The history of scientific research concerning the discovery of alternatives for providing space for urban activities can be traced back till the end of 80th - beginning of 90th [1,2]. But especially increasing interests in 3D property rights utilisation can be observed nowadays in Czech Republic [3], Iceland [4], Norway [5], Netherlands [6,7], and Israel [8].

It is worth to mention that issues of 3D determination of property rights become more and more important in Ukraine as well [9]. Land Reform and Privatisation Program were launched in 1991 in Ukraine. As a result of Privatisation Program's performance diverse number of property owners and users have been appeared. There are diverse varieties of interests in real estate, which are distributed both on the ground and the space above and under the ground. The clarification of property rights and resolution of conflicts has no institutional home in Ukraine, since such problems were not recognised in the socialist system. Therefore the institutional determination of property rights to land has been the core issue of transition. Potential investors in land need ready access to accurate and detail information concerning land boundaries, prior and current ownership, limitations on use of land, constraints on alienation. Uncertainty about the current and future structure of ownership of land and other resources is a main impediment to investments, efforts and economic growth. This means that effective system of property right's registration should be introduced in Ukraine. The main question is 'What kind of system?'

Analysis of current privatisation precedents in Ukraine shows that existent legislative and administrative tools fail to manage most of cases concerning allocation and registration of real estates with complicated configuration both boundaries and property rights allocation. These precedents include underground buildings and constructions, underground and above the ground infrastructure, apartments, pipelines and cables, constructions on the top of each other. The State Land Cadastre is in charge of land parcel's registration. It based on 2D model of geometric representation of land parcels. The process of initial Cadastral Data Base's creation is ongoing in the most cities of Ukraine. In the conditions of lacking of institutional abilities to clarify the complicated cases with allocation of property rights, each case is treated differently from another. Thus inconsistent information about real estate objects are put into the Cadastral Register. This situation is further complicated by the fact that real estate objects like buildings and apartments are registered separately from underlying land parcels. This causes the problems regarding clear and unambiguous determination of real estate objects now. But most and much complicated problems will appear in the future when using information in decision-making process. Therefore the ultimate conclusion could be drawn that new legislative and administrative tools as well as new model of real estate object's determination are needed to elaborate to meet requirements of legible and explicit determination of real estate.

It could also be mentioned that more and more situations in the different countries occur in which the vertical dimension is an important factor in registering the legal status of real estate

objects. Land Registration Offices and Cadastres throughout the world are being confronted to register those situations within the current registration possibilities.

Summarising important trends and needs in three-dimensional utilisation of property rights we can describe the most important of them as follows:

- The need to diminish the harmful influence on environment by the way of placing disturbing facilities underground;
- The basic living need of people to have their own apartment independent on any landlord;
- Progressive land shortage in densely populated areas call for more effective utilisation of space both above and below the surface;
- Above and below the ground planning and development activities can be considerably accelerated by guarantying the property rights of ownership;
- Land Administrations could obtain significant land reserves on a national scale by exploring the space above and under the ground;
- Registration of property rights will promote investment in subsurface and surface projects, leading to higher state revenue by way of taxation;
- The engineering aspects of planning, developing, maintaining and operating subsurface and surface systems could be managed in controlled and proper manner;
- The certain interests of lending institutions to have secured and protected rights and interests in spatially located real estate objects as collateral for credit providing.
- Urgent needs to clarify and protect of property rights for new rights' holders during Land Privatisation in former socialist countries.

Therefore it is important to investigate the legislative provisions for creation of property rights in space in different countries. To cope with this task at the Donetsk National Technical University, Department of Geoinformatics and Geodesy, research has been initiated to investigate of possibilities of 3D determination of real estate. This task includes the investigation of possible legislative, administrative and technical arrangements, which provide the 3D determination of real estate objects. The aim of this paper is to present the main important outcomes of this investigation.

In the beginning the investigation of property right's systems in countries from civil law and common law jurisdictions has been made. The major intention is to analyse the structure of property interests and the possible ways of their allocation in space. The legislative and administrative arrangements are investigated for the purpose of spatial division of ownership. Useful arrangements for property right's allocation like condominium (from civil law) and strata title (from common law) are investigated on the next stage. Finally general conclusions are presented.

The Structure of Real Property Rights in Civil Law Countries

Analysis of property rights' structure in civil law jurisdictions shows that ownership of land involves an important distinction between movables and immovables and attaches less significance to the difference between rights *in rem* (property rights) and rights *in personam* (personal rights) opposite to common law jurisdiction. The main distinction is that property right remains with the property, whereas personal right is a right that in principle remains with the person that concluded the contract.

Within the property right a distinction between a full right and restricted rights of use can be made. The most comprehensive is right of ownership. Absolute ownership implies the right to own, occupy and dispose of the land and any building on the land, but subject to any general public regulation in force.

A restrictive right of use is derived from a more comprehensive right (ownership) which is charged with the restrictive right. The major feature is that restrictive right rests on the property to which it is connected. Therefore transfer of property does not cancel this right. The most important

are the following restrictive rights of use: servitude, lifetime lease, right of superficies, right of apartment, usufruct, and mortgage.

Within the category of restricted rights of use there are possibilities for creation and utilisation of property rights in space. The right of superficies seems to be an exception to the rule that the owner of the land is at the same time owner of all buildings and other structures on the land. The investigation shows that the most common forms of this right are building right and surface right. These kinds of rights are temporal rights of ownership, which provide the ownership of building and structures on the land of the third parties. This right can be exercised as independent right (from ownership of land) or in conjunction with right of use under the tenancy agreement or long-term leasehold. They are property rights (*in rem*) and can be transferred and mortgaged. Upon the registration they are enforceable between parties.

A right of apartment is an important tool for establishing of the separate ownership of individual apartment (or unit in building). It is provided by condominium ownership's creation by way of splitting up of the right of ownership (or lease right) of a building and land in a number of apartment rights. The splitting up is made by means of a notarial deed, which has to be registered in the public register of immovable property.

Analysis of cases from Netherlands, Norway and Denmark concerning condominium ownership provision let us to identify the important common concepts and rules, which implemented by different countries. The word "condominium" literally means "joint dominion" - the domains (homes) are arranged together in a single property. Therefore the principle element of this scheme is co-ownership, whereas the exclusive right to use one's own parts of the building is accessory to it.

The common rules are provided for the creation of condominium in different countries. In simplest form a condominium is made up of:

- Division (or splitting) of real property (buildings and land under it) into units by means of notarised deed;
- Allocation of the common areas owned by way of co-ownership;
- Establishment of an administrative framework to manage the scheme (for example, Owners Association).

The important feature of this form of ownership is that it is combined from the (1) share in the joint right of ownership of the building and the land and (2) exclusive use of certain parts of building and the land. Those rights are not separately owned and cannot be separately disposed [12]. But full condominium ownership is freely transferable and can be mortgaged. It should also be mentioned that there are rather complicated rules for management of condominium scheme and very strict rules concerning the modifying, alteration or termination of deed of division.

Thus condominium arrangement seems to be useful tool for creation and utilisation of property rights in space. But certain important questions are needed to be investigating further on. These mostly concern the complex scheme for provision of management of common interests and rules on modification and termination of the division. The important also is to analyse the possibility of those rights determination in space by way of registration in Cadastre.

The structure of Real Property Rights in Common Law Countries

The analysis of property rights' system in common law countries shows us that there are two types of legal titles to real estate: freehold title and leasehold title. Freehold property is owned absolutely and forever in time by the holder but there can be restrictions imposed on the title (easements, restrictive covenants, etc.).

By contrast, a leasehold interest subsists for a limited period of time and the rights of disposal are controlled. Essential feature is that a leasehold interest in real estate confers upon the leaseholder a legal right to exclusive possession of land or premises for a specified period of time in return for payment of a rent. It imposes contractual obligations on both landlord and tenant which they will be required to perform throughout the term of the lease.

The owner of land will, except in very limited circumstances, also own the building constructed on the land. But it is possible to own part of a building. Whilst vertical division of legal title causes few difficulties, in almost all cases where there is horizontal division the owner of parts will have leasehold rather than freehold ownership. Whilst it is technically possible to have freehold ownership of a horizontal layer of a building, such ownership is extremely rare in England and is not generally advisable because of technical legal issues relating to enforcement of ownership obligations.

Thus we can conclude that leasehold arrangement for common law countries is of a great importance. It creates flexible tools for providing of enjoyment of estates by different right holders. There have been substantial changes in the law governing landlord-tenant relationships in the second half of the 20th century. These changes have most notably affected the law concerning residential tenancies, particularly tenancies in urban apartments.

The lease is used where something less than absolute ownership is intended, such as right to occupy land for a limited period, or a right to occupy only part of a building on set terms, where in other countries they might use a condominium. The lease will grant the owner of the lease the exclusive right to use and occupy the property and can be fully transferable. It will usually be granted either for a premium (or capital sum), in the case of longer leases, or for a monthly, quarterly or other periodic rent, or a combination of both. Due to the high value of land many businesses do not wish to tie up their capital in land ownership and will therefore lease their premises.

The important features of this commonly used tool are as follows:

- Lease gives exclusive possession to the tenant.
- Lease has a fixed beginning and a fixed end (certainty of duration) stipulated by contract.
- Regulated relationship between tenant and landlord (rights and obligations, transfer of rights and duties) by way of special articles in contract.
- Protection of tenants' interests by special legislation provisions.
- In essence - a little distinction between freehold and leasehold tenure.
- Leasehold rights are protected by registration, are transferable, and can be mortgaged.

English law does not recognise the civil law concept of a 'usufruct' or the right to use or enjoy the produce of another party's land. The nearest equivalent is the long lease. The nearest equivalent to the building right used in some countries is a building lease, i.e. a long lease under which the tenant agrees to erect a building.

One of the useful tools for landowners in planning land use to maintain peoples' home and the value of their land is the commonhold scheme. The 'commonholders' would become registered proprietors of their own fee simple and would share ownership of the common parts of the buildings through a commonhold association registered on a Commonhold Constitution Register. This kind of ownership is similar to notion of condominium, which is widely used in civil law countries.

But the most important and useful tool for spatial allocation of property rights have been elaborated in some common law countries, where condominium legislation has been developed into strata title legislation. Analysis of cases from New South Wales (Australia) and British Columbia (Canada) let us to identify the important concepts, which provide the possibility for allocation, utilisation and registration of property rights in space on the ground, above and under the ground [10, 11, 13].

In its simplest form a condominium in common law jurisdictions is made up of: (1) division of real property horizontally and vertically; (2) allocation of the remaining real property as common areas owned in tenancy in common by all the unit owners; and (3) establishment of an administrative framework to manage the scheme. Separate title is created for each unit (strata lot) in much the same way as separate titles are created for lots in a subdivision of land at surface level. Notwithstanding is strata lot and share in common property constitute one unity, thus cannot be separated. On registration of the strata plan, a separate certificate of title issued for each lot, and thereafter each lot could devolve or be transferred, leased, mortgaged or otherwise dealt with in the same manner and form as land parcels.

The result of all of this is that upon establishment of a condominium, an individual is free to purchase what is essentially a cube of space (case of New South Wales). The cube is defined by reference through field plans, to the building surrounding it. It is important to note that the ownership of the cube of space is entirely independent of any ownership of some definable parcel of the surface of the earth. The cube may be dealt with in exactly the same fashion as any traditional parcel of land subject to the rules of the condominium (cases of South Wales and British Columbia strata legislation).

In the New South Wales legislation there are major concepts of lot (or unit) and strata plan, comprising location and floor plans. The lots are created upon the division of the building and land under it into separate units. These lots and common areas are properly determined and described on the location and floor plans. Exact determination of location, size and configuration of each lots and common areas provides the solid foundation for depositing them into Title Register. The ownership on lots comprises the fee simple estate on individually determined unit in the building and share in common areas. There is also unit entitlement in respect of each lot in strata plan, which determines the voting rights, the proportion of levies, and the value of each lot. These kinds of entitlement can be considered as to be attached to each lot respectively.

There are strict legislative provisions concerning the management of common areas through Owners Corporation, which acted through its council. Upon the registration of strata plan the Body Corporate (or Owners Corporation) shall be established thus providing the possibility to manage common property.

There are also important possibilities for staged development schemes by way of further subdivision of lots and common property and for the consolidation of a number of lots into one. These schemes provide very effective and flexible tools for land development and allow managing finance of the development in stage. Finally, upon registration the benefits of Torrens title, notably indefeasibility of title, apply to lots in a registered strata plan.

Cases study from British Columbia provide us important concepts such as conventional parcel (when there is two-dimensional subdivision), an air-space parcel (when there is three-dimensional subdivision) and strata lots (when there is either two or three-dimensional subdivision of building or land).

The incorporation into the legislation the concept of air-space parcel (is also to be considered as land) provides the possibility to subdivide the air-space above, or the sub-surface below land parcel. This concept allows a variety of possibilities for the creation of parcel of different use (residential, commercial, industrial) in the space above and under the ground.

Incorporation the concept of strata lot (or condominium concept) provides the possibility to subdivide a building or land into strata lots. Strata lots can be defined as estates in fee simple coupled with an interest as a tenant in common in respect to the remaining common areas. But these two interests are a unity and cannot be dealt with separately. Thus the strata owner is the owner in fee simple with a share in the common property. It is important to note that lots created in this fashion may be disposed of in the same manner and form as any land that is registered in a Land Title Office. We can define this kind of subdivision as useful tool for creation not only residential properties, but also for non-residential properties, such as industrial, commercial and recreational properties.

The major requirements for such kinds of subdivision are preparation of subdivision plan (for conventional parcels), air-space plan (for air-space parcels) and strata plan (for strata lots). These plans are to be registered in Title Land Registry. As a result of such procedure, fee simple estates are created respectively on conventional parcel, air-space parcel, and strata lot. Thus registered title in fee simple can either be a conventional parcel, air-space parcel or strata lot, which are all considered as land under the legislation. It is important to mention that the procedures for the creation of different kinds for parcels for different purposes are similar, thus providing the simplicity and homogenous of applied tools.

Conclusions

Summarising important outcomes of proposed investigation we can state that different legislative tools are available within existing legislation of common law and civil law jurisdictions for the three-dimensional determination of real estate. Hence all Western legal systems allow the owner of property to divide it along spatial lines. A somewhat different set of problems arises when the desired division is vertical rather than horizontal.

By and large common law legislation allows such vertical divisions, so that one person may own the mineral strata underneath land, another the surface of the land, and the third the air rights. The civil law systems have some difficulties with these types of division of ownership, because of the medieval maxim: "Whoever owns the soil owns all the way to heaven and all the way to hell". Nevertheless in both systems modern legislation has made possible ownership of an apartment or other spatial units by implementation of different tools.

1. Leasehold arrangement is an important tool in common law countries, which is commonly used for the purpose of creation of ownership rights less than absolute, such as right to occupy land for a limited period, or a right to occupy only part of a building, or a building lease. Generally whereas in civil law countries the different restricted rights of ownership like usufruct, building or surface rights will be used; the common law will provide long lease arrangement.
2. Although buildings and anything, which is fixed or annexed to the land, are treated as part of the land in civil law countries, there are certain legislative provisions for granting the rights for buildings: heritable lease over the building, or long lease by the third party, which erects the building. Hence rights of superficies are commonly used in civil law countries in order to have or acquire in ownership buildings, premises, structures, plantations in, on or over the immovable of a third person. These rights are commonly exercised in the form of building or surface rights.
3. Condominium ownership is intended to enable large sections of the population to become owners of their own flats. The important feature of civil law condominium scheme is close link between a joint ownership of a common parts and the exclusive right to use a unit in the property. That is why the joint ownership of common part seems to be on the first place and right of exclusive use of a separate unit is on the second place of condominium ownership scheme. This hardly can be considered as the existence of ownership on apartment, it rather is as a quasi-ownership right on apartment (or exclusive right to use individual apartment unit). Thus our conclusion is that condominium ownership in civil law countries is more complicated, because condominium owner owns not only the area within the four walls of his apartment or house but also rights and privileges to use common area and utilities. The latter requires special legislative provisions and certain regulations and statutes within condominium for the management of common property.
4. Condominium scheme creation in common law jurisdiction by way of subdivision is essentially different from civil law in the notion of ownership. The condominium legislation has been developed into strata title legislation in countries, which exercised the Torrens system of registration, thus providing security of property rights in spatially located units. The major element is strata title scheme, which provides for the granting of a separate Torrens title for individual parts of a building (strata lots), which are shown on the strata plan. Therefore the important difference with civil law condominium ownership is that the ownership of individual unit (apartment or strata lot) is on the first place and the tenancy in common in respect of common parts follows after the ownership rights.
5. More valuable tools are legislative provisions in common law countries permitting owners of a parcel to deal in an economic fashion with the air space above the ground level (case of British Columbia air-parcel legislation). That economic use may take a number of forms from absolute conveyance to splitting off individual rights associated with the air space parcel. The former is most often encountered in large, multi-level construction projects. Thus it would be possible under an air space parcel statute to separate ownership of a mall from ownership of

an underground parking lot below the mall. Hence this kind of provisions are powerful tool for allocation of property rights on underground facilities in large urban areas. The splitting off individual rights can also occurs in several situations in a complicated urban environment such as, for example, the purchase of extra height credits from owners of lower buildings.

Ultimately we can conclude that nowadays the condominium and air-space parcel legislation coupled with the advantages of Torrens title registration are the most valuable tools for the allocation of property rights in space on the ground, above and under the ground. This tool can be used in most cases dealing with the three-dimensional determination of real estate. Moreover this legislative tools provide both for two-dimensional and tree-dimensional subdivision within one common legal framework, thus lead to simplicity of implemented formation procedures.

Further analysis of current situations showed that a horizontal division in the legal status of property is made by the establishment and registration of the rights and limited rights on the parcels. However the current registration and cadastral systems lack of possibility to describe and depict them. Two-dimensional defined boundaries of parcel don't satisfy the needs for the more complex multi-layer property situations. Therefore purpose of the researchers nowadays is to develop a prototype of a Land Information System, which can take the juridical relevant spatial information on the vertical dimension into account.

We can find two alternatives in this research subject.

The first one could be seen as realistic and its aim is to develop of three-dimensional (3D) cadastral system, which gives more insight in the juridical and factual situation above and under the surface in case this is relevant with respect to the legal security. This could be done through defining constructions on, above and under the surface as geo-objects in the cadastral system. The Danish and Norwegian experience seems to be close to this research activity. Netherlands also follows this direction of researches. The major challenge for this research activity is that insight in what is situated under and above the surface would support the definition of rights concerning real estate objects under and above the surface.

The second alternative is development, determination and registration of 3D parcels. This direction of research activity is presupposes the development of the automated cadastral system, which provides geodetic description of the property rights of the owners on the ground, above and under the ground. The other ultimate task in this direction is the extension of basic principles of the Torrens system to three-dimension. Israel seems to choose this direction for the development of 3D automated cadastral system.

But this creates some other problems that have to be solved. The major of them is concerned with the definition of property when separate use of space under and above the surface comes into play as well as definition of ownership rights on spatially located objects, which are further restricted and limited. Therefore some rights are obvious and can be formulated, but some of them are fuzzy due to difficulties in defining the connected area and describing it in the registration system. Although the outcome of this development could not being unappreciated. The task to define and manage the juridical situation of current complicated urban environment satisfactory creates a challenge for the scientists both in the domain of jurisprudence and technical science.

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УДК 528:711

Митрофанова О. Права власності і тривимірне визначення.

Аналізуються необхідність і можливості для тривимірного визначення прав власності на об'єкти нерухомості. Розглядаються системи прав власності на об'єкти нерухомості в країнах цивільного і загального права, досліджуються структури прав власності і можливі шляхи їхнього розміщення в просторі. Визначено ефективні законодавчі, адміністративні і технічні міри для цілей тривимірного формування об'єктів нерухомості в країнах цивільного і загального права.

УДК 528:711

Митрофанова Е. Права собственности и трехмерное определение.

Анализируются необходимость и возможности для трехмерного определения прав собственности на объекты недвижимости. Рассматриваются системы прав собственности на объекты недвижимости в странах гражданского и общего права, исследуются структуры прав собственности и возможные пути их размещения в пространстве. Определены эффективные законодательные, административные и технические меры для целей трехмерного формирования объектов недвижимости в странах гражданского и общего права.