

The Feasibility of 3D Cadastre in Thailand

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Key words: cadastral system, 3D cadastre

SUMMARY

The existing cadastral system has been adapted sufficiently to make people to securer and transfer their properties to utilize them for more valuable purpose, by land and building administration and registration together by definition of 2D as parcel and property. In the cities, the multiple uses of space or separate right above or under the reference land surface such as apartment, condominium as multilayer building for economics cost in condition and living style. 2D parcel on cadastre is suitable or unsuitable for representing the land right, isn't it? Land registration preparing for multi user on a reference parcel under the department of land, Thailand, is investigated a processing for developing a 3D cadastre. By conceptual the registration of 3D cadastre in the international context and the current DOL registration of 3D cadastre are reviewed and analysis in multilayer building case study. The 3D cadastre of DOL representing the legal 3D space is separated from the surface parcel (2D) by sub-plan and is integrated the building unit and it respective the right in the partition ownership of building. At the final the legal point of view has been leded to the solution for 3D cadastre.

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1. INTRODUCTION

In the center of cities especially business districts, land use have been consumed for settlement in various types of live style and complicated to constructions. The land use are added under and above each other, commonly the construction has been built on top each other as condominium, apartment and high rise building for extend the use of land from the surface level, the third dimension or height level. The traditional registration and cadastral system are challenged to the multi-ownerships on the properties located on the same reference of land or parcel. The property registration and cadastral perspective on the building is base on 3D cadastre which will insist on the cadastral system consisted of two part; a series of maps or plans showed the size and location of all properties together with the texts of attributes of them, so the cadastral system is important role in urban planning, resources management and administration, such as the access to the property, legal security, easy transfer of right, and a transparent market. The research proposal are to investigate the existing registration in 3D cadastre, condominium, in Thailand under Department of Land(DOL) and compare to the lesson in other country by empirical evidence.

2. CADASTRE REVIEWS

In Thailand, the cadastral system is based on a 2 dimension representation which land parcel are represented only parcel with general and fixed boundaries without topographic and building or any construction on the projection surface. The system consists of 2 parts, the parcel and property registration, and cadastral map.

2.1 The 2D cadastre

Excluding the registration, information on parcel such as parcel identification, owner and address etc, the cadastral map is recorded land parcel and properties in cadastral system, showed boundaries and ownerships of land. Mostly it represents just the projection surface of earth with individual land parcel in 2D boundaries. The 2D map is hard to record and display the multi use of land with the construction of both upper ground and lower ground. The registration could be delimited both in plan 2 dimension, x-y and height for different ownerships in the space. It could be concluded that the most land administration system is not adequate to cope with the increasing complex range of right, restriction and responsibilities in relation to land. The 2D cadastral map is land-parcel base which is complex of the use in sharing joint parcel. The property unit can be topped on the other property units or in more complex structure and in some interesting on several surfaces.

2.2 The 3D cadastre

For more understanding and learning, the 3D cadastral objects are reviewed a cadastral user, a legal parcel object as a basic for organizing, storing, managing of cadastral data to sufficiently flexible accommodate or support the growing number of complex using and other interests in land. The important parts on registration of 3D cadastral objects are mainly concerned with the legal and instructional aspect.(Stoer ,2002) 3D cadastral institutions refers to different property units with different types of users are located on top of each or constructed in more complex structure of those property units within one base parcel or crossing base parcel boundaries.

3D cadastre, accessions, 3D cadastre, can be horizontal and vertical ownership of the adjunctive parts which are increased or added to the main object. The vertical accession means the owner of the land owners what are attached to the land, such the building, trees and other thing that fix to the land if other right or restriction have not been created on these adjunctive parts. Horizontal accession is the rule to regulate that the parts which over the boundary and reach another parcel are belong the main properties but the encroaching parcel. The part over the boundary must be a construction part of the main part on the other parcel and this accession should be approved by all parts involved in this situation. Easement is a common method of meeting a property unit's need of space for particular purpose in another property unit as a right to use another's properties in 3D situation. Right of superficies to allow the holder to own the constructions on under or above someone else's land, this right means that the ownership of building is separated from the ownership of the ground below or above by means of a separate title. Apartment and condominium rights, the building unit is one partition of the entire building divided by the ownership. In different jurisdictions, the right of these 3D situation as apartment complex is dealt in difference ways.

2.3 The 3D specification

On the previous 3D cadastral reviews, the space related to the land surface parcel is used intensity, construction cross or above the boundary of land or located on top of other. There are two alternative concept to describe:

ECE(1996) describes land boundary is like an infinitely small thin surface extending from the center of the earth to infinite in the sky and this boundary surface intersect the land ground along the land boundary line. The land rights are the rights of the space bounded by this surface. There is no explicit limitation in the vertical extension of the parcel space, a space from center of the earth to the infinite of the sky, if some restrictions are not set on to regulate this space right.

On the other hand, the vertical extension of the land surface parcel has not been limited in legislation and provisions. A common concept view is the space of the land surface that extends vertically downward and upward as far as the ownership has any economics interest to the owner of the surface property. The other person in most case are allowed to use the space above and below the parcel as long as the interest of original owner are not damage.

For consideration, the right of condominium is considered as part of common law jurisdiction constituting a specific law of ownership for the holder own individual unit within a building together with an undivided interest in common area. A condominium is a type of joint

ownerships of real property in which a party of the property are commonly owned and other parties are individually owned. While the right of apartment is based on the co-ownership which means the owners of apartment jointly own the entire building and the ground below and each owner holds exclusive right to use a certain part of the building.

Separation of building ownership and land ownership, constitutes an exception from the superficies alone credit principle. The party holding the building right has ownership over the building and the right of the land. The building right is established with a valid contract concerning to the obligation to establish the building right and containing permission followed by a registration in the relevant land register.

3. EXPERIENCE OTHER COUNTRIES

Several countries have worked on 3D cadastre efficiently which will be the lesson to learn.

3.1 The studying

In British Columbia, Canada, the air-space parcel is subdivided from the existing land parcel and is registered separately. The air-space means a separate 3D space ownership apart from the traditional parcel. Air space parcel can be used for stratified property, but also for purpose of later granting a right of view to benefit a parcel next to planned construction. The air space is further divided into strata lots by the provision of a building state plan.

In Queensland, Australia, 3D parcel is defined as parcel with bounded volume (volumetric parcel, building parcel) on parcel apart from the land surface (restricted parcel). A 3D parcel established the volume right unrelated to land surface. These 3D parcels are used to register the 3D property units and the 3D parcel is available in cadastre with 3D spatial descriptions.

Greece, horizontal ownership is based on the customary law, the horizontal ownership of properties in 3D situation is definite by percentage of ownership on the land parcel such as 0% to the owner of floor or a part of floor, 100% and subsoil to the owner of the ground-floor and the owner of the air can be transferred to another.

3.2 The results

Based on the evidences, all right in 3D situation are related to the interest on the occupation or multiple use of the 3D land space, therefore the 3D cadastral object can be classified in 3D object with co-ownerships, and with fragmental right, and 3D space. To clearly register right of 3D objects in co-ownership, a plan is needed to demonstrate the real situation while in this plan the elevation information may be presented or may not be.

3D objects with fragmental right below and above several land parcel according to the existing registration possibilities can not be registered property as one cadastral object in registration. They are projected on the land surface, either divided into a number of parcels corresponding to the surface parcels in whose space the object is located or new parcel are created on the land surface and registered with special code indicating the location of the 3D object. Consequently, the right of a real estate object is fragmented in cadastral registration.

3D space, the title to land can be stratified, and the owner can hold a 3D space below or above the land surface, air space parcel. The 3D space turns to be the registration object.

Although the 3D space right is apart from the land surfaces, the registration still relied on 2D method in cadastral registration. However, the 3D space provided a legal space for the existence of 3D cadastral object.

3D cadastre is a cadastre that registers and gives in sight into right and restrictions not only on parcel, but also on 3D property units.

4 . THE 3D CADASTRE REVIEWS IN THAILAND

At present, 3D cadastre will be focus, eventuality, most cadastre consisted of 2D geometric description of land parcels linked to other records describing the legal aspect, such as ownership. In major urban centers with high densities of population and land use intensibility, space under and above the surface is considered a growth interest in using.

In Thailand, 3D cadastre is able to define and manage the related juridical representation satisfactory description and registering today. The more and more vertical dimension situation, not only condominium is related to the registration of legal stage or real estate object. 3D cadastre is being challenged to register such situation with the framework of existing register and spatial data set. It is a scientific challenge to identify and develop practical geometric description. The representation of legal boundaries of parcel used for registering the legal status is fixed in 2D parcel base on a natural reference system. The vertical dimension of real estate objects are registered in legal document and administration base strata title legislation. Is it possible to create a geometry accepted definition and administration of a 3D properly, the right to use a creation volume of 3D object.

4.1 The registration system

Thailand registration system is Torrens title system in principles as;formally land rights, only land ownerships, must be registered in all land transaction, otherwise no legal security. Land registration is obligation in land transaction and land registration authorities.

Verification, the registration authorities must verify the application of the registration including the document presented and legal registration to transfer the land.

Registration credibility, land rights or land transaction in the land registry book have the force of substantive law. The land rights of goodwill have legal effective for the third part, non repudiation of land right and non obligation to return the land.

Compulsory registration, all land must be initial registration, afterward each land rights transfer must be registered as the transfer registration.

Land register book, the book is authoritative record kept in government office by the land code which maintain and warrant the register.

Land certificate, the land registration authority have to issue the certificate to the claimant after recording the land right and land transaction items in the land register book.

No Building and other constructions included in the land register, the land registration object is only object, not including building and other appendage on or under the land. The owner of the building can be both apart from and attached to the land ownership so that right on building are ownership and mortgage.

In case the building is partition owner by several persons, apartment building, the whole building is divided in to the building unit by the ownership. This kind of building ownership

is called “Partition Ownership of Building” in Thailand. The land user is hold in undivided shared which may vary in size.

4.2 Condominiums code

Condominiums building registration is the process to verify and record of building ownership and mortgage. The creation, transfer and diminish building rights should be verified and registered by the department of land where record and maintain the legal status of building right and the building ownership certificate issued to prove house property right.

General Registration is done when there are no building registration before or existing registration become useless. When building registration needed as apartment and condominiums, the whole new building is registered as one entity. The ownership of the building can be transferred, rebuilt and mortgage. The surveying and computation of the building is to survey the construction acreage and the land use area of the building which is recorded in cadastral system. About the construction acreage is the sum of horizontal projected area of each floor and can be subdivided in to the acreage of private unit in case of partition ownership of building.

Condominiums building registration has been responsibilities by DOL after local government authority given construction license by construction code and city planning control. Those documents are application and registration documents in the processing cadastral registration. The registration documents in register procedure are legal document and consistent with information on building ownership certificate. Building registration form is described on building type, location, parcel number, building orientation, structure, construction area and building plane, one by one building ownership certificate. The surveyor make cadastre investigate form which is similar field investigation.

5 ANALYSIS IN 3D SITUATION

In Thailand, there is only condominium registration as 3D situation on a parcel with definition boundaries as a property right. Parcel has been still be main entity in the cadastral system and the building can be on the land surface including below and under the land surface. The land parcel related to the building in 3D situation by the level of each floor in the building. The new land user can be provided by the legal supporting on the vertical dimension which can not damage to other land users. That is a 3D space parcel represented and registered in the vertical dimension as a legal boundary separated from existing parcel on the land surface on the space. Without geometry spatial object to compose a surface parcel called sub-parcel is defined a group of administrative parcel object. For hybrid solution, 2D and 3D information are both available and can be combined by 2D in traditional system while 3D situation is tagged. The technical views are not suggested on this paper, it is just only registration for 2D parcel and 3D situation in one system advised.

The same as most countries for determination of 3D cadastral system to get the better solution from 2D cadastre giving more characteristic in the legal and physical situation above the land surface. In the frame work of 3D cadastral registration, Thailand has only condominium right which making in certain case to present 2D cadastral system in sufficient to describe the 3D cadastre. The basic real property object are two-dimensional real property object (land parcel)

and three-dimensional real property object above the surface only condominium.

5.1 The documentation

Condominium unit title deed (nang sue kammasit hong chout) is the form of title deed, evidence of ownership of a condominium unit. It is importance similar to the land title deed (chanod) from the administrative procedures related to the registration and issue. The case of two dimension real property ownership, land parcel, is traditional system with spatial characteristics in 2D, it is horizontal ownership in digital form.

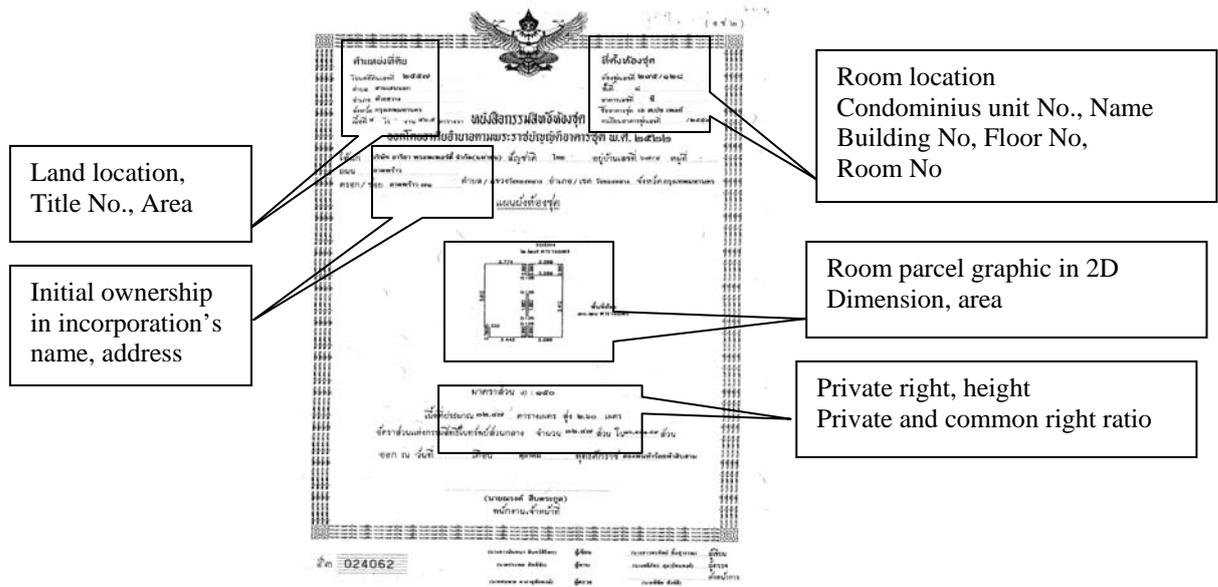


Fig 1. Front of Title of Condominium code

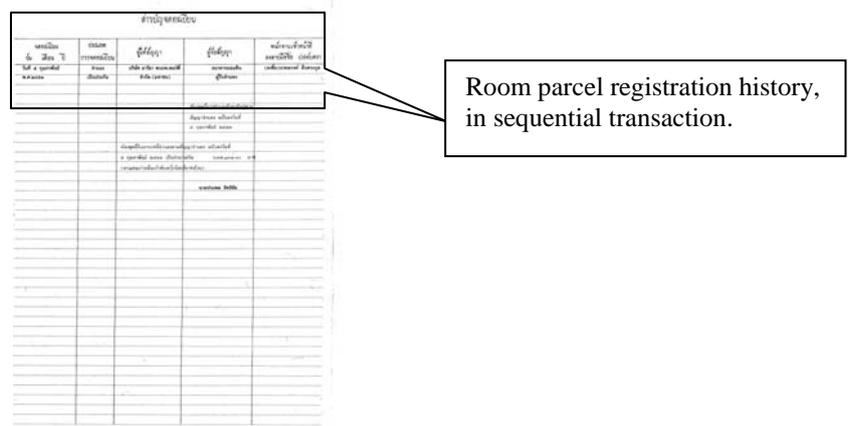


Fig 2. Front of Title of Condominium code

In case of condominium is vertical ownerships which are administrated procedure without

spatial characteristics in 3D. The existence of 3D objects found on land parcel which are expropriated by the current legal situation as the legal boundaries extend from the surface up to the specific height. It is the only legal boundaries, legal land object take place registered in the cadastre. The ownership is separated from the ownership of the above land parcel that means parts of the building that is not the unit such as land on which the building is constructed or other properties provided for common use.

For 2D cadastral system, traditional system, in digital map and registration data base can show the title in Torrens system that could be verified in UML.

5.2 The UML model

The UML class diagram of 3D right object is shown, Fig 3, the 3D representation of a right that is established on a parcel. The 2D extent of a 3D right-object is the actual boundary for limiting of the space where the right applied in the vertical dimension of the rights established. All 3D right objects belonging to one physical object can be found since they refer to the same 3D physical object. The current administrative model is based on three classes in UML: person as subject, parcel as object and right. When registration 3D situation is needed defining as cadastral object, together with the holders of these objects, the three classes were composed of dependent classes. Subject class are generated to non person, parcel class is super class of 3D building as high rise and large building in the code, condominium, where has to belong to 3D right. The holder on the condominium is not the owner of the surface but has limited rights on the parcel such as right of building or a right according to administration.

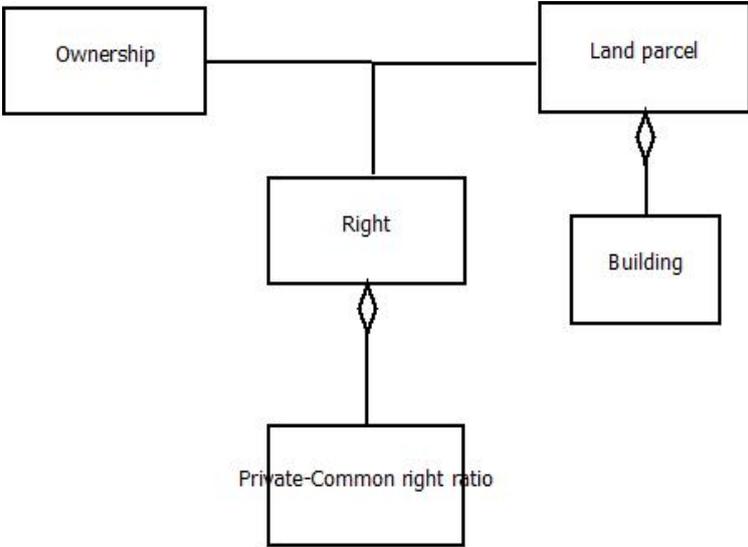


Fig3. UML class diagram of 3D object

6 FEASIBILITY FRAMEWORK

Cadastral processes have been established by the registration of existing right on the 2D surface parcel without linking any explicit construction on the parcel. Another parcels on the surface can be defined the legal status in 3D situation. The title, which is at the basic of the registration, is composed of drawing and description which is very useful in complex situation. The drawing is on the title to clarify a situation provided additional view in dimensional legal boundaries, it is a part of the title. Drawing are shown for the establishment of the right of condominium. Height is not included of the drawing that is infringed the concept of the 2D legal object.

Currently 3D situation in Thailand is only condominium where are based on 2D legal object. A 3D solution is not necessary from a strictly legal and cadastral point of view. The purpose of 3D situation is to provide legal security concerning only high rise building. The complex 3D situations requirement should be identifiable and their registration should be accessible directly. At the moment the accessibility of the registration in 3D situation is poor on technical view. The people may not be aware of a 3D situation, just let alone the public at large and the non spatial cadastre. It is mainly for information part of view existing the better legal security of 3D situation including the consistency and redundancy of the data in case of the intersection of the parcel on each floor or another vertical facility.

The land parcel and the building on it form a real estate registration system in 3D situation described condominium right. The cadastral in 2D situation system have been sufficient by showing the 3D situation on description on the Torrens System. The Torrens system provides a state guarantee of registered interests an assurance fund to compensate owners whose interests are overcome due to an error at the Land Titles Office, DOL. The operation of the system has been described thus: the cardinal principle of the statute is that the register is everything, and that such person has an indefeasible title against all the world. In case of actual fraud on the part of the person dealing with the registered proprietor has to except by special code, condominium code. Under the system of transferring, or conveying each unit or parcel, the history of the property can be examined to ensure the seller can convey good title to the purchaser. When the property is sold, a deed is filed and recorded with the DOL official. The deed contain the names of the seller and the buyer, and the legal description of the property being transferred. The good title passed with each transaction. If any problems exist with the titles, they must be remedied before the purchaser may obtain good title. Also the examiner of 3D situation title can review the legal history of the unit on condominium of the land.

7 CONCLUSION

Thailand 3D cadastre in reality, the registration of 3D real property is only condominium which must be large building by code as the systematic effort to solve with legal object without technical problem in 3D dimension graphic. The legislation processes has been as 2D cadastre without vertical drawing information. All 3D information is described in legal recording including height and ownership right on the building.

The solution of 3D cadastre in Thailand was found that 3D object in right is the most necessary without accuracy in 3D space and is showed in graphic on title. The 3D object can

be extended on 2D cadastral system by data record for vertical information. If there are others type of 3D cadastre, the legal object has to be defined specific code without 3D space object accuracy in spatial data that is made 3D cadastre more simple due to without topology and geometric precision. Moreover, the public do not need to view 3 dimension graphic that the cost is not expensive in the system.

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BIOGRAPHICAL NOTES

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