

# LEGAL AND ORGANIZATIONAL ASPECTS OF MALAYSIAN 3D CADASTRE

Muhammad Imzan Hassan  
Alias Abdul Rahman

Department of Geoinformatics,  
Faculty of Geoinformation Science and Engineering,  
Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia.

## ABSTRACT

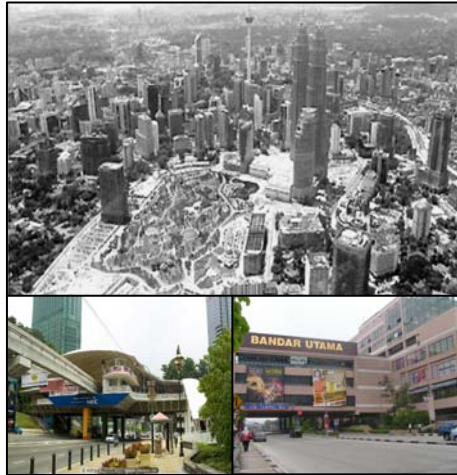
Cadastre, being the core component of a land administration system, plays an important role in a modern economy is rapidly developing among people in the economic, land related fields or even to the layman. 2D cadastre mapping is being practiced in Malaysia and at the moment it provides vital land and property information like ownerships of the parcels for most parts of the country. However in very near future, this 2D information may not be able to serve more advanced situations for example in large cities. How do they deal with 3D situations, concerning legal as well as organisational aspects and can we learn from other countries? In Malaysia, JUPEM is responsible for preparing, producing and managing the spatial data including the surveying and mapping of the cadastre parcels. The non-spatial data (i.e. the registration) is being the responsibility of the Land Office (i.e. the "PTG"). Even though the intention of this research is not to develop a full-blown operational 3D cadastre system and it focuses mainly on the technical aspect of the cadastral system, the institutional aspect cannot be ignored. Perhaps this paper could generate interest and afford on doing research on the institutional aspect of Malaysian 3D cadastre. Primarily, relevant aspects have to be considered before

the implementation stage is the technical as well as the institutional. However, the institutional aspect, it seems still far away from full 3D cadastre system.

## **1.0 INTRODUCTION**

What is Cadastre? Nowadays, awareness that cadastre, being the core component of a land administration system, plays an important role in a modern economy is rapidly developing among people in the economic, land related fields or even to the layman. Cadastre supports economic development, social stability and environment management for the country. According to International Federation of Surveyors (FIG), cadastre can be defined as:

*“A cadastre is the core or basis of a land administration system and is defined as a parcel based and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of interests, the ownership or control of those interests, and often the values of the parcel and its improvements.”*



**Figure 1:** Kuala Lumpur city centre, the busiest and most complex city in Malaysia

## 1.1 Needs of 3D Cadastre

Traditionally, cadastral registration systems are parcel based systems and it is in 2D nature. 2D cadastre mapping is practiced in Malaysia and at the moment it provides vital land and property information like ownerships of the parcels for most parts of the country. Obviously current cadastral information serves most of the users need for decades. However in very near future these 2D information may not be able to serve more advanced situations for example in large city centers (see Figure 1) because one way to deal with this situation is by having a more advanced cadastral system like 3D cadastre. This means we need to extend the 2D system into a three-dimensional (3D)(Rahman, Stoter et al., 2005). The disadvantage of the solutions to

register 3D property units in current cadastral registration is that the 3D information is not integrated in the spatial part of the cadastral database. Therefore it is not possible to view the 3D situation interactively. Major primarily relevant aspects have to be considered before the implementation stage of having 3D cadastre system for Malaysia is technical as well as institutional aspects.

## **2.0 WHY INSTITUTIONAL ASPECTS ARE IMPORTANT?**

Major primarily relevant aspects have to be considered before the implementation stage is technical as well as institutional. It is evident from the fore going system development that the “institutional” aspects are important as the technical aspect in ensuring the successfulness of the implementation stage. Institutional issues can be broadly categorized into four main aspects, namely legal, organizational, social and financial. However, only two aspects have been chosen in this paper, which are the legal and organizational issues. The choice of only two of the identified issues was made because of the limits of resources available and particularly the time factor. The two issues are apparently the logical choice to be given emphasis for this study. In making the choice, consideration has been given to the fact that the implementer and concerned parties were keen and had greatest concern in the implementation aspect or “how to go about implementing 3D Cadastre for Malaysia”, above everything else.

### **3.0 3D CADASTRE ABROAD**

There are many countries throughout the world have experienced which has led to multilevel buildings and properties. How do they deal with 3D situations, concerning legal as well as organisational aspects and can we learn from other countries?

On 2004, Stoter have reviewed several countries based on the results of few international workshops on 3D Cadastres. She had a closer look at 3D cadastral issues in six selected countries and states: Denmark, Norway, Sweden, Queensland (Australia), British Columbia (Canada) and Israel. She noticed that these countries is either that the discussion on 3D cadastral issues has already started or that these countries have introduced solutions that solve (part of) the problem of 3D Cadastre.

The problems of having 3D Cadastre are depending on the national legal system and the state of the art of the cadastral registration in the specific country. One of the aspects that seem to influence the development of 3D registration is the basis of the legal system. However, the legal system in those countries provided the possibility to establish multilevel ownership no longer related to surface parcels. Unlike Malaysia, where property rights to real estate is still land (surface) oriented. In most countries the registration of apartment rights is different since every country has its own specific problems concerning 3D registration and also its own specific juridical and cadastral framework (dependent on the historical background). However, no cadastral registration has been found that is able to reflect the third dimension of rights as part of the cadastral geographical data set.

The main idea of having the discussion is to get the information on how other countries faced the problems on having the 3D Cadastre for their country. Stoter (2004) assessed the different between the countries by examining the following questions:

- How can 3D property units be established within the existing juridical framework?
- What was the main trigger to establish 3D property units or to start the discussion on how to establish 3D property units? Do 3D property units exist as independent properties in the land registration?
- Do 3D property units exist as independent properties (with 3D geometry) in the cadastral registration, and if so, how (e.g. with link to 3D geometry or integrated in cadastral geographical data set)?
- What are the main shortcomings of current registration of 3D property situations?

### **3.1 Evaluating International 3D cadastral issue**

From the discussion did by Stoter, she conclude that, in Denmark the separate registrations of real property in the land registration and of real estate in the cadastral registration makes it already difficult to check the legal status of 2D situations (most likely to Malaysia situation). Therefore, the first step towards a 3D cadastre requires linking the land registration and the cadastral registration more closely together, allowing both registrations to access the information of each other. The other five countries are, or will be soon, able to establish 3D property units with multilevel ownership no longer related to surface parcels within the existing juridical framework (with some extensions).

#### **4.0 CURRENT SITUATION IN MALAYSIA**

Malaysia is a well developing country with the plenty of big cities all over the country especially the city of Kuala Lumpur. The high rise buildings have been built in order to optimize the limited space. Hence, more complex buildings being built to cater the needs of the people who do business or stay in the big city. The complex buildings have different architecture design and latest technologies situated in the limited space like in Kuala Lumpur (see Figure 2).



**Figure 2:** One Utama Shopping Mall with the building above the road

With the technologies nowadays, buildings have been design in a complex way to occupied and optimize the space. Some of the buildings been built on top of each others or with the cross boundary edge. The major problems that will be address in this research are about the cross boundaries buildings. How the buildings or the properties should be register? Is the current cadastre system sufficient enough to handle the registration of these complex buildings?

Cadastre system is being used in some government agencies such as Local Authority and *Lembaga Hasil Dalam Negeri Malaysia* (LHDNM) to support the valuation and taxes system. In Malaysia, there are two organizations responsible on managing and maintaining

the cadastre system (Gengatharan, 2005). The Department of Survey and Mapping Malaysia (JUPEM) deal with the cadastral survey with high accuracy survey determine the location, dimension and size of the properties. JUPEM is responsible for preparing, producing and managing the spatial including the surveying and mapping of the cadastre parcels. The non-spatial data (i.e. the registration) is being the responsibility of the Land Office (i.e. the PTG). PTG deal with the ownership registration, whose owns what (3R; Right, Responsible, Restriction). In Malaysia, the cadastre system is being managed by two different organizations. Both organizations have their well developed system called CLRS (Computerised Land Registration System) in PTG and CDMS (Cadastre Data Management System) in JUPEM. Unfortunately the systems works separately in each organization and is still in 2D in nature (Chai, 2006). As far as Malaysia is concerned the needs for this research output is clearly sought after by the National Mapping Agency (NMA), i.e. JUPEM and the Land Office (LO), i.e. The Land and Mines Office (PTG). With the rapid development of technologies and technique, both systems could be integrated to cater the needs of 3D properties registrations.

#### **4.1 Evaluating Malaysia 3D cadastral issue**

*How can 3D property units be established within the existing juridical framework?*

Similar to Denmark situation, real property is always related to surface parcels. Currently the legal description of land differentiates lot (surface parcel), strata parcel (multi-storey apartment parcel) and stratum parcel (underground parcel). The owners of the multi-level building or apartment are restricted in using the whole parcel column by strata rights.



*What was the main trigger to establish 3D property units or to start the discussion on how to establish 3D property units?*

Before this, there is no serious discussion on having the 3D property right, until the responsible bodies have difficulties on registering complex 3D properties on space with a different land use underneath the property. Since this concept is a limiting factor for establishing and providing insight into the juridical situation in the case of 3D property situations, the question arise as to how to establish and register 3D property units.

*Do 3D property units exist as independent properties in the land registration?*

Limited rights and strata rights are only known in the land registration. The legal documents that establish the title can be accompanied with drawings of the situation. In this case a drawing with an overview of the floor(s) is included in the document in which the apartment right is established.

*Do 3D property units exist as independent properties (with 3D geometry) in the cadastral registration, and if so, how (e.g. with link to 3D geometry or integrated in cadastral geographical data set)?*

Currently, there was no 3D property unit being registered in the existing 2D registration system because its only contains a parcel registration. The land registration always has to be queried to determine what rights are established on a parcel.

*What are the main shortcomings of current registration of 3D property situations?*

In the current registrations of real property, information on the 3D situation is not readily accessible, since information on property registration is maintained in two different organisations (NMA and LO). To bring the land registration and the cadastral registration together requires decisions at the political level.

## **5.0 LEGAL AND ORGANIZATION ASPECTS ON 3D CADASTRE FOR MALAYSIA**

This section shall evaluate the available options in proposing an appropriate Malaysian 3D cadastre, from the legal, as well as the organization aspects.

### **5.1 Legal Aspect**

The basic concept of land parcel (lot) in Malaysian land law is the infinite ownership space defined as a cone down to the centre of earth, with boundaries on the surface extends vertically upwards and downwards to an extent. Its adjudication consists of two parts, first the ascertaining of the physically surface boundaries by surveyed boundary marks, then the official ascertainment of rights in land via registration and issue of documents of title.

However, it should be noted that existing Malaysian Cadastre deals with properties located not only on the surface, but also above and below the surface level. For all intents and purposes, the rights and responsibilities of the proprietor of the surface parcel shall also apply to the proprietor of the underground land.

There are also provisions to survey and issue title for strata and stratum. The parcel is defined by the bounding floor, walls and ceiling. Individual parcels are then issued with strata title in accordance to a strata registration. On the other hand, the cadastral map or digital cadastral database (DCDB) is only two-dimensional in nature. It contains neither altimetry information nor detailed information of existing objects or structures within the parcel area. The vertical

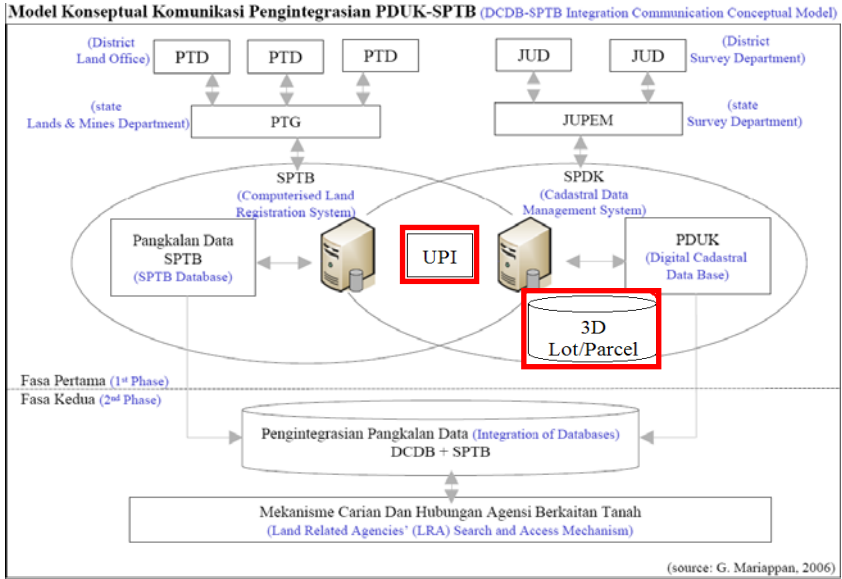
dimensions are only available on the strata and stratum certified plans, as scanned images in the image library.

## **5.2 Organization Aspect**

The cadastral system comprises a land registration system and a cadastral registration as key components. Land registration is a state government responsibility while cadastral registration is under federal responsibility.

According to Chai in 2006, experience in developed countries has shown that stand-alone or isolated approaches where data and processes were maintained separately are not sustainable. A non-unified land registry system is known to have the following shortcomings:

- Legal administrative and cadastral mapping data integrity is not well maintained.
- Work flow, data updating and data service are less efficient (incomplete DCDB and patches of irregularities of SPTB and DCDB)
- Quality and consistency of information are difficult to maintain due to parallel registration and updating
- Less cost effective (examples include overheads to deal with two separate government departments for one land related transaction – one might be located at the state capital but the other at district, or extra efforts to ensure data integrity during data exchange as both set of records are inter-dependant)



**Figure 3:** Integrated Cadastre System with 3D Lot/Parcel Enablement (partly from G. Mariappan)

### 5.2.1 Integration of the cadastral databases (SPTB with DCDB)

DCDB and SPTB could be integrated electronically. Furthermore the integration of the spatial database of DCDB with the textual database of SPTB is the prerequisite requirement for the formation of a comprehensive land information system. There is currently a research to investigate how best these two standalone databases can be possibly integrated. G. Mariappan proposed a mechanism to integrate these two databases. Conceptually the proposed process can be illustrated as in Figure 3.

Nevertheless, there are many hurdles to cross at current stage of practice. G. Mariappan underlines the following issues associated with the proposed integration:

- Organizational - there is no mechanism for exchanging data among organization
- Technological – compatibility of existing hardware and software
- Data - data quality and integrity
- Legal - data custodian and rights
- Different working procedures and practice

## **6.0 CONCLUSIONS**

As can be concluded from this paper, none of these solutions is a complete solution for 3D cadastral registration. Digital description of the 3D property unit in vector format is not maintained (only scanned or paper drawings) in the land registration. Therefore, the 3D property unit cannot be viewed interactively and the geometry because 3D properties are still not incorporated in 3D in the geographical data set of the cadastral registration. To query the 3D situation is quite impossible.

Although the examples of establishing multilevel ownership show good potentials for a 3D cadastre, but on the institutional aspects for Malaysia situation, it seems we are way behind to have the full 3D cadastre system. As per written by Stoter in 2004:

*“In countries where the concept of ownership of real estate is still restricted to a surface parcel, the 3D cadastre either has to find solutions to improve cadastral registration using the concept of a*

*surface parcel or has to reconsider the traditional concept of ownership."*

This paper is a part of the research on Developing Malaysian 3D Cadastre System. Even though the intention of this research is not to develop a full-blown operational 3D Cadastre System and it focus mainly on the technical aspect of the cadastral system, the institutional aspect cannot be ignore. Perhaps this paper can be a start to generate interest and afford on doing research on the institutional aspect for developing Malaysian 3D cadastre.

## **BIBLIOGRAPHY**

- Abdul-Rahman, A., J. Stoter, et al. (2005). Towards 3D Cadastre in Malaysia. ISG 2005, Penang.
- Chai, C. S. (2006). Toward a 3D Cadastre in Malaysia - An Implementation Evaluation. Delft, Delft University of Technology: 110.
- FIG (1995). Statement on the Cadastre, report prepared for the International Federation of Surveyors by Commission 7 (Cadastre and Land Management).
- Gengatharan, M. (2005). Model Konseptual bagi Pengintegrasian Pangkalan Data Ukur Kadaster dan Sistem Pendaftaran Tanah Bekomputer. Faculty of Geoinformation Science and Engineering. Skudai, Universiti Teknologi Malaysia: 127.
- Imzan Hassan, M., A. A. Rahman, et al. (2006). "Developing Malaysian 3D cadastre system : preliminary findings." In: Innovations in 3D geo information systems : selected papers from the 1st international workshop on 3D geoinformation science and engineering, 7-8 August 2006, Kuala Lumpur, Malaysia / ed. by A.A. Rahman, S. Zlatanova, V. Coors. Berlin : Springer, 2006. ISBN 3-540-36997-X. pp. 519-533.

- Nordin, A. F. (2001). Institutional Issues In The Implementation Of The Coordinated Cadastral System For Peninsular Malaysia: A Study On The Legal And Organisation Aspects. Geomatic. Skudai, Universiti Teknologi Malaysia.
- Stoter, J. E. (2004). 3D Cadastre. Netherlands Geodetic Commission NCG : Publications on Geodesy : New Series;57  
PhD thesis Delft University of Technology; Summaries in Dutch and English. Delft, Nederlandse Commissie voor Geodesie (NCG): 327
- Stoter, J. E. and P. J. M. van Oosterom (2006). 3D Cadastre in an international context : legal, organizational and technological aspects. Boca Raton, Taylor & Francis  
CRC.
- Stoter, J. E., P. J. M. van Oosterom, et al. (2004). "3D parcels basis for 3D cadastre? : comparison of conceptual 3D cadastral models in different countries." *GIM international : the global magazine for geomatics* 18(6).
- Stoter, J. E., P. J. M. van Oosterom, et al. (2004). "Conceptual 3D cadastral model applied in several countries." In: *Proceedings of the FIG working week 2004 : The Olympic spirit in surveying : Athens, Greece May 22-27, 2004.* 27 p.
- van der Molen, P. (2001). "Institutional aspects of 3D cadastres." In: *Registration of properties in strata proceedings of an International workshop 3D Cadastres, Technical University Delft, 28-30 November 2001.* pp. 53-66.
- van der Molen, P. (2003). "Institutional aspects of 3D cadastres." *Computers, Environment and Urban Systems : an international journal* 27(4).