

NEW CADASTRAL SYSTEM TOWARDS SUSTAINABLE DEVELOPMENT

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ABSTRACT

The urban population in Asia has increased by 550 million people during 1960-1990 and is expected to increase by 1,286 million people by year 2020 (Ji, 2007). Since late 1990s, the population of Malaysia has increased from approximately 21.80 million to 27.73 million in 2008 (Statistic, 2008) and it is predicted to reach 31 million by 2020. Cities in State of Penang, Selangor, Kuala Lumpur and Johore have so far absorbed their growing numbers in settlements with a varying quality of living and the complexities of the extreme modern buildings are expected to be designed and built in the near future. Unfortunately, the existing Malaysian Cadastral System and legislation for 2D parcel is unsuitable for representing the land rights in 3D situations for those rapid increases for development and technical purposes. Hence, an efficient 3D land use in real estate property especially for multilayer objects is directly linked to the socio economic and environmental development in Malaysia.

This paper describes the overview of Malaysian Cadastral System for 3D purpose and the situation in Malaysia. We explain the current practice of cadastral registration in Malaysia and the Malaysian Cadastral Data Model are elaborates also. The Malaysian Digital Cadastral Database (DCDB), Computerised Land Registration System (CLRS) and Cadastral Data Management System (CDMS), the development of 3D Cadastre registration and the integration of CLRS and CDMS are illustrates respectively.

Throughout the paper it is hope that this new approach can bring to planning and construction sustainability in Malaysia.

KEYWORDS

land administration, 3D, legislation, cadastre, property rights.

1 INTRODUCTION

A systematic record of lands matters involving registration of the details of transaction such as transfer of land and interest, lease, charge, releasing of easement and change of condition of land is very important in the land administration, planning and development of land. As stated in UN-ECE (1996), land administration consists of Cadastral Survey and Mapping Registration System, and Land Registration System. Both systems contain different sets of records about land. These two systems are very important for the formation of a good

cadastral system. A cadastral system is an information system consisting of a series of maps or plans showing the size and location of all land parcels together with text records that describe the attributes of the land.

One of the important issues with regards to land is the inadequacy of vacant land for development. There are many countries from all over the world including Malaysia who do not have enough vacant land on the ground surface to cater for the rapid development, particularly in big cities. In densely developed area and crowded cities, many of the real estate developments are either above or below the ground surface.

2 OBJECTIVES

In view of the Malaysian Cadastral System that is based on the 2D cadastre, the purpose of this paper is to give an introduction on limitation onto private and public properties. Here, we identified some problems and constraints in current Malaysia Cadastral System for registration of 3D multilayer building. We explain the development, cadastral map and land title situation in Malaysia. This paper also shows the current cadastral registration system in Malaysia, the Malaysian Cadastral Data Model and Database. Finally, 3D cadastre registration development and the possibility of integration of Computerised Land Registration System and Cadastral Data Management System will be illustrated here.

3 3D CADASTRE & 3D PROPERTY

At present, there is a lot of development taking place that is not covered in the 2D cadastre system as there is a lot of interest in utilising land and space above and below the ground surface. From an institutional perspective, land administration includes the formulation of land policy, the legislative framework, resource management, land administration arrangements, and land information management as well as entails organisational. Thus, there is a necessity to find a suitable cadastre solution for multilayer building. The traditional cadastral system and land registry based on 2D have not been prepared to register this utilisation of land in a 3D situation. Therefore, the proposed 3D cadastre system should be able to represent the actual real world situation and not the surface parcel. The implication of these new ways of land use due to a high demand for ground space means that, there must be changes made to the 2D paradigm in law and legal aspects.

An earlier paper by (Tan, Hussin and Ernest Khoo, 2009a) did describe that today's property situations often occur whereby the third dimension play a significant role in determining the legal status of such property, especially in areas with multilayer use of space. Meanwhile, state roads and municipal roads belong to state government while federal roads belong to federal government. When a private property is constructed above the public road, the cadastral system should recognise two or more different owners at the same time. An earlier example of some cases for 3D cadastral parcel above the ground surface of public road in Malaysia was presented by (Tan, Hussin and Ernest Khoo, 2009b) and (Tan, Hussin and

Ernest Khoo, 2009c) determined it into three categories, i.e. building and transportation network over a public road and overlapping private properties.

4 CONSTRAINTS IN CURRENT MALAYSIA CADASTRAL SYSTEM

The current 2D Malaysian Cadastral System is insufficient to meet the changes brought about by the booming yet complex high density developments in urban areas. Furthermore, there is a growing interest and need for using space above or below the ground surface for multilayer building especially in metropolitan areas. Here are some constraints in current Malaysia cadastral system.

- a. In Malaysia, the main thing that hinders the progress has been the national legal system. There are no provisions and there is a lack of proper legislation in 3D land rights in Malaysia cadastre law to cater for the registration of legal and organisational aspects for 3D cadastral parcel in 3D cadastre as described by Stoter (2004). Many conflicts seem to exist between laws and statutes in current status.
- b. Cadastre consists of spatial and non spatial land information while land registration consists of non spatial (textual) information. Furthermore, land title registration and Cadastral Survey and Mapping Registration are located in different authorities in Malaysia.
- c. The property market is not operated accordingly. The value of any real property depends on its location and parcel area. The parcel areas in the Final Titles are based on the 2D area given in architect, engineer or surveyor plan as well as Certified Plan where parcel area was given after final survey completed.
- d. In Malaysia, public road i.e. state roads and municipal roads belong to state government while federal roads belong to federal government. When a private property is constructed above the public road, the cadastral system should recognise two or more different owners at the same time.

5 SITUATION IN MALAYSIA

There is a need for a refined description of land because land is the most valuable resource for humans and it is the fundamental or base for all forms of human activities. Since the last 15 years, urbanisation of Malaysia in an amazing speed and millions of people migrate to the cities, especially in Georgetown, the city of Kuala Lumpur, city in Selangor and Johore. The areas of the cities are expanding and at the same time, construction projects keeping running in the urban area. The skyscraper and transportation network constructions, which are for multiple uses are now seen in all major cities of Malaysia. However, the experiences on registration, management, real estate market and legislation show that there are insufficient of such 3D cadastral parcel legislation.

The cadastral system is adopted worldwide and Malaysia is one of the countries who adopted the system for its land management. Malaysia land administration is traditionally based on the Malaysian land law and this provides a variety of rights that are dependent on the traditions of the country. It would be more practical if the Malaysian Cadastral System includes relevant information such as foundation of buildings, underground utilities, skywalks, using of air space, transportation services, and underground construction or whenever a situation arises for the need of exploiting a lot or land parcel for different activities (Tan, Hussin and Ernest Khoo, 2010).

After final survey of an individual parcel of land or a number of lands, Certified Plan will be produced for those plot/plots of land. It shows the lot boundary in various scales with a given Certified Plan number. Immediate after the approval of Certified Plan, the document of title, will be prepared, approved and issued to the owner. Unfortunately, these Certified Plan and Title mostly only represents the surface level of ground with individual land parcels by 2D boundaries, descriptions, rights, restrictions and responsibilities. However, it has difficulties to record and display the multiple uses of lands with the construction above and below the ground surface.

6 THE MALAYSIAN CADASTRE REGISTRATION SYSTEM

The current Malaysia Cadastral Registration System does not consist and includes 3D objects registration and 3D rights as well, but this current system is more similar to land administration system. As stated in (Tan, Hussin and Ernest Khoo, 2009c), land administration consists of Cadastral Survey and Mapping Registration System and Land Registration System where both of them contain a set of records about land. This type of 2D Cadastre system being practice in Malaysia for a period of one hundred years and it provides essential information about land and property like ownerships of the lots and land parcels for the country. In Malaysia, the cadastral system is managed by three main authorities namely Department of Survey and Mapping Malaysia (DSMM), State Land and Mines Office (PTG) and District Land Office (PTD).

In Malaysian Cadastral System, there are two systems namely Cadastral Database Management System (CDMS) and Computerised Land Registration System (CLRS) which operated by DSMM and PTG as well as PTD. The CDMS database stored land attributes, spatial objects and other things while the CLRS database stored land ownerships, land tenures and so on, but these two systems works separately in each organisation with difference legal aspect and still in nature of 2D. This mean, there are no 3D object property rights as well as 3D cadastral rights. These two systems later on can be incorporated in the registration form with the present advance and modern technologies such as GIS, internet, web based and e-commerce applications. Figure 1 shows the current system with the proposed concept of legal aspect for 3D objects registration and visualisation rights as well as 3D property rights. For more discussion and detail on 3D property rights, see (Paulsson, 2007).

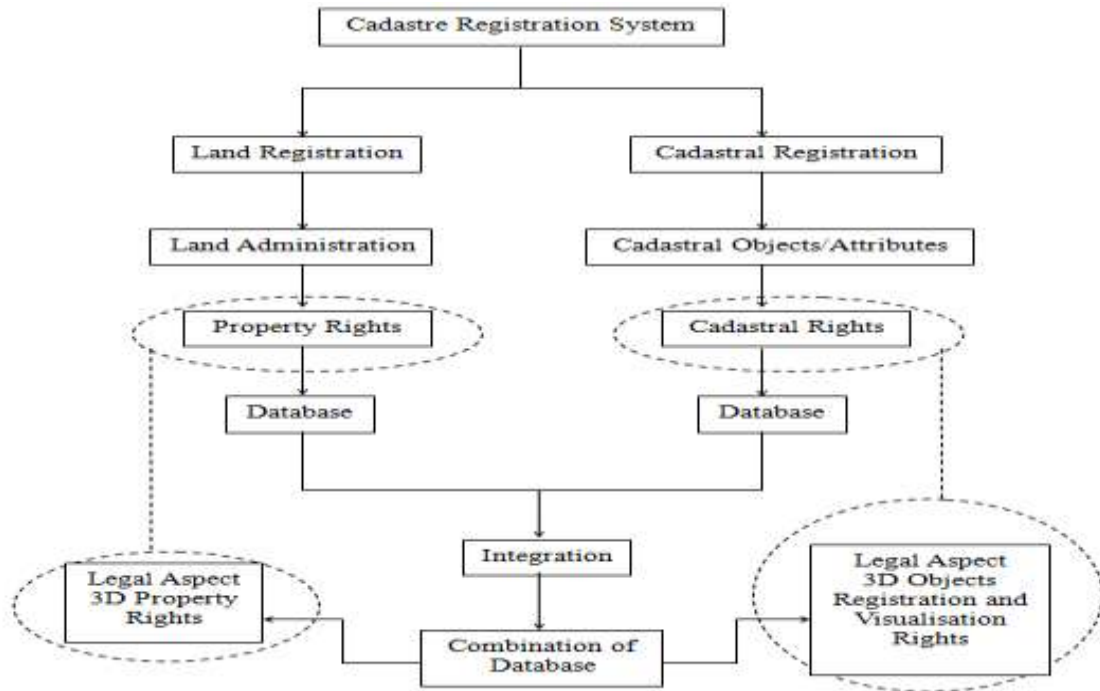


Figure 1: Current cadastral system with proposed concept of rights

7 MALAYSIAN CADASTRAL DATA MODEL

The Core Cadastral Domain Model (CCDM) which introduced in the current version of model (Van-Oosterom et al., 2006) mentioned that this data model is the foundation of most land administration. Which means that, this foundation of core cadastral data model is designed for various land registration system and cadastral system all over the world and as a base for all cadastral registration, therefore, in other words, the relationship between the three core classes in the UML diagram as in Figure 2, there are Person (subject), RRR (right, restriction, responsibility) and Register Object (real property objects), can used to illustrate Malaysia Cadastral Data Model.

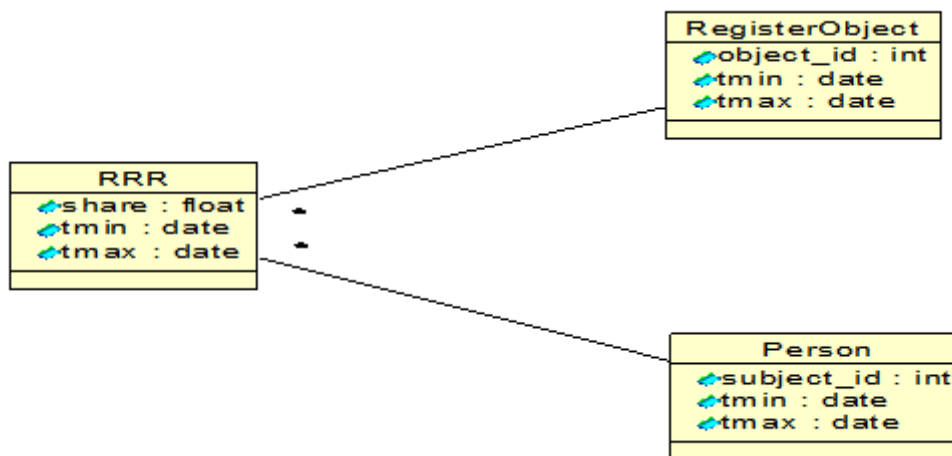


Figure 2: UML class diagram of CCDM: (Adapted from Stoter, 2004; Van-Oosterom et al., 2006; and Chong, 2006)

8 MALAYSIAN CADASTRAL DATABASE

The Cadastral Data Management System (CDMS) will provides a network for the DSMM to access the Digital Cadastral Database (DCDB) and the digital image library from any personal computer within the network, with a single window and single point of access. DCDB holds digital cadastral base maps that are used for building up GIS and land related applications, while the image library holds scanned and indexed certified plans stored in the disk arrays at every state survey departments.

With the implementation of the CLRS, a system to modernise and to facilitate the registration of land title and dealings, data are extracted from both the documents of title and other land related documents. Meanwhile, the information in the CLRS database are based on the records kept in the land registers and relevant files with include information on ownership (Person), land identification (Register Object), restriction (RRR) and record of dealings.

9 THE DEVELOPMENT OF 3D CADASTRE IN MALAYSIA

The development of 3D Cadastre registration are more on technical part where researchers study on the process of adding 3D Cadastre objects in the current cadastre data model and information accessible among DSMM, PTG and PTD, unfortunately the two state database which are CDMS and CLRS database works separately in different authorities and still in 2D situation. Recently, the 3D Cadastre proposed registration model focused on the combination of these two different databases mentioned above and these two cadastre registration databases namely the legal rights land attributes and the spatial objects geo-data.

The 3D Cadastre objects such as strata building, construction on, above and below the ground surface, i.e. underground tunnel, metro station, skywalk and other things is a real property object that being built on the 2D land parcel, which are the responsible by PTG, PTD and DSMM on the ownership registration and object registration respectively. Apart from this 2D land parcel, there is also a 3D land parcel, which is similar to 3D physical object based on the hybrid solution by (Stoter 2004), together form from the Register Object, where the 2D land parcel is represented as a 2D geometry while 3D land parcel is form with 2D geometry and 3D information.

To sum up, 3D Cadastre registration is a combination of land registration with 2D and 3D land parcel of cadastral registration. There are combination of legal rights of land attributes, 2D cadastral objects and 3D information. The combination of this concept data model can be shown in Figure 3.

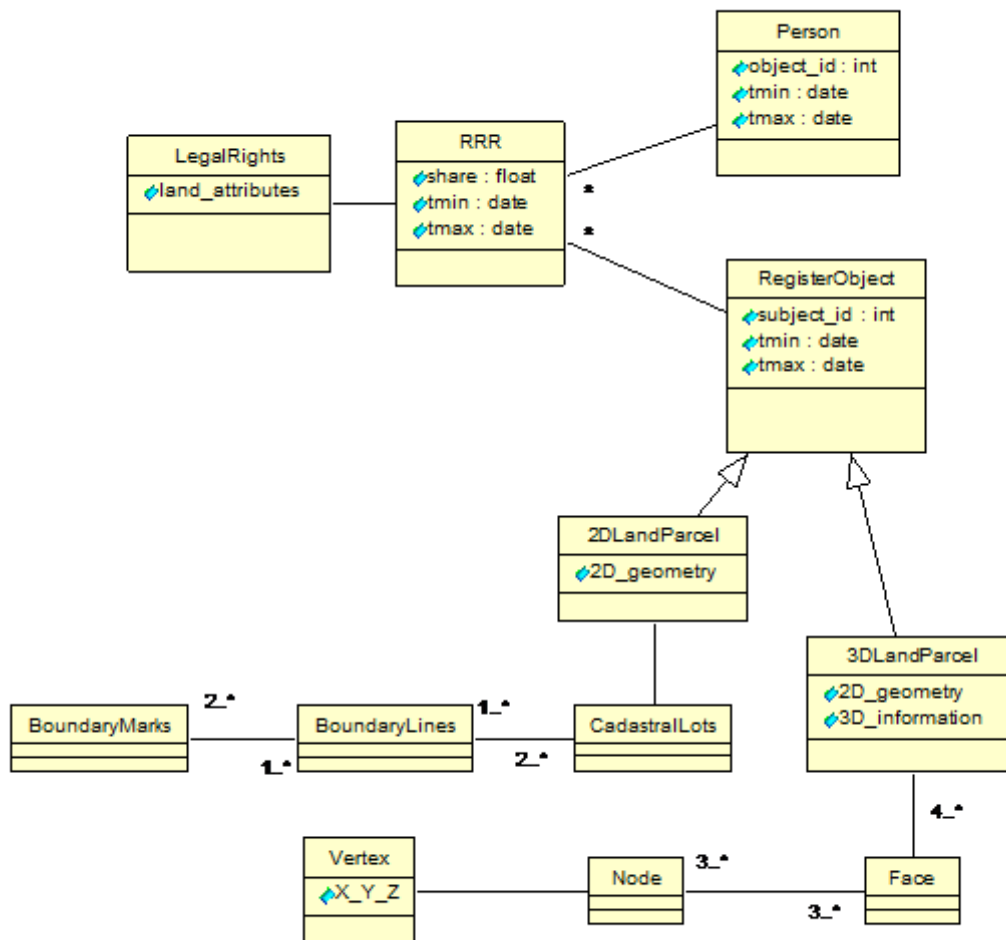


Figure 3: UML class diagram of 3D cadastre registration concept data model (Partly adapted from (Ahmad-Nasruddin and Abdul-Rahman, 2006))

10 INTEGRATION OF COMPUTERISED LAND REGISTRATION SYSTEM (CLRS) AND CADASTRAL DATA MANAGEMENT SYSTEM CDMS)

There could be extensive benefits if these two systems, which are CLRS of PTG and CDMS of DSMM, are linked together. For that reason, a pilot project being started in Kuala Lumpur in 1st April 1995 to electronically connect and integrate the CLRS with the CDMS for the whole Kuala Lumpur then to develop the operational systems that can subsequently be implemented throughout the country in Peninsular Malaysia. Therefore, with the integration of attribute data from CLRS and spatial data from CDMS and through identified application, efficiency of land administration can be greatly improved. Nordin (2001) stated that the envisaged applications include on-line registration for survey and preparation of title, extending DCDB enquiry module to the land administrators and on the hand, linking the Qualified Title information to the DCDB.

In order to achieve the goal of comprehensive Land Information System from district level up to state and eventually at the national level, the integration of spatial CDMS database with the

textual, CLRS database play a preliminary requirement of all these. Moreover, Mariappan (2005) introduced a mechanism to integrate these two standalone databases. Coordination among DSMM, PTG and PTD can be provided by the installation of centralised server or distributed server at each of their office which act as the transporters and bridges in exchanging data between CLRS and CDMS. Figure 4 illustrates the conceptual integration of cadastral survey and title registration databases. Although there are a lot of benefits from an integrated textual title registration database and the graphic as well as spatial cadastral database, but there are still many hurdles to solve at this stage.

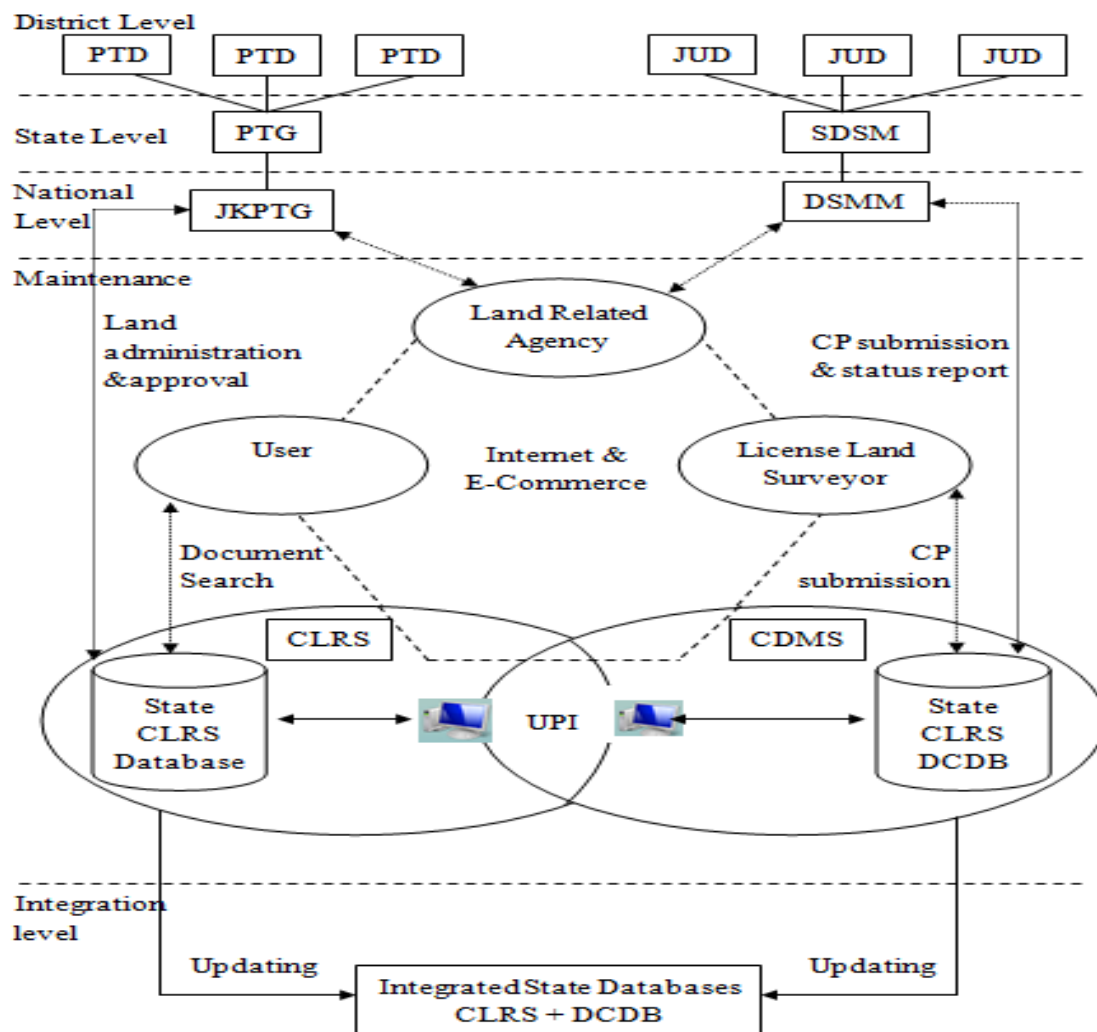


Figure 4: Conceptual model to integrate CLRS and DCDB
(Partly adapted from Mariappan, 2005)

11 CONCLUSIONS

Research on 3D cadastre and 3D property have been carried out in several countries like in the Netherlands, Norway, Sweden, Denmark but most of these works are still needs a lot of research efforts in legal and organisational aspects before it could be fully implemented and realized in Malaysian law of cadastre. Finally, this paper is part of the research on proposing a suitable legislation for multilayer building in Malaysia which taking consideration of 3D aspect. In short, this paper can be an initial start for research on the legal and organisational aspects for developing Malaysian 3D Cadastral System.

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BIOGRAPHICAL NOTES



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