

# **A Review of Korean LADM based on the Cadastre Reform Project**

**Yoon-Ho SHIN and Byung-Yong KWAK, Korea**

**Key words:** Korean LADM, Cadastre Reform Project, 3D Cadastre Model

## **SUMMARY**

In modern society, many efforts in land management are tried to make an effective land management model over the world. As a remarkable outcome on ISO/TC211 WG7, international cooperation finally standardized the LADM (Land Administration Domain Model) in order to implement the land administration system and the land information efficiently. It also includes the standard of administrations, laws, spatial elements and surveying related with land. In 2012, a Korean land administration model (Korea country profile) proposed to the ISO/TC211. But there are limitations to express 3D spatial information, physical objects and rights because proposed model was only demarcated 2D physical information. Therefore, in this study, 3D components such as 3D parcel, 3D right property and 3D physical property information are added to the proposed Korean LADM last year.

This new proposed model contains the 3D physical attributes information about buildings, which will be more materialized ‘Administrative Package’ components illustrated in the Korea country profile last year. In addition, the cadastral reform project has been performing to correct cadastral information since 2012. This project suggests that the new cadastral model which contains underground utility and superficies information should be basically registered to present physical and legal information in parcel information. The shape of land, terrain and azimuth information are also provided as secondary information in this cadastral model. Thus, government expects that it will be a next generation land administration model which is able to cover all kinds of information on cadastre.

Nowadays the 3D cadastre is becoming essential elementary to maintain land administration as a world trends. Nevertheless, till now the 3D cadastre is applied and implemented only several megacities in Korea. Cadastral reform project has been carried out as a national project. The new proposed model is needed and applied to other cities.

Finally, we suggested updating proposed Korean profile LADM based on ISO/LADM in order to manage the spatial information in Korea.

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## **1. INTRODUCTION**

Nowadays the 3D cadastre is becoming an essential element to maintain land administration as a world trends. To follow the international standard on LADM, Korea also submitted Korea country profile last year but the proposed country profile contains only 2D parcel information.

In addition, to implement cadastral reform project since 2012, 3D right (superficies) and physical objects (buildings and underground utilities) also need to be registered in cadastral book. Therefore the main purpose of this paper is to update Spatial Unit parts in order to apply 3D situation on the parcel and physical objects. To present more actual situation on the new county profile is suggested the new information such as centroid, metadata, result of surveyed cadastral information and characteristics of land.

## **2. UP-TO-DATE TREND IN KOREA LAND ADMINISTRATION SYSTEM**

### **2.1 KLIS (Korea Land Information System)**

Land administration varies according to different countries. Land administration in Korea can be mainly divided into three parts: cadastral management, ownership registry, and land use management. The legal basis and executing body differs for each part. For this reason, their information systems have been built in an exclusive rather than an integrated manner. Cadastral Management is a system providing public access to a factual relationship of land boundaries by using locational punctuality based on the land survey.

The legal foundation is based on 'the Law of Cadastre' and the Ministry of Land, Infrastructure and Transport of Korea(MOLIT) is in charge of this system. There are two main documents involved in the core of the cadastral management system: 'the Land Registry', which has the attributes of land by parcels such as Parcel Numbering Unit, legally given land use, area, etc., and 'the Cadastral Map', which has the 2D boundaries and X-Y coordinates of each land parcel.

The Land Ownership Registry is a system that shows the intangible relationship of ownership of each land parcel, and is controlled by the Supreme Court, based on the 'Law of Real Estate Registry'. The Supreme Courts launched information systems to digitally control land ownership management from 1994 and these systems were completely operated in 2002. The Land Use Management is a system related to land use policies, land appraisal, land trading management, land use planning, and it is legally based on several laws executed and authorized by the MOLIT.

The core of the KLIS lies in the management support systems for the land administration of local governments. Data produced at the local government level is collected and relayed to the regional and central government, to support the decision-making process on land policies.

Public services can also be provided at the local government, regional government and central government level via the Internet, and through specially designed Web portal services (Figure1).

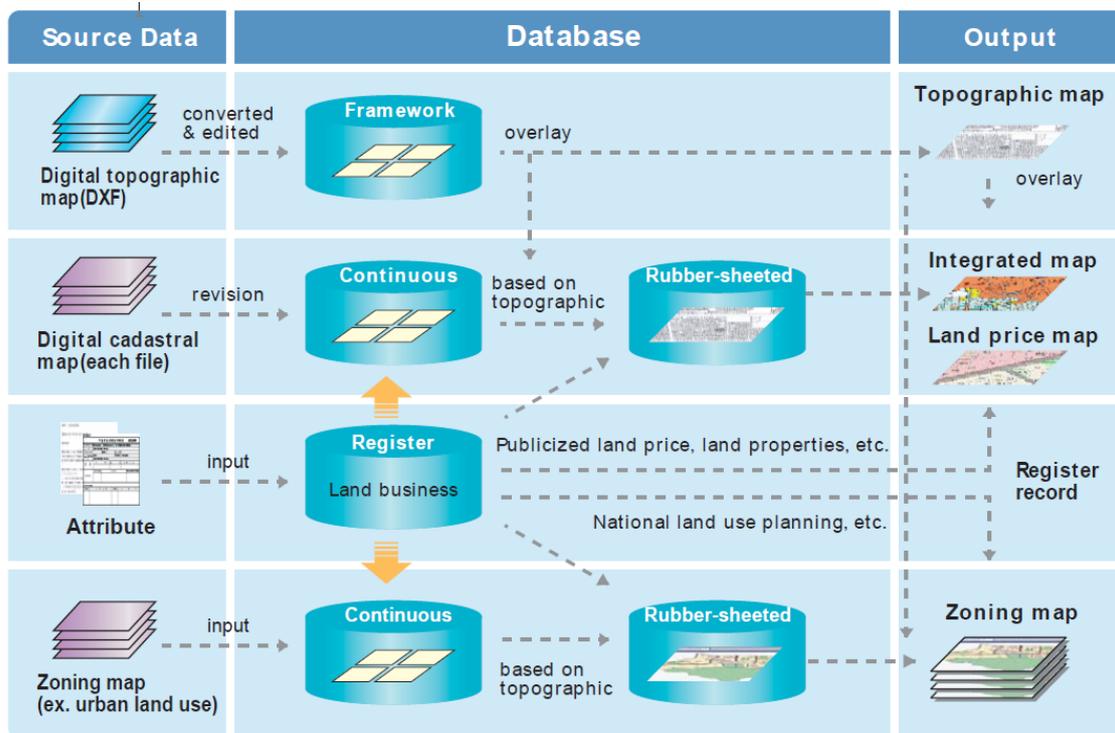


Figure 1. Database of the KLIS

## 2.2 LADM country profile in Korea

As mentioned above, Korea land administration is based on KLIS, to build a Korea country profile, KLIS's information such as parcel attribute, map should be contained to Korea LADM country profile.

In this country profile, Cadastral Information Class contains six classes(map sheet class, parcel class, spatial source class, control point class, owner information class, and parcel price class). The Cadastral information is an abstract class and it is combination of parcel class and cadastral map sheet class. In parcel class, owner information, parcel price and control point are used interactively. Also spatial source is used with map sheet and parcel sheet (Figure 2 and 3).

- KR\_OwnerInformation(LA\_Party)
- KR\_Parcel(LA\_SpatialUnit)
- KR\_CadastralMapSheet(LA\_SpatialUnitGroup)
- KR\_SpatialSource(LA\_SpatialSource)
- KR\_ParcelPrice(LA\_BAUnit, LA\_RRR)

These days the complex relationship of rights and duties exists in the real world such as buildings, subway station, tunnels, bridges and utilities but it is impossible to present 3D right

and physical object because current Korea country profile based on KLIS has only 2D parcel information. In addition current cadastral information is managed separately on cadastral map and land registry. It is linked to specific ID (parcel number).

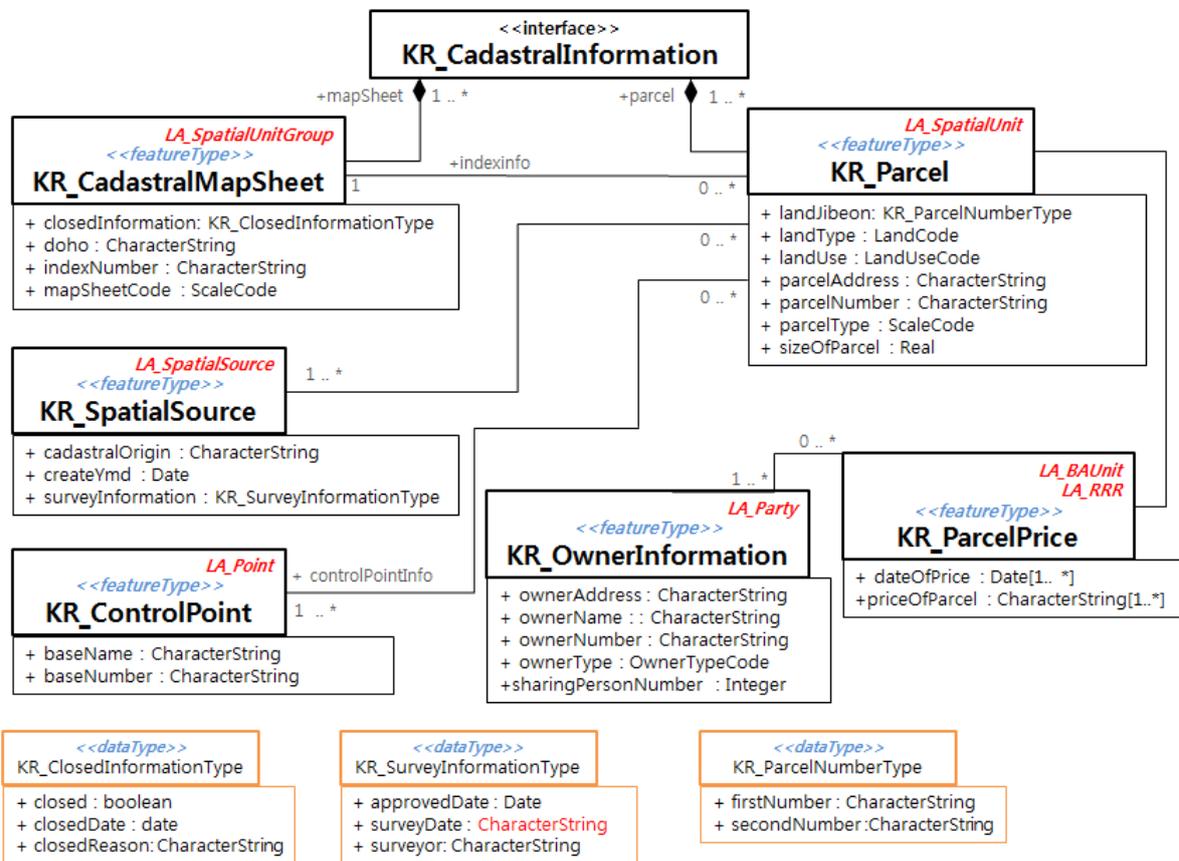


Figure 2. Current Korea country profile

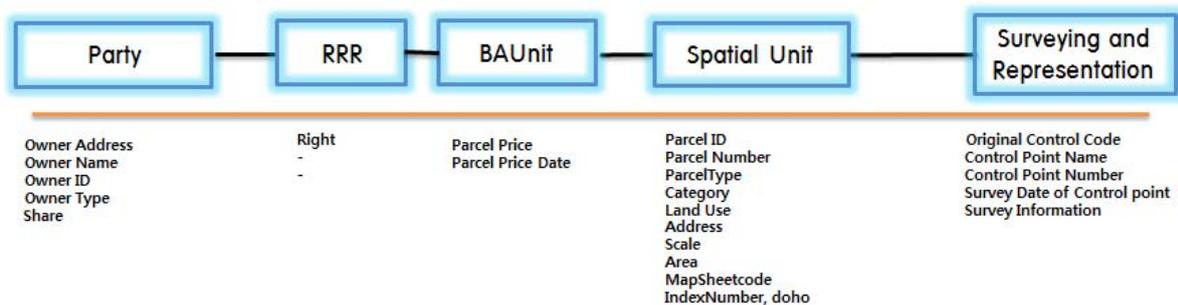


Figure 3. Basic classes of Korea country profile

### 3. KOREA CADASTRAL REFORM PROJECT

According to government reports, 14.8% of South-Korea land is mismatched between cadastral boundaries and actual boundaries. To adjust this situation, the cadastral resurvey is needed and the cost of this cadastral survey reaches up to 900 million USD including lawsuit costs. With many efforts to correct mistake in cadastral information, the special law of cadastral resurvey project has been passed by parliamentary in March 2012. The main purpose of the cadastral reform project is to establish digital cadastral system and integration of geospatial information for next generation as a national project. It is supposed to take 18 to 20 years to complete this project.

Government expects that this project would establish digital cadastral system for protecting of citizen's property rights and for building high quality spatial information to manage territorial resource efficiently.

#### 3.1 3D components in Reform Project

A notable thing in this project is to consider how to register or present the 3D right in land administration/cadastral information. In fact, there were many debates and conferences in order to find out best methods before starting the resurvey project,. In accordance with this special law, it contains the 3D superficies act 2 'PI (Parcel Investigation)' in order to enforce the cadastral resurvey project; owners, parcel numbers, categories of land use, areas, boundaries or coordinates, buildings and location of underground structures, publicly notified individual land price should be investigated on a parcel investigation (MLTM, 2012).

According to the special law, the buildings and underground structure should be investigated and be registered on PI after updated its location to present an open public system. Korean government expects that the outcome of this project will be one of opportunities to improve weakness of current land information system for land administration.

Detail information should be registered in a cadastral book based on the enforcement regulation act 13 for the parcel investigation as shown in Figure 4.

- Land information (land category, area, owner information, address)
- Building information (structure, use, floor area ratio, building to land ratio, number of stories etc)
- Land use (land use zoning, developing plan etc)
- Underground structures/utilities information ; adjoining parcel ID, name of utilities
- Investigation of boundaries duplication and Surveying history
- Superficies; scope, reason, purpose, period
- Other information

In addition PI makes a possible to collect high quality information which related 3D right in land with high accuracy in above and below. It is easily integrated to other spatial information to manage utility management and create superficies to physical object.

## WRITTEN INVESTIGATION FOR PARCEL

※ Administrative Unit

List for Land	classification	Land Category	Area	Owner Information			note
	land book	Site	200	Name	Address		
	land ownership registry <th>Site</th> <td>210</td> <td>Shin Yoon ho</td> <td colspan="2">880-4, bangbe 4-dong, seocho gu, SEOUL</td> <td>n</td>	Site	210	Shin Yoon ho	880-4, bangbe 4-dong, seocho gu, SEOUL		n

List for Building	classification	Parcel Number associated	structure	use	number of stories (above/below)	building area (m <sup>2</sup> )	building to land ratio floor area ratio	Owner Information		note
	building book	880-4	concrete	house	2/1	400	200 % 150 %	Kim Ok-Gil	570-1, sawoo-dong, gimpo,	
					/		%			
					/		%			
					/		%			

List for Landuse	land use zoning	second level urban distict, general residential zone	
	developing plan	building hight zone, catural facility area	

< 국토정보시스템 >

210mm X 297mm [확장지: 80g/㎡ (지정용종이)]

(목록)

Actual Condition Investigation for LAND	Actual Condition	Road Condition	terrain	other structure
	commerical area	one sided contact	gentle slope	-

Actual Condition Investigation for BUILDING	Parcel Number associated	structure	use	number of stories (above/below)	building area (m <sup>2</sup> )	Owner Information		note
	880-4	concrete	shopping	2/2	200 / 200	Name	Address	
				/	/	M-Won	570-1, sawoo-dong, gimpo,	-
				/	/			
				/	/			

Actual Condition Investigation for UNDERGROUND STRUCTURE / UTILITIES	Parcel Number associated	Name	Superficies				Structure				etc	
			purpose	area	scope	period	track	M.F	passage way	shopping center		use · profit
	880-4	Kon M-Won	lease	100	30	10 year	-	-	-	-	-	-

contents of investigation	data	date	2012. 1. 1	CONTINENT of SURVEY	date of notification	- . -	reason / comment	
	investigation field	name	Park Jawon		date of resurveying	- . -		
date		2012. 3. 1	date of 2 <sup>nd</sup> notification		- . -			
investigation	name	Song Minju	date of 2 <sup>nd</sup> resurveying		- . -			
			date of 3 <sup>rd</sup> notification		- . -			
			date of 3 <sup>rd</sup> resurveying		- . -			
Comment		-	survey		surveyor			surveyor comment
					date of surveying			
			inspection		inspector			
					date of inspecting			

Figure 4. Investigation of actual situation on the parcel and building

### 3.2 Improvement of Korea country profile in LADM

In this new model, following attributes are added and removed information. (Figure 5 and 6).

- KR\_RRR : it is a main elementry class to present the land relationship rights and duties in LADM but there is no sepecific explanation in previous profile. Therefore Right (Ownership, condominium ownership, superficies, easement) is added to present 3D relationship rights and duties;

- KR\_Parcel: it is basic spatial unit to land registration to offer more parcel information( Building Number, Building Constructure, Building Use, Building Area, Building Volume, Utilities Information, Slope Level, Land Shape, Land Aspect, Topology and Parcel Centroid);
- KR\_BAUnit : Building Price, Building Price Date attributes are added;
- KR\_CadastralUnit : It is a land administration process related to land information changes(new registration, division, merge of land);
- KR\_Cadastral Map Sheet (removed): It is not used in field.

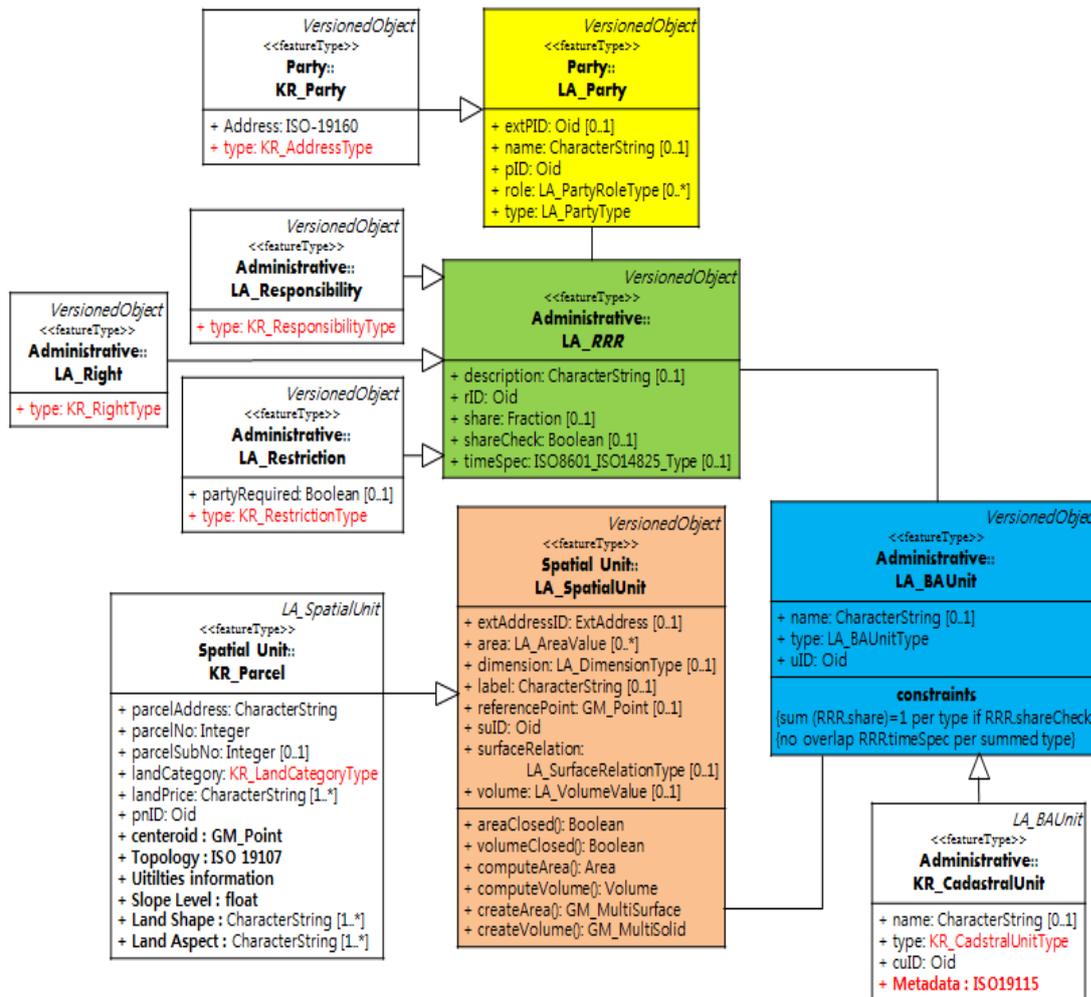


Figure 5. New Korea country profile 2013

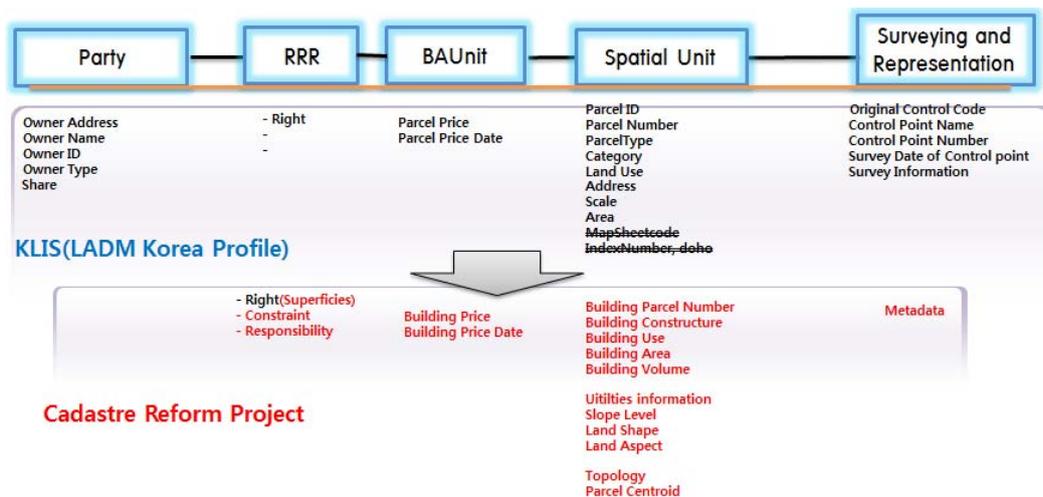


Figure 6. Improvement of Korea country profile

#### 4. CONCLUSION

In summary, only 2D information is proposed on previous KLADM profile but more spatial information related with land is needed because complex legal relationships are emerged in modern era. In order to improve KLADM, the survey information is added in this research and it will be useful to understand all kinds of information related with land. In addition we expects that Korean LADM will apply or modify to other asian countries to establish related with 3D laws, regulations, strategies and approaches.

#### 5. FURTHER STUDY

We found out some difficulties of integrating with Korean address system proposed to ISO19160 because Korean address system are on the transition period to road name address system according to follow the International Standard. In this reason, there are some difficulies to integrate parcel ID and new address system. In this paper, we only resarched LADM based on parcel information but more study is needed to integrate LADM and addressing system for improving Korea administration system.

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## **BIOGRAPHICAL NOTES**

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