FUTURE VISION ON KOREAN CADASTRAL SURVEYING

Myounwoo LEE, Vice President, Korea Cadastral Survey Corporation, Korea

1. INTRODUCTION

Cadastral surveying, which contributes to secure the ownership of the public and supply land related information, has been recognized as important business affair. Korean cadastral system was set up in 1910s through land surveying project and forest surveying project. However, as social and economic conditions have been changed in the long term so far, there have also been considerable changes in it, such as cadastral performing agency and cadastral municipal laws. Furthermore, enormous land movement has occurred by land price rise due to population growth and urbanization, land category specialization, large-scale land allotment, not to mention a variety of land development which needs land category change. These facts demanded that cadastral maps which were made in the era of beginning cadastral system cannot catch up with the needs of the times, requiring high accuracy of them. Therefore, in this paper the problems of current Korean cadastral system will be analyzed so that future visions on it can be suggested in the long run.

2. ESTABLISHING KOREAN CADASTRE

Korean cadastral surveying system was established according to the results of land surveying project and forest surveying project from 1910 to 1924. The pilot project of the land surveying project was executed from 1909 to 1910 in the provision of it. On the basis of the outcome and experience of it, nationwide surveying plan was arranged and the land book and cadastral maps were turned out using the results of it, including names of administrative districts, land category, boundary, ownership, grade and size.
The forest surveying project started by the project surveying in 1916, finishing in 1924. The methods and procedures were similar to the land surveying project and the focus was in the areas which were excluded in the land project surveying. The forest book and forest maps were made by means of this accomplishment.

3. CHANGES OF THE CADASTRAL AGENCIES

The history of cadastral surveying agencies shows a various aspect with the changes of cadastral system.

3.1 Direct Management of Government (from 1910 to 1923)

In the beginning, when the cadastral system was first formed, the government (the Japanese Government-General of Korea) directly managed cadastral affairs. It was partly because the Japanese Government-General of Korea took over the land surveying project. However, the main reason was that land surveying project and forest surveying project were carried out during this period. In other words, it was needed to organize unified and standardized cadastral system in order to perform large-scale projects.

3.2 Competitive System (from 1923 to 1938)

The cadastral affairs were transferred to an administrative office after the land surveying project was completed. It was hard to maintain direct management of cadastral affairs by the government because the temporary land surveying office was abolished. Not like it, the normal administrative office was far short of budget and manpower to be able to fulfill the duties of overwhelm cadastral affairs. At this point, the Bureau of Finance, the Japanese Government-General of Korean introduced private surveying offices which employ cadastral surveyors, being permitted by the competent authorities. It also nominated private surveyors to deal with cadastral affairs, which is called as a nominated (licensed) surveyor system.

In this period, a number of private surveying offices and nominated surveyors performed cadastral surveying on behalf of the government.
It was a competitive system and lasted until 1938.

3.3 Full Charge Agency System (from 1938 until now)

Though the competitive system had contributed to the budget of the nation (expenses and manpower), there were several serious disadvantages.
Instead of abolishing private surveying offices and nominated surveyors, the Japanese Government-General of Korean formed the Korea Cadastral Association (KCA) in 1938, adopting the full charge agency system. KCA was changed to Korea Cadastral Survey Corporation on July, 1997 to do nationwide cadastral surveying in order to be responsible for it. The details of it are as follows.

Firstly, all of the employees, including surveying assistants, were appointed to regular staff. Secondly, a three-level hierarchical structure – head office, branch offices in metropolitan cities and agencies in cities, districts and counties – was installed to work in connection with the cadastral administration system. Thirdly, for the purpose of training and education of cadastral engineers and research and development of cadastral technology, Cadastral Technology Training & Research Institute (CTTRI) was strengthened.

4. KOREA CADASTRAL SURVEY CORPORATION (KCSC)

KCA was founded in 1938 and changed to KCSC in 1977. With a history of 62 years, it has developed to the only specific organization doing cadastral surveying in Korea.

4.1 History of KCSC

The major history of KCSC is as follows.
- 24 Jan. 1938: Setting up Chosun Cadastral Association as a non-profit corporation
- 1 May. 1949: Changed to Korea Cadastral Association as a non-profit corporation
- 21 May. 1953: Installing Cadastral Surveying Training Center to train cadastral surveyors
- 1 Jan. 1962: the supervisory office of Ministry of Finance changed to Ministry of Internal Affairs
- 1 Jul. 1977: Korea Cadastral Association changed to KCSC

4.2 Structure and Manpower

KCSC has the head office in Seoul, Cadastral Technology Education & Research Institute in Yongin and 12 branch offices in metropolitan cities and provinces, 210 local agencies in cities, districts and counties. It has 3,759 employees, including 3,671 cadastral engineers and 86 administrators.
There are 17 cadastral experts, 2,998 cadastral engineers and 665 cadastral technicians in KCSC.

4.3 Affairs

KCSC fulfills all aspects of cadastral surveying affairs for the government including initial registration surveying, subdivision surveying, boundary relocation surveying, land consolidation surveying and drawing cadastral maps. It sends the surveying results to the cadastral departments in the local governments to examine them. After KCSC receives the results from them, it is allowed to offer them to the public.

Major affairs which are performed by KCSC are as follows:
1. Agent services for cadastral surveying affairs under the Cadastral Law
2. Production and reproduction of cadastral maps and forest maps related to cadastral surveying
3. Surveying affairs of underground facilities and historic site
4. Surveying and mapping of lands, properties
5. Education and training for the KCSC staff
6. Research and development of cadastral system and technology

KCSC's cadastral surveying number of parcels and income by year are shown in table 4-1.

Table 4-1. Cadastral surveying number of parcels and income by year

Year Division	1996	1997	1998	1999	2000
The number of surveying (thousand unit)	3,873	2,383	2,500	2,178	2,200
Income (million USD)	155.72	140.95	155.58	134.05	157.00

5. DRAWBACKS & ALTERNATIVES

5.1 Drawbacks

The problems of current Korean cadastral system could be non-existence of Database of cadastral maps, operating graphic cadastral surveying rather than numeric cadastral surveying and generating non-coincident lands.

5.1.1 Non-Existence of Database of Cadastral Maps

When the Cadastral Law was totally revised on 31 Dec. 1975, land book's type was changed from book style to separate card style in order to prepare for the

computerization of cadastre. And the First Public Administration Computerization Project, one of the national computerization projects, resulted in completing computerizing land and forest book. Nationwide on-line service started 1 Feb. 1992. However, because the database of cadastral maps and forest maps has not been established, it is difficult to have full effect of cadastral computerization.

5.1.2 Operating Graphic Cadastral Surveying

Because most of the current cadastral maps and forest maps have been made by means of Land Surveying Project and Forest Surveying Project ninety years ago, the accuracy of maps has dropped by expansion, contraction, abrasion and distortion. Furthermore, cadastral surveying is mostly done by graphic surveying using a plane table. It means that systematically, it is hard to make out the precise surveying results which people demands.

In order to enhance the cadastral surveying, the numeric surveying system which registers X, Y coordinates in the cadastre like several developed countries was introduced and has been used in land readjustment, agriculture and redevelopment area. However, as is shown in the table 5-1, the results are very slight.

Table 5-1. Status of Graphic Cadastral Surveying

Total		Graphic Surveying		Numeric Surveying	
Parcel amount	Size	Parcel Amount	Size	Parcel Amount	Size
(100%) 34,975	(100%) 99,434	(96.2%) 33,640	(96.6) 97,067	(3.8%) 1,335	2,367

– unit : 1,000 parcel, km^2
– source from cadastral statistics annual report 2000, Ministry of Government Administration and Home Affairs (MOGAHA)

5.1.3 Generating Non-Coincident Lands

The reason why non-coincident lands which has the details of cadastral book is not accord with the category, boundary, size, ownership of lone parcel of land is that the errors and less-unified control points of Land Surveying Project (1910-1918) and Forest Surveying Project (1916-1924) are still used up to now. They are also caused by the errors of cadastral surveying and boundary relocation surveying, constructing or re-constructing buildings while trespassing on ones neighbors fields.

Non-coincident lands are shown in the table 5-2.

Though they are much limited comparing to total parcel amount and size, exercising one’s land ownership such as constructing new buildings or property transfers, should be limited in this area.

Table 5-2. Status of Non-coincident lands

Total		Graphic Surveying		Numeric Surveying			
Parcel amount	Size	Parcel Amount	Parcel Amount	Size	Size	Parcel Amount	Size
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* source from cadastral division, Ministry of Government Administration and Home Affairs (MOGAHA)

* unit : 1,000 parcel, km^2

5.2 Alternatives

5.2.1 Operating Cadastral Re-surveying Project

Korea cadastral system has being operated with the structure that all national lands are registered in cadastral book in order to protect the ownership of the public. However, the cadastral book was printed out in 1910s by the surveying projects.
The paper maps at that periods have been damaged as time passed, causing elasticity, abrasion and distortion. It makes hard to induce precise cadastral surveying and adopt advanced numeric surveying method. Therefore, it is demanded that cadastral re-surveying should be done in order to provide the public with more precise surveying results and land information in an information-oriented society.

5.2.2 Project of Computerizing Cadastral Maps

This project is to transform cadastral maps into numeric file and integrate land book and cadastral maps into one unified form. It will make it possible to supply a variety of services to the public and share land information. It should focus on the computerization of cadastral administration based on the cadastral maps and help to manage underground facilities, offering various information to make land policy.
The potential effects by computerizing cadastral maps are firstly, quality and accuracy of them could be constantly maintained as a result of automatic process. And distortion or deformation of data also will be prevented through the development of storing data method. Secondly, there is no limitation of scales to edit and print numeric cadastral maps. While the accuracy of assessing line and boundary line depend on the precision of surveying, original map and data processing, the size of maps could be adjusted. Thirdly, by expressing numeric coordinates into graphics, it is easy to renew the maps. The results of renewing and editing could be shown on the screen. Fourthly, as numeric files are stored in the type of electricity, the loss of accuracy when transforming data could be minimized. The capacity of storing can be extended by inserting new hardware.

5.2.3 Overseas Study of Cadastral Engineers

The cadastral departments in universities and technical colleges have been installed since 1978 for the first time in the world in order to bring up cadastral manpower and contribute to enhance cadastral system.

It is desirable that cadastral engineers should be sent to overseas study to acquire advance technology and system of developed countries. These dual system-colleges education and sending engineers overseas-has to be sustained to cope with information-oriented society in 21st century.

5.2.4 Introducing Multipurpose Cadastral System

While the demand on lands increases consistently according to population and income growth, industry development and urbanization, the supply of it is limited comparatively. In order to use land intensively the range of human being's life has expanded from surface of land to underground and above the ground.

Though it is ninety years passed since Korean cadastral system was introduced, managing surface of lands efficiently and systematically, general management of land registering including underground space. It should be moved from pure cadastre which deals only with the surface of land to three dimensional cadastre which includes not only underground space (underground shopping centers, subways, underground facilities) but also above surface (buildings, overhead bridges, bridges, surface fabrics). It should be developed to the multipurpose cadastral system in which land and properties can be managed collectively and scientifically.

6. CONCLUSION AND RECOMMENDATION

Korean cadastral system has maintained to the present, based on the cadastral maps and forest maps made by the Land Surveying Project and Forest Surveying Project in 1910s. There have been several problems of Korean cadastral system experiencing land subdivisions and frequent land transfers caused by intensive land development and use during high growth of national economy that occurred between 1970s and 1990s. One of these is discrepancy between cadastral maps and actual boundaries because the quality of cadastral maps have been deformed and distracted. This makes it difficult to maintain and manage Korean cadastre. Owing to inaccuracy of land indication, a cornerstone of land public notice, the protection of people's property rights and national land administration could not be achieved.

In order to revitalize Korean cadastral affairs, cadastral re-surveying project, computerization of cadastral maps, introducing multipurpose cadastre and overseas training of cadastral engineers should be continuously thrust forward, reforming new cadastral surveying system to meet information-oriented society in the 21st century.

CONTACT

Myounwoo Lee
Vice President, Korea Cadastral Survey Corporation
45 Yoido-dong
Yongdeungpo-ku, Seoul
KOREA
Tel. + 82 2 3774 1021
Fax + 82 2 3774 1029
Email: mwlee@kcsc.co.kr