

The Role of Cadastral Information for the Good Land Administration in South Korea

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SUMMARY

Land administration system is mainly concerned with administrative and operational processes dealing with the information about the tenure, value and use of land. In particular, a cadastral system mainly deals with land ownership and its spatial boundary. It is also one of the main components for the land administration system as parts of national spatial data infrastructure (NSDI). The maintenance and management of the cadastral information in cadastral organizations are very important issues for the implementation of surveying and mapping. Many land-related activities, such as conveyancing, taxation, legal protection of rights are based on the cadastral information.

The domain of the land administration system mainly consists of three disciplines such as cadastre, land registry, and land valuation. The domain in Korea is currently managed by separate organizations which are neither shared nor integrated because of lack of the institution, land policy, standardization of spatial data.

For the implementation of a new land administration system, a reliable cadastral data management is important because many activities, such as land conveyancing, taxation, and legal protection for land tenure are based on these data. Thus the cadastral system should be primarily developed based on the accurate individual cadastral survey and plans built from original survey activities. The current cadastral system, however, is not able to provide reliable information to the customer because the cadastral map is not accurate enough to be used as the source for reconstruction of parcel corners in case of disputes.

This paper focuses on the role of cadastral system as the information provider of measurement based survey records. Besides, it addresses important factors for the development of a new land administration system within a National Spatial Data Infrastructure (NSDI).

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1. BACKGROUND

The average rate of yearly growth of the 1980's of the information industry in Korea reached the level of 25%. It was due to the popularization of personal computers and the creation of new services by combination these products. In particular, as the national economy developed and real estate transaction increased, people demanded faster and better land administration services. However, it was difficult to provide integrated services of land information such as cadastre, land registry, and land value because organizations in charge did not harmonize each other. Thus the current cadastral system is not able to provide reliable information to the customer because the cadastral map is not accurate enough to be used as the source of the reconstruction of boundary corners in case of dispute.

As explained above, this paper focuses on how to improve the quality of cadastral information what the roles of cadastral organizations are for the good land administration system emphasizing a cadastral data model to integrate survey record data into digital cadastral features so that newly produced maps are directly related to new survey information collected in land development.

2. ANALYSIS OF THE CURRENT LAND ADMINISTRATION

2.1 Initiatives in e-Government activities

An ad-hoc committee was organized for e-Government under the Presidential Committee on Government Innovation in January 2001 and officially announced 11 key tasks to complete the framework for e-Government, most of which need inter-agency collaboration and coordination. The vision and goals of Korean e-Government are enhancing services to citizens, providing the optimal business environment for enterprises, and improving efficiency, effectiveness, and transparency of government administration.

Eleven tasks were designed to reach the most complex state with the highest expected values

by developing the whole life cycle of the service, providing Internet-based two-way transactions including electronic payment.

Geographic Information Systems (GIS) are exploited in various areas of water, sewage, road, and disaster management as well as land administration at the government sectors in Korea. However, GIS has been managed in a dispersed and fragmented way among agencies because of institutional or technical reasons. It is important to share geographic information among agencies and to manage the integrated system at a national level in order to prevent redundant investment and to save government budget. Recognizing its importance, the Ministry of Construction and Transportation (MOCT) has initiated two-staged National GIS Project since 2000 and now implements its services. However, the e-Government plan has not reflected the importance of spatial components into their agendas so far. It is desirable to integrate and link GIS into the nation-wide G4C (Government for Citizen) and other e-Government services.

2.2 NGIS Project

NGIS project is for establishing GI infrastructure implemented by Ministry of Construction and Transportation (MOCT) has been launched since 1995. The first phase (1995~2000) and the second phase (2001~2005) were successfully finished. Finally, the third phase (2006~2010) launched a master plan recently. Table 1 shows the output of NGIS project during 1995 ~ 2005.

| Type | First Phase (1995-2000) | Second Phase (2001-2005) |
|--------------------------|---|--|
| Geo-data Construction | <ul style="list-style-type: none"> - Digital conversion of topographical and cadastral map - Construction of thematic layer | <ul style="list-style-type: none"> - Maintenance of geodetic controls - Establishment of basic geo-DB of road, river, building, marine |
| Application Construction | <ul style="list-style-type: none"> - Construction of underground facility map | <ul style="list-style-type: none"> - Making practical application of geo-data |
| Standardization | <ul style="list-style-type: none"> - Standardization of making, distribution | <ul style="list-style-type: none"> - Standardization of application system |

| | | |
|-------------------|-----------------------------|---|
| IT development | - Mapping, DB Tool, GIS S/W | - 3D GIS, Processing of high RS data |
| Capacity Building | - Offline GIS education | - Online, offline GIS education - Development of education materials |

Table 1. The Outputs of NGIS Project

2.3 Land Register Digitalization Project

The land registration system managed by the Supreme Court had served analogue data to the customer until 2000. The Supreme Court completed Land Register Digitalization Project to digitalize the real estate registration process in an effort to improve the quality of service and to optimize work efficiency. This big project was promoted with the purpose of overcoming spatial and time limits of civil services, setting the standards and enhancing the efficiency of land registration processes. For the efficient title administration and service, the court introduced digitalized issuance and title search, reengineered work processes, and Internet View Service. Governmental land information and agricultural policy was made by providing a variety of statistic data. The land registry DB contains the data of land rights such as ownership, acquisition date, and mortgage. The main users of the information are real estate agents.

2.4 Cadastral System based on KLIS, RPIMC and Total Survey System

The current cadastral system had been established according to the results of the land surveying and forest surveying project from 1910 to 1924. The government had implemented land survey project to register and certify the ownership of land. The results of the cadastral system have been used to provide information for relevant land taxes, legal protection of land rights and efficient management of land.

The cadastral organizations can be divided mainly in two parts: cadastral administration and cadastral survey organization. The Cadastral Department in the Ministry of Government Administration and Home Affairs (MOGAHA) is charged with the supervision and guidance of all cadastral affairs as well as the promotion of the quality of IT systems. Recently

cadastral organizations have many activities for spreading cadastral information using Geo-ICT. KLIS, RPIMC and Total survey system supply a real time cadastral information out of the way traditional system.

- Korea Land Information System (KLIS)

The cadastral survey organization of Korea Cadastral Survey Corporation (KCSC) is in charge of cadastral survey activities which is originally the affair of the government. The Korea Land Information System (KLIS) developed by MOGAHA and KCSC since 2001 currently provides cadastral information through Internet. KLIS mainly consists of two parts, survey data reduction and cadastral administration. In the cadastral survey aspects, surveyors make use of cadastral survey results for executing boundary survey, subdivision survey, etc. In the other hand, cadastral administration module can be used for the examination of cadastral survey results or updating cadastral records in municipalities. If a cadastral survey or requests cadastral data from a municipality, a cadastral administrator send a file through Internet, the process is depicted in Figure1.

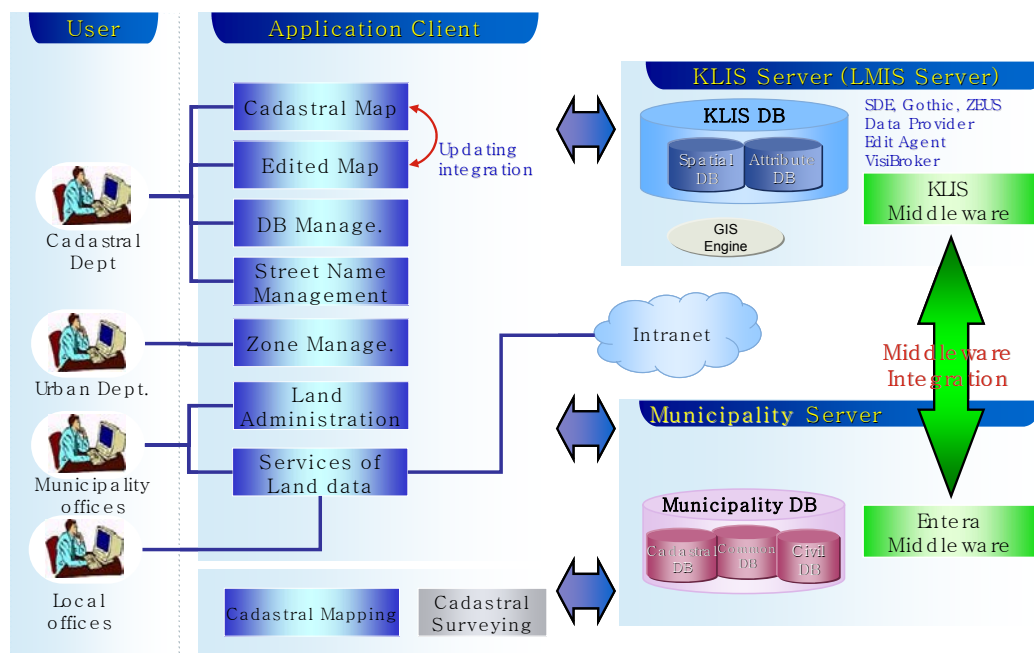


Figure 1. Concept of KLIS system

- Real Property Information Management Center (RPIMC)

Recently, MOGAHA provides a seamless updating service by the comparison of related basic data and to build up efficient and interoperable infrastructure for sustainable data

management. It provides an assessment of total property tax of each person (or organization) for land and buildings and also verifies integrated taxation data by the comparison of collected the property tax from each municipality.

This system called Real Property Information Management Center (RPIMC) is linked with a number of DBs(over 1billion data records) such as cadastre, resident registration, and property taxation of the MOGAHA, facility data, land value of the Ministry of Communication and Transportation (MOCT) as well as a department valuation of apartment house of the National Tax Service.

- Total survey system

As the project of digitization of cadastral maps was completed, modernized surveying method and automation of surveying process were developed and it was originally called Total Survey System in 2000.

Recently, KCSC has spread rugged PCs to its cadastral surveyors 1,000 surveying teams that performed field surveys with tablet PC and digital cadastral maps. The Total Survey System is synchronized with KLIS because survey data required for field surveys come from KLIS through Internet. If a surveyor requests cadastral data from the cadastral administration department in a municipality, the cadastral administrator in charge accepts the request. He/She extracts relevant 1 data from the DB in the municipality and sends to the cadastral survey office. The figure below shows cadastral survey using a Total Survey System in the field and KLIS in cadastral office



Figure 2. Cadastral survey using Total survey system

- SIMC (Survey Information Management Center)

The cadastral survey has been done by a plane table method, which can not guarantee the accuracy and precision that people expect. It has increasingly caused the survey disputes between surveyors and clients or clients and their neighbors because a parcel has different survey results each other. Therefore, cadastral surveyors are difficult to show qualified survey results to the customers.

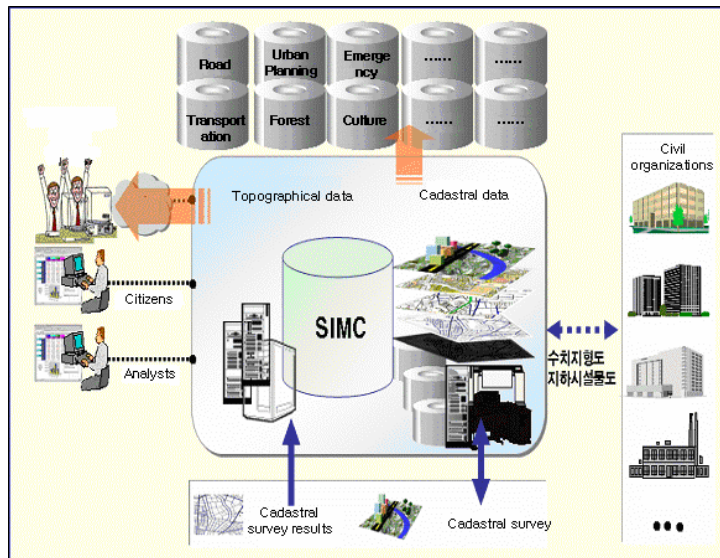


Figure 3. Concept of a SIMC (Survey Information Management Center)

The KCSC was ready for performing SIMC project for efficient management of survey records in 2006 and will construct this center in 2007. The SIMC has the following objectives; management of survey records, maintenance of spatial data such as cadastral maps, urban planning maps, facility maps as an independent layer within a land information system. Thus cadastral surveyors can store their survey data in the survey record database. Analogue cadastral maps are going to be converted to the digital images for the sake of building an integrated cadastral data infrastructure.

3. PROBLEMS AND ISSUES OF LAND ADMINISTRATION

Overcoming the current situation and problems of the cadastral system, government and cadastral organizations suggests strategic alternatives and procedures about importance of a cadastral reform project. This project is to build a newly digital cadastral system which meets the age of U-KOREA in which the transfer from the cadastral system centered on supplier to that centered on demander is indispensable.

To prepare a good cadastral system, cadastral organizations need current problems and issues of land administration as relationship between land organizations, spatial data quality and a cadastral reform project.

3.1 Not Integrated and Shared Land Information between Land Organizations

Land organizations such as cadastre, land registry and property tax cannot share their data each other until now. The main reason is that the organizations had autonomously established own information systems without standardization of NGIS policy. Although these service look like digital type, their work process are hardly hanged in contrast to the traditional way. For example, if a cadastral surveyor works by means of the method called Total Survey System, the survey result should be managed a traditional inspection system by government officer because the inspection system and regulations concerned are not changed so that the inspection process is still performed by the conventional method.

Although cadastral and land registry information system had been developed, they are operating independently and autonomously. For example, the current updating process is that a customer who received a survey result visits the land registry and requests the changes of ownership to the registry officer. It is also the same process between cadastral office and registry in a municipality. This process is time and budget consuming to both the governments and citizens. Therefore land organizations should harmonize and integrated each system within the land administration system.

3.2 Demanding Reliable Spatial Data Quality

Since most of current cadastral maps had been made about one hundred years ago, accuracy of maps has been decreased. Furthermore, cadastral surveying is mostly done by graphic surveying using a plane table (electronic total surveying also is based plane surveying).

Original survey records are not stored and managed until now. It means that systematically, it is impossible to use the precise original surveying records which people demand. Although the current cadastral system cannot provide for customers, they want to rely on survey results. However many customers think of dissatisfying survey results and most of customers want to consistent and reliable results than precise it. From the analysis data from service desk in municipality, every customer can understand additional costs in the future if the cadastral system can deliver a more credible service to the customer.

3.3 Cadastral Reform Project

The cadastral system which provides the base of national land administration with accurate and appropriate data is supported many activities such as land conveyancing, taxation and legal protection for land tenure.

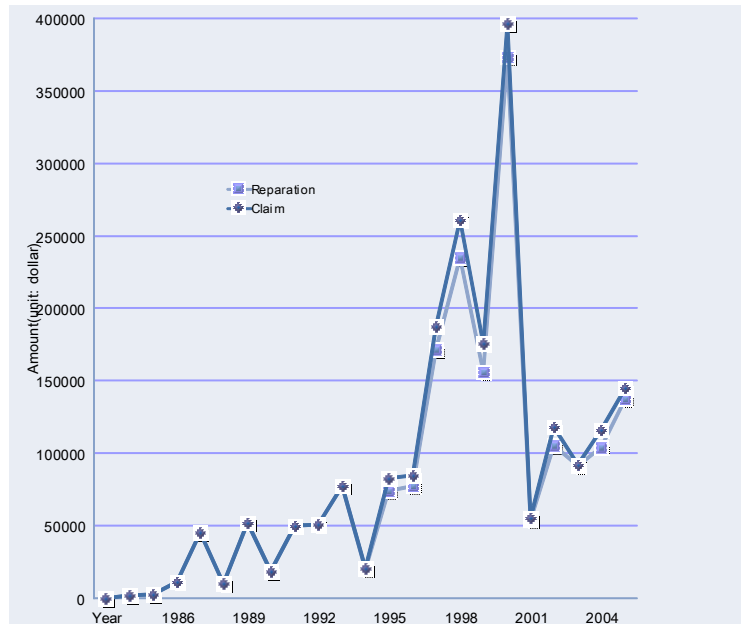


Figure 4. Claims to the cadastral surveyors of KCSC

However, number of boundary disputes in South Korea has increased because the cadastral data are not in accordance to the land use category, boundary, size, and/or ownership of a parcel in reality. Furthermore errors in control points propagate in the cadastral spatial data. There are many examples of errors in control networks. The land disputes are also caused by boundary reconstruction surveying which has been done by the inaccurate controls. Thus, land owners and neighbors make a claim to the surveyor and eventually do not trust the results of the cadastral survey. Figure 4 shows the claims to cadastral surveyors of the KCSC during 1984 ~ 2005.

But even in spite of many efforts, the inaccurate problems were frequently found in the data accuracy of the cadastral domain. Currently cadastre-related surveying, educational and governmental organizations and people's representatives are preparing laws and regulations for performing the cadastral reform project.

4. ROLES OF THE CADASTRAL ORGANIZATIONS FOR GOOD LAND ADMINISTRATION

4.1 Improving spatial quality of the cadastral data

In the current cadastral surveying system of South Korea, survey records are stored in analogue ways such as paper plans, document sheets. Updating data and specific information collected by the field activities cannot be directly stored in the current LIS which was developed integrating spatial map data with attribute tables. Therefore, it is very important to introduce a new survey recording system so-called a SIMC for archiving survey data in digital formats. The cadastral data based on survey records can provide the good understanding of the survey quality to the users and other surveyors. The subsystems of SIMC include the classes and the delivering system depicted in Figure 5. In this article, each sub-system is defined and modeled by the processes of computing, updating and delivering. Figure 5 shows the SIMC and its sub-systems.

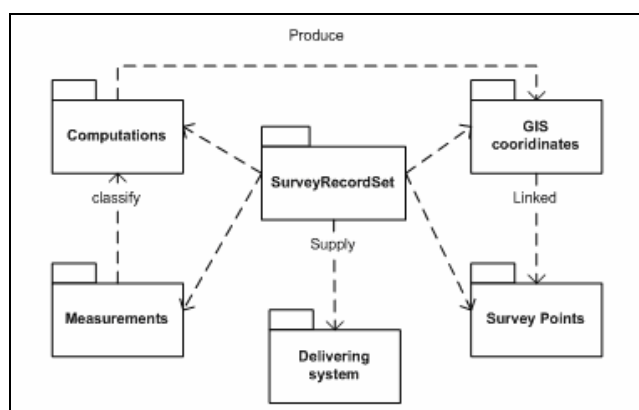


Figure 5. Sub-systems of the SIMC

To acquire accurate cadastral information, survey records within the SurveyRecordSet are composed of survey measurements, computations, GIS coordinates and survey points which are linked cadastral feature data in the spatial standard model. When an update of a survey record occurs, these linked vector data are also accordingly updated. The geometry of spatial records can be updated after all these adjustment.

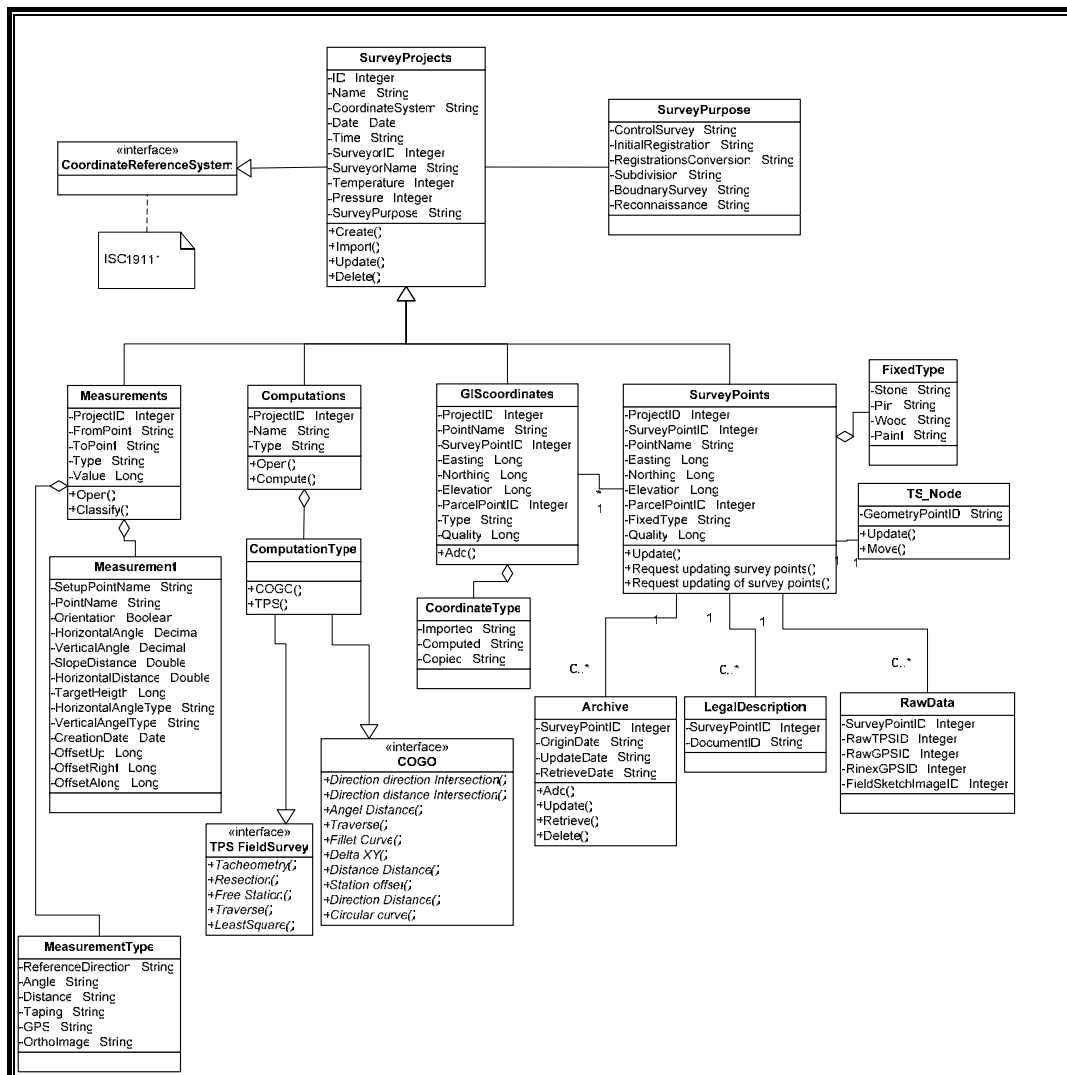


Figure 6. The general model of the SurveyRecordSet

In a highly competitive market, the cadastral organizations should increase the quality of their products and services, reducing lead-times, minimizing the costs and increasing the profits. Therefore, the direct integration of cadastral survey data with a GIS can provide a way to acquire accurate cadastral information.

4.2 Creation of a new land administration institute between land organizations

Land administration is strongly connected with the cadastre and the ‘benefits of a good land administration system’ are described through the term ‘modern cadastre’, which was concerned with detailed information at the individual land parcel level. Cadastres are

evolving into broader land administration systems addressing a diversity of issues, ultimately supporting not only land ownership and land markets, but also increasingly sustainable development. The good land administration is at the outset of better land use and that sustainable development is not attainable without a sound land administration system (UN-ECE, 1996).

Regardless of spatial and non-spatial nature of the data, there are more than 80 different regulations concerning land use and physical planning in terms of appropriate use of land. The spatial data infrastructure has been composed of a variety of geo-databases, which are concerned among municipal and civil affairs administrations. The data model and contents of the databases has been standardized and constructed for the sharing of land information among information systems so that land databases can be used as a spatial data infrastructure by municipalities.

Operations of land administration are divided into the vertical and horizontal relationships depending upon the characteristics and are carried out by several organizations. Municipalities are responsible for producing and managing the land information, but many operations are carried out by municipal posts (such as land management, land registry, land use planning, computerization, etc.). For these reasons, indifference, lack of cooperation, conflicts, and rivalries between land organizations have surfaced. It is difficult to solve these problems quickly, but they interfere with the successful completion of a new information development.

The purpose of the institute of land administration is to regulate procedures, methods, and standards related to the production, management and dissemination of each land information system that are created in the process of transacting the operations of land administration.

4.3 Capacity Building

Effective human capacity is a key ingredient in building and sustaining a country's land administration. An ability of employees will ultimately be far more important than matters pertaining to technology and process. Yet current cadastral officials and surveyors have not been given much serious attention in the cadastral system.

There is a need for broader knowledge amongst all those involved in the cadastral systems and for greater exchange of information. There should be awareness seminars at all levels,

from politicians and managers to cadastral administrator, registry staff and cadastral surveyors. There is a need for continuing training for all members of staff because it is no longer possible to assume that the knowledge imparted during initial training continues to be sufficient (UN-ECE, 1996). Training system is dynamic and changes not only at the technical level but also in concepts and procedures at the administrative and land-management levels. Organizations officers are the most significant factor for success of the land administration system. However, officials in charge of practical affairs have limited time to participate in building their information system and are also more familiar with bureaucracy and industrialism. First of all, officials in charge of the land administration tried to lead the new information-oriented paradigm. Also, they tried to become active users on the information system instead of adhering to the existing system. To solve these problems, public information and education have been used to bring down the barriers between officials and agencies.

5. CONCLUSION

In Korea, it is time to start promoting standardization in IT field. As the word 'information' itself implies, IT standardization should be promoted to facilitate generation, interchange and application of information. And for this it must be harmonized to have interchangeability with all the countries of the world as well as the neighboring nations, needless to say within the state. Land is nation's one of the most important resources. With the complete understanding of the status of land ownership, financial institutions can regard the land as collateral based on the precise land related information. This will increase the value of the land. Also, the systematic management of the land will enable you to analyze the national real estate trends that will help to make right administrative decisions

The quality of the land spatial information should be improved by supporting to be able to amend inconsistent data management system of related property information in the level of pan-government. In particular, land organizations should support a basis of establishment of land administration policies and the realization of improving spatial quality by providing accurate survey records as well as collaboration of related other parts. Thus the administration system can be opened a fair world in the future. It is not to guarantee transparent information based on the efficient property data management by centralization of land information, but also to provide high information of the real property data based on GIS infrastructure to integrate spatial information for possibility of multiple analyses.

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