Innovative Geospatial Information and Green Growth of Korea

Presentation 2.

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Geospatial Information and Green Growth

Geospatial data as a key of sustainable development

- Effective use of limited land and resources
- Save time and money
- Reduction of damage from natural disasters and emergencies

Usage in economic and social activities

- **Public:** National space planning, urban planning, integrated urban management and services
- **Private:** High value-added industries, job creation
- **Individuals:** Selection and use of data according to the needs

Fig. Geospatial data for green growth
Geospatial Information and Green Growth of Korea

PBLIS (2000)
- Cadastral maps (Spatial data)

LMIS (2002)
- Zoning data (Attribute data)

KLIS (2010)
- Zoning maps cadastral maps (Spatial + attribute)

NIIS (central DB)

Other (Land) Information Systems
- KOPSS
- Territorial Information Platform...

Fig. Relationship among PBLIS, LMIS, KLIS, and other systems under the framework of NGIS

PBLIS: Parcel Based Land Information System
LMIS: Land Management Information System
KLIS: Korea Land Information System
NIIS: National Integrated Information System
Korea Land Information System (KLIS)

- Integrated platform for land policy establishment and land (conflict) management
- Planned under the framework of NGIS construction, which began in 1995
- Unification of the system into KLIS by government-led in 2010, combining spatial data and attribute data
- Organized by: Central government, local government, research and public institutions, private companies
- User: Land-related departments, individuals
- Function: Real-time viewing of land information, transaction, cadastral map...
- DB: Size, type, related law and regulations and land prices...per parcel
- Features: Continuous connections of 38 million parcels nationwide

Fig. User interface of KLIS
Korea Land Information System (KLIS)

Effects of Land Management Information System

<table>
<thead>
<tr>
<th>Providing users with convenient and appropriate land use opportunities</th>
<th>Improving efficiency in government services</th>
<th>Establishing scientific real estate policy and tax policy</th>
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<tbody>
<tr>
<td>• Computerized certificate processing for land ownership and use</td>
<td>• Decreasing time and energy inputs due to digitalization</td>
<td>• Real-time identification of land transactions for utilizing policies such as housing supply, compensation, and anti-speculation</td>
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<td>• Efficient and impactful management of limited land and ecological resources</td>
<td>• Small and efficient government implementations, prevention of redundant (duplicate) investments</td>
<td>• Factual-based taxation policy</td>
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<td>• Facilitating quick and accurate administrative process and document issuance</td>
<td>• Improving the quality of public services</td>
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Implications

• Importance of cadastral maps construction
• Government leadership
• Basic system for reasonable land compensation and tax collection
• Credibility of land policy
• Easy connection with other systems

Fig. Land use plan detailed in KLIS

(Image source: Google map)

Seoul City Hall
KORea Planning Support System (KOPSS)

- Land planning analysis tool based on geospatial information, launched in 2006
- Organized by: Ministry of Land, Infrastructure and Transport (MOLIT)
- User: Central and local governments
- Function: Support on policy-making for national land administration and urban planning
- DB: Sharing with KLIS, land use, regulations, and development plans...
- Features: Easy to apply changes in national land policy to spatial planning, 3D simulation for new developments

**Five analysis modules used by the national and local governments**

- Urban infrastructure planning support module
- Land use planning support module
- Regional planning support module
- City maintenance planning support module
- Landscape Planning Support Module

(Image source: Kim et al., 2014 Korea Planning Support System (KOPSS). Sejong, Korea: KRIHS.)

Fig. The Concept of KOPSS
KOrea Planning Support System (KOPSS)

Implications

- Scientific land/urban planning
- Promote transparency in policy-making
- Reduced budget by preventing redundant investment

Fig. Land use planning support module of KOPSS

Territorial Information Platform

- Platform for storage and distribution of all paper maps and digital spatial information created since the 1960s
- Organized by: National Geographic Information Institute (NGII)
- User: Government, private sector, individuals
- Function: Unification of the production, management, and distribution of various spatial information
- DB: Numerical map, aerial photograph, national control points, old maps...
- Features: Web-based spatial analysis tool


Fig. The functions of Territorial Information Platform, and various maps produced and distributed
Territorial Information Platform

Analysis by facility, distance, and spatial unit
(Exam.) Diagnosis of accessibility to infrastructure in neighborhood

- Population density within 500m of a community park?
- Population density within 1 km of the library?
- Medically vulnerable population in the general hospital service area?

Implications

- A specialized institution in charge of production, storage and distribution of geospatial information
- Publicity of using spatial information: Non-experts can also easily analyze urban data.
Seoul Transport Operation & Information Service (TOPIS)

- Control tower of integrated urban management, Platform for collecting and utilizing urban data
- Phased development from the late 1990s to the present
- Monitoring center located in Seoul City Hall
- Organized by: Seoul Metropolitan Government (SMG)
- User: Mayor, citizen, departments related to transportation, urban planning and safety...
- Function: Location-based services, monitoring and management, policy-making
- DB: Numeric maps, vehicle, climate, air quality, and the location information where bus card and credit card are used...
- Analysis: Population, transportation, environment, facilities, climate, vulnerable areas, development projects...

Fig. Seoul TOPIS: Urban management and policy-making using spatial information
Seoul Transport Operation & Information Service (TOPIS)

Location-based services

Policy-making: Night owl bus routes

Implications
- Easing urban problems and resolving citizen's discomfort using urban data
- Phased implementation considering demand, economy, and technology level (TOPIS has gradually developed over 20 years.)
Virtual Seoul

- Seoul built in virtual space, virtual laboratory for policy-making such as urban planning, climate, environment...
- Launched in 2019
- Organized by: Seoul Metropolitan Government (SMG)
- User: Departments related to urban planning, climate, environment and disaster, citizen
- Function: 3D-bsd virtual Seoul twin city, simulation, connection and management with other DBs
- DB: 3D spatial information, traffic, weather, population, buildings, disaster and safety information...
- Features: The interior space of public buildings, subways, and underground facilities can also be identified.

Fig. User interface of Virtual Seoul, and the concept
Virtual Seoul

Implications

- Function as a tool to prevent developments that do not have the considerations of the environment and urban contexts
- Active response to air pollution, heat island, and global warming
Cases in Private Sector

**SPACEWALK**

- Calculation the optimal construction model and return on investment by combining parcel’s area and form, regulations, urban planning laws

**OPEN mate**

- Analysis of commercial supremacy and optimal location for business, considering real estate prices, current population, user statistics
Cases in Private Sector

Fig. Changes in the Korean spatial information industry (2012 - 2018)

Since the survey of the spatial information industry in 2012, annual sales have steadily increased to 8.5%, 6.8% of workers, and 3.6% of corporations.

Implications

- Job creation effect: 3 times higher than the manufacturing sector, and 1.6 times higher than the construction sector in Korea
- Easy to connect and integrate with other business
- Opportunities for economic growth and social development through the spatial information industry (The global spatial information industry is growing rapidly.)
- The foundation of a knowledge-based society through the creation of a spatial information ecosystem

Conclusions

Inclusive Green Growth

- **KLIS**: 1) Efficient management of land resources, the basis of economic growth, 2) Promote social integration of utilization of land resources through transparency of land policy

- **KOPSS**: 1) Achieve rational development considering regional characteristics such as climate and environment, resources, and laws, 2) Land planning as an economic growth engine while considering the environment

- **Territorial Information Platform**: 1) Spread of the production, storage, distribution, and utilization of geospatial data, 2) Contribution to social equity with easy access to data

- **Seoul TOPIS**: 1) Energy and cost reduced by combining spatial information and smart and green technology, 2) Emergency and disaster preparedness, supporting for the vulnerable

- **Virtual Seoul**: Enhancing sustainability against climate change, environmental pollution, disasters in city-scale

Cadastral maps for usage of geospatial information

- Spatial info: Parcel type, area, boundary, physical environment and infrastructure...

- Attribute info: Possession, transaction, price information, associated planning and regulation...

Define geospatial issues, think about rational solutions

- Project execution based on problem-solving, after clear identification of the issues

- Mid- to long-term plan considering finance, technology level and infrastructure such as communication network

- Advanced technology: Production of 2d/3d data by drone

- Low cost: Free/cheap materials such as archived aerial photographs and open street maps...
Seoul Urban Solutions Agency (SUSA)

Solutions that improve the quality of life for urban dwellers

Private Sector

International Organizations

Seoul Metropolitan Government

Affiliated Organizations

Overseas Cities

Overseas Governments & Agencies

Cooperation

G2G Network

Transportation
Metro Rapid Transit
Water Treatment
Sewage Treatment
Urban Planning and Housing

Environment
Waste Management
e-Government
Citizen Safety
Disaster Prevention and Management

Making
Identifying Best Practice Policies
- Development of knowledge products (policy briefs, research reports, etc.)
- Developing and managing database of policies

Sharing
Knowledge Exchanges
- Study visits and training programs
- International conferences and workshops
- Cooperation with international organizations

Solving
Policy Advisory and Joint Projects
- Cooperation with national government, MDBs, and ODA programs
- Providing consulting and advisory services
- Urban Solutions workshops
Seoul Urban Solutions Agency (SUSA)

Study Visits, Training Programs, Joint Workshops

- India-Korea Smart City Knowledge Exchange (World Bank, September 2016)
- Establishment of Local Business District Analysis System Using Big Data (Buenos Aires, Argentina, January 2017)
- ADB-KRIHS Sustainable Urban Infrastructure Workshop – Seoul Module (September 2017 & 2018)
- ADB-SUSA Joint Workshop on Waste and Solid Waste Management (March 2018)
- ADB-SUSA Study Tour on Water and Energy for Uzbekistan (April 2018)
- Saudi Arabia-Korea Smart City Knowledge Exchange (October 2018)
- ADB-SUSA Joint Workshop on Smart City Financing (WUF, February 2018)
- E-Tax System Development for Sri Lanka (July 2018)
- EBRD-Seoul Joint Seminar on Big Data and Shared Economy (EBRD, August, 2018)
- Smart City Training for Kyiv, Ukraine (SHRDC, May 2018)
- EBRD-Seoul Joint Seminar on Smart Transportation and Smart Energy (EBRD, June 2019)

Policy Advisory and Consulting

- Production of Mobile-based ITS Guidebook for Developing Countries (World Bank, 2017)
- Establishment of Automated Taxation System in Colombo, Sri Lanka (KEXIM, 2018)
- Kyiv Smart City and Urban Diagnostics Master Plan (National IT Industry Promotion Agency, 2018)
- Improvement of Unsanitary Landfills in Manila, Philippines (National Research Foundation Korea, 2018-2019)
- KSP-IDB Joint Consulting: Master Plan for Buenos Aires Internet Data Center (KEXIM, 2019)
- Detailed Engineering Design, Preparation of Bidding Documents and Supervision of Works for Dar Es Salaam Bus Rapid Transit (BRT) Infrastructure (World Bank, 2019)
- Creative Cities Supporting Competitiveness and Sustainable Urban Development: Case Study on Seoul (World Bank, 2019)
Thank you.