Land Price Assessment System for Urban Development of Korea

Mie Oak CHAE, Ph. D
Chief Research Officer,
KAB Real Estate Research Institute

Korea Appraisal Board
CONTENTS

I. Urban Development Financing Systems

II. Land Price Assessment System
Land Price Assessment System for Urban Developments of Korea

Funding Systems for Urban Development

- Economic Development
  - Securing urban land
  - Infrastructure Establishment
  - Financing

- Tax
- Quasi-Tax
- Land Development
- Contributed Acceptance
- Public-Private Partnership (PPP)
1. Tax System

To provide funds for public services
To protect anti-speculation by recapturing development gains

Holding Tax

- Land Tax
- Non-Business Land Tax
- Vacant Land Tax
- Excessive Land Holding Tax
- Comprehensive Land Tax
- Comprehensive Real Estate Tax

Transfer Tax

- Acquisition Tax
- Anti-speculation Tax
  Based on 「Special Law on Regulating Real Estate Speculation」
- Capital Gains Tax
1-1. Property Tax

- Property tax has been introduced to raise fund for economic development, and to secure tax income for local governments, since 1961.

- Categorized land by land usage into ‘general aggregate levy’, ‘separate aggregate levy’ and ‘separate levy’
  - The lowest tax rate, 0.07%, is imposed on farmland and forest.
  - Luxury land such as golf courses, summer houses are subject to a 4% tax rate.

- Depending on the land price, the tax rate increases from 0.2% to 0.5%.

<table>
<thead>
<tr>
<th>Land (General Aggregate)</th>
<th>Tax bracket (won)</th>
<th>Tax rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 million and under</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td>50 million to 100 million</td>
<td>100 thousand won + (0.3% of amount over 50 million won)</td>
</tr>
<tr>
<td></td>
<td>Over 100 million won</td>
<td>250 thousand won + (0.5% of amount over 100 million won)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Housing</th>
<th>Tax bracket (won)</th>
<th>Tax rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60 million and under</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td>60 million to 150 million</td>
<td>60 thousand won + (0.15% of amount over 60 million won)</td>
</tr>
<tr>
<td></td>
<td>150 million to 300 million</td>
<td>195 thousand won + (0.25% of amount over 150 million won)</td>
</tr>
<tr>
<td></td>
<td>Over 300 million</td>
<td>1.57 million won + (0.4% of amount over 300 million won)</td>
</tr>
</tbody>
</table>

**Tax Base**

- Land and buildings : 50-90% of Public Announced Price of Land
- Housing : 40-80% of the Public Announced Price of House
1-2. Comprehensive Real Estate Tax (CRET)

- To promote tax equality and stability of real estate market through controlling excessive property possession

- Imposed on the owner of land and houses that exceed certain criteria, based on Comprehensive Real Estate Tax Law since 2005
  - A household with 1 house: 900 million KRW
  - A household with 2 more houses: 600 million KRW

- Levied taxes on the total sum of the properties owned by individuals

<table>
<thead>
<tr>
<th>Taxable property by type</th>
<th>Deductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential buildings (including associated land)</td>
<td>Public Announced Housing Price 600 million won (1 household 1 house* 900 million)</td>
</tr>
<tr>
<td>Comprehensive aggregate land (unimproved land)</td>
<td>Public Announced Land Price 500 million won</td>
</tr>
<tr>
<td>Separate aggregate land (land pertaining to commercial and office buildings)</td>
<td>Public Announced Land price 8 billion won</td>
</tr>
</tbody>
</table>

- The CRET is calculated by adding up the CRET for land and the CRET for residential buildings
- Tax rates increases with the aggregate value of the property held from 0.5 to 2% (housing).
1-3. Transfer Tax: Capital Gains Tax

- Levied on the profits from selling real estate
- Tax rate increases to the transfer profit
- Households owning a house for more than 2 years are exempt from taxation.
- The higher tax rate applies to people with 3 or more houses.
- The “Capital Gains Tax” has been used as a key means of restraining real estate speculation or activating the real estate market through tax rate adjustment.

- Tax base
  - Public Announced Land Price, transaction price

### Tax Rate

<table>
<thead>
<tr>
<th>Tax base (KRW)</th>
<th>Held for 2 years or more</th>
<th>Regular zones</th>
<th>Speculative zones (3 or more residential buildings) Non-business land</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>Accumulated deductions (KRW)</td>
<td>Rate</td>
</tr>
<tr>
<td>12 million or less</td>
<td>6%</td>
<td>0</td>
<td>16%</td>
</tr>
<tr>
<td>46 million or less</td>
<td>15%</td>
<td>-1.08 million</td>
<td>25%</td>
</tr>
<tr>
<td>88 million or less</td>
<td>24%</td>
<td>-5.22 million</td>
<td>34%</td>
</tr>
<tr>
<td>150 million or less</td>
<td>35%</td>
<td>-14.9 million</td>
<td>45%</td>
</tr>
<tr>
<td>300 million or less</td>
<td>38%</td>
<td>-19.4 million</td>
<td>48%</td>
</tr>
<tr>
<td>500 million or less</td>
<td>40%</td>
<td>-29.4 million</td>
<td>50%</td>
</tr>
<tr>
<td>More than 500 million</td>
<td>42%</td>
<td>-35.9 million</td>
<td>52%</td>
</tr>
</tbody>
</table>

- Stagnant market ▶ Reduces tax burden by lowering tax rate ▶ Reinvigorates market
- Flourishing market ▶ Increases burden by raising tax rate ▶ Prevents speculation

**Short-term transfer**

<table>
<thead>
<tr>
<th>Less than 1 year</th>
<th>Land</th>
<th>50%</th>
<th>1 year – 2 year</th>
<th>Land</th>
<th>40%</th>
<th>Unregistered Real estate</th>
<th>40~60%</th>
<th>70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>40%</td>
<td></td>
<td></td>
<td>Housing</td>
<td>40%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Quasi-tax : Charge System

**Development Charge**

- Imposes a 25% tax on development gains from land development projects as stated in the “Restitution of Development Gains Law”
- **Development gains**: Gains from increases in land price in excess of regular increase rate, from development projects or changes in land use plans

\[
\text{Development Charge} = \text{Development gains} \times 25% \\
= [\text{Land price at endpoint} - \text{land price at commencement point} - \text{regular increase in land price} - \text{development cost}] \times 25%
\]

**Infrastructure charge**

- Charged partial installation costs for 7 types of infrastructure for constructions over areas of 200 m²

**Reconstruction development charge**

- Restitution of development gains from redevelopment apartment buildings which were often targets of speculative demand
- Forced partial supply of small-area rental apartments for redevelopment apartment buildings
3. Land Development System

Land Readjustment project

<table>
<thead>
<tr>
<th>Land Owner</th>
<th>Project Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part of Land (as a recompense)</td>
<td>Repotted Land (Developed land)</td>
</tr>
</tbody>
</table>

**Land Readjustment Rate**

\[
\text{Land Readjustment Rate} = \frac{\text{The decreased land area}}{\text{All(Former)land Area}} \times 100(\%)
\]

Source: Seoul Urban Planning Portal (http://urban.seoul.go.kr)
4. Contributed Acceptance, Public contribution

Land Development, Housing Redevelopment, District Development Plan

Local Govt

Approve, provide incentive

Developer

Infrastructure, road, park, rental housing

50% of additional FAR

300% of FAR (Maximum FAR by LAW)

Public facilities, small houses (under 60m²)
(from 30% to 75% of additional FAR)
5. Private Development System: Public-Private Partnership (PPP)

- The Act on Promotion of Private Capital into Infrastructure Investment (1994)
  - Alternative financing method by utilizing private sector’s know-how and creativity
  - Partnership between government and private sector
  - Government role: plan, evaluate, approve execution, and support implementation
  - Private partner’s role: design, finance, build, and operate facilities

BTO (Build - Transfer - Operate)

- Construction by the private sector
- Ownership transferred to government
- Operation by the private sector
- Both solicited and unsolicited projects are eligible
- Roads, seaports, and railway projects, etc
- User-fees, Minimum Revenue Guarantee (MRG) for solicited projects
- High risk, high return
- IRR is determined through negotiation (9~15%)
02

Land Price Assessment System
The Necessity of a Systematic Land Price Assessment System

A systematic land price assessment system is a cornerstone of sustainable economic development,
- as it not only contributes in enhancing fairness and transparency of taxation,
- but also helps secure rationality for various land administration tasks such as compensation, recapturing of development gains, etc.
Introduction of Unified Land Price Assessment System

Before 1989,
- Price disparity among departments
- Duplication of survey tasks
- Different standards and methods for surveying land price

Purpose
- Consistency of land price assessment by unifying standards & methods
- Transparent and efficient taxation & compensation

Integraton of 4 different Assessment Systems

The Public Announcement System of Land Price (PASLP) was introduced in 1989
Korea’s Land Price Assessment System

Public Announcement System of Land Price (PASLP)

Official Land Price, Computer-Assisted Mass assessment System

- Assess and provide unified land price information for taxation, compensation, development charges, etc. (Approximately 60 administrative tasks) once a year by MOLIT
- The assessed prices can be adjusted for each specific administrative purpose

National taxes

Compensation

Local taxes

Development charges and impact fees

Public property sale/Rent
Standard for local health insurance fees
Overview of the Public Announcement System of Real Estate

- The Law on the Public Announcement System of Land Value was amended to become the Law on the Public Announcement System of Real Estate Value, in 2005
- The PASLP was extended to include the announcement of Official Housing Prices
The Main Components in Assessing Official Land Price

- Reference Lot Price
- Survey of Land Characteristics
- Land Price Index Table
Survey of Land Characteristics

To assess land prices, the PASLP surveyed characteristics of lands, such as elevation & land shape, land use, planning, regulation, accessibility to public facilities for land parcels throughout the country.) These land characteristics also became the basis for establishing the comprehensive land information system in Korea (LMIS, KLIS).

<table>
<thead>
<tr>
<th>Classification</th>
<th>Major characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public regulations</strong></td>
<td>1) Land-use zones</td>
</tr>
<tr>
<td></td>
<td>2) Use districts</td>
</tr>
<tr>
<td></td>
<td>3) Urban planning facilities</td>
</tr>
<tr>
<td></td>
<td>4) Forest regulations</td>
</tr>
<tr>
<td></td>
<td>5) Farmland regulations</td>
</tr>
<tr>
<td><strong>Physical characteristics</strong></td>
<td>1) Elevation, land shape, direction</td>
</tr>
<tr>
<td></td>
<td>2) Road adjacency</td>
</tr>
<tr>
<td></td>
<td>3) Fertility (for farmland)</td>
</tr>
<tr>
<td></td>
<td>4) Area</td>
</tr>
<tr>
<td><strong>Land use</strong></td>
<td>1) Land category</td>
</tr>
<tr>
<td></td>
<td>2) Land use type</td>
</tr>
<tr>
<td><strong>Distance from public or undesirable (NIMBY) facilities</strong></td>
<td>1) Distance from expressways or railroads</td>
</tr>
<tr>
<td></td>
<td>2) Distance from waste treatment facilities</td>
</tr>
<tr>
<td><strong>Large-scale development projects</strong></td>
<td>1) Project method</td>
</tr>
<tr>
<td></td>
<td>2) Project stage</td>
</tr>
</tbody>
</table>
Korea’s Land Price Assessment System

**Land Price Index Table (LPIT)**

- The LPIT is the collection of price adjustment ratio tables made from land price assessment models, based on the price and characteristics of Reference Lots.
- It contains 18 different types of land characteristics for each classified price level zones of each administrative district

### Example of the Land Price Index Table (Elevation)

<table>
<thead>
<tr>
<th></th>
<th>lowland</th>
<th>flat</th>
<th>mild slope</th>
<th>steep slope</th>
<th>highland</th>
</tr>
</thead>
<tbody>
<tr>
<td>lowland</td>
<td>1.00</td>
<td>1.02</td>
<td>0.88</td>
<td>0.83</td>
<td>0.80</td>
</tr>
<tr>
<td>flat</td>
<td>0.98</td>
<td>1.00</td>
<td>0.86</td>
<td>0.81</td>
<td>0.78</td>
</tr>
<tr>
<td>mild slope</td>
<td>1.14</td>
<td>1.16</td>
<td>1.00</td>
<td>0.94</td>
<td>0.91</td>
</tr>
<tr>
<td>steep slope</td>
<td>1.20</td>
<td>1.23</td>
<td>1.06</td>
<td>1.00</td>
<td>0.96</td>
</tr>
<tr>
<td>highland</td>
<td>1.25</td>
<td>1.28</td>
<td>1.10</td>
<td>1.04</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### Example of the Land Price Index Table (Land shape)

<table>
<thead>
<tr>
<th></th>
<th>square</th>
<th>rectangle</th>
<th>trapezoid</th>
<th>irregular</th>
<th>flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>square</td>
<td>1.00</td>
<td>0.99</td>
<td>0.98</td>
<td>0.94</td>
<td>0.89</td>
</tr>
<tr>
<td>rectangle</td>
<td>1.01</td>
<td>1.00</td>
<td>0.99</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>trapezoid</td>
<td>1.02</td>
<td>1.01</td>
<td>1.00</td>
<td>0.96</td>
<td>0.91</td>
</tr>
<tr>
<td>irregular</td>
<td>1.06</td>
<td>1.05</td>
<td>1.04</td>
<td>1.00</td>
<td>0.95</td>
</tr>
<tr>
<td>flag</td>
<td>1.12</td>
<td>1.11</td>
<td>1.10</td>
<td>1.06</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Korea’s Land Price Assessment System

Assessing Land Price

Selection of a comparable Reference Lot

Comparison of land characteristics between the subject Individual Lot and the selected Reference Lot

Application of price adjustment ratio using the Land Price Index Table

Reference Lot Price * Price adjustment ratio = Individual Lot Price

<table>
<thead>
<tr>
<th>Reference Lot Price</th>
<th>Land-use zone ratio</th>
<th>Land use ratio</th>
<th>Road adjacency ratio</th>
<th>Elevation ratio</th>
<th>Land shape ratio</th>
<th>Individual Lot Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000,000 (won/m²)</td>
<td>X 1.0</td>
<td>X 1.0</td>
<td>X 0.9</td>
<td>X 1.05</td>
<td>X 0.97</td>
<td>9,166,500 (won/m²)</td>
</tr>
</tbody>
</table>
Individual Land Prices are automatically calculated using the Automatic Land Price Calculation System.
Landowners can access all information regarding assessed land prices by year from 1990. The Official Land Price is one of viewable category items in KLIS.

<table>
<thead>
<tr>
<th>REQUESTED LAND</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base Year</strong></td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>1994</td>
<td>Gaepo-dong, Gangnam-gu, Seoul</td>
</tr>
<tr>
<td>1993</td>
<td>Gaepo-dong, Gangnam-gu, Seoul</td>
</tr>
<tr>
<td>1992</td>
<td>Gaepo-dong, Gangnam-gu, Seoul</td>
</tr>
<tr>
<td>1991</td>
<td>Gaepo-dong, Gangnam-gu, Seoul</td>
</tr>
<tr>
<td>1990</td>
<td>Gaepo-dong, Gangnam-gu, Seoul</td>
</tr>
</tbody>
</table>

*Unit: won/m²*
Improvements to the Land Price Assessment System Using ICT
The ARLSS was developed to provide more objectivity in the Reference Lot selection process of Individual Lot assessment. The use of the ARLSS resulted in the reduction of the average time spent by assessing officers on Individual Lot assessment by 87.5%.
The Mobile Field Survey App was developed by KAB to maximize survey efficiency while improving survey accuracy. The App is equipped with the latest version of GPS-installed parcel and satellite maps.
Improvements to the Land Price Assessment System Using ICT

Automatic Land Characteristics Survey System (ALCSS)

The ALCSS analyzes land characteristics by utilizing public information (digital map, Korea Land Information System) and ICT (GIS, drone, satellite images, etc.) → Improves time and labor efficiency
## Automatic Land Characteristics Survey System

### Performance Evaluation: enhances accuracy and consistency in field surveys
Field Survey Method: Subjective judgements made by individual assessors → Computer simulations based on objective standards

<table>
<thead>
<tr>
<th>Land Shape</th>
<th>Field Survey</th>
<th>ALCS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Ratio</td>
</tr>
<tr>
<td>Missing</td>
<td>946,444</td>
<td>3.0%</td>
</tr>
<tr>
<td>Square</td>
<td>765,677</td>
<td>2.4%</td>
</tr>
<tr>
<td>Rectangle</td>
<td>5,101,047</td>
<td>15.9%</td>
</tr>
<tr>
<td>Trapezoid</td>
<td>5,290,141</td>
<td>16.5%</td>
</tr>
<tr>
<td>Triangle</td>
<td>886,436</td>
<td>2.8%</td>
</tr>
<tr>
<td>Irregular Field</td>
<td>19,068,776</td>
<td>59.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance to major roads</th>
<th>Field Survey</th>
<th>ALCS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Ratio</td>
</tr>
<tr>
<td>Missing</td>
<td>149,962</td>
<td>0.7%</td>
</tr>
<tr>
<td>0m</td>
<td>2,012,645</td>
<td>9.80%</td>
</tr>
<tr>
<td>Within 50m</td>
<td>1,846,601</td>
<td>9.00%</td>
</tr>
<tr>
<td>Within 100m</td>
<td>1,638,314</td>
<td>8.00%</td>
</tr>
<tr>
<td>Within 500m</td>
<td>6,743,225</td>
<td>32.80%</td>
</tr>
<tr>
<td>Above 500m</td>
<td>8,200,399</td>
<td>39.80%</td>
</tr>
</tbody>
</table>

© Korea Appraisal Board
e-Real Estate Pricing System

Automatic assessment of land prices using GIS and market transaction data

- Developed by the Korea Appraisal Board in 2015
- Uses market transaction information uploaded real-time
- Currently used by 4 major Korean financial institutes for land collateral valuation

Objectives

\` General Market

• Provide Price reference to the general public land sales & acquisition

\` Financial Institutes

• Mitigate risks for financial institution concerning collateral loans

\` Korean Government

• Provide review standards in checking the validity of appraisals
• Support the government in policy making
e-Pricing Method

Land price
- Comparison Method of Public Announced Price and Market Price
- Comparison Method of Land Characteristics of Transacted Land and Target Land

Building price: estimate based on Cost Approach to Value

Housing price: estimated land price + estimated building price
To upgrade the current e-Real Estate Pricing System, the AI-based assessment system has been in development since 2016.

The AI-based system consists of four major steps – 1) classification, 2) feature selection, 3) modeling level 1, and 4) modeling Level 2 with six different regressors including Random forests, Gradient boosting, Adaboost, Extra tree.
improvements to the land price assessment system using ICT

Effects, Limitations & Future Task

The Past
- Manual/Field Survey

The Present
- Computerized Survey System
  - Manual/Field Survey

The Future
- Computerized Assessment System with ICT & Market data

Effects

- In the past, the PASLP was assessed manually, and relied on field surveys. Nowadays, it is improved through application of ICT.

- The greatest feature of the PASLP lies in the Land Price Index Table that helps non-specialists calculate land prices systematically.
  - The PASLP enhanced the consistency and reduced the subjective judgement of assessors with the Land Price Index Table(LPIT).

- The PASLP improved time & cost efficiency.
  - Only 1.5% of the land is valued by appraisers, and the rest are assessed by local officers

- Reduce complaints from the people

- Contribute to enhance the legitimacy & transparency of land related public administration
Improvements to the Land Price Assessment System Using ICT

Effects, Limitations & Future Task

The Past

Manual/Field Survey

The Present

Computerized Survey System

Manual/Field Survey

The Future

Computerized Assessment System with ICT & Market data

Limitations

- Relied on appraisers & local government officials’ field surveys in most cases
- Gap between market price and official land price

Ongoing & Future Tasks

- Reduce subjective judgement of assessors & surveyors’, increase objective consistency
- Reduce gap between market price and official price based on market price
  - Upgrade On-line linkage of Various administrative Information
  - Improve e-Pricing System with AI technology & real-time market data
THANK YOU