Korea’s Real Estate Mass Valuation System and Related Overseas Projects

01 Introduction of REB

02 Overview of Korea’s Mass Valuation Framework

03 Property Characteristics Survey

04 Demonstration of How Work Is Done at REB
01. Introduction of REB
I. Introduction of REB (Korea Real Estate Board)

OVERVIEW

- **(Formerly)** Korea Appraisal Board (KAB) (~12/09/2020)
- **(Type)** State-owned enterprise
- **(Founded)** April 25, 1969; 51 years ago in Seoul, Korea
- **(# of Locations)** HQ, R&D center and 30 branches
- **(# of Employees)** Approximately 1,100
- **(Website)** [www.reb.or.kr](http://www.reb.or.kr)
- **(CEO)** Tae-rak SON

MISSION

Contribute to maintaining order and protecting consumer’s rights and interests in real estate sectors

VISION

Trusted real estate expert organization
Introduction of REB (Korea Real Estate Board)

- Land, Residential
- Appraisal Review
- Green Building Certification, R&D, etc.
- Mass Valuation
- Expropriation
- Appraisal Market Management
- Others
- Statistics
- Real Estate Market Management
- Urban Renewal
- Land, Residential, Commercial
- Transaction Data, REITs, and etc.
## I. Introduction of REB (Korea Real Estate Board)

<table>
<thead>
<tr>
<th>Type</th>
<th>Project Title (Funder)</th>
<th>Country</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting</td>
<td>• Land Price Assessment Capacity and Land Price Assessment System Improvement Project for Vietnam (KOICA¹)</td>
<td>Vietnam</td>
<td>‘16.11-’19.05</td>
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<tr>
<td></td>
<td>• Consultancy Services for Capacity Building for GIS-based Revenue Collection System in Zanzibar of Tanzania (World Bank)</td>
<td>Zanzibar, Tanzania</td>
<td>‘17.07-’20.03</td>
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<tr>
<td></td>
<td>• A Study on the Effects of the Land Reallocation Project in Korea</td>
<td>--</td>
<td>‘20.07</td>
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<td></td>
<td>• Feasibility Study on Technical Support Project for Establishing Multi-Purpose Land Resource Database in Uzbekistan (KOICA¹)</td>
<td>Uzbekistan</td>
<td>‘20.11</td>
</tr>
<tr>
<td></td>
<td>• Feasibility Study on Consulting for the Project Development in the Area of Establishing SDI-based Real Property Assessment System (KOTRA²)</td>
<td>Zanzibar, Tanzania</td>
<td>‘21.02-’21.12</td>
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<tr>
<td></td>
<td>• Project for Establishment of Land Price Information System in Lao (MOLIT³)</td>
<td>Laos</td>
<td>‘21.04-’21.11</td>
</tr>
<tr>
<td>Training/ Capacity Building</td>
<td>• Knowledge and Experience Sharing Program of Korean Infrastructure Development for High-level Officials (MOLIT³)</td>
<td>(Multiple)</td>
<td>‘15.02-’17.12</td>
</tr>
<tr>
<td></td>
<td>• Capacity Building Program for Assessment of Real Estate Price for Taxation, Compensation Management System for Public Work and Urban Renewal (KOICA¹)</td>
<td>(Multiple)</td>
<td>‘18.10-’20.10</td>
</tr>
<tr>
<td></td>
<td>• Capacity Building Program on Property Assessment for Taxation</td>
<td>Thailand</td>
<td>‘19.03</td>
</tr>
<tr>
<td></td>
<td>• Capacity Development Program on Property Assessment (MOLIT³)</td>
<td>Belarus, Uzbekistan</td>
<td>‘21.05</td>
</tr>
<tr>
<td></td>
<td>• Capacity Building Program for Establishment of Thailand National Property Valuation Management Center (MOLIT³)</td>
<td>Thailand</td>
<td>‘22.02</td>
</tr>
</tbody>
</table>

¹ KOICA : Korea International Cooperation Agency, ² KOTRA : Korea Trade Promotion Corporation, ³ MOLIT : Ministry of Land, Infrastructure and Transport
02. Overview of Korea’s Mass Valuation Framework
Ⅱ. Overview of Korea’s Mass Valuation Framework

1. Reference Property
   - Reference Selection
   - Regional Analysis
   - Reference Selection
   - Adjustment
   - Selection Confirmation
   - Reference Valuation
     - Characteristics Survey
     - Valuation
     - Review

2. Comparison Table
   - Regional Unit Determination
   - Regional Analysis
   - Unit Determination
   - Tabulation
   - Hedonic Price Model Application
     - Finding Multipliers
       - Review

3. Individual Property
   - Characteristics Survey
   - Reference Matching
   - Comparison
   - Valuation
     - Review
Ⅱ. Overview of Korea’s Mass Valuation Framework

☐ (Reference Selection) A portion of properties (approx. 1~5%) are selected to proportionately represent regional zonings, land use and other features like shape

☐ (Reference Valuation) Selected references are assessed individually according to standard of mass valuation by REB professionals or private appraisers
Ⅱ. Overview of Korea’s Mass Valuation Framework

- **Comparison Table Generation** Based on multiple regression analysis performed on results of reference properties valuation, comparison tables are generated.

  - **(Example #1) Comparison table for slope and elevation**

    |                | lowland | flat  | mild slope | steep slope | highland |
    |----------------|---------|-------|------------|-------------|----------|
    | lowland        | 1.00    | 1.02  | 0.88       | 0.83        | 0.80     |
    | flat           | 0.98    | 1.00  | 0.86       | 0.81        | 0.78     |
    | mild slope     | 1.14    | 1.16  | 1.00       | 0.94        | 0.91     |
    | steep slope    | 1.20    | 1.23  | 1.06       | 1.00        | 0.96     |
    | highland       | 1.25    | 1.28  | 1.10       | 1.04        | 1.00     |

  - **(Example #2) Comparison table for land shape**

    |                | square | rectangle | trapezoid | irregular | flag |
    |----------------|--------|-----------|-----------|-----------|------|
    | square         | 1.00   | 0.99      | 0.98      | 0.94      | 0.89 |
    | rectangle      | 1.01   | 1.00      | 0.99      | 0.95      | 0.90 |
    | trapezoid      | 1.02   | 1.01      | 1.00      | 0.96      | 0.91 |
    | irregular      | 1.06   | 1.05      | 1.04      | 1.00      | 0.95 |
    | flag           | 1.12   | 1.11      | 1.10      | 1.06      | 1.00 |
Ⅱ. Overview of Korea’s Mass Valuation Framework

□ (Multivariate Comparison) Characteristics of individual property are compared to those of comparable reference property based on comparison tables, from which adjustment multipliers are determined.

□ (Assessment of Individuals) Individual property is assessed by multiplying reference property price by aforementioned multipliers.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Reference</th>
<th>Individual</th>
<th>Adjustment Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning</td>
<td>residential</td>
<td>residential</td>
<td>1.00</td>
</tr>
<tr>
<td>Use</td>
<td>residential</td>
<td>commercial</td>
<td>1.20</td>
</tr>
<tr>
<td>Road Condition</td>
<td>16m wide</td>
<td>8m wide</td>
<td>0.87</td>
</tr>
<tr>
<td>Slope/Elevation</td>
<td>mild slope</td>
<td>flat land</td>
<td>1.16</td>
</tr>
<tr>
<td>Shape</td>
<td>square</td>
<td>rectangle</td>
<td>0.99</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference Unit Price</th>
<th>Adjustment Multiplier</th>
<th>Individual Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>X 1.00</td>
<td>X 1.20</td>
</tr>
</tbody>
</table>
03. Property Characteristics Survey
Ⅲ. Property Characteristics Survey

01. Overview of Characteristics Survey

Why Survey Property Characteristics?

- To figure each value-determining factor’s influence on property value
  → Comparison tables generated with which individual properties are mass-assessed
01. Overview of Characteristics Survey

Characteristics to Survey

- **Physical & Locational Characteristics**
  - Land shape, Slope, Adjacent Road, Directions, Distance to Undesirable Facilities, etc.
  - Survey Method: Field Survey
  - Assisted by: Field Survey App

- **Administrative Characteristics**
  - Zoning, District, Urban(Regional) Planning, Other Regulations, etc.
  - Survey Method: Desk Job
  - Assisted by: REB mainframe fetching data from central/local governments
III. Property Characteristics Survey

01. Overview of Characteristics Survey

Characteristics to Survey

- Physical & Geographic characteristics
- Administrative Characteristics

Before vs. Now

- GIS Tools
- Mobile APP
- Digital Map
- IT System
Ⅲ. Property Characteristics Survey

02. Physical Characteristics

**Current Use**

- Single-family detached home
- Multifamily residential
- Industrial
- Orchard
- Commercial
- Mixed (Residential + Commercial)
- Agricultural
- Forest
02. Physical Characteristics

Adjacent Road

- **Width**: Average width of road adjacent to a property (if width is inconsistent)

Width: 4m~8m

→ Average width: 6m
III. Property Characteristics Survey

02. Physical Characteristics

Adjacent Road

- **Number of sides adjacent to road(s)**
  - Whether adjacent to two sides or more (corner lot) is another quality
Ⅲ. Property Characteristics Survey

02. Physical Characteristics

Land Shape & Direction

- **Land Shape**: determined from adjacent road’s perspective
  - (Square, Horizontal/Vertical Rectangle, Trapezoid, (Inverted) Triangle, Flag lot, Indeterminate)
- **Direction**: determined either from adjacent road’s perspective or slope direction (for forest land)

Parcel # : Land Shape / Direction

- ① Horizontal rectangle / Northwest
- ② Vertical rectangle / Southeast
- ③ Flag land / Southeast
- ④ Trapezoid / Southeast
Ⅲ. Property Characteristics Survey

02. Physical Characteristics

Jointly Used Land Lots

- **Meaning**: Two or more land lots are used jointly → treat as a single parcel
  - Whether to be used jointly is determined in light of being site for the same building, actual use, ownership

- Single home on two land lots
- Both lots being building site as per building register (Lot #463-2 & #463-8)
- Same owner

- Treat as a single parcel
  - Jointly used O: same adjacent road for both lots
  - Jointly used X: The lot in the back has no adjacent road
02. Locational Characteristics

Distance to Undesirable Facilities

- Distance to facilities railway, highway (causing noise) and waste management facilities
  - Classified as “Less than 50m”, “50m~100m”, or “100m~500m” (straight-line distance)
Ⅲ. Property Characteristics Survey

02. Locational Characteristics

Distance to Undesirable Facilities

- Distance to aboveground substation
  - Classified as “Less than 50m”, “50m~100m”, or “100m~600m” (straight-line distance)
Ⅲ. Property Characteristics Survey

03. Administrative Characteristics

Zoning

- Every piece of land belongs to a zone, checked by “confirmation certificate of land use planning”
  - As zoning regulates land use, construction and development, it is considered the most important administrative characteristic
03. Administrative Characteristics

Urban planning

- Whether a land parcel is included in an urban plan (ex. for road, park, etc.)
  - As affected land’s use is restricted, affected portion in percentage is surveyed (ex. 30%, 50% ...)

![Diagram showing urban planning elements: Green belt, Urban plans, Road, Park](image-url)
### Development Plan

- **Whether a land parcel is part of a development project such as an urban renewal project**
  - Survey ‘type of development’ along with ‘current project phase’

  - ① Type of development: (Redevelopment, Reconstruction, Urban Renewal, etc.)
  - ② Current project phase (project approved, under construction, etc.)
04. Demonstration of How Work Is Done at REB
IV. Demonstration of How Work Is Done at REB

01. REB’s In-house Software : KRIMS

1. Choose property to work on

2. Select ‘Land part’ and put in land characteristics
IV. Demonstration of How Work Is Done at REB

01. REB’s In-house Software : KRIMS

1. Choose characteristic to work on : ‘Shape’

2. Select characteristic feature you surveyed : ‘Indeterminate shape’
IV. Demonstration of How Work Is Done at REB

01. REB’s In-house Software: KRIMS

1. Choose 'Building part'

2. Put in building characteristics such as structure, use, area, construction completion date, economic life, etc.
IV. Demonstration of How Work Is Done at REB

01. REB’s In-house Software: KRIMS

Real-time Data Fetching from Multiple Government Bodies

Fetch data such as zoning restrictions, land/building registers, title deeds, cadasters, etc.
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

1. Log in

2. Choose work for which to survey
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

- Tap on what to do
- Properties shown on a map
- List of properties to survey
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

- Satellite view
- Map

Or
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

Select property to survey

Directions to the property
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

Characteristics to survey

Drop-down menu to choose from
IV. Demonstration of How Work Is Done at REB

02. Mobile Field Survey App

Take photo
## IV. Demonstration of How Work Is Done at REB

### 03. Automated Characteristic Survey

#### Overview

- **To Improve Accuracy & Efficiency of Survey Using IT/GIS Technologies**
  - Utilizing cadastral map, topographic map, road map, etc.
  - Self-developed by REB in 2019

<table>
<thead>
<tr>
<th>Automatically-surveyed Characteristics</th>
<th>Required Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Slope</strong></td>
<td>Cadastral Map, Topographic Map, TIN/DEM*</td>
</tr>
<tr>
<td><strong>Land Shape</strong></td>
<td>Cadastral Map</td>
</tr>
<tr>
<td><strong>Direction</strong></td>
<td>Cadastral Map, Road Map, Topographic Map</td>
</tr>
<tr>
<td><strong>Adjacent Road</strong></td>
<td>Cadastral Map, Road Map</td>
</tr>
<tr>
<td><strong>Distance From Railway/Highway</strong></td>
<td>Cadastral Map, Road Map</td>
</tr>
<tr>
<td><strong>Distance From Undesirable Facilities</strong></td>
<td>Cadastral Map, Coordinates of Undesirable Facilities</td>
</tr>
</tbody>
</table>

* (TIN) Triangulated Irregular Network / (DEM) Digital Elevation Model
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Land Slope

- **How to determine land slope**
  - **Criterion #1**: Absolute degree of slope
  - **Criterion #2**: Relative slope compared to nearby arterial road or surrounding topography

<table>
<thead>
<tr>
<th>Value (Attribute)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowland</td>
<td>Significantly low-lying land compared to nearby arterial road or surrounding topography</td>
</tr>
<tr>
<td>Flatland</td>
<td>Land of similar height to nearby arterial road or surrounding topography (or A land with no or minor slope)</td>
</tr>
<tr>
<td>Mild slope</td>
<td>Land of high elevation compared to nearby arterial road or surrounding topography (w/ slope less than 15 degrees)</td>
</tr>
<tr>
<td>Steep slope</td>
<td>Land of high elevation land compared to nearby arterial road or surrounding topography (w/ slope 15 degrees or higher)</td>
</tr>
<tr>
<td>Highland</td>
<td>Land of very high elevation land compared to nearby arterial road or surrounding topography</td>
</tr>
</tbody>
</table>
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Land Slope

- Automated slope determination
  - Calculating slope and elevation using GIS technologies

\[ \text{Area Of Cell} = 10\text{m} \times 10\text{m} = 100\text{m}^2 \]

\[ \text{Mean Slope} = \frac{\sum (S_i \times A_i)}{\sum A_i} \]

Where, \( S_i \) is a slope for each cell

\[ \text{Mean Elevation} = \frac{\sum (E_i \times A_i)}{\sum A_i} \]

Where, \( E_i \) is a elevation for each cell

(Area for each cell)

* (TIN) Triangulated Irregular Network
* (DEM) Digital Elevation Model
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Land Shape

- How to determine land shape
  - Assessor picks one from given types of shape from his/her perspective
  → Since land shape is not quantitative, there is always a chance of error.
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Land Shape

- Automated shape determination
  - Figuring out spatial features of land using GIS technologies
  - Represented in shape index, WL(width-length) index, winding index

\[
\text{Shape Index} = \frac{\text{Parcel Area}}{\text{Minimum Bounding Geometry Area}}
\]

\[
\text{WL Index} = \frac{\text{Shorter Side Length}}{\text{Longer Side Length}}
\]

\[
\text{Winding Index} = \frac{\text{Parcel Area}}{\text{Convex hull Area}}
\]
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Direction

- How to determine direction of land
  - Residential property: determined from the perspective of adjacent road
  - Forest land: determined by slope of forest

* Direction matters only for either residential properties or forest land
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Direction

- Automated direction determination
  - Residential: determined using cadastral map and road map
  - Forest: determined using cadastral map and topographic map
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Adjacent Road

- How to determine direction of land
  - Decided by ① width, ② number of sides adjacent to road and ③ types of passable vehicles for narrow path
03. Automated Characteristic Survey

### Adjacent Road

- Automated adjacent road determination
  - ① Find adjacent road and its width  →  ② Classify adjacent road using cadastral map and road map
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Distance to Undesirable Facilities

- How to determine distance to undesirable facilities
- Determined by straight-line distance to undesirable facilities later to be classified as follows

< Classes of distance to railway/highway >

<table>
<thead>
<tr>
<th>Code</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>~50m</td>
<td>50m ~ 100m</td>
<td>100m ~ 500m</td>
</tr>
</tbody>
</table>

< Classes of distance to waste management facilities >

<table>
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<th>2</th>
<th>3</th>
</tr>
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<td>100m ~ 500m</td>
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< Classes of distance to substation >

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</tbody>
</table>
IV. Demonstration of How Work Is Done at REB

03. Automated Characteristic Survey

Distance to Undesirable Facilities

- Automated measurement of distance to undesirable facilities
- Measuring straight-line distance to undesirable facilities from land perimeters
IV. Demonstration of How Work Is Done at REB

Assessment Methodology and Process

Three Approaches to Value

- **Sales Comparison (main approach)**: based on sales price of comparable property
- **Cost Approach**: based on replacement cost minus depreciation
- **Income Approach**: based on income to be generated

Searching for Comparable Sales

Assessors search for comparable sales on REB's in-house software (KRIMS)
IV. Demonstration of How Work Is Done at REB

Assessment Methodology and Process

**Sales Comparison Approach (with Cost Approach)**

- (1) Select a comparable sale: recent one that is most similar to the subject property preferably nearby
- (2) Figure out land price by subtracting building price from sales price: Building price is generally determined as replacement cost ± adjustments
- (3) Compare characteristics' attributes between the subject and the comparable: Adjustment multipliers applied → assessed value of the subject

The Real Estate Transaction Reporting System was introduced in 2006, forcing transacting parties to report their sales transaction to local government within 30 days of transaction, whose data is later to be transmitted to REB’s mainframe.
IV. Demonstration of How Work Is Done at REB

Assessment Methodology and Process

Real Estate Transaction Reporting System

- **Reporting**
  - By either transacting party or realtor
  - To municipality

- **Review**
  - Automated review
    - Using AVM*
  - Manual review

- **Open to Public**
  - Verified transaction data open to public
  - Used for multiple purposes like assessment

- **Statistics**
  - Statistical Analysis
    - Price, volume, etc.
  - Source for 67 different statistics
Thank you!