

# Freight Demand Analysis & Data Collections in Korea

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Sang Kyu Hwang, Ph.D.  
Center for Korea Transport DB



## Contents

- 1 Introduction on KTDB Center
- 2 What is KTDB ?
- 3 Overview on KTDB Freight Projects
- 4 Freight Survey
- 5 Freight Demand Analysis & Results
- 6 Future Research Plans

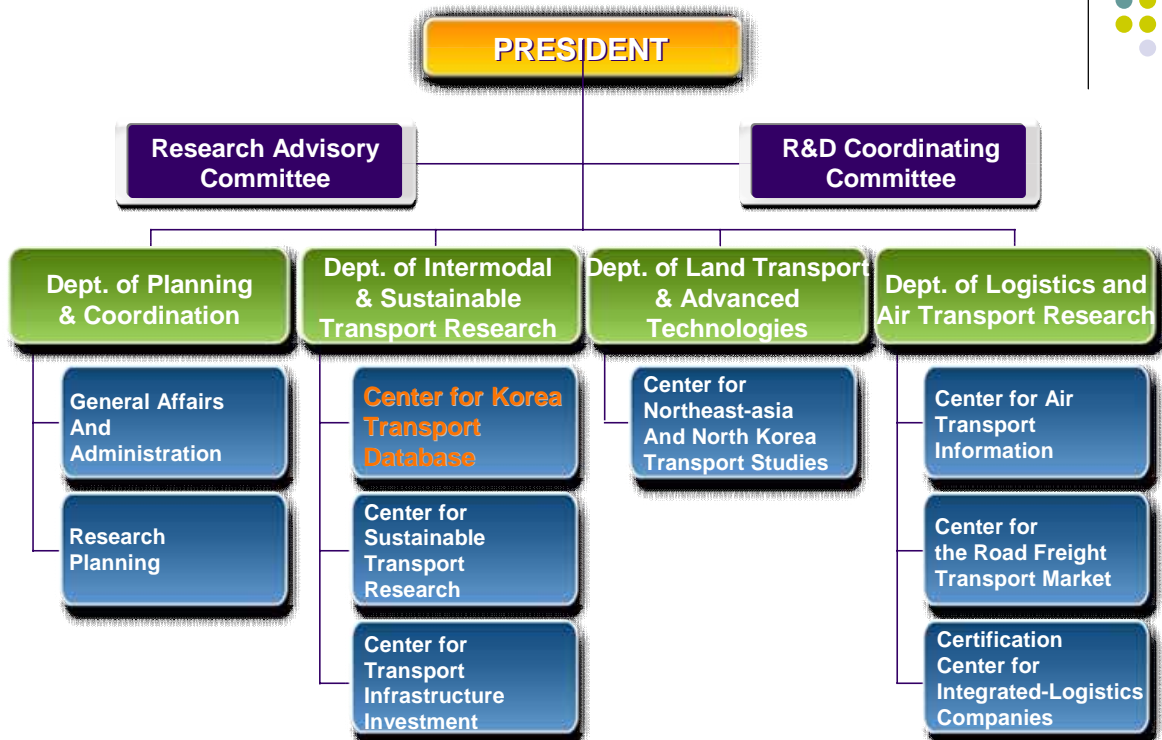


# Part. 1

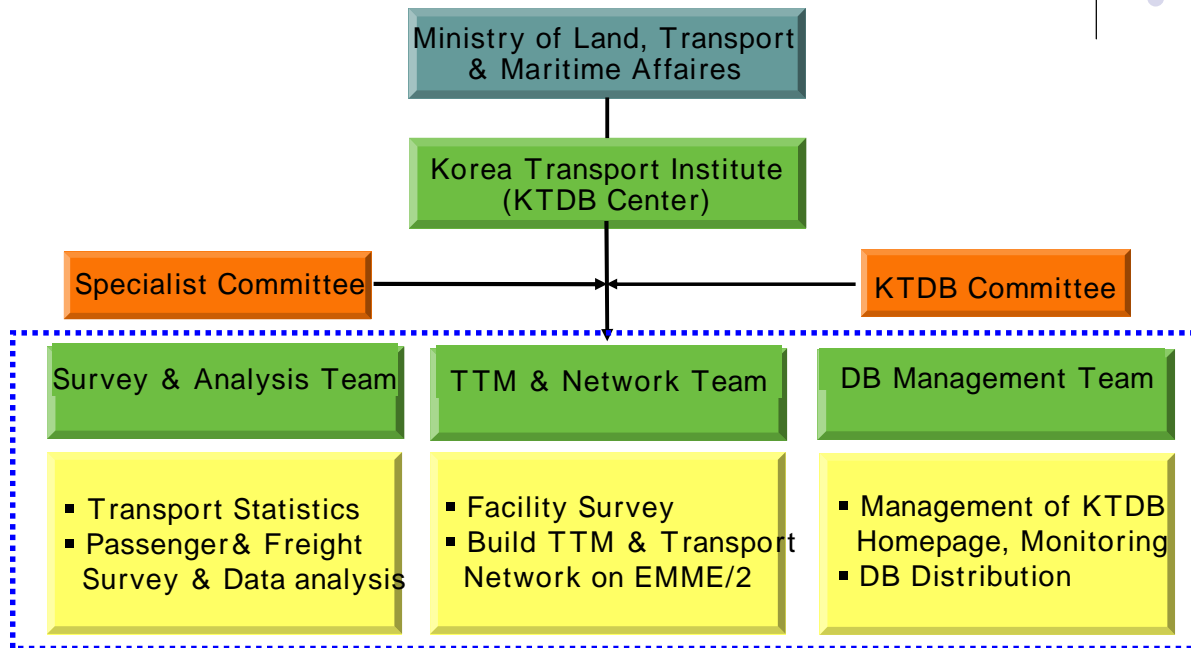
## Introduction of KOTI, KTDB



### 1. About KOTI & KTDB Center



# Organization of KTDB Center

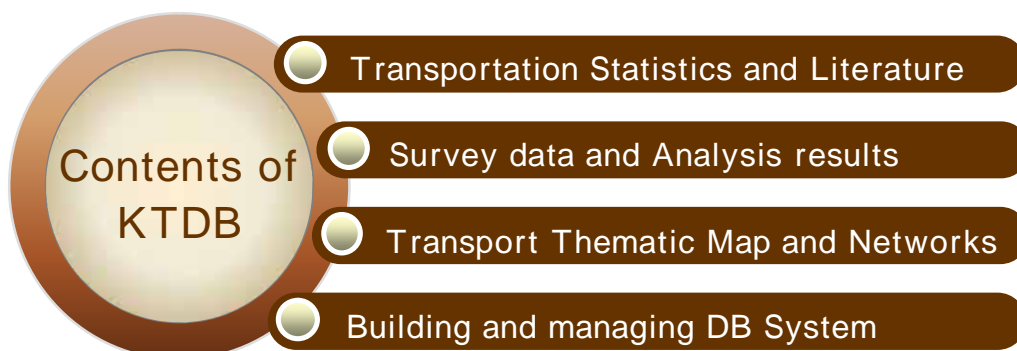


5

## 2. What is KTDB?



- ◆ **Comprehensive Transport DB** : integrating transport statistics, Passenger & Freight survey data and transport network data.
- ◆ **Policy oriented Transport DB** : tool for the evaluation of SOC projects such as Highway, Rail road on national level



6

# Part. 2

## Freight Demand Analysis, Data Collections in Korea



### 1. Overview on KTDB Freight Projects

#### ❖ Freight Survey



#### Major Survey

- Nationwide Commodity Flow Survey
- Metropolitan Area Commodity Flow Survey
- Water Commodity Flow Survey
- Maritime Import-Export commodity Survey
- Freight trip generation rate survey
- Distribution Channel Survey

#### Data Applications

- Development of commodity flow/truck travel model
- Analysis of movements of goods/trucks
- Forecasting commodity flows
- Assessing the impact of change in freight system
- Improvement on the accuracy of models
- Improvement on the reliability



## ❖ Freight Analysis

### Analysis

- Nationwide Freight OD Estimation and Forecasting
- Metropolitan Area Freight OD Estimation and Forecasting
- Water Freight OD Estimation and Forecasting
- Import - export Freight OD Estimation and Forecasting

### Contents

- constructing freight model
- Providing basic data for case studies
- Providing information for Policy analysis
- Forecasting commodity flows
- Assessing the impact of change in freight system



## ❖ Historical Projects

|          |          | 1998                                  | 1999                                   | 2000                                   | 2001   | 2002 - 2003  |
|----------|----------|---------------------------------------|--|--|--|--|
| SURVEY   | Region   | Nationwide                            | Metropolitan Areas                     | -                                      | Nationwide   | -  |
|          | Contents | Freight travel pattern, travel volume | Freight travel pattern, travel volume  | -                                      | Commodity flow survey, Maritime import-export freight survey | -  |
|          | Samples  | 1,001 companies                       | 286 areas/ 111,710 Households          | -                                      | 275 areas/ 11,018 samples                                    | -  |
| Analysis |          | -                                     | Basic analysis In 5 Metropolitan areas | Basic analysis In 5 Metropolitan areas | Basic analysis on national logistics status                  | Estimation of Interregional & Metropolitan areas O/D |

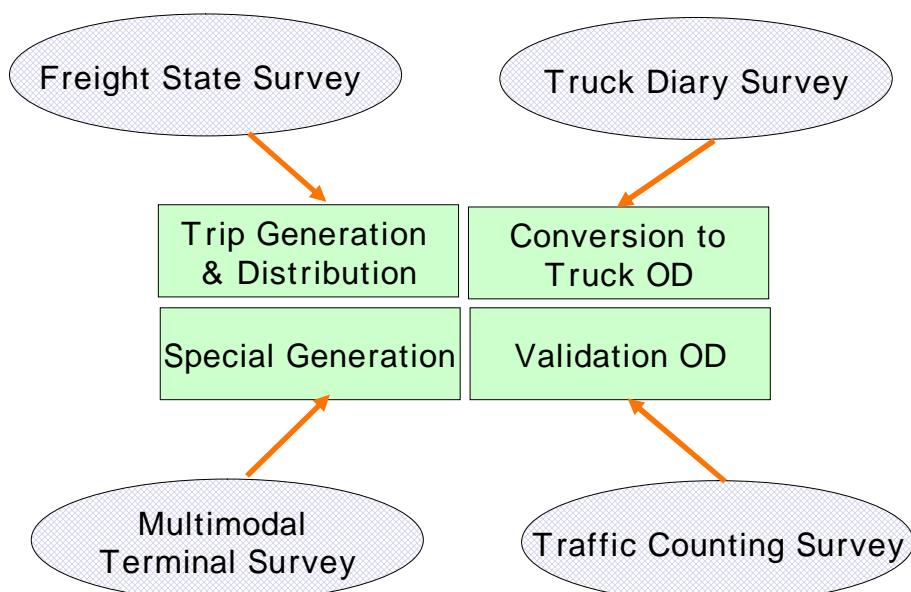


|          |                   | 2004   | 2005  | 2006  | 2007  |
|----------|-------------------|--|---|---|---|
| Survey   | Region            | Seoul Metropolitan area  | Nationwide  | Nationwide  | Nationwide  |
|          | Contents          | Preliminary survey for commodity flow survey In 2005                                       | Commodity flow survey, Maritime import-export freight survey      | Supplementary survey for the estimation of inter-regional freight O/D       | Distribution channel survey                               |
|          | Amount of samples | 21 hubs/29 areas/ 918 Samples  | -   | -   | -   |
| Analysis |                   | Inter-regional and 5 Metropolitan areas O/D update (2003) and future freight OD prediction | Inter-regional O/D update (2004) and future freight OD prediction | Estimation of inter-regional O/D (2005) and prediction of future freight OD | Inter-regional O/D update (2006) and future OD prediction |

11

## 2. Freight Survey

### ◆ Nationwide Commodity Flow Survey (2005)



12



# 1) Freight State Survey for Companies

- Sample size: 13,000 companies
- Survey items
  - : Amount and Value of yearly, monthly and 3 days shipment by commodity and mode
  - : Departure and arrival places of freight

| Type                             | contents   |
|----------------------------------|--|
| General                          | - Number of Industrial Classification, Primary handling-item,<br>- Location, Number of Employees, Annual sales etc.  |
| Annual transport trends Survey   | - Annual and monthly Arrival- Shipment Weight & rate<br>- Arrival Shipment Weight by item, by city & province.<br>- Previous month Arrival- Shipment Volume & Items,<br>- Arrival- Shipment Volume & Items for 3 days. |
| Goods movement Survey for 3 days | - Arrival- Shipment Date, Item, and Shipper & Receiver Type of Industrial Classification<br>- Origin- Destination, O-D Facilities, Weight(ton),<br>- Major mode, Travel time etc.                                      |

13



# 2) Truck Diary Survey

- Sample size: 13,000 veh.
- Survey items
  - : Payload and truckload by commodity
  - : Departure and arrival place

| Type                   | contents   |
|------------------------|--|
| Vehicle Characteristic | Industrial Classification, Vehicle type, Capacity etc.   |
| Trip Characteristic    | Travel Date, Origin(type), Start time, Destination(type), Arrival time, Freight Item, Load Weight(ton), Travel distance. |

14



### 3) Multimodal terminal Survey

- Sample size: 54 Multimodal Terminals
- Contents
  - Counting # of trucks passing multimodal terminals
  - Interviews with the experts in multimodal terminals

| location                                | Contents  |
|---|---|
| Freight Terminal, ICD, Station, Airport | Daily Freight Vehicle trip & use pattern.<br>- Load Item, Load State, Average Load rate.<br>- Industrial Classification & Type of Freight Vehicle, Origin-Destination |



### 4) Traffic Counting near Industry Parks

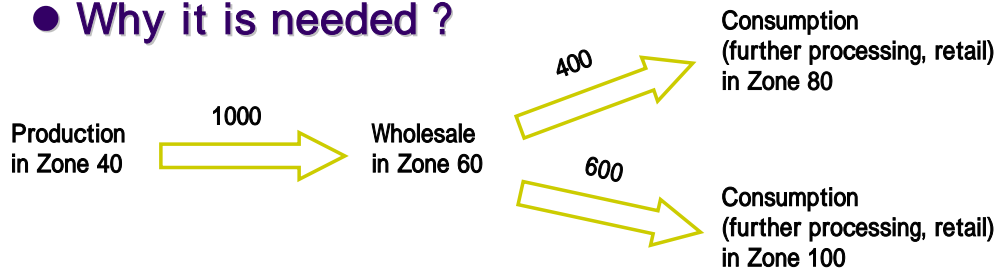
- Sample size: 110 sites
- Contents
  - : Counting # of trucks coming in and out of industry park

| location  | Contents  |
|---|---|
| Roadside Survey on Express way, Road nearby Industrial Park | Loaded item, status, Average Loading rate, Empty vehicle rate.<br>Freight Vehicle trip Distribution by time<br>Industrial Classification & Type of Freight Vehicles, Loading state. |

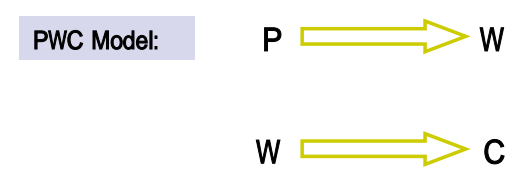


# ◆ Distribution Channel Survey (2007)

## ● Why it is needed ?



|         |     |     |
|---------|-----|-----|
| C zones |     |     |
| P zones | 80  | 100 |
| 40      | 400 | 600 |



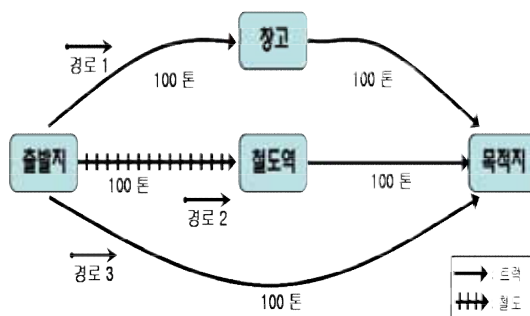
|         |      |     |     |
|---------|------|-----|-----|
| C zones |      |     |     |
| P zones | 60   | 80  | 100 |
| 40      | 1000 |     |     |
| 60      |      | 400 | 600 |

17

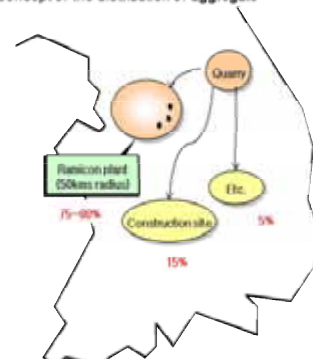


## ● Survey items and results

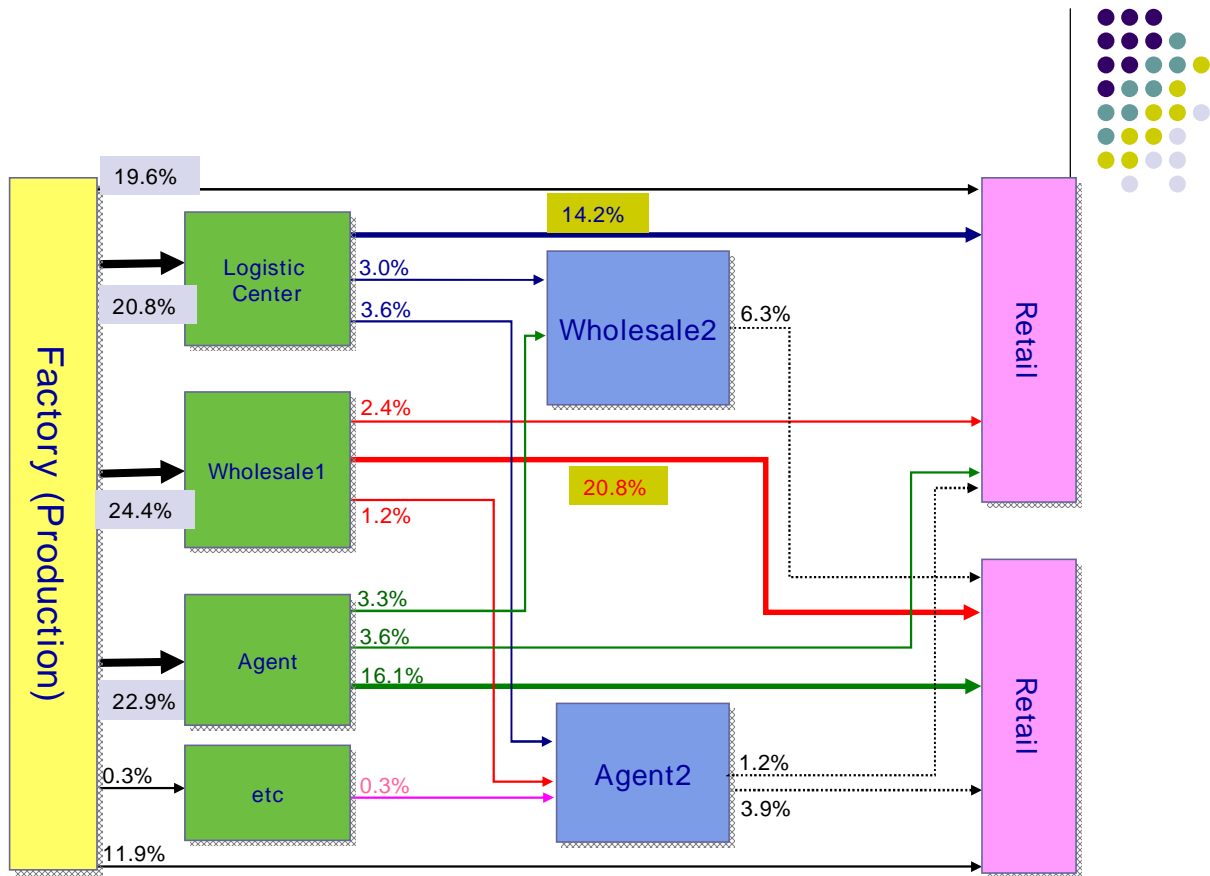
- Sample size: 980 companies
- Survey items  
Steel, food, aggregate, cement, electronic & electrical  
Distribution channels Status



The concept of the distribution of aggregate



18



19

### 3. Freight Demand Analysis

#### □ Forecast of Inter-Regional Freight OD

##### ◆ Scope

- Base year: the last year(2005)
- Spatial scope: whole country

##### ◆ Estimation Method

- Four-step Commodity Forecasting

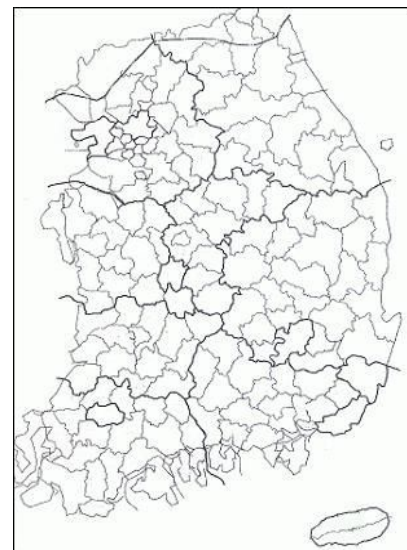
##### ◆ Results

- Estimates of Inter-Regional Freight & Truck OD in Base year

OD in Base year

- Estimates of Inter-Regional Freight & Truck OD in Future years

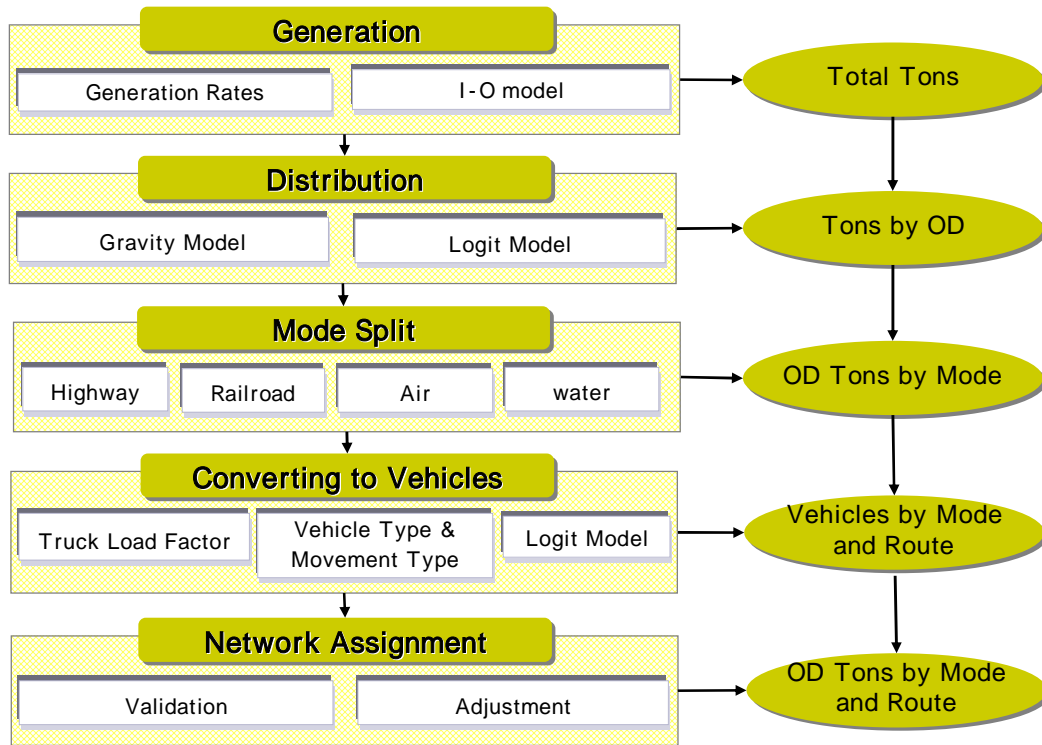
OD in Future years



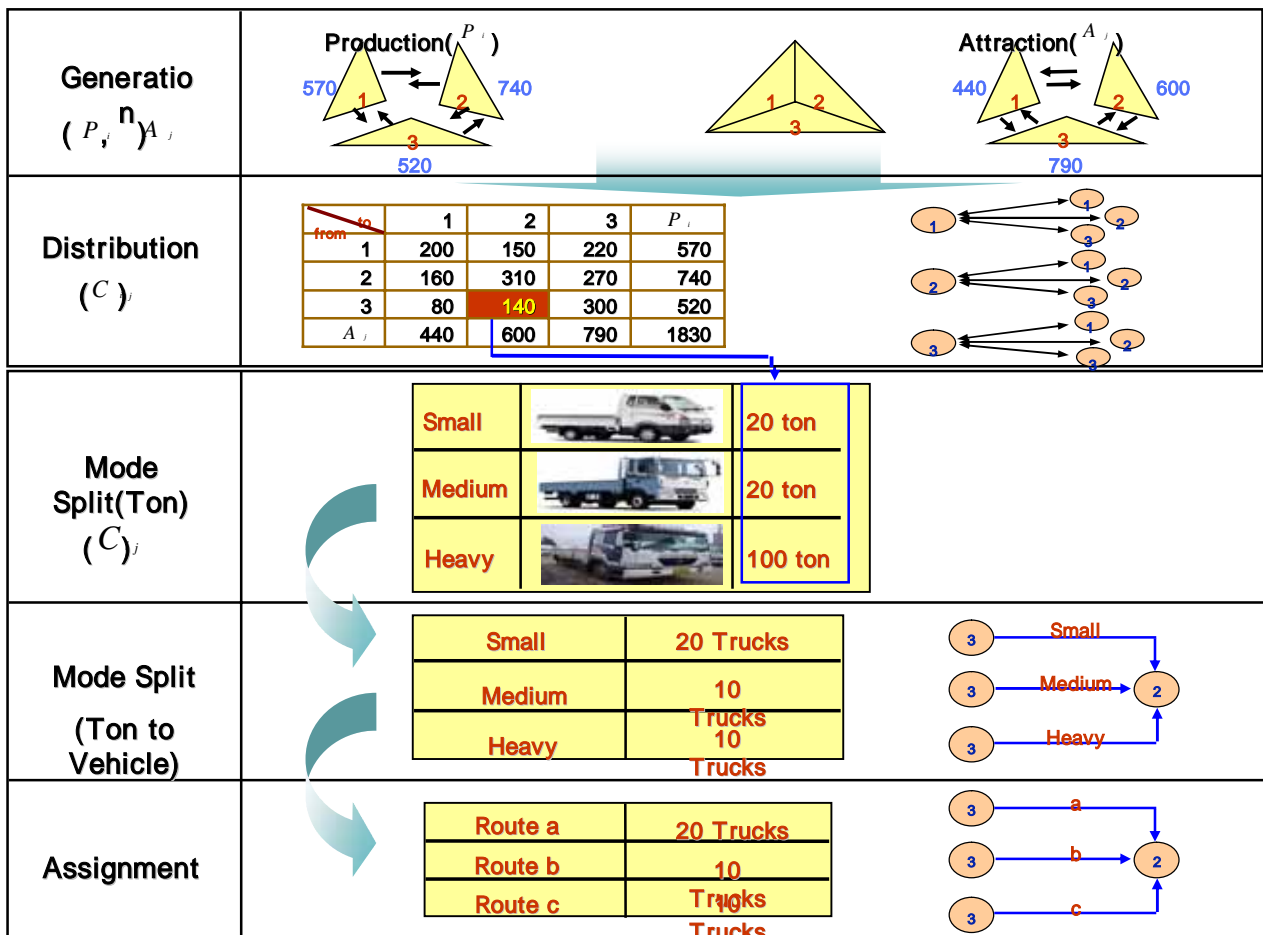
20



## Forecasting Process

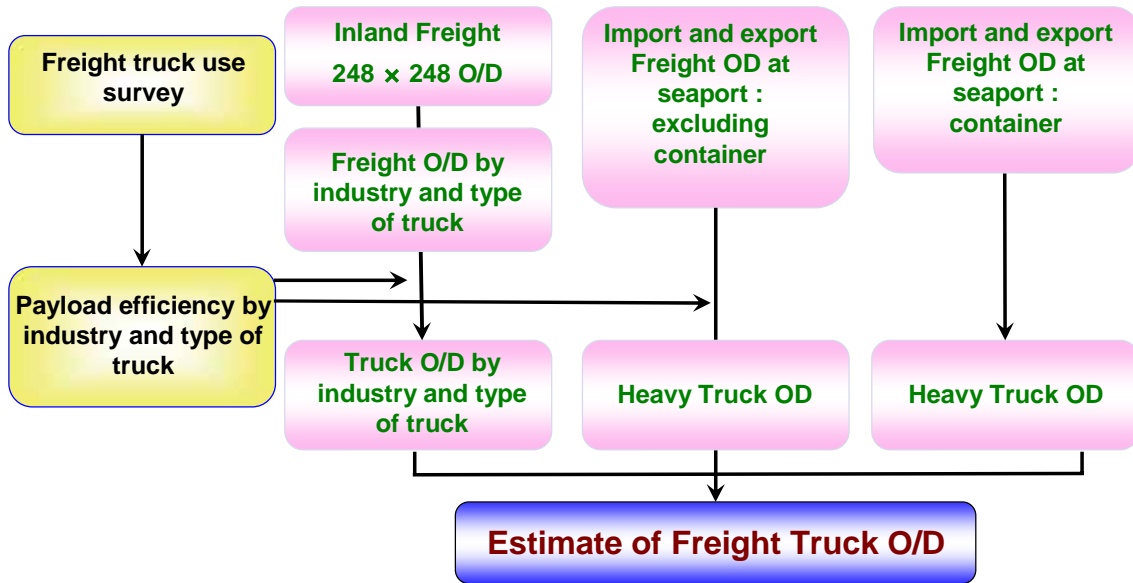


21





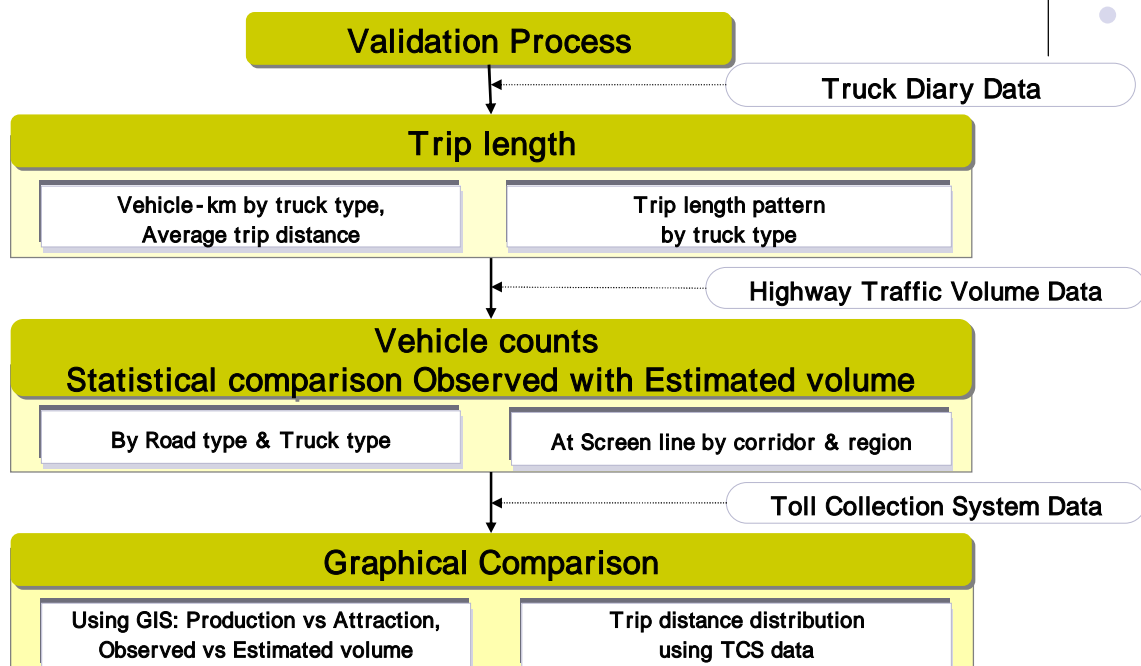
## □ Conversion Commodity Flow to Vehicle Flow



23



## □ Validation of Freight OD



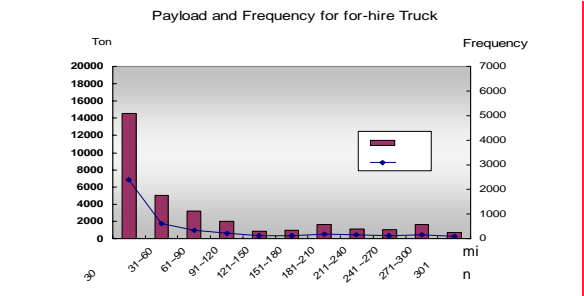
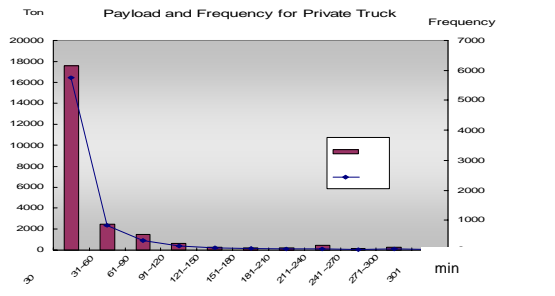
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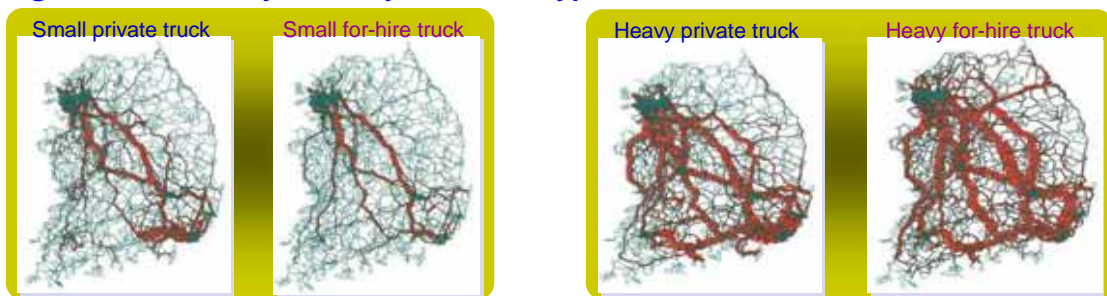
## ◆ Validation by Trip length distribution

- Comparison observed versus estimated trip length distribution

### - Truck volume distribution by trip length



### - Assignment results by industry and truck type

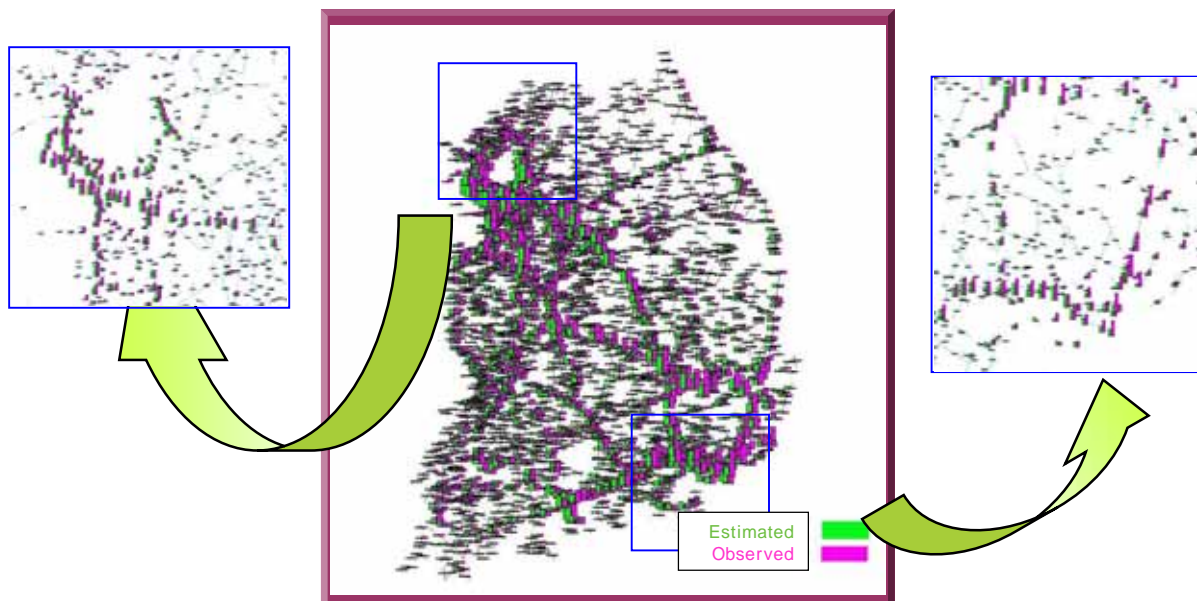


The 2<sup>nd</sup> T-LOG/EASTS Logistics IRG Seminar



## ◆ Validation through Graphical Comparison

- Comparison observed versus estimated trips
- Check the model for geographical biases



26

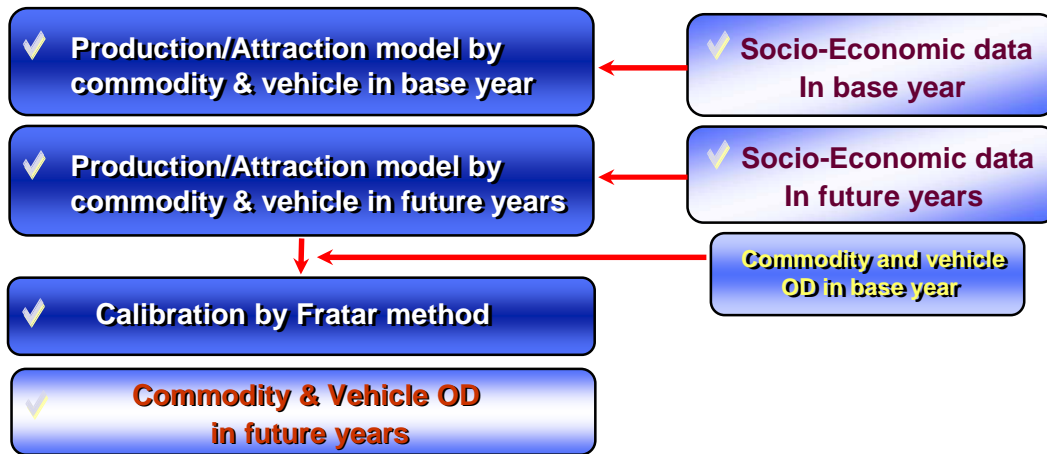
The 2<sup>nd</sup> T-LOG/EASTS Logistics IRG Seminar





## □ Prediction of Freight OD in Future years

### ◆ Freight Vehicle OD: Using generation model



### ◆ Railroad & Air OD: Using growth rate provided by related resources

27



## □ Results

### - Amount of Commodity Flow in 2006

| Mode     | Shipment (Million tons) | Ration (%) |
|----------|-------------------------|------------|
| Highway  | 1,618                   | 91.1       |
| Railroad | 43                      | 2.4        |
| Water    | 114                     | 6.4        |
| Air      | 0.355                   | 0.02       |
| Total    | 1,775                   | 100.00     |



28



## □ Results

### ◆ Comparison Commodity Flows to Other Countries

| Mode   | Japan            |       | Korea            |       | USA              |       | UK               |       | France           |       |
|--------|------------------|-------|------------------|-------|------------------|-------|------------------|-------|------------------|-------|
|        | Million ton - km | %     | Million ton - km | %     | Million ton - km | %     | Million ton - km | %     | Million ton - km | %     |
| Road   | 334,979          | 58.72 | 100,869          | 73.24 | 2,081,406        | 28.50 | 163,400          | 63.63 | 177,447          | 71.60 |
| Rail   | 22,813           | 4.00  | 10,108           | 7.34  | 2,790,244        | 38.21 | 21,700           | 8.45  | 23,518           | 11.44 |
| Water  | 211,576          | 37.09 | 26,590           | 19.31 | 951,566          | 13.03 | 60,900           | 23.71 | -                | -     |
| Air    | 1,075            | 0.19  | 151              | 0.11  | 25,317           | 0.35  | 2                | 0     | -                | -     |
| Others | -                | -     | -                | -     | 1,454,543        | 19.92 | 10,800           | 4.21  | 4,640            | 2.26  |
| Total  | 570,443          | 100   | 137,718          | 100   | 7,303,075        | 100   | 256,802          | 100   | 205,605          | 100   |

29

## 4. Future Research Plans

| Strategy                              | Projects   |
|---------------------------------------|--|
| Improvement of Freight OD Reliability | <ul style="list-style-type: none"> <li>4th Commodity Flow Survey</li> <li>Distribution Channel Survey by Main Commodities</li> <li>Freight Generation Rate Survey for Logistic Hubs</li> <li>Analysis of Logistic Network using I-O Table</li> </ul> |
| Provision of Data for User needs      | <ul style="list-style-type: none"> <li>Survey for Dangerous Material Shipment</li> <li>Freight Cost Survey</li> </ul>  |
| Effective Usage of KTDB               | <ul style="list-style-type: none"> <li>Manual for Freight Demand Analysis</li> <li>Integrated Analysis of Urban and Inter-regional Freight Demand</li> </ul>   |
| Develop advanced Survey method        | <ul style="list-style-type: none"> <li>Data Collection using Advanced Survey Methods</li> </ul>  |

30