



Korea National Transport Survey (KTDB)

KIM, Juyoung

Korea Transport Institute

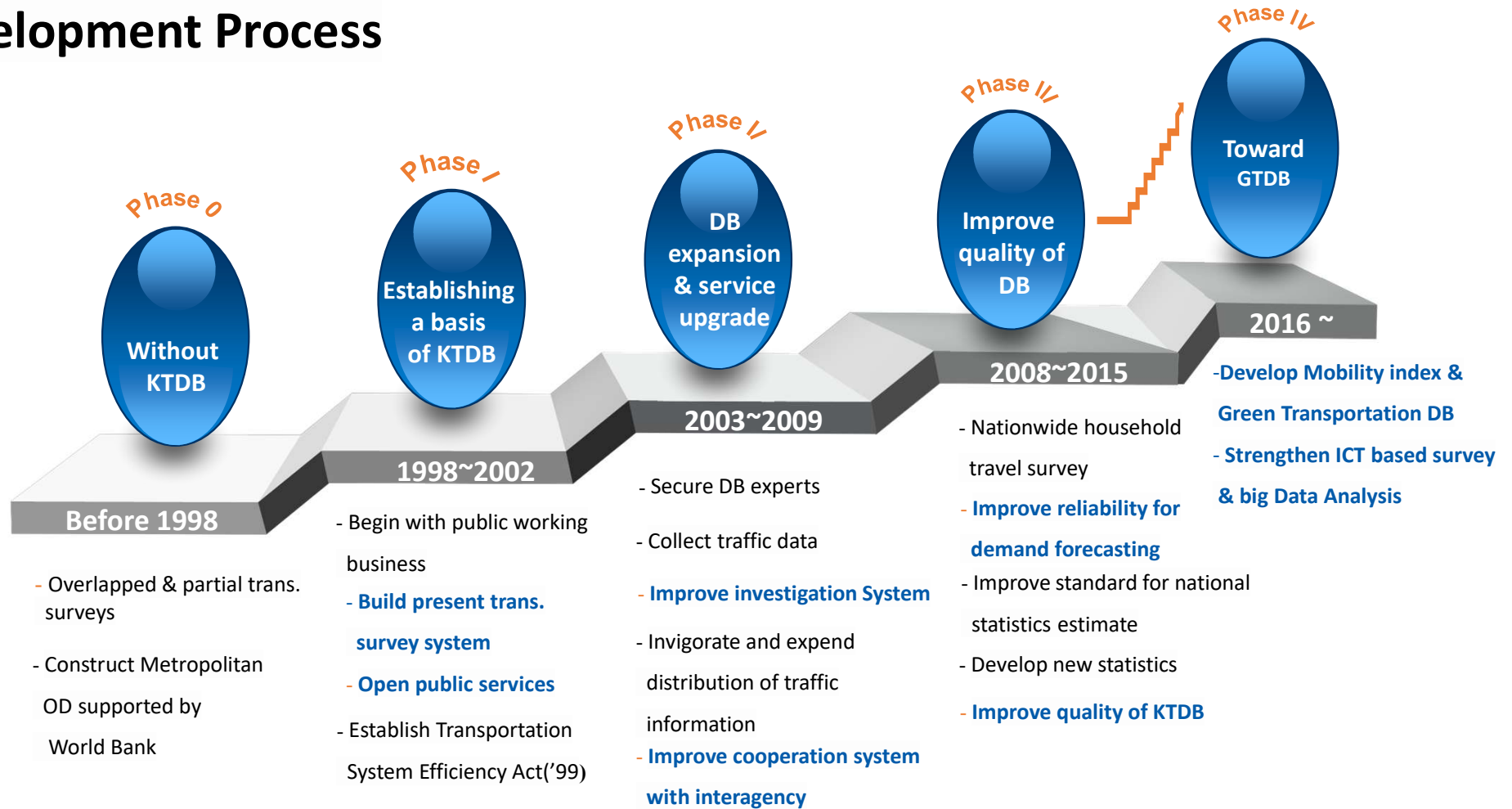
National Integrated Transport System Efficiency Act

- Prevent duplication of traffic surveys and establish a reasonable national traffic policy
- Establishment of the Korea Transportation DB (KTDB)

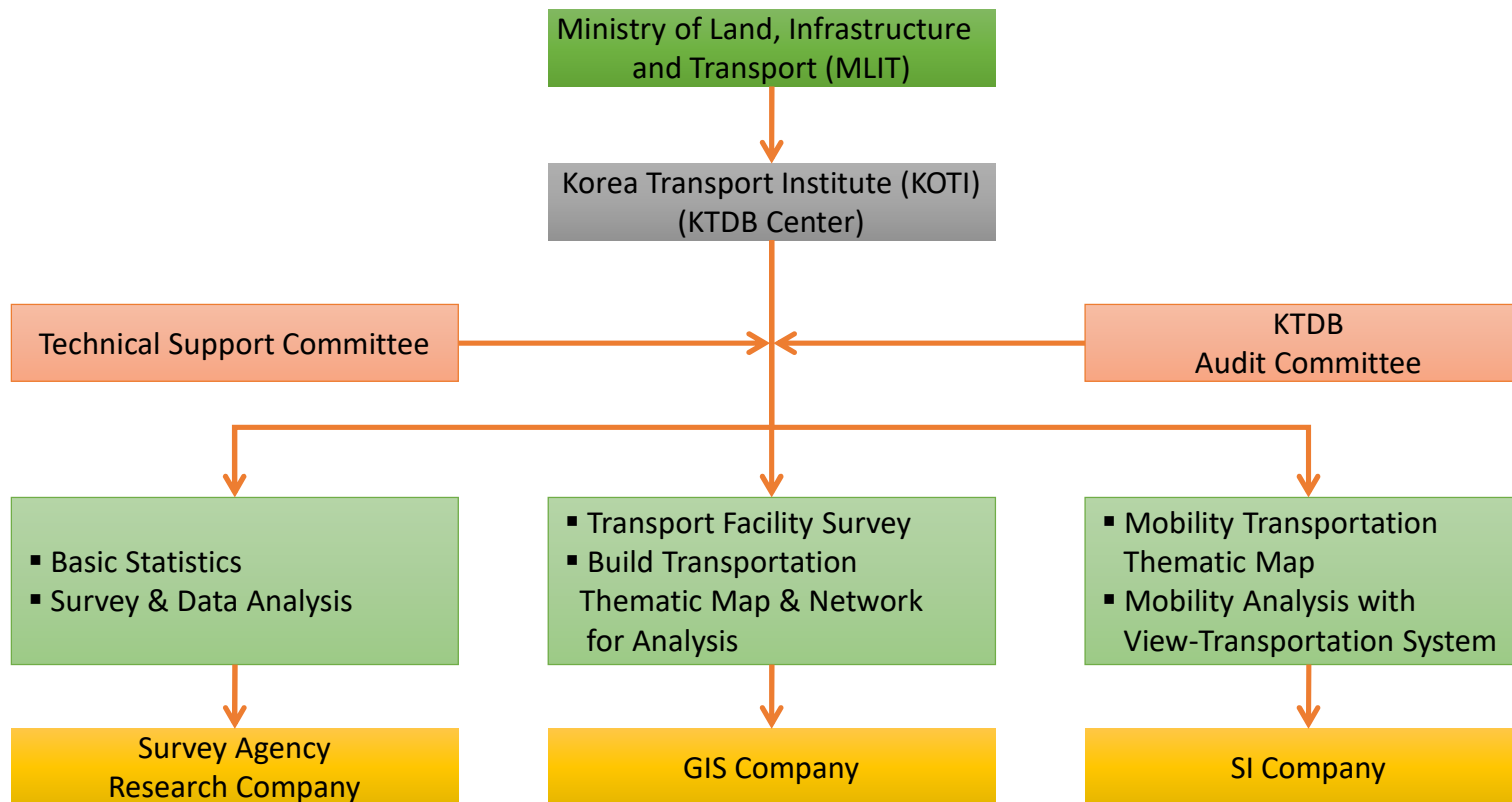
- ☑ Status of registration and use by transportation means
- ☑ Status of supply and operation of routes, traffic volume, mileage, etc. by transportation means and facilities
- ☑ Traffic volume of passengers and cargo by transportation means and facilities
- ☑ Transportation and logistics expenses incurred in the use of transportation means, investment, operation, management, etc
- ☑ Traffic-related social costs such as traffic congestion, traffic accidents, environmental pollution, and greenhouse gas emissions
- ☑ Energy Consumption and Efficiency by Transportation means
- ☑ Greenhouse Gas Emissions by Transportation means
- ☑ Transport performance and share ratio by transportation means and facilities
- ☑ Matters necessary for the establishment of policies and plans related to transportation, analysis and evaluation of investment in transportation facilities

Korea National Transport Survey

Development Process



Organizations



01 Korea National Transport Survey

Nationwide survey



Passenger Traffic Survey



Cargo Traffic Survey



Special Period Traffic Survey

Bigdata Analysis



Mobile data



Vehicle GPS data



Public transport card data

Transport Statistics

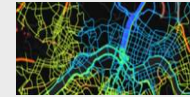


Domestic traffic statistics/indicators



International traffic statistics/indicators

Transport infrastructure map



Traffic Demand Analysis Network



Transport Infrastructure Map

Basic data on transportation demand analysis(O/D, network)

Standard model for traffic demand analysis

Nationwide road traffic speed/volume

Transport statistics(means-sharing ratio, accessibility index, commuting time, etc)

Transportation costs (congestion, environment) and transportation performance index

Public Transport DB and Infrastructure Map

Natioawide Survey

- ❖ National Transport Survey: to figure out the amounts of movements for both passengers and freights
- ❖ Conduct regularly at every five-years

Class	Area	Year	Survey Type
Passenger	Nationwide & Metropolitan	1998 2005 2010 2016 2021	<ul style="list-style-type: none"> • Weekday Trip Diary Survey • Weekend Trip Diary Survey • Traffic Counting & Occupancy • Station & Terminal Survey • Express way survey
Freight	Nationwide	1996 2001 2005 2017 2022	<ul style="list-style-type: none"> • Freight Survey for Companies • Truck Diary Survey for Drivers • Inter-modal Terminal Survey • Traffic Counting around Industry Parks • Toll Booth

Nationwide Survey (Passenger)

< Types of Passenger Survey >

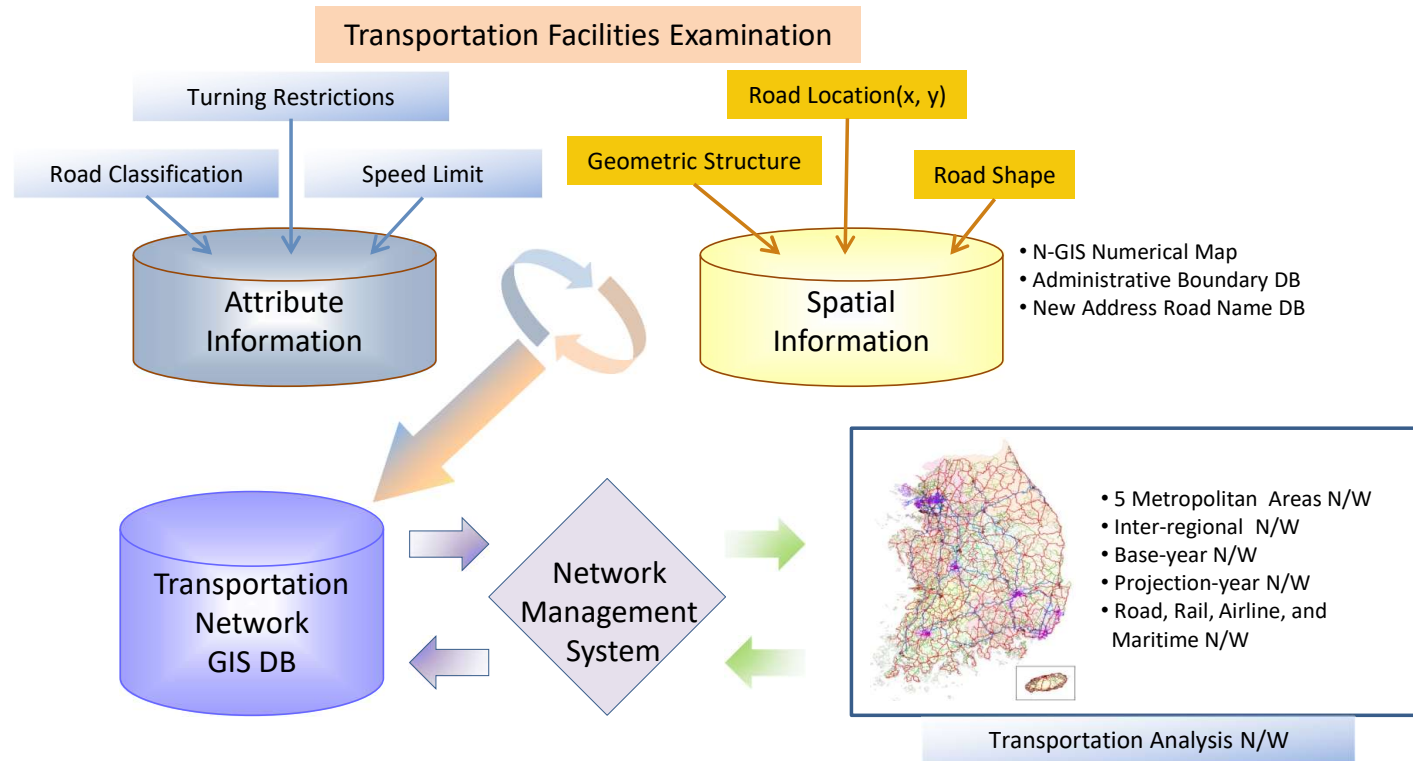
Survey Type	Target Population	Survey items
Household Travel Survey	Households in South Korea	Trip purpose, origin, destination, travel time, mode, occupancy, home address, etc.
Expressway survey	Autos passing through all Expressway Toll Gate	
Traffic Volume counting	Cars passing through the cordon lines (on all roads)	
Public Transport Facilities survey	Passengers on express/inter-regional buses, trains, airplanes, and ferries	

< Household Travel Survey >

The image shows a detailed survey form for household travel. It includes a header with the survey title and contact information. Below that, there are several sections with checkboxes and input fields for collecting data on travel frequency, purpose, origin, destination, mode of transport, and other related factors. The form is organized into columns and rows, with some sections having sub-headers like '첫 번째 여행' (First Trip) and '두 번째 여행' (Second Trip).

Transportation Network for Demand Analysis

- ❖ Build **road & railway analysis networks** for both current & future
- ❖ Build GIS map with **attribute & spatial information** of transportation facilities



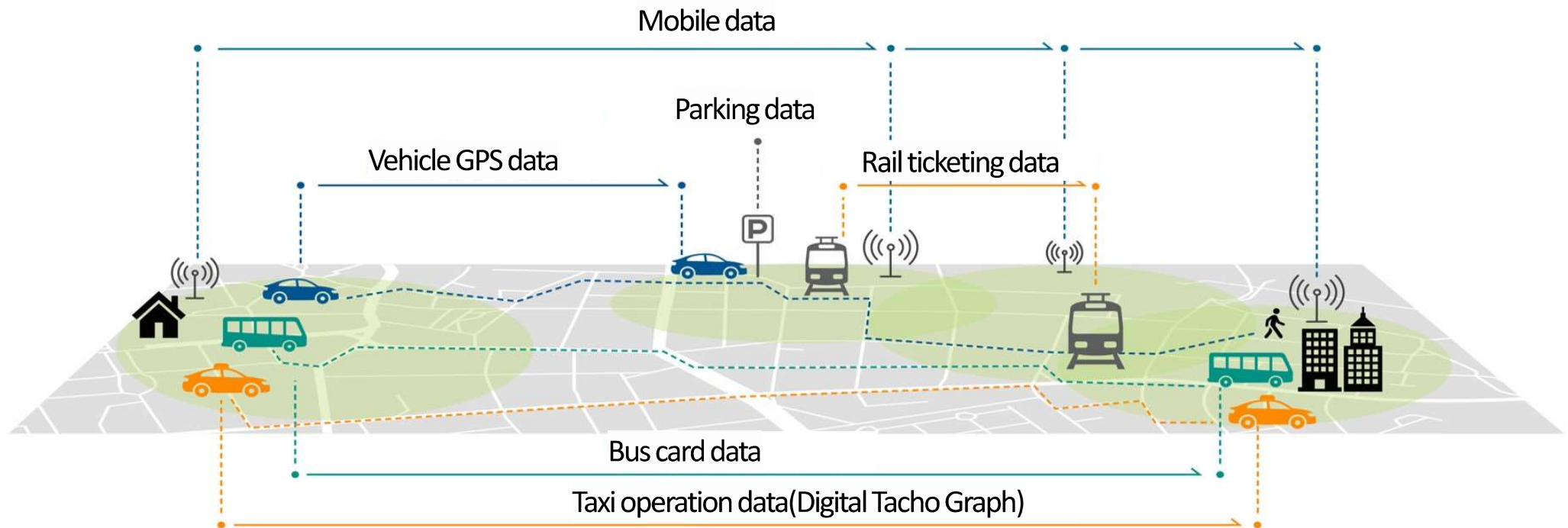
Estimation of Passenger & Freight Demand

- ❖ Estimate current & future passenger movements by trip purpose & mode
 - Nationwide & Metropolitan Area O/D, Mode shares, Travel time & distance
- ❖ Estimate current & future freight movements by mode
 - Nationwide O/D, Tons and Ton-km by mode, commodity movement by commodity type



▮ Mobility Bigdata

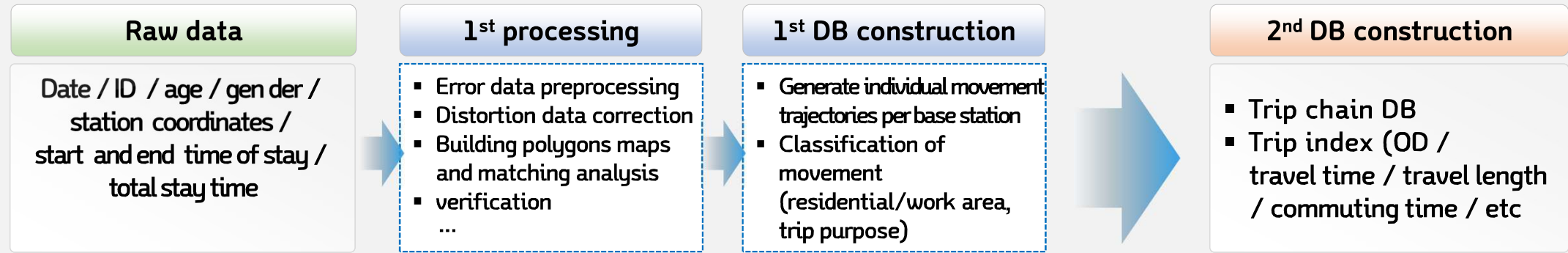
- spatiotemporal data to grasp continuously the movement of people and vehicles



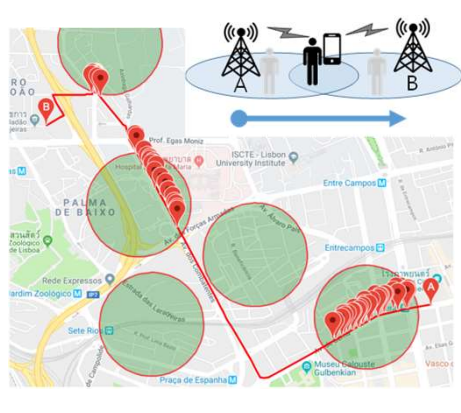
02

Mobility Bigdata and Analysis Methodology

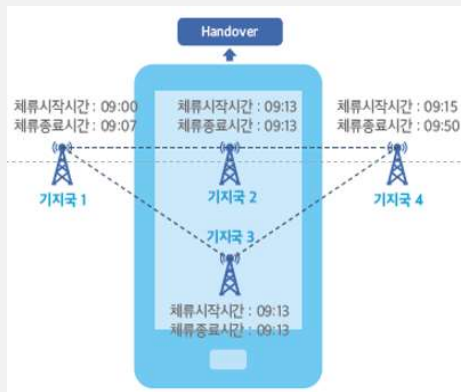
Construction technology of mobile data



➤ Convert station information to route information

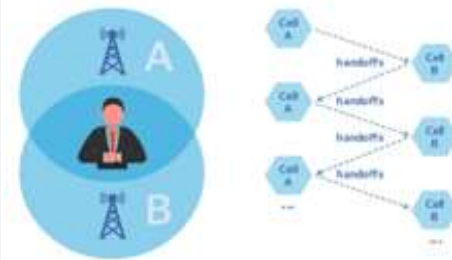


➤ Distortion data correction

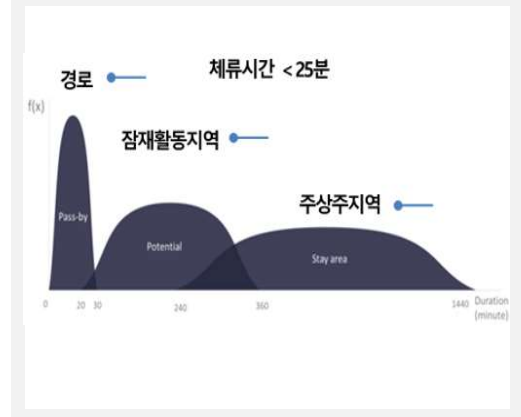


➤ Ping-pong Handover Correction

: 서로 다른 2개 이상 기지국 좌표가 짧은 시간(1분)연달아 번갈아 나타나는 데이터 보정

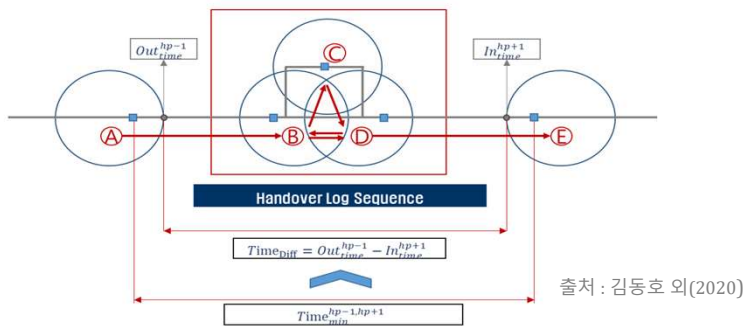


➤ Trip classification and travel purpose estimation



Handover search and correction algorithm

- Time gap between two base stations < shortest travel time



Stay location type estimation algorithm

- Assume that home is the area where people stay the longest during late-night hours/weekends.
- Work/school are assumed to be the areas where people stay the second longest and commute regularly

1. Home Area

Setting individual sleep time zone

- ❖ Aggregation of individual traffic volume
- ❖ Set the time with the least mobile traffic as sleep time

(예) A의 traffic량이 가장 적은 시간대가 04시 :
수면시간대는 03~05시로 설정

Maximum cumulative stay area during sleeping hours → Yes → Home

2. Work / School Area

2nd highest cumulative stay area

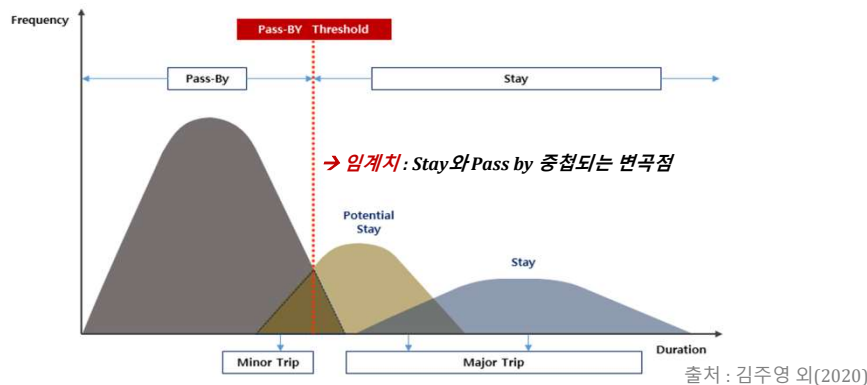
Commute more than 3 times a week & stay more than 3 hours a day → Yes → Work/School

3. Other stay Area

Others

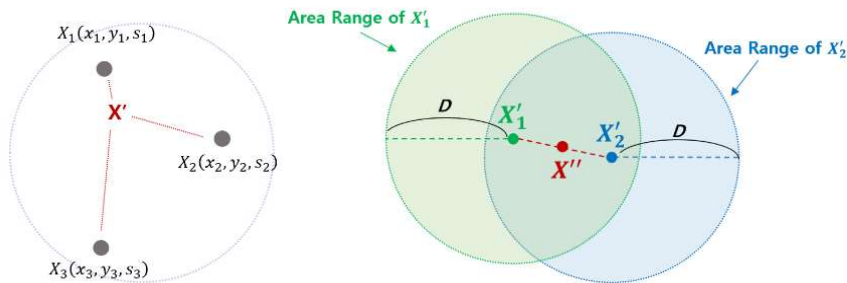
Movement and stay classification algorithm

- Classify Pass by, Potential Stay, Stay



Travel time correction

➤ Step 1 : Data preprocessing and spatiotemporal correction

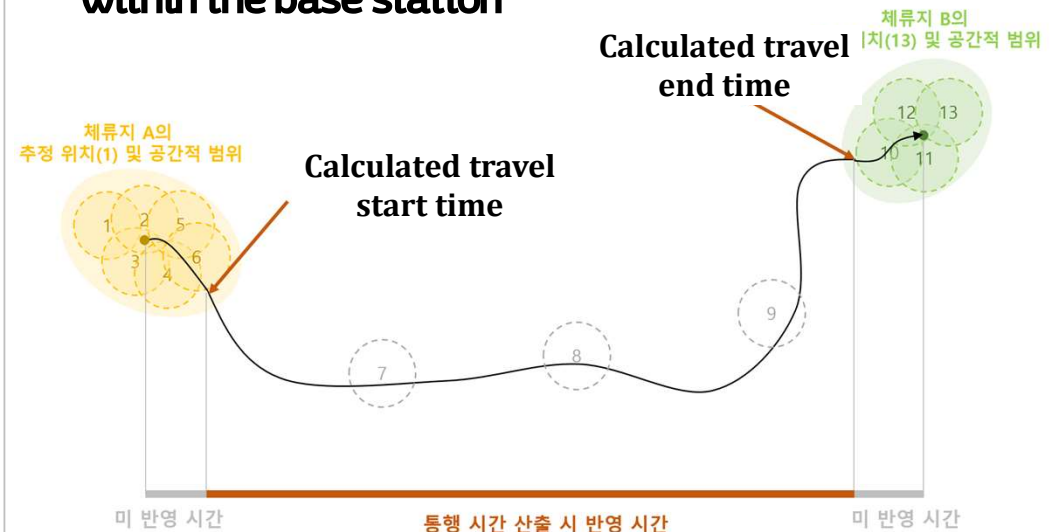


$$X'(x,y) = X' \left(\frac{\sum_1^n x_n \times s_n}{\sum_1^n s_n}, \frac{\sum_1^n y_n \times s_n}{\sum_1^n s_n} \right)$$

$$X''(x,y) = X'' \left(\frac{\sum_1^n x'_n \times s'_n}{\sum_1^n s'_n}, \frac{\sum_1^n y'_n \times s'_n}{\sum_1^n s'_n} \right)$$

➤ Step 2 : Correction of travel time within the base station

- Reflecting the travel time for the radius within the base station



• Confusion Matrix

❖ Home Accuracy : $(0+836)*100/836 = \mathbf{100\%}$) ❖ Work Accuracy : $(93+579)*100/836 = \mathbf{80.4\%}$) * When mixing CDR → over 90%

		Surveyed		Sum
		Home X	Home O	
Estima- ted	Home X	0	0	0
	Home O	0	836	836
Sum		0	836	836

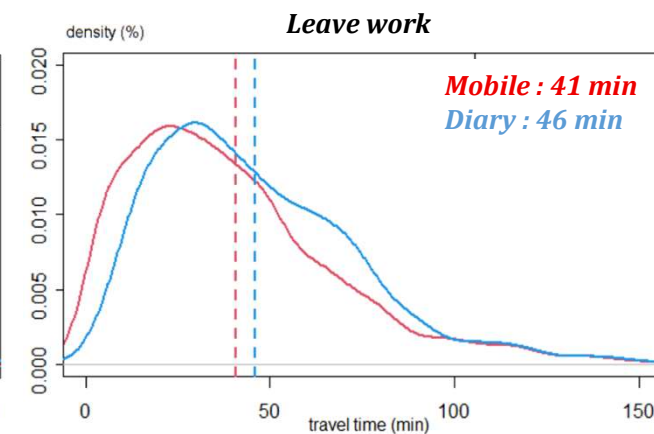
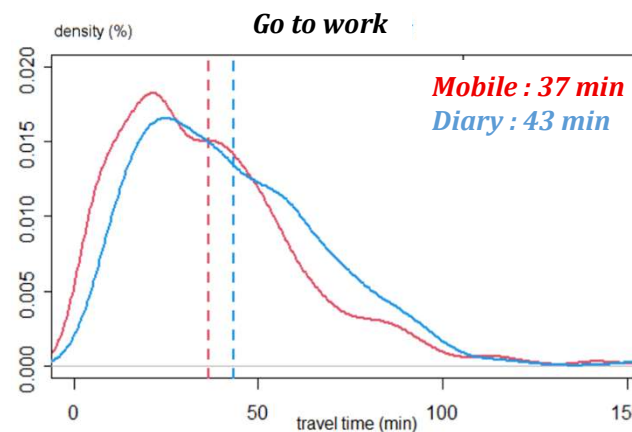
		Surveyed		Sum
		Work X	Work O	
Estima- ted	Work X	93	106	199
	Work O	58	579	637
Sum		151	685	836

Ratio of people to actually work compared to estimated to work **91%**

Ratio of people estimated to work compared to actually to work **85%**

❑ Accuracy / location & commute time error

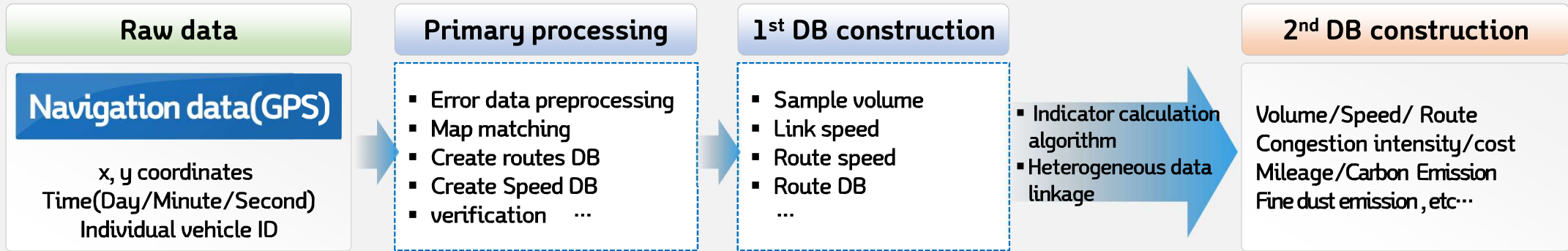
Occupation	Home		Work	
	Accuracy	Location Error	Accuracy	Location Error
Office	100%	2.3km	87%	1.3km
Sales	100%	0.8km	85%	1.4km
Freelancer	100%	0.2km	55%	4.8km
Housewife	100%	0.3km	71%	-
Inoculation	100%	0.3km	72%	-
Others	100%	1.7km	59%	2.7km
Sum	100%	1.59km	80%	1.57km



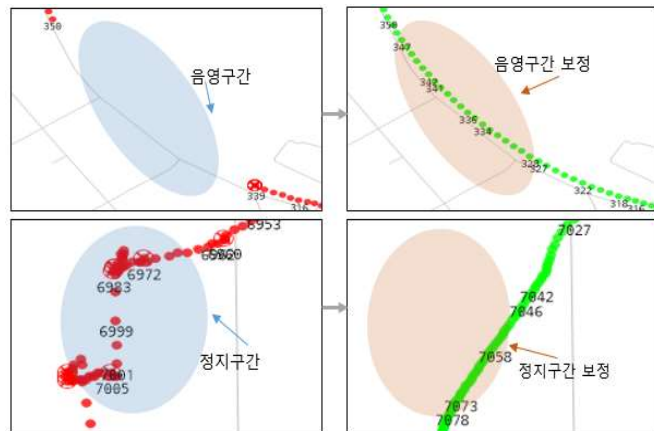
02

Mobility Bigdata and Analysis Methodology

Construction technology of Vehicle GPS data



➤ Preprocessing of shaded and missing sections



➤ Point-link map matching



Traffic Index

Traffic Volume



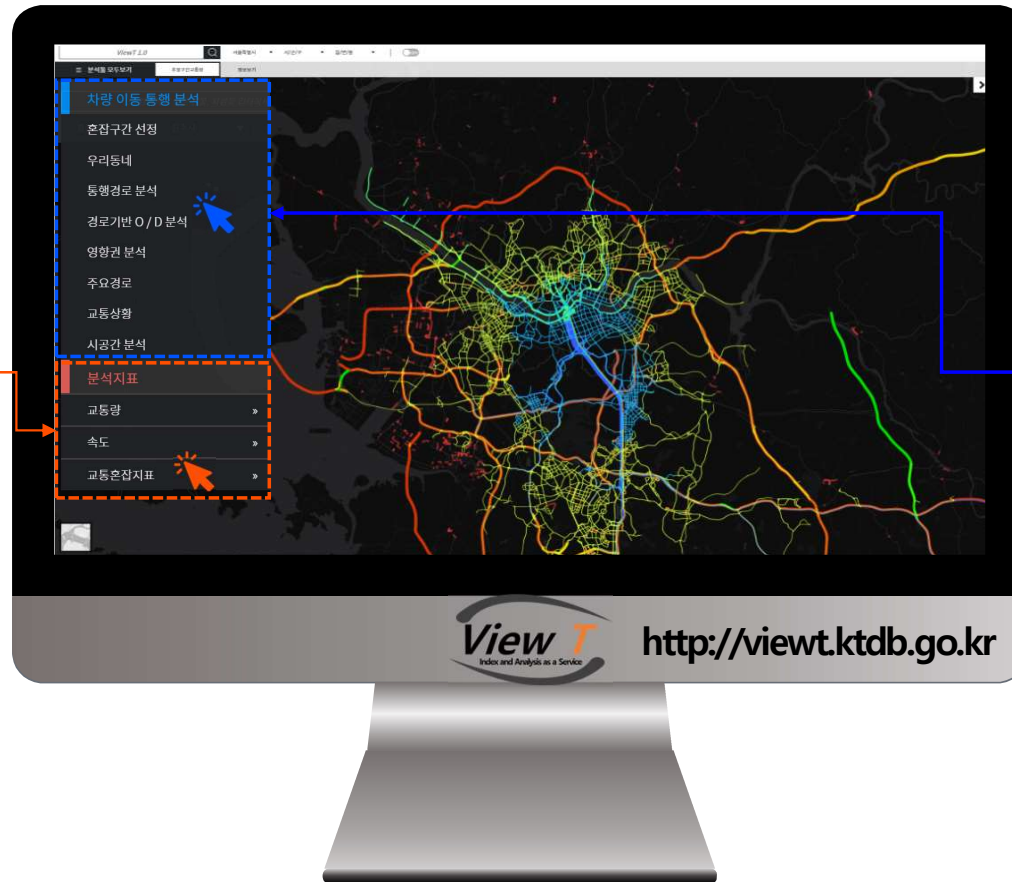
Speed



Congestion Intensity

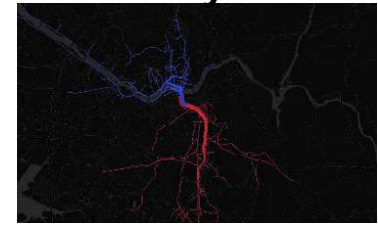


View-T(View Transport) System

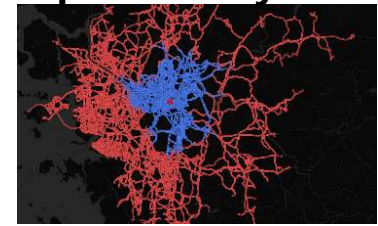


Analysis Module

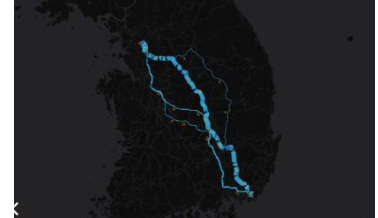
Route Analysis



Trip Area Analysis



Social Cost Analysis



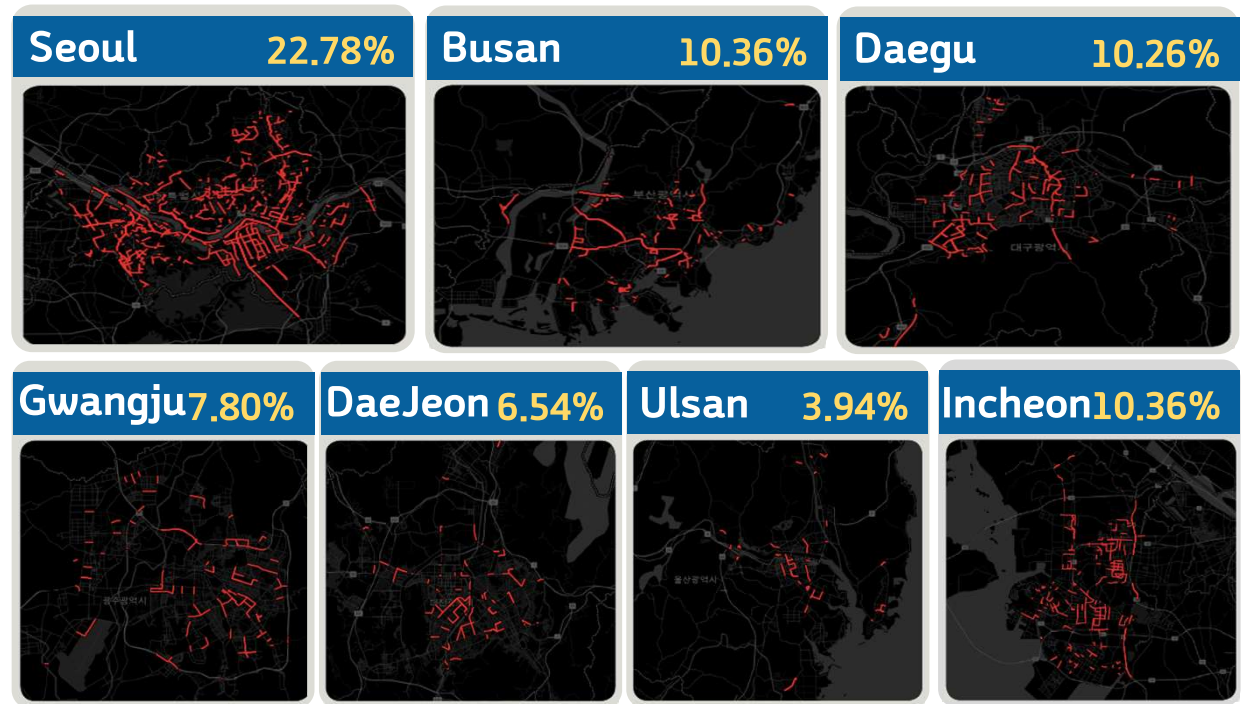
“ Users can easily analyze and download road traffic data all over the country ”

02

Mobility Bigdata and Analysis Methodology

- Establishment of nationwide vehicle mobility DB (traffic volume/speed, etc)
- Technology that mix public observation traffic data and private vehicle trajectory data (Navigation)

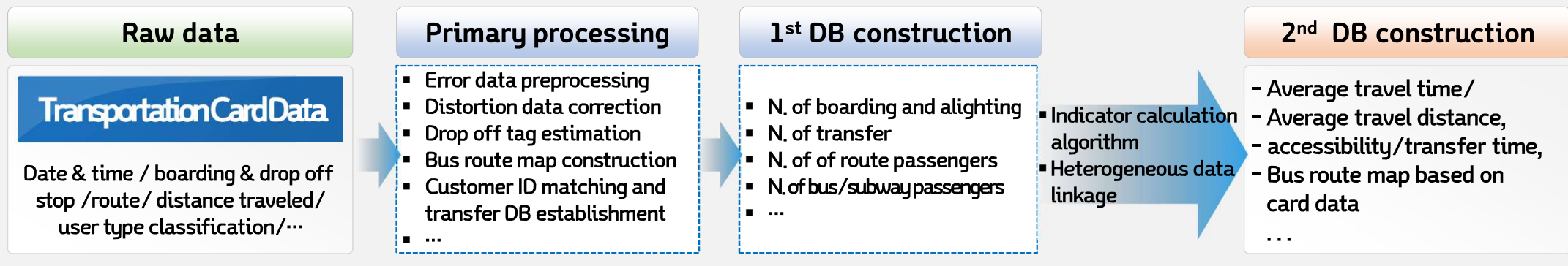
※ Ratio of congestion area



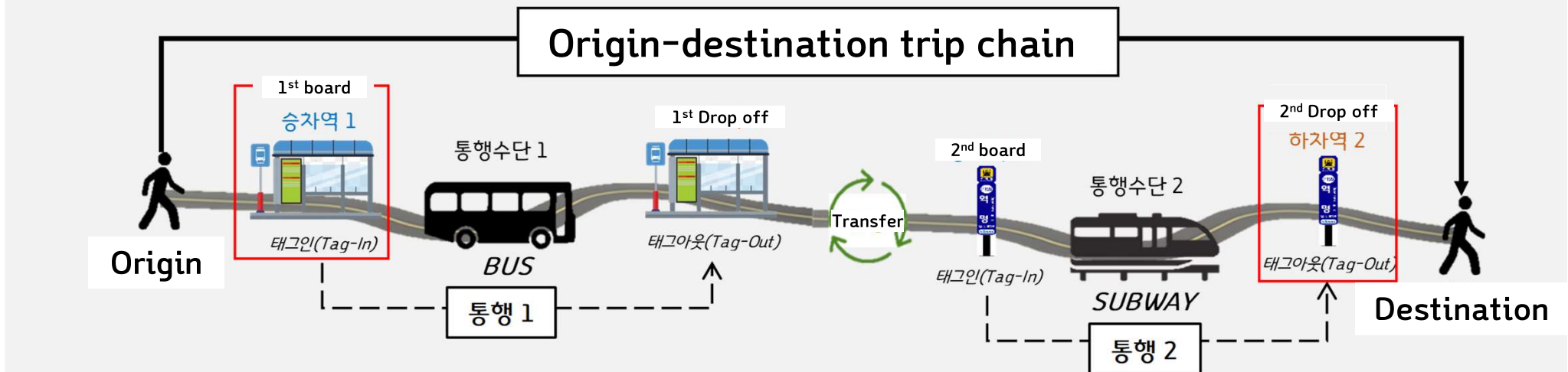
02

Mobility Bigdata and Analysis Methodology

Construction technology of public transportation card data



Public transportation Trip-Chain DB

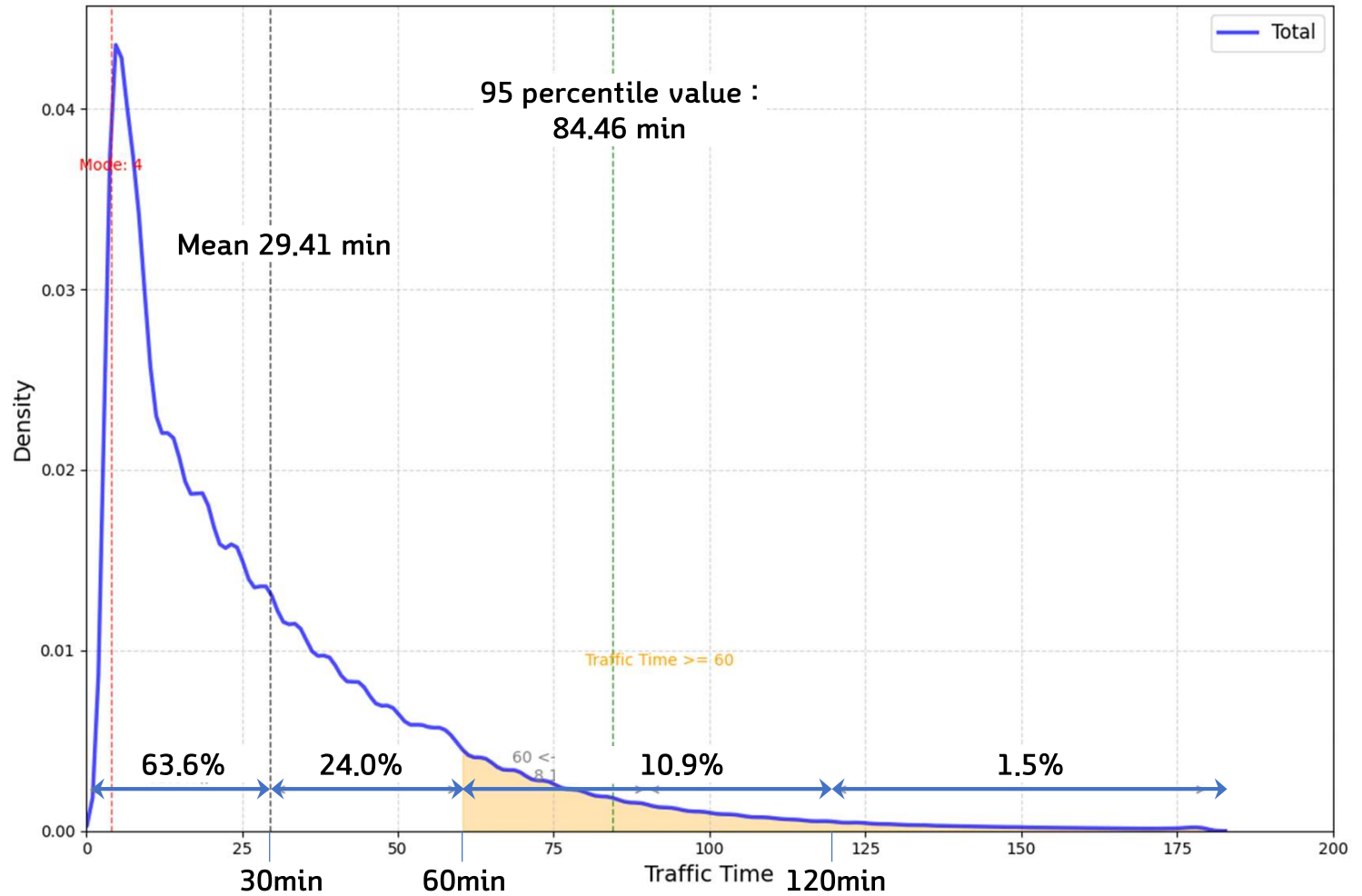


03

Commuting Time Analysis

Nationwide distribution map

- Percentage of commuting longer than 30 minutes: 36.4%
- Poor Commuter (over 60 m) : 12.4%

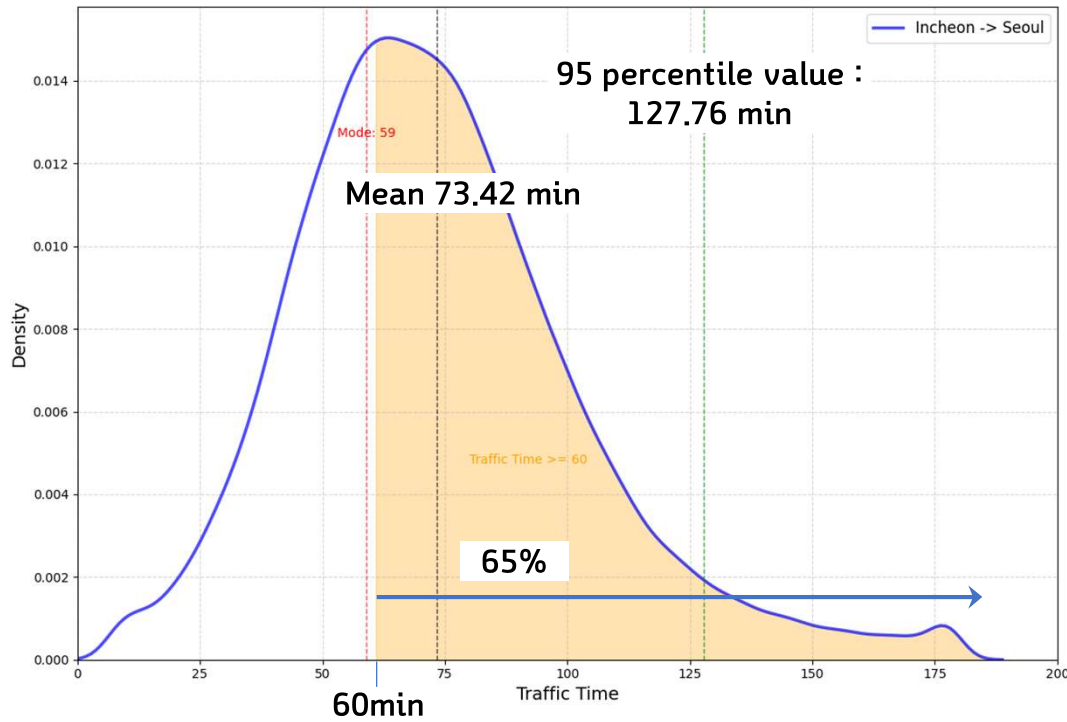


03

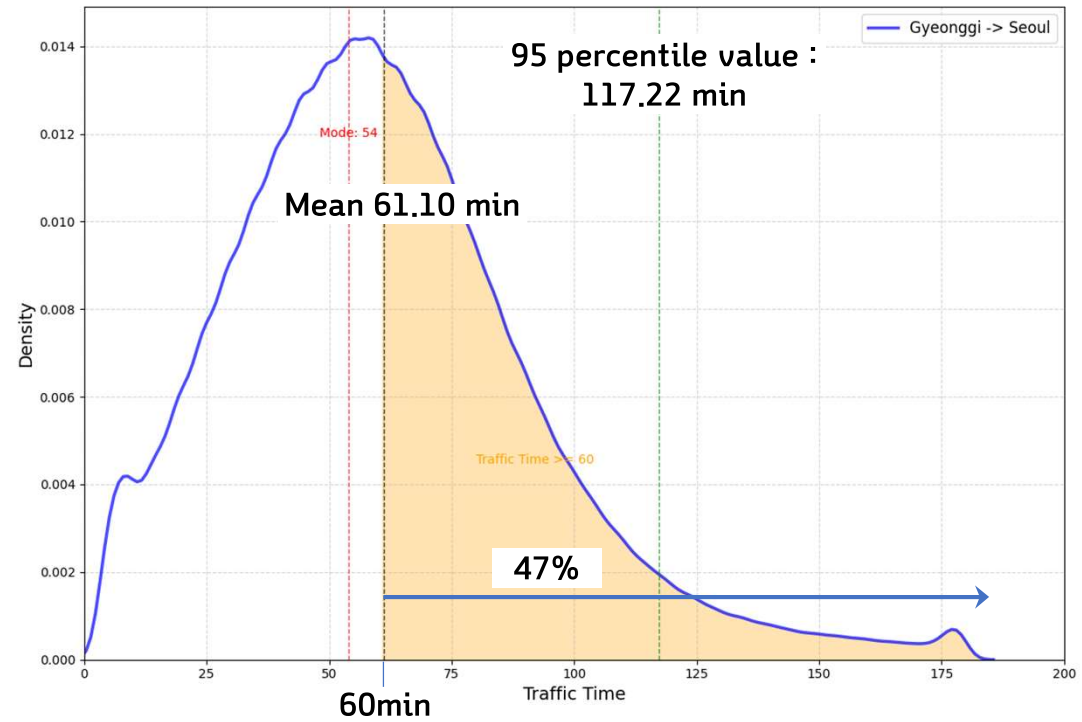
Commuting Time Analysis

Metropolitan Area

Incheon -> Seoul

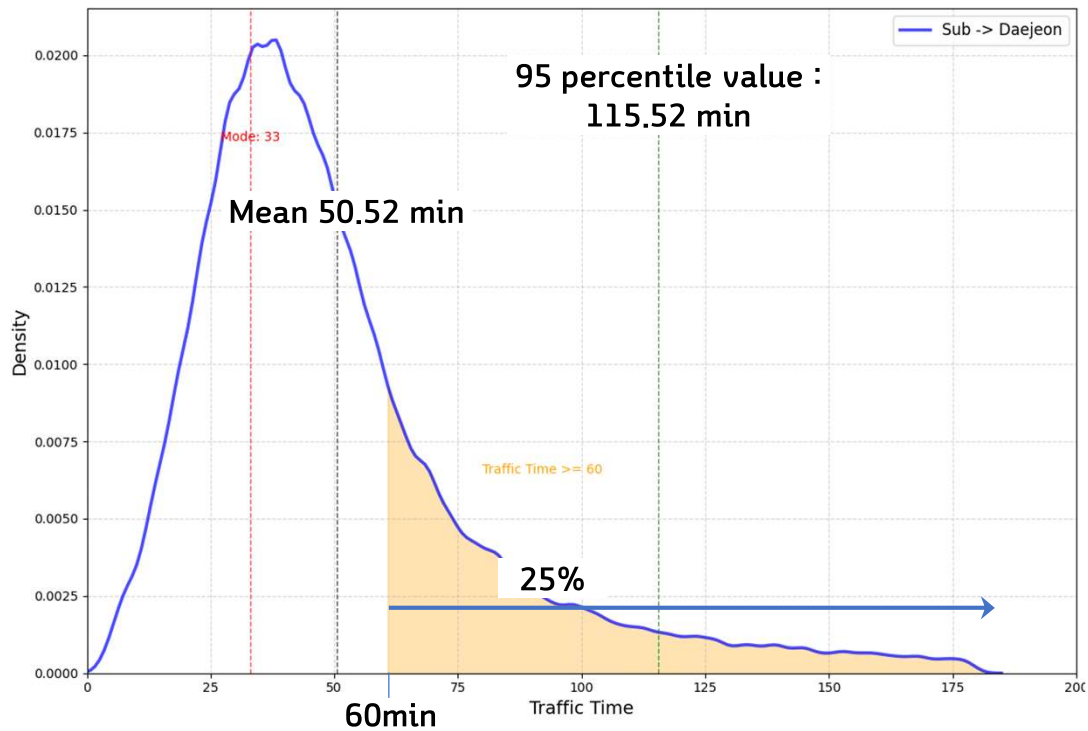


Gyeonggi -> Seoul

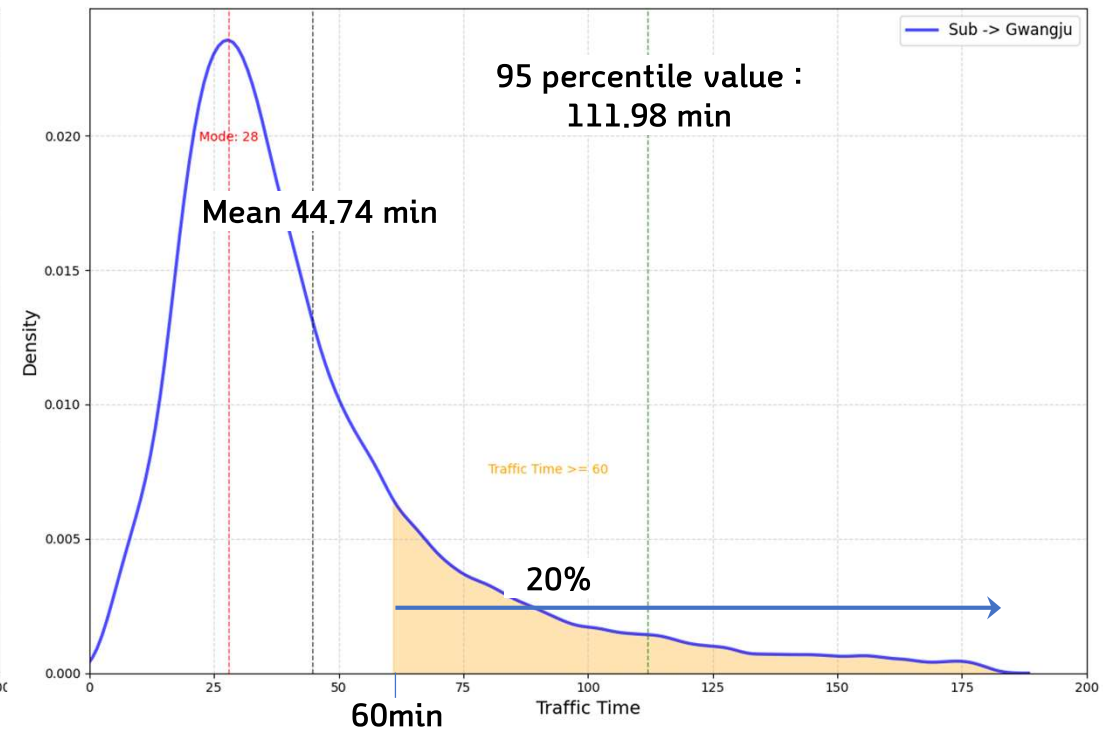


Metropolitan Area

Suburbs -> Daejeon

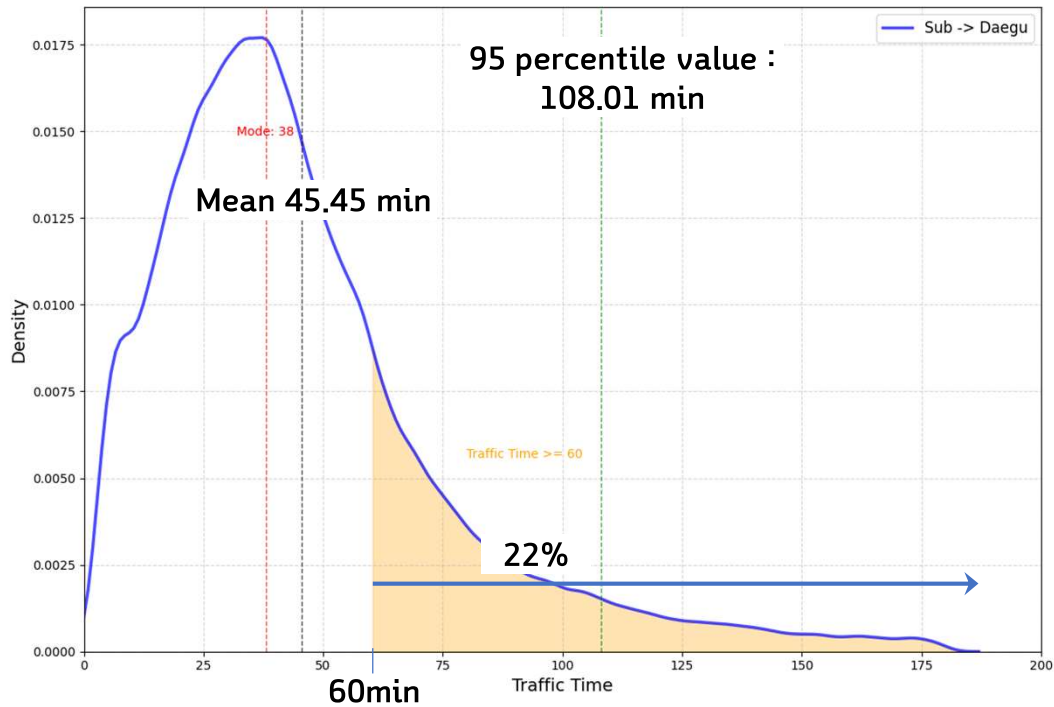


Suburbs -> Gwangju

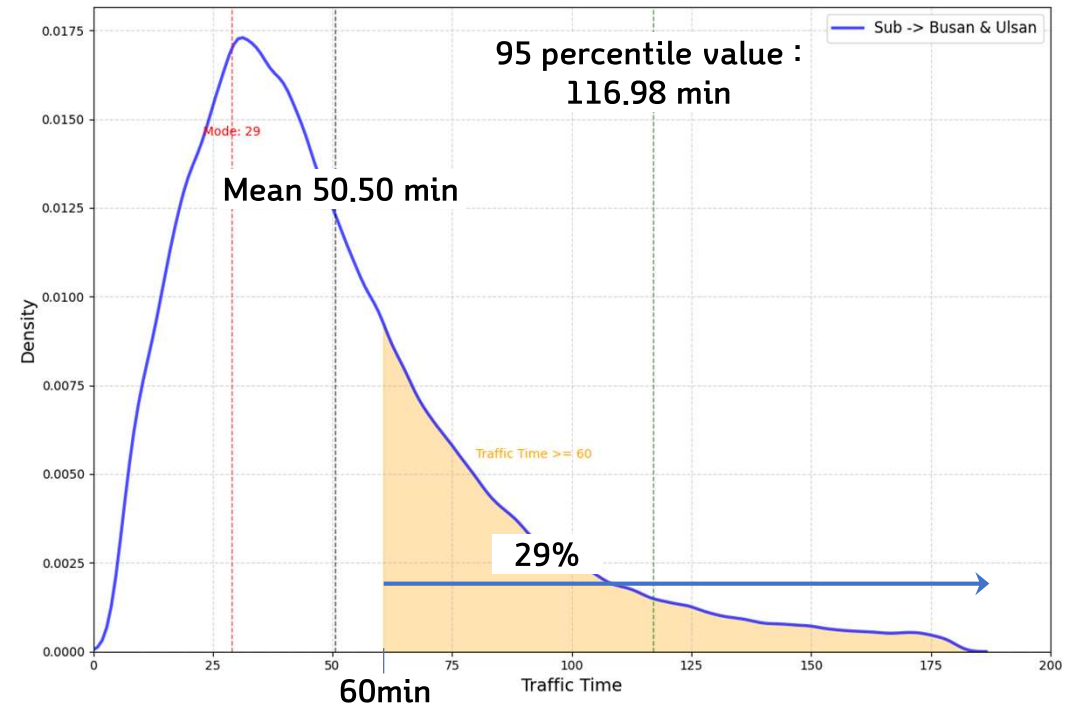


Metropolitan Area

Suburbs → Daegu



Suburbs → Busan/Ulsan



03

Commute Time Analysis

City	commuting time							average commuting length(km)	Percentage of same administrative district(home & work)
	N. of Sample	Average	Std. Dev.	95 percentile value	≤30min	30min≤ & ≤60min	60min≤		
Seoul	4,958,330	32.31	27.40	83.31	0.55	0.31	0.14	7.92	0.86
Busan	1,690,685	28.56	25.43	77.73	0.63	0.27	0.10	6.93	0.91
Daegu	1,195,059	25.78	23.90	71.54	0.69	0.23	0.08	7.29	0.87
Incheon	1,323,579	33.72	30.63	95.81	0.58	0.25	0.17	8.97	0.72
Gwagnju	708,622	25.33	23.18	70.12	0.71	0.22	0.07	7.11	0.87
Daejeon	754,270	25.70	23.76	71.26	0.70	0.22	0.08	7.00	0.88
Ulsan	565,388	26.37	23.80	73.00	0.69	0.23	0.08	6.79	0.94
Sejong	150,878	29.46	29.47	89.99	0.63	0.25	0.12	11.73	0.60
Gyeonggi	6,635,776	34.73	30.66	95.80	0.56	0.26	0.18	9.75	0.49
Gangwon	739,755	21.20	23.72	68.01	0.80	0.14	0.06	6.95	0.87
Chung-buk	813,151	24.31	25.10	74.43	0.74	0.18	0.08	7.95	0.83
Chung-nam	1,058,219	24.27	25.57	75.95	0.74	0.18	0.08	8.16	0.79
Geon-buk	812,687	22.94	23.75	69.02	0.76	0.17	0.07	7.55	0.79
Geon-nam	769,771	22.98	24.27	70.94	0.76	0.17	0.07	7.28	0.77
Gyoung-buk	1,234,541	22.53	23.48	67.94	0.77	0.17	0.07	7.25	0.82
Gyoung-nam	1,538,572	24.97	24.42	73.19	0.72	0.20	0.08	7.47	0.80
Jeju	409,523	26.70	25.48	77.07	0.69	0.21	0.09	7.52	0.91

Thank you

