Sustainable Urban Transport Policy: Experience of Daejeon city

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Do you Know which city in korea?

Seoul?
Incheon?  Suwon?
Busan?
Jeju?
Always ready & opened city to the World

DAEJEON

The host city for the OECD committee for Scientific and Technological Policy held a Ministerial-level meeting (20–21 October, 2015)

The host city for the Asia Pacific City Summit in September 2017
The reasons to participate

Well established public transit.

Nevertheless, traffic congestion is increasing
Results of past, keys of future

“Present”
Contents

1. Introduction of Daejeon city
2. Why we need sustainable transport system?
3. What is Strategy?
4. How do we do this?
Introduction of Daejeon city
Location

Daejeon

Seoul

Busan

Je-ju

China

Japan

Google Earth
Modern History

1950
(The Korean War)

1960 ~
(City Reconstruction)
Today

- Populations: 154 million (7th of Korea) [2015]
- Leading Science and technology city of Korea
  - Principal institution
    National government complex
    The INNOPOLIS Daeduck (Many government research institutes, 11.8% of Ph.D-level researcher in Korea are concentrated)
- Place to translate dreams into reality

Quarterfinals of 2002 World Cup, Korea vs Italy
Why we need sustainable transport system?
Urban Public Transit

- **Subway / Fare = $1.136 (Rate 1$ = 1,100 won)**
  Line1 (2007~), 22km, 22 station, headway 5~10min., 110K passenger/day

- **City bus / Fare = $1.136 (one pay, 3 transfer)**
  965 Bus, 95 line, headway 5~15min., 450K passenger/day
• Expected city bus arrival time is informed
  - 2,000 Bus stops, 888 Bus Information Terminal (BIT)
  - Smartphone app: Android and iOS

(Frequency of access is about 150K per day)
• Well connected road network : 1,929km
Performances

- Modal share (exclude walking) of 2014

- Traffic congestion cost of city: $1.1 billion / year
- Gasoline gas cost per one person: $364 / year
What is Strategy?
To be sustainable city, trying to

More

Less

Public Transit

Bike

Passenger Car

Walk
More Efficiency

Less Cost
More

Data

Less

Intuition
Current

Rate of road is high (28%)

Shortage of Public transit infrastructure

Passenger car using rate is high (Modal share 56.5%)

Strategy

Surface Transit supply (Modal shift)

Travel Demand manage

Alternative Fuel Vehicle supply
How do we do this?
Contents
Public transit network
Vehicle network
Bike and pedestrian
Safety
Green gas emission reduction (Eco-friendly vehicle supply)
Etc.
Transit passenger trend, 1991-2014

Semi-public management system for city bus was started

Subway line 1 was opened
Urban Rail(line 2) Construction

- **Circle line Tram** (2014~2025)
  - Length: 32.4km
  - Stop: 30
  - Headway: 7.5 minute
  - Power: Wireless Full Battery
  - Construction Cost: $520 million
Philosophy about New System

- Transit priority **rise** and road capacity **reduce** simultaneously
- Not speed, but **convenience** for vulnerable users
Construction on the Arterial Road

- Traffic volume of Intersection
  (Source: ITS center Data)

- 2nd Subway line
Public u-Bike “Ta-shu”

- A self-service public bike rental system which can be used anytime, anywhere
Operating statistic

- Station : 201 (300, due 2018)
- Bicycle : 2,065 (4,000, due 2018)
- Fare : $0.45 per hour
- Operating Budget : $3 million per year
- Install cost : $33 thousand (1 station + Kisok + 10 bicycle)
- Average rental frequency : 2,319 per day
- Average travel distance : 1.70km (30 minute)
- Peak time : 5 p.m. to 10 p.m.
- Highest using age : 20 ~ 29
In light of operator, bicycle rearrangement is significant problem.
- Rearrangement operator accounts for 52.3% (23 person) of all operator (44 person)
We think Ta-shu rearrangement problem is similar as Traveling Sales Problems (TSP) of Operations Research (OR) and are trying to minimize cost.

- Which route is the shortest path?
Travel Demand Management
Using existing Infrastructure Of ITS

- **ATIS of Daejeon**
  - Road Side Equipment (RSE) : 407
  - Hi-Pass (Non stop electric toll collection system) OBU
  - DSRC Technology
Principle of travel speed calculate

Definition of estimating travel time and speed in each RSE section

\[ V = \frac{\text{distance}}{(\text{Time 2} - \text{Time 1})} \]
Weekly Car-Free Day

- Citizens **participate oneself** and acquire **10% reduction of car tax**
- A participant **has car rest a day** which select oneself
- But, should **fix car rest day**

Improvement Direction

• People don’t like **fixed car rest day & perfect detection**
  - At least 6.2% (27K vehicles) of target vehicle (436K vehicles) are participating

• **Now we are changing the operating rule**
  - Do not fix car rest day
  - Participant has only to rest any one day of week which want
Alternative Fuel Vehicle supply

• **EV Taxi** pilot and feasibility study (2013)
  - To rise taxi driver’s salary by energy cost reduction
  - 22Kwh Battery → Range 143.5km, charging time 63.5 minute
  - Feasible on condition that taxi driver bear inconvenient
Dwelling pattern

- Apartment accounts for 55% of the whole house
• Because of difficulty to secure personal parking lot in apartment, supply policy of EV is not activated.
• So, mobile charger receive attention many user
Making policy using big-data

- Data warehouse for many stakeholders (2012~).

Dash boar of Daejeon ITS center’s data warehouse
• **Spatial analysis for city-bus planning**

- Bus passenger by card data

Open-source: Qgis and Naver map
• **Spatial analysis** for 2nd subway (Tram) planning

- [Image of map with markers for bus card data and intersection RSE data. The map is marked with green and red circles indicating data points.]

- Open-source: Qgis and Naver map

- Try to find citizen’s deep mind or thoughts by keyword analysis
- Reflect analysis result in to plan
- For citizen-friendly policy making
• Daejeon is trying to be sustainable city by maximal using of existing resource and new technology

• If you have any question or idea, contact me please

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Safe and happy world
Go together
Thank you!