

Seoul Transport Reform and Information Technology for Public Transportation System





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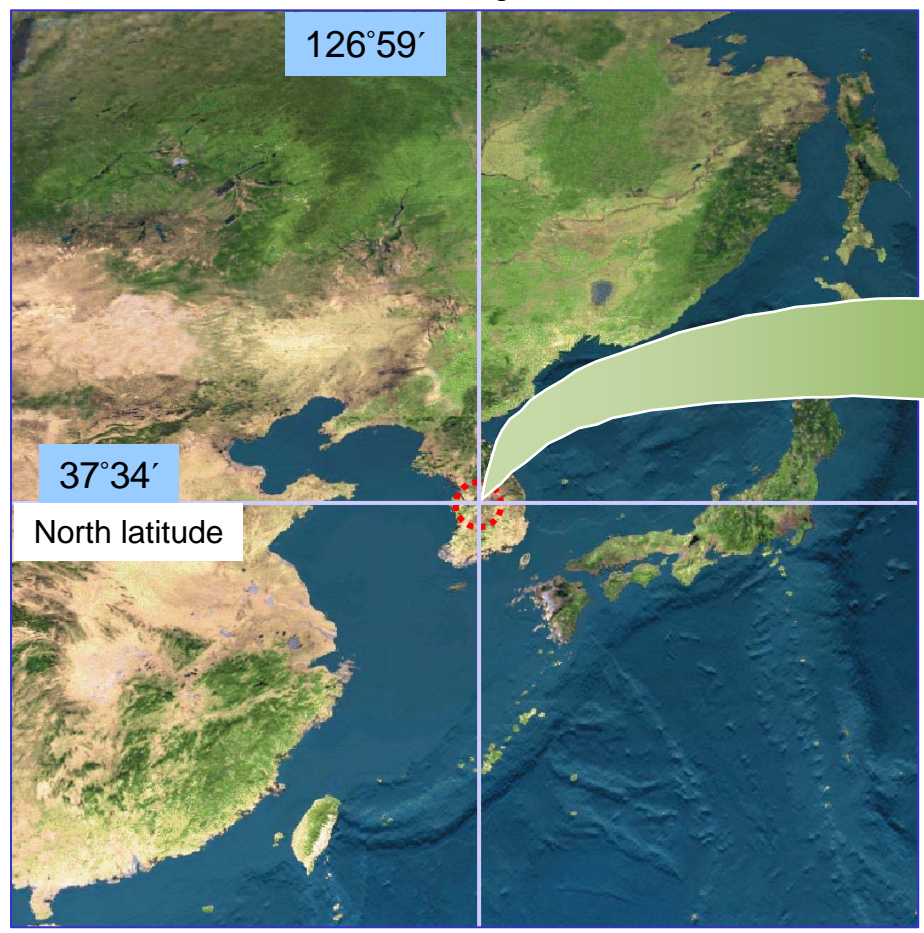
- About Seoul
- Review on Transport Policy Measures in Seoul
- Problems before STR
- Seoul Transport Reform
- Conclusion

East longitude

126°59'

37°34'

North latitude

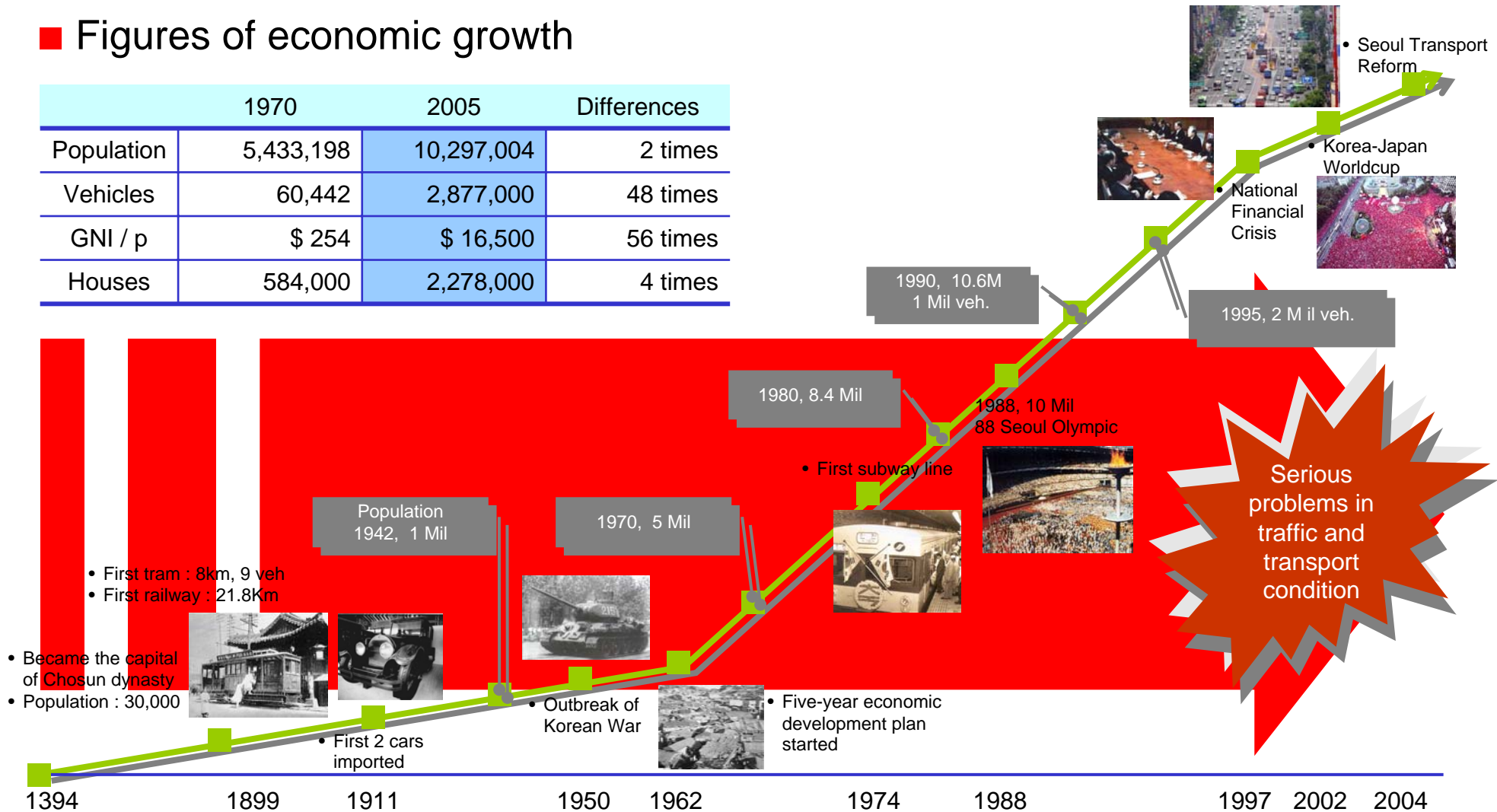


- Area : 605.4 km²
- Population : 10.3 Million



■ Figures of economic growth

	1970	2005	Differences
Population	5,433,198	10,297,004	2 times
Vehicles	60,442	2,877,000	48 times
GNI / p	\$ 254	\$ 16,500	56 times
Houses	584,000	2,278,000	4 times



1960's

Five-Year Economic Development Plan (1962)

Urbanization



1970's

Subway started to operate (1974)

City development planning focused on residence



1980's

Asian Games (1986) & Olympic Games (1988)

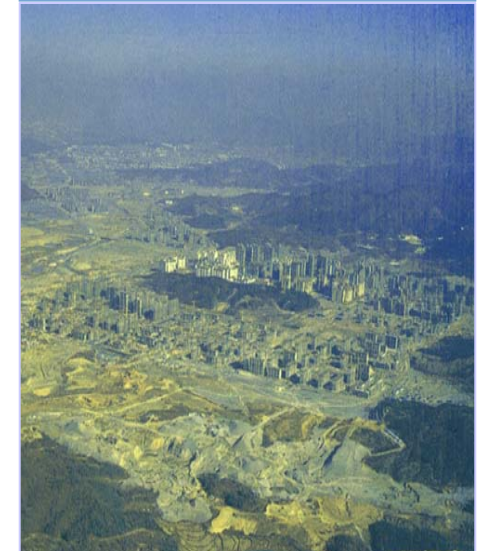
Increase of cars caused traffic problem



1990's

New 5 satellite towns (1990-94)

Increase traffic and environment problem





200 passengers on a bus(60~70 limit)

<p>Buses</p>	<p>No. of Buses : 10,000 No. of Routes : 765 under 150 Operators No. Passengers: 5 million per day</p>
<p>Subway</p>	<p>Total length: 350km No. of Lines: 9 under Four Operators (Public) No. of Rolling stocks: 3,500 No. of Passengers: 4.5 million passengers per day</p>
<p>Taxi</p>	<p>No. of Vehicles: 75,000</p>
<p>Private Passenger car</p>	<p>No. of Vehicles : 2,8 million 16km/h average speed in downtown</p>

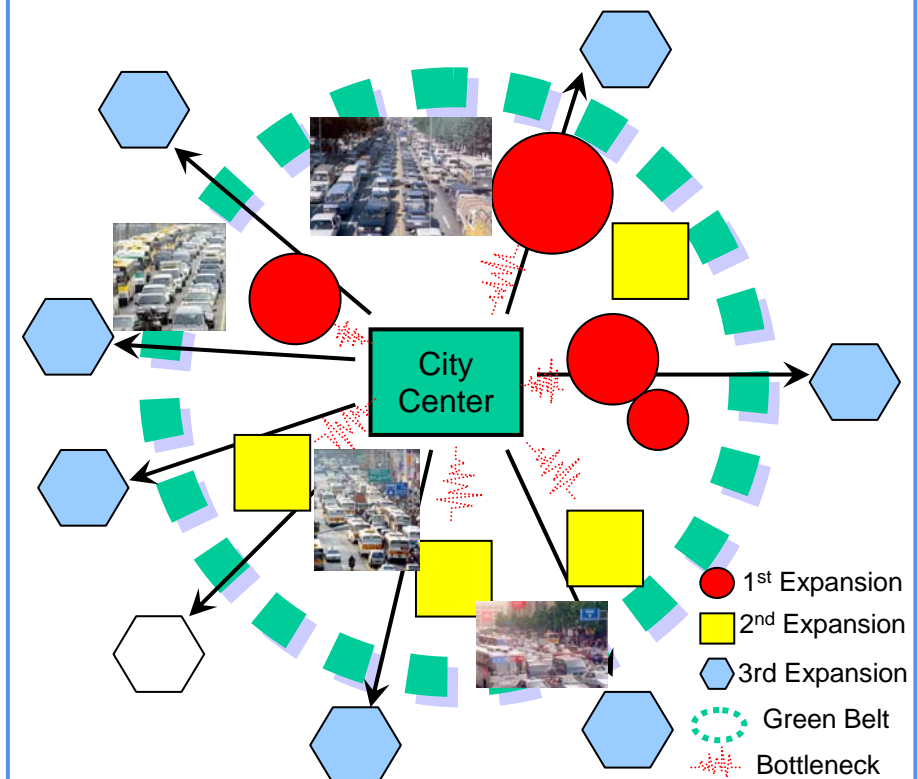
- To facilitate commuting demand to CBD, radial trunk roads had been expanded that eventually built up high density road infrastructure around City Center.

Concentrated road infra near City Center



“Cheong-gae” stream was covered and an upheaved road was built in 1969 even if Seoul had only 50,000 cars

Building Radial Road Network



- Not much attention to “how to use” the infra. With obsolete bus system and extended commuting distance due to area expansion, more people of better income chose passenger cars for commuting mode. Eventually, it led serious traffic congestion in Seoul.

**Han river bridge
construction
in 60's to 70's**

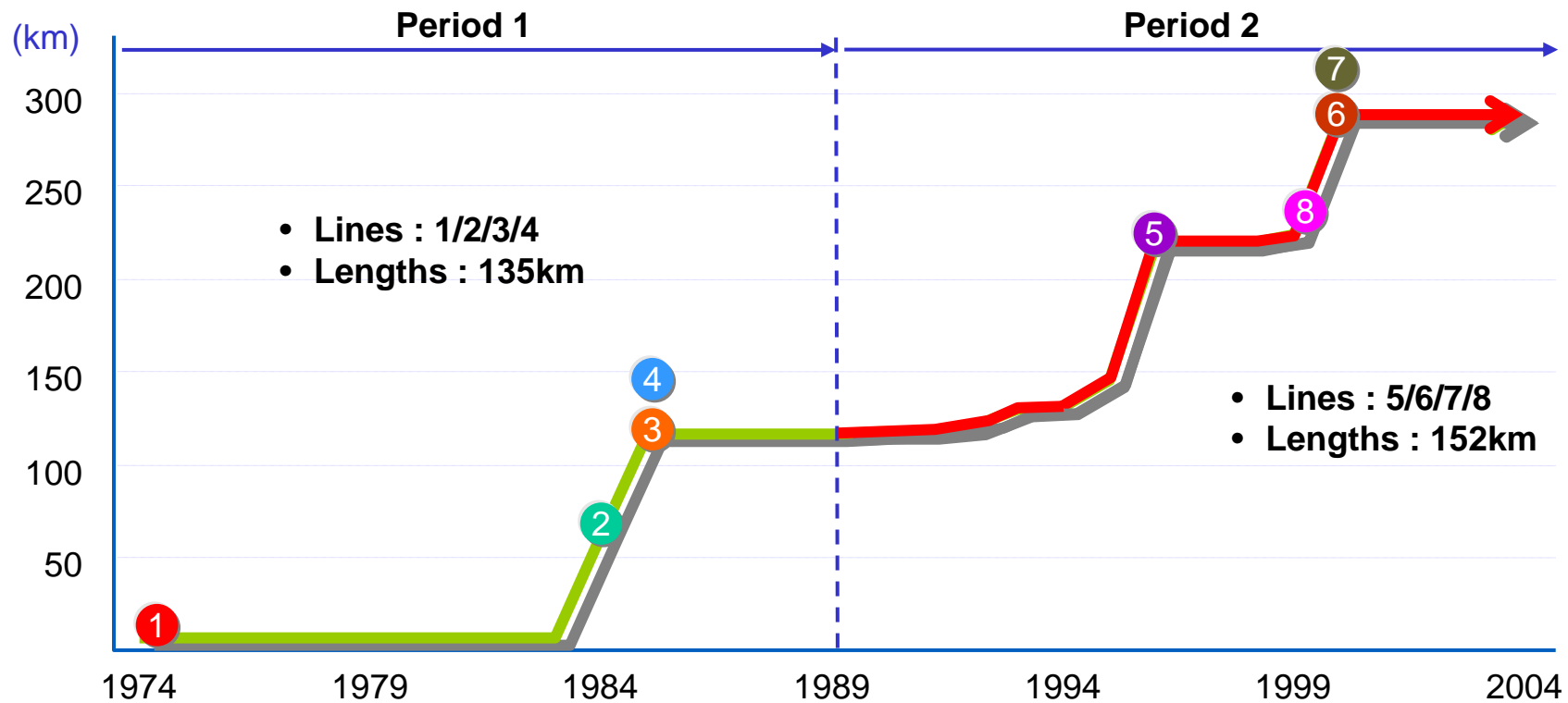


**Gangnam
(south-of-river)
development in
70's to 80's**

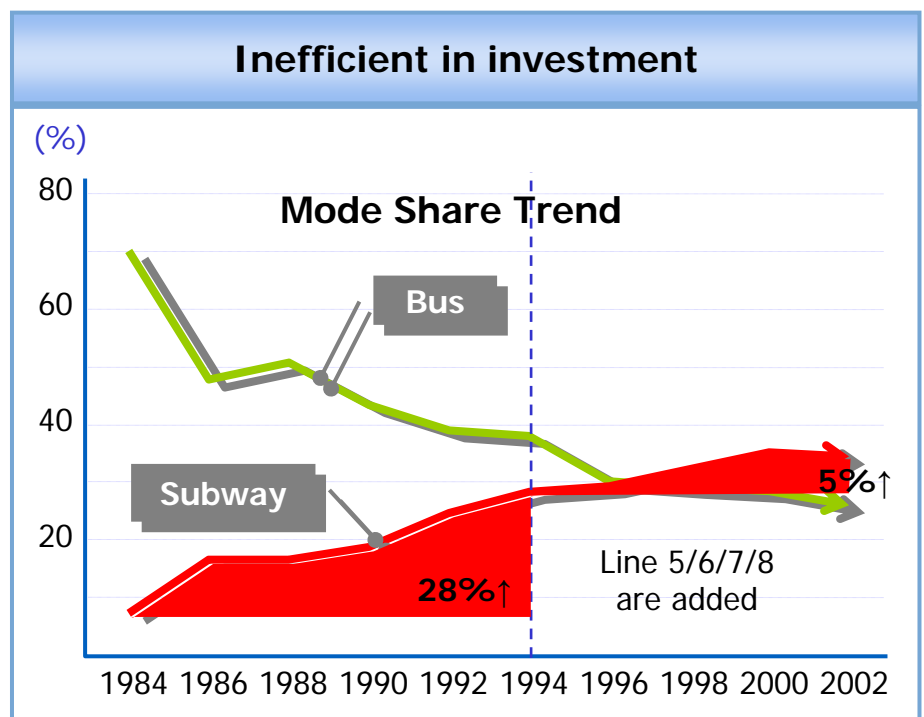


■ Seoul has constructed a subway network of 287km.

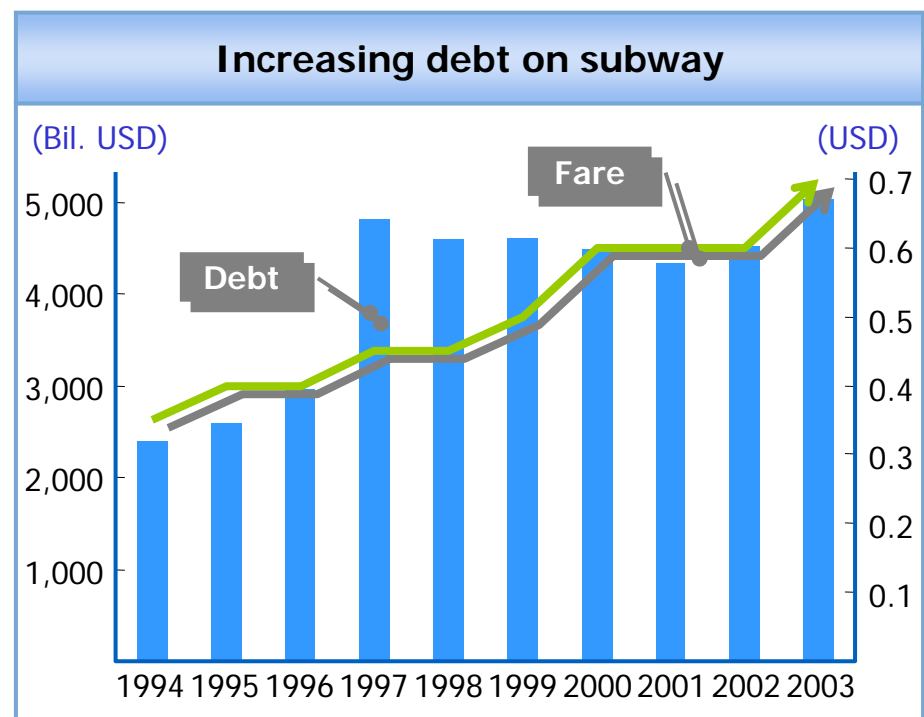
Construction of Subway



Overestimated demand and increasing deficit



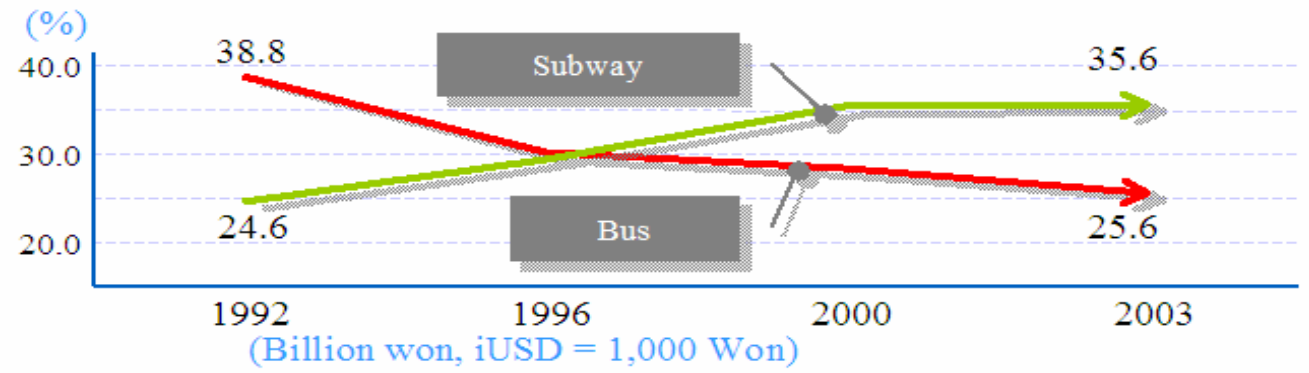
- Demand below expectation : for line 5, 23,000 passenger/km expected → 11,000/km realized
- Take 10 years for completion for line 5
- Operation cost for each trip of subway and bus: \$1.148 vs. \$ 0.7



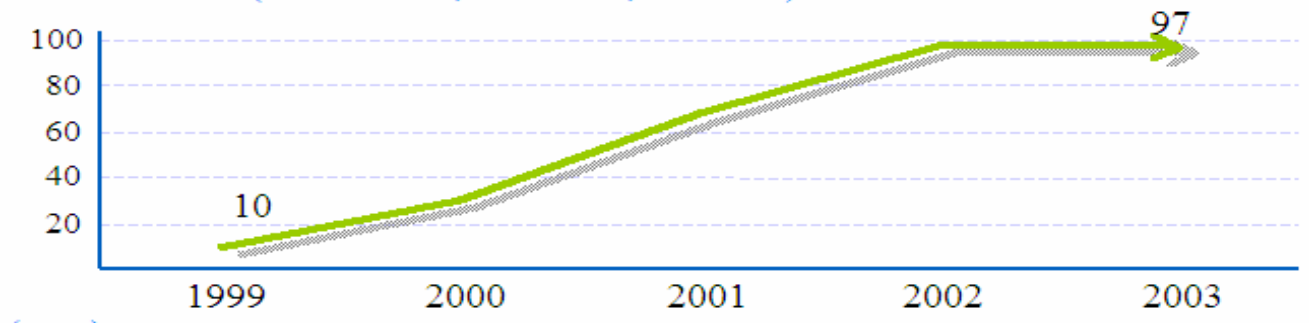
- Major stress on municipal financial status
 - 93% of total debt, caused by subway
 - Construction and operation cost/km= 100 Mil. USD
 - Pressure on fare increasing

- **Population growth and Area Expansion**
Rapid growth in travel demand crossing the city boundary
2.68 mil. veh. per day (1996) → 3.15 mil. Veh. Per day (2003)
- **Traffic congestion**
Average speed of cars in downtown
20.04 km/h (1994) → 16.3 km/h (2002)
- **Decreasing Ridership**
Number of passengers per bus per day
1,069 passengers (1983) → : 504 passengers (2003)
- **Expansion of subway network**

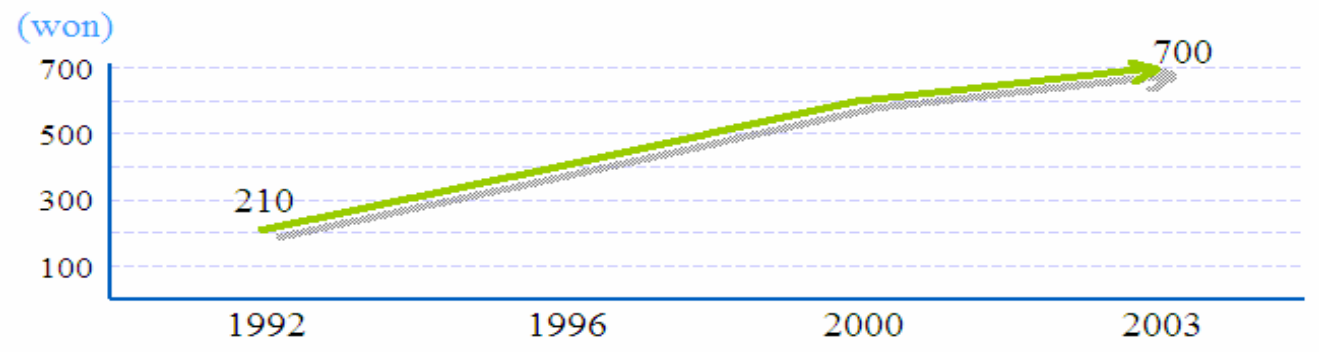
Modal Split

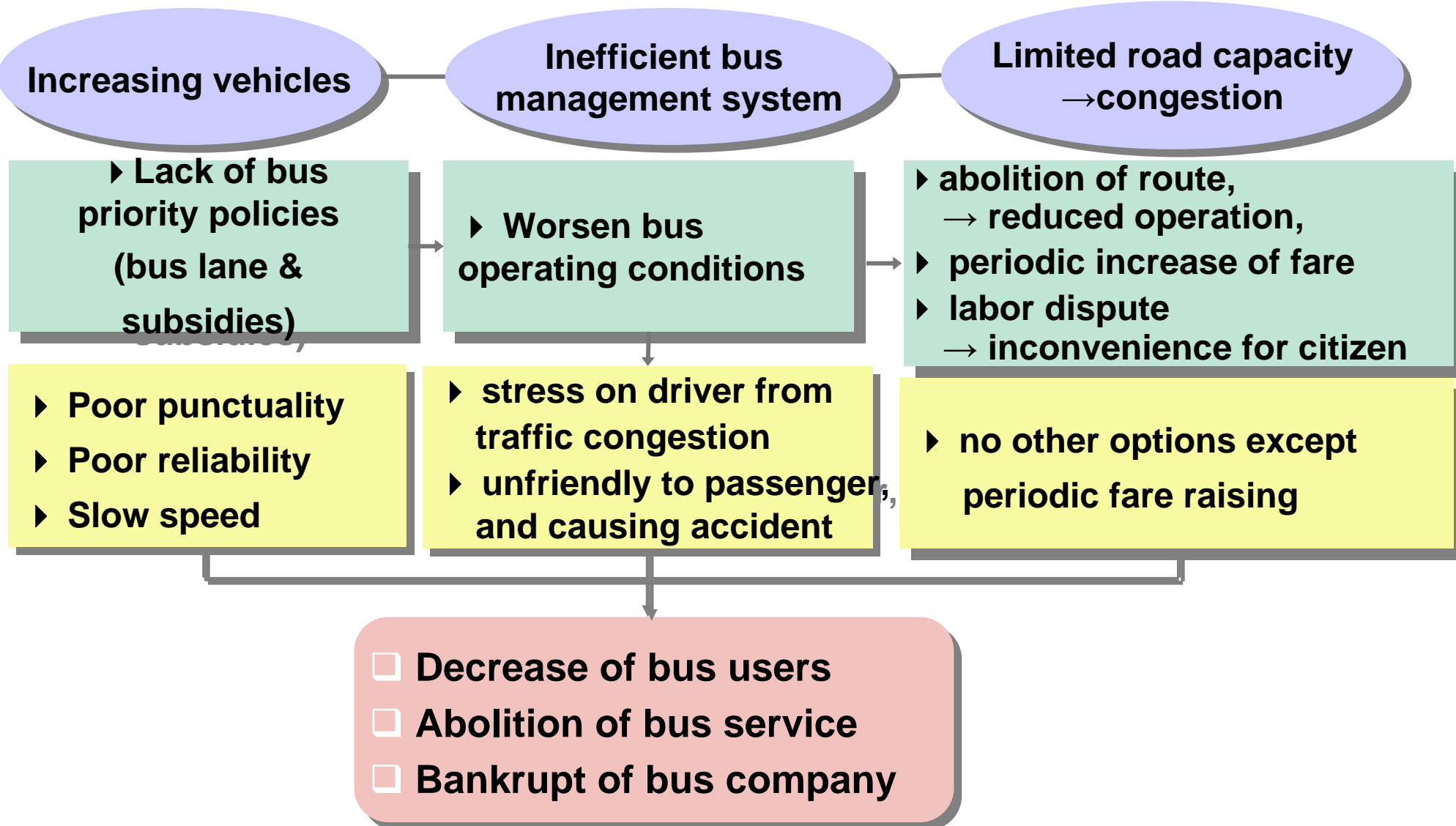


Subsidy



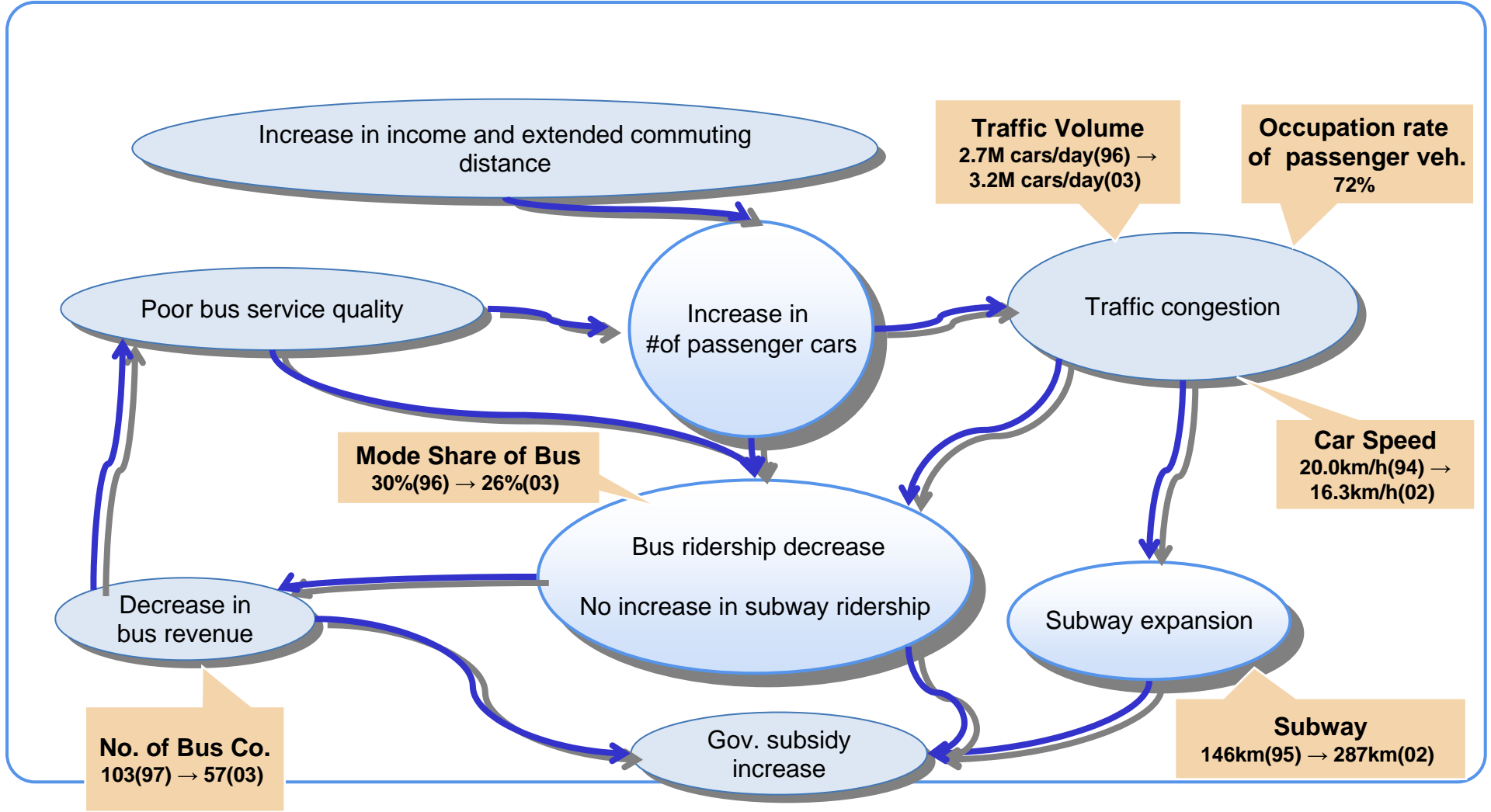
Bus Fare

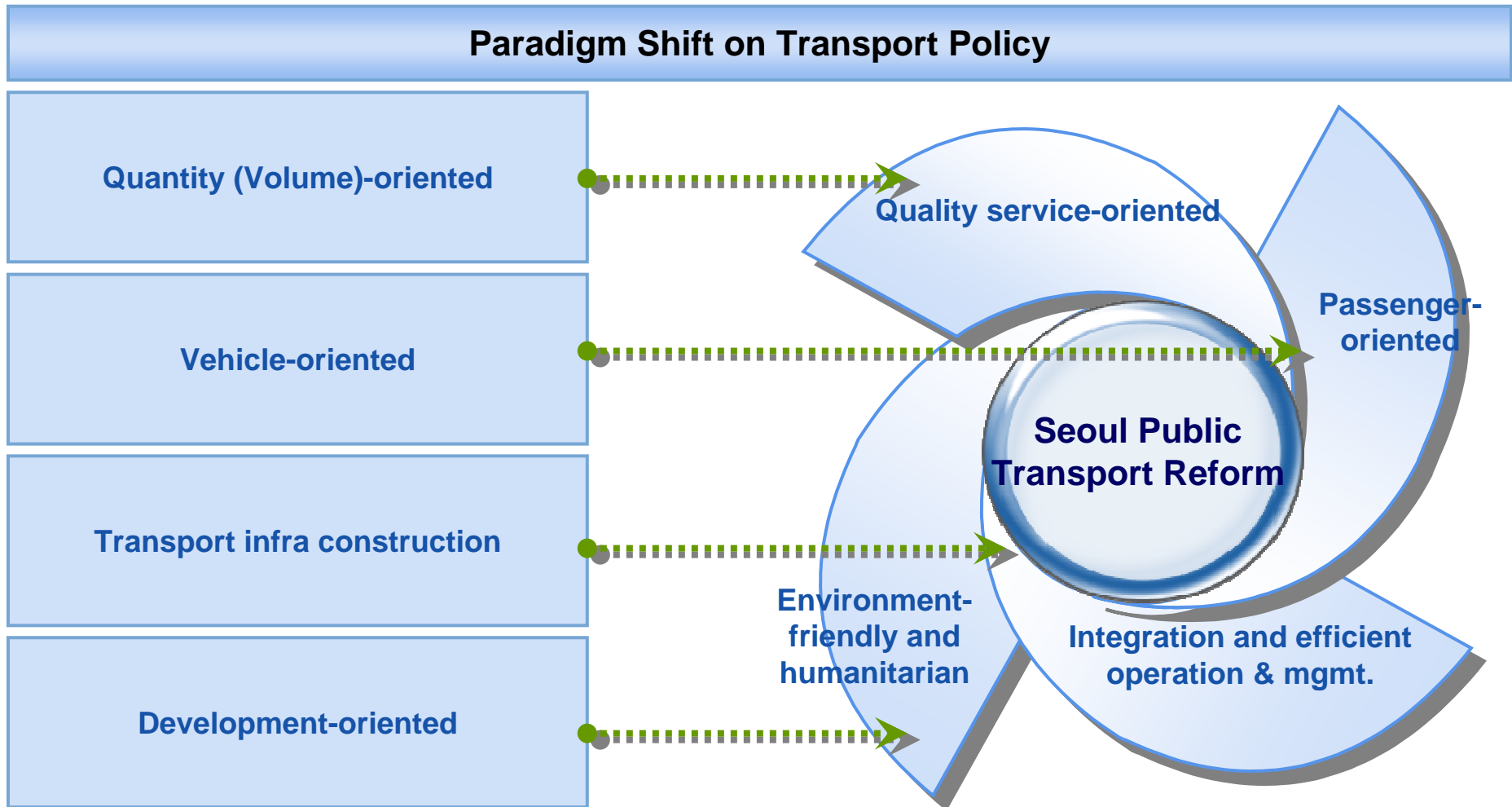




Vicious Circle in Public Transport System

Problems before STR





Integration of Public Transport Network

1

**Unified Fare System
& Free Transfer**

2

Trunk-feeder system

3

Transfer Facilities

Technological Innovation

4

New Smart Card System

5

BMS / BIS

6

TOPIS

Improvement of Mgmt.

7

Scientific Administration

8

Quasi-Public Operation

Enhancement of Environment for Bus Operation and Pedestrians

9

Axial Bus Lane

10

**Road
Channelization**

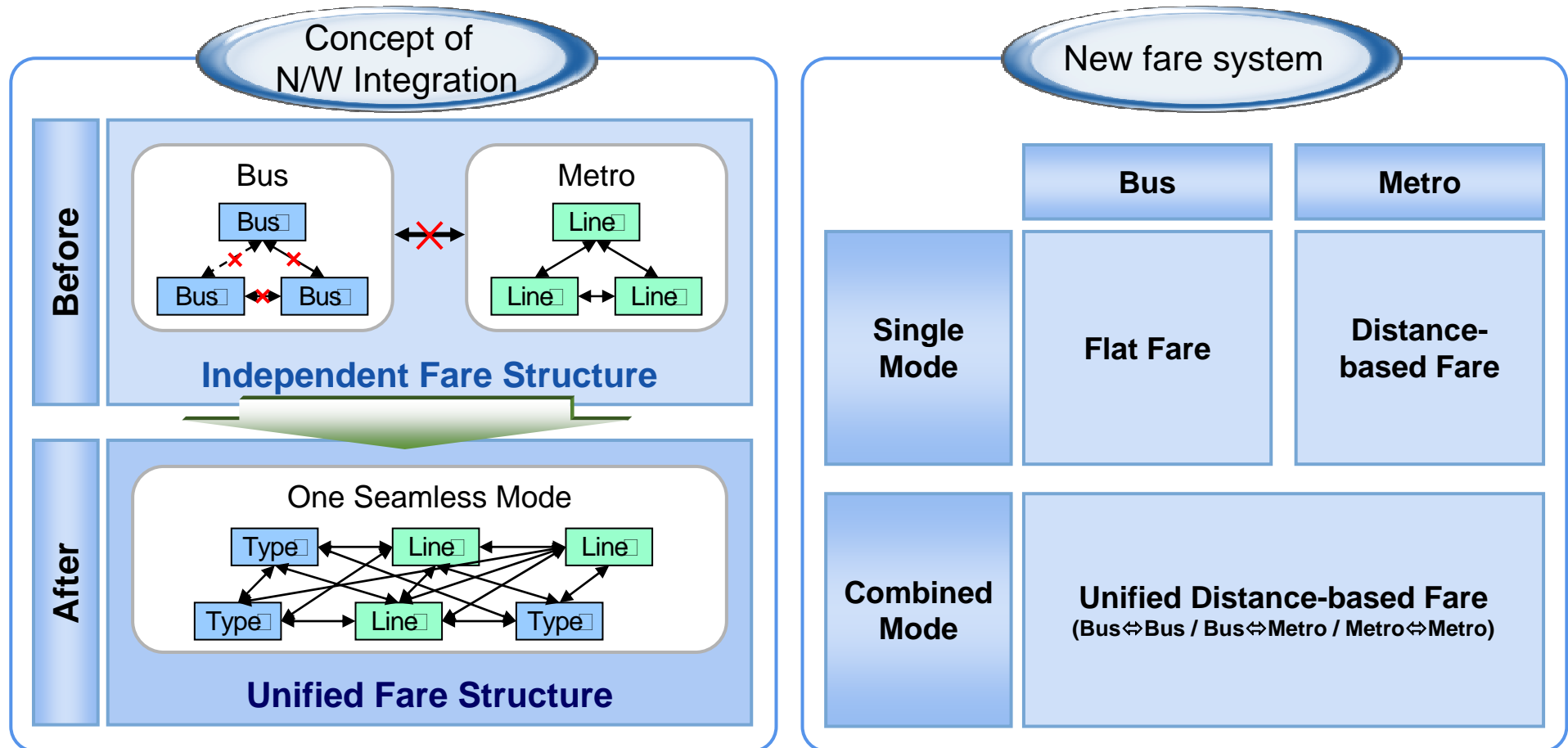
11

**Premium Bus
& Shelter**

12

**Policy of
" More for
Pedestrian"**

- Adoption of distance-based unified fare system irrespective of transport mode



→ Unified Fare Structure

+ "Transaction Unit"

- A chain of sequential ride records comprising a trip from an origin to a final destination.
- Each ride record should be completed by its alighting-record.
- No more-than-30-minute intervals do not exit between an alighting and the next boarding
- No more than 4 transfer rides are allowed in a transaction unit.

+ Fare Structure

- Subway (single ride) : Basic Fare W800 for 12 Km
Distance-based Fare W100 for 6Km up to 42Km and for 12Km beyond
- ◆ Bus [single ride] : Flat Fare W800(Trunk), W500 or W300(Feeder)
- ◆ Transaction Unit : a single combined system is applied.

The basic fare (for 10Km) for a transaction unit is the highest one in the chain.

Beyond 10Km, the distance-based fare(currently, 100 Won for 5km) is added.

However, if the combined fare of the unified fare system for a transaction unit is higher than the sum of independent fares in the transaction unit, the latter is collected.

→ Fare Collection System

The Whole System

- Operators collect fares not for itself, instead but for the whole system

Collection

- Collections are made at boardings and alightings
- Collections are made for the maximum fare of certainty up to the moment

At a boarding

- At a boarding, the maximum basic fare up to this ride within the chain and the amount of **penalty**, if any, are determined.
- If the basic fare of this boarding is less than the previous maximum basic fare, then no fare is charged for this ride.
- Else, the difference between the current basic fare and the previous maximum basic fare is collected.

At an alighting

- At an alighting, the fare for the chain up to this alighting is determined and the difference between the newly determined fare and the total collected fare for the chain before this alighting is collected.
- If tagging is made at alighting, fare collection is completed up to the alighting.

Penalty: If tagging is not made at an alighting, the transfer before the alighting is not a valid transfer.

The fare for the ride of the alighting should be recalculated at the next ride.

The diff.(new-old) should be collected as a penalty for not tagging at an alight.

→ Fare Settlement Scheme

Scheme 1

The part of distance-based fare, collected by transits, belongs to the transit operators.

Scheme 2

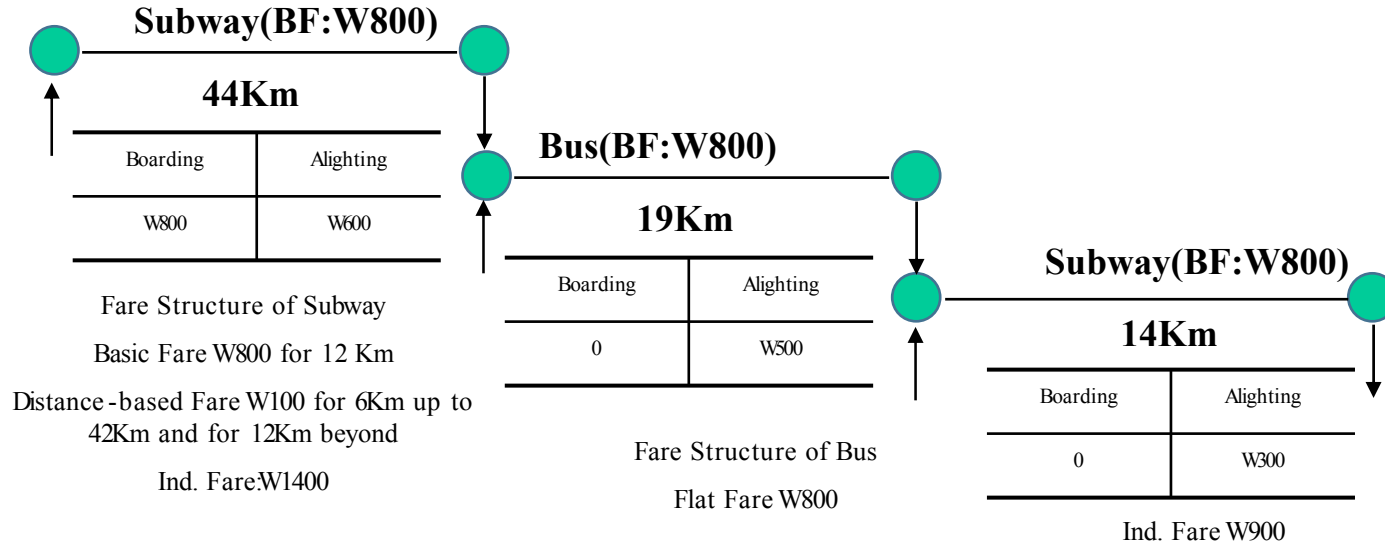
The rest is shared by the operators in the transaction unit .

Scheme 3

The distribution rate for an operator is the proportion of its basic fare to the sum of the basic fares of all ride records in the chain.

→ Application of unified fare system on a chain

Collection



Sum of Ind. Fares: W3,100

Total Length 77Km

Unified Fare : W2,200

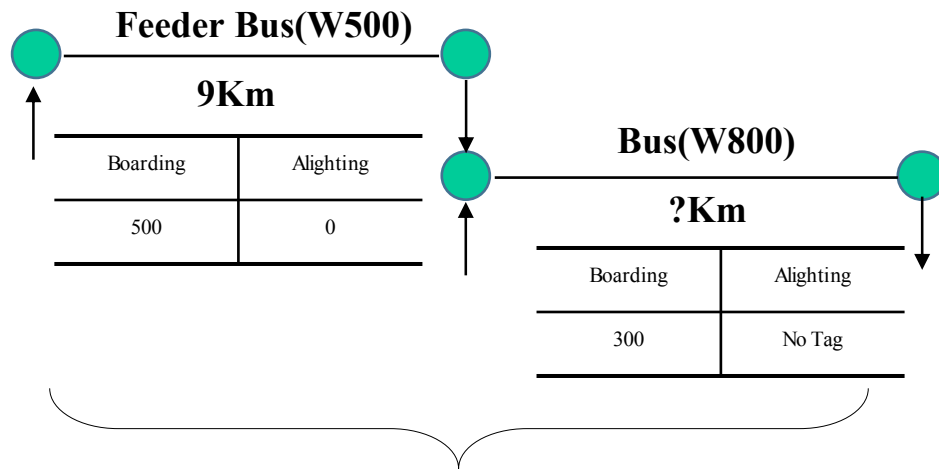
Settlement

- Distance-based Fare of Subway (1) for 32km, W600, to Subway(1)
- Distance-based Fare of Subway(2) for 2km, W100, to Subway(2)
- The rest, W1,500, distributed to Subway(1), Bus, and Subway(2) by the ratio 8:8:8

Sub(1): 500+600=1,100
Bus : 500
Sub(2): 500+100=600

→ Penalty Case

Collection



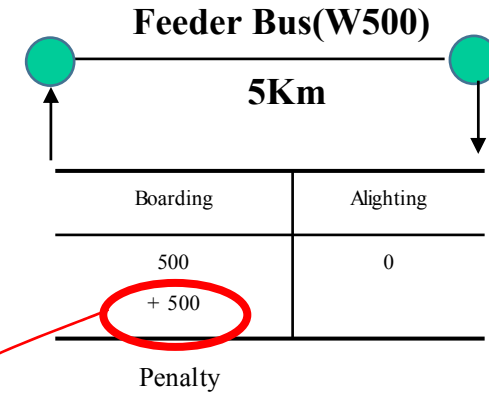
Collected Fare: 1,300

Settlement

Feeder 500+Bus 300-500(Penalty)

Distribution Rate: Feeder:Bus= 5:8

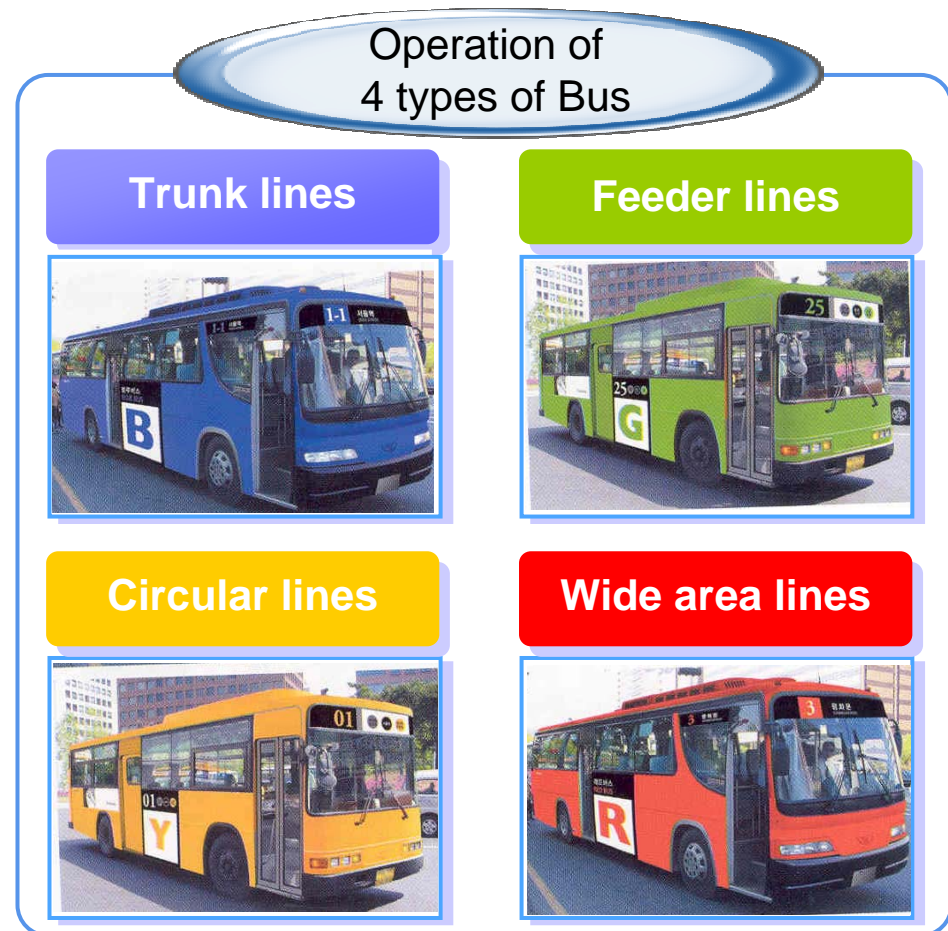
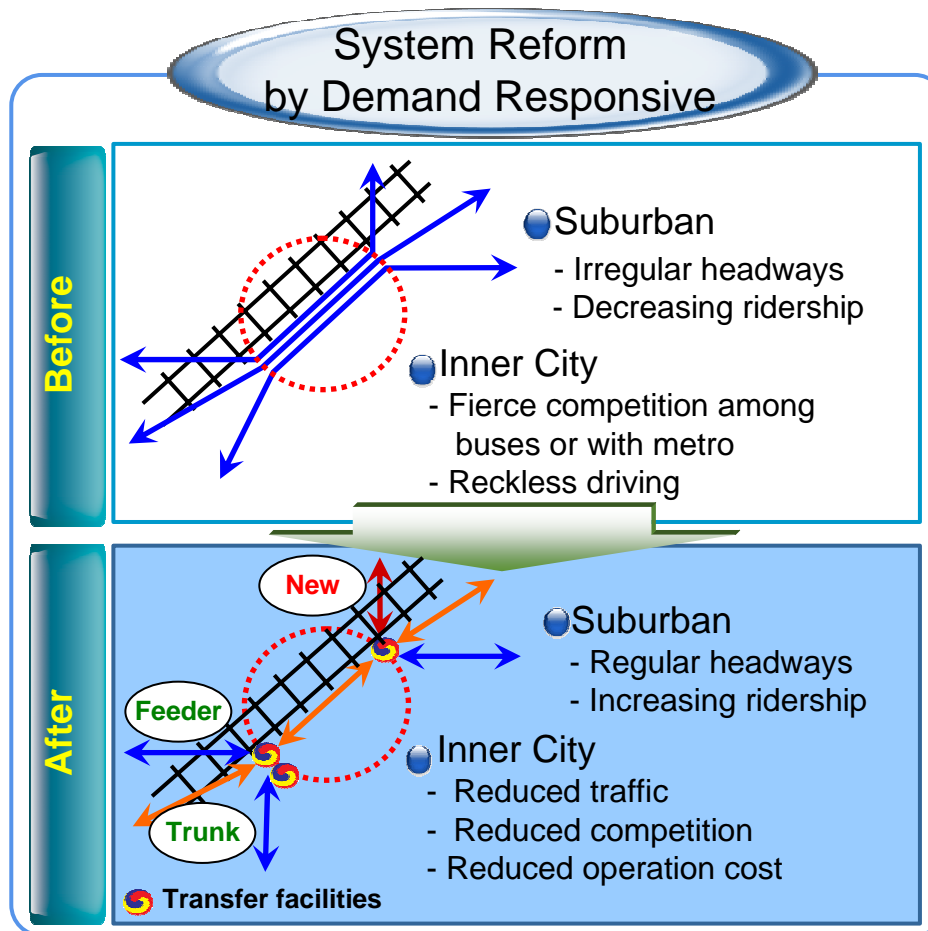
Feeder : 500
Bus : 800



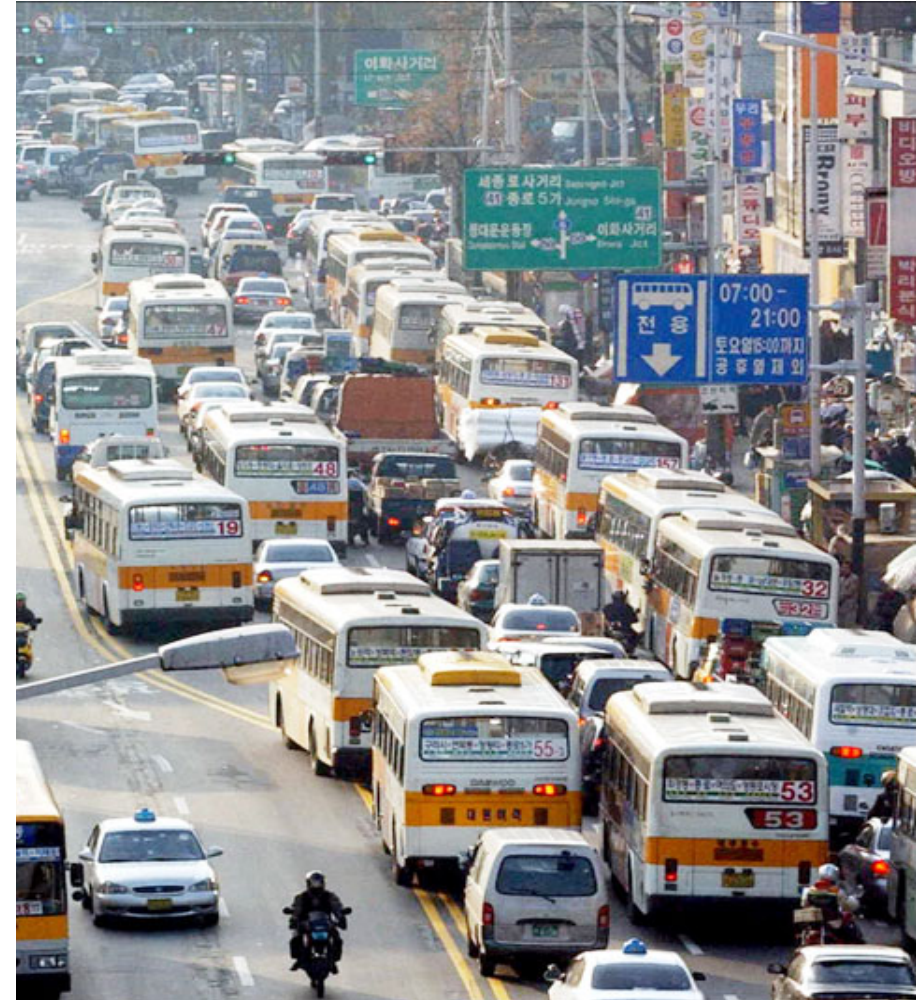
Collected Fare : 1,000 = 500+500

Feeder: 500

■ Bus route reorganization and Function change



All routes were passing through CBD before the reform



Classification of 4-types of Buses by colors :

Trunk Lines · Feeder Lines · Circular · Wide Area

- Regional connection between suburbs and downtown area
- Ensuring operation speed and punctuality

Trunk
lines

Blue
bus



- feeder to trunk lines and subways
- Meeting local traffic demand

Feeder
lines

Green
bus



- Local lines within the downtown area
- Serving for business and shopping trips

Circular
lines

Yellow
bus



- Express connection between satellite cities and downtown area
- Absorbing passenger car commuters

Wide area
lines

Red
bus



- Building transfer terminals at node between trunk line and feeder line connected with bus and metro

Transfer Terminal for Downtown and Suburban

The map illustrates the Seoul transport network with several key features: green circles representing secondary city centers, purple triangles representing boundaries, and blue squares representing suburbs. Red arrows indicate trunk lines radiating from the city center, while smaller red arrows represent feeder lines. Two large green arrows point from the map to the Cheongryangni and Yeoido transfer terminals. A legend at the bottom left identifies the symbols: a green circle for '(Secondary) city center', a purple triangle for 'Boundary', and a blue square for 'Suburb'.

Cheongryangni Transfer Terminal

Yeoido Transfer Terminal

● : (Secondary) city center ▲ : Boundary ■ : Suburb

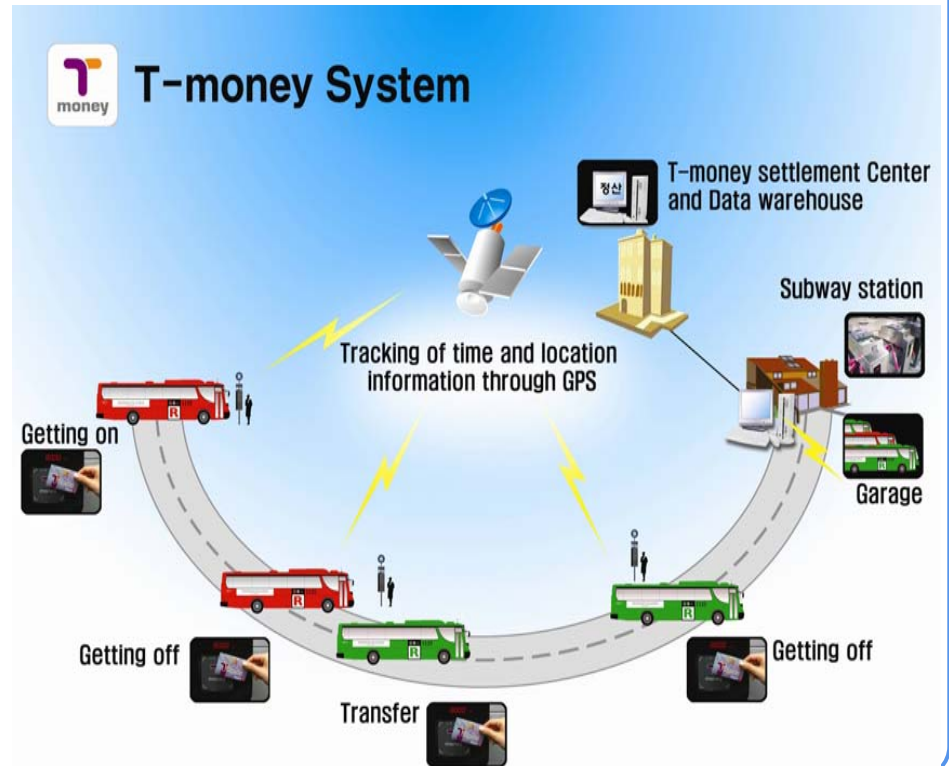


- Adopt T-Money, new smart card system for integrated fare collection

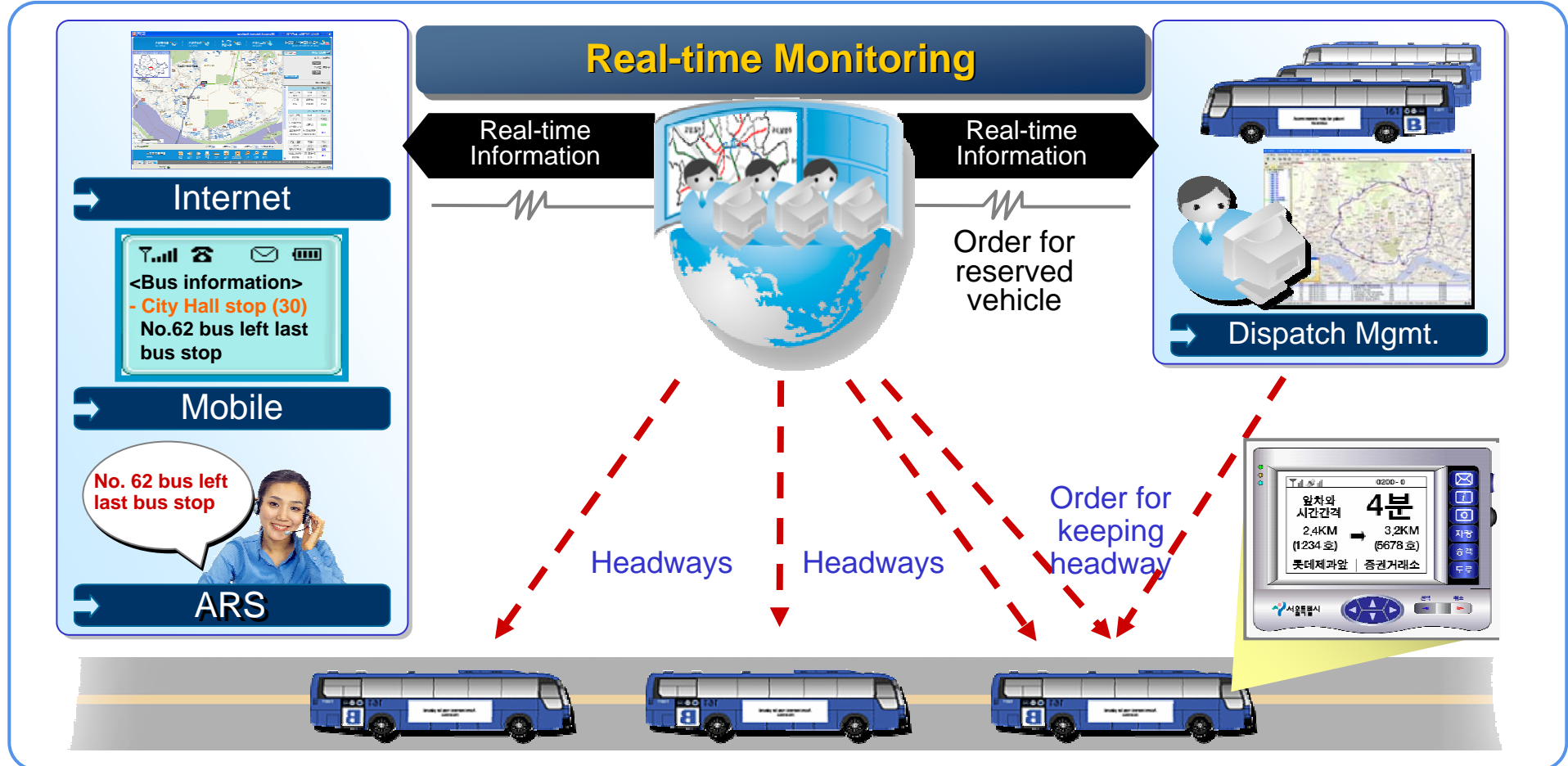
New Smart Card System

Characteristics

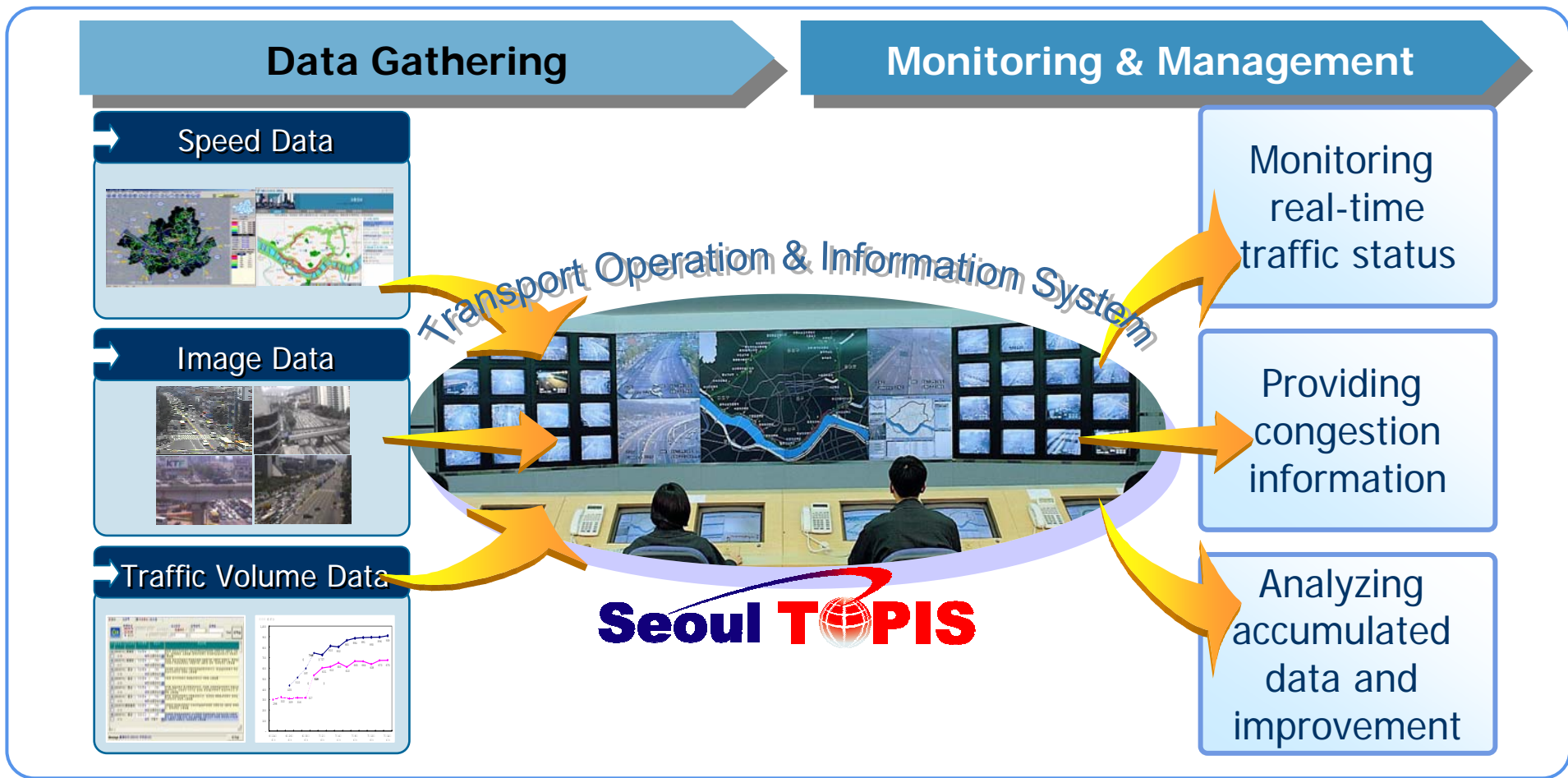
- m **Flexible to various fare policy**
 - unified distance-based and time difference fare system
- m **Provides multi-functional services**
 - Transport, shopping and civil service, etc
- m **Adopted International standards**
 - Type A / B
- m **Enhances security**
 - adopt EMV



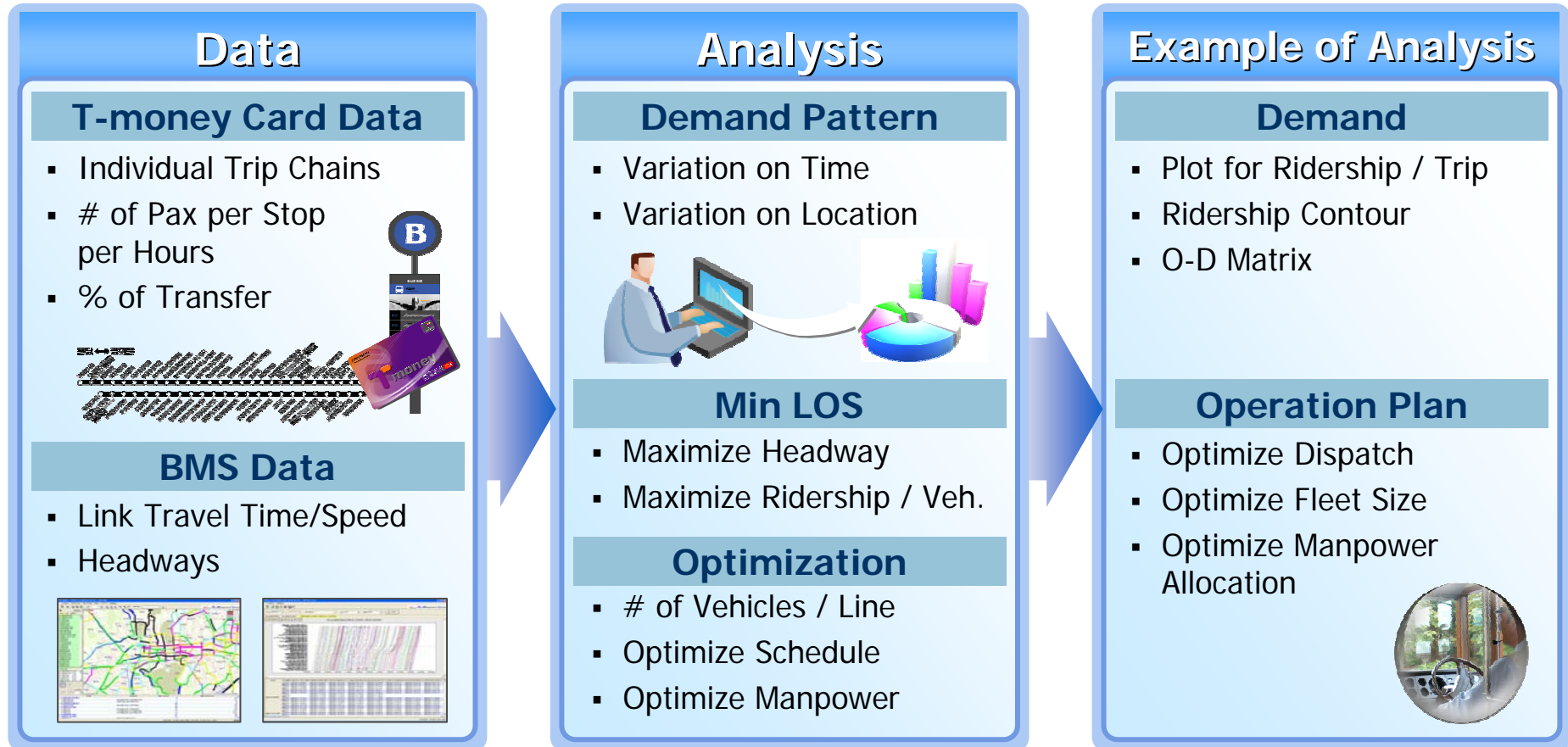
■ Bus operation information collecting at control center through GPS



- Supporting on-the-spot traffic control using real-time traffic data



■ Policy making based on scientific analysis through smart card & BMS



→ The Old Bus Network

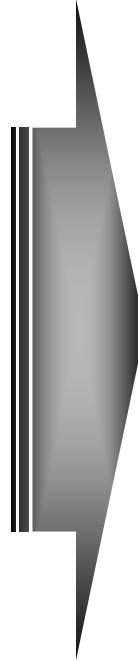
- ❖ long and winding routes
- ❖ covering locations of major trip demand
- ❖ unreasonable amount of time to complete a trip to its destination
- ❖ many common long stretches of competing routes on trip-demand belts
- ❖ but almost no bus service outside of those belts
- ❖ putting the bus industry on the competing position against the transit system instead of complementary one
- ❖ no organized effort to integrate transit and bus network into one cooperative network

Restructuring the whole bus route network Renovating the quality of bus services

- ❖ Establishment of “trunk-feeder” system
- ❖ Straightening up the old winding routes
- ❖ Keeping the operation cost under control
- ❖ Strict control over bus operations and driving practices

Quasi-public Operation System with Bus Management System/ “Revenue Pool”

- ❖ private bus firms run their bus operation on the assigned routes and schedules, determined by the city government
- ❖ reimbursed for the operational cost with guaranteed business profit rate by the **revenue pool committee**



■ Expansion Plan (13 lines/192□)

- Status of Existing Bus Lanes(2005)
 - Exclusive median bus lanes: 7 lines/ 84□
 - Curbside bus lanes: 293.6□

■ Road Channelization and introduction of high technology system

Road Channelization

Bus-Stop Red Zone

- 428 red zone stops at the end of 2005
- Stopping order establishment through smooth in and out



Curbside Bus Lane

- 183.3Km at 2005
- Differentiation through colored pavement
- Prevention of illegal parking/stopping at curbside lane



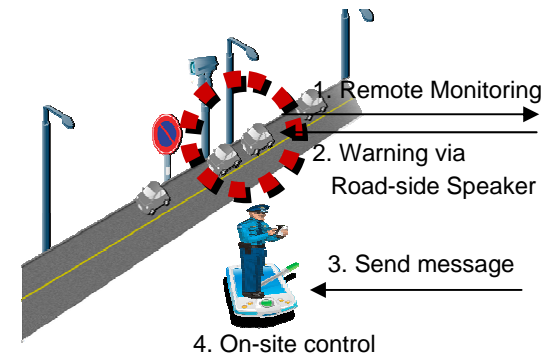
Surveillance on Illegal Parking

- 117 CCTV installation in 2004 to 2005
- Control illegal operation/parking/stopping at bus only lane



Surveillance site

Control center



- Introduce premium buses for high quality service and replacing shelters for walking environment improvement at bus stops

Premium and User-Friendly Bus

Articulated Bus



- Large capacity, high efficiency bus→3 times passenger capacity as general bus
- 20 buses of 8 routes are in operation

Low-floor Bus / CNG Bus



- Convenient for the disabled and seniors (32cm height from road to bus floor)
- 125 buses are in operation
- Environment-friendly bus which remarkably decrease air pollution

Shelter Improvement

Before



Shelter & Fence installation

After



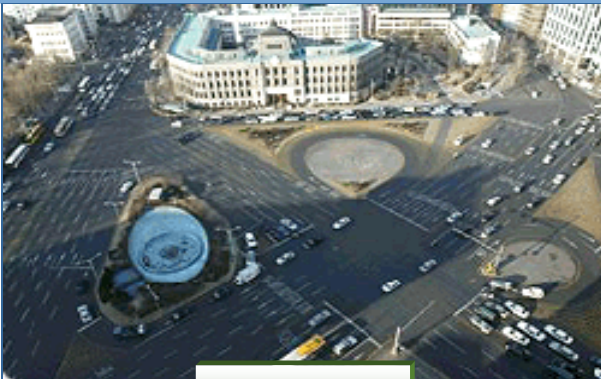
● Principle of Operation by Service Types

Trunk lines	Major lines	Articulated buses, Low-floor buses, CNG buses
	Aux. Trunk lines	Low-floor buses, CNG buses
Feeder lines		Medium-size buses
Circular lines		Medium-size buses



- Establish humanitarian transport culture with environmental concern

Reform of Seoul Plaza



Restoration of “Cheong-gae” stream



Pedestrian Crossing Re-establishment



Reduce Space for Private Passenger Veh.

- Demolition Elevated Motorway
- Create Seoul Plaza

Improve Ped. Facility

- Improving Sidewalk Network
- Expand Pedestrian Crossings

Congestion Pricing

- Expand Pricing Spots
- Automated Surveillance on Illegal Parking

Decrease of car-traffic volume : 125,000 veh/day



Before

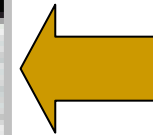


After(Sep. 2005)

Chunggyecheon Restoration Project : history

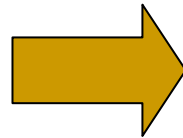


Early 20C

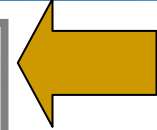


Place for washing in
Cheonggye Stream

Bridge on
Cheonggye
Stream(Ogansu
mun)



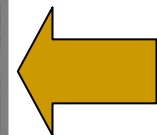
Chunggyecheon Restoration Project : History



After War: Urban Squatter until 1970's



After the construction of the overpass



Road Building above Cheonggye

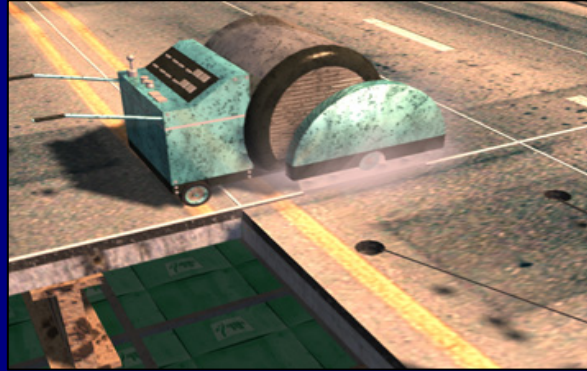
Chunggyecheon Restoration Project

□ Process of Demolition

- Step 1



- Step 2



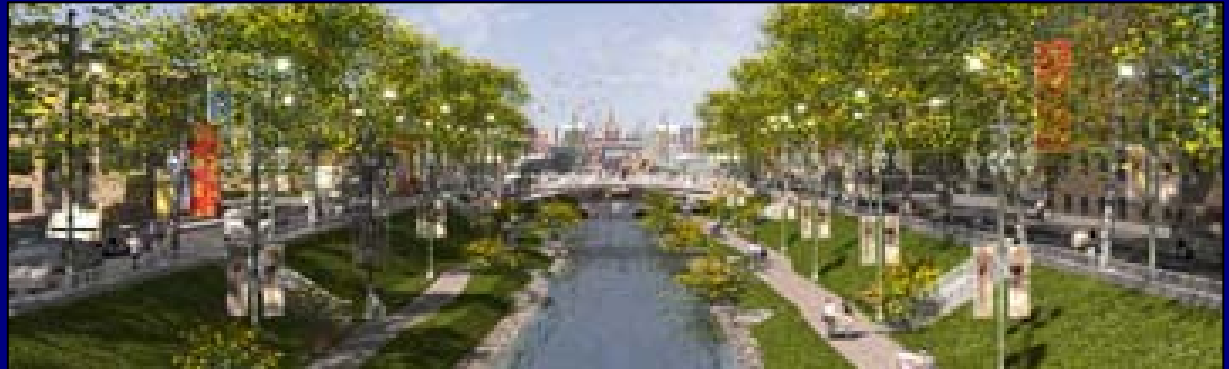
- Step 3



- Step 4



- Step 5



Waterway Opened



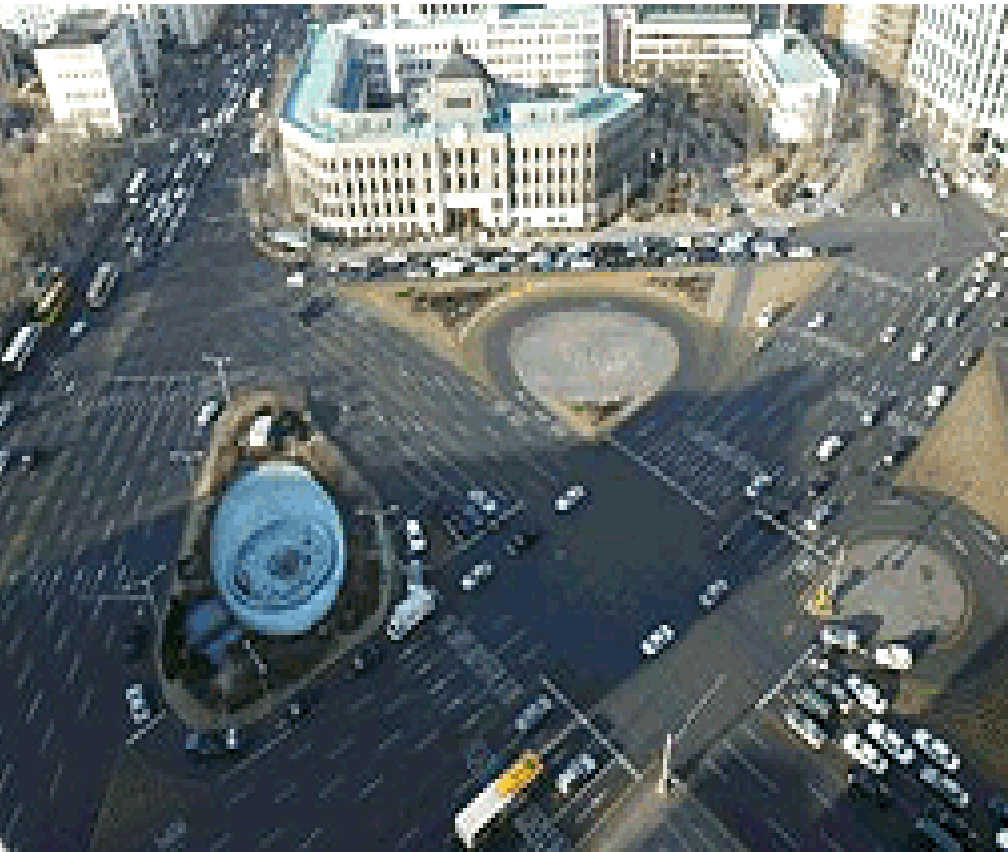
Wall Painting



Night View Cheong Gye Cheon



2004. 5. 1 Open → Restrain Traffic Flow → Ped. Square



Before



After(May 2004)

Reducing car-oriented space, Create Pedestrian-crossing



Before(2003)



After(2005)

Conversion to oneway, expanding pedestrian crossing from 3 m width to 6 m.





Before



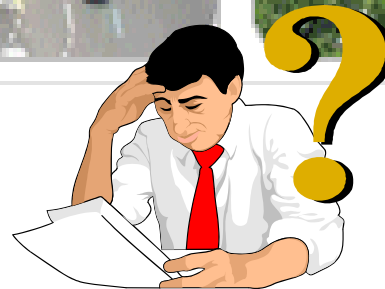
After(May 2004)



Before

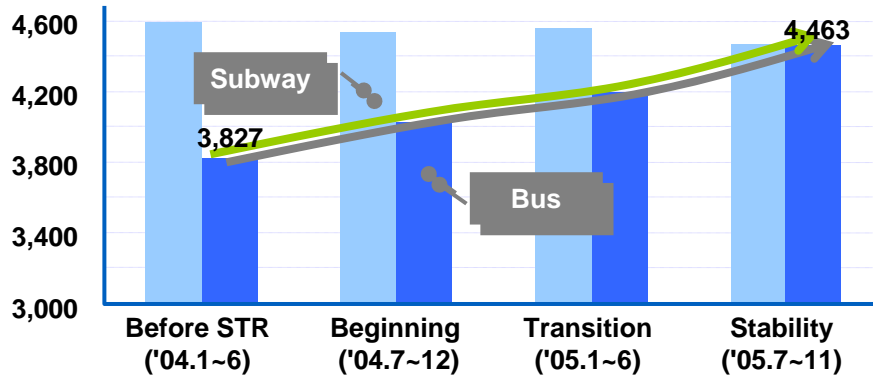


Plan(2006)



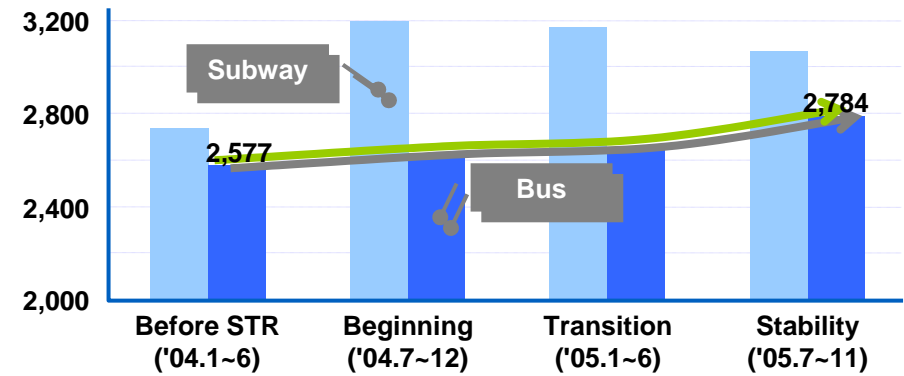
Increase in Passengers

(Thousand Persons per day)



Increase in Fare Revenue

(Thousand USD per day)

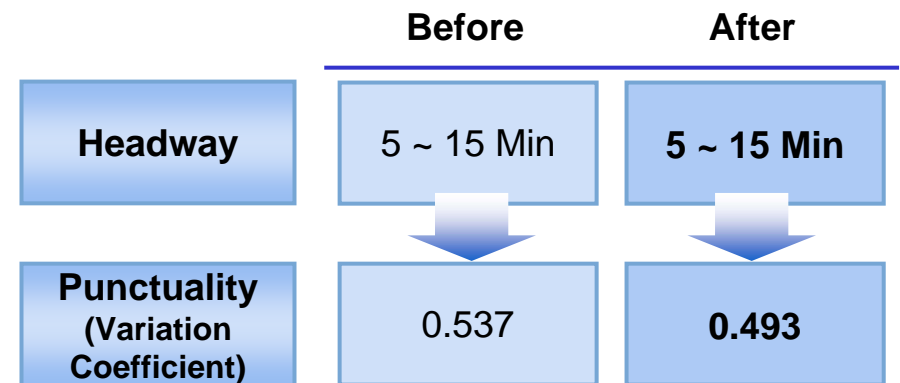


Increase in Speed

(Km/hour)

		Before Jun 2004	After Dec 2004	Difference
Dobong-Mia Road	Bus	11.0	22.0	11.0↑
	Car	18.5	21.6	3.1↑
Susaek-Seongsan Road	Bus	13.1	21.5	8.4↑
	Car	20.3	22.3	2.0↑
Kangnam Road	Bus	13.0	17.3	4.3↑
	Car	18.0	18.6	0.6↑

On-time Operation



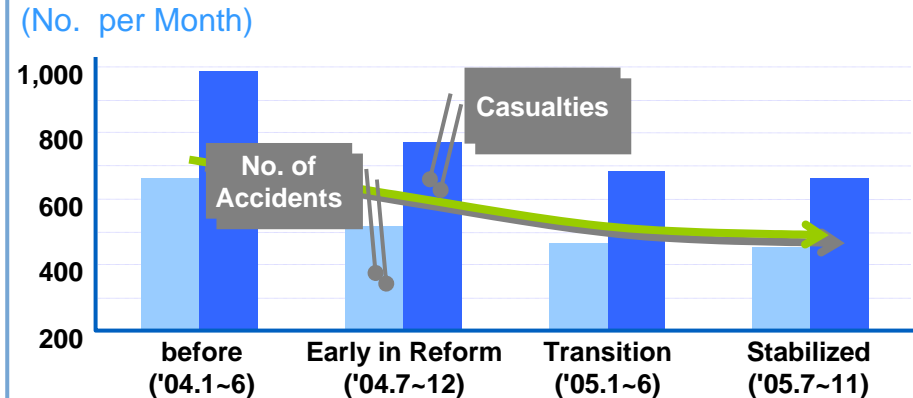
Air Pollution

	2003	2004	2005
CO(Ton)	748.3	623.8	488.0
NO _x (Ton)	2,074.6	1,799.7	1,694.1
HC(Ton)	356.6	358.6	332.4
PM(Ton)	45.1	36.2	27.3

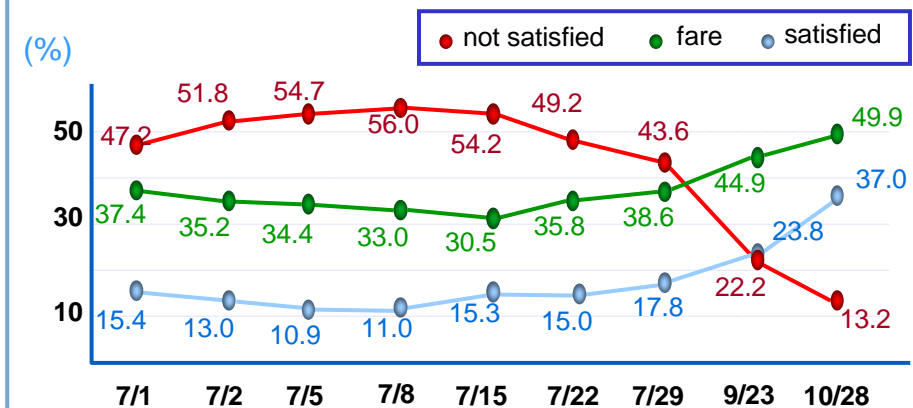
Fuel Consumption

		2003	2004	2005
Diesel	Usage(1,000ℓ)	148,059	126,485	118,783
CNG	Usage(1,000㎥)	33,955	41,7310	44,671
Total Fuel Cost (KRW M)		64,816	58,685	56,033
Difference of Cost(%)		-	□9.5	□4.5

Traffic Accidents



Citizen' Satisfaction



Axial Bus Lane

Increase of speed for both bus and p-car

- 10 km/h to over 20 km/h

More carriage of passenger

- 6 times more passengers than other lanes

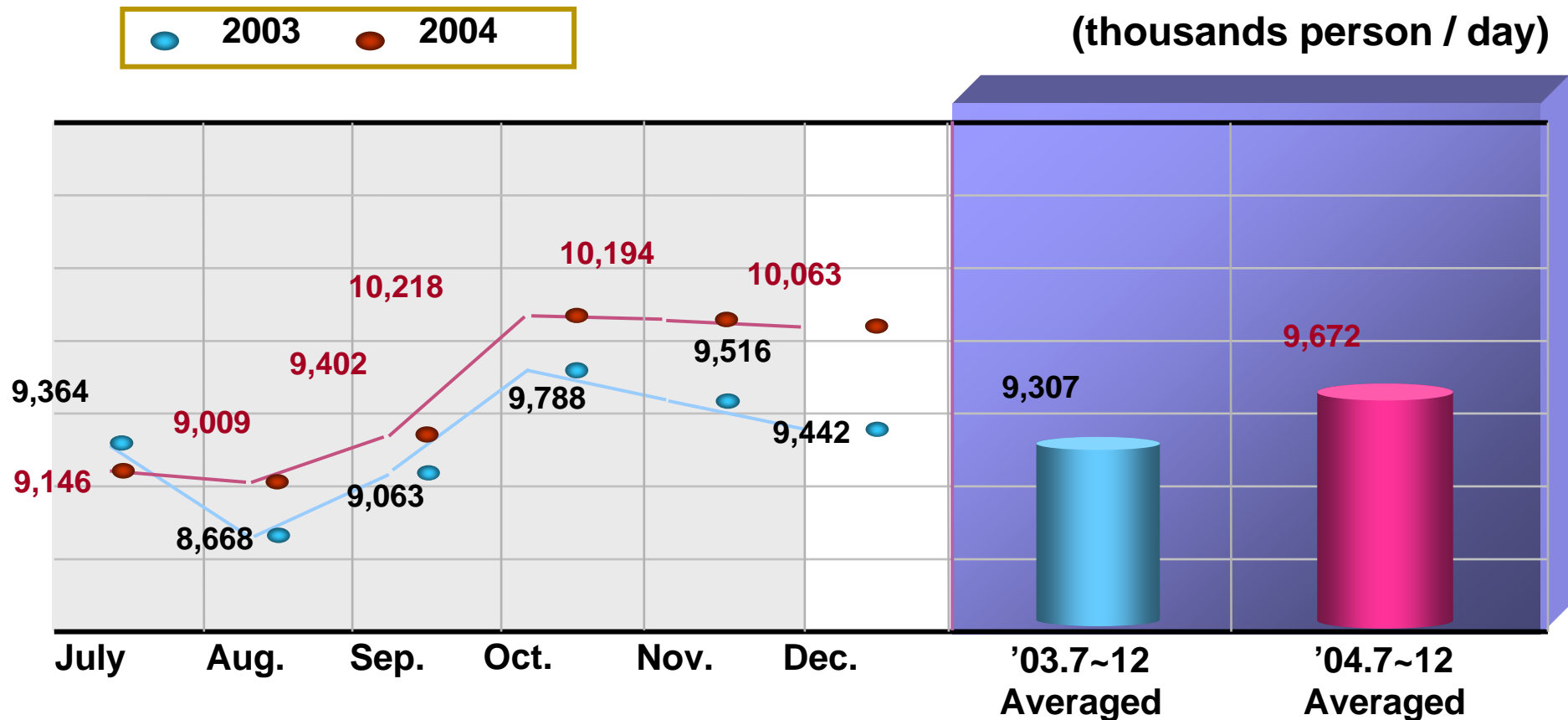
Less travel time variation

- 5 times less than other bus lanes



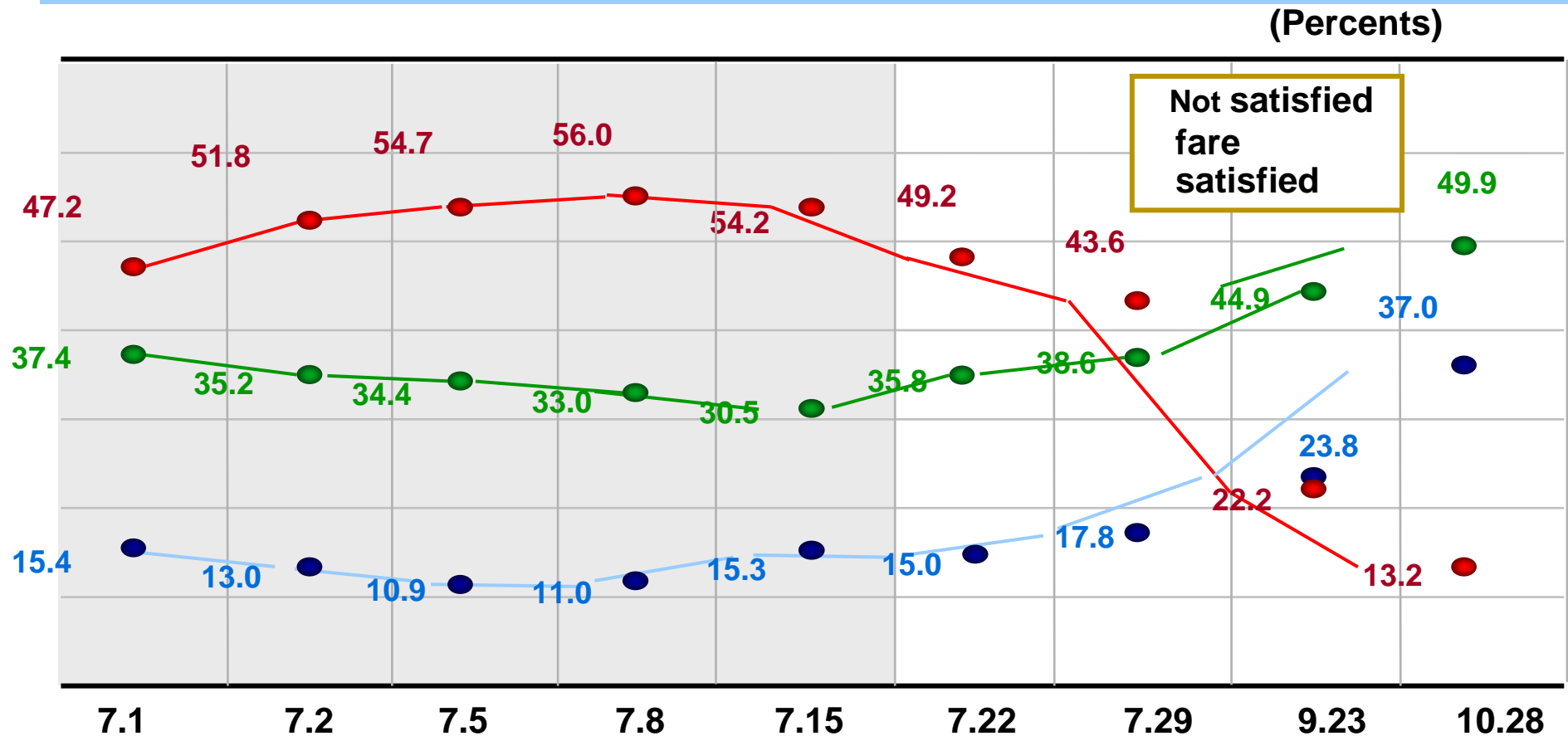
Increase of Passengers

- The number of Public Transport users in July and October increases 11.0% from last year







Citizen's satisfaction



- Citizens are getting more more satisfied from the public transportation system after reform.



Air Pollution

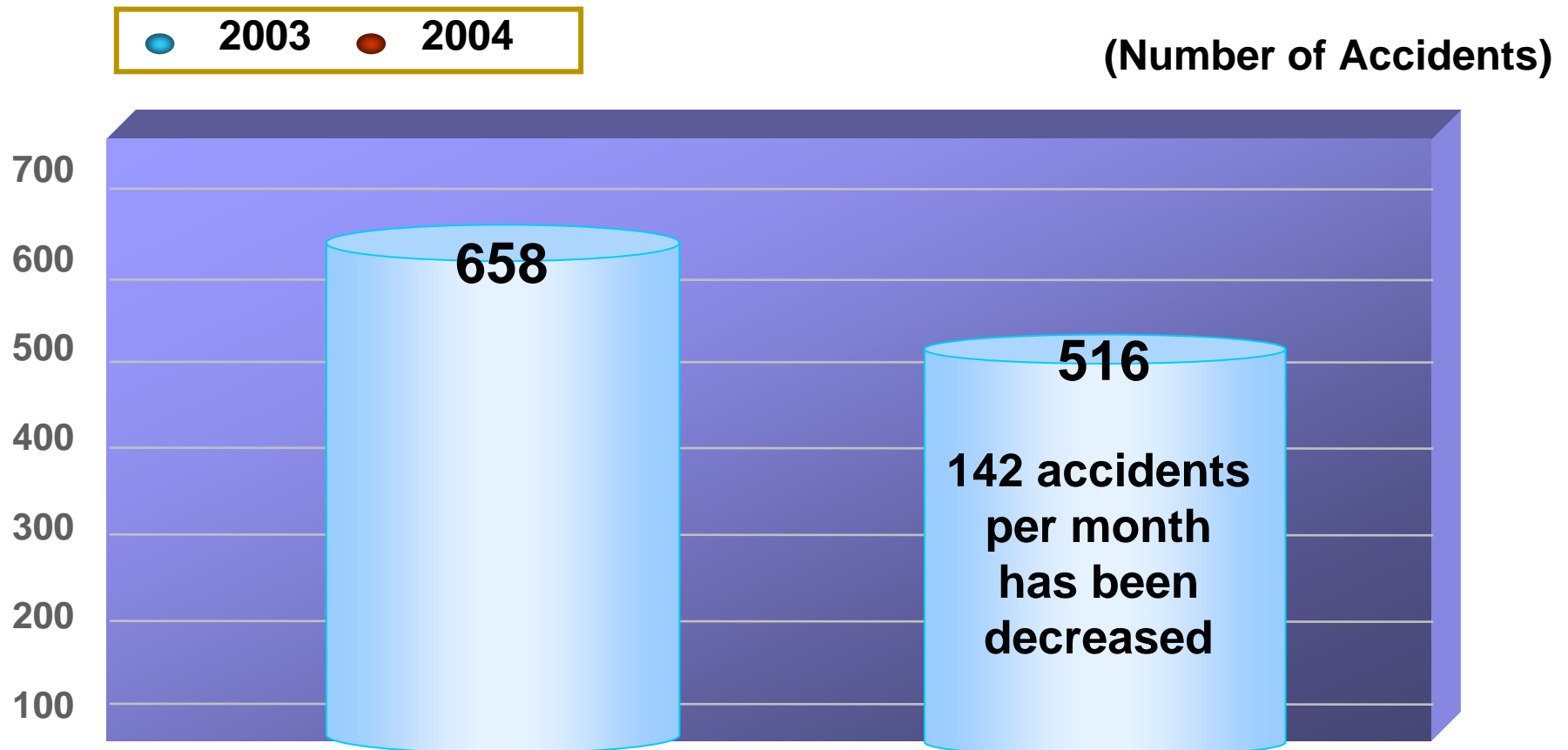
	2003	2004	2005	Ratio ('03 -> '05)
CO(Ton)	748.3	623.8	488.0	 34.8%
NO_x(Ton)	2,074.6	1,799.7	1,694.1	 18.3%
HC(Ton)	356.6	358.6	332.4	 6.8%
PM(Ton)	45.1	36.2	27.3	 39.5%

Fuel Consumption

		2003	2004	2005
Diesel	Usage(1,000ℓ)	148,059	126,485	118,783
CNG	Usage(1,000□)	33,955	41,7310	44,671
Total Fuel Cost (KRW M)		64,816	58,685	56,033
Difference of Cost(%)		-	 9.5	 4.5

Bus related accidents

- The number of accidents in July, 2004 decreased 26.9% than the July of 2003





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- About Seoul
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Successfully Done in mega-city using the existing resources

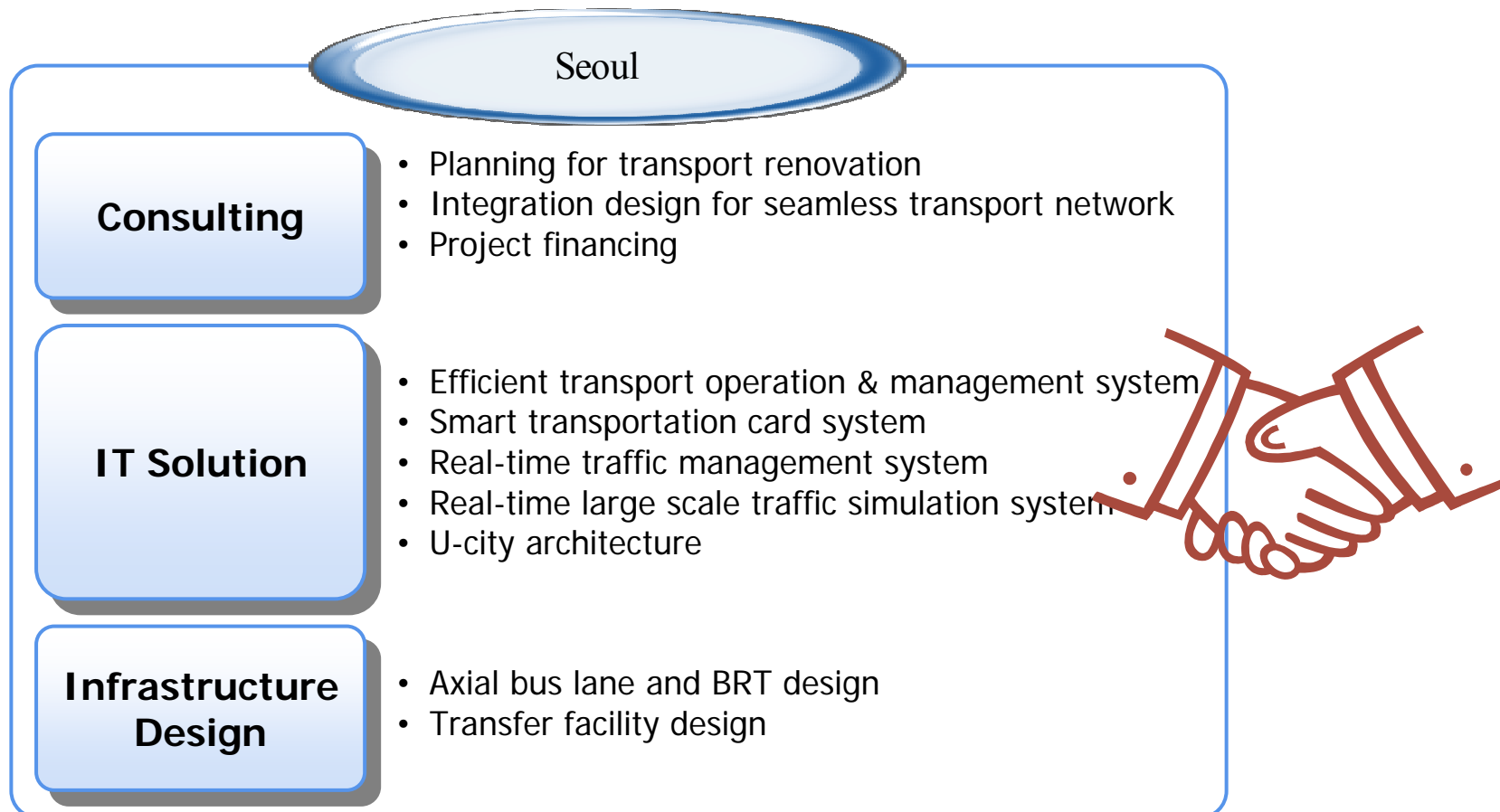
- Not in a new town or a planned city
- Done in a large scale with ten thousand residents
 - Daily public transport passengers : 10 M
 - Daily smart card transactions : 20 M
- No major addition of infra structure

2

Integrated by information technology and new management

- Loosely coupled and controlled existing resources were integrated into one seamless system by IT and adoption of new management scheme

- Seoul is ready to work and share its experience with other cities.



Thank You!!

Contact Us

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