

The Study on City Master Plan and Urban Development Program of Ulaanbaatar City (UBMPS)  
Intensive Learning Session on Urban Planning under Market Economy

# Environmental Consideration

27th July, 2007

Kenichi KURAMOTO  
Environment Assessment

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## Contents of This Session

- Part I : Environmental Impact Assessment
- Part II : Environmental City Planning

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## Part I : Environmental Impact Assessment

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## What is Environmental Impact Assessment (EIA)?

- Purpose of EIA is:
  - To mitigate negative impact and to strengthen positive impact caused by project.

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## General EIA

Generally, EIA is executed related to a certain project during feasibility study or design stage. It is for environmental permission. → Project-Level Assessment

**Time Schedule**

Planning Stage      Feasibility Study      Design Stage

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## What is Weakness of Project-Level Assessment?

- Limited feedback and modification to planning (Limited within project design)
  - Changing installed Facility : Possible
  - construction method : Possible
  - project location : Difficult
  - Cancelling project : Difficult

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### What is Weakness of Project-Level Assessment?

2. Limited assessment against accumulative impact caused by multiple activity.

Project B : Bridge Construction  
Small Water Impact

Project A : Power Plant  
Medium Water Impact

Project C : Complex Building  
Small Water Impact

Small Water Impact?

River

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### What is Weakness of Project-Level Assessment?

3. Limited Consensus Building because EIA is executed for each project

Project B : Bridge Construction

Project A : Power Plant

Project C : Complex Building

We agree

We agree

We agree

We agree?

River

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### Strategic Environmental Assessment (SEA)

- SEA aims at strengthening environmental impact assessment system.
- Key Points of SEA
  - Planned-Level Assessment : Recommendation can be reflected to planning.
  - Public Disclose and Involvement : Securing Transparency and Fairness.
  - Comprehensive Assessment : Applicable evaluation for multiple project.

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### EIA vs SEA

	EIA (Project-Level EIA)	SEA (Planned-Level EIA)
Weakness	<ul style="list-style-type: none"> <li>Limited feedback and recommendation to planning</li> <li>Limited accumulative evaluation</li> <li>Limited consensus building</li> </ul>	<ul style="list-style-type: none"> <li>Non-detailed evaluation</li> <li>Complicated procedure</li> <li>Affect to (private) business activities</li> </ul>
Advantage	<ul style="list-style-type: none"> <li>Technically detailed evaluation</li> <li>Easy establishing mitigation program</li> </ul>	<ul style="list-style-type: none"> <li>Transparency and fairness</li> <li>Accumulative evaluation</li> <li>Easy feedback to planning</li> </ul>

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### Points of SEA

- Comprehensive Impact Assessment
  - Overall evaluation for multiple project
  - Aiming at accumulating impact, not detailed evaluation for individual project.
- Public Involvement for Consensus Building
  - Partnership with residents, NGOs, Academics, e.g.
- Feedback to Planning
  - Evaluation of alternatives, with/without project
- Feedback to project-level assessment
  - Scoping for EIA for environmental permission

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### Strategic Environmental Assessment

Time Schedule →

Planning Stage      Feasibility Study      Design Stage

FRAMEWORK  
Policy, Plan and Program

Government Developer

Citizens Stakeholder

NGOs Academics

Project A

Project B

Project C

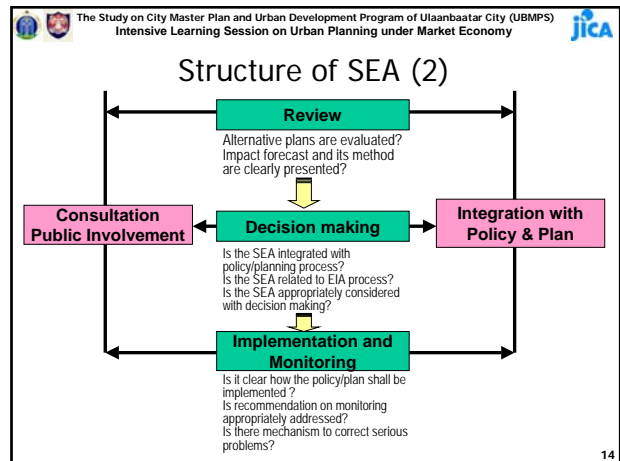
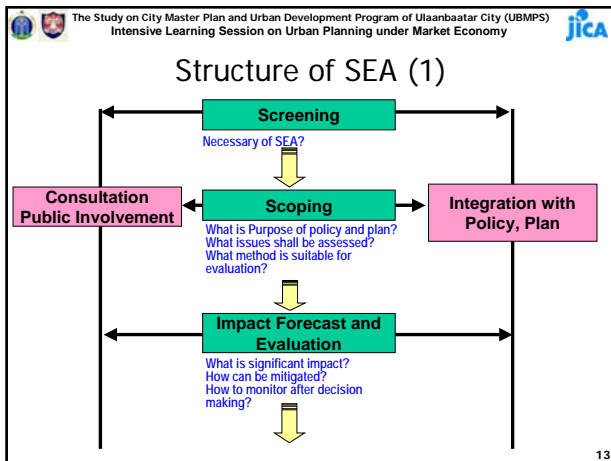
EIA

EIA

EIA

Strategic Environmental Assessment

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- ### Case Study of SEA (Japan)
- Approach on Innovation of SEA System in Japan
    - Local governments have led to innovating SEA system prior to national government.
    - EIA procedures are different from each local government (type/scale of project, e.g.)
    - National government (Ministry of Environment) established guideline for SEA in 2007.
    - Previously, Ministry of Land, Infrastructure and Transport has established Procedural Guideline for Public Involvement from Planning Stage.
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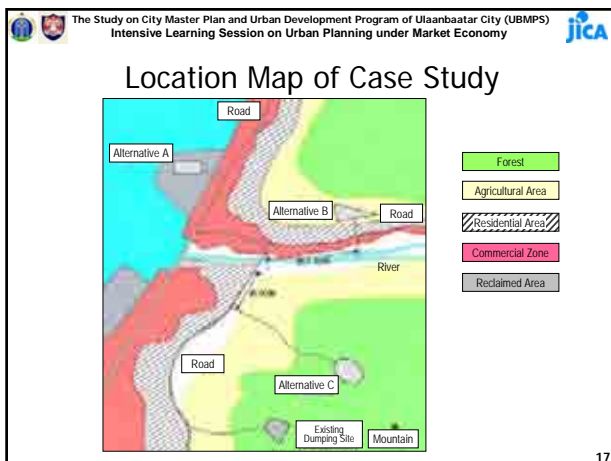
### Case Study on Waste Dumping Site

**Purpose of Planning**  
To establish basic program on Facility Improvement for Urban waste  
Investigative Commission among stakeholders has been established.  
In the commission, Possibility of renovation of existing sites and 3R (Reuse, Recycle and Reduction) was investigated. Then Necessary capacity of dumping site are estimated based on above approach. → Assessment of without case

**Outcome of Planning (expected project)**  
Construction of dumping site for domestic waste (Capacity : 3,000,000 m<sup>3</sup>)

Source: Workshop Report on Strategic Environmental Assessment, 2007

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### Case Study on Waste Dumping Site(2)

**Natural and Social Condition in the Area**  
Large traffic volume generates noise disturbance and serious traffic congestion.  
There are wide reclaimed sites existing in coastal area.  
There are various endangered insects, amphibians living.  
There is good spring water area registered as the best spring water  
There are various visually significant areas, also nature park, also some area is categorized as traditional residential area, forest/agricultural land, e.g.  
The location is reside commutable area of inner city, so that population is on the increase.

**Major Environmental Issues**  
Improvement of living environment (air pollution, noise/vibration disturbance) along roads.  
Conservation of natural environment (nature park, forest, landscape)

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### Case Study on Waste Dumping Site(3)

**Recommendation and Requirement from Residents**  
 Vehicles to dumping site shall avoid from driving inner city road.  
 Dumping site shall not be constructed beside our area.  
 Location shall avoid beside environmentally rich site where is used for extra education program.  
 Acceleration of traffic congestion shall strictly be prohibited.

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### Case Study on Waste Sumping Site(4) Alternative Plan

	Location	Point
Plan A	Coastal area	Avoiding of residential zone. Conserving of natural environment in mountain area.
Plan B	Alluvial area	Minimizing traffic disturbance.
Plan C	Mountain area	Saving project cost
Without Project	According to investigation under Commission, it was resulted that existing dumping site will not meet demand on waste dumping.	

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### Case Study on Waste Repository Site(5) Alternative Plan

Evaluation Item	Plan A	Plan B	Plan C
Air Condition	N	SI	I
Water Condition Surface Underground	I	I	I SI
Soil Condition, Geography		I	
Ecosystem		N	SI
Landscape	I	N	
Amenity		I	N

SI: Significant Impact, I: Impact, N: No or Little Impact

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### Case Study on Waste Repository Site(6) Alternative Plan

Evaluation Item	Plan A	Plan B	Plan C
Environmental Impact to be Considered	Coastal Water Landscape	Air Condition River Water Topography Geography Amenity	Air Condition River/Undergro und Water Ecosystem
Consistency between Environmental Conservation Policy Living Environment along Road Conservation of natural Environment in Mountain Area	= 0	0 0	0 ==

0: No Change, =: Predicted Aggravation, ==: Predicted Serious Aggravation

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### Environmental Consideration under Japan Assistance (JICA/JBIC)

- Relationship between JICA and JBIC
  - IEE level preliminary study is conducted under JICA Master Plan Study
  - Public consultation is supported by JICA study.
  - Scoping process of EIA conducted by recipient government is executed for developing JBIC project
- Points of Environmental Consideration
  - Planned-level assessment from policy/planning stage (JICA Master Plan Study)
  - Public involvement and disclose aiming consensus building, transparency and fairness.
  - Obligation of Approval on EIA preceding project implementation
  - Special attention on social environment (Involuntary resettlement, Gender, Infectious disease, e.g.)

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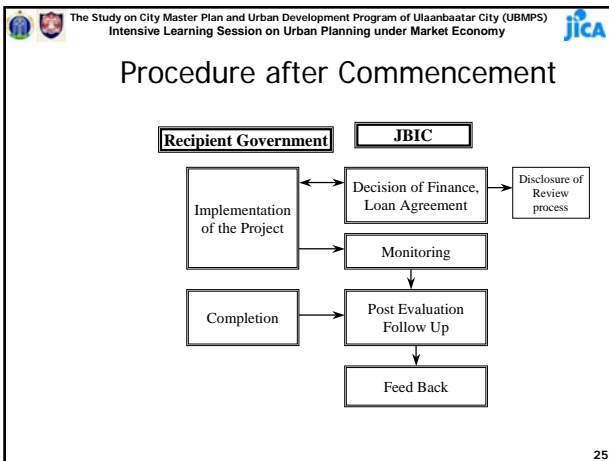
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### Procedure under JBIC Project

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      subgraph Recipient_Government [Recipient Government]
        P[Preparation of Project]
        R[Request of Loan]
        S[Submission of Screening Form]
        E[Submission of EIA]
        I[Implementation of the Project]
      end
      subgraph JBIC [JBIC]
        Ex[Examination of Project]
        SC[Screening, Categorizing Project]
        IR[Implementation of Review]
        DFLA[Decision of Finance, Loan Agreement]
      end
      P --> R
      R --> Ex
      Ex --> SC
      S --> SC
      SC --> IR
      E --> IR
      IR --> DFLA
      DFLA --> I
      P -.-> D[EIA Disclosure]
      SC -.-> DSR[Disclosure Screening Result]
      IR -.-> PFI[Provision of information]
      DFLA -.-> DR[Disclosure of Review]
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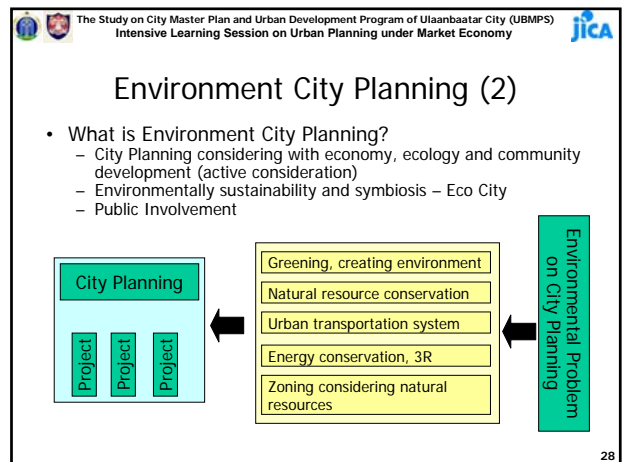
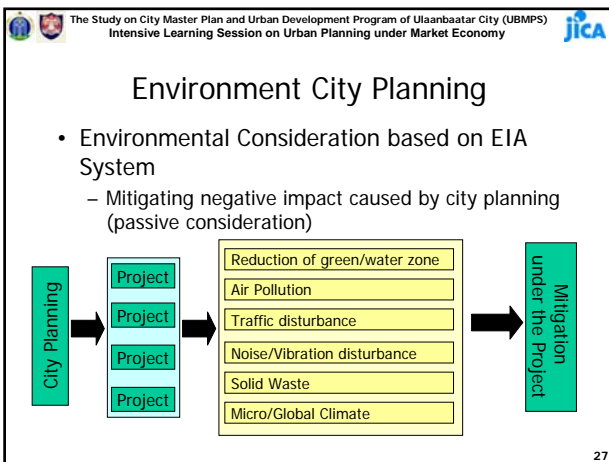
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## Part II : Environment City Planning

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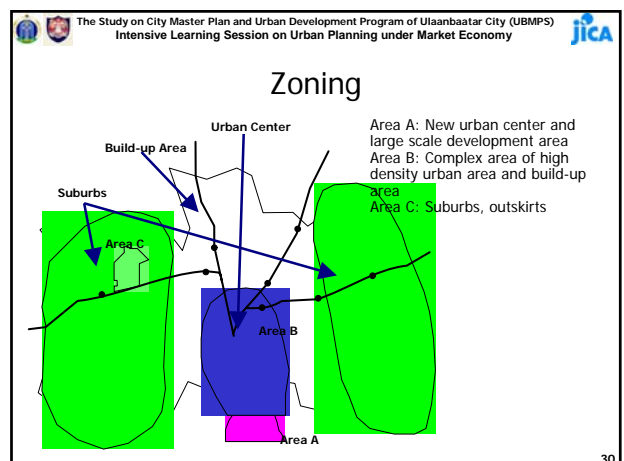
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### Case Study of Environment City Planning

- Concept of Eco-City
  - Zoning based on land use and natural environment condition

Source: YASOKAWA Jun et al., 1994, "A Study on the Northern City of Metropolitan Area TOKYO", Architectural Institute of Japan

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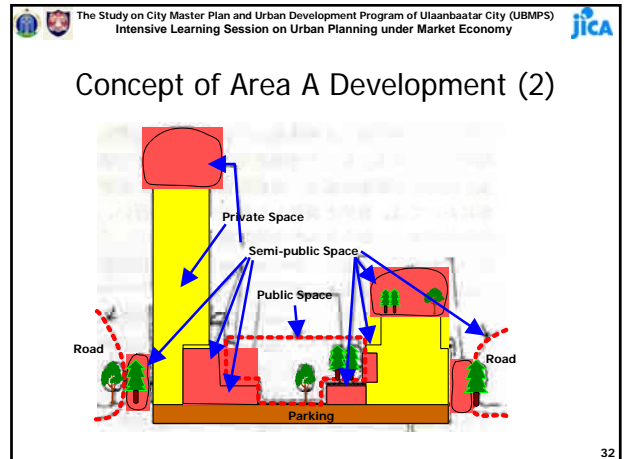


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### Concept of Area A Development

- Accumulation of high-level city function including government-related organization.
- Improvement of transportation network crossing urban area.
- Beneficial use of open space
- Energy saving system
- Environmentally friendly development

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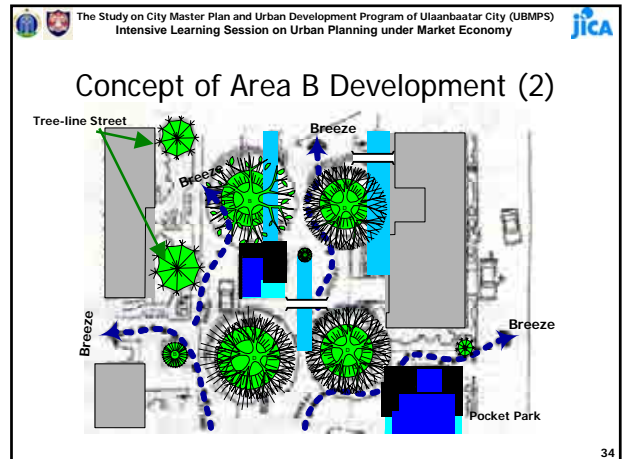


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### Concept of Area B Development

- Landscape consideration between traditional heritage and urbanized business area.
- Improvement of living environment on air and water conditions.
- Road management improvement.

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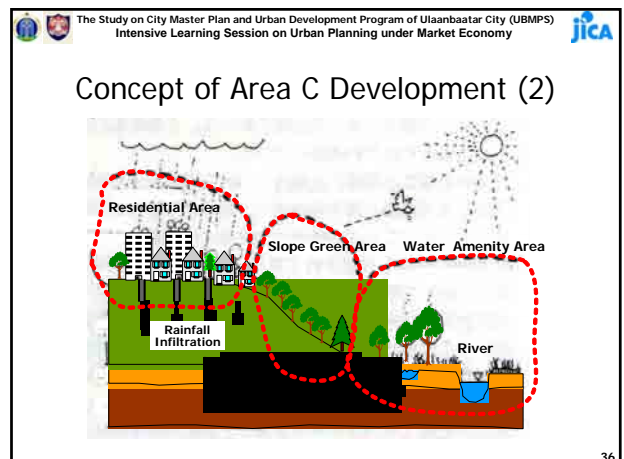


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### Concept of Area C Development

- Land readjustment concentrating on residential area.
- Development harmonized with natural environment.
- Conservation of natural resources.

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## Conclusion

- Strategic Assessment for Policy/Planning Stage
  - Feedback to policy/planning, and project-level EIA
- Passive Consideration to Active Consideration
  - Environmentally friendly and sustainable development
  - Environmental creation
- Public Involvement
  - Transparency and Fairness
  - Use various resource/knowledge from stakeholders
  - Share responsibility and obligation

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## Environmental Points on City Planning in Ulaanbaatar City

- Air pollution: especially in winter season caused by activity in Ger Area.
- Water shortage: water resource will not meet water demand in 2015.
- Water pollution in Tuul River: especially west side (down stream).
- Lack of sewage management
- Spring Water Pollution caused by sewage facility.
- Soil contamination, e.g.

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## Thank you for Attention

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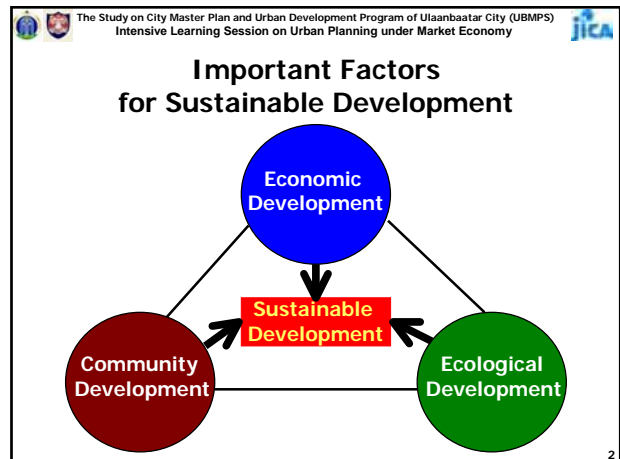
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## Social Considerations in Urban Planning

July 27, 2007

Rieko SASAKI  
JICA Study Team

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## Social Impacts

- The **consequences to human populations of any public or private actions** that alter the ways in which people live, work, play, relate one another, organize to meet their needs, and generally cope as members of society
- **Cultural impacts** involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society

Source: Interorganizational committee on Principles and Guidelines for Social Impact Assessment

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## Scope of Social Considerations (Scope of Impact to be examined)

- The impact ... includes **impact on human health and safety** ..., through air, water, soil, waste, accidents, water usage, ecosystems, biodiversity, and also including the **social impact** followings:

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## Scope of Social Considerations 2 (Scope of Impact to be examined)

- Migration of population and involuntary resettlement
- Local economy such as employment and livelihood
- Utilization of land and local resources
- Social institutions such as social infrastructure and local decision-making institutions
- Existing social infrastructures and services
- Vulnerable social groups such as the poverty level and indigenous peoples
- Equality of benefit and losses and equality in the development process
- Gender
- Children's rights
- Cultural heritage
- Local conflict of interests
- Communicable diseases

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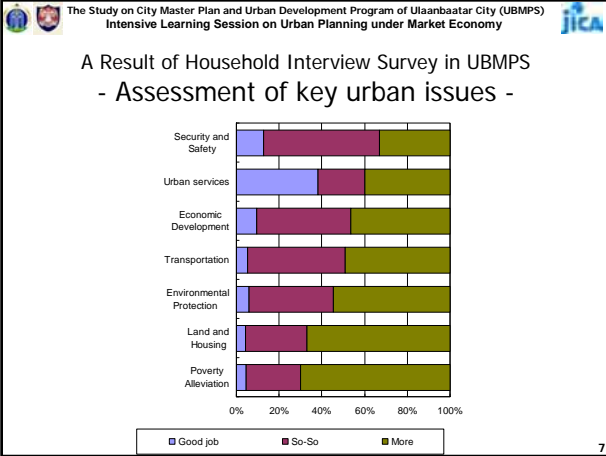
## Scope of Social Considerations 3 (Scope of Impact to be examined)

- In addition to the **direct and immediate impact** of projects, **derivative, secondary and cumulative impact**... to a reasonable extent [is included]. It is also necessary that **the impact that can occur at any time during the duration of the project** be continuously considered throughout the life cycle of the project.

Source: JICA, [http://www.jica.go.jp/english/global/env/pdf/01\\_eng.pdf](http://www.jica.go.jp/english/global/env/pdf/01_eng.pdf)

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# Municipal Finance and Public-Private Partnership

Masayoshi Iwasaki  
Implementation Plan and Cost Estimate

July 30 2007

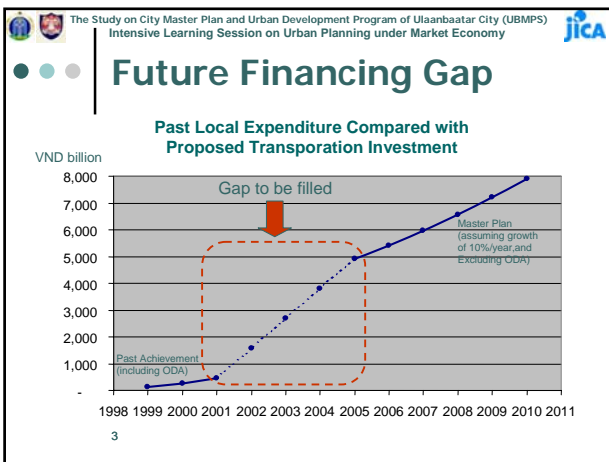
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# 1. Municipal Finance

- 1) Principles of Municipal Finance
- 2) Municipal Finance Model
- 3) Experiences in Different Countries  
- Japan, UK, USA and Singapore

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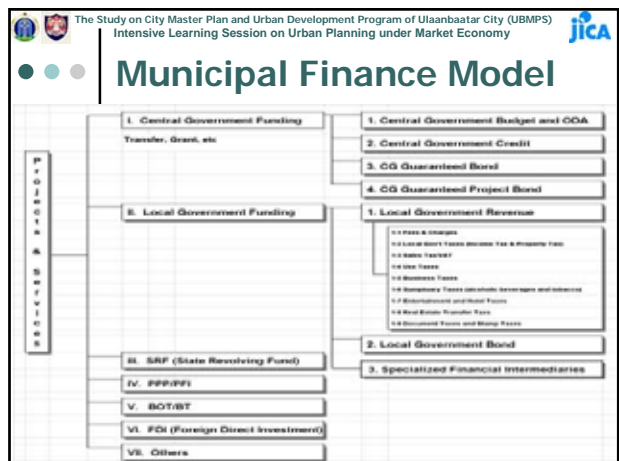
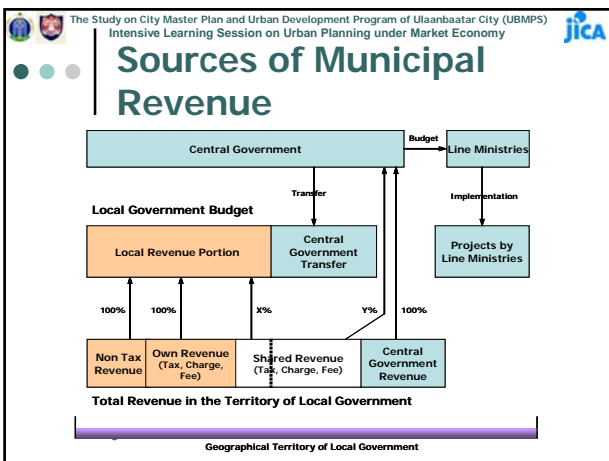


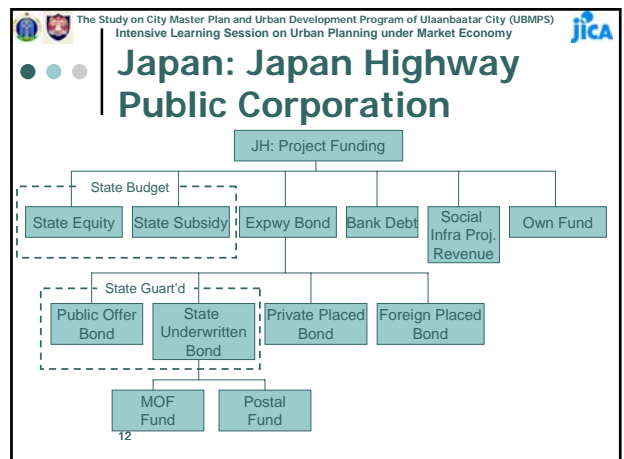
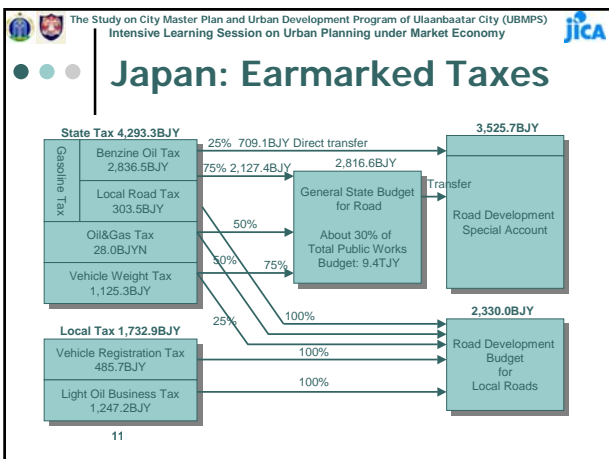
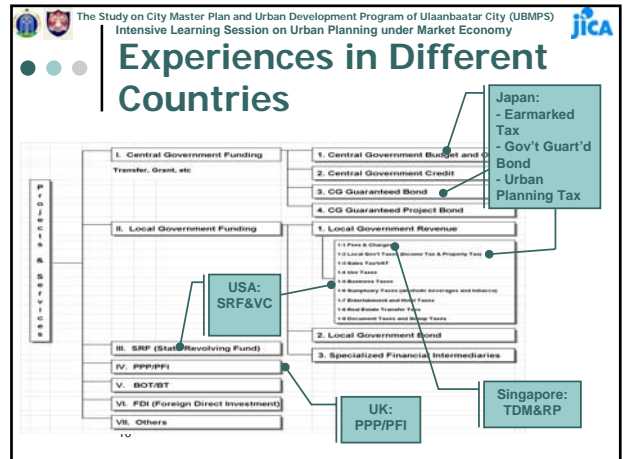
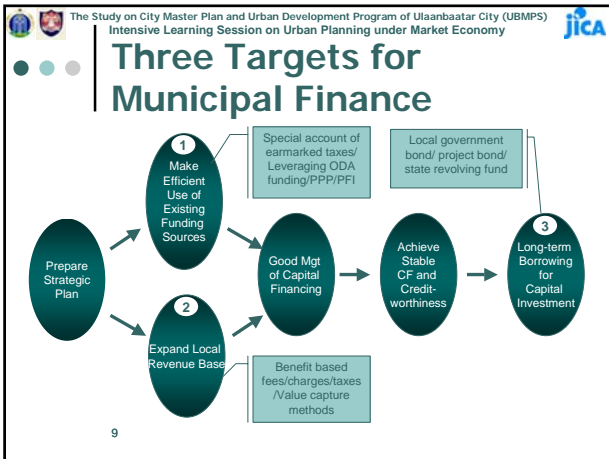
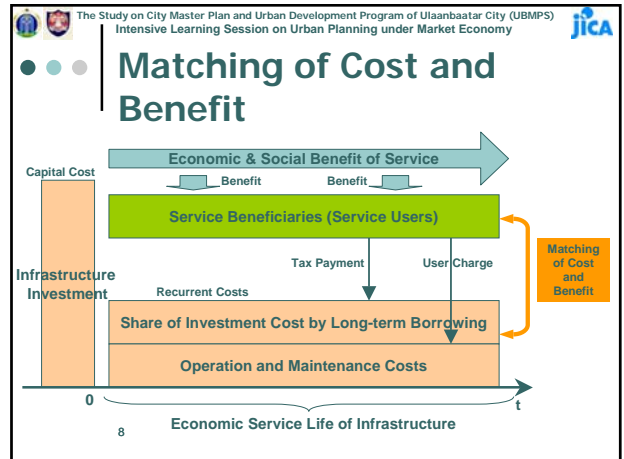
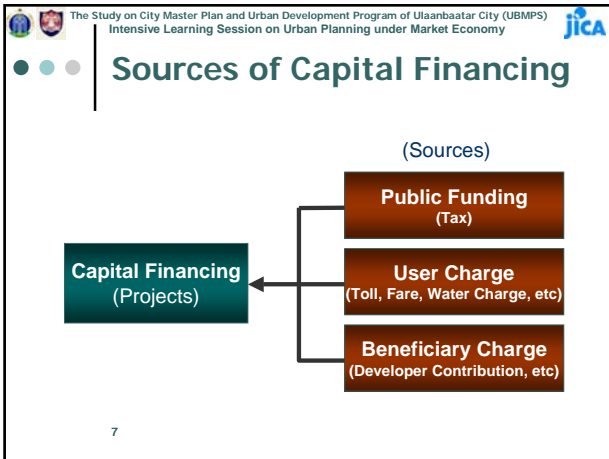
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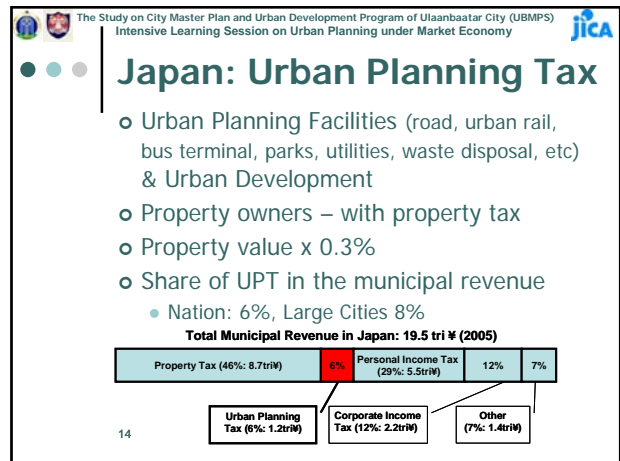
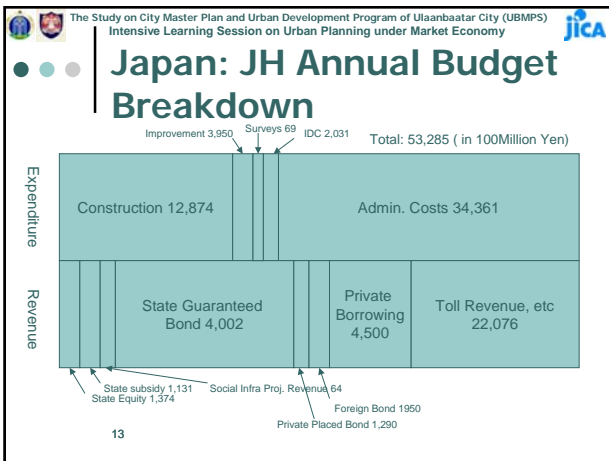
## Structure of Municipal Revenue

		OECD Avg.	Netherlands, UK	Austria, Sweden	Mongolia (2005)	UB City (2007B)
Local Gov't Revenue	Grants & Subsidies	30-40%	70%>	20%<	8%	11%
	Local Revenue	60-70%	30%<	80%>	91%	89%

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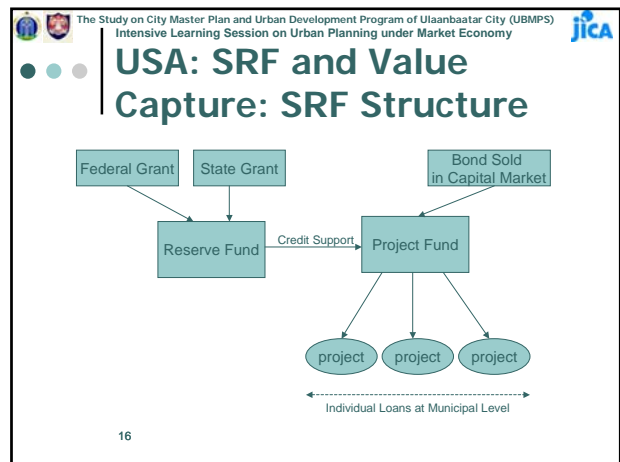




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## UK: PPP/PFI -> Next Section

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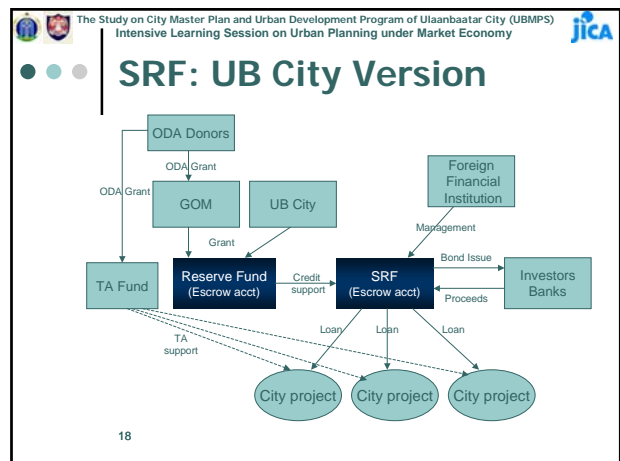


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## SRF: 5 Layers of Credit Support

- Layer 1: Municipality's promise**
  - To repay using general tax and transfer revenue
- Layer 2: Interest earned**
  - To accumulate to strengthen credit, support additional lending, adm. cost, etc
- Layer 3: Aid Intercept mechanism**
  - To intercept transfer payment from state to local
- Layer 4: Guarantee**
  - Municipality's obligation, Fund's obligation
- Layer 5: Certainty of the existence of the fund**
  - For the terms of the loans

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# Value Capturing

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# Value Capture Methods

Methods	Description
1. Impact Fees	Burden charge for service users; such as drainage impact fee collected at permit
2. Development Taxes	Local infrastructure tax on construction and reconstruction of building based on assessed value
3. Capital Contribution	Fees collected from builders and developers based on for their peak demand of water, sewer
4. Special Construction Responsibility.	Cost sharing by builders and developers for the cost of distribution lines, water pumping stations, sewage lifting facilities, etc.
5. Special Assessment	Fees based on the assessment of costs of public improvements against properties benefiting from the improvements (e.g. a new road, water line, etc)
6. Tax Increment Financing	Assess the property tax levy in an area designated by the local government and issues bonds to be paid off with the projected increase tax revenues

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# Singapore: TDM and ERP

- o The first urban congestion charging system
- o Area Licensing Scheme (ALS) in 1975 => RPS in 1995 for expressways
- o Upgraded to ERP in 1998
- o All vehicle to enter the cordon 0730 – 1900
- o In Vehicle Unit (IVU) with smart card
- o Since the change ALS to ERP daily reduction of 15%
- o Attain the desired optimal speed range of 20 – 30 km/h, expressway for 45-60km/h during peak period
- o ERP Revenue for Traffic Improvement

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# ERP System in Singapore

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# 2. Public-Private Partnership

- 1) Principles of PPP
- 2) Structuring a PPP Project
- 3) Case Studies

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# What is PPP?

- o PPP is a method of providing public services under the partnership between the public and private sectors

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## PPP .... ?

Government's functions shifting from providing public services itself towards becoming a "manager of the providers" ....

**PPP Concept**

- 100% Public Initiative
- Part of Capital Investment
- Overall Management
- Part of Capital Investment
- Operation & Maintenance
- 100% Private Initiative

**PPP**

- Privatization
- Joint Venture
- Outsourcing
- Sales Leaseback
- Concession
- Wider Market Initiative

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## PPP Modality

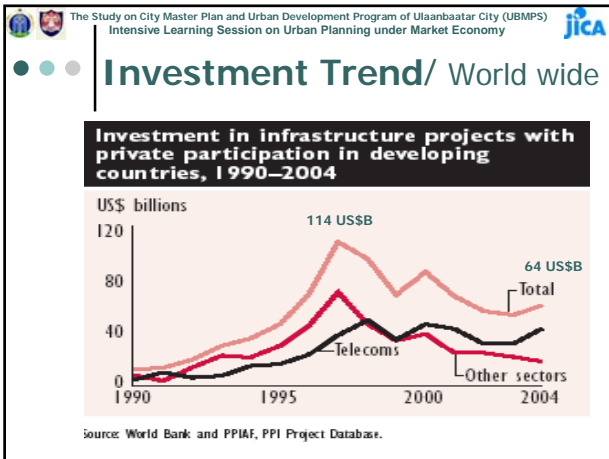
**Public Private Partnership**

No Facility Investment | With Facility Investment

- Work & Services Contract
- Management & Maintenance Contract
- O & M Concessions
- DB/BT or Turn Key
- ROT/RO Concessions
- BLT/BTO/SOT/BOO Concessions
- Strategic Partnership
- Full Privatization

Low | Extent of private sector participation | High

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## Value for Money Mechanism

~ How to structure a PPP project ~

**Public** | **Private**

**Principle 1** Specify Service Output → Output Specification

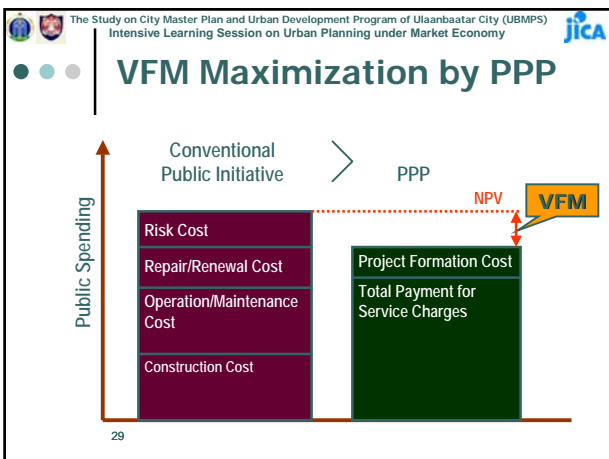
**Principle 2** Transfer Risks and Clarify Responsibilities → Risk Transfer/Contract

**Principle 3** Compete, Innovation, Cost down, Finance → Competition/Know how/Finance

**Principle 4** Conventional Method vs PPP → Assessment of VFM

**Value for Money (VFM)**  
Target Quality at Best Price for the Tax Payer

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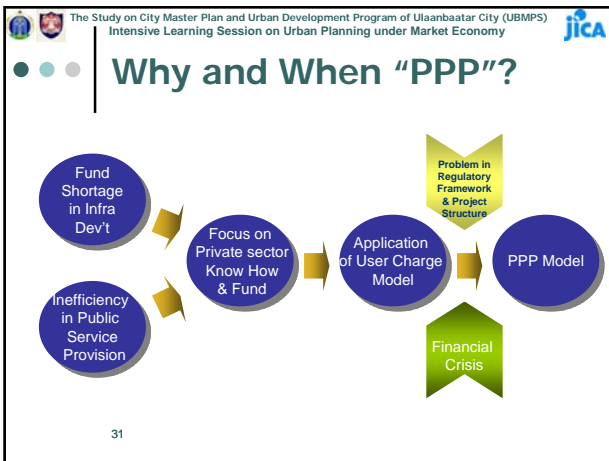
## Three Funding Sources for PPP

**PPP**

(Sources)

- Public Funding (Tax)
- User Charge (Toll, Fare, Water Charge, etc)
- Beneficiary Charge (Developer Contribution, etc)

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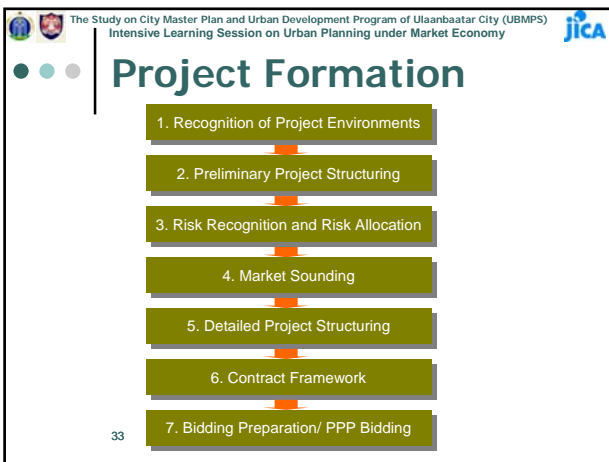


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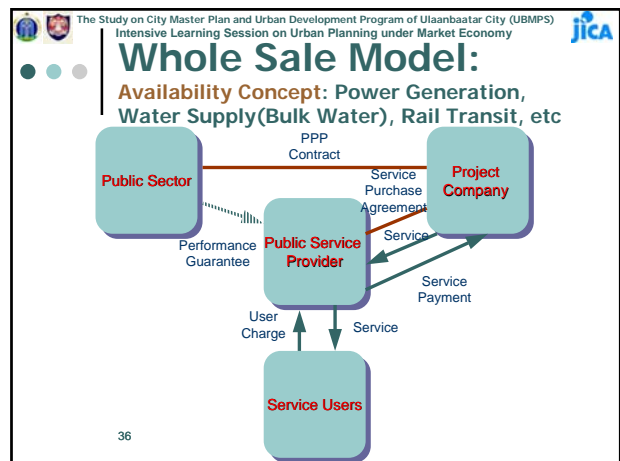
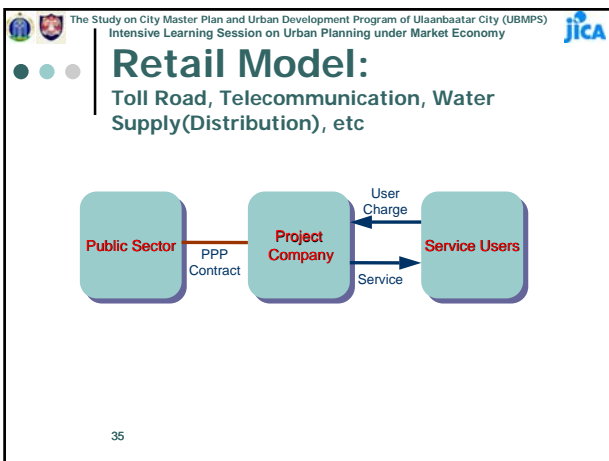
## Conventional vs. PPP

Conventional	PPP
<b>Disadvantage</b> <ul style="list-style-type: none"> <li>Slow in implementation</li> <li>Low competition =&gt; Expensive</li> <li>Little innovation</li> </ul>	<b>Disadvantage</b> <ul style="list-style-type: none"> <li>Complexity and uncertainty in implementation</li> <li>Requirement of expertise and capacity building on public sector</li> <li>Proper regulatory and institutional framework</li> </ul>
<b>Advantage</b> <ul style="list-style-type: none"> <li>Certainty in implementation</li> </ul>	<b>Advantage</b> <ul style="list-style-type: none"> <li>Less financial burden</li> <li>High competition =&gt; VFM</li> <li>Innovation, many options, easy to privatize</li> <li>Output-Based service delivery</li> <li>? Fast procurement =&gt; 'buying time at expensive price'</li> </ul>

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- ## PPP – Three Models
- o Retail Model
  - o Whole Sale Model
  - o Service Purchase Model
  - o And a mixture of above three
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## Service Purchase Model:

PFI Service Purchase Concept: Hospital, School, Prison, IT System, Office Accommodation, etc.

```

    graph LR
      PS[Public Sector] -- "Service Payment" --> PC[Project Company]
      PS -- "PPP Contract" --> PC
      PC -- "Service" --> SU[Service Users]
  
```

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## Pro-Poor

Current Public Service → Market Efficiency Gap → Real Access Gap

Can be Solved by Improvement of Efficiency in Service Provision

Only Solvable With Policy Intervention such as Subsidy

Subsidy

Actual Payment

Payment by Beneficiary

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## Project Structuring - Viability Gap

Revenue

Profit

Principal & Interest Payment

O&M Cost

Equity

Debt

Viability Gap Funding

Time

Investment

0

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## Unbundling

	Power	Water	Airport	Road	Rail
Private	Generation	Treatment	Terminal	Toll Facilities/ Pavement	Rolling Stocks /EMS
Public	Transmission	Distribution	Runway	Road Structure, Civil works	Carriageway, Civil works
Public	Distribution	Dam			

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## Unbundling-Railway

	Function
Public	Operation
Private	Maintenance: Rolling Stocks, EMS, Depot buildings & facilities
Private	Construction: Rolling Stocks, EMS, Depot buildings & facilities
Public	Construction: Carriageway, Stations, Depot platform
Public	Acquisition: ROW

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## UK: Dockland Lewisham Extension Project

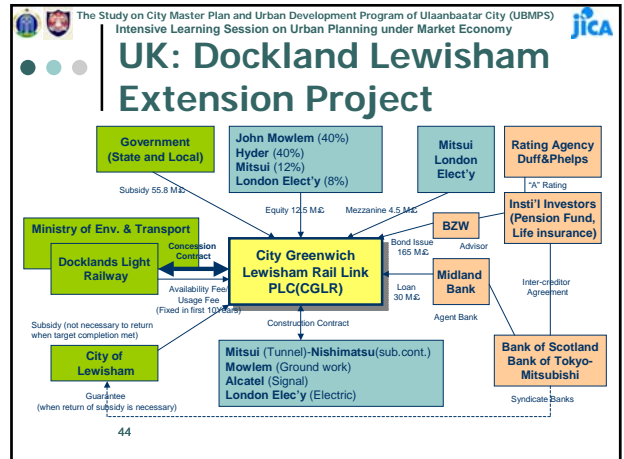
- o BLT
- o 3.8km (incl. Tunnel 1km)
- o Opened in 2000
- o Concession 24.5yr
- o Project size: 200M£

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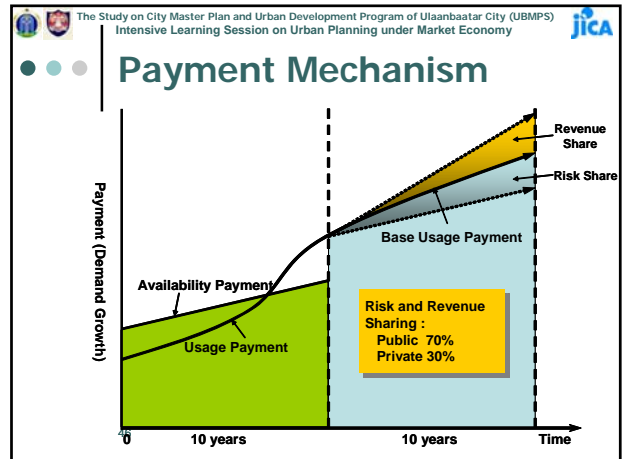
## UK: Dockland Lewisham Extension Project

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## UK: PPP/PFI Lewisham Extension Project

- 4.2km (incl. Tunnel 1km)
- Opened in 2000
- Concession 24.5yr
- Grantor: Docklands Light Railway Ltd.(DLR)
- Project Company (figure)
- Project size: 200M£
- DLR
  - 22km, 27stn, Auto-driven, Greenwich-Lewisham, connecting BR
- Risk Allocation
  - Project Co: DBF+M
  - DLR: O
  - Subsidy:
    - State: 50M£
    - Local: 7M£
  - Land: DLR
- Payment
  - BLT, Facility leased to DLR
  - Availability Fee for first 10yr
  - Usage Fee afterwards
- Returned free after the period



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## Unbundling-Expressway

	Function
Private	<b>Operation</b>
Private	<b>Maintenance:</b> All Road Facilities
Private	<b>Construction:</b> Toll Booths, Pavement, Lighting Facilities
Public	<b>Construction:</b> Road Structure, Civil Works
Public	<b>Acquisition:</b> ROW

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## Philippines: Manila Toll Road



- BTO (Two Tier System)
- 15.6km
- Planning Stage
- Concession: Endogenous (30yr)
- Project size: 360M\$ (55%:Public, 45%: Private)

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## Public and Private Risk Sharing

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## Investment and Financing

**Total Project Cost = P13,747.3 million**

Government Support	Private Sector Funding
<ul style="list-style-type: none"> <li>C3/R9 Segment</li> <li>Construction = P6,871m</li> <li>ROW = 0.0</li> <li>Stand-alone FIRR = 13.5%</li> </ul>	<ul style="list-style-type: none"> <li>R10+R10/C5Link</li> <li>Construction = P6,876m</li> <li>ROW = P350.0m</li> <li>FIRR = 16.5% with revenues of C3/R9</li> </ul>
<ul style="list-style-type: none"> <li>Financing Plan                             <ul style="list-style-type: none"> <li>Gov't accounts = P 1,328m</li> <li>Loan (ODA) = P 5,543m</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Financing Plan                             <ul style="list-style-type: none"> <li>Private Equity = P 1,719m</li> <li>Domestic Debt = P 2,063m</li> <li>Foreign Debt = P 3,094m</li> </ul> </li> </ul>

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## Philippines: Manila Toll Road

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## Delay Issues

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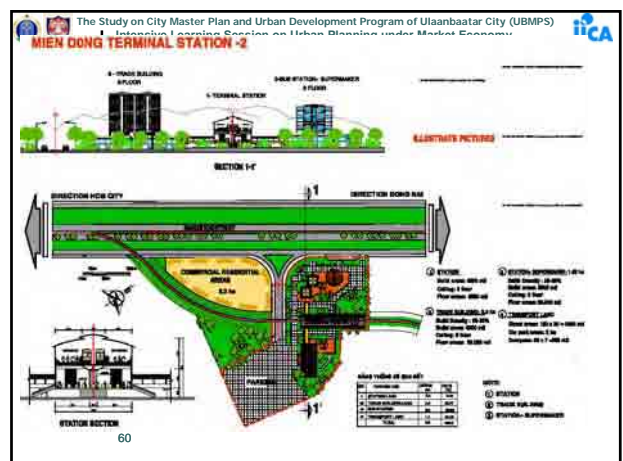
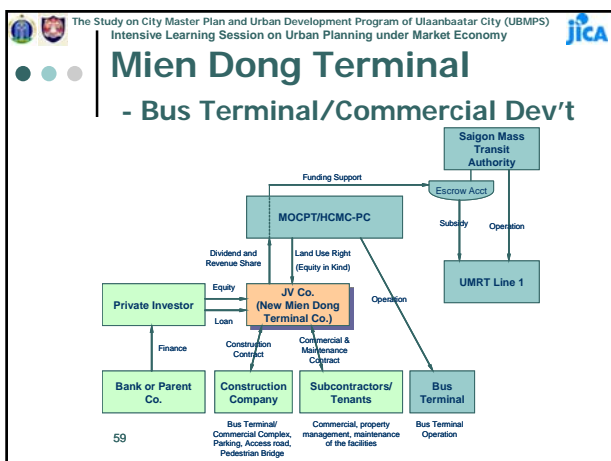
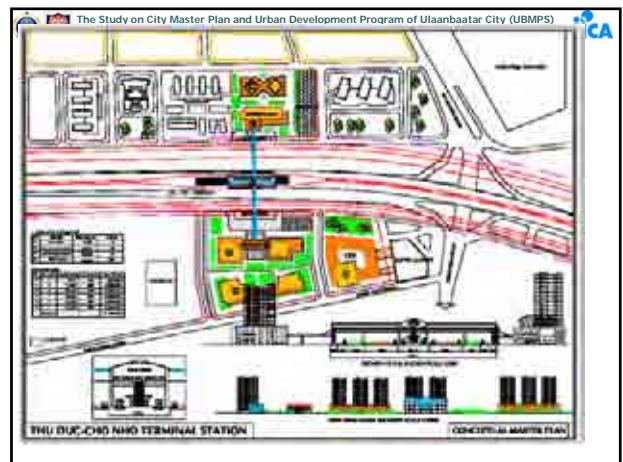
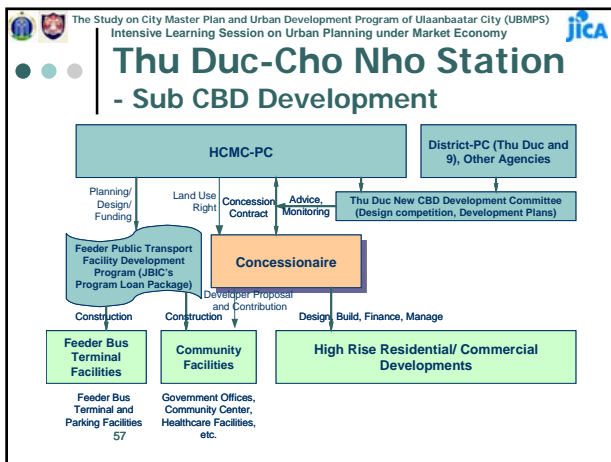
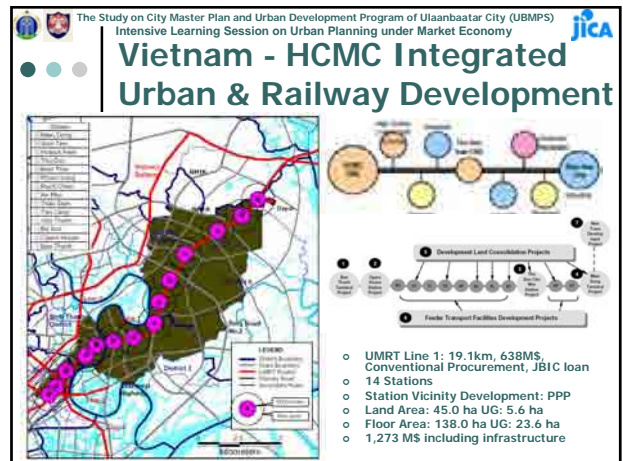
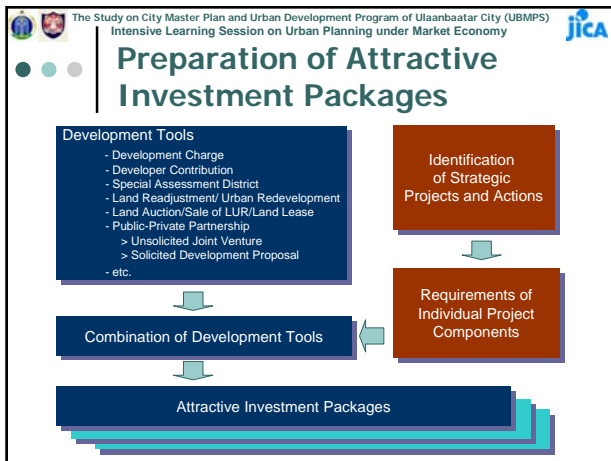
## Endogenous Concession – Target Cumulative Revenue (TCR)

- Government will set the Toll Level
- Private Bidders will bid its TCR => Lowest TCR => Winning Bidder
- Concession will expire when cumulative revenue hits the TCR
- 5 year extension option after 30 years for the TCR

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## PPP – Urban Development



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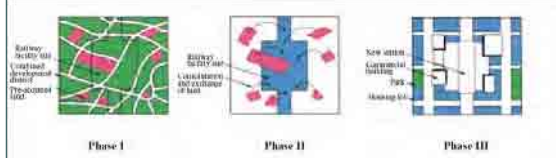
## Tsukuba Хурдан Галт Тэрэг-Хотын



- Construction: 1992-2005
- 58.3km (Akihabara-Tsukuba Science City)
- 20 stations (7 underground)
- Metropolitan Railway Co.,Ltd. (Shareholders: Local government along the corridor + 207 Private Co.S)
- Finance: 1.05 Tri.Yen (8,500M\$)
  - 40% Non-interest Loan from Central Gov't
  - 40% Non-interest Loan from Local Gov't
  - 20% Equity and Gov't Loan

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## Нэгтгэсэн Хот Байгуулалт Болон Төмөр зам



- Орон нутгийн засаг захиргаа**
  - Land Readjustment
    - 17 sites, 3,000ha, 1.2 tri. yen (9,700M\$)
    - Housing & Public facility, 4.2 tri. yen (34,000M\$)
- Хөрөнгөө оруулалт болон хүүгүй зээл, Acquisition of Land in advance**
  - Facilitating Land Readjustment
- Urban Renaissance Agency**
  - 6 New Towns, 1,421ha, Population 120,000

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## Tsukuba Хурдан Галт Тэрэг – Аюулыг Ялган Онцлох

Tsukuba Хурдан галт тэргийн нэгтгэсэн хөгжил

**Нийтийн салбар Засгийн Газар**  
Enactment of Integrated Development Law in 1989

- Хүүгүй зээлийг сунгах
- Tsukuba Хурдан галт тэргийн нэгтгэсэн хөгжлийг зохицуулах
- Орон нутгийн засаг захиргаа
- Хөрөнгөө оруулалт болон хүүгүй зээл
- Acquisition of Land in advance
- Urban Planning and Facilitating Land Readjustment around the Stations

**Urban Renaissance Agency (URA)**

- Creation of Attractive Urban Development Corridor and an Urban Railway System in an integrated manner
- Generation of patronage for the Urban Railway System

**Хувийн салбар Худалдаа арилжааны хөгжил**

- Хөрөнгөө оруулах
- Хөгжлийн санал төлөвөгөө
- Орон нутгийн засаг захиргааны цохиуулалт болон URA
- Synchronize Commercial and Residential Development with Construction of the Railway and the stations
- Хөгжлийн санхүүжилт
- Marketing and Management of each Commercial Development

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## Tsukuba Хурдан Галт Тэрэг – Rokucho Өртөө



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## Misato Chuou Өртөө



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## PPP Issues in UBMPs

- PPP Law- BOT Law Draft
- Sector Laws and Regulations (Railway, Road and Urban Development), Granting Power, Subsidy, Fare/Toll setting, Bidding and Evaluation Procedure, Institutional Setup, Incentives
- Formulation of Attractive **Investment Packages**
- Strategic Use of **Public Land and Land Use Right**
- Utilization of **ODA Financing**
- Procurement of **Long-term Domestic Financing**
- Capacity Building** for PPP Expertise (Project Structuring, Investment Packaging, Tender Preparation, Bid Evaluation, Contract Negotiation, Project Monitoring, etc.)

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**Хот Байгуулалт**

Corridor	Хөгжлийн төслийн	Нийтийн	Хувийн
1. Нийтийн тээврийн хэрэгсэл	(1) Төмөр зам		
	(2) Метро шугам		
	(3) LRT		
	(4) Трамвай		
	(5) Автобусны зам		
	(6) Автобус/микро автобус		
2. Нэгтгэсэн хот байгуулалт	(1) Өртөө/Нэгтгэсэн хот байгуулалттай газрын ойролцоох бүрдүүлэх төв/Автобусны эцсийн буудал		
	(2) Итермодал Комплекс/Харилал дүүргийн төв/Худалдаа арилжаа/Бизнес/зочид буудал/Орон сууцны байр		
3. Related Facilities			
4. Гол их зам/Хурдны зам			
5. Бие даасан худалдаа			

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**PPP Investment package**

3.A.4 Investment Package for Mass Rapid Transit Project

**Project Overview:**  
**Project Description and Objectives:**  
 The project aims to improve the urban transport system in Ulaanbaatar City by providing a high-quality, efficient, and sustainable mass transit system. The project will consist of the construction and operation of a mass rapid transit (MRT) system, including the construction of stations, tracks, and rolling stock. The project will also include the provision of related facilities, such as parking, security, and maintenance facilities.

**Project Structure - Mass Rapid Transit System:**

**Key Tasks:**  
 - Station Construction: Design, procurement, and construction of stations.  
 - Track Construction: Design, procurement, and construction of tracks.  
 - Station Operation: Operation and maintenance of stations.  
 - Track Operation: Operation and maintenance of tracks.

**Investment Package:**  
 - Construction: Station Construction, Track Construction.  
 - Operation: Station Operation, Track Operation.

**Financial Summary:**

Category	Station Construction	Track Construction	Station Operation	Track Operation
Investment	1000000	2000000	500000	1000000
Revenue			500000	1000000
Net Present Value (NPV)	1000000	2000000	0	0

**Implementation Status:**  
 - Construction: 100%  
 - Operation: 100%

**Key Risks:**  
 - Construction: Delay in construction, cost overruns.  
 - Operation: Low ridership, operational issues.

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# Introduction To Traffic Management

August 7, 2007

JICA Study Team

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## Contents

1. Overview of traffic management
2. Data collection and identification of problems
3. Data Analysis
4. Formulation of solutions
5. Implementation of improvement measures
6. Operation and evaluation
7. Traffic problems in Ulaanbaatar
8. Improvement direction

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## 1. Overview of Traffic Management

- What is traffic management?
- Rationale for traffic management.
- Traffic management process.

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## What is Traffic Management?

- A set of traffic **E**ngineering, **E**nforcement and **E**ducational measures to make traffic more efficient and safer.
- No acquisition of additional land.
- Far less costly as compared with road construction or road widening.
- Can be implemented in a short time.
- Physical and operational measures.

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## Objectives of Traffic Management

- **General objectives:**
  - Make traffic more efficient.
  - Enhance traffic safety
  - Reduce pollutant emission
- **Specific objectives:**
  - Promote public transport use
  - Promote non-motorized transport (NMT)
  - Restrict use of private cars (traffic demand management)

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## Rationale for Traffic Management

- Not enough roads to accommodate growing traffic demand.
- Cannot keep constructing new roads even if fund is available.
- New approach that relies on:
  - Improvement of public transport
  - Intensive management of travel demand, and
  - Traffic management techniques to increase effective capacity of available road space.



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- ### 2. Data Collection & Problem Identifications
- Identification of problem (traffic congestion) and its location.
  - Traffic survey.
    - Various traffic surveys were conducted in this study
  - Opinion and behavior survey.
- UBMPS

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### Traffic Congestion

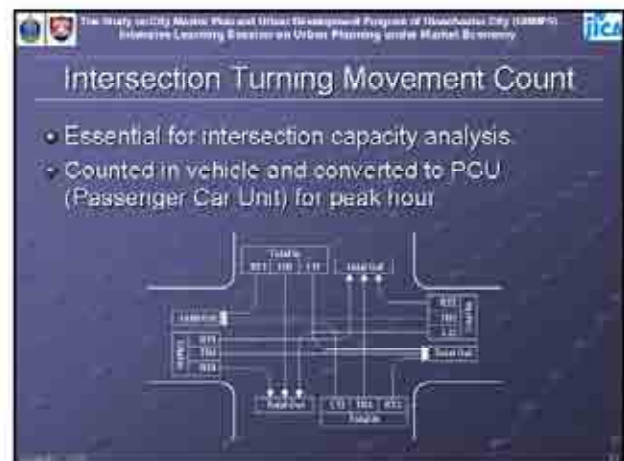
- Traffic congestion occurs when:  
Demand > Capacity
- Even small excess demand can cause heavy congestion.

Heavy congestion in Bangkok, Thailand

UBMPS

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- ### Bottleneck Points
- A location where physical or effective capacity decreases and congestion starts.
    - Intersection / roundabout
    - Narrowed road section
    - Roadside parking
    - Bus stop
    - High side friction
- UBMPS

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- ### Traffic Survey
- Objectives. Obtain quantitative data that is required to identify traffic problem and formulate solutions.
  - Type of survey:
    - Intersection turning movement count
    - Intersection inventory survey
    - Traffic signal operation survey
    - Traffic accident survey
    - Travel time survey
- UBMPS



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## Travel Time Survey

- To identify bottleneck and low speed section along the survey route.
- Test vehicle runs several times along survey route and records time at waypoints.

Time-Distance Chart      Travel Speed Chart

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## 3. Data Analysis

- Intersection capacity analysis
- Traffic flow simulation
- Traffic analysis software for PC

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## Intersection Capacity Analysis

- A procedure to analyze traffic operation at intersection.
- Helpful to examine critical movements and overall intersection performance.
- Applicable for both signalized and non-signalized intersection.

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## Intersection Capacity Analysis

- Input data:
  - Directional traffic volume
  - Lane width and movement assignment
  - Signal timing (for operational analysis of signalized intersection only)
- Analysis output:
  - [Volume] / [Saturation Rate] for each movement and overall intersection
  - A set of critical movements

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## Example of Intersection Capacity Analysis

PM peak hour traffic volume

Line width & assignment

	AM	PM
Max N-S V/S	0.32	0.33
Max E-W V/S	0.40	0.49
V Value	0.72	0.83

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## Traffic Flow Simulation Software

- A set of computer programs that constructs virtual road network and simulates movements of individual vehicle on it.
- Performance of network under various road conditions and traffic demands can be tested.



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### Input Data Required

- Link, node and network configuration
  - Length, grade, lane assignment, connection, turn pocket
- Traffic control at intersection:
  - Signalized and unsignalized, vehicle detector
- Traffic volume and vehicle properties:
  - Input volume, turning movement at intersection, vehicle performance by type, etc.

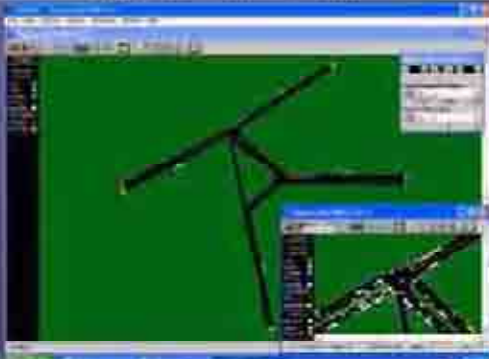
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### Simulation Output

- Traffic data:
  - Number of trips, traffic volume, delay
  - Congestion data (max and average queue)
- Person data:
  - Person-km, person-trips, delay/person
- Vehicle data:
  - Moving time, delay time, queue time
- Energy and environment:
  - Fuel consumption, pollutant emission

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### Traffic Flow Animation



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### Application of Traffic Flow Simulation

- Can be used for comparison and evaluation of various traffic improvement measures including:
  - Intersection geometric improvement
  - Signalization / Signal improvement
  - Fly over
  - Traffic regulation (lane control, turn prohibition, parking control, one-way, etc.)
  - Public transport improvement
  - HOV (high occupancy vehicle) lane

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### Advantage of Using Simulation Software

- Several traffic management measures can be tested and compared with minimal time and cost.
- Various measures of effectiveness (MoE) can be obtained.
- Visual presentation of road network and traffic operation available.

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### Traffic Analysis Software for PC

- Intersection / arterial streets / network operation analysis software.
- Many package software are available:
 

• Highway capacity software	• SIG/CINEMA
• Passer II/III/IV	• TRANSYT-7F
• SYNCHRO	• TSIS
• SIMTRAFFIC	
• aaSIDRA	

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## 4. Formulation of Solutions

- Traffic management instruments:
  - Intersection geometric improvement
  - Traffic signal
  - Transit signal priority
  - Traffic sign & road marking
  - Traffic demand management
  - Parking management

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## Traffic Management Instruments

- Various technique is available and applicable to regulate vehicle and pedestrian flows.
- Basic rules are:
  - Simplify traffic flow (reduce no. of movements)
  - Segregate road users in space and time
  - Increase capacity in order to accommodate more vehicles (supply side measure)
  - Restrain traffic in order to reduce traffic volume (demand side measure)

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## Traffic Engineering Solution

- What is "traffic engineering?"
  - Traffic Engineering applies engineering principles to help solve transportation problems, and brings into play knowledge of psychology and habits of users of the transportation systems, aside from technical foundations.

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## Traffic Engineering Measures

Traffic Engineering Measures	Road section	<ul style="list-style-type: none"> <li>One-way</li> <li>Truck ban</li> <li>Reversible lane</li> <li>Traffic sign / road marking</li> </ul>
	Intersection	<ul style="list-style-type: none"> <li>Geometry improvement</li> <li>Traffic sign / road marking</li> <li>Turn restriction</li> <li>Signal timing review</li> <li>Advanced signal control</li> </ul>
	Wide area	<ul style="list-style-type: none"> <li>Area traffic control system</li> <li>Traffic information system</li> </ul>

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## Intersection Geometric Improvement

- Regulate vehicle and pedestrian movements at intersection by modifying intersection geometry.
- Basic rules
  - Make intersection size as small as possible
  - Keep number of approaches four or less
  - Make approach angle close to 90 degree
  - Provide left turn lane if necessary
  - Provide refuge space for pedestrian

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## Example of Intersection Geometric Improvement



Before



After

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### Traffic Signal – Signal Warrant

- Signal warrant determines whether a traffic signal is required at a particular intersection or not.
- Factors to be considered:
  - Traffic volume
  - Left turn volume
  - Pedestrian volume
  - V/C ratio
  - Nearby facility
  - Traffic accident

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### Traffic Signal – Basic Parameter

- Cycle (duration of 1 cycle - second)
- Split (ratio of green time against cycle, %)
- Offset (time difference between 2 signals with same cycle, second or %)

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### Traffic Signal – Control Mode

Category	Mode	Technology	Cost	O/M
Isolated	Fixed time	Simple	Low	Easy
	Time-of-day			
	Actuated			
Arterial	Coordinated	Sophisticated	High	Difficult
Area	Responsive			
	Adaptive			

O/M: Operation and maintenance

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### Traffic Signal - Coordination

- Signals along arterial street are coordinated to maximize throughput and minimize delay

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### Traffic Signal – Control Mode

Fixed Time, Time-of-day (TOD), Actuation, Coordinated, Area Traffic Control (Traffic responsive/adaptive)

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### Traffic Signal – Manual Control

- Why manual control is not efficient?
  - Control based on wrong perception
    - Minimizing stops instead of total throughput
  - Effective only for light traffic
    - Not effective for near- or over-saturated traffic
  - Local optimization at best
    - Coordination not considered, not network-wide optimization
  - Fatigue and loss of attention
    - Human nature

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### Traffic Signal – Long Cycle Time

- If cycle time is doubled, average delay is also doubled with same traffic volume

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### Platoon – Group of Vehicles

- In manual control, operator tends to wait for approaching vehicle - wrong practice!

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### Platoon Profile

- Green time is wasted as it is not fully utilized
- Efficiency decreases with longer cycle

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### Transit Signal Priority

- Red signal is shortened or green signal is lengthened to minimized delay of bus

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### Traffic Signs and Road Markings

- Effective tool to regulate traffic
- Mongolian standards established

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### Traffic Demand Management

- Demand suppression
  - Road pricing
  - Restriction by plate number
  - Tele-working
  - Parking control/parking fee
- Modal shift
  - Use of public transport
  - Park & ride
- Demand dispersal
  - Traffic information system
  - Staggered office / school hour
  - Flex time
- Efficient use of car
  - HOV lane
  - Car sharing
  - Efficient cargo distribution

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### TDM Application

- Area license (Electronic Road Pricing) - Singapore, London
- High Occupancy Vehicle (3-in-1) – Jakarta
- HOV lane
- Color coding (License plate) – Seoul, Manila (Monday (1,2), Tuesday (3,4),...)
- Pedestrian / transit mall (Istaklal)

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### ERP, Busway, 3-in-1

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### Parking Management

- Vehicle needs space to park.
- Reasonable amount of parking space must be provided.
  - Otherwise, rampant illegal parking
- Affluent supply of parking space will induce and encourage private car use.
- Balance between demand and supply

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### Parking Management Instruments

Supply Management	On-street parking provision/reduction	
	On-street area for loading/unloading of goods	
Demand Management	Provision of off-street parking	By public sector
	Parking requirements for building	By private sector
Efficient use of parking	Alternative mode of transport	
	Goods transport improvement	
User's behavior	Parking information provision	
	Enforcement of no parking	
	Education / campaign	

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### 5. Implementation of Improvement Measures

- Cost estimate and funding
- Consultation with stakeholders
- Legislation and regulation
- Public relations

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### Cost Estimate and Funding

- Realistic cost must be estimated using prevailing price of materials, cost of similar works and inquiry to potential suppliers / contractors.
- Fund must be secured from annual budget, special budget, or other sources.
- Long lead time must be considered for timely implementation

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## Consultation with Stakeholder

- Share knowledge and experience and collaborate in formulating workable solution
- Participants: Driver (public, private), passenger, pedestrian, resident, shop owner, other government agencies (national and local)




Stakeholder Meeting in Jakarta, Indonesia

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## Information & Education Campaign

- Disseminate information to foster road user's cooperation



Traffic rule campaign in Hanoi, Vietnam

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## 6. Operation and Evaluation

- Guidance and enforcement
- Review and evaluation

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## Roles of Traffic Enforcer

- Get drivers and pedestrians to obey traffic rules and regulations – main task
- Human signal controller – secondary task
- Impromptu new traffic scheme not effective



Traffic police at work

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## Monitoring and Evaluation

- Essential for sustainability
- Indicators
  - Comparison of "before" and "after" data (traffic volume, travel time, delay, etc.)
  - Number and severity of accidents
  - Pedestrian (space, waiting time and path to cross intersection)
  - Complaints

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## Summary

- Effectiveness and limitations of traffic management measures must be properly understood (no almighty solution)
- Scientific approach must be taken (think before you tinker)
- Concerted and sustained efforts by all parties concerned is required (never ending task but do your best)

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### 7. Traffic Management Problem in Ulaanbaatar

- Weak road network
- Traffic congestion
- Traffic accident
- Parking
- Traffic control facilities
- Public transport

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### Weak Road Network

- Few collector and local roads



Aerial photo of Ulaanbaatar

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### Traffic Congestion


- Growing but still at manageable level.

Vehicle type	Route	Direction	Travel Speed (km/h)	
			1999	2001
Car	Poznan Ave	East	41.4	35.4
		West	42.8	35.7
	Khongorhidol - 16th October	East	30.5	31.1
		West	35.5	30.9
	16th October	South	49.9	59.5
		North	42.5	39.0
Manny Zhai	East	43.3	35.7	
	West	41.2	36.0	
Bus	UB15 - Yarmag	East	25.1	27.8
		West	31.9	30.1
	UB15 - Chingelhal	East	24.1	39.9
		West	24.1	39.9

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### Traffic Accident

- High accident rate compared with number of vehicles
- High rate of pedestrian accidents.
- Accident prone locations:
  - Intersection, roundabout, high traffic volume



Accident prone locations

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### Parking Problem

- One of the causes of traffic congestion.
- No parking management policy exists.
- Insufficient parking supply.



Double parking along

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### Traffic Control Facilities

- New and functional signal and obsolete signals are mixed.
- Insufficient number of traffic sign.
- Road marking almost non-existing.




Obsolete signal controller

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## Poor Public Transport

- Proliferation of mini-bus:
  - 337 units (1998) → 2,016 units (2004)
  - Lowest evaluation among modes (HIS)
- Deteriorating trolley bus service:
  - 134 buses (1998) → 53 buses (2004)
- Existing bus lane not enforced



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## 8. Improvement Direction

- Traffic Management Improvement Project
  - Package of traffic engineering measures
- Establishment of Transportation Research Center
  - Transportation database, modeling & planning
  - Traffic engineering study & design
  - Human resource development
- Public transport improvement
- Parking management policy and measures

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## END

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# Urban Policy and Strategy

24 August 2007  
Shizuo IWATA  
JICA Study Team

THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM  
OF ULAANBAATAR CITY IN MONGOLIA

jica

## Contents

1. Urban Problems and Issues
2. Role of Urban Planning
3. Preliminary Urban Policy and Strategies
4. Next Steps
5. Discussion Topics

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Slide 2

1. Urban Problems and Issues

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### □ Main Urban Problems/Issues in Ulaanbaatar

<p>1. Urban Economy</p> <ul style="list-style-type: none"> <li>■ Employment</li> <li>■ Income</li> <li>■ Competitiveness of industries and services</li> <li>■ Investment environment and opportunities</li> </ul> <p>2. Living Conditions</p> <ul style="list-style-type: none"> <li>■ Affordable housing</li> <li>■ Access to urban services and amenities</li> <li>■ Neighbourhood environment</li> <li>■ Sense of community</li> <li>■ Security/safety</li> </ul>	<p>3. Transportation, particularly mobility of the poor</p> <ul style="list-style-type: none"> <li>■ Accessibility</li> <li>■ Traffic safety</li> <li>■ Walking environment</li> <li>■ Traffic management</li> <li>■ Road maintenance</li> <li>■ People's awareness</li> </ul> <p>4. Environment</p> <ul style="list-style-type: none"> <li>■ Air quality</li> <li>■ Sanitary conditions</li> <li>■ Disaster preparedness</li> <li>■ Parks and green space</li> <li>■ Landscape and urban design</li> </ul>
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➡ Need to prioritize the problems/issues

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### □ Difficult to Identify Causes of Problems, e.g., Traffic Congestion

- Easy to identify: visible to everybody.
- Difficult to define: subjective.
- More difficult to identify the causes: many interrelated factors.
  - Road capacity: network configuration, pavement conditions
  - Demand: traffic mix, land-use characteristics, user behavior
  - Traffic management: engineering, enforcement, education
- Big cities can never solve traffic congestion.
- Need to have good indicators to guide a more efficient use of investments and to share the burden of congestion equitably.

e.g., - commuting time between selected locations  
- bus travel speed along selected main roads

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Slide 4

2. Role of Urban Planning

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### □ Increasingly Complex Urbanization Impacts and Environmental Changes

<p><u>Past</u></p> <ul style="list-style-type: none"> <li>• Relatively low pressure of population growth</li> <li>• Low economic growth</li> <li>• Closed economy</li> </ul>	<p><u>Future</u></p> <ul style="list-style-type: none"> <li>• Further urban population increase</li> <li>• Accelerated economic growth</li> <li>• Motorization</li> <li>• International integration</li> <li>• Changes in lifestyles</li> <li>• Growing concern on global environment</li> </ul>
--	--

➡

- Urban problems/issues becoming more complex.
- Ulaanbaatar stands at a critical turning point, which requires an improved approach to urban planning and management.

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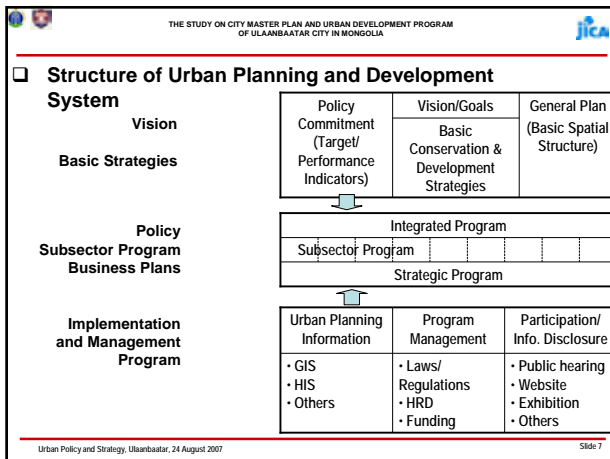
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### □ Changes in Approach

<u>Aspect</u>	<u>Old</u>	<u>New</u>
Policy Objective	<ul style="list-style-type: none"> <li>• Reducing poverty</li> <li>• Promoting economic growth</li> </ul>	<ul style="list-style-type: none"> <li>• Promoting economic growth</li> <li>• Reducing poverty</li> <li>• Supporting human development</li> </ul>
Planning Framework	<ul style="list-style-type: none"> <li>• Static</li> <li>• Centralized</li> </ul>	<ul style="list-style-type: none"> <li>• Dynamic</li> <li>• Demand-responsive</li> </ul>
Driving Forces	<ul style="list-style-type: none"> <li>• Public sector management/funding</li> </ul>	<ul style="list-style-type: none"> <li>• Public sector policy making, regulation, facilitation, procurement</li> <li>• Private sector skills/resources</li> </ul>
Forms of Intervention	<ul style="list-style-type: none"> <li>• Investment in projects</li> </ul>	<ul style="list-style-type: none"> <li>• Capacity building/institutional restructuring</li> <li>• Policy reform to create competitive market</li> </ul>

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- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- 3. Preliminary Urban Policy and Strategies**
- Critical Considerations**
  - Vision for the Future**
  - Basic Conservation and Development Strategies**
  - Proposed Spatial Structure**
  - Opportunities for Urban Development (Tentative)**
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- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- Critical Considerations for the City's Sustainable Development**
- Management of urban growth.
  - Provision of infrastructure/environment for competitive economic activities.
  - Improvement of living conditions.
  - Strengthening of international linkages and regional integration.
  - Strengthening of urban sector management capacity.
- Urban Policy and Strategy, Ulaanbaatar, 24 August 2007 Slide 9

- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- Management of Urban Growth**
- Assumed scenario
    - Trend : sprawl, disorganized land use.
    - Master Plan : controlled, expanded urban area.
    - Guided growth: mass-transit-led compact city.
  - Success factors for guided growth
    - Quality mass transit corridor.
    - Integrated urban/land-use development.
    - Adequate institutional framework for private sector investments.
  - Shared understanding of the concept of "mass-transit-based compact city"
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- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- Provision of Infrastructure/Environment for Competitive Economic Activities = Urban Centers**
- **Strengthening of CBD**
    - Expand accessibility through public transport, walking and private transport.
    - Increase floor area for commercial/business purposes including development of underground space.
    - Enhance amenity and attraction for both citizens and visitors throughout the year.
  - **Development of sub centers**
    - Develop sub centers that share similar characteristics in integration with mass transit.
    - Expand investment opportunities by improving infrastructure.
  - **Development of logistics centers and reorganization of markets**
  - **Establishment of effective development mechanism**
    - Promote public-private-partnership (PPP)
    - Build adequate institutional framework for development
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- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- Improvement of Living Conditions**
- Provision of affordable housing
    - Analyze market and affordability.
    - Develop technical standards for affordable housing.
    - Establish workable supply mechanism.
  - Establishment of ger improvement strategies
    - Implement short-term site improvement.
    - Carry out medium- to long-term resettlement.
  - Development of indicators to assess level and quality of living conditions
    - Convenience: access to services, availability of transport, etc.
    - Healthiness : availability of health care, sanitary conditions, etc.
    - Safety : traffic safety, crime-free environment, etc.
    - Amenity : landscape, parks and green space, etc.
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**◀ Strengthening of International Linkages and Regional Integration ▶**

- International level
  - Promote trade and transport capacity and efficiency.
  - Expand human/information exchange.
  - Provide more conducive investment environment.
- Country level
  - Develop strategic growth corridors.
  - Strengthen interprovincial connectivity through transport and communication.
  - Develop strategic regional growth/service centers.
- City level
  - Segregate inter-city from urban transport.
  - Strengthen social and economic linkages between Ulaanbaatar and regional growth/service centers.

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**◀ Strengthening of Urban Sector Management Capacity ▶**


- Improvement of urban planning system
  - Establish institutional framework.
  - Provide alternative development methods/systems.
  - Provide urban planning information.
- Strengthening of planning/implementing capacities
  - Enhance planning skills.
  - Provide education and training.
  - Learn from best practices and experiences of other countries.
- Strengthening of program management
  - Prioritize projects.
  - Look for funding.
  - Encourage participation (private sector, communities).

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**□ Vision for the Future**

- Where Ulaanbaatar stands now



- Where Ulaanbaatar wants to be

To be discussed and agreed by the people

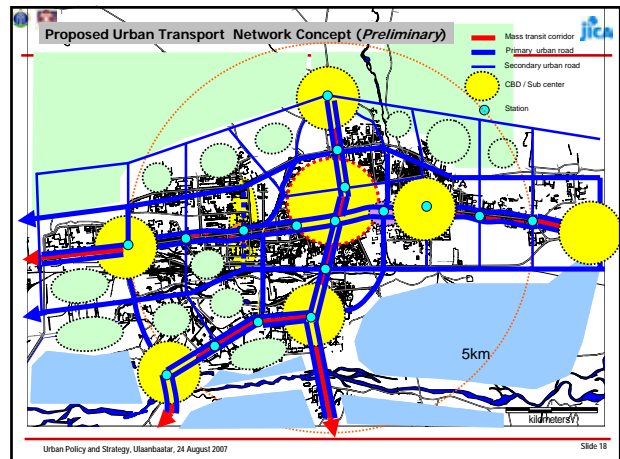
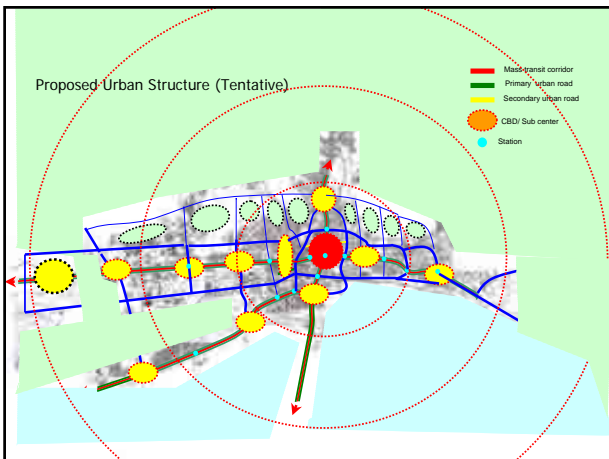
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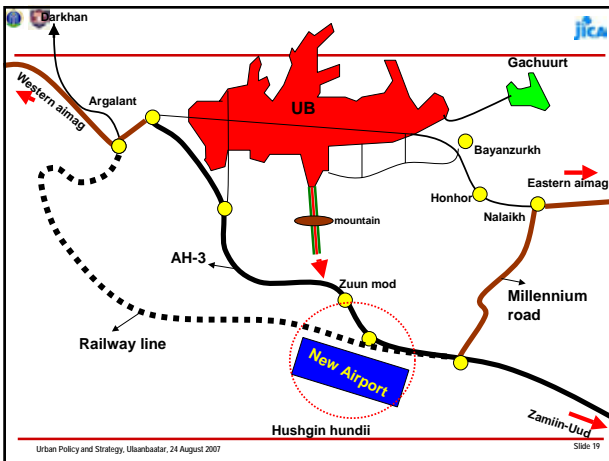
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**□ Basic Conservation and Development Strategies**

- Establish a unique city image that will appeal to the people and the international community.
- Place environment as foundation of city development to avoid/minimize disaster risks, improve quality of water sources, and enhance amenity and landscape.
- Promote compact urban areas based on an efficient public transport system comprising mass transit as backbone and effective feeder systems to ensure mobility/accessibility for everyone and increase opportunities for socio-economic development.
- Develop the city in a way that healthiness and amenity of the citizens and visitors are enhanced.
- Promote community development to further enhance overall quality of life at the neighbourhood level.

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- Opportunities for Urban Development (Tentative)**
- Infrastructure Devt./Improvement
    - Roads (urban, inter-city)
    - Traffic management (flyovers, parking)
    - Rail (urban, inter-city)
    - Utilities
    - Logistics centers
  - Urban Center Devt./Redevt.
    - CBD incl. underground space
    - Subcenters integrated with mass transit lines
    - Transit/Pedestrian malls
    - Satellite centers/towns
  - Rebuilding of Super Blocks
    - Infrastructure
    - Urban housing
    - Comm'l/business devt.
  - Strategic Development of:
    - Ger areas
    - Industrial areas
    - Marketplaces
    - Railway properties
    - Airport premises
  - Environment and Recreation
    - Parks and green space
    - Riverfronts
    - Street trees, walkways, bicycle lanes
  - Economic Development
    - Housing and construction industries
    - Suburban agriculture
    - SOHO business
    - Urban tourism
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- THE STUDY ON CITY MASTER PLAN AND URBAN DEVELOPMENT PROGRAM OF ULAANBAATAR CITY IN MONGOLIA
- 4. Next Steps**
- Deepen the shared understanding of the proposed planning concepts.
  - Formulate and discuss alternative scenarios of future development of Ulaanbaatar City.
  - Discuss workable mechanisms to promote and realize plans and projects.
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- 5. Discussion Topics**
- Strengths, weaknesses, opportunities, and threats to existing urban planning system, and need for reform.
  - Overall growth management strategy for the city based on mass transit system development.
  - Definition of a compact city concept for Ulaanbaatar.
  - Approach to CBD redevelopment/renewal through relocation of universities, government offices, and embassies to new satellite centers.
  - Others.
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**Thank you for your attention.**

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# Infrastructure Planning

Toshiaki KUDO  
JICA Study Team  
24 Aug. 2007

1

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## Topics

1. Infrastructure in Urban Planning
2. Infrastructure Development in Japan
3. Infrastructure Development in UB
4. Disaster Management and Infrastructure

2

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## 1. Infrastructure in Urban Planning

3

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## Infrastructure

- Economic Infrastructure:
  - Transport facilities
  - Utilities (Power supply and heating, water supply, telecommunication, sewage & drainage,)
- Social Infrastructure:
  - Waste treatment facility
  - Education and culture facilities
  - Parks and open spaces
  - Social welfare, health and medical facilities
  - Others (river bank, disaster prevention facilities, defense, etc)

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## Infrastructure - Lacking

Infrastructure is important to support our living

↓

However, lack of sufficient infrastructure and public service facilities is one of common issues of many cities.

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## Infrastructure Development and Five Planning Issues of UBMPS

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## Infrastructure Development in Urban Planning

- Infrastructure plan is a core component with land use plan in urban planning.
- Infrastructure planning (development) induces/ guides land use while land use (zoning) regulation gives a development controlling measure.

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## Planning process (1)

```

    graph TD
      GO[Goals & objectives] --> SEF[Socio-economic framework]
      SEF --> DSI[Demand & Supply for Infrastructure]
      SEF --> SR[Space requirement]
      DSI --> IP[Infrastructure plan]
      SR --> LUP[Land-use plan]
      IP <--> LUP
      IP --> PP[Projects/Programs]
      LUP --> PP
  
```

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## Planning Process (2)

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## 2. Infrastructure Development in Japan

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## Infrastructure in Urban Planning in Japan

One of the major three pillars of urban planning System

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## Infrastructure (Urban facilities) to be addressed in Master Plan

Category	Kind
Transport facilities	Road, urban railway, parking, automobile terminals, others (railway, airport, port)
Open spaces	Park, green are, square, cemetery, other open spaces
Utilities	Water supply, power supply, gas supply, sewerage, sanitation facility, solid waste treatment facility, others
Education & culture	School, library, research institute, others (museum, etc)
Social welfare and health	Hospital, nursery, others
Physical logistics	Logistics center
River, canal, water way	River, canal, drainage canal
Market	Public market, slaughter house,
Others	Disaster prevention facilities, telecommunication facilities, others

Facility Kind, Facility Name, Location, Area shall be addressed in the plan, & each facility is stipulated by specific laws and regulations.

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## Infrastructure Plan on City Planning Map

Infrastructure as well as land zoning is described

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## Urban Planning Projects

```

graph TD
    A[Urban Planning Projects] --> B[Infrastructure (Urban facilities)]
    A --> C[Urban Development Projects]
  
```

Urban development Projects are Area Development including infrastructure.

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## Urban Planning Project of Infrastructure (urban facilities)

- Implementation body: municipality
- Land expropriation right
- Preemption right of Local governments
- Right to request of purchase to local government by land owners
- Restriction of development and construction
- Appropriation of City Planning Tax
- Subsidy from national government

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## Urban Development Projects

- Land Readjustment Project
- Urban Redevelopment Project
- New Residential Area Development Project
- New Town Infrastructure Development Project
- Residential Block Development Project
- Industrial Estate Development Project
- Disaster Prevention Block Development Project

These area projects include development of infrastructure authorized in the master plan.

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## Example of Land Readjustment Project

Before

After

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## Land for Infrastructure by Project

- Land Acquisition (purchase) type
- Right conversion type

Urban Planning Projects	Type of Land Procurement
Individual infrastructure (urban facilities)	Acquisition (purchase)
<b>Urban Development Projects</b>	
Land Readjustment Project	Right Conversion
Urban Redevelopment Project	Right conversion (type 1) and Acquisition (type 2)
New Residential Area Development Project	Acquisition
New Town Infrastructure Development Project	Mixture of Right conversion and land acquisition
Residential Block Development Project	Right conversion
Industrial Estate Development Project	Land acquisition
Disaster Prevention Block Development Project	Right conversion

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## Underground Use





Hiroshima city

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## Underground Common Conduit

Underground common public utility conduit



accommodates trunk lines of power supply, water supply, sewage, telephone, gas, etc. then maintenance, repair, extension works can be done without road excavation work.



Common conduit

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## Infrastructure Finance of Local Governments

- General account budget
- Earmarked tax revenue
- Local Bond
- Subsidy from central government

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## Earmarked Taxes in Japan

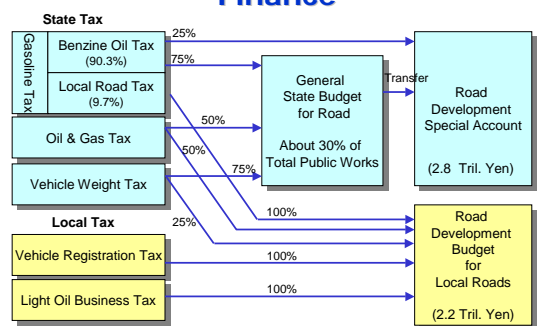
Beneficiary-pay-principle

Tax	Use
Taxes on ownership and purchase (registration) of vehicle, and fuel	Road development
City Planning Tax	Urban facilities
Business Office Tax	Urban facilities

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## Earmarked Taxes for Road Finance

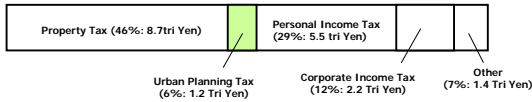


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## City Planning Tax

<b>Use</b>	Officially planned urban facilities (road related facilities, parks and open spaces, utilities, sanitation, solid waste treatment facilities, etc.) or Land Readjustment Project
<b>Payer</b>	Local (municipality) tax on owners of property (land and building)
<b>Rate</b>	Max 0.3% of property value (decided by local ordinance)
<b>Revenue size</b>	City Planning Tax share to local tax revenue = average 6%, large city: 8%, city: 6%, town & village: 4%. (2005 fiscal year) Revenue: 1.2 Trillion yen (= 12 Trillion Tg)



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## Business Office Tax in Large Cities

- Local tax
- Business offices in cities of more than 300,000 population
- 70 cities (2005)
- Revenue: Total 298 billion yen (in 2005)

Item	Tax rate	Minimum	Revenue (in 2005)
Office Floor	600 yen (6,000 tg)/m <sup>2</sup>	1000 m <sup>2</sup> & over	216 Bil Yen (72.3%)
Total salary paid	2.5% of total salary paid	100 px & over	82 Bil. Yen (27.7 %)

Use: Development of infrastructure: road related facilities, parks and open spaces, utilities, sanitation, solid waste treatment facilities, etc.)

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## Reference: Rapid Urbanization and Infrastructure Development in Japan

- Japan experienced rapid urbanization in '60s and '70s.
- Local municipal governments were suffered from increasing demand for public services (water supply, schools, parks, etc) for immigrants.
- Almost half municipal governments have established a development guideline to control development, starting with Kawasaki city in 1960.
- And there are almost half municipalities having guidelines (1,658 of 3,255 municipal governments in 2003).

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## Guidelines

	Description
<b>Purpose</b>	<ul style="list-style-type: none"> <li>To provide good living environment (94% of 1658 municipalities, in 2003)</li> <li>To prevent over, sprawling development (77%)</li> <li>To lessen financial burden based on beneficiary-pay-principle (10 %)</li> </ul>
<b>Request</b>	<ul style="list-style-type: none"> <li>Minimum road width (around 60%)</li> <li>Minimum requirement open space (park) (around 60%)</li> <li>Provision of land for firefighting facilities, waste management facilities, community halls, schools, etc. (around 10~20%)</li> <li>Money donation for public facility development (around 20%)</li> </ul>

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## Summary

- In Japan, infrastructure is authorized in urban planning.
- Urban planning projects of infrastructure and urban development projects facilitate infrastructure developments.
- Earmarked taxes are used for infrastructure development on beneficiary-pay-principle.

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## 3. Infrastructure Planning in UB

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## Situation - Increasing Demand

- Rapid population growth, particularly, Uncontrolled, sprawling, outward expansion of Ger areas to cause further lack of infrastructure
- Modernization of living style of city dwellers
- Inefficient demand side management (tariff structure, metering)

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## Situation - Supply Capacity

- Smaller capacity caused by old facilities
- Inefficient operation (organizational structure, management, institutional)
- Difficulty in land acquisition for infrastructure, particularly by land ownership in Ger area
- Resource constraints (limited natural resource endowment)
- Financial constraint

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## Major Planning Issues of Infrastructure in UB

- Supply side:
  - Improvement of facilities
  - Improvement of operation (Organizational structure, management, incl. PPP)
  - Secure land for facilities
  - Exploitation of new supply sources, if necessary
- Demand side:
  - Demand side management
  - Control of sprawling, outward expansion of Ger areas

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## Major Points for Infrastructure Planning

- Urban structure of less burden to infrastructure
- Demand structure (Ger vs. Apartment)
- Efficient supply system
- New development or maintenance of the existing facilities
- Levels of need for infrastructure

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## Urban Structure More Efficient to Infrastructure

Avoid uncontrolled sprawling      Densification

A compact city lead by rational land management to control immigrants and densification in the existing urbanized area gives more efficiency.

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## Demand Structure

Big gap of demand between Ger and apartment areas

For example, in case of water

	WWT MP 2020 (2006)
Apartment	230 lpdp
Ger	25 lpdp

Social framework (Ger area ratio) influences the demand for infrastructure considerably and this will be heeded in infrastructure plan

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## Efficient Supply System

Central supply system      Cluster system

More efficient supply system will be planned.

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## New Development or Maintenance of Existing Facilities

- To improve and maintain supply capacity:
  - Maintenance / repair / rehabilitation of the existing facilities
  - A new facility development
  - Replacement of inefficient facility with a new more efficient facility
  - Resource recycling

Efficient combination will be planned for better supply.

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## Levels of Infrastructure

**Infrastructure Level**

- Minimum survival level
- Basic required level
- Strategic advanced level

Civil minimum should be supplied by all means.

Development Vision influences the priority of infrastructure levels

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## Summary

- Infrastructure will be planned taking consideration of:
  - Target level of quality of life and economic growth, to improve competitiveness and livability, based on development vision;
  - Sustainable balance of demand and supply to maintain sustainable environment and financing capability by restraining demand and improvement and rationalization of supply capacity; and
  - A rational land management not letting uncontrolled sprawling of Ger Area, toward urban structure of less burden on infrastructure development.

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## 4. Disaster Management and Infrastructure

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## Disaster Management Cycle

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## Disaster Preventive City

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## Infrastructure as Urban Spine for Disaster Prevention

- Roads, parks and open space are used as evacuation routes and places
- Fire-spreading prevention measures are promoted by construction of fire-proof buildings

Evacuation routes and fire-spreading prevention and fireproofing

Fireproof building around the evacuation place

Evacuation place (park)

Disaster management center

Secondary road

Primary road

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## Area Improvement

**Congested urban area**

Little road space and other open space are likely to suffer from road blockage by debris and difficult evacuation in case of disaster.

**Improvement of the Area**

Area development including roads, park and collective housing makes the area safer and gives better amenity. (Area development or phased development)

- Development of detached houses into mid- to High rise apartment houses
- Development of roads
- Development of park and plaza
- Development of Disaster management Center
- Using school as disaster prevention center

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## Protection of People in Areas Vulnerable to Disaster

**Existing Risky Area dwellers:**

- Move people out from the risky area (resettlement)
- Let people live in the risky area with countermeasures to reduce impact of disasters
- Combination of the above (partly relocated and partly strengthened with countermeasures in an area)

**Future Risky Area Dwellers:**

- Control Development (encroachment) into the disaster vulnerable area

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## Thank you

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## (A) Land Readjustment Project

- The LRS project operates by adjusting the boundaries of land plots in order to build roads, parks and utility service facilities, etc.
- This improves the value of residential property in the project area, although this involves reduction of individuals' land areas to share a reserved land area.
- The reserved land shall be sold at market prices to cover the project cost.

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## (B) Urban Redevelopment Project

An Urban Redevelopment Project is undertaken where land is not efficiently used, where disaster prevention measures are difficult with environmental problems.

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### (C) New Residential Area (New Town) Development Project



New Towns are developed as one of urban planning projects which legally designated in sub-urban 10-12 km far from the center of City.

