No. 70030

Thursday, 10:45-12:15

Ishikawadai Building No.4, Room B04/05

Project Evaluation for Sustainable Infrastructure

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Outline

This course aims to provide the methods necessary to undertake project evaluation and cost benefit analysis for sustainable infrastructure. The methods comprise of microeconomics background, cost benefit analysis, valuing market and non-market goods, and other technical issues. Case studies of various infrastructures are also provided.

Schedule

1. Introduction to Project Evaluation	11 April
2. Foundations of Cost Benefit Analysis	25 April
3. Valuing Benefits and Costs in Primary Markets	02 May
4. Discounting Benefit and Cost, Existence Value	16 May
5. Midterm Examination	23 May
6. Valuing Impacts: Observed Behavior (1)	30 May
7. Valuing Impacts: Observed Behavior (2)	06 June
8. Valuing Impacts: Contingent Valuation	13 June
9. Cost Effective Analysis, How Accurate	20 June
10-11. Presentation (1,2) 9:00-12:15	4 July
12. Presentation (3)	11 July
13. Presentation (4)	18 July
14. Final Examination	01 Aug

*1. No Class: 18 April, 27 June, 25 July. 9 May is Thursday Class.

*2. You may attend the class of Presentation in your term only.

Grade

Midterm Exam	**30%**
Presentation	**20%**
Report	**15%**
Final Exam	**35%**

Presentation & Report

1. Select one method of Valuing Market or Non-Market Goods from Chapter 9, 12, 13, 14 and 15.
2. Find one paper from **“international”** scientific journals from any research fields to use your selected method.
3. Explain the paper by powerpoint.

English presentation (**8 mins**) and discussion (about 5 mins) for each.

Presentation Report Submission

Deadline**: Not Decided Yet**
Summarize 3 to 4 pages report and submit me by email as **PDF file**.
(hanaoka@ide.titech.ac.jp):

1) Reasons to select this paper.
2) Advantages and disadvantages of your selected method in the context of the selected topic. Discuss whether other methods are possible to apply for the selected topic.
3) Respond some questions if you need.
4) Impression (comments, requests, etc) of this course.

Textbook and References

Boardman, A. E., Greenberg, D. H., Vining, A. R. and Weimer, D. L. (2010)

Cost Benefit Analysis: Concepts and Practice (4th Edition), Prentice Hall College.

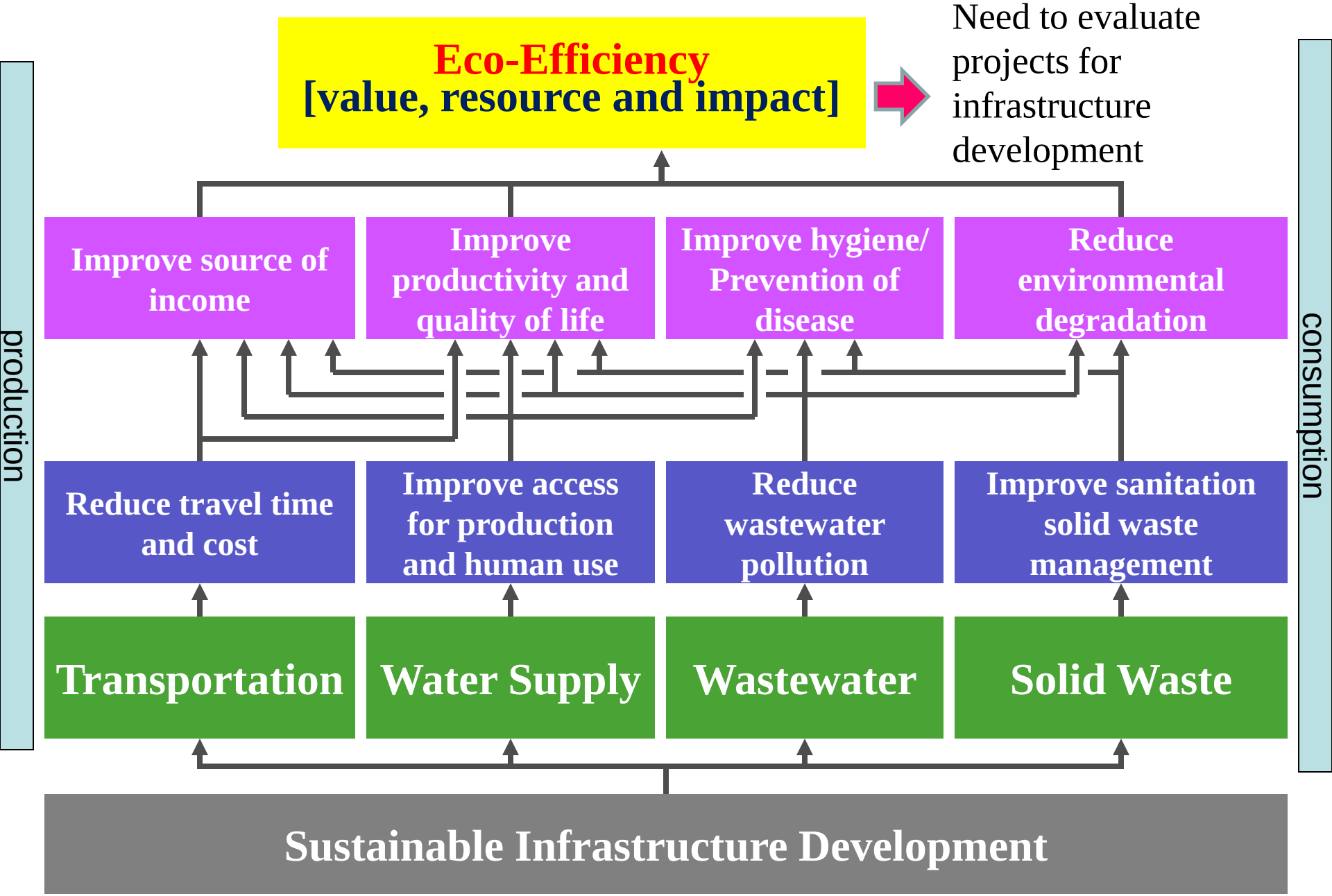
UNESCAP (2007)

Sustainable Infrastructure in Asia -Overview and Proceedings-.

Varian, H.R. (2003)

Intermediate Microeconomics: A Modern Approach 6th Edition, W.W.Norton & Company.

Concept of Sustainable Infrastructure Development



World Fastest Growing City

Eco-efficiency is possible?

Economic Growth with ***Eco***logically Efficient

We need to execute **good projects** for developing Sustainable Infrastructure in realizing eco-efficient society.

What is Project?

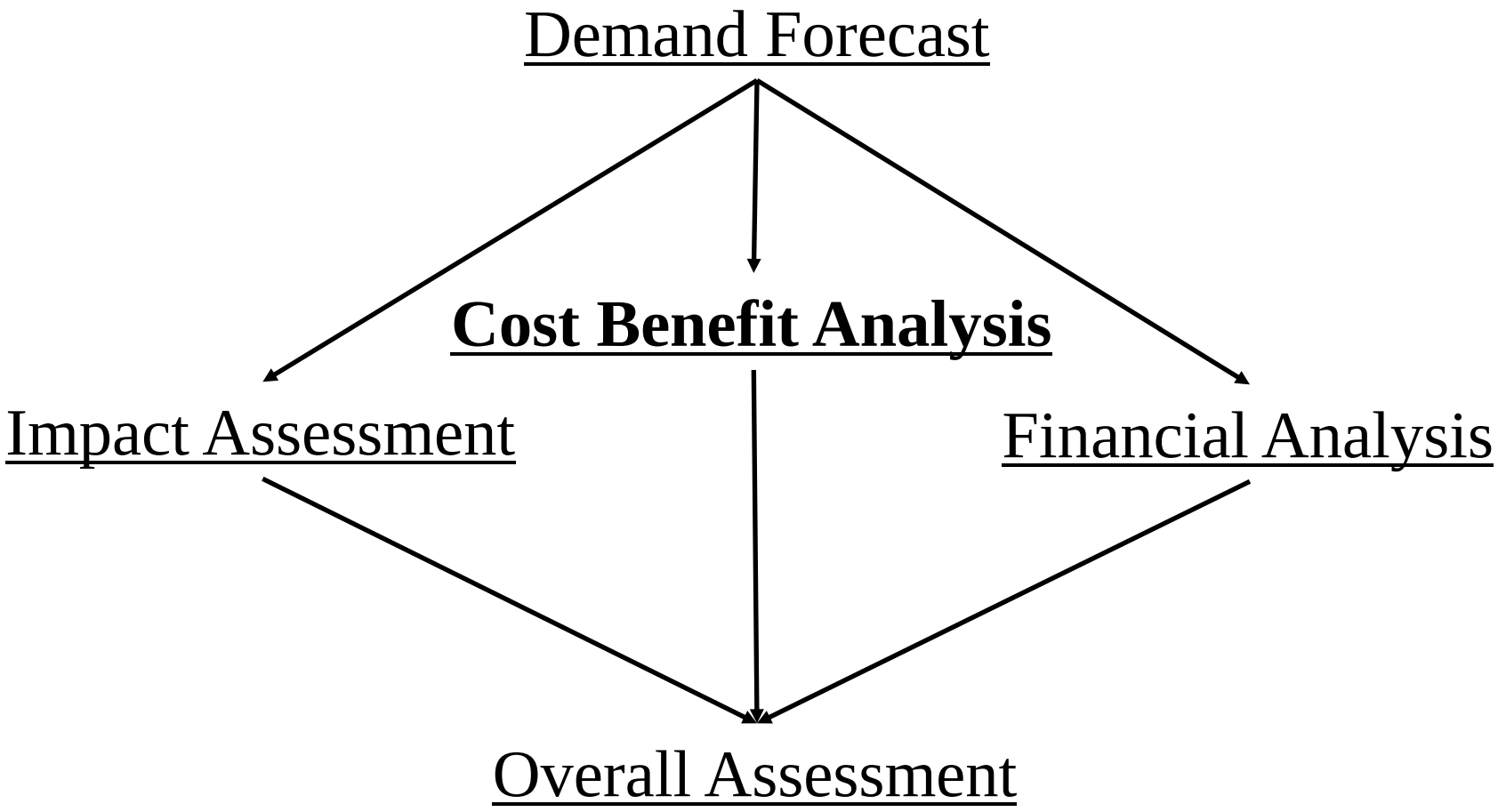
- Projects are “temporary” in nature with a defined beginning and end, to meet “unique” goals and objectives.
- What is the contrast word to “Project”?

Aims of Project Evaluation

To evaluate the feasibility of infrastructure development/investment project under limited budget.

- to be viable or rejected
- to compare alternatives, priority
- to capture the significant impact
- to support decision-making
- to report the result in a consistent (scientific) form
  [Accountability for the public]

Overall Scheme in Case of Transport Infrastructure Project



What is Cost Benefit Analysis?

Cost Benefit Analysis

- Social Viewpoint

(Quantifying in monetary terms [Monetizing])

Benefit, Cost, Utility, Efficiency…*

NSB (Net Social Benefit) $= B$ *(Social Benefit)* $- C$ *(Social Cost)*

Based on Microeconomics Theory

*Utility: A person's happiness/ satisfaction

Financial Analysis

- Private (Firm) Viewpoint

Revenue & Expenditure

Financial values on a commercial basis at market prices.

Microecnomics & Macroeconomics

Microeconomics

- Target is **Individual**.

  Households, Firms and Government

Society

Macroeconomics

- Target is **Whole**.

  National, Regional, and Global

Chapter 1 Introduction to Cost-Benefit Analysis

Major Steps in CBA "Highway Example"

1. Specify the set of alternative projects
   Road Surface, Routing, Size (Lane), Tolls, Wild Animal Friendliness, Timing
2. Decide whose benefits and costs count
   Global, National, Provincial, Local…
3. Catalogue the impacts and select measurement indicators
   Time saving, Operation cost saving, Safety Benefit, Toll Revenue, New Users, Alternative Road Benefits, Construction cost, Maintenance cost, etc.
4. Predicts the impacts quantitatively over the life of the projects
   Number of vehicle-trips, Vehicle operation cost, number of accidents avoided, number of lives saved, etc.
5. **Monetize all impacts (as much as possible)**
   - Observed Behavior: Direct Estimation & Indirect Market Method (HPM, TCM)
   - Contingent Valuation Method (Stated Preference)
6. Discount benefits and costs to obtain present values
7. Compute the net present value of each alternative
8. Perform sensitivity analysis
9. Make a recommendation

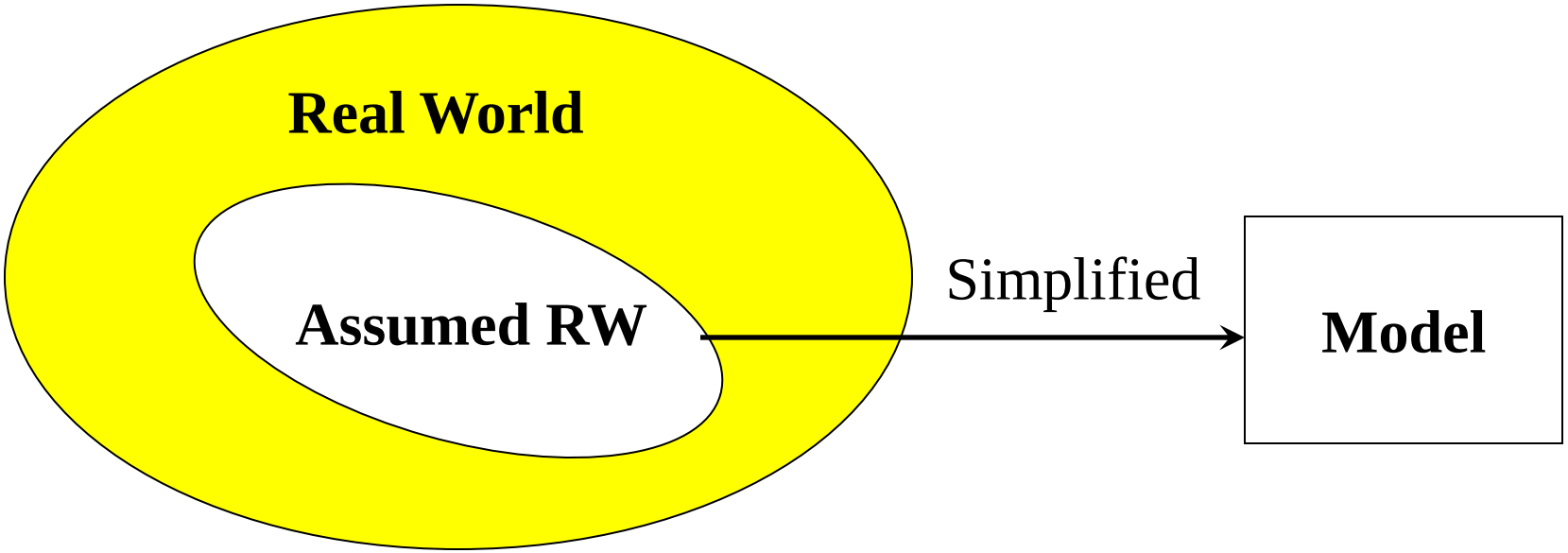
Effect and its Indicator of Transport Projects

Effect	Indicator
User Benefit (Efficiency)	Time saving, Cost saving
Other transport system	Network, Pricing, Intermodality
Safety	Accident
Environmental impact	Air Pollution, Greenhouse Gas
Wider economic impact	Employment, Production…
Other policy impacts beyond the transport system	Relevant policies, Consistency, Conflict
Financial viability	Cash flow, Profit and Loss

Model: Market Mechanism

Model: simplified representation of reality

> elimination of irrelevant detail



Basics of Microeconomic Model

Consumer	⟺	Producer
Demand Side		Supply Side

Principle of behavior of agents (people)

The optimization principle

- to choose the **best** pattern of consumption that they can afford
  : reasonable to assume that people try to choose things they want rather than things they don't want.

The equilibrium principle

- **Prices** adjust until the amount that people demand of something is equal to the amount that is supplied

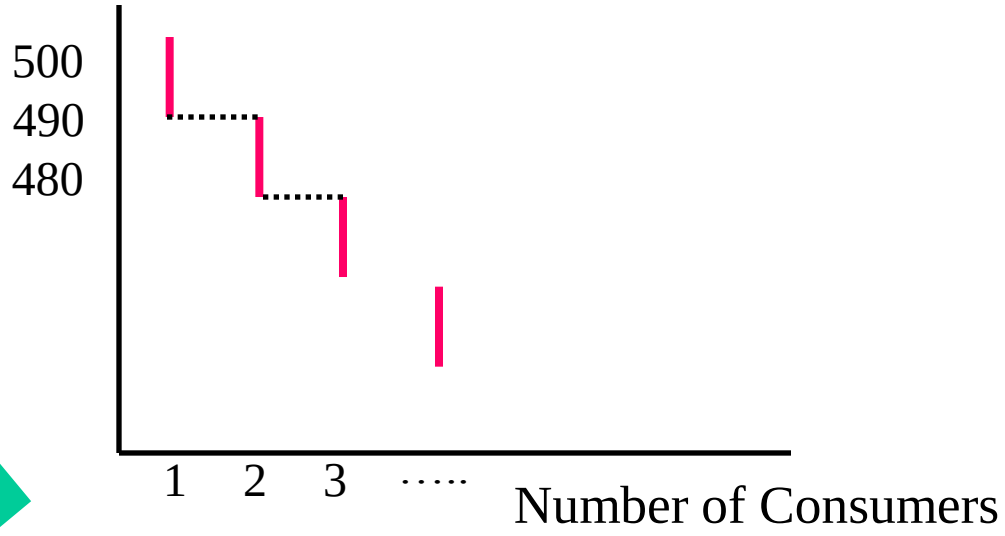
  Demand Side: Consumer

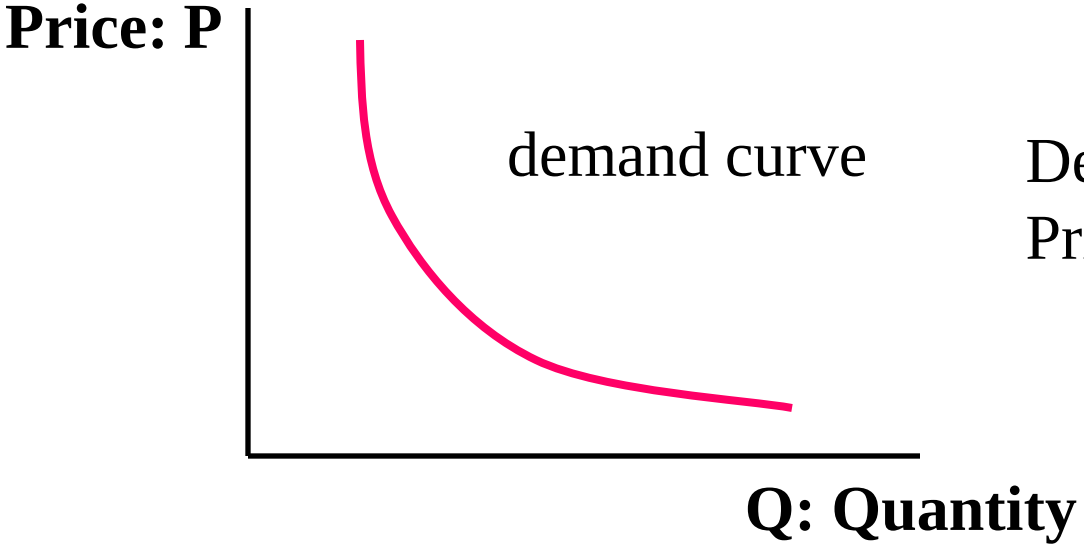
  Supply Side: Producer

Demand Side

WTP: Willingness to Pay

"Maximum amount people would pay"





demand curve

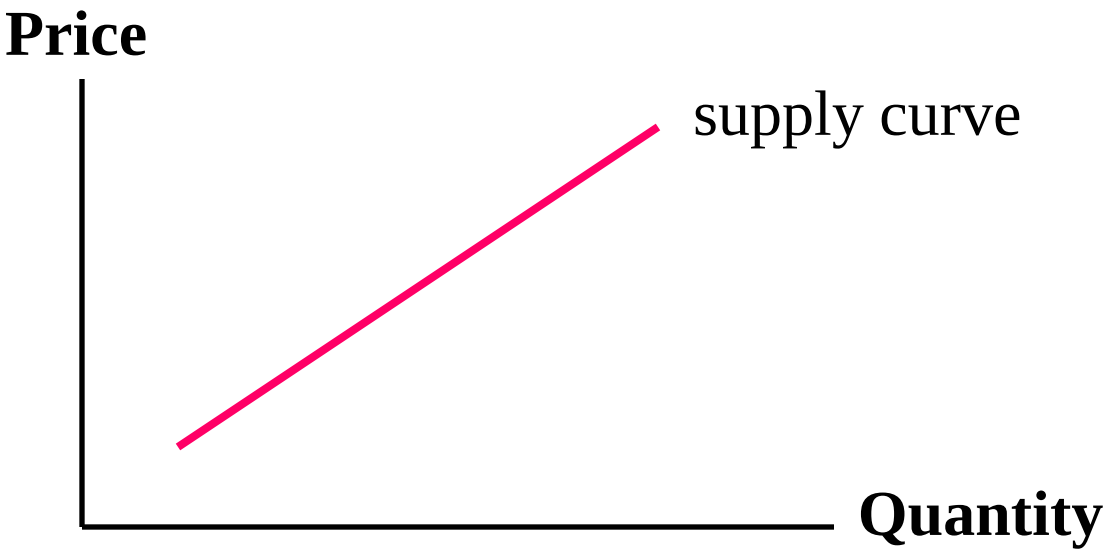
Demand-Supply:
Price-Quantity Graph

Supply Side

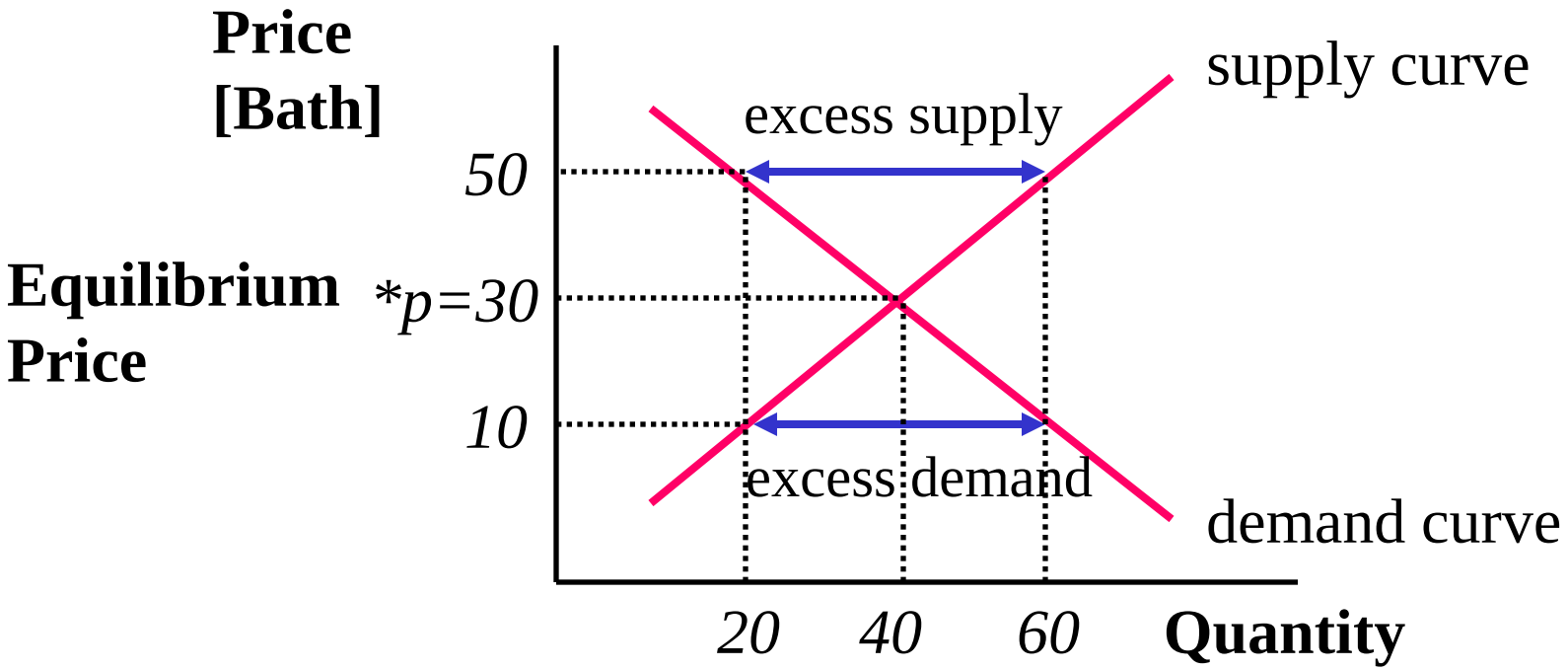
- Competitive Market - Basic market

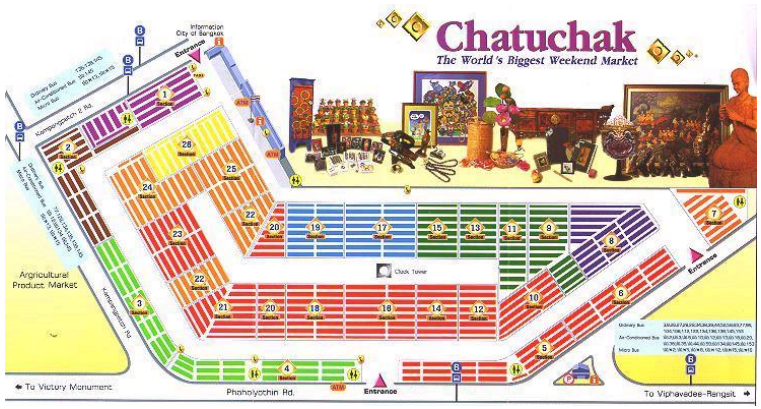
  many independent suppliers

- Monopoly
- Oligopoly (Duopoly)
- Control or Regulation (by Government)



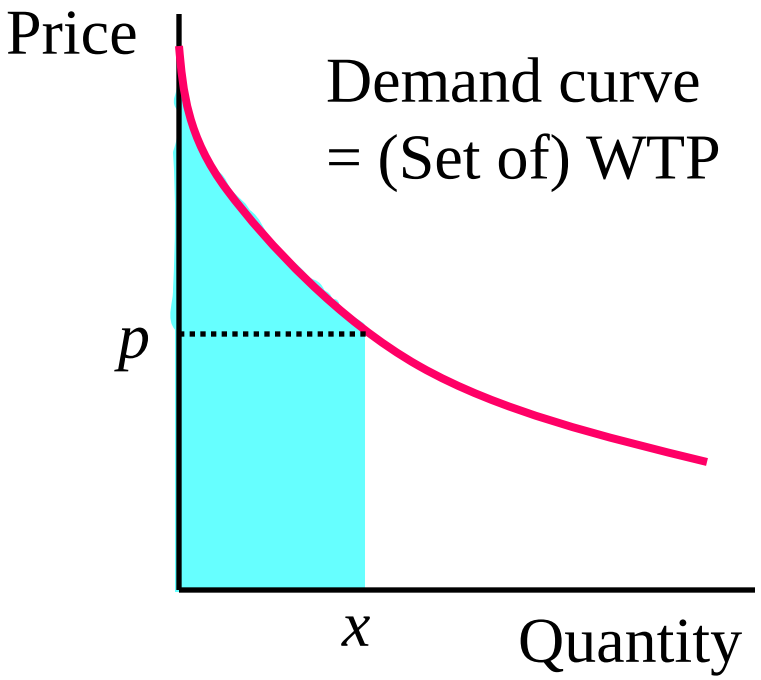
Market Equilibrium



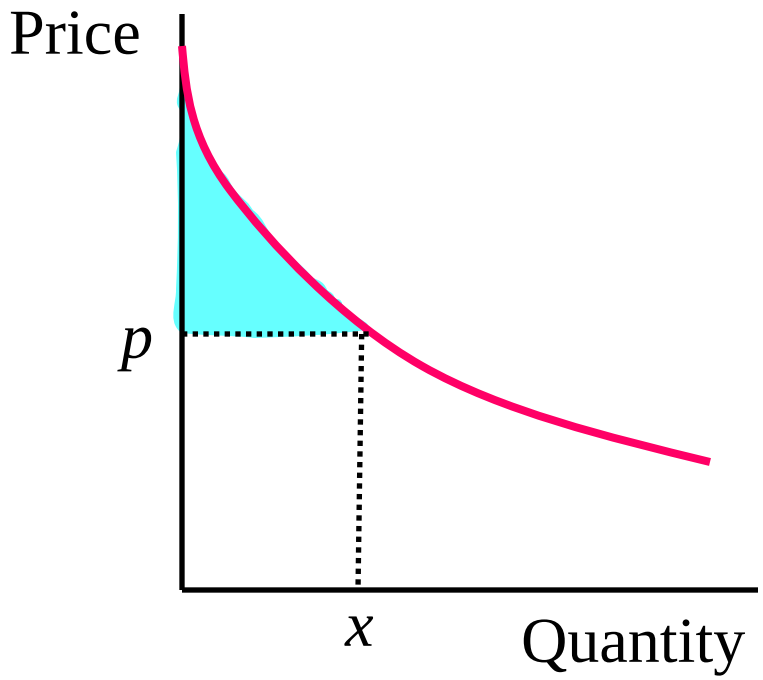


Weekend Market in Bangkok

Consumer's Surplus and Benefit



Gross Surplus



Net Surplus

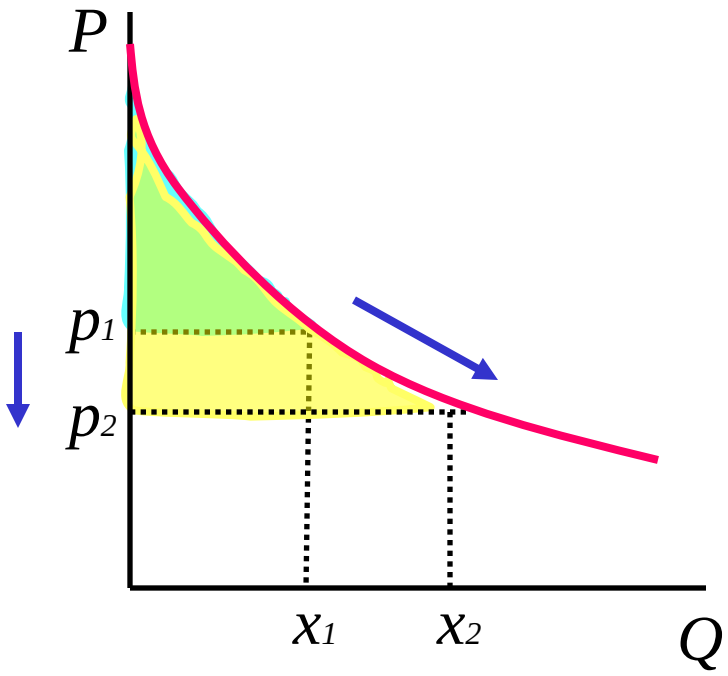
→ **Consumer's surplus**

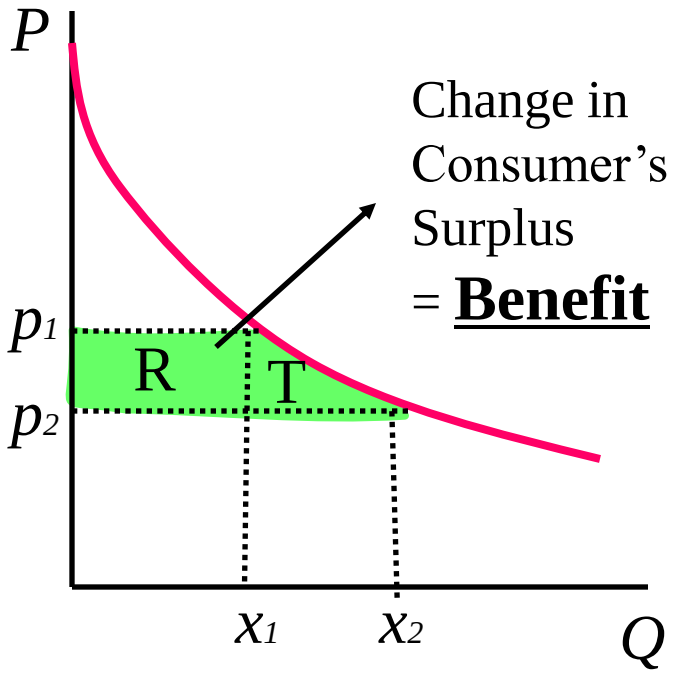
From single consumer's surplus to all the consumer's surplus

aggregate measure

Interpreting the Change in Consumer's Surplus

Impacts on the results from some policy change





Price change

e.g. fare of public transport

R: Benefit to pay less

T: Benefit to increase consumption