Chapter 9 Benefit/Cost Analysis and Public Sector Economics

- **Public sector projects**
  - Public sector projects have a primary purpose to provide services for the public good at no profit.
  - Examples include hospitals, schools, utilities (electricity, water, phone), roads, bridges, etc.
  - Public sector projects are often analyzed using benefit/cost ratio.
- **Public vs. private sector projects**

Characteristic	**Public Sector**	**Private Sector**
Size of investment	Large	More Medium to small
Life estimates	Long (30-50 years)	Short (2-25 years)
Cash flows	Costs, benefits, disbenefits	Revenues and costs
Funding	Taxes, fees, bonds, donations	Stocks, bonds, loans, owners equity
Interest rate	Low (4-8%)	High
Decision criteria	Multiple criteria (with noneconomic factors)	Based on profitability (PW, ROR)
Decision Environment	Politically inclined	Primarily economic

- **Public and private sectors partnership, BOT**
  - A modern trend is for the private sector to partner and execute public projects.
  - A popular form is BOT (Built-Operate-Transfer) where a private company is responsible for the full design, financing, and operation of a project (e.g. a highway, mobile phone network).
  - In return, the company in a BOT arrangement collects revenues (e.g. toll booth fees) for a period of time (e.g. 10 years).
  - After this period the project ownership is transferred to the government.
  - BOT is sometime referred to as BOOT (Built-Own-Operate-Transfer).
  - Sometime a BOO (Built-Own-Operate) agreement is adopted, where the company owns the project permanently.
  - BOT is a much debated idea in Lebanon's public sector especially in electricity and mobile phones.

- **Elements of benefit/cost analysis**
  - Costs - estimated expenditures to the governmental entity.
  - Benefits - economic advantages experienced by the public.
  - Disbenefits - undesirable consequences to the public.[1]

[1] Benefits and disbenefits are difficult to estimate for most public sector projects.

- **Benefit/cost analysis of one project**
  - Benefit/cost (B/C) ratio,

$$\text{B/C} = \frac{\text{value of benefits}}{\text{value of costs}}.$$

  - If B/C $\geq$ 1, accept the project. Otherwise, reject it.
  - To estimate the value use PW, AW or FW. (All give the same results – However, ratios may not be equal).
  - Conventional B/C ratio,

$$\text{B/C} = \frac{\text{benefits} - \text{disbenefits}}{\text{costs}}.$$

  - Modified B/C ratio,

$$\text{B/C} = \frac{\text{benefits} - \text{disbenefits} - \text{M\&O costs}}{\text{initial investement}}.$$

  - Both ratios give the same result.
  - Salvage values are subtracted from the denominator.

- **Comparing two alternatives with B/C analysis**
  - As with ROR analysis, incremental analysis is required.
  - Incremental analysis is done by subtracting costs and benefits (minus disbenefits, if any) of the low (initial) cost project from the other project.
  - If the resulting B/C ratio $\geq$ 1, accept the project with high cost. Otherwise, accept the project with low cost.

- With unequal life spans find the B/C ratio using PW over LCM of lives, assuming cash flows repeat over the LCM, or otherwise, over a study period.
- With long life spans in public projects, finding B/C ratio based on AW is advantageous, assuming cash flows repeat.

- **Comparing three or more alternatives with B/C analysis**
  - Rank the alternatives from smallest to largest cost.
  - Compare first alternative (with smallest cost) with the second alternative as discussed above.
  - Compare the winning alternative with the third alternative.
  - Continue with this pair-wise comparison until all alternatives are considered.

Remark. If the do-nothing alternative could be selected, then start the analysis by eliminating all the alternatives with B/C < 1. If all alternatives have B/C < 1, the do-nothing alternative wins over other alternatives considered.