



**Everyone's Smart
University**

Project Feasibility Study

Lecture 2

PMG201

Economic Analysis

Economic Analysis

Learning outcomes

- 1- Demand Estimation**
- 2- Benefit Estimation**
- 3- Cost Estimation**
- 4- Economic Feasibility Evaluation**
- 5- Ways to Attract Private Investment**
- 6- Financial Feasibility Analysis**

1- Demand Estimation

1- Demand Estimation

- 1. Transportation Projects**
- 2. Water Resources Projects**
- 3. Other Projects**
- 4. Standards to Reflect Development Plans**

1. Transportation Projects

- A. Process to Estimate Transportation Demand**
- B. Use of Data that have Public Confidence**
- C. Constancy of Total Traffic Volume**
- D. Omission of the Mode Choice Step for Road Projects**

2. Water Resources Projects

Water resources projects including those for multipurpose dams have significant impact on the public and the nation's economy and create a financial burden if they overestimate or underestimate the future demand for water in the impact areas. Water supply and demand analysis in preliminary feasibility studies is essential to ascertaining the feasibility of projects and deciding on their optimal scale.

Therefore, more rational and objective methods should be used for such analysis, and much focus should be placed on it at the step of preliminary feasibility study to ensure precise estimation.

- A. Scope and Procedures of Analysis**
- B. Water Demand Estimation**
- C. Water Supply Estimation**
- D. Analysis of Water Supply and Demand**

3. Other Projects

- ❑ Projects to build industrial, cultural, tourism, sports, and science complexes generate effects that are direct but not so great.**
- ❑ They mostly have indirect effects. As such, demand arising from indirect effects must be higher than direct demand for projects. If the main purpose of a project to form an industrial complex is to raise the competitiveness of the appropriate industry, the most important is to accurately estimate the demand to be created by the project in the industry.**
- ❑ As demand estimation can be extremely difficult in some cases, it is recommendable to estimate demand for both the best-case and worst-case scenarios.**

4. Standards to Reflect Development Plans

- ☐ **Development plans go through several steps of review by the central government or local governments from project conception to implementation.**
- ☐ **Projects can be cancelled midway, or even when implemented, and the scale and other aspects can be altered as necessary. Their implementation depends on how systematically the execution agency executes them.**
- ☐ **Development plans are an important factor in the analysis of projects' feasibility and should be included in project plans (drafts).**

2- Benefit Estimation

2- Benefit Estimation

- 1. Transportation Projects**
- 2. Water Resources Projects**
- 3. Other Projects**

Benefit estimation

- **Benefit estimation starts with the identification of benefit items. Benefit items vary greatly according to the characteristics and contents of projects, and they need to be subdivided according to project plans submitted by the competent ministry. Once they are identified, opportunity cost or value per unit is calculated by item to estimate benefits.**

1- Transportation Projects

- Investment projects of transportation facilities generate direct benefits for transportation and indirect social benefits.
- Direct benefits generated by transportation projects for users of transportation facilities include savings in vehicle operating costs, travel time, and accident costs as well as increased pleasure, improvements in punctuality, greater safety, and such.
- It is relatively easy to put a monetary value on the first three items, but it is difficult to do so for the others as their value can vary according to individuals' subjective levels of satisfaction.
- For railroad projects, the benefits resulting from shifts in demand from aviation and shipping and benefits from reductions in accidents and delays thanks to improved crosswalks need to be reflected, but quantifying these benefits is difficult.

2. Water Resources Projects

- **It is not easy to classify the benefits of water resources projects as direct or indirect or as tangible or intangible and to suggest calculation methods for each project.**

3. Other Projects

- **As in demand estimation, the benefit estimation method differs slightly for different projects of building industrial, cultural, tourism, sports and science complexes as they are each of somewhat different character.**
- **The benefits of industrial complexes can be derived from the revenue of additional added value or industrial production that will occur as a result of their formation. When calculating expected added value, simple transfer income, namely, revenue expected to be transferred from other regions or projects should be excluded.**

3- Cost Estimation

3- Cost Estimation

- 1. Transportation Projects**
- 2. Water Resources Projects**
- 3. Other Projects**
- 4. Calculation Standards for Land Acquisition Costs**
- 5. Calculation Standards for Contingency Reserves**

III. Cost Estimation

- **Cost estimation also differs depending on the nature and specifics of projects. Project costs can be largely divided into construction costs, land acquisition costs, Operating and Maintenance costs (O&M costs), etc.**
- **Construction costs refer to the entirety of project costs minus lot purchase costs and additional facility costs, and, land acquisition costs are the costs of buying lots in the project area and compensation costs. O&M costs include not only initial investment costs but also ordinary operating costs that even consider life cycle costs to maintain the functions of fixed assets like land, buildings, and facilities.**
- **The following reviews and suggests cost estimation methods for transportation, water resources, and other projects:**

1. Transportation Projects

Cost analysis should be done differently for different transportation projects to build expressways, roads, bridges, railroads, ports, and airports.

A. Road Projects

B. Railroad Projects

2. Water Resources Projects

- **Cost estimation for water resources projects should be divided for dam construction, river conservation work, etc. With regard to cost estimation, different types of construction comprise dam and river projects. For more details on cost estimation by construction type, refer to the ‘Study on the Sectoral Guidelines for Preliminary feasibility Studies for Water Resources Projects (fourth edition)’ (hereinafter ‘Sectoral Guidelines for Water Resources Projects (fourth edition)’).**

3. Other Projects

- **Initial investment in forming cultural, tourism, sports, and science complexes includes construction costs, land acquisition costs, and other costs. The costs are to be estimated based on the size and characteristics of facilities, but unit prices need to be separately determined by the preliminary feasibility study team.**

4. Calculation Standards for Land Acquisition Costs

- Land acquisition costs in preliminary feasibility studies are purchase costs of and and compensation for obstructions when eminent domain is exercised.
- Purchase costs of land are those to buy lots required for public interest projects targeted by preliminary feasibility studies.
- Compensation for obstructions refers to money paid to remove things like buildings, structures,

5. Calculation Standards for Contingency Reserves

- **To review the feasibility of investment projects, contingency reserves must be included as a cost item.**
- **The process of pushing ahead with a project inevitably entails numerous unexpected events and contingency reserves should be set aside against them.**
- **Contingency reserves are to be set at 10% of the total project costs including VAT.**

4- Economic Feasibility Evaluation

4- Economic Feasibility Evaluation

- 1. Analysis Methods**
- 2. Social Discount Rate**
- 3. Processing of Transfer Payments Including Taxes**
- 4. Base Day of Analyst**
- 5. Processing of Salvage Value sis, Period of Analysis, Etc.**
- 6. Sensitivity Analysis**

Economic Feasibility Evaluation

- **Economic Feasibility is evaluated using the benefit and cost numbers from the above estimation of demand, benefits, and costs. Evaluation of economic feasibility basically depends on cost-benefit analysis.**

1. Analysis Methods

- **A Benefit-Cost Ratio (BCR) is first calculated to evaluate economic feasibility. A BCR is the ratio of benefits to costs where both benefits and costs are expressed as discounted present values. In other words, costs and benefits to occur in the future are converted into present values, and the present value of benefits is divided by that of costs.**

2. Social Discount Rate

- **One of the most important parameters used in the economic feasibility evaluation of government-financed projects is the social discount rate. Discounted benefit and cost values are determined by the social discount rate, and as a result, the BCR. Determination of the social discount rate is an absolute determinant of economic feasibility.**

3. Processing of Transfer Payments Including Taxes

- In economic analysis, transfer payments like taxes should not be regarded as pure economic costs. Transfer payments are transfers from one entity to another, and they can be costs or benefits depending on the relevant party in financial feasibility analysis.
- However, they do not have any effect on national finances in economic analysis. Preliminary feasibility studies should attempt analysis that excludes transfer payments like taxes as much as possible, but it is in practice difficult to determine how to deduct taxes in the different types of projects.

4. Base Day of Analysis, Period of Analysis, Etc.

- In economic feasibility evaluation, all the benefits and costs should be discounted at the same point of time. As benefits and costs occur at different points of time, they should be reconciled as the values of the same point of time using a discount rate. This makes them comparable.
- Preliminary feasibility studies under these Guidelines are to use the end of a year prior to a year when analysis of the concerned project commenced

5. Processing of Salvage Value

- **Salvage value is closely related to the duration of the concerned facility and the analysis period of economic feasibility. For instance, a road is paved again some 15 years after completion.**
- **Such repaving does not require much reinvestment; only ordinary maintenance and operation costs are incurred each year. What preliminary feasibility studies, therefore, consider as salvage value in a road project is acquisition costs of land.**
- **The study team should set acquisition costs of land as salvage value in a road project and deduct them from the costs of the final year of analysis.**

6. Sensitivity Analysis

- The calculation of benefits and costs in economic analysis used to evaluate feasibility engenders many uncertainties. Sensitivity analysis is often conducted to deal with these uncertainties. This analysis looks at how economic feasibility changes when each important variable that can affect investment costs or economic feasibility like initial construction costs, operating costs, demand for transportation, discount rates, etc. changes by a certain degree.**
- Preliminary feasibility studies conduct sensitivity analysis about these variables. The scope and methods of sensitivity analysis can differ slightly depending on the type of a project.**

5- Ways to Attract Private Investment

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- 1. Background and Purpose of Review**
- 2. Review of the Possibility of Private Investment at the Step of Preliminary Feasibility Study**

1. Background and Purpose of Review

- **Preliminary Feasibility Studies are designed to transparently and fairly determine whether to invest in large-scale public investment projects based on priorities to prevent budget waste and help increase efficiency in public investment management.**
- **They also provide sufficient objective and neutral data in advance for project plans established by each ministry like their feasibility, review of alternatives, and considerations to make so that rational decisions can be made regarding whether to pursue them, a proper time to implement them, and their optimal scale, etc.**

2. Review of the Possibility of Private Investment at the Step of Preliminary Feasibility Study

- **A. Process to Review the Possibility of Private Investment**
- **B. Checklist Items to Evaluate the Possibility of Private Investment**
- **C. First-Step Checklist Evaluation**
- **D. Financial Feasibility Analysis**
- **E. Second-Step Checklist Evaluation**

6- Financial Feasibility Analysis

6- Financial Feasibility Analysis

1. Comparison between Economic Feasibility Analysis and Financial Feasibility Analysis
2. Basic Assumptions
3. Analysis Methods
4. Cost & Income Estimation and Feasibility Analysis
5. Financial Discount Rate Calculation
6. Calculation of a Minimum Rate of Government Financial Support

6- Financial Feasibility Analysis

- Financial feasibility analysis is conducted for projects of which feasibility in **terms** of law and policy is recognized at the first-step of checklist evaluation and that can be pursued as BTO projects, or for those proposed as BTO projects in the project plan submitted by the responsible department.
- Even projects which are not profitable enough to be pursued by a private party can be pursued as PPP projects with some level of government financial support if they are more suitable to be pursued by such party in terms of creativity and efficiency. In this case, financial feasibility analysis needs to be conducted to ascertain an appropriate amount of government financial support.

1. Comparison between Economic Feasibility Analysis and Financial Feasibility Analysis

- **Economic feasibility analysis is to measure public projects' costs and benefits from the perspective of the entire nation (society) and accordingly to calculate their economic profitability and to determine their feasibility.**
- **In comparison, financial feasibility analysis estimates actual monetary costs and cash flows from the perspective of individual parties responsible for projects, not the entire society, and accordingly calculates financial profitability to ascertain projects' feasibility.**

2. Basic Assumptions

- A. Investment Methods of Projects**
- B. Base Year of Analysis, Analysis Period, & Completion Rate**
- C. Salvage Value**
- D. Taxes and Charges, Financing Costs, and Interest Rates**
- E. Supplementary Projects**

3. Analysis Methods

- **The most commonly used discounted cash flow methods are used for financial feasibility analysis.**

4. Cost & Income Estimation and Feasibility Analysis

A. Definition of Cash Flows

B. General Principles for Cash Flow Estimation

C. Guidelines for Income and Cost Estimation

5. Financial Discount Rate Calculation

- A. Assumption of the Capital Cost of Debt**
- B. Assumption of the Capital Cost of Equity**
- C. Assumption of the Weighted Average Cost of Capital**
- D. Calculation of a Real Discount Rate**

6. Calculation of a Minimum Rate of Government Financial Support

- **Some public investment projects that are economically but not financially feasible are implemented as PPP projects with some level of government financial support.**
- **Financial feasibility analysis should assume cases where financial support is provided for some of the construction costs and cases where financial support is provided so that the FNPV becomes zero, except for cases when projects are 100% privately financed.**