Transportation Costs

John K. Abraham

To Who?

- Users
  - Fares, tolls and other direct costs
  - Discomfort, fatigue
- System Owner-Provider
  - Construction, operation, Maintenance
- Nonuser
  - Land value
  - Environmental degradation
- Government
  - Subsidies, grants
  - Loss of tax revenues
- Region
  - Usually indirect – altered growth etc.
Transportation Costs

- Initial Investment (Capital)
  - Right-of-Way, Grading
  - Paving,
- Maintenance and Operations (Annual)
  - Pavement, Mowing, Sanding
  - Painting, Signals and signs, other
- Salvage
  - materials, ROW?

Cost-Output Relationships
Cost-Output Relationships

Cost, $ vs. $\text{output/day}$

- $\text{MC}(x)$, marginal cost
- $\text{ATC}(x)$, average total cost

Cost-Output Relationships

Cost $ vs. $\text{output/day}$

- $\text{TC}(x)$, total cost
- $\text{VC}(x)$, variable cost
- $\text{FC}$, fixed cost
Joint Costs

- Costs incurred in the production of one product which is produced using a technology that yields another product.
Economic Analysis

- No product to sell
- Highway at lowest cost with acceptable LOS
- Work under direction of public for the benefit of the public
- Integral part of engineering design:
  - Advise management and policy makers of best design alternative

Private Investments

- No interest in the selling agency and vice-versa
- Option of buying as much as required
- Material gratification
- Tangible costs and benefits

CLASSICAL ECONOMIC ANALYSIS IS APPROPRIATE
Transportation Service

- Unique
- Economic principles may be same
- Designers and engineers are a part of the Transportation Department
- Official agents of the public
- No profit motive - rather public service motive

Consequences of Highway Improvement

- Commodity savings
- Travel time reductions
- Personal preferences
- Community consequences
Commodity Savings

- Construction materials, motor vehicle fuel, tires, medical supplies, hospital service and others
- Reduction in motor vehicle running costs

Travel Time Reductions

- Time has value, but is not money.
- Serves as a medium thru’ which wages or salary may be earned
- This earning may be used to pay for the highway or other activities
- Does not mean a new highway will make the users richer
Personal Preferences

- Non monetary satisfactions - comfort, convenience, uniform speed
- These benefits may lead the user to pay from reducing the expenses on food, shelter, clothing...
- May not be used for justification of highway construction costs, but indicates preference of the user to spend
- May result in higher productivity

Community Consequences

- Aesthetics
- Business and trade
- Community pride
- Land values
- Postal services, fire, EMS, health
- Recreation
- Utility services

ALL ARE NON-MONETARY
Present Worth of Costs

- Combines all investment costs and expenses into a single present worth sum
  - Lowest PWC is best

Net Present Value

- Difference between PW of inward and outward cash flow
  - Greater NPV-the better
- Economists’ favorite
- Applicable to single alternative analysis
- Also to mutually exclusive alternatives
  - Greatest NPV wins
Why Study Costs / Economic Analysis

- One of the criteria for evaluating different designs / alternatives
- Different groups of people pay different costs – need to know for planning
- Costs vary over time and need to take into consideration economic factors
- Important to know the types of costs so that they may be appropriately used in analysis