

Urban Transportation, Land Use, and the Environment in Latin America: A Case Study Approach

Lecture 4 Part 1:

A. Urban Transport Finance

B. Traditional Planning Approaches

Urban Transport Finance: An “Ideal” World

- *fuel costs* to cover resource cost (the border price) and carbon emissions (directly proportional to fuel consumption);
- *road maintenance and congestion costs* charged directly through highly differentiated tolls;
- *environmental costs* charged through emission charges;
- *redistribution objectives* be pursued through non-distorting lump sum taxes.
- Simultaneous application of different charging mechanisms – allocate costs to users responsible for them, in direct proportion to costs imposed.

The “Real” World

- Infrastructure Separated from Operations
- Multiple (sometimes competing) Objectives of Urban Transport Policy
- Multiple Sources, Potential Sources
- Multiple Agencies at Different Levels of Government

Government Levels

Central Government Transfers

- Major (capital) cities often have benefit (liability) of full financing by central government
- Central governments will provide matching funding for capital costs, recurring costs (operations, maintenance) the responsibility of local governments – produces an infrastructure building bias.

Local Government Borrowing

- Local governments often do not have this authority
- If allowed, requires securitization –i.e., general municipal revenues, toll revenues, etc.

Instruments

- General Taxes, Fees
- Real Estate Taxes and Related Value Capture
- Direct and Indirect Service Charges
 - Fares, Parking Fees, Tolls, Fuel Taxes

General Taxes, Fees

- Special Vehicle Sales Taxes
 - Denmark, Hong Kong, Singapore examples
- Typically central government responsibility in developing countries (i.e., national sales tax)
 - even vehicle registration and property taxes often set by national government (though often locally collected).
- Registration fees often the most valuable related source for local governments
 - sometimes used for redistribution purposes
 - can correct for road wear effect
- Other mechanisms sometimes used
 - i.e., “val transporte” in Brazil, imposed on employers to finance part of the commuting costs of their employees

Property Taxes & Related Value Capture

- Based on principle of “beneficiary should pay”
 - infrastructure brings value to land (accessibility), at least part of that increased value should be returned to investor (i.e., govt).
 - Property taxes, betterment taxes, impact fees.
- May also, at times, be used for redistribution

Value Capture - Challenges

- Property taxes
 - collected after investment (thus require bonds/loans)
 - assessments are very rarely updated
 - rates are low
 - investment source not necessarily linked to tax
- “Betterment” taxes
 - not easy to assess or apply in practice, especially if directly linked to the increment in value of the land
 - Might be directly linked to the cost of providing the infrastructure (impact fee).
 - Require good development controls.
- Land speculation, “clientelism” of the spatial allocation of public investment, lack of participation in planning.

Direct Service Charges

- Tolls - revenue to the supplying authority
 - rare in urban areas, on some limited access highways,
 - increasing with use of concessions.
 - Congestion fees: a “tax” or a fee/charge?
 - Legally important – which government level has right?
 - Politically important – not “just another tax”
- Parking fees – local government source and/or private sector (garages, lots).
 - Congestion proxy - by varying by time and place (still cannot deter through-driving nor reflect distances/routes)
- Public transport charges and financing – Detailed later

Indirect Service Charge – Fuel Tax

Effectiveness

- *Road maintenance* - does not differentiate well by vehicle type, needs supplemental axle weight charge.
- *Congestion charge* - not time and place specific
- *Environmental charge* – except for carbon, most emissions not proportional to consumption
- *Distributional purposes* – the right combination of low price elasticity and high income elasticity, promising income redistributor in developing world

Advantages

- *Exists* – political, administrative ease
- *Distance-basis* – potential to include other currently fixed charges (i.e., insurance)

Fuel Taxes - Challenges

- Multiple fuels, multiple sectors, multiple objectives. Ex:
 - Diesel: local air pollution may warrant high tax, but as primary road freight transport fuel (intermediate input, not final consumption good), deserves relatively low tax burden.
 - Kerosene: low tax, even subsidized since it is low income household fuel
 - But, lower diesel/kerosene taxes encourages vehicle substitution (diesel for gasoline) or fuel adulteration (kerosene mixed with diesel).
- Using fuel taxes as proxy for local impacts (congestion, pollution) may cause ‘fuel carrying’ from nearby regions.
- Fuel tax almost always national, revenues to central govt.
 - for city-level purposes, requires national agreement on allocation of all transport related tax revenues and expenditure responsibilities

Direct/Indirect Fee - Guidelines

- Fuel should never cost less than border price.
- Congestion charges should vary by time of day, reflect different vehicle types' congestion contribution
- Maintenance costs should be recouped on a variable impact basis (standard axle kilometers). At minimum, wear and tear cost incorporated partly in fuel tax & partly in vehicle category related charges (preferably usage based).
- Environmental & Public Accident Costs recouped through local fuel tax and insurance surcharges.
- “Luxury” taxes (i.e. using road fees for non-transport reasons) on passenger (not freight) transport.
- With diesel taxed lower, compensating tax on diesel powered light passenger vehicles.
- Coordination, comprehensive strategy crucial

Public Transport Pricing and Financing

Primary Objective

- Generate revenues to ensure an efficient and adequate supply of public transport service.

Additionally

- Contribute to the reduction of congestion and environmental impact of road traffic;
- Allow efficient coordination between public transport modes;
- Reduce (alleviate) poverty.

Influencing Factors

- Level of Government (decentralization), source of subsidy (national, local), supply fragmentation (service/infrastructure, public/private)

Public Transport Pricing and Financing

Two Basic Needs

1. “doing the right thing” – provide best range of services with the resources available
 - Pure market outcome may not be optimal (equity and efficiency grounds)
 - Government intervention required
2. “doing the thing right” – Supply the services at the least possible cost
 - Via commercial competition
 - Reduce subsidy requirement via improved efficiency, reduced costs
 - Target needed subsidies at the objectives, embody them in competitive framework

Public Transport Competition and Pricing Implications

- Pure commercial/competitive operations of mixed mode system will produce sub-optimal usage for modes with the greatest proportion of fixed cost (i.e., empty trains and overfull buses).

Also affects the service structure

- How to structure commercial operations to take advantage of modal complementarity – i.e., small buses, minibuses off of major trunk corridors, buses feeding into rail systems instead of competing with them?

Public Transport Subsidy Issues

Efficiency

- Macroeconomic effects – inflationary impacts
- Subsidies and Congestion – with system-wide congestion, general public transport subsidy can be justified. But:
 - Benefits must outweigh reduced supply efficiencies
 - Targeting challenge – Peak period public transport subsidy (shift demand from off-peak); with spatial variation, route by route subsidies, difficult to implement.
 - Actual modal shift achieved? Empirical evidence suggests low cross elasticity of demand for auto use w/r to public transport price – weak leverage at high cost?
 - Perverse land use effects – All transport ends up subsidized, increased travel and sprawl.

Public Transport Subsidy Issues

Equity

- Subsidized fares should be progressively financed (i.e., progressive income tax, tax on private motor vehicles); lack of sustained financing will reduce service quality and quantity.
- *Fare structure*. Flat fares considered equitable
 - cross-subsidy – by short trips to longer (poor) trips
 - but, may discourage short trips; may be best handled in other ways (i.e., targeted to lower incomes).
- *Integrated Fares* – efficient bus and rail integration might require bus cross-subsidy to rail (feeder)
 - but bus user is typically poorer.
- *Fare reductions or exemptions*
 - should be poverty-targeted and subsidized via redistribution.

Infrastructure Finance – Private Sector Concessions

- i.e., BOT, DBOM, BOO, etc.
- Justifications
 - State’s poor performance in infrastructure delivery or, inability to keep up with investment needs.
 - Delivery efficiencies in terms of saved time and resources;
 - Partial risk transfer to the private sector;
 - Independent and multiple verification of project feasibility (filtering out of “white elephants”);
 - Potential introduction of technology & delivery innovations;
 - Improved value from different quality, price, delivery time combinations;
 - Reduced public sector staffing needs; and
 - Reduction of political pressures on tolls or fares.

Infrastructure Finance – Private Sector Concessions

- Criticisms

- Government guarantees reduce purported private sector efficiency incentives.
- Compounded in urban transport due to high investment costs, no alternative use of infrastructure, and highly uncertain demand estimates.
- Challenges regarding exclusivity of service and the need for infrastructure and service integration with a larger network.

Infrastructure Concession – Project Characteristics Related to Success

- Rodriguez (1999) examines 6 projects in Latin America
 - Buenos Aires Suburban Railway, BA Subway, BA Access Roads, Sao Paulo State Busway, Sao Paulo Municipal Busway, Bogota Busway
- Limited analysis, but concludes successful implementation (financial closure) depends on:
 1. Capital Investment – high capital costs, asset indivisibility
 2. Concession Period
 3. Exclusivity – urban transportation, intermodal competition, demand uncertainty
 4. Fare/Toll Setting Authority
 5. Policy Risks – developing countries, incipient financial markets

Conclusion: Success seems associated with low capital requirements, concession duration

Infrastructure Concessions – Lessons to Date

1. Institutional Context

- Clear transport policy and overall strategy for the sector (concessions as component, *not* driving force);
- economic/political stability;
- competent government sponsor, defining well project scope, competitive framework;
- Solid legal and regulatory framework;
- public participation.
- Private sector (including financial sector) capable of responding

2. Concession Design

- simplified, yet comprehensive evaluation process (technical and economic merit); account for ultimate modifications

3. Modal considerations

- highways dominate concessions, though innovative rail has been seen; busways less successful to date.

Infrastructure Concessions – Outstanding Questions

1. External costs (benefits)
2. Effects on political patronage
3. Proper regulatory structure
4. Busways
5. Long-term enterprise viability.

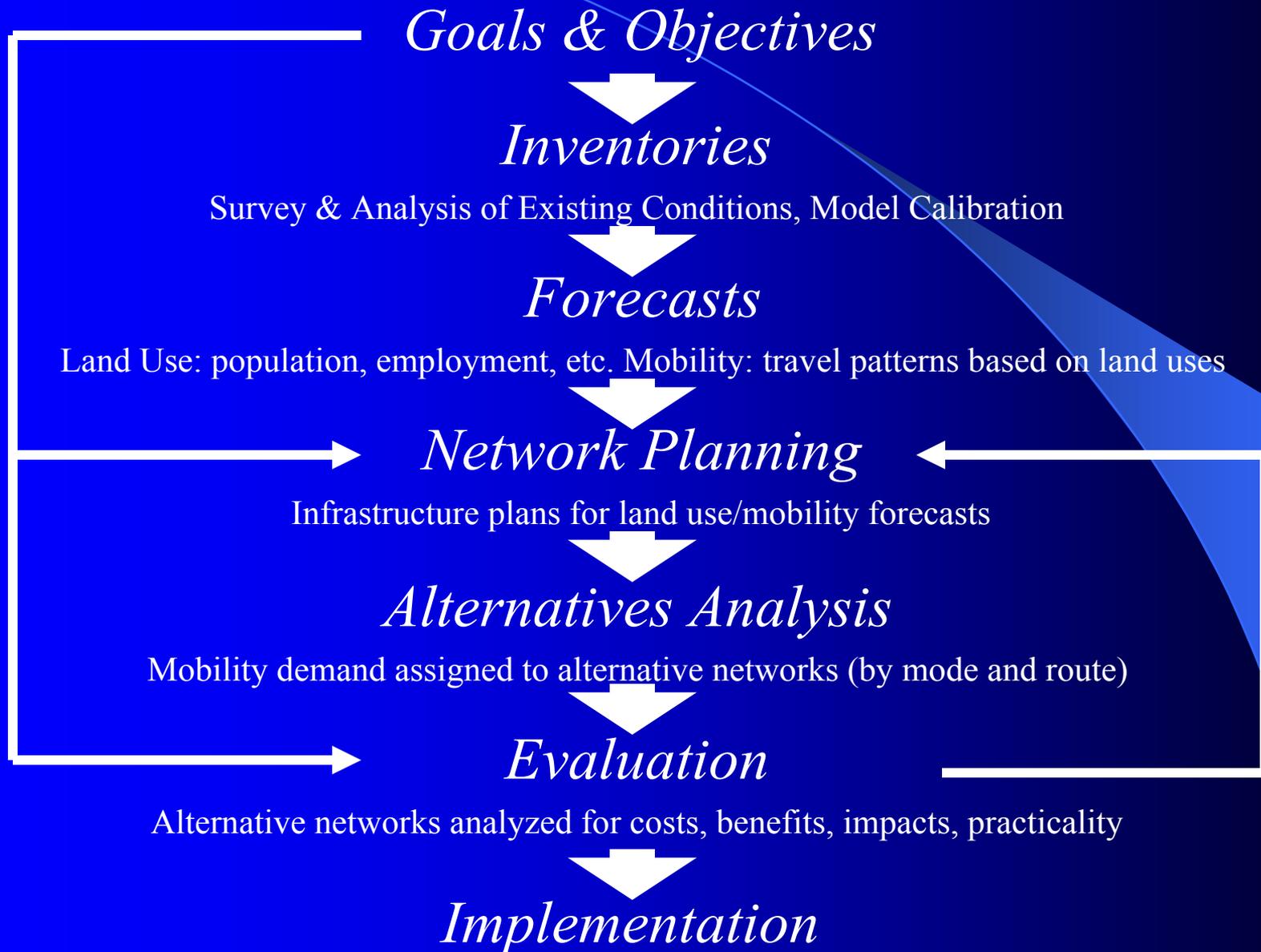
Finance Coordination – Key Issues

1. System wide approach rather than a strict financial balance for individual modes or suppliers.
2. Future of congestion charging will depend on proposed uses of revenue
 - need to combine transport service objectives with social/fiscal goals – fair actual (and perceived) distribution of resources.

Finance Coordination – Key Issues

3. Likely need for a secure, “ring fenced” fund, i.e., *Urban Transport Fund*
 - Collecting all related finances (taxes, transfers, etc.) and financing all transport expenditures
 - Administered by Executive –
 - local political authority (being considered in Buenos Aires),
 - joint committee of contiguous authorities (being developed in many large, multi-jurisdictional Brazilian urban areas).
 - Requires:
 - strong project appraisal;
 - project funding linked to agreed upon urban development plan;
 - could allow for channeling of central govt transfers through block funds, allow local areas to determine how best to spend.

The Urban Transportation Planning Process



Conventional Travel Models

Data Inputs

Inventories and forecasts of population, land uses, travel behavior, etc.

Trip Generation

Predicts number of trips produced and attracted in a given zone

Trip Distribution

Produces trip production and attraction for each zone

Modal Split

Predicts mode share typically for auto and public transport (can include walk, bike)

Trip Assignment

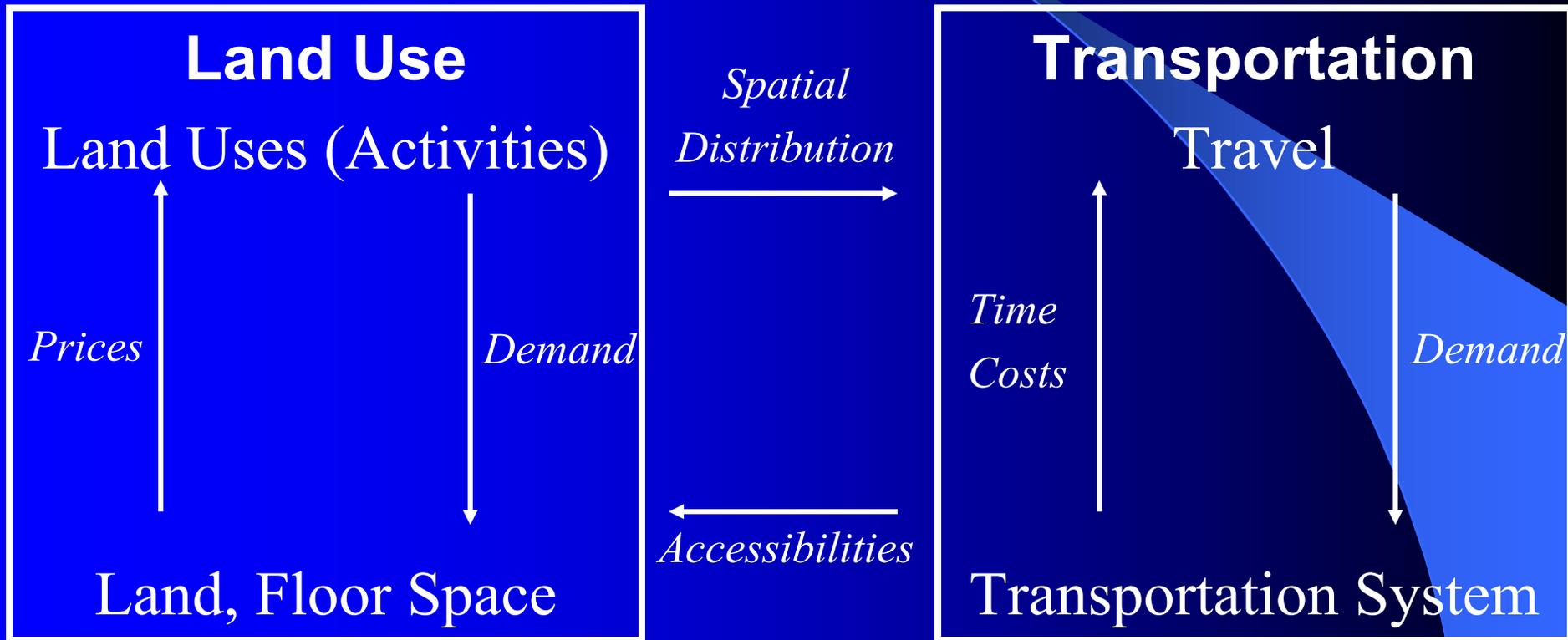
Assigns trips to their respective networks

System Outputs

Provides, for each link, data including traffic volumes, speeds, vehicle mix

→ *Emissions Model (i.e., MOBILE)*

Land Use-Transport Models



Some Shortcomings & Criticisms

Planning Approach

- Project-oriented
 - originally designed for highway planning – narrow focus
 - Ignores fundamental relationships (i.e., land use-transport)
- Forecast-based:
 - based on existing trends, not goal-based
 - perpetuate the existing system
- Technocratic process
 - Role of politicians? General public? Links to funding realities

Some Shortcomings & Criticisms

Modeling

- Theoretical Problems
 - Each step quite simplified
 - Home-to-work focus; difficulty in capturing chained trips
 - Internal consistency among the four steps - i.e., generation affected by assignment; iteration only partly fixes this; direct demand models extremely complex.
 - Practical Land use-Transport models, still quite simplified representations
- Application Problems
 - Historical definition of a trip; size of analysis zones
 - Treatment of non-motorized modes, other factor analysis in mode choice
 - Data quality
 - Disconnect between travel models and emissions models

Modeling - Promise

- Technology advances
 - Computing power, GIS
- Theoretical advances
 - Direct-demand models
 - Integrated transport-use models
 - Activity modeling
 - Transport-Emissions modeling
- Practical advances
 - Mode consideration
 - Lower-cost data collection methods

What do the modeling advances really buy us?

Shortcomings & Criticisms Specific to Developing World

- Technical
 - Reliability of forecasts
 - Socioeconomic, vehicle fleets, land development patterns
 - Modal considerations
 - Effective treatment of public transport (multi-operator environment), consideration of non-motorized modes
 - Travel behavior
 - Fundamentally different in developing country context?
 - Availability & Reliability of Data
 - Availability of Local Technical Expertise
 - Dependence on foreign consultants

Shortcomings & Criticisms Specific to Developing World

- Strategic
 - Long term proposals fail to consider steps to get there (financing, politics, stability)
- Political
 - Insularity of the planning process, lack of transparency of decision-making tools
- Ideological
 - bias towards certain modes in projections, mode choice models, and evaluation
- Appraisal
 - treatment of environment, accidents, comparability of investment/operating costs with health, value of life, value of time (for mode choice) and for project evaluation