Techniques for Evaluation of Infrastructure Projects

Submitted by: IDB
Techniques for Evaluation of Infrastructure Projects

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Conceptual Framework

- Different methodological approaches
  - Net Present Value
  - Multicriteria Analysis
  - Infrastructure and equality
  - Hedonic Prices
  - Gender (Composition of technical teams)
Institutional setting and methodological approaches

• Fiscal Federalism and decentralized investment in USA
• Central government level decision making with technical rigor: The Latin American experience
• The role of minimal standards in analyzing investments
Review of literature on institutions and public investment

• The role of government
• Investment in a decentralized government structure
• Barry Weingast’s “Tragic Brilliance”
• Strengthening fiscal pillars of local governance
• Planning as a coordinating tool among different levels of government and sectors.
Decentralization and Territorial Comparative Advantage

• Each level of government has a set of spending and investing responsibilities.
• Planning or coordination or both?
• Economy-wide vision with local complementarities
• Gap Analysis at the central level
• Gap analysis at the regional and local levels
• Who funds what type of infrastructure?
• The role of APP’s
Institutional Context of Public Investment Management and Execution: Planning, Decentralization, Coordination
Infrastructure gaps are not being resolved

Global investment needs by sector, 2016-30

Closing infrastructure gaps drive infrastructure plans

<table>
<thead>
<tr>
<th>Issue</th>
<th>Number of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport bottlenecks</td>
<td>17</td>
</tr>
<tr>
<td>Demography</td>
<td>14</td>
</tr>
<tr>
<td>Regional imbalances</td>
<td>13</td>
</tr>
<tr>
<td>Asset maintenance</td>
<td>11</td>
</tr>
<tr>
<td>Provision of basic infrastructure</td>
<td>11</td>
</tr>
<tr>
<td>Climate change mitigation</td>
<td>10</td>
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<tr>
<td>Digital Economy</td>
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<tr>
<td>Research and Development</td>
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<tr>
<td>Social imbalances</td>
<td>9</td>
</tr>
<tr>
<td>Adaptation to climate change</td>
<td>9</td>
</tr>
<tr>
<td>Fiscal pressures</td>
<td>8</td>
</tr>
<tr>
<td>Depreciation of capital stock</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: OECD (2018), Survey on Capital Budgeting and Infrastructure Governance
Public Investment is a Shared responsibility among different levels of government: The role of decentralization

Subnational Public Investment in OECD and LAC countries

Note: 2013 for Latin American countries and New Zealand, 2012 for Australia and 2011 for Turkey. OECD averages are weighted.

Examples
Application of new management practices and tools to Peru: From SNIP to Invierte.pe
Why the Reform?

• Economic and institutional reasons behind the reform
• The need to manage the investment cycle
• The need to strengthen coordination between investment office and budgeting
• The need to strengthen management, technical, and information gaps at the local level
• The role of technology
Growth of public investment in Peru prior to the reform

The role of local governments in preparing and executing public investment increased between 2006 - 2014.

Spending executed by level of government - Perú
(Millions of New Soles)

Fuente: Cálculos propios FMM.
¿How did Peru invest in 2014?

Central Government

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Protección Social</td>
<td>0%</td>
</tr>
<tr>
<td>Act. recreativas, Vivienda y Serv.</td>
<td>1%</td>
</tr>
<tr>
<td>Servicios Públicos</td>
<td>5%</td>
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<tr>
<td>Otras Act. Econ.</td>
<td>8%</td>
</tr>
<tr>
<td>Defensa</td>
<td>11%</td>
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</table>

Regional Governments

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defensa</td>
<td>0%</td>
</tr>
<tr>
<td>Energía</td>
<td>2%</td>
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<tr>
<td>Servicios Públicos</td>
<td>15%</td>
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<tr>
<td>Educación</td>
<td>28%</td>
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</table>

Local Governments

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educación</td>
<td>25%</td>
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<tr>
<td>Servicios Públicos</td>
<td>13%</td>
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<tr>
<td>Salud</td>
<td>7%</td>
</tr>
<tr>
<td>Defensa</td>
<td>0%</td>
</tr>
</tbody>
</table>

Fuente: Cálculos propios FMM.
Example of Infrastructure gaps in Peru (2016)

- Stock of highway network represents one third of the LAC’s region. Peruvian economists: Zambrano y Aguilera (2011) estimated that the highway gap is 15% of GDP

- Gap in electricity is 11% of GDP; highway quality is 5% of GDP; and water and sanitation is 0.6% of GDP
III. Focusing on measuring and closing infrastructure and service Gaps through the Public Investment Cycle: New Technical Approach and Methods
The new approach: Focus on closing gaps and manage the full investment cycle

• Develop infrastructure gap analysis as the basis for a new multiyear investment plan
• Improve coordination on budgeting priorities
• Strengthen local institutions and human capital
• Introduce technological tools to gather information to foster better monitor and control of the investment cycle
• Introduce the infrastructure acquisition process as part of the investment cycle
• Promote ex – post analysis to measure development impact of public investment
Estimating gap on Health sector: Example in Argentina

- **Index of Need**: Algorithm that estimates the need of a given population group to have Access to a Health Unit in the territory, as a function of population density and their distance to the asset.

- **Index** is estimated as a function of accessibility to existing infrastructure (quantity and capacity of hospitals, population and distance to hospitals).
Multi criteria approach in Argentina to measure infrastructure gaps

### Units of measurement
- Renovation outpatient clinics
- Renovation in patient hospitals
- Digital tools for imaging diagnostics
- Updating medical equipment

### Sectoral Gaps
1. **Health Gap**

### Total Gap
- **Total Infrastructure Gap**

### Basic level on infrastructure
- Intermediate level of infrastructure
- Equipment
- Connectivity

### Education Gap

### Gap on low income neighborhoods
Infrastructure and Inequality
Could Long-Term Investments in Infrastructure Reduce Inequality?

- Test for possible link b/w infrastructure and inequality:
- use US state-level panel data from 1950 to 2010
- Ginis data from van der Weide and Milanovic (2014):
  - bottom 40% and top 40%
- Infrastructure data from US Census Bureau:
  - health, education, highways, judicial, etc
- Regress Ginis in year t on real growth rate of infrastructure
  - spending in decade prior to time T

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Measuring the impact of infrastructure spending (or lack thereof) on equality

- Inequality correlates negatively with past infrastructure spending growth
- Highways and higher education spending most significant
- Results stronger with bottom inequality and for highways
- Data neither reject causal effect from infrastr. to inequality
- nor support reverse pattern (caveat: no causality test)
- Counterfactual exercise identifies losers.winners
Winners and Losers for Highway growth
Winners and losers due to higher education growth
Closing infrastructure gaps that affect equality: The example of USA

• Lack of infrastructure in education affects test results and access to higher levels of education in the medium term

• Lack of investment in roads and networks affect generation of economic opportunities in the long run
Gender Composition of Evaluating Teams Matters
Introducing variables to close environmental and gender gaps

• IDB studies show that more women participating in the investment cycle decision making process promotes more investments in health, education, climate resilience infrastructure.

• IDB study by Yanez-Pagan 2014.
Using hedonic pricing to measure Gaps in Urban Quality of Life: Lack of basic infrastructure and amenities

- Households that lack solid waste management services, report a 13% lower level of life satisfaction than households that enjoy the Service.
- These households are situated in the lower two income deciles.
- Individuals who have solid waste management services that have a coverage that is 10% lower than average, report:
  - 1% lower level of life satisfaction.
  - 2% lower level of satisfaction with the neighborhood.
  - Furthermore, housing values fall around 3% of their market value.

Source: Quality of Life in City of Guatemala, 2012, (IDB)
Final Thoughts

- Need to expand the theoretical framework to new methods of project analysis
- Variety of technical approaches influenced by institutional arrangements
- Team composition matter
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Best Practices on Public Investment Systems (EC 08 2018A)