

TA 4581: Developing a National Result-Based
M&E System For Key Projects
建设国家重大项目以结果为导向的
监测与评估系统

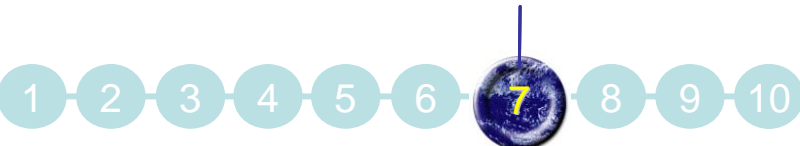
Evaluation

March 2007
2007年3月

What leaders want to know 3-5 years after construction

- Was the project properly implemented?
- Did the project achieve the intended operating results?
- Does the operational phase need adjustment to optimize the results?
- Are the results sustainable throughout the working life of the project outputs?
- Has the project achieved the intended impact?
- Should we do similar projects in future?
- What lessons have we learned from this project that we can apply to future projects?

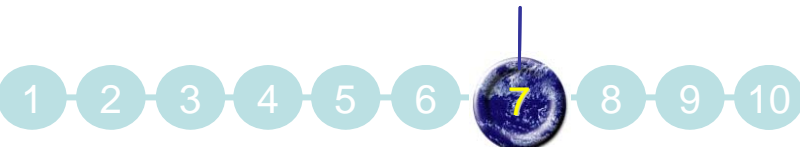
Evaluation



Evaluation 评价

- The systematic and objective assessment of a project, program or strategy – we will restrict our discussion to *projects*.
- Includes assessment of its feasibility study, design, implementation and results.
- Can be done before, during or after implementation, but we are most often concerned with post-completion evaluation.
- In-depth evaluations should be done only on selected key projects.

Evaluation



Outcomes and impacts

- In the absence of a formal Evaluation, outcomes and impacts are often not measured after a project is completed.
- Outcome evaluation studies the more immediate results of the project: financial, first-level results such as asset usage and other directly-observable effects.
- Impact evaluation studies the broader economic, social and environmental effects of the project.

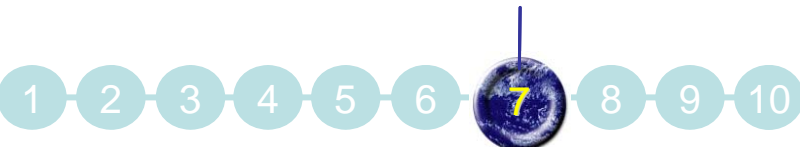


Evaluation

Purposes of project evaluation

- To assess project relevance, design and implementation.
- To determine outcomes and impact:
 - effects on financial, economic, social and environmental indicators;
 - including both intended and unintended impacts.
- To assess sustainability:
 - are achievements sustainable into the future?
- To learn for the future:
 - alternatives to consider
 - lessons learnt

Evaluation

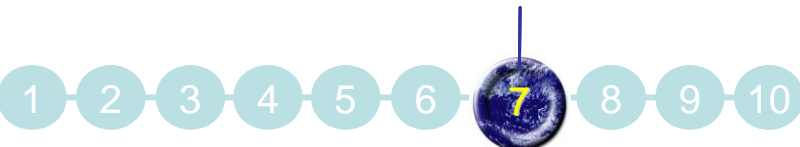


When to do evaluations

The timing of an evaluation depends on what is wanted from it:

- Evaluations before and during project implementation focus on the relevance of the project and the likely adequacy of the design in meeting requirements.
- Evaluations carried out within one year of construction completion are mainly concerned with the project outputs and initial outcomes due to operation .
- Evaluations between one and three years after construction completion deal with outcomes from the operation of the completed project outputs, and my look at early impact.
- After three to five years post-construction, evaluation is focused on longer-term impact.

Evaluation

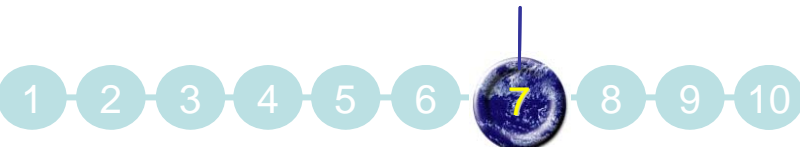


Elements of Evaluation

- **Relevance**
 - consistency of project's impact and outcome with the country's development strategy,
 - adequacy of project design
- **Effectiveness**
 - extent to which the outcome has been achieved
- **Efficiency**
 - how economically resources have been converted to results
- **Sustainability**
 - how likely is it that resources (human, institutional, financial) are sufficient to maintain the outcome over its economic life

ADB Guidelines

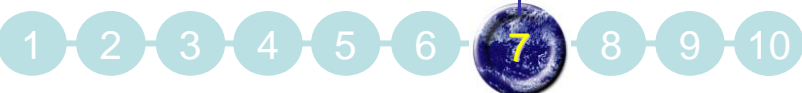
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Post-implementation Evaluation

- “Ex-post” Evaluation
- Purpose is to determine the results flowing from the project
- Examines all four criteria:
 - Relevance
 - Effectiveness
 - Efficiency
 - Sustainability

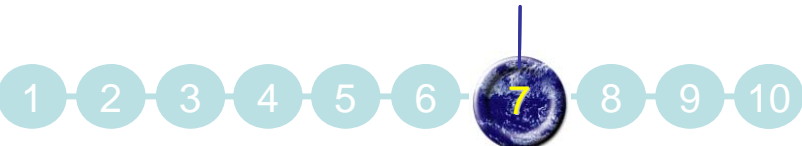
Evaluation



Impact Indicators

- As outcomes continue to be delivered by the project outputs, they contribute to broader impacts
- Impact indicators are used in Evaluations

Evaluation



Impact indicators – examples

长期效应

- Quantity
 - net additional employment attributable to the project in the long term
- Quality
 - amount of reduction in mortality rates of specific diseases
 - infectious diseases incident rates (e.g. Infant Mortality Rate in project area, improved by at least xx per cent in every district compared to before-project values)
- Financial
 - economic benefit brought by the project – for example: Aggregate Gross Domestic Product (GDP) increased for affected city districts and counties along the expressway; Aggregate direct investment in affected city districts and counties along the expressway increased.

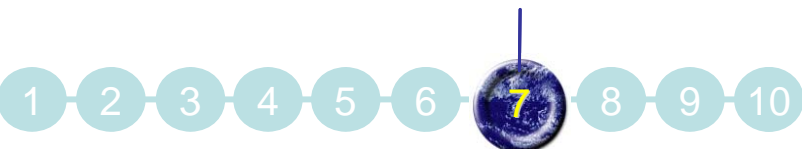
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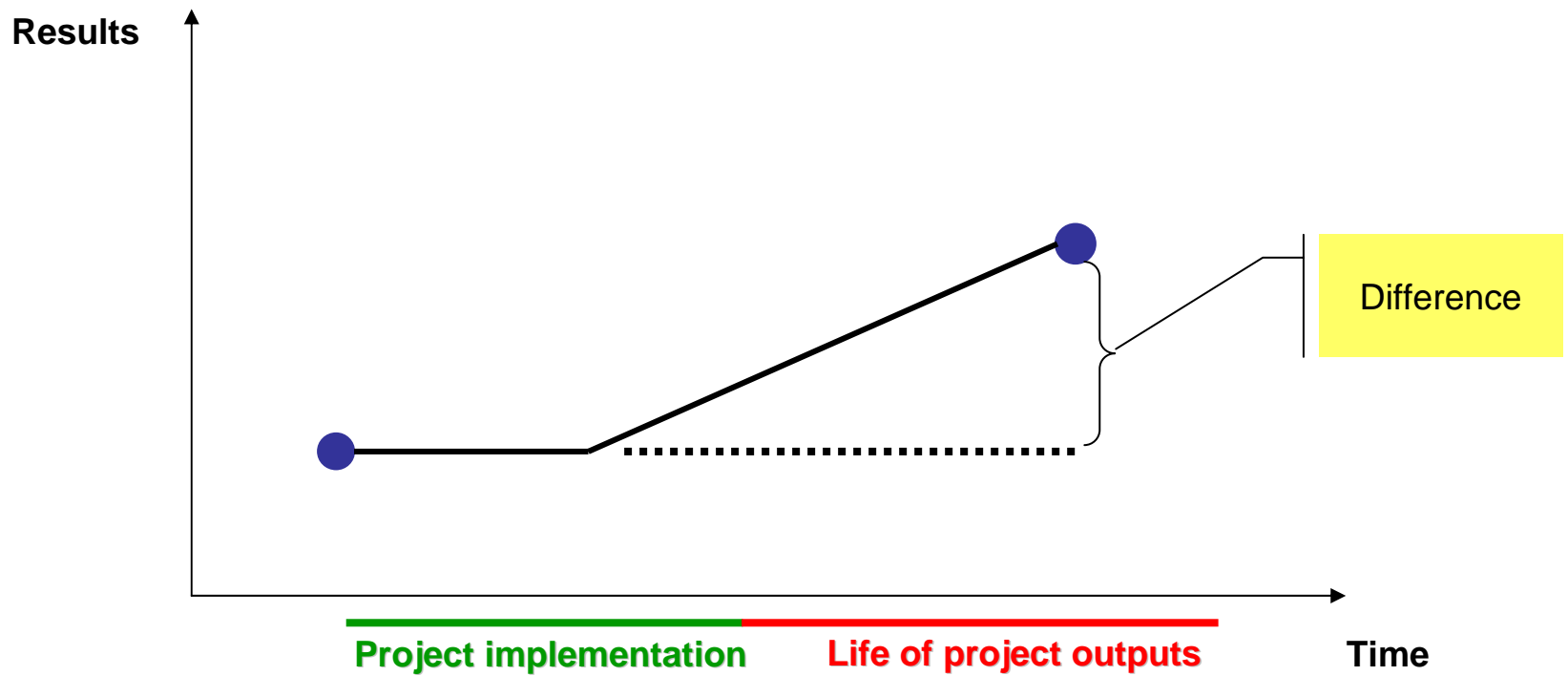
Analyzing the effect of a project

- Analysis is required to reveal the ‘true’ effect of project.
- Comparison of:
 - “before” against “after”
 - “achieved” against “target”
 - “with project” against “without project”.
- Two types:
 - Quantitative
 - Qualitative

Evaluation



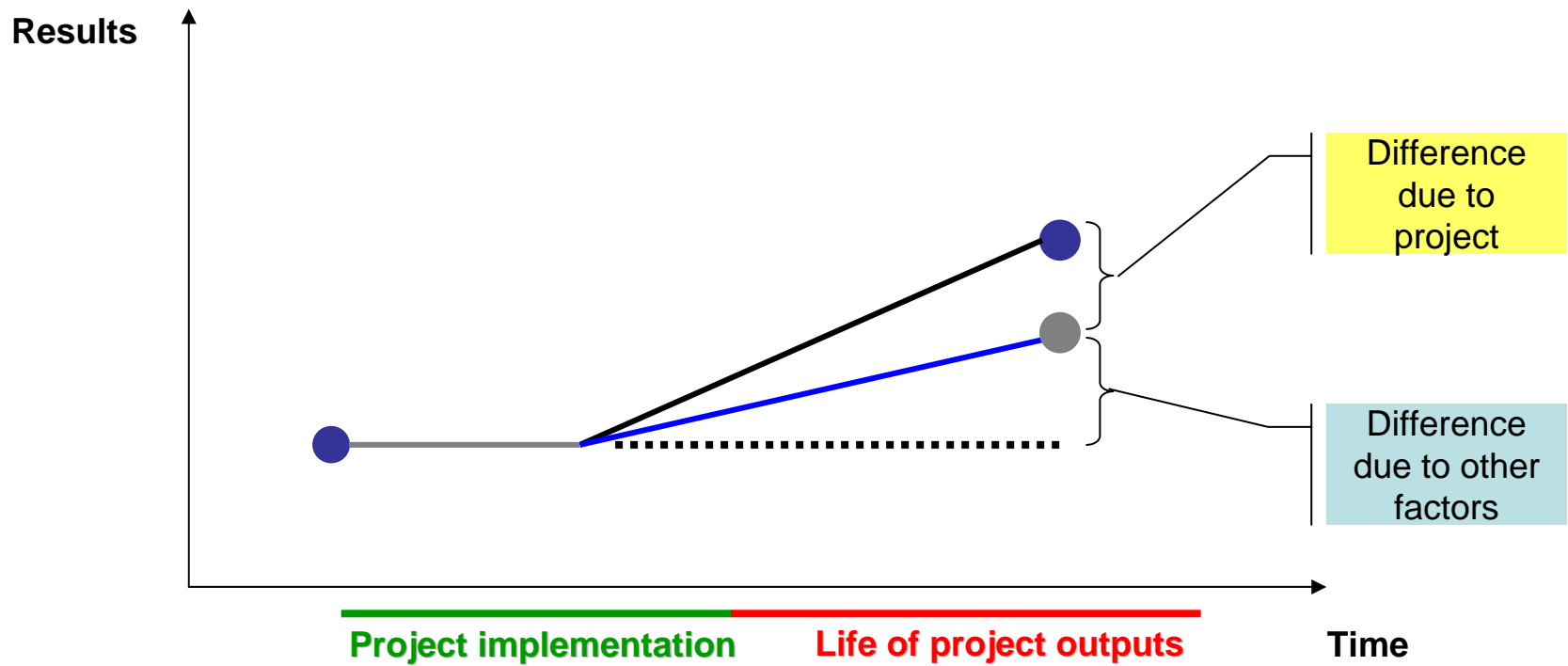
Before/After



Evaluation



Effect of other factors



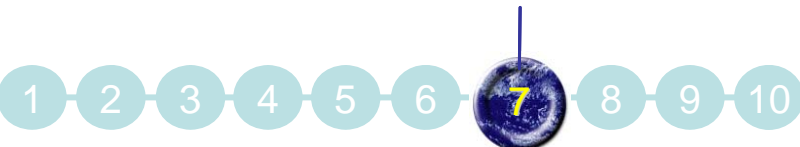
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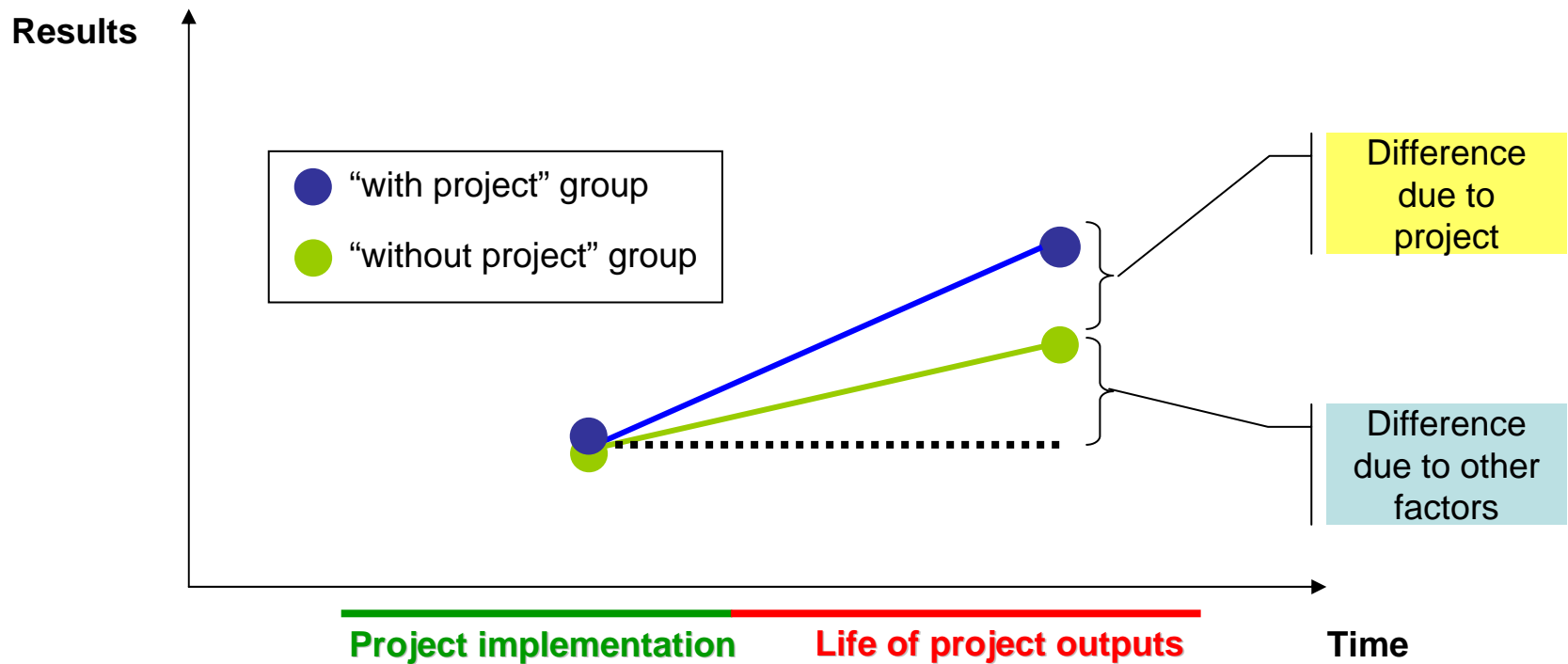
Quantitative analysis – using the “counterfactual”

- Compares actual observed outcomes for groups or areas benefiting from the project against outcomes for those who did not benefit from the project.
- Requires careful construction of the study method.
- Uses experimental, “quasi-experimental” or “non-experimental” design.

Evaluation



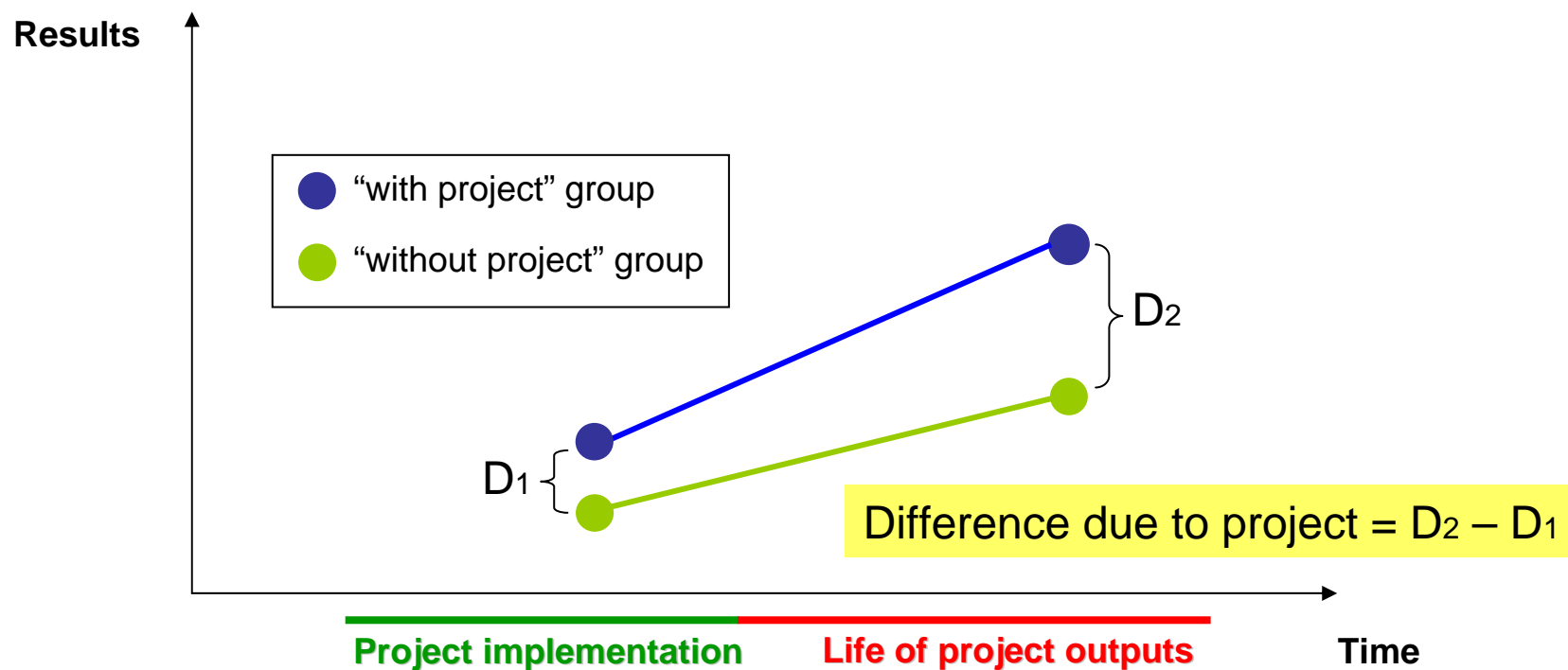
Using the counterfactual



Evaluation



Comparison groups may start from different baselines

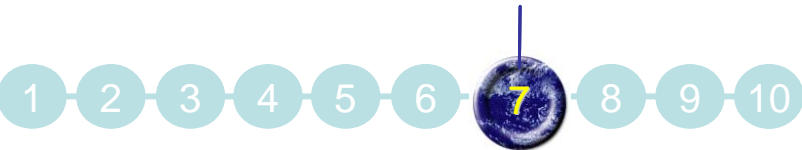


Evaluation

Quantitative methods

- Random experiment design
- Quasi-experimental design
- Non-experimental design

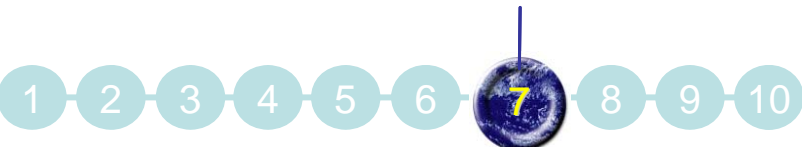
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Random experiment design

- Similar to medical research – compares control (non-project) group versus experimental (project-affected) group.
- Limited ability to use for projects, in practice.

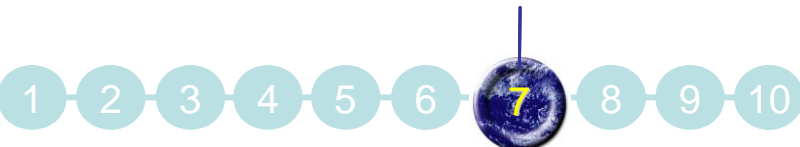
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Random experiment design

- Randomly assign individuals or communities into a “treatment” group who receive project benefits or into “control” group, who do not receive project benefits.
- The two groups have to be made up so they are as identical as possible at the beginning.
- The treatment and control groups should pass through the same external events over time, except for the project.
- Outcomes are measured for each group.
- Differences in outcomes between the groups are attributed to the project – provided any other, external, differences between the groups are only minor.

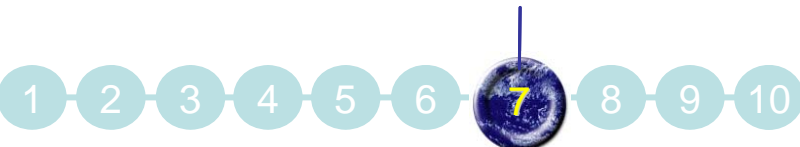
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“Quasi-experimental” design for with/without project comparisons

- Principle the same as experimental design but:
 - no random assignment to control/treatment groups;
 - uses matching of naturally-occurring comparison groups, not random assignment into groups;
 - requires more data to rule out alternative explanations.
- Includes:
 - non-equivalent comparison design;
 - interrupted time series design;
 - correlational design.

Evaluation



Non-experimental methods...

- Use statistics to *simulate* the counterfactual.
- Include:
 - propensity score matching,
 - difference in differences ($D_2 - D_1$),
 - regression discontinuity design, and
 - instrumental variables.
- Caution required to prevent estimation biases

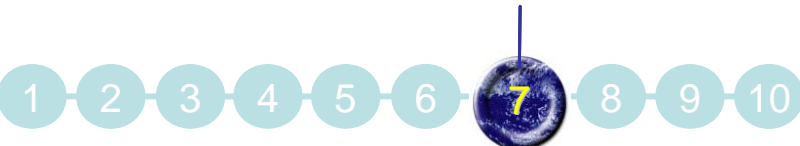
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Choosing a quantitative method

- Involves trade-offs between:
 - level of confidence in the results
 - cost
 - practicality

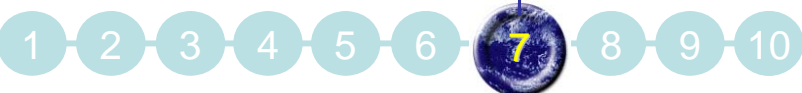
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Qualitative analysis

- Many important impacts may not be easily quantifiable, or may be better assessed qualitatively.
- Qualitative information adds depth of understanding to the quantitative data.
- Includes:
 - observation
 - structured interviews
 - surveys (qualitative questions)
 - focus groups
 - diaries and self-reports
 - expert judgment

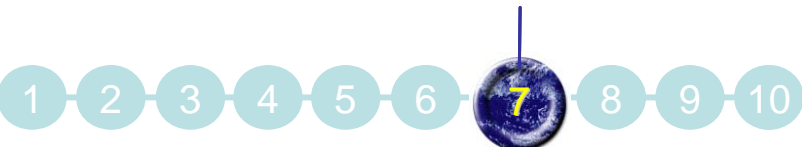
Evaluation



Qualitative Impact Evaluation

- Does not use counterfactual analysis.
- Draws inferences from studies using qualitative methods such as process reviews, interviews, surveys, and analysis of secondary data.
- Although not as rigorous as quantitative methods, often provides useful information.
- Many in-depth evaluations use qualitative methods to enhance quantitative findings by filling in knowledge of complex situations in the field.

Evaluation



Quantitative versus Qualitative Analysis

- Quantitative analysis more authoritative but requires more effort and rigor.
- Qualitative analysis supplements and strengthens evaluations even when quantitative data is available.

Evaluation



Designing an Evaluation

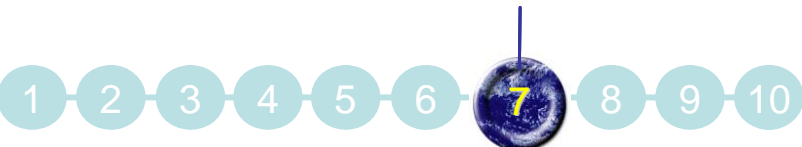
During project identification and preparation

- Determine whether to carry out an evaluation
- Clarify the objectives of the evaluation
- Investigate data availability
- Select the evaluation method
- Form the evaluation team
- If data collection is needed, then
 - design and select samples
 - develop questionnaires
 - staff and train for fieldwork
 - pretest survey

During and after project implementation

- Conduct baseline and repeat surveys
- Analyze data
- Report the findings and discuss with stakeholders
- Incorporate the findings in future project design

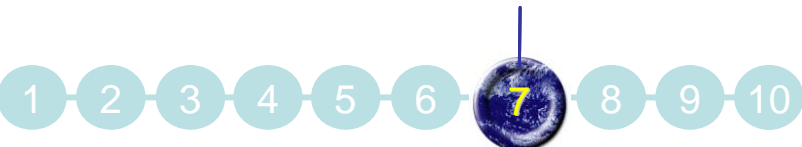
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Resourcing Evaluations

- Depends on evaluation approach.
- Can cost as much as RMBY 1 million for a very detailed study.
- Will be less if a monitoring system has already been put in place to collect outcome data for the project, from the start.

Evaluation



Practical considerations

- It is more difficult to measure specific impact of large scale infrastructure projects, because they affect a large part of the population.
- Some projects take time to generate an impact – for example economic growth can lag transport, water or power access by years, if it relies on investment in commercial production facilities that follows the newly created accessibility.

Evaluation



Case example – Hebei Roads

- Evaluation team
- Design & Monitoring Framework
- Field data collection
- Reporting
- Conclusions

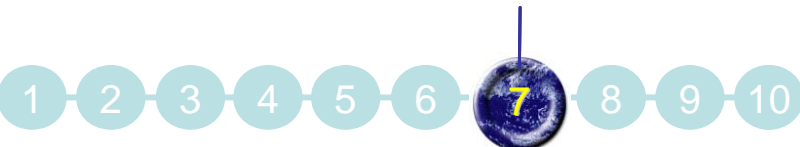


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Evaluation team

- Evaluation officer
- Transport economist - international
- Transportation expert - Chinese
- Socioeconomic/resettlement expert - Chinese

Evaluation



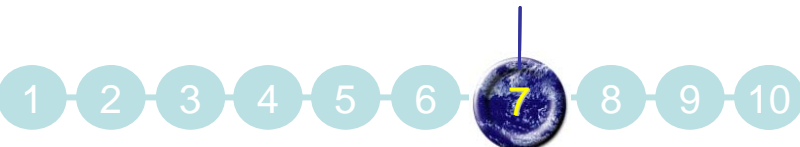
Design & Monitoring Framework

Design Summary	Indicators and Targets	Data sources / Reporting Mechanisms
<p>Impact Increased economic growth and reduced poverty in Hebei Province.</p>	<p>Economic growth for impacted cities and counties during 2000–2010 meets government economic growth targets. Per capita incomes in nine designated poverty counties Increase to above the poverty threshold (CNY1,100) by 2005.</p>	<p>Social survey by Operations Evaluation Mission (OEM) and data from Hebei Provincial Communications Department (HPCD).</p>
<p>Outcome</p> <ol style="list-style-type: none"> 1. Improved road infrastructure through the provision of increased capacity for more efficient and safer movement of freight and passengers. 2. Improved access to officially designated poverty counties and villages 3. Build capacity in, and corporatize, expressway agencies 	<p>Average travel speed on major routes at peak times increase from 40 kilometers per hour (kph) to 60 kph Decrease in deaths per 10,000 vehicle-km travelled by at least 10% by 2005. Reduced traffic congestion on existing roads (230 km), as indicated by annual average daily traffic carried on existing roads (AADT) increased by about 30% by 2005. Delivery times for agricultural inputs and production within the project area reduced by at least 15% by 2003. International pavement roughness index (IRI) reduced to < 3 m/km. Improvement in efficiency of public expenditures on roads by at least 5% by 2003. Reorganization of Hebei Provincial Communications Department (HPCD) and computerization of expressway management and operational procedures by 2000.</p>	<p>Speed survey by OEM using GPS equipment Traffic Police Statistics Traffic data from HPCD and OEM traffic surveys. Average point-to-point travel times derived from traffic survey and HPCD data. Estimated by OEM ride survey – visual inspection & ride quality. HPCD budget data. HPCD</p>

Documentation review

- ADB project documents;
- The project feasibility study (1997, Hebei Communication Programming and Design Institute)
- The project post-evaluation study (2004, China Road Construction Consulting and Management Enterprise)
- Jing Hu Expressway socioeconomic evaluation paper (March, 2005, Hebei Social Academic Institute)
- Cangzhou poverty impact monitoring report (April, 2004, Hebei Social Academic Institute)
- Jing Hu Expressway resettlement monitoring report (Nov. 2003, Hebei Social Academic Institute)
- Project Income statement, Cash flow, Balance sheet (From 1998-2013, Jing Hu Expressway administration office)
- Organization structure (2006, Jing Hu Expressway administration office)
- Annual Traffic volume in the toll station (Expressway administration office)
- Hebei Year book (2005, Hebei Statistic Bureau)

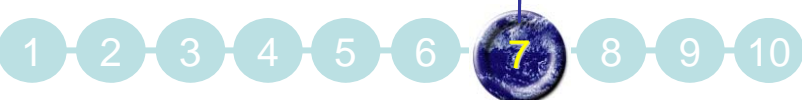
Evaluation



Field data collection

- Vehicle traffic counts in 5 county connector roads;
- 60 questionnaire-based interviews of stakeholders in 9 villages about county connector road impacts;
- Measure the road roughness and inspect roads all through the expressway and the original road104;
- Interview project feasibility study author;
- Interview the project operators (the head of the office, the head of finance, maintenance, regulation department, the head of one toll gate, a head of overloading issues department);
- Interview the project owner (the chief engineer of project office, the financial, planning and maintenance department of the project office, Hebei provincial communication department);
- Interview the government officers relating to the rural area development;
- Interview the experts of Hebei Social Academic Institute;
- Interview the county communication department;
- Interview the head of the village;
- Interview the teachers of one local primary school.

Evaluation



Indicators and Targets	
<p>Economic growth for impacted cities and counties during 2000–2010 meets government economic growth targets.</p> <p>Per capita incomes in nine designated poverty counties Increase to above the poverty threshold (CNY1,100) by 2005.</p>	<p>Economic growth observed but no targets were given at appraisal.</p> <p>Achieved. Per capita income in nine designated poverty counties rose from CNY212 in 1998 to CNY958.3 in 2004 (average compounded growth of 28.6% per annum).</p>
<p>Average travel speed on major routes at peak times increase from 40 kilometers per hour (kph) to 60 kph</p> <p>Decrease in deaths per 10,000 vehicle-km travelled by at least 10% by 2005.</p> <p>Reduced traffic congestion on existing roads (230 km), as indicated by annual average daily traffic carried on existing roads (AADT) increased by about 30% by 2005.</p> <p>Delivery times for agricultural inputs and production within the project area reduced by at least 15% by 2003.</p> <p>International pavement roughness index (IRI) reduced to < 3 m/km.</p> <p>Improvement in efficiency of public expenditures on roads by at least 5% by 2003.</p> <p>Reorganization of Hebei Provincial Communications Department (HPCD) and computerization of expressway management and operational procedures by 2000.</p>	<p>Achieved. The average speed on G-104 was 40 kph compared with 60 kph after implementation of the expressway component. Traffic on the existing G-104 declined by about 30% due to diversion to the expressway .Thus traffic congestion was reduced.</p> <p>Achieved. Accident rate declined from 0.00140 per 10,000 veh-km in 2001 to 0.00048 in 2004.</p> <p>Achieved. Improvements in capacity of county connector roads by raising road class from Class IV to Class II, which in effect widens the road from 4 meters to 8 meters. Annual average daily traffic (AADT) increased at the rate of 34% per annum between 2001 and 2005 on the expressway.</p> <p>Travel times have been significantly reduced. For example, between Qingxian to Wuqiao & Nanpi & Haixing the trip time has been reduced by 50%.</p> <p>Achieved. International Roughness Index (IRI) estimated at 2.0 m/km for expressway.</p> <p>In 2005 the budget for maintenance on county connector roads was approximately CNY1.0 billion and the budget estimated for 2006 maintenance is CNY1.5 billion. This level of budget in terms of the length of road it has to maintain amounts to approximately CNY12,900 per km (about \$1,600 per km). The budget for maintenance comes from contributions from the national Government, the city finance budget, and the county finance budget. Expressway agency is still not fully corporatized. HPCD has been reorganized and expressway management and operational procedures are computerized.</p>

Evaluation basis

- **Relevance:**
 - expert review of documentation on project, government and ADB strategies and priorities.
- **Effectiveness:**
 - data on achievement of primary purposes:
 - reducing vehicle operating costs (VOC)
 - reducing traffic congestion;
 - facilitating intercity traffic access;
 - reducing poverty in the project area.
- **Efficiency:**
 - data demonstrating efficiency:
 - Economic Internal rate of Return (EIRR).
- **Sustainability**
 - data demonstrating sustainability:
 - assessment of physical sustainability of the assets;
 - financial sustainability (revenues, re-estimated Financial Internal Rate of Return, FIRR);
 - adequacy of maintenance (current and planned).

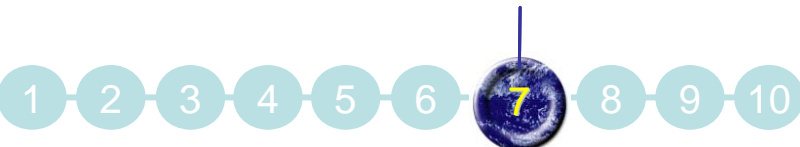
Evaluation



Evaluation basis (continued)...

- Impact on institutions
 - qualitative assessment about:
 - Hebei Provincial Communications Department (HPCD);
 - Jing Hu Expressway Management Organization (JHEMO)
- Resettlement impacts:
 - quantitative measure so resettlement and expert review of resettlement process, including monitoring.
- Socioeconomic impacts
 - measurement of economic growth in project-affected counties in comparison with a non-project area;
 - assessment of socioeconomic impacts including household income, quality of life, access to health, education, credit and other services, impact on agriculture and impact on women and minority people.

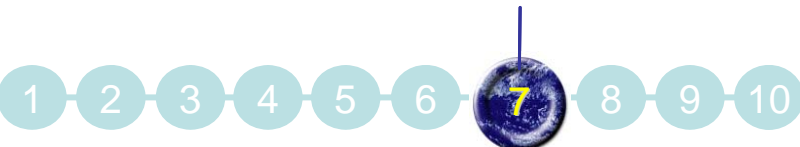
Evaluation



Report

- **Relevance:** the project is rated highly relevant.
 - All components of the project - expressway component, county connector roads village roads, equipment and institutional support were highly relevant.
- **Effectiveness:** the project was rated effective.
 - The primary purpose of improving transport efficiencies, reducing vehicle operating costs, relieving congestion along the existing road, facilitating access for intercity traffic, and reducing poverty in the project area was achieved.
- **Efficiency:** the project was rated as efficient.
 - EIRR and FIRR, significantly high and in line with those obtained at both appraisal and at the PCR.
 - The expressway and connector roads components are both rated efficient.
- **Sustainability:** the project was rated likely to be sustainable.
 - The assessment of sustainability considered both the financial resources as well as the institutional and human resources to maintain the outcomes of the project over its lifetime. The physical and financial sustainability of the expressway components of the expressway is high. The sufficient flow of funds generated from toll revenues can easily cover the operation and maintenance (O&M) and periodic/rehabilitation costs.
- **Overall:** the project is rated highly successful.

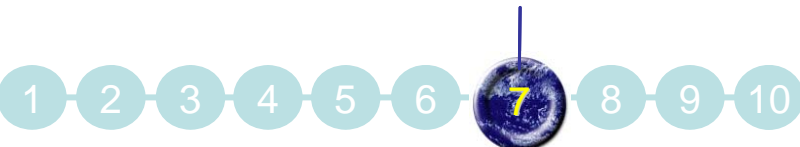
Evaluation



Report (continued)...

- Impact on institutions
 - The project has introduced institutional changes and enhanced capacity.
- Socioeconomic impacts
 - The expressway has provided a catalyst for major economic transformation in key growth centers and social development in the influence areas.
 - The connector and village roads are able to generate significant socioeconomic impacts by improving access for local communities in influence areas.
 - These have resulted in economic growth and increased incomes as well as social development.
- Environmental Impacts.
 - No significant environmental impacts.

Evaluation



END

Evaluation

