

Economics Training Series

Introductory Course

Sensitivity and Risk Analysis

Case Study

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JILIN Water and Sewerage Project

Project Primary Benefits:

- Improvement of WW collection and treatment services
- Provisions of an alternative low-cost supply of water for industrial users based on re-use of treated wastewater effluent
- Flood damage reduction on the Yong Chun River
- Improvement in water supply treatment and distribution services in Shuangyang, Liaoyuan and Meihekou
- Improvement in local drainage works to reduce local flooding in Liaoyuan

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1. Water Supply Benefits

- Improved water supply treatment and distribution services (24-hour uninterrupted service, improvement in system pressure, drinking water quality and reduced risk of exposure to water-borne pathogens and reduction in non-revenue water)
- Indirect benefits include elimination of financial costs incurred to cope with the interrupted water supply service, elimination of disruptions including loss of employment opportunities
- Willingness to pay approach used to estimate the incremental water demand over the 25-year period of analysis.

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2. Wastewater Benefits

- Improved aquatic environment in local streams and downstream in Songhua River
- Reduced risk of human and livestock exposure to waterborne pathogens in surface water
- Reduced transboundary aquatic pollution in Songhua River Basin
- Provision of low-cost water for industrial use
- Enhanced sustainability of drinking water supplied for Changchun

Used two approaches to evaluate benefits:

- *Project is the least cost option ; use cost-effective wastewater management measures (achieve target wastewater treatment rate by a certain year)*
- *Willingness to pay method – but only captures portion of project benefits since it only considered urban waste water service customers and not the downstream beneficiaries*

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3. Flood Reduction Benefits

- Flood damages estimated using avoided damage approach
- Estimates based on household survey and standard methods and parameters and flood damage calculations used in China
- Flood damage reduction

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Costs:

1. Base costs plus physical contingencies for each subproject costs were estimated and apportioned on the basis of tradable, nontradable, and skilled and unskilled labor costs
2. Operation and maintenance costs were estimated, apportioned on the basis of tradable and nontradable works, consumables, services, equipment and machinery, and skilled and unskilled labor valued in economic prices.
3. Transfer payments were excluded
4. Physical contingencies were added to capital costs.

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Sensitivity Analysis Tests conducted using the following:

- Elimination of PPP adjustment on the exchange rate
- Appreciation of RMB against US \$ in 2006 by 5%
- Increase total project investment costs by 10%
- Delay in sales growth by one year
- Delay in tariff adjustments by one year
- Combination of increase in total project investment costs and delay in tariff adjustments by one year

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EIRR	Changchun WW	Shuangyang Wholesale WS	Liaoyuan WS, WW	Meihekou WS	Liaoyuan FDR	Yongchun FDR	Total Project
Base Case	15.8%	30.7%	30.0%	20.6%	33.1%	26.2%	20.5%
Eliminate PPP	16.0%	30.9%	30.1%	20.85	33.3%	26.3%	20.7%
Yuan appreciates 5%	16.1%	31.0%	30.2%	20.9%	33.5%	26.5%	20.8%
Project Costs up by 10%	14.4%	28.5%	28.1%	19.3%	31.2%	24.6%	19.0%
O&M cists up by 0%	15.4%	30.1%	29.4%	20.5%	33.0%	26.1%	20.2%
Delay sales growth 1 yr	15.6%	28.4%	28.7%	20.5%	33.1%	26.2%	20.1%
Delay tariff inc by 1 yr	14.9%	31.6%	30.2%	20.5%	33.1%	26.2%	20.1%
Inc cost 10% & delay tariff inc by 1 yr	13.6%	29.3%	28.2%	19.2%	31.2%	24.6%	18.6%

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- Switching values for the cost based tests were high
- EIRR did not fall below 12% until project costs were increased by more than 91% or operation and maintenance costs were increased by more than 190%

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- no risk analysis was undertaken for the project
- RRP did not provide information on the sensitivity analysis conducted; details can be found in Appendix 13 and Supplementary Appendix J of the RRP

RETRO 2005 Findings

- Sensitivity and risk analyses were inadequate or poor in about half of the RRPs.
- Still continued with the practice of applying project costs and benefits increase (or decrease) by 10%.
- Only a small number of projects conducted quantitative risk analysis

Retro 2002 and 2003 Findings

- A large number of proposals applied sensitivity tests but the analysis is generally limited to a mechanistic “plus10% costs”, “minus 10% of benefits”, or “1 –year Delay in implementation”
- Test results gave little meaningful information on the robustness of the economic viability since it failed to provide insights and inputs for identifying critical triggers for active monitoring and supervision during project implementation