

ECONOMIC ANALYSIS (SUMMARY)

A. General

1. Economic viability was assessed for the 10 subprojects proposed under the Corridor Towns Development Project using preliminary design cost estimates and expected project scope and benefits. The methodology adopted in the evaluation was essentially in accordance with the Asian Development Bank (ADB) *Guidelines for the Economic Analysis of Projects*¹. Economic analysis involved (i) determining the economic viability of the investments; (ii) testing the impact of changes in key input variables on investment viability; and (iii) analyzing the distribution and impact of economic benefits brought about by the investments to various stakeholders, particularly the poor.

2. The economic analysis of the subprojects was undertaken by computing the economic internal rate of return (EIRR) and net present value from a stream of incremental benefits and costs attributable to the investments over a period of 18 years (2013–2030). Using domestic price numeraire, economic costs were derived from the financial estimates of investments. Taxes and duties were deducted and financial costs were segregated into tradable and nontradable components. Shadow pricing was applied using a shadow exchange rate factor of 1.1, a shadow wage rate factor for unskilled labor of 0.75, and a factor of 1.0 for nontradable components.

3. Economic benefits were identified for each subproject; however, only those that were readily quantifiable and had available data were included in computation of the EIRR and net present value. Sensitivity analyses were also undertaken to test the robustness of the subprojects to various changes in assumptions.

B. Water Supply

4. A water supply system is proposed for Moc Bai, which is part of the Tay Ninh Economic Zone. The subproject will provide an additional 7,000 cubic meters (m³) of water per day to the current capacity of 1,400 m³ per day. The increased capacity will serve the growing population of the area (77,000 people in 2011) and industrial zones totaling 963 hectares (ha). The least-cost technical solution was used during the design of the water supply system to ensure the system has the lowest investment costs and operating costs.

5. The appraisal report showed that the Moc Bai water supply system will help to (i) increase the capacity of the current system, and (ii) meet demand from residential and commercial consumers in the Tay Ninh Economic Zone. Willingness to pay was used as the proxy value for the economic benefits. The evaluated EIRRs range from 12.8% to 16.4% for the base case and various scenarios tested.

C. Urban Roads and Drainage

6. Urban road and drainage subprojects are proposed in the corridor towns of Dong Ha, Lao Bao, and Moc Bai. All subprojects are expected to improve selected existing main and lateral roads. In these emerging economic corridor towns, growth has brought physical development and employment. It is expected that if growth continues, existing infrastructure will

¹ ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila.

need improvement. The problem will become more acute in the near future with increasing investments in the areas.

7. The EIRR for the subprojects was calculated by comparing the with- and without-project scenarios for the road subprojects. In the without-project scenario, the roads are assumed to receive only minimal maintenance and continue to deteriorate. The with-project scenario includes routine and periodic maintenance according to international standards. Without the project, the traffic volume would exceed the capacity of the roads in the near future and the roads would become congested, leading to increased travel times and vehicle operating costs. With the project, travel times will be reduced because of higher speeds; travel times and operating costs will be reduced because of the faster and smoother ride on the subproject roads.

8. Sensitivity analyses have been undertaken to test the robustness of the analysis and the consequences of changes in variables. Except for the Lao Bao urban road subprojects, all EIRRs remain over 12%, and the plausible ranges of variability of the tested parameters or variables are well within the switching values calculated under the sensitivity tests, indicating the economic viability of the subprojects. For Lao Bao, the EIRR for the scenario where there would be a delay in implementation by 1 year is marginal, at 11.6%.

D. Solid-Waste Management

9. A solid-waste management subproject in Lao Bao includes development of a sanitary landfill, construction of the road leading to the landfill site, and procurement of collection equipment to improve the waste collection system.

10. The project will directly benefit people in rural (Lao Bao and Khe Sanh) and urban (Tan Thanh, Tan Long, Tan Lap, Tan Liem, and Tan Hop) areas, and three industrial zones totaling 706 ha. The appraisal report showed that the existing collection system covers only 20% of the town. Implementation of the proposed improvements will remove the service limitations and enable more households and businesses to receive efficient waste collection and disposal service. Quantifiable economic benefits from the solid-waste management system include willingness to pay of the intended beneficiaries, which represents the perceived economic benefits that beneficiaries assume they will get from the subproject.

11. The evaluated EIRRs range from 15.2% to 18.3% for various scenarios tested.

E. River Embankment Protection

12. This priority urban environmental infrastructure subproject aims to establish a stretch of the Hieu River that is protected from erosion and can facilitate local economic activities, trading, restaurants, and traditional festivals, and contribute to making Dong Ha an attractive and competitive town along the corridor. The subproject will involve construction of an expanded area of riverbank erosion protection extending from the existing bank out to 50 meters (m) over an 800 m section.

13. The river embankment protection subproject will directly benefit residents and business establishments of five wards: Dong Giang, Dong Thanh, and wards 1–3 of Dong Ha city with a total length of about 5.9 kilometers (km)—4.7 km on the south bank and 1.2 km on the north bank. It is estimated that the project will have positive impacts for nearly 8,100 households with 35,600 beneficiaries on an estimated area of 700 ha. The economic feasibility of the

investments was assessed over a period of 18 years. Quantifiable economic benefits from the flood control protection include increase in land value with the completion of the subproject. This is used as proxy indicator for the benefits attributable to the project. The evaluated EIRRs range from 18.2% to 23.3% for the various scenarios tested under the scenario analysis section.

F. Wastewater Treatment Plant

14. The wastewater treatment subproject in Moc Bai will include a wastewater collection system and a treatment plant. It will cover about 21,000 ha and will benefit approximately 30,000 residents in the area by 2020, or 30% of the total population. The following economic benefits are quantified for the project: improved health conditions, thus minimizing health care expenses; savings in unproductive time during illnesses; and increase in land value due to improved environment and sanitation condition.

15. The evaluated EIRRs range from 22.8% to 34.6% for various scenarios tested.

G. Port Rehabilitation

16. The proposed Dong Ha river port rehabilitation will include construction of a wharf, internal roads, riverbank protection, storage facilities, covered parking with vehicles washing area, administration building, perimeter fence, gate, and guardhouse. The whole area will also be provided with power, water supply, wastewater collection network, and goods handling equipment.

17. The project will result in a social surplus for both producers and consumers. The social surplus was estimated to be the amount that will be saved from using maritime shipping compared to other means of transporting goods. Based on the survey of transport costs, water transport will save approximately 70% of the unit cost per km compared to rail or road transport. A social surplus equivalent to D50,000 per ton was used in the analysis. The evaluated EIRRs range from 12.3% to 15.3% for various scenarios tested.

H. Materials Recovery Facilities

18. Two materials recovery facilities are proposed—in Dong Ha and Moc Bai in Tay Ninh Economic Zone. These subprojects aim to develop sustained implementation of the principle of "3Rs"—reduce, reuse, and recycle. This is in anticipation of the expected economic growth and the consequent increase in waste generation in these areas. The subprojects will translate to improved environmental conditions and provide sources of income to key stakeholders such as waste pickers and the host community. The system is also expected to promote sanitary collection and recovery and transport of recyclables, and prolong the life of the disposal facility with the reduction of residual wastes.

19. Overall, a daily average of 0.24 tons of recyclables is expected to be recovered from Moc Bai and 0.48 tons from Dong Ha. To value the above-mentioned benefits, the revenue to be derived from the operation of the facility is used as proxy value of the economic efficiency of recovering wastes, which actually adds to the overall local economy. Additional benefit is expected from reduced costs of disposal or savings in disposal costs with the extension of the life of disposal facilities. The evaluated EIRRs range from 14% to 30% for all scenarios tested.

I. Economic Analyses and Sensitivity Tests

20. The results of economic analyses and sensitivity tests are presented in the following table.

Summary Indicators – Base Case and Sensitivity Analysis				
Subprojects/Scenarios	EIRR (%)	NPV at 12% (\$ million)	Benefit–Cost Ratio	SV (%)
Dong Ha River Embankment				
1 Base case	23.3	3.87	1.61	
2 Cost increase 10%	20.8	3.63	1.47	94
3 Benefits decrease 10%	20.6	3.20	1.45	85
4 2 and 3	18.2	2.49	1.32	46
5 Delay 1 year	18.5	2.81	1.81	49
Dong Ha River Port Rehabilitation				
1 Base case	15.3	0.88	1.25	
2 Cost increase 10%	13.8	0.53	1.14	107
3 Benefits decrease 10%	13.7	0.44	1.12	97
4 2 and 3	12.3	0.08	1.02	52
5 Delay 1 year	13.4	0.20	1.25	82
Dong Ha Urban Roads				
1 Base case	15.5	7.18	1.28	
2 Cost increase 10%	14.6	5.60	1.17	156
3 Benefits decrease 10%	14.4	4.70	1.15	191
4 2 and 3	13.5	3.12	1.06	66
5 Delay 1 year	14.9	6.03	1.36	105
Lao Bao Urban Roads				
1 Base case	13.3	1.13	1.09	
2 Cost increase 10%	12.5	0.49	1.00	128
3 Benefits decrease 10%	12.3	0.26	0.98	105
4 2 and 3	13.0	0.91	1.18	59
5 Delay 1 year	11.6	0.38	0.90	100
Lao Bao Solid-Waste Management				
1 Base case	18.3	0.05	1.50	
2 Cost increase 10%	18.8	0.04	1.37	122
3 Benefits decrease 10%	16.7	0.03	1.35	111
5 2 and 3	15.2	0.02	1.23	58
4 Delay 1 year	15.2	0.02	1.25	59
Moc Bai Urban Roads				
1 Base case	14.2	3.07	1.11	
2 Cost increase 10%	13.4	2.13	1.05	144
3 Benefits decrease 10%	12.9	1.30	1.01	118
4 2 and 3	13.9	2.82	1.24	70
5 Delay 1 year	11.6	0.62	0.89	134

Subprojects/Scenarios	EIRR (%)	NPV at 12% (\$ million)	Benefit–Cost Ratio	SV (%)
Moc Bai Water Supply				
1 Base case	16.4	2.31	1.30	
2 Cost increase 10%	14.8	1.54	1.18	92
3 Benefits decrease 10%	14.6	1.31	1.17	83
4 2 and 3	13.0	0.55	1.07	45
5 Delay 1 year	12.8	0.39	1.18	67
Moc Bai Wastewater Treatment				
1 Base case	34.6	2.56	1.43	
2 Cost increase 10%	29.3	1.96	1.30	65
3 Benefits decrease 10%	28.7	1.71	1.29	59
4 2 and 3	23.1	1.11	1.17	30
5 Delay 1 year	22.8	1.63	1.43	29
Dong Ha Materials Recovery Facility				
1 Base case	30.1	0.60	3.53	
2 Cost increase 10%	27.6	0.56	3.21	120
3 Benefits decrease 10%	27.3	0.50	3.17	109
4 2 and 3	25.0	0.46	2.88	59
5 Delay 1 year	24.0	0.42	3.23	50
Moc Bai Materials Recovery Facility				
1 Base case	17.8	0.15	1.98	
2 Cost increase 10%	15.9	0.11	1.80	92
3 Benefits decrease 10%	15.7	0.09	1.78	84
4 2 and 3	13.9	0.05	1.62	45
5 Delay 1 year	14.3	0.06	1.88	51

EIRR = economic internal rate of return, NPV = net present value, SV = switching value.

Source: Project preparatory technical assistance estimates.