



Council for Administration of the Infrastructure Fund

Major Projects Secretariat
Infrastructure Fund, TL

EVALUATION GUIDELINE FOR IF PROJECTS

- Pre-Evaluation
- Ongoing Evaluation
- Ex-post Evaluation

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1. Why the project evaluation is necessary?

Proposed new infrastructure projects should be appraised to decide to implement or not based on their plans, and decide the priority of each project in the project PDCA cycle¹, however there is still no established way to evaluate them with sufficient correct logic, easy to understand, and practically feasible.

The most important factor for a Project will be the **Efficiency of the Investment**, but in case of infrastructure project, other various items could not be ignored, and the relative importance of such evaluation items should be clarified to indicate the importance of the project.

2. What type of projects will be evaluated?

Evaluation items are different according to the kind and character of projects. The following table presents kinds of target projects of this Guideline.

River	Dam/Reservoir	Power	Flood Control Sabo ²	Sea shore protection	Road	Harbor	Airport	Water	Sewage	Public building	Telecom	Agriculture
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3. At what stage the project will be evaluated?

In principle, the evaluation is expected to conduct at the three stages as shown in Table 1. It is desirable to unify the evaluation items for each stage, but their weights will be different.

(See the Chapter 10 about the details for weighting of evaluation items)

Table 1: Kind of evaluation by the project stage

Stage	Pre-implementation	Execution	Post-completion
	• Budgeting stage prior to the project implementation	• Deciding stage of ongoing project whether continue or cancel	• Stage after a certain period from the project completion to check the operation status
View point of evaluation	• Expectable investment effect and situations to the implementation of project based on the project plan. (by Project concept or FS report)	• Project investment effects and expectable project progress, potentiality of alternatives methods reflecting the changes in the socio-economic situation surrounding the project	• Assessment of the effects, impacts results and the project operation situation in which the latest situation should be compared with the initial project plan and the past evaluation results
Remarks	• If the alternative plan is studied in the higher-level plan (such as M/P), apply the comparison results also	• Study about the handling status of executing projects to clarify how to treat not only invested cost but also necessity or cancellation of additional costs	• If the post-evaluation results are different from the initial expectations, analyze the reasons and take necessary corrective actions

¹ Plan-Do-Check-Action

² Erosion Control

4. What are the evaluation procedures?

The evaluation process is performed by five-steps as shown in the Figure 1. It is better to give weight to each evaluation items if possible.

- About evaluation items: See Chapter 5.
- About evaluation indicator: See Chapter 6.
- About evaluation scores: See Chapter 7.
- About how to decide weight: See Chapter 10.

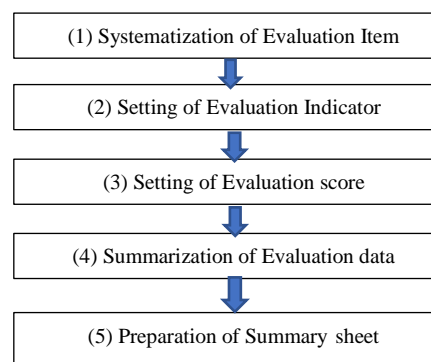


Figure 1: Evaluation procedure

5. What Items are necessary for evaluation?

This Guideline is prepared to start the evaluation of infrastructure projects from **three Main Evaluation Items** as shown in the Table 2.

Table 2: Main Three Evaluation Items

Main evaluation Item	Pre-Implementation	Execution stage	Post-Completion
Investment Efficiency (Effectiveness against the investment)	◎	◎	○
Situations for the Implementation (Procedures' prospects required for project implementation)	◎	○	◎
Project Effect (Various effects and impacts due to the project)	○	◎	◎

The Sub-evaluation items to supplement the Main 3 items are set on the hierarchy system as shown in the Figure 2.

To set sub-items and indicators for evaluation, the following should be considered:

- 1) Independence between each evaluation item;
- 2) Effects of each project;
- 3) Various effects of the project implementation.

The indicators are expected to express numerically as much as possible to appraise by setting evaluation indicators. The Main items and Sub-Items may be variable according to the character of the project.

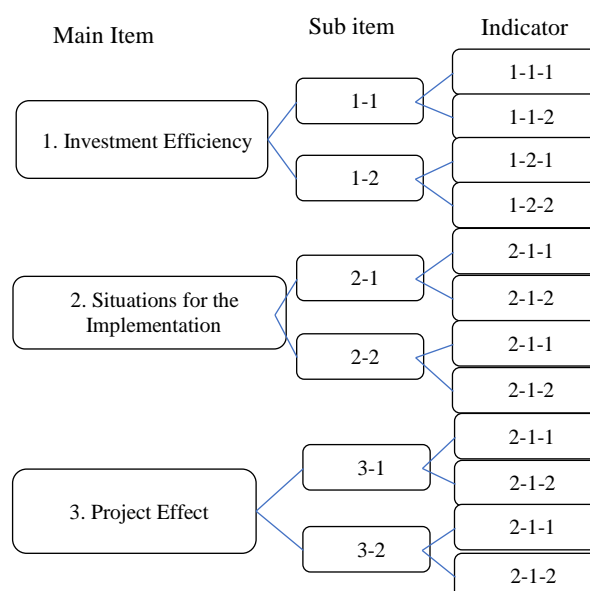


Figure 2: Hierarchy system of evaluation items

5.1 Evaluation of Sub-items for “Investment Efficiency”

There are three following types of the cost-benefit analysis. However, B/C is recommended to understanding easily the project feature. However, any item could be added/deleted according to the actual project conditions (*see Chapter 8*).

Table 3: Comparison of three cost-benefits analysis methods

	Outline	Judgment
B/C	<ul style="list-style-type: none"> Ratio of the total benefit generated from the Project to the total cost of the Project Evaluate based on a baseline value³ 	<ul style="list-style-type: none"> The project is evaluated as reasonable one. if the total benefit is greater than the total cost the value (B/C > 1)
Net Present Value (NPV)	<ul style="list-style-type: none"> Total value of the benefits minus costs after discounting for each period 	<ul style="list-style-type: none"> The change of the NPV value is greater than B/C according to variation of the discount rate and may not indicate the project's rate of return
IRR	<ul style="list-style-type: none"> Discount rate where the sum of the discounted values of benefits and the discounted values of expenses for each period become equal 	<ul style="list-style-type: none"> The meaning is not easy to understand. In order to judge the relevance of the project, some basic discount rate is required for the comparison, but usually it is not clear why such basic rate is used

Example of the Sub-evaluation item in “Investment Efficiency” are as shown in the Table 4.

Table 4: Example of sub-evaluation items in “Project Situations for the implementation”

Sub Evaluation item	View point in setting			
Cost (Million US\$)	1-5	5-10	>10	no info
Cost-Benefit Ratio (B/C)	>2	>1.5	>1	<1
IRR Internal Rate of Return	Example of Classification by IRR			
	IRR >16	16>IRR>12	12>IRR>	8>IRR

Note:

About the Cost: See the Chapter 9.1.

About the Benefits: See the Chapter 9.2.

³ Baseline value is of the initial year (see Chapter 9.4)

5.2 Evaluation of Sub-Items for “Situations for Project implementation”

The Table 5 shows examples of three Sub -evaluation items for the “Project Situations for the implementation”, and examples of the Minor Evaluation items corresponding to each Sub-evaluation item.

Table 5: Example of sub-evaluation items in “Situations for Project implementation”

Sub-evaluation item	View point on setting evaluation item	Example of minor evaluation items
Relevance of Project	<ul style="list-style-type: none"> • It is listed in an existing higher-level plan or not? • Progress is consistent with related projects? 	<ul style="list-style-type: none"> • Relationship with higher level plan • Relationship with other Projects
Possibility of Project Realization (O&M possibility)	<ul style="list-style-type: none"> • Coordination has been completed with local residents and related parties? • Legal procedures has completed necessary for project implementation, such as city planning decisions and environmental impact evaluation? • Budget will be secured? • Good O&M plan is already prepared? 	<ul style="list-style-type: none"> • Consensus of local people • Situations of legal procedures • Budgetary status • O&M plan status
Technical Difficulty	<ul style="list-style-type: none"> • Is there any difficulty which come from topographic condition? • New technologies or new construction methods is included which are difficult, but not common in TL? • Is there any issues, if it is not based on ordinal technology in TL? (Ex. many imported material is essential?) 	<ul style="list-style-type: none"> • Topographic condition (flood) • Topographic condition (land slide) • Advanced technology experience for construction and O&M

5.3 Evaluation of Sub-Items for “Project Effect”

The example of five corresponding items sets as Sub-evaluation items and shown in the Table 6. This is related to the effects/impacts and achievements of policy objectives, but it’s difficult to convert into ‘the monetary terms.

Table 6: Example of Sub evaluation item in “Project Situations for the implementation”

Sub-item	View point on setting Evaluation item	Example of minor evaluation items
Life of the people	• Realization of a lively life of each individual personnel	<ul style="list-style-type: none"> ✓ Improvement of public service ✓ Opportunity for expansion in life ✓ Improvement of Amenity
Economy of Concerned area	• Development of competitive economic society	<ul style="list-style-type: none"> ✓ Expansion of Productivity ✓ Increasing of Job opportunity
Safety	• Ensuring of Safety	<ul style="list-style-type: none"> ✓ Reduction of Natural Disaster ✓ Reduction of Accidents and Disasters
Environment	• Conservation and creation of good environment	<ul style="list-style-type: none"> ✓ Conservation of Life Environment ✓ Conservation of Natural Environment ✓ Improvement of Landscaping ✓ Contribution to the conservation of global Environment
Local Community	• Development of stable and happy community	<ul style="list-style-type: none"> ✓ Utilization of local Resources ✓ Stabilization of Community ✓ Promotion of local culture

5.4 Hierarchy of the Evaluation Items

The hierarchy of the Evaluation items could be arranged as shown in the Figure 3. However, the evaluation items are variable according to the kind of project as shown in the Chapter 6.

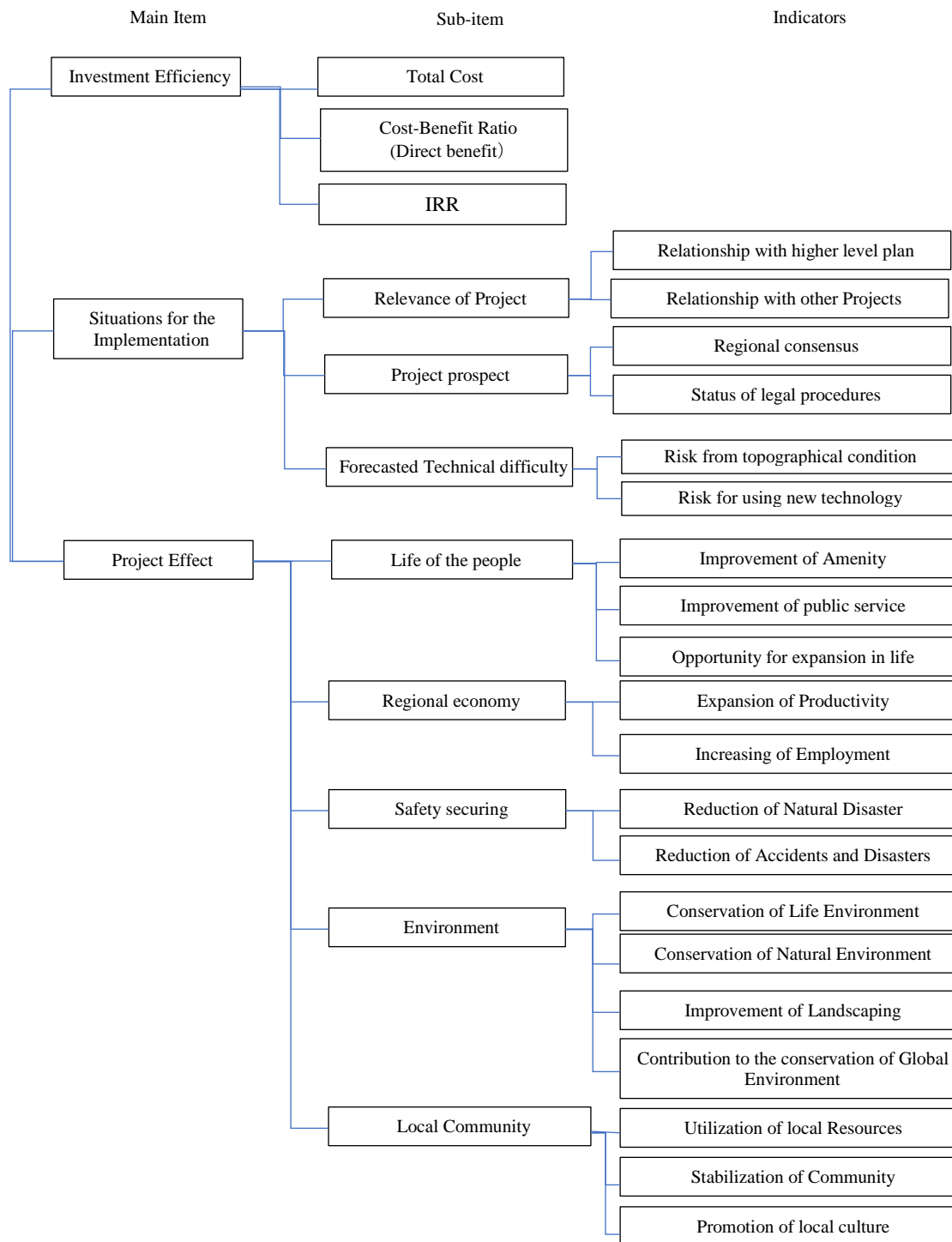


Figure 3: Example of systematization of evaluation items

6. Comparison of evaluation Items for each project category

Evaluation items will be different according to the kind of project. The Table 7 presents the summary of Sub-evaluation items and Indicators applicable for each type of projects.

Table 7: Sub Evaluation factor and indicators applicable for different types of project

Investment Efficiency													
Main item	River	Dam/ Reservoir	Power	Flood Control	Sea shore protection	Road	Harbor	Airport	Water	Public building	Sewage	Telecom	Agriculture
Investment Efficiency							B/C						
				-		-	IRR		-	-			-
Situations for implementation/ conservation													
Relevance of Project					Relationship with higher-level plan								
					Relationship with other Projects								
Prospect for Project Realization					Consensus of local people								
					Situations of legal procedures								
					Status of Budget								
					Status of O&M plan								
Forecasted technical difficulty					Risk comes from topographic condition								
					Risk of advanced technology adoption								
Project Effect for													
Life of the people					Improvement of access to public service								
					Improvement of access to main transportation								
					Improvement of transportation								
					Intermingling among communities								
					Improvement of access to recreational facilities								
					Contribution to happy/healthy life								
					Development of Amenity								
Concerned area economy					Expansion of Productivity								
					Increasing of Job opportunity								
Safety securing					Reduction of Natural Disaster								
					Reduction of Human Disasters								
					Improvement of safety in life								
Environment					Reduction of Air/Water Prolusion								
					Reduction of Noise/Vibration								
					Conservation of soil/water								
					Conservation of Rare species								
					Improvement of Landscaping								
					Improvement of Ecosystem								
					Contribution to Global Environment								
Local Community					Utilization of local Resources								
					Reduction of Financial expenditure of community								
					Improvement of regional difference								
					Promotion of Local culture								

In case if some project/some items are not appropriate to use as the evaluation item. Therefore, the weight of evaluation items should be adjusted according to the kind/sector of project. Weighing methods explained in Chapter 8. Table 9 and 10 are example of application of evaluation index.

7. How to set up the evaluation score?

On the actual implementation of evaluation, scoring will be required for each evaluation item. The range and handing of evaluation scores, and how to summarize the total points will be explained in this chapter.

7.1 Range of the evaluation score

It is important to unify the score range. The evaluation score is better to set to the same range in order to compare the evaluation results comprehensively.

If the range of the evaluation score is set with a different width depending on the evaluation indicator, the weight of the evaluation indicator itself becomes complicate, so the evaluation score range setting for all evaluation indicators should be set by same one.

7.2 Setting of the evaluation score

On setting the Evaluation Score, the situation and changes assumed in the Project should be associated with each Evaluation Score to clarify the criteria.

The range is recommended to be **+0 to +3** (Minimum is 0 point, Maximum is 3 point).

There are various possible ways to set the Evaluation Score as shown in the Table 8.

It is necessary to select the appropriate one for each Evaluation Indicator.

Table 8: Methods of evaluation score

Evaluation Score	Changing of situation	Relationship with higher level plan	Status of effect	Harmony of structure with the surrounding landscape	
0	Worse than the current situation	no	The effect does not meet the standard	Natural environment was modified	Regional landscapes become worse
+ 1	Difficult to decide the changing	Strategic Plan	Minimum effect to achieve	Although the structure is good	Structure are breaking the harmony of scenery
+ 2	Expectable better than current situations	Sector Plan	Expectable good effect	the negative impact to landscapes is minimized by the design	There is some minus effect to the natural and regional
+ 3	Improved already the current situation	Master Plan	Effect is confirmed	the new structure created a more beautiful landscape	With harmony on natural and artificial beauty

8. Self-Evaluation sheet

The Table 9 shows example of self-evaluation sheet setting and ranking to make easy to understand about minor evaluation items score. This sheet is expected to prepare by the executing agencies as Self-checking sheet and to submit with the Project Concept sheet.

Table 9: Example of the Self-Evaluation Sheet

Main Item	Sub-item	Indicator	Examples of Indicators and reference data			
Investment Efficiency	Cost-Benefit during evaluation period	Cost (million US\$)	1-5	5-10	>10	no info
		Cost benefit ratio (B/C)	>2	>1.5	>1	<1
		Internal Rate of Return (IRR)	>16%	>12%	>8%	<8%
Situations for implementation O&M	Relevance of Project	Relationship with higher level plan	Master Plan	Sector Plan	Strategic Plan	no
		Type of Project	Basic Infrastructure	Economic Infrastructure	Social Infrastructure	no
	Possibility for Project Realization (or O&M possibility)	Consensus of local people	Already accepted	Negotiated	Start negotiation	No process
		Situations of legal procedures	Approved already	Sure	On application	No process
		Budget status	Already in the budget book	Next year Budget Plan	Only proposal	No process
		Status of O&M plan preparation	Approved O&M budget	Already has O&M plan	On preparation	No process
	Forecasted technical difficulty	Topographic condition (flood)	No risk	Low risk	Medium risk	High risk
		Topographic condition (land slide)	No risk	Low risk	Medium risk	High risk
		Advanced technology experience for construction and O&M	A lot of experience	Limited experience	Only single case	No experience
Project Effect	Life of the people	Improvement of access / quality to public facilities	Provide initial access	Improve quality (price)	Improve only access	Can't expect
		Improvement of public transportation	Direct result from project	Improve public access	Some benefits	Can't expect
		Interconnection between communities	Become easy and fast	Become possible	Some expected	Can't expect
		Resettlement	No resettlement required	Only a few households	Significant resettlement	Can't expect
		Improvement of tourism	Main target	Bring benefits	Some expected	Can't expect
		Contribution to healthy life	Health project	Good for health	Some expected	Can't expect
	Economy of Concerned area	Expansion of Productivity	Create new products	Improve import/export	Improve internal trade	Can't expect
		Increasing of Job opportunity	Create new permanent jobs	Support current jobs	Only during construction	Can't expect
	Safety securing	Reduction of natural disaster	Direct protection	Improve safety	Somewhat expectable	Can't expect
		Reduction of accidents	Safety project	Improve safety	Somewhat expectable	Can't expect
	Environment	Reduction of air/water pollution	No pollution	Pollution during construction	Pollution after construction	Can't expect
		Reduction of noise	No noise	Noise during construction	Noise after construction	Can't expect
		Conservation of soil	No damage	Some damage	Significant damage	Can't expect
		Conservation of rare species	No lost	Some damage	Significant damage	Can't expect
		Improvement of landscape	Give harmony on natural and artificial beauty	There is some minus effect to the natural and regional	Structure are breaking the harmony of scenery	Structure are breaking the harmony of scenery
	Local Community	Utilization of local materials and human resources	For construction and O&M	Only for construction	Somewhat expectable	Can't expect
		Cost saving for community	Make profit	Reduce expenditures	Minimize damage cost	Can't expect
		Improvement of regional equity	Direct improvement	Only in some areas	Somewhat expectable	Can't expect
		Promotion of local culture	Develop culture and traditions	Save culture and traditions	Somewhat expectable	Can't expect

The Table 10 shows an example of evaluation sheet for the Airport Project.

Table 10: Example of Evaluation sheet for the Airport Project

Main Item	Sub-item	Indicator	Examples of Indicators and reference data			
Investment Efficiency	Cost-Benefit during evaluation period	Cost (million US\$)	1-5	5-10	>10	no info
		Cost benefit ratio (B/C)	>2	>1.5	>1	<1
		Internal Rate of Return (IRR)	>16%	>12%	>8%	<8%
Situations for implementation/ O&M	Relevance of Project	Relationship with higher level plan	Master Plan	Sector Plan	Strategic Plan	no
		Type of Project	Basic Infrastructure	Economic Infrastructure	Social Infrastructure	no
	Possibility for Project Realization (or O&M possibility)	Consensus of local people	Already accepted	Negotiated	Start negotiation	No process
		Situations of legal procedures	Approved already	Sure	On application	No process
		Budget status	Already in the budget book	Next year Budget Plan	Only proposal	No process
		Status of O&M plan preparation	Approved O&M budget	Already has O&M plan	On preparation	No process
	Forecasted technical difficulty	Topographic condition (tsunami)	No risk	Low risk	Medium risk	High risk
		Topographic condition (land slide)	No risk	Low risk	Medium risk	High risk
		Advanced technology experience for construction and O&M	A lot of experience	Limited experience	Only single case	No experience
Project Effect	Life of the people	Improvement of access / quality to public facilities	Provide initial access	Improve quality (price)	Improve only access	Can't expect
		Improvement of public transportation	Direct result from project	Improve public access	Some benefits	Can't expect
		Interconnection between communities	Become easy and fast	Become possible	Some expected	Can't expect
		Resettlement	No resettlement required	Only a few households	Significant resettlement	Can't expect
		Improvement of tourism	Main target	Bring benefits	Some expected	Can't expect
		Contribution to healthy life	Health project	Good for health	Some expected	Can't expect
	Economy of Concerned area	Expansion of Productivity	Create new products	Improve import/export	Improve internal trade	Can't expect
		Increasing of Job opportunity	Create new permanent jobs	Support current jobs	Only during construction	Can't expect
	Safety securing	Reduction of natural disaster	Direct protection	Improve safety	Somewhat expectable	Can't expect
		Reduction of accidents	Safety project	Improve safety	Somewhat expectable	Can't expect
	Environment	Reduction of air/water pollution	No pollution	Pollution during construction	Pollution after construction	Can't expect
		Reduction of noise	No noise	Noise during construction	Noise after construction	Can't expect
		Conservation of soil	No damage	Some damage	Significant damage	Can't expect
		Conservation of rare species	No lost	Some damage	Significant damage	Can't expect
		Improvement of landscape	Give harmony on natural and artificial beauty	There is some minus effect to the natural and regional.	Structure are breaking the harmony of scenery.	Structure are breaking the harmony of scenery.
	Local Community	Utilization of local materials and human resources	For construction and O&M	Only for construction	Somewhat expectable	Can't expect
		Cost saving for community	Make profit	Reduce expenditures	Minimize damage cost	Can't expect
		Improvement of regional equity	Direct improvement	Only in some areas	Somewhat expectable	Can't expect
		Promotion of local culture	Develop culture and traditions	Save culture and traditions	Somewhat expectable	Can't expect

The Table 11 shows example of evaluation sheet for the Public Building Project.

Table 11: Example of Evaluation Sheet for the Public Building Project

Main Item	Sub-item	Indicator	Examples of Indicators and reference data			
Investment Efficiency	Cost-Benefit during evaluation period	Cost (million US\$)	1-5	5-10	>10	no info
		Cost benefit ratio (B/C)	>2	>1.5	>1	<1
		Internal Rate of Return (IRR)	>16%	>12%	>8%	<8%
Situations for implementation/ O&M	Relevance of Project	Relationship with higher level plan	Master Plan	Sector Plan	Strategic Plan	no
		Type of Project	Basic Infrastructure	Economic Infrastructure	Social Infrastructure	no
	Possibility for Project Realization (or O&M possibility)	Consensus of local people	Already accepted	Negotiated	Start negotiation	No process
		Situations of legal procedures	Approved already	Sure	On application	No process
		Budget status	Already in the budget book	Next year Budget Plan	Only proposal	No process
		Status of O&M plan preparation	Approved O&M budget	Already has O&M plan	On preparation	No process
	Forecasted technical difficulty	Topographic condition (flood)	No risk	Low risk	Medium risk	High risk
		Topographic condition (land slide)	No risk	Low risk	Medium risk	High risk
		Advanced technology experience for construction and O&M	A lot of experience	Limited experience	Only single case	No experience
Project Effect	Life of the people	Improvement of access / quality to public facilities	Provide initial access	Improve quality (price)	Improve only access	Can't expect
		Improvement of public transportation	Direct result from project	Improve public access	Some benefits	Can't expect
		Interconnection between communities	Become easy and fast	Become possible	Some expected	Can't expect
		Resettlement	No resettlement required	Only a few households	Significant resettlement	Can't expect
		Improvement of tourism	Main target	Bring benefits	Some expected	Can't expect
		Contribution to healthy life	Health project	Good for health	Some expected	Can't expect
	Economy of Concerned area	Expansion of Productivity	Create new products	Improve import/export	Improve internal trade	Can't expect
		Increasing of Job opportunity	Create new permanent jobs	Support current jobs	Only during construction	Can't expect
	Safety securing	Reduction of natural disaster	Direct protection	Improve safety	Somewhat expectable	Can't expect
		Reduction of accidents	Safety project	Improve safety	Somewhat expectable	Can't expect
	Environment	Reduction of air/water pollution	No pollution	Pollution during construction	Pollution after construction	Can't expect
		Reduction of noise	No noise	Noise during construction	Noise after construction	Can't expect
		Conservation of soil	No damage	Some damage	Significant damage	Can't expect
		Conservation of rare species	No lost	Some damage	Significant damage	Can't expect
		Improvement of landscape	Give harmony on natural and artificial beauty	There is some minus effect to the natural and regional.	Structure are breaking the harmony of scenery.	Structure are breaking the harmony of scenery.
	Local Community	Utilization of local materials and human resources	For construction and O&M	Only for construction	Somewhat expectable	Can't expect
		Cost saving for community	Make profit	Reduce expenditures	Minimize damage cost	Can't expect
		Improvement of regional equity	Direct improvement	Only in some areas	Somewhat expectable	Can't expect
		Promotion of local culture	Develop culture and traditions	Save culture and traditions	Somewhat expectable	Can't expect

The Table 12 shows example of evaluation sheet for the Sanitation Project.

Table 12: Example of Evaluation Sheet for the Sanitation Project

Main Item	Sub-item	Indicator	Examples of Indicators and reference data			
Investment Efficiency	Cost-Benefit during evaluation period	Cost (million US\$)	1-5	5-10	>10	no info
		Cost benefit ratio (B/C)	>2	>1.5	>1	<1
		Internal Rate of Return (IRR)	>16%	>12%	>8%	<8%
Situations for implementation/ O&M	Relevance of Project	Relationship with higher level plan	Master Plan	Sector Plan	Strategic Plan	no
		Type of Project	Basic Infrastructure	Economic Infrastructure	Social Infrastructure	no
	Possibility for Project Realization (or O&M possibility)	Consensus of local people	Already accepted	Negotiated	Start negotiation	No process
		Situations of legal procedures	Approved already	Sure	On application	No process
		Budget status	Already in the budget book	Next year Budget Plan	Only proposal	No process
		Status of O&M plan preparation	Approved O&M budget	Already has O&M plan	On preparation	No process
	Forecasted technical difficulty	Topographic condition (flood)	No risk	Low risk	Medium risk	High risk
		Topographic condition (land slide)	No risk	Low risk	Medium risk	High risk
		Advanced technology experience for construction and O&M	A lot of experience	Limited experience	Only single case	No experience
Project Effect	Life of the people	Improvement of access / quality to public facilities	Provide initial access	Improve quality (price)	Improve only access	Can't expect
		Improvement of public transportation	Direct result from project	Improve public access	Some benefits	Can't expect
		Interconnection between communities	Become easy and fast	Become possible	Some expected	Can't expect
		Resettlement	No resettlement required	Only a few households	Significant resettlement	Can't expect
		Improvement of tourism	Main target	Bring benefits	Some expected	Can't expect
		Contribution to healthy life	Health project	Good for health	Some expected	Can't expect
	Economy of Concerned area	Expansion of Productivity	Create new products	Improve import/export	Improve internal trade	Can't expect
		Increasing of Job opportunity	Create new permanent jobs	Support current jobs	Only during construction	Can't expect
	Safety securing	Reduction of natural disaster	Direct protection	Improve safety	Somewhat expectable	Can't expect
		Reduction of accidents	Safety project	Improve safety	Somewhat expectable	Can't expect
	Environment	Reduction of air/water pollution	No pollution	Pollution during construction	Pollution after construction	Can't expect
		Reduction of noise	No noise	Noise during construction	Noise after construction	Can't expect
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		Conservation of rare species	No lost	Some damage	Significant damage	Can't expect
		Improvement of landscape	Give harmony on natural and artificial beauty	There is some minus effect to the natural and regional.	Structure are breaking the harmony of scenery.	Structure are breaking the harmony of scenery.
	Local Community	Utilization of local materials and human resources	For construction and O&M	Only for construction	Somewhat expectable	Can't expect
		Cost saving for community	Make profit	Reduce expenditures	Minimize damage cost	Can't expect
		Improvement of regional equity	Direct improvement	Only in some areas	Somewhat expectable	Can't expect
		Promotion of local culture	Develop culture and traditions	Save culture and traditions	Somewhat expectable	Can't expect

9. How to set up the weight of evaluation items?

There are two weight decision methods:

(1)	Summing up individual questionnaire results using excel calculation
(2)	Decide through the discussion among weight setters' group"

9.1 Questionnaire to weight setter

Questionnaire survey for multiple people is desirable, because the weight varies depending on the value of the person.

Weights will be calculated using representative values of questionnaire result. However, the weight varies depending on the project type, and even for the same type of project, the weight varies depending on the purpose of the project and local conditions.

9.2 Two kinds of Weight methods

Weighting is necessary to reflect the relative importunateness between the evaluation items. The weight is a numerical value usually assumed by the evaluator. There are two methods to give the weight as shown in the Table 13.

Table 13: Setting methods of weight

Method	Outline	Merit	Demerit
Direct Evaluation Method	<ul style="list-style-type: none">• A method that directly determines the weight of all evaluation items at the same time	<ul style="list-style-type: none">• The weight evaluation for each evaluation item can be directly reflected by the sense of the weight setter• The weight determination does not involve complicated calculation procedures	<ul style="list-style-type: none">• It is generally not easy to determine the weights of a large number of evaluation items at the same time• There is a tendency that the weight of each Evaluation Item becomes similar
Paired items comparisons Method	<ul style="list-style-type: none">• Calculating method of the relative importance for the results of the comparison of all paired evaluation items	<ul style="list-style-type: none">• Can determine the weight of multiple Evaluation Items simultaneously• Usually weight comparison only for a paired items is easy	<ul style="list-style-type: none">• This involves complicated calculations• The result has a possibility not to meet with the sense of the weight setter

9.3 Direct evaluation method

The Figure 4 shows an example of evaluation score sheet to be delivered by the expert. Each expert will put the weight ratio to the form by own experience.

Weight setter is requested to put weight score into each item.												
Investment Efficiency		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Total Cost</td> <td style="width: 20%;"></td> </tr> <tr> <td>Cost-Benefit Ratio (Direct benefit)</td> <td></td> </tr> <tr> <td>IRR</td> <td></td> </tr> </table>	Total Cost		Cost-Benefit Ratio (Direct benefit)		IRR					
	Total Cost											
	Cost-Benefit Ratio (Direct benefit)											
IRR												
Situations for the Implementation		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Project Relevance</td> <td style="width: 20%;"></td> </tr> <tr> <td>Project prospect</td> <td></td> </tr> <tr> <td>Technical difficulty</td> <td></td> </tr> </table>	Project Relevance		Project prospect		Technical difficulty					
	Project Relevance											
	Project prospect											
	Technical difficulty											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Relationship with higher-level plan</td> <td style="width: 20%;"></td> </tr> <tr> <td>Relationship with other Projects</td> <td></td> </tr> </table>	Relationship with higher-level plan		Relationship with other Projects							
	Relationship with higher-level plan											
Relationship with other Projects												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Regional consensus</td> <td style="width: 20%;"></td> </tr> <tr> <td>Status of legal procedures</td> <td></td> </tr> </table>	Regional consensus		Status of legal procedures								
Regional consensus												
Status of legal procedures												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Risk from topographical condition</td> <td style="width: 20%;"></td> </tr> <tr> <td>Risk for using new technology</td> <td></td> </tr> </table>	Risk from topographical condition		Risk for using new technology								
Risk from topographical condition												
Risk for using new technology												
Project Effect		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Life of the people</td> <td style="width: 20%;"></td> </tr> <tr> <td>Regional economy</td> <td></td> </tr> <tr> <td>Safety securing</td> <td></td> </tr> <tr> <td>Environment</td> <td></td> </tr> <tr> <td>Creation of Community</td> <td></td> </tr> </table>	Life of the people		Regional economy		Safety securing		Environment		Creation of Community	
	Life of the people											
	Regional economy											
	Safety securing											
	Environment											
	Creation of Community											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Improvement of public service</td> <td style="width: 20%;"></td> </tr> <tr> <td>Opportunity expansion in life</td> <td></td> </tr> <tr> <td>Improvement of Amenity</td> <td></td> </tr> </table>	Improvement of public service		Opportunity expansion in life		Improvement of Amenity					
	Improvement of public service											
	Opportunity expansion in life											
	Improvement of Amenity											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Expansion of Productivity</td> <td style="width: 20%;"></td> </tr> <tr> <td>Increasing of Employment</td> <td></td> </tr> </table>	Expansion of Productivity		Increasing of Employment							
	Expansion of Productivity											
	Increasing of Employment											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Reduction of Natural Disaster</td> <td style="width: 20%;"></td> </tr> <tr> <td>Reduction of Accidents and Disasters</td> <td></td> </tr> </table>	Reduction of Natural Disaster		Reduction of Accidents and Disasters							
Reduction of Natural Disaster												
Reduction of Accidents and Disasters												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Conservation of Life Environment</td> <td style="width: 20%;"></td> </tr> <tr> <td>Conservation of Natural Environment</td> <td></td> </tr> <tr> <td>Improvement of Landscaping</td> <td></td> </tr> <tr> <td>Contribution to the conservation of Global Environment</td> <td></td> </tr> </table>	Conservation of Life Environment		Conservation of Natural Environment		Improvement of Landscaping		Contribution to the conservation of Global Environment				
Conservation of Life Environment												
Conservation of Natural Environment												
Improvement of Landscaping												
Contribution to the conservation of Global Environment												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Utilization of local Resources</td> <td style="width: 20%;"></td> </tr> <tr> <td>Stabilization of Community</td> <td></td> </tr> <tr> <td>Promotion of local culture</td> <td></td> </tr> </table>	Utilization of local Resources		Stabilization of Community		Promotion of local culture						
Utilization of local Resources												
Stabilization of Community												
Promotion of local culture												

Figure 4: Example of the weight score sheet

9.4 Paired items comparisons method

To conduct a questionnaire to all of main items, sub-items, and indicators, as shown in the Table 14 and ask respondents to classify to 9 ranks about the important for each pair. The result of geometrical means the multiple respondents will be calculated using Excel.

$$\text{Geometrical mean } a_i = \sqrt[n]{a_1 * a_2 * \dots * a_n}$$

Table 14: Example of questionnaire

Request for cooperation										
On implementing the xx project, we wish to conduct a questionnaire survey to hear your opinions on what kind of viewpoint should be evaluated.										
In this questionnaire, we will show you the evaluation items by each pair-items, and you are requested to give the importance degree between each pair-item.										
Q 1 Please put “√” on the most appropriate column (Comparison of Main 3 items)										
	Left is absolutely important	Left is pretty important	Left is important	Left is slightly important	Almost same	Right is slightly important	Right is important	Right is pretty important	Right is absolutely important	
Investment Efficiency										Situations for implementation
Investment Efficiency										Project Effects
Situations for implementation										Project Effects

	Item	Contents
A	Investment Efficiency	<ul style="list-style-type: none"> • It is based on the viewpoint of whether the project meets with the national policy to give priority investment for high investment effects (project). • It is evaluated using cost-benefit analysis about the items that can be converted into monetary values. Projects are considered to have higher priority which has with higher cost-benefit (direct benefit) • Profitability is also an important indicator when private entities or third-sector entities are responsible for the operation
B	Situations for implementation	<ul style="list-style-type: none"> • It is based on the viewpoint of whether the project can be smoothly carried out according to the plan and schedule. Projects have higher priority if the following conditions are satisfied. <ul style="list-style-type: none"> • Coordination with relevant agencies • Possibility for project implementation <ul style="list-style-type: none"> • Situations of legal procedures • Relationship with higher level plan • Relationship with other project
C	Project Effects	<ul style="list-style-type: none"> • It is an evaluation from the viewpoint of the effects and impacts of project implementation. Projects have higher priority which contribute to the following points. <ul style="list-style-type: none"> • Life—Realization of a lively life of each individual personnel • Concerned area Economy—Development of competitive economic society <ul style="list-style-type: none"> • Safety—Ensuring of Safety • Environment—Conservation and creation of good environment • Regional community—Development of stable and happy community

Please refer Excel file to calculate weight ratio about multiple items.

9.5 Integration of the evaluation score

The evaluation value is integrated by taking a weighted sum of the evaluation score and weight of each evaluation item. The evaluation value is calculated for each Main item and Sub-item to be used as a reference when deciding regarding the implementation of the Project.

$$\text{Evaluation Value} = \sum_i W P_i$$

Wi : Weight for Evaluation Item i

Pi : Evaluation Score for Evaluation Indicator i

The weight of the evaluation item used in the analysis reflects the value norms of the weighted setter. Therefore, it is desirable to analyze the change in the evaluation value due to the difference in weight by performing sensitivity analysis by appropriately changing the weight between evaluation items as necessary.

And the total weight should adjust to become 10 points (Figure 7, p. 25).

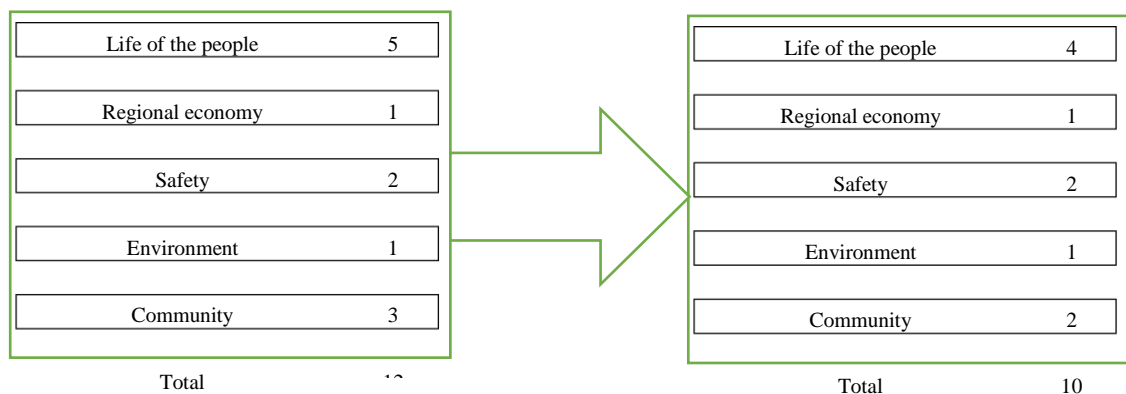


Figure 5: Conversion of weight

10. Summary of the project evaluation results

The evaluation results should be summarized as shown in the Table 15.

Table 15: Example of Summary sheet of all evaluation item score

Project Name		Owner	
Location		Scale	
Outline/Purpose			

Main Item	Middle item	Small item	Score	Weight	Score x weight	Total score
Investment Efficiency	Total Cost					
	Cost-Benefit Ratio					
	IRR					
Subtotal						
Project Situations for the implementation	Relevance of Project	Relationship with higher level plan				
		Relationship with other Projects				
	Subtotal					
	Possibility of Project Realization	Consensus of local people				
		Situations of legal procedures				
	Subtotal					
	Forecasted technical difficulty					
Subtotal						
Project Effect	Life of the people	Improvement of public service	Improvement of access for public facilities			
			Improvement of access for main transportation			
		Opportunity for life expansion	Enhancement of Public transportation			
			Expanding of interacting population			
			Improvement of access to recreational facilities			
		Improvement for Amenity	Fatigue reduction			
			Pedestrian Amenity Improvement			
	subtotal					
	Concerned area Economy	Expansion of Productivity				
		Increasing of Employment				
	Safety	Reduction of Natural Disaster	Development of the space for disaster prevention			
			Ensuring of traffic services			
		Reduction of Accidents and Disasters	Reduction of direct damage			
			Improvement of safety on walking			
	Subtotal					
	Environment	Conservation of Life Environment	Reduction of air pollution			
			Reduction of Noise			
		Conservation of Natural Environment	• Rare species conservation			
			• Ecosystem conservation			
		• Conservation of soil and water environment				
		Contribution to the conservation of Global Environment				
		Improvement of Landscaping				
	Subtotal					
	Community	Utilization of local Resources				
		Stabilization of Community	Reduction of Financial expenditure			
			Correction of regional difference			
		Promotion of local culture				
	Subtotal					
Subtotal						
Total						

Reason for approval

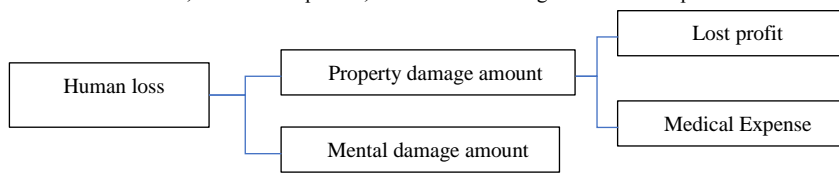
11. How to carry out cost-benefit analysis?

To perform cost-benefit analysis, it is necessary to decide how to estimate both cost and the benefit (or loss) of the target project, how to assume the target period for those estimation, how to handle price escalations during that period, and the necessity of sensitivity analysis. The Table 16 shows evaluation items to be used for evaluation of cost-benefits.

Table 16: Indicator list to be used in evaluation (draft)

<ul style="list-style-type: none"> • Items that are considered appropriate for common use in all Project fields 	<ul style="list-style-type: none"> • Economic growth rate • Social discount rate • Reduction of Environmental load by monetary unit (Carbon dioxide, noise, etc.)
<ul style="list-style-type: none"> • Items that are considered to make matching with similar Project 	<ul style="list-style-type: none"> • Time value • The value of human life • Effect of Environmental matters (Carbon dioxide, noise, landscape, etc.) • Handling of External (dis) Economic Effects

For the reference:

Time value	<ul style="list-style-type: none"> • For Vehicles: set value using initial cost, average service period, service rate, residual value and fuel consumption volume for the saving time. • For Human: set value using disposable income ⁴, working period, working ratio
Human loss	<p>• When using human loss for benefit measurement, human loss is calculated with “Lost Profit”, “Medical Expense”, and “Mental Damage” as basic components.</p>  <pre> graph LR HL[Human loss] --> PDA[Property damage amount] HL --> MD[Mental damage amount] PDA --> LP[Lost profit] PDA --> ME[Medical Expense] </pre> <p>Fig 6 Composition of Human Loss</p>

11.1 Cost

Table 17: Project Cost

Costs	Category	Including
	Land costs	Compensation costs
	Construction costs	Design, supervision cost and interest in case of loan project
	Operation costs	Government office human cost if it is established newly for the project
<i>In case of project expenses that are not included in the expenses, clearly indicate such cost items and the reason for excluding.</i>		

⁴ (可処分所得)

11.2 Benefits

Table 18: Benefits or Loss

	Category	Explanation	Example
Benefits (loss)	Main benefit Direct benefits	Benefit as an output of the project. Benefit related to the original purpose of project implementation	Reduction of travel time and savings on vehicle gasoline and repair costs for road project, Increasing of agricultural products for the irrigation project
	Secondary benefits Side benefit	Incidental benefit Benefits that arise in society as a whole	Improvement of landscape
		Incidental loss	Damage by accidents Human loss due to accident in road project
	Indirect benefits	This category benefits are difficult to assess appropriately	Increasing of production of fertilizer and farm equipment, if agricultural production increased Environmental mal effect

All cost should be converted to present value by appropriate methods (Ex. Social discount rate).

11.3 Example of Cost and Benefits for each type of Projects

Table 19: Evaluation items for cost-benefit analysis in each kind of project

	River	Dam/ Reservoir	Power	Flood Control	Sea shore protection	Road	Harbor	Airport	Water	Sewage	Public building	Telecom	Agriculture
Cost						Project construction) cost							
						Land cost							
						Management/repair and operation costs							
						Renewal or Reinvestment costs							
Benefit						Travel time saving						User's benefit	
	Flood protection			Cost reduction effect		Transportation costs							
				Erosion prevention		Reducing traffic accidents			Damage reduction				
		Lifesaving benefits				Life improvement							
						Productivity improvement							
						Water quality improvement effect, etc.							
						Landscaping							
						Land use effect							
						Sand and splash protection							
						Development of Tourism							
						Reduction of medical expenses							
						Improved building performance							
						Supplier benefits							
						Coastal environmental conservation				Consideration for the environment			
						Coastal area utilization							
Minus benefit						Resettlement							
						Dust /CO							
						Noise							
						Sceneries							

11.4 Cost-benefit analysis comparison for each stage

See FS-Guideline Appendix 3.

Table 20: Cost benefit analysis comparison for each stage

Table 20: Cost benefit analysis comparison for each stage					
Stage	Pre-implementation	Re-assessment		Post-completion	
	When a new project is adopted	During execution of Project		After the completion of project and during in service	
Target	Investment efficiency of the entire Project		Investment efficiency of remaining Project	Investment efficiency of the entire Project	Monetary efficiency on the operation
Evaluation concept	Evaluate the investment efficiency of the entire project	Use the total project invested cost and the total generated benefit up to the time of re-evaluation	Evaluate investment efficiency about the necessary additional future costs and the expectable additional benefits for continuation of project	Use the total project invested cost and the total generated benefit up to the time of re-evaluation	Compare the effect of project operation/ maintenance cost and benefit
Cost	Estimated all costs on the evaluation year	(With: when project continued)		Actual cost for construction and repair costs up to the previous year of the evaluation	Cost for Operation and maintenance based on the actual record up to the evaluation year and the forecasted cost for future. The cost of renewal or large-scale repair work is expected to include, if possible
		Construction costs are actual one up to the previous year and for Remaining period. Future maintenance cost are repair expenses, renewal expenses, etc. of facilities that are partially used already	Construction and maintenance cost. (Not necessary to consider the cost of the investments occurred in the past and the benefits generated up to the time of the re-evaluation.)		
		(Without: when project is cancelled partially)			
Compare the case of With and Without			Necessary countermeasures cost shall be deducted, such as removal of facilities and restoration of original conditions.		
Benefit	Estimated benefits All benefits and costs are converted to the evaluation base year value	(With: when project continued)		Newly estimated benefit based on economic trends in the evaluation year,	
		Newly estimated benefit based on economic trends in the re-evaluation year,			
			excluding benefits expected from partial, and further assumed benefits to be sold or diverted to another.		
		(Without: when project is cancelled partially)			
			The value of land and other assets value should be excluded. The value of assets such as land and structures will be calculated as residual value that can be diverted to other sites after examining the possibility of sale and diversion		
Evaluation period	Project construction period plus in-service period based on the maintenance schedule and project contents.				
Base year	Base year is the evaluation year or the re-evaluation year				
Social discount rate	Assumed based on real yields (interests) of government bonds, etc., or social discount rates of other similar projects	• If there is a restudy, evaluate by original social discount rate up to the previous year of the evaluation and by the new restudied discount rate for the each year after revaluation		Use the social discount rate for the re-evaluation year	
		• If there is no restudy, use the existing social discount rate			

12. What documents are necessary for the project evaluation?

Table 21: Necessary documents for Project Evaluation

	Document Name	Outline	Reference
Pre-Implementation stage	Project Concept Self-Evaluation Sheet	Brief documents to show outline of the project plan	Project Concept: Page 20 Self-Evaluation Sheet: Page 8
Execution stage	Project Progress Report (PPR) Self-Evaluation Sheet	Report imposed on both contractors and construction supervision consultants by the Contract documents. Usually by monthly report format	
Post-Completion stage	Project Completion Report (PCR) Self-Evaluation Sheet	Final report imposed on both contractors and construction supervision consultants by the Contract. Submission of As-built drawings will be imposed separately	
	Project Maintenance Plan Self-Evaluation Sheet	Principally this should be prepared by Executing agency. However, executing agency may ask to supervising consultant by specifying in the contract	

Project Concept Form

(Concept should be prepared in the tabular form)

1. Project Name					
<i>Describe simply Name which could show the character of Project</i>					
2. Outline of Project (Within a few line as shown below)					
<i>“In (Location / Target), completion of (Project Purpose) will contribute to (Overall goal) by executing of (Output)”</i>					
3. Project Location Map or Photo					
4. Outline Scale: (not quantity) Show by the comparison table about “Current status” vs “Expected Plan”					
	<i>(Example)</i>		<i>Current status</i>		<i>Expected Plan</i>
	Area (m2) or Length (km)				
	Capacity				
	Total employee number				
	Current Issues / Items to be improved				
5. Relevance: (Background)					
<i>List of upper plans (with page number) in which the project is recommended</i>					
6. Rough Cost estimate					
<i>Very rough estimate. Attach breakdown at the end of this Table, if possible.</i>					
7. Implementation Schedule (Expected schedule like below Table)					
	<i>(F/S)</i>	<i>(DED)</i>	<i>Land Acquisition</i>	<i>Construction</i>	<i>O&M</i>
	<i>(2019)</i>	<i>(2020)</i>	<i>2021-2024</i>	<i>2022-2026</i>	<i>2027-</i>
	<i>(6 months)</i>	<i>(12 months)</i>	<i>3years</i>	<i>4 years</i>	
8. Project Benefit					
	<i>(Example)</i>			<i>Expected Plan</i>	
	<i>(Qualitative)</i>			<i>(Narratives by a few line)</i>	
	<i>(Quantitative) such as B/C</i>				
	<i>Redemption period / Cumulative turnaround year</i>				
9. Financial prospect for O&M (show by the comparison style)					
	<i>(Example)</i>		<i>Current status</i>		<i>Expected Plan</i>
	<i>Annual Revenue (by 1000US\$)</i>				
	<i>Expenditure for O&M (by 1000US\$)</i>				
	<i>Direct staff number for O6M</i>				
10. Specific Item to be studied (if F/S is necessary)					
<i>Study items to solve the Current issue</i>					
<i>(it is not good to describe the current issues only)</i>					
11. Expected Financial Resources					
<i>“Infrastructure Fund” or “Loan” or “Grant”</i>					
12. Estimated F/S budget (if F/S is necessary)					
<i>Very rough estimate</i>					

13. How the evaluation period should be identified?

Usually, infrastructure projects have a long period from planning to the service life. On the cost/benefit analysis, a service life of the project should be assumed. And all cost and benefits should be converted to present values.

Table 22: Evaluation Period (see p. 2-11 of FS-GL Part 2)

	10	20	30	40	50
Agriculture Irrigation:					50
Railway			25~40		
Water and Sewerage:			20~30		
Road			20~30		
Flood Control				30~50	
Dam/Reservoir				30~50	
Harbor:			25~30		
Airport:			20~30		
Power Plant			20~50		
Telecommunication		20			
Public Building				30~50	

Source: JBIC “IRR calculation manual of Loan Project Practice” April, 2007

14. Sensitivity analysis

It is necessary to perform the analysis of sensitivity for uncertain factors that may affect to evaluation results at the time or prior to evaluation and re-evaluation.

Table 23: Sensitivity analysis items and methods

Item	Method of sensitivity analysis
Expense	Analyzing by multiplying the initial project cost by a certain percentage, taking into consideration the prior and subsequent fluctuations of the project cost in the same and similar projects so far
Project period	Considering the Project period of the same type / similar Project so far, analyze the initial Project period by adding or subtracting a certain period
Demand forecast	Population frames, economic growth frames, etc., which are prerequisites for demand forecasting, are analyzed using demand forecasting results that take into account the fluctuation range of upper and lower frames based on the latest research data

Appendix: Operational & Effect Indicators

*For quantitative evaluation,
but can be assumed by the
owner/expert*

A1.1 Aviation sector

	New airport	Airport expansion	Terminal expansion	Rehabilitation	Control system development
Number of passengers	O	O	O	O	
Cargo Volume	O	O	O	O	
Number of Takeoffs and Landings by Origin and Destination	O	O	O	O	
Air Traffic Volume					O
Number of tourists			o		
Number of Passengers for Project			o		

A1.2 Harbor

	New Container terminal / expansion	New establishment and expansion of bulk (grain, oil, etc.) terminals	New Establishment and expansion of general merchandise terminal	Established and expanded ferry terminal	Route dredging	Wharf and cargo handling machine rehabilitation
Annual Total Cargoes Container cargo volume (tons and TEU) Bulk cargo volume (tons) General cargo volume (tons)	O	O	O	o	O	O
Total Passagers				O		
Total ship Gross Tonnage	O	O	O	O	O	O
Berth Occupation Ratio	O	O	O	O		O
Berth Charge	o					
Maximum Dead Weight Tonnage	o	o	o	o	O	
Weekly Working Hours Ratio	o	o	o	o		o
Weekly Crane Operating Ratio	o					o
Dredged Amount					O	
Containerized Cargo Ratio	O					
Average Waiting Time	O	O	O	O	O	O

A1.3 Road sector

	New bypass, tunnel, bridge	Road rehabilitation, pavement	Lane widening, three-dimensional intersection	New highway	Bridge rehabilitation, disaster prevention
Annual Average Daily Traffic (AADT)	O	O	O	O	O
Time Saving or Distance shortening	O	O	O	O	
Vehicle Operation Cost Saving					
Average Velocity Increase	o	O	O	O	
Decrease of Number and Frequency of Traffic Accident	o			o	
Congestion Length Decrease and Time Saving	o		o		
Decrease of Annual Traffic Impassability Dates Due to Disaster					o

A1.4 Telecommunication sector

	Exchange equipment	Transmission equipment	Subscriber facilities
Telephone Main Lines in Operation – Exchange Capacity Ratio	O		
Telephone Traffic [Call * Minutes]	O	O	O
Call Completion Rate	O	O	O
Fault Ratio	O	O	O
Faults Cleared by Next Working Day	O	O	O
Dissatisfaction level	o	o	o
Satisfaction level	o	o	o
Telephone Density	O		O
Telephone penetration rate			
Waiting List for Main Lines	O		O
Telephone Traffic [Call * Minutes]	O	O	O
Telephone project sales	O	O	O
Total amount of communication equipment imported and produced	o		o
Area/Population Ratio Who Can Use Telephone Services		o	
Internet Uses/Providers	o	o	

A1.5 Power sector

	Thermal power generation (coal, gas combined geothermal, oil)	Thermal power rehabilitation	Installation of desulfurization equipment	General hydropower/pumping	Wind- power generation	Power transmission & Substation	Power distribution
Maximum Output (MW)	O			O	O		
Net Electric Energy Production					O		
Plant Load Factor (%)	O	O					
Availability Factor (%)	O	O			O	O	
Availability Factor or Operating Hours					O		
Auxiliary Power ratio (%)	O	O					
Capacity Factor				O			
Comprehensive Circulating Efficiency				O			
Operating Hours				O			
Gross Thermal Efficiency (%)	O	O					
Utilization Factor				O	O		
Outage Hours for Every Cause (Hr./Year or Days/Year)	O	O		O	O	O	
Outage Times for Every Cause (times/Year)	O	O			O	O	
Planned Outage Hours				O	O		
Voltage Drop at End User						O	
Transmission Loss						O	
Annual Total Volume of Inflow to The Reservoir (M3/Year)				O			
Volume of Sedimentation in The Reservoir (M3/Year)				O			
Net Electric Energy Production (Gwh/Year)				O			
Sox Emission Concentration at Rated Output			O				
Sox Removal Efficiency			O				
Desulfurization Availability to Generator Operation Hours			O				
Outage Hours for Every Cause			O				
Outage Times for Every Cause			O				
Maximum Output (MW)	O	O					
Net Electric Energy Production (Gwh/Year)	O	O					
The Amount of Sox Reduction			O				
The Amount of Dust Reduction			O				
CO2 Reduction Ratio	O	O					
SO2 Reduction Ratio	O	O					
Dust Reduction Ratio	O	O					
Fuel Reduction Ratio	O	O					

A1.6 Irrigation and agriculture sector

	Agriculture	Irrigation
Area Benefited by The Project (Ha)	O	
Cultivated Area by Crops (Ha)	O	
Production Volume of Major Crops (Ton/Year)	O	
Yield of Major Crops Per Unit Area: Rainy Season / Dry Season (Ton/Year)	O	
Gross Annual Average Farm Income (\$/Year/Household)	O	
Net Annual Average Farm Income (\$/Year/Household)	o	
Labor Requirement Per Unit Area (Hrs./10a)	O	
Collection Rate of Irrigation Water Charge (%)		o
Sufficiency Rate of Operation and Maintenance Cost (%)	o	
Rate of Water Users Group Formulated (%)		o
Annual Total Volume of Inflow to The Reservoir (M3/Year)		o
Annual Total Volume of Water Release Through Intake Facilities (M3/Year)		o
Volume of Sedimentation in The Reservoir (M3/Year)		o
Operation and Maintenance Cost Per Unit Area ((Yen)/Year/Ha)		o
Peak Intake Discharge: Dam/Head works (M3/S)		

A1.7 River improvement (flood control)

	Improvement	Flood control
Annual Maximum Flow (M3/S)	O	
Annual Highest Water Level (M)	O	
Discharge Capacity (M3/S)	O	
Annual Maximum Inundated Area By Levee Breach or Overflow (Km2)	O	
Annual Maximum Number of Inundated Houses By Levee Breach or Overflow (household)	O	
Annual Reduction in Number of Flood by Levee Breach or Overflow	O	
Annual Maximum Damage By Levee Breach or Overflow	o	
Annual Maximum Inundated Time by Levee Breach or Overflow	o	

A1.8 Water works

Population Served	O
Amount of Water Supply(M ³ /d)	O
Rate of Facility Utilization(%)	O
Unaccounted-for Water Rate(%)	O
Accounted-for Water Rate(%)	O
Leakage Rate(%)	o
Amount of Water Intake(M ³ /d)	o
Water Quality	o
Percentage of Population Served(%)	o
Water Supply Per Capita(L/man · day)	o
Land Subsidence(cm/year)	o
Revenue on Water Supply	o
Percentage of Population Served(%)	o

A1.9 Sewage

Population Treated (man)	O
Amount of Wastewater Treated (M ³ /d)	O
Rate of Facility Utilization(%)	O
BOD Concentration (at Inlet, outlet, reduction rate)	O
Covered Ration of Sewer Main (%)	o
Suspended Solid Concentration (at Inlet, outlet, reduction rate)	o
Foam of Sludge Disposal	o
Rate of Sludge Recycled(%)	o
Rate of Service Charge Recovery(%)	o
Percentage of Population Served(%)	O
Improvement of Water Quality at discharge point (BOD/COD)	o
Percentage of Population Connected(%)	o
Improvement of Irrigation Water (BOD)	o
Ratio of Cost Recovery (%)	o
Reducing Ratio of Sludge Disposal C. (%)	o
Percentage of Population Served(%)	o
Percentage of Wastewater Treatment(%)	

A1.10 Education

Enrollment rate	O
Male-Female Ratio	O
Promotion Rate	O
Completion Rate	O
Share of Students by Subject	O
Student Test Score	O
Repetition Rate	o
Drop Out Rate	o
Student: Teacher Ratio	O
Qualified Teacher Ratio	O
Teachers Per Class	O
Students Per Classroom	O
Female Teacher Ratio	o
Classroom Area(m ²) Per Student (m ²)	O
Textbook-Student Ratio	o
Distance from School (Km)	o
Public Education Expenditure Share of GNP	o
Public Education Expenditure Share of Total Government Expenditure	o
Teacher Salary Share of Total Education Expenditure	o
Education Expenditure Per Student	o
Per Student Expenditure Between Primary and Tertiary Education	o
(Actual Annual Instruction Time)	o

A1.11 Afforestation

Afforestation Area (ha), Quantity of Planting (numbers)	O
Survival Rate (%)	O
Quantity of Complementary Planting (numbers)	O
Quantity of Benefited Forest Owners (numbers)	o
Area of Nursery (ha), Production Capacity of Seedlings (numbers)	o
Production of Seedlings (numbers)	o
Activity of community	o
Rate of Forest Cover (Rate of Tree Crown) (%)	O
Amount of Products Volume (m3), Monetary Value (\$)	O
Average annual income per household regarding Benefited Forest Owners (\$)	o
Number of Employees (numbers)	o
Membership in Training Class (numbers)	o
Amount of Forest Resources	o
Quantity of Water Outflow	o
Quantity of Erosion	o
Situation of Wild Animals	o

A1.12 Health/Medical

Number of Testing • Operations	O
Number Of Inpatients • Outpatients • Emergency Patients	O
Bed Occupancy Rate(%)	o
Number of Patients Diagnosed • Childbirth • Hospital Death(人)	o
Number of Physicians, Nurses, Co-Medical Workers Trained	o
Number of Patients Diagnosed	o
Birth Rate • Mortality Rate	O
Under 5 Mortality Rate	o
Infant Mortality Rate	o
Maternal Mortality Rate	o
Mortality Rate by Diseases	o
Life Expectancy	o
Incidence Rate	o
Prevalence Rate	o

A1.13 Tourism

Apply operational indicators of other related sectors such as roads, airports, harbors, water and sewage systems, afforestation, etc.	o
Number of Visitors	o
Entrance Fee	o
Number of Tourist	o
Income from Tourism	o
Number of Hotel Guest	o

A1.14 Public Buildings

Function or business contents of the building	o
Number of staff	o
Number of Worker or Helper	o
Working space for one staff (m2/person) excluding lobby	o
Meeting room number for total staff	o
Number of people to visit the building from outside (per year)	o
Lobby area for the vaster per day (person/m2)	o