GUIDELINES ON PROVINCIAL/LOCAL PLANNING AND EXPENDITURE MANAGEMENT

Project evaluation & development

Volume 5

ADB
Asian Development Bank
National Economic and Development Authority

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Volume 5: Project Evaluation and Development

This is part of the **Guidelines on Provincial/Local Planning and Expenditure Management** produced under the NEDA-ADB Technical Assistance on Strengthening Provincial and Local Planning and Expenditure Management. The Guidelines consist of:

Volume 1: Integrated Framework
Volume 2: Provincial Development and Physical Framework Plan
Volume 3: Investment Programming and Revenue Generation
Volume 4: Tools and Techniques on Budgeting and Public Expenditure Management
Volume 5: Project Evaluation and Development

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Acronyms

AIP	Annual Investment Program
APIS	Annual Poverty Indicator Survey
BAS	Bureau of Agricultural Statistics
BCR	Benefit-cost ratio
CBMS	Community-Based Monitoring System
CER	Cost-effectiveness ratio
ECF	Economic conversion factor
CIF	Cost, insurance, and freight
CIP	Communal Irrigation Project
CIS	Communal Irrigation System
CSCF	Commodity-specific conversion factor
DTI	Department of Trade and Industry
EIRR	Economic internal rate of return
EP	Economic price
ER	Exchange rate
FEP	Foreign exchange premium
FFS	Farm field schools
FIES	Family Income and Expenditure Survey
FOB	Freight on board
FP	Financial price
ICC	Investment Coordination Committee
IEC	Information, education and communication
IRA	Internal Revenue Allotment
IRR	Internal rate of return
ISF	Irrigation service fee
LGU	Local Government Unit
MAO	Municipal Agriculturist's Office
MARO	Municipal Agrarian Reform Office
M&E	Monitoring and evaluation
NEDA	National Economic and Development Authority
NPV	Net present value
ODA	Official Development Assistance
O&M	Operations and maintenance
PARO	Provincial Agrarian Reform Office
PDIP	Provincial Development Investment Program
PDP	Provincial Development Plan
PED	Project evaluation and development
PPAs	Programs, projects, and activities
RATA	Representation and transportation allowance
RPMES	Regional Project Monitoring and Evaluation System
SDR	Shadow discount rate
SER	Shadow exchange rate
SFR	Small farm reservoir
STW	Shallow tube well
SWR	Shadow wage rate
TFR	Total fertility rate
VAT	Value added tax

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Executive Summary

NEDA, with assistance from ADB, formulated the Guidelines on Provincial/Local Planning and Expenditure Management comprising of (1) Integrated Framework, (2) Provincial Development and Physical Framework Plan, (3) Investment Programming and Revenue Generation, (4) Tools and Techniques on Budgeting and Expenditure Management, and (5) Project Evaluation and Development.

This fifth volume aims to guide provincial planners evaluate the programs, projects, and activities (PPAs) included in the Provincial Development Investment Program (PDIP). The outputs of this volume are project evaluations which, in the case of PPAs recommended for implementation, are in the form of detailed project briefs and proposals. These project briefs and proposals form the basis for the budgets, financing and, if necessary, more detailed design, needed for PPA implementation.

Project Evaluation and Development (PED) consists of tools and techniques that are needed to enhance the effectiveness and efficiency of public expenditure. By effectiveness, we mean the extent to which the province's goals are met. In PED, we screen out projects that do not meet the stated goals and those that conflict with other goals of the province. By efficiency we mean the amount of resources (money, personnel time, etc.) needed to produce a unit of output. In PED, we prioritize projects that meet priority development goals and those that create enabling conditions for other projects. We also screen out redundant projects and those that meet the goals at a very high cost.

This volume divides the PED procedures into four stages, each one progressing in detail:

1. Know the project;
2. Understand the project;
3. Analyze it thoroughly; and
4. Judge it fairly.

These four stages make up what we call the comprehensive PED.

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Project evaluation takes off from the Provincial Development and Physical Framework Plan (PDPFP) and the Provincial Development Investment Program (PDIP). Not all projects listed in the PDIP need to be subjected to comprehensive PED. But all of them need to go through the first two stages which are known as the basic PED. The suggested criterion is the project cost or funding source, i.e., if the project based on cost is considered as "big" regardless of funding source or if the project funds will be sourced externally regardless of project cost. The proposed cutoff in project cost is the amount of equal sharing of municipalities from the 20% development fund of the provincial LGU. A project will be considered "big" if the following applies:

$$\textbf{Project cost} > \frac{\textbf{20\% development fund}}{\textbf{number of municipalities}}$$

This scheme is easily justified if we consider one municipality to be just as important as the next, and if the project will require resources greater than the amount computed at equal sharing, then we need to be able to defend the project to the other municipality that will have to forego some of its share from the "fiscal pie".

There are many manuals and even books that can be used as references in undertaking PED. This volume differs from the others in at least three respects:

1. It follows a "building up" (vertical) rather than a "step-by-step" (horizontal) approach. Results from the previous step are carried over to the next step.
2. It gives due recognition to the fact that the projects being evaluated have already been deemed relevant to the goals of the province. This being the case, the volume gives suggestions on how a project can be enhanced to possibly make it viable.
3. It recommends simple methodologies that can qualify as "second best" solutions in case there are not enough resources to implement the "first best."

This volume also comes with a Technical Appendix that can be referred to if more details concerning concepts and underlying principles are desired.

PED PROCEDURES

KNOW the project

This step identifies and characterizes the output of the project. The output is the product resulting directly from the use of project inputs. This output should be classified at the onset, whether it is a public, private, or mixed good. In addition, we also classify it into either a tradeable, nontradeable, or partly tradeable good. A tradeable good is further classified into importable or exportable.

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The purpose of this step is to anticipate what we call the pricing problem. This will be relevant later on when we compute the costs and benefits of the project.

UNDERSTAND the project

Next, we need to determine the desired outcome of the project. We should be able to trace back the desired outcome of the project to the developmental goals of the province, as spelled out in the PDPFP. This step is greatly facilitated using objective tree and logical framework analyses. If the desired outcome does not fall under any of the developmental goals of the province, the project should not be undertaken.

Another important objective of this step is to classify the project into either a stand-alone project (S), or a required project for other projects to achieve output (R), or one that needs another project to achieve output (N). This step can help identify projects that have been forcibly subdivided in order to escape being subjected to a comprehensive PED. A possible red flag is for projects that are proposed to be implemented in the same locality. A project classified as N should be packaged with the other projects that are needed to achieve the output.

ANALYZE it thoroughly

Having identified the output of the project, we need to forecast the demand for this output. If there is no clear excess demand for the project over the medium- to long-term (say five to 10 years), we need not proceed.

The next step is to determine technical feasibility. This is best done with an engineer who can examine other technically feasible options. The project must be rated as the most cost-effective among all technically feasible options. Even more important than the decision is the process of considering other possible alternatives.

The next step is to determine the cost of project investment, maintenance, and operations. This is an important step even if the project cannot be expected to pay for itself. At the very least, the LGU is made aware of the amount needed to subsidize the operations and maintenance on top of the investment cost.

A decision has to be made at this point – Is the LGU willing and able to finance or subsidize the cost of operations and maintenance, in case the project cannot pay for itself? If the answer is no, the project should not be undertaken, since we cannot expect the project's output to be so maintained and operated as to be useful.

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JUDGE it fairly

This last step determines how much benefit society can really derive from the project's output.

The true cost of the project is valued at the economic price of all inputs required, absent distortions. Similarly, the benefit is valued at the economic price of the outputs, absent distortions. In determining the economic price, we value other resources such as foreign exchange and (unskilled) labor at a premium (or discount). Usually, costs are incurred upfront when the project is being constructed or developed. Meanwhile, we expect benefits to be realized only after the project is completed. The net impact of the project to society is given by its net present value, valued at economic prices. In other words, it is the difference between the present value of economic benefits and the present value of economic costs. This again presents another decision point: If the net impact is negative, then the project should not be undertaken. This means that the project costs more than it can give to society.

We then proceed to determine if the project still yields positive net impact under different benefit and cost assumptions. If the net impact becomes negative, given small deviations from the assumed cost and benefit streams, the project should be reinforced or else shelved. It can still be undertaken if the deviation is deemed highly unlikely to happen within the implementation period.

PROJECT PROPOSAL DEVELOPMENT

A project brief, discussed in the third volume on Investment Programming and Revenue Generation, will be developed for all projects. However, for projects that will be funded externally, a project proposal is required. There may also be a need to contract out a feasibility study (FS). Note, however, that this step should be done only after the project has passed the pre-FS. There are two sets of inputs needed in developing the project proposal – one concerns the project, and the other the prospective funder.

The first set of inputs will come from the PED procedures earlier discussed. The second set of inputs is bound to vary across funders and over time. It is recommended that the information be gathered as the need arises. The information will concern the following about the prospective funder: current thrusts, review procedure, requirements for application including project proposal format and/or template, other nuances (recommended discount rate, conversion factors for some commodities, etc.), and procedures for follow-up. If the project has passed comprehensive PED, then developing the project proposal regardless of form should be easy. For one thing, the information required will have been gathered or estimated in the conduct of PED. For another, the PED provides the best support to your own conviction that the project is indeed a worthwhile undertaking.

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part 1 introduction

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introduction

NEDA, with assistance from ADB, formulated the Guidelines on Provincial/Local Planning and Expenditure Management comprising of (1) Integrated Framework, (2) Provincial Development and Physical Framework Plan, (3) Investment Programming and Revenue Generation, (4) Tools and Techniques on Budgeting and Expenditure Management, and (5) Project Evaluation and Development.

The fifth volume aims to guide provincial planners evaluate the programs, projects, and activities (PPAs) included in the Provincial Development Investment Program (PDIP). The outputs of this volume are project evaluations which, in the case of PPAs recommended for implementation, are in the form of detailed project briefs and proposals. These project briefs and proposals form the basis for the budgets, financing and, if necessary, more detailed design, necessary for PPA implementation.

A. OVERVIEW: PROJECT EVALUATION AND DEVELOPMENT

Project Evaluation and Development (PED) consists of tools and techniques that are needed to enhance effectiveness and efficiency of public expenditure.

PED improves the effectiveness of public expenditure:

- By screening out projects that do not meet the stated goals of the province
- By screening out projects that may conflict with other goals of the province

Effectiveness refers to the extent **by which goals are met** by the investment or project

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PED improves the (allocative) efficiency of public expenditure:

Efficiency refers to the relation of the amount of resources required to produce a unit of output

- By prioritizing projects that meet priority development goals of the province
- By prioritizing projects that create enabling conditions for other projects
- By screening out redundant projects
- By screening out projects that meet the goals but at a very high cost

PED links planning and investment programming with budgeting. The figure below, reproduced from the first volume, Integrated Framework, illustrates this linkage.

Recall that in the planning stage, PPAs that are deemed essential to the achievement of the province's goals are identified in the Provincial Development and Physical Framework Plan (PDPFP). These PPAs undergo preliminary screening and ranking in order to arrive at a six-year PDIP. This PDIP, in turn, is broken down into six single-year investment programs or the Annual Investment Program (AIP).

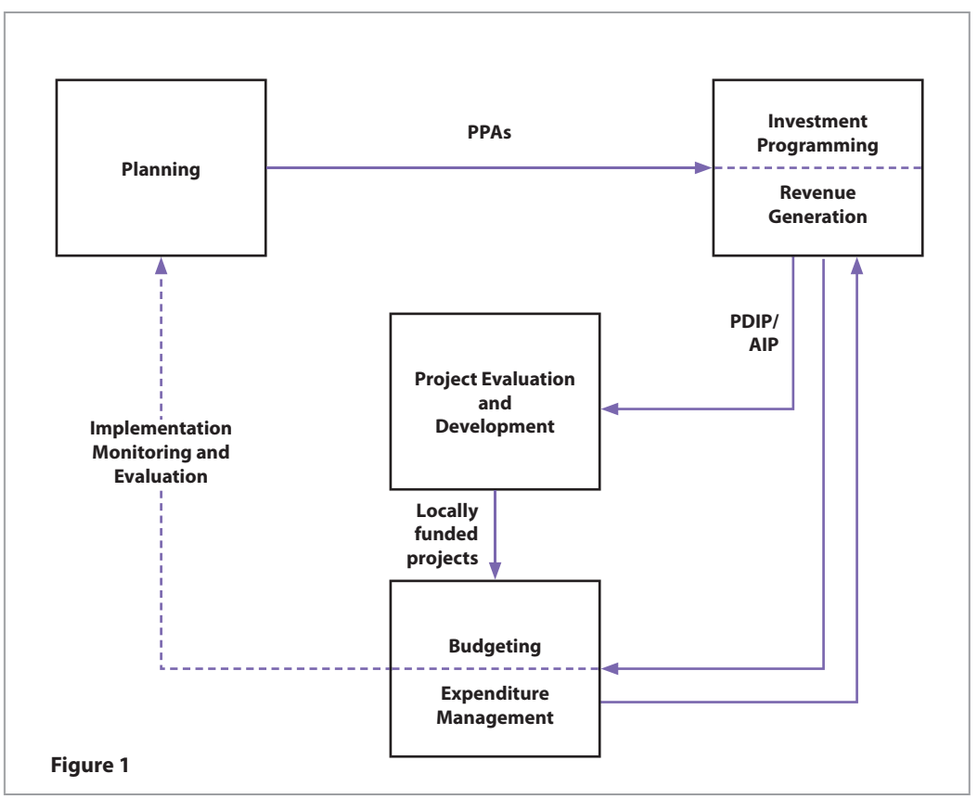

Figure 1

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All PPAs identified in the PDIP (and necessarily in the AIP) will be subjected to PED. Accepted projects that are to be financed from local sources of funds, as well as estimates of revenues to be generated, subsequently become inputs to the budgeting and expenditure management process.

B. BASIC AND COMPREHENSIVE PED

This volume divides the PED procedures into four stages, each one progressing in detail:

1. Know the project;
2. Understand the project;
3. Analyze it thoroughly; and
4. Judge it fairly.

These four stages make up what we call the comprehensive PED. Not all projects need to be subjected to comprehensive PED. But all of them need to go through the first two stages, or the basic PED.

The figure that follows can best clarify the difference in application.

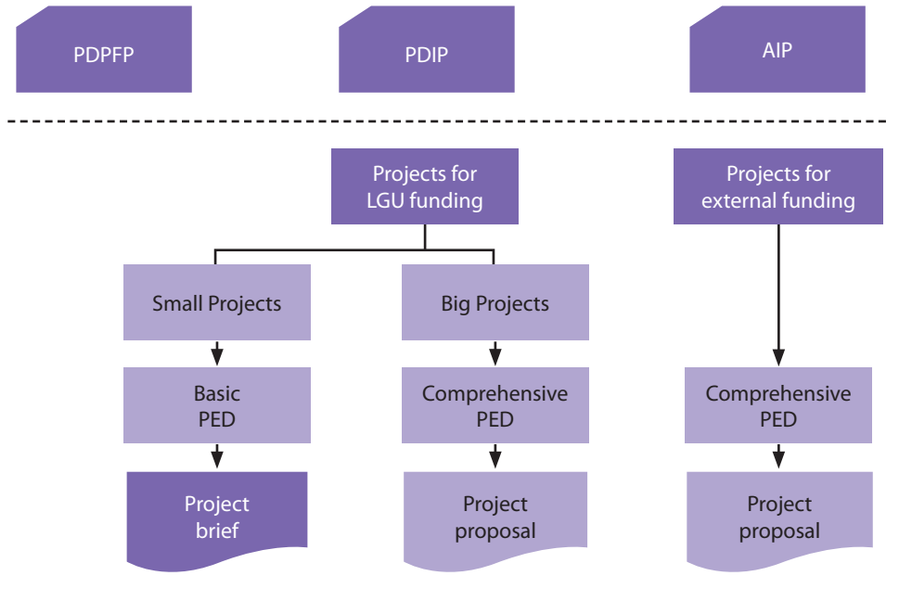

Figure 2

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PED takes off from the PDPFP, the PDIP, and the AIP. Projects will first be classified according to funding source, then according to investment cost.

- Small projects to be funded by the LGU will undergo basic PED. If accepted, the Project Brief discussed under the third volume on Investment Programming and Revenue Generation is drawn up.
- Big projects to be funded by the LGU will be subjected to comprehensive PED. If accepted, the project proposal is then packaged.
- Projects that are to be funded externally will go through evaluation and appraisal procedures required by the funder. Most of them, however, will require the comprehensive PED. The project proposal will also need to conform to the funder's template.

This volume discusses in detail the aforementioned four stages. A simple algorithm to classify projects into "big" or "small" is also suggested.

C. PED IN THE OVERALL PROJECT DEVELOPMENT CYCLE

As the phrase implies, project development is a process of transition from inception to completion. It covers the following sub-processes[1]:

- Pre-investment
  - Project identification
  - Project preparation
  - Project appraisal and financing
- Investment
  - Detailed engineering and design
  - Project implementation
- Post-investment
  - Project operation
  - Ex-post evaluation

Note!

These sub-processes actually correspond to the Integrated Framework. We modify this framework by isolating the PPAs, as presented in Figure 3.

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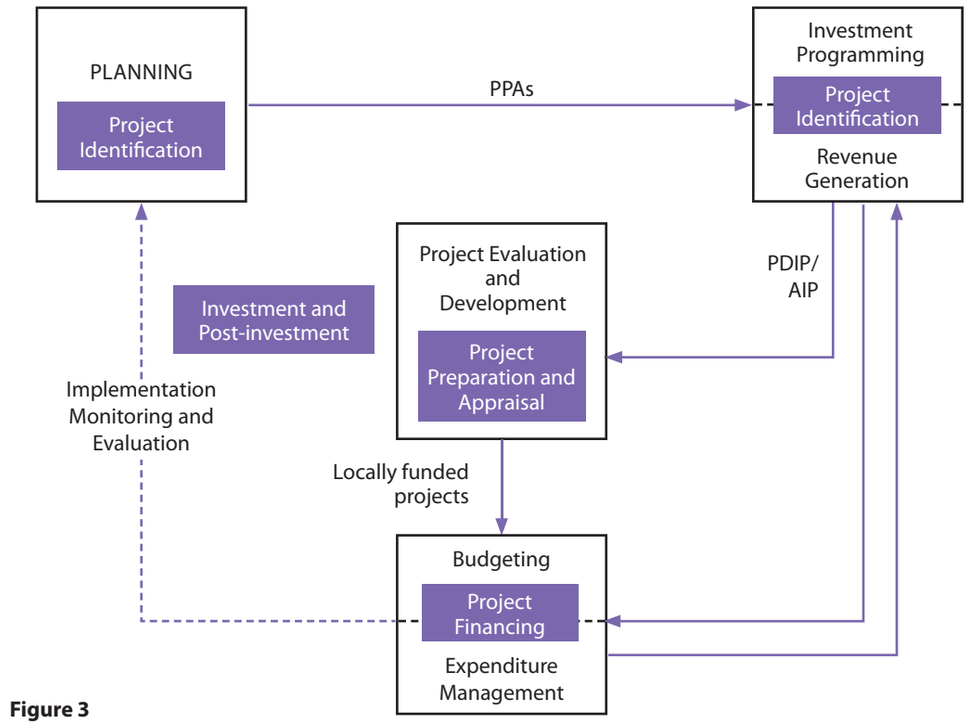

Figure 3

1. Project identification is undertaken at the planning stage and refined during the investment programming stage.
2. During project preparation stage, the project is evaluated and is subjected to further screening and/or fine-tuning. Projects that pass the finer screening are then appraised. It is the funder, or any party acting on behalf of the funder, that conducts the appraisal. This stage is the subject of this volume on PED.
3. Approved projects are then provided the necessary financing. This stage coincides with the process on budgeting and expenditure management.
4. Detailed engineering and/or design are usually undertaken only for approved projects. This is because this phase requires substantial resources, which are, in turn, built into the project cost. Projects that do not involve construction of hard infrastructure do not require detailed engineering. In such cases, only the detailed design needs to be done. This includes the arrangements for implementation, e.g., project management, fund disbursement and accounting, and monitoring and evaluation. If a project is proposed for external funding, some description of these arrangements may be already required before a project is approved.

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5. The next step is project implementation. For projects that involve construction of hard infrastructure, project operation commences only after the structure is built. For other projects, or for projects that include non-infrastructure components, project implementation coincides with project operation. Examples of the latter are an immunization project, supplementary feeding, an irrigation project with technical assistance component.
6. Some time after the project implementation and operation, it is recommended that an ex-post evaluation be conducted. Results from the ex-post evaluation can enhance the design of future projects in order to increase its effectiveness and efficiency.

D. STRUCTURE AND ORGANIZATION

There are many books, manuals, even guidelines already written about project evaluation and development. A number of these were used as reference for this volume. Hence, there are similarities but there are also marked differences particularly in the following respects:

1. It follows a "building up" (vertical) rather than a "step-by-step" (horizontal) approach. Results from the previous step are carried over to the next steps.
2. It gives due recognition to the fact that the projects being evaluated have already been deemed relevant to the goals of the province. This being the case, this volume gives suggestions on how a project can be enhanced to possibly make it viable.
3. It recommends simple methodologies that can qualify as "second best" solutions in case there are not enough resources to implement the "first best."

There are two major sections in this volume, excluding this Introductory Part - Project Evaluation and Development Procedures (Part 2), and Project Proposal Development (Part 3). A Technical Appendix on PED is included. This is for the more advanced user and contains a technical discussion on the principles and concepts behind PED.

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part 2

project evaluation & development procedures

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project evaluation & development procedures

This part of the volume focuses on the procedures to be followed in conducting Project Evaluation and Development (PED). Section A reviews the basic principles behind PED and then discusses the basic concepts. The four stages in PED are also introduced. We close Section A by classifying projects that will be subjected to PED. Section B discusses the basic PED procedures in detail. Section C discusses the rest of the PED procedures completing the comprehensive PED while Section D provides a summary.

A. INTRODUCTION

1. Overview of Basic Principles of PED

Undertaking PED necessarily requires time and resources. There is also a lot of subjectivity that can enter into the analysis. Needless to say, there should be an extreme effort at objectivity and if there are assumptions that need to be made, the rule is always to be conservative and prudent. If a project turns out to be viable because of lax assumptions, then the project may not be viable at all.

The discipline to exercise prudence in the conduct of PED depends on how well one appreciates the principles behind public investment, which include the following:

1.1. Society will continue functioning even without the public investment;
1.2. The purpose of public investment is to effect change and catalyze development;
1.3. Resources available today are more valuable than the promise of benefits to be enjoyed at some time in the future;
1.4. There is always more than one way to produce an output and even an outcome; and
1.5. Public investments will produce gainers and losers. The benefits to gainers should be so much as to be able to compensate the losers so that the net effect is that nobody was made worse off.

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2. Overview of Basic PED Concepts

2.1. **Evaluation.** We begin with a very broad definition of evaluation. Evaluation is the process of examining how well a project meets the objective for which it has been designed. The types of evaluation are distinguished according to the timing of the evaluation and the parameters being evaluated.

2.1.1. With respect to timing, the evaluation can be undertaken:

- Ex-ante (if it is conducted before a project is implemented);
- Ex-post (after a project is implemented); or
- Periodically before, after and even sometime midway through a project's timeline, or time series.

2.1.2. The evaluation also differs with respect to the parameters being examined:

- Process Monitoring & Evaluation (M&E) --where the interest is in input-output monitoring and efficiency of delivery systems; and
- Impact evaluation -- where the interest is on the outcome and impact of the project on the intended beneficiary and society.

2.2. **Feasibility study** pertains to the whole gamut of analyses carried out to determine if the project can be implemented, can achieve the desired goals and, more importantly, if it will result in net benefits. It includes market, technical, financial, and economic analyses, assessment of environmental and market risks and institutional analysis. These components of a feasibility study are explained in the next section.

2.3. **Pre-feasibility study** is similar to the feasibility study in terms of the principles and steps followed. The difference lies in the depth and, therefore, accuracy of the analysis. This is largely due to the short duration of time allowed for the conduct of the pre-feasibility study. Usually, the purpose of a pre-feasibility study is to determine if a feasibility study is warranted.

2.4. **Project appraisal** is similar to the feasibility study in terms of the steps followed. Often, however, the parties responsible for financing the project are the ones that conduct the appraisal. This, being the case, the interest is in verifying the assumptions used in the earlier feasibility study.

2.5. **Economic life** refers to the time span over which the project is able to generate benefits (or earnings) and influence development or economic behavior. This is determined by the rate of depreciation subject to operations and maintenance schemes, and obsolescence when new (and better) technologies become available.

2.6. **Discount rate** reflects the opportunity cost of money. Opportunity cost is usually defined as the benefit foregone from using a good or resource in its best alternative use or simply

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the cost of the foregone alternative. Essentially, this is how we consider Principle 1.3 above. Future benefits are "discounted."

The *discount rate*, or sometimes referred to as *rate of discount*, is equal to the interest charged on a loan but deducted in advance. If P is the amount of the principal, r is the interest rate, and the repayment period is just 1 year, then

Amount in year 1 is P*(1 + r)
If the interest is deducted in advance, the amount to be given to the borrower at year 0 is:

$$P^d = \frac{P}{1 + r}$$

The value of the discount rate depends on the alternative defined. Note that resources devoted to public investments compete against either private investments or private consumption. The next two definitions illustrate this concept.

2.7. **Financial rate of discount** is applied when the resources devoted to the project are seen to compete with private investments. Usually, this is pegged at the commercial lending rate. In other words, the resources to be spent for the project is compared against projects that can be undertaken by the private sector and earn an average rate of return.

Example (a):
Suppose your friend wants to borrow from you the amount of PhP150,000 with a promise to be paid back after 1 year. Will you be satisfied with a repayment of exactly PhP150,000?

The answer is most likely a "no". If you are a businessman, you could have invested it somewhere profitable and earned an interest of 20%. With this in mind, you can lend the amount of PhP125,000 now and agree to accept payment of PhP150,000 a year from now.

2.8. **Social rate of discount or social rate of time preference** is applied when the resources devoted to the project are seen to compete with private consumption. It is the rate at which an individual would be willing to give up current consumption. Usually, this is pegged at the interest rate paid on long-term government bonds. While it is NEDA that estimates the social rate of discount, some funders may also have their own values of the social rate of discount. It is suggested that both are consulted on this.

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Example (b):

Let us modify the premise of example (a). Suppose you are not a businessman and are unlikely to undertake investments. The alternative for you is to place the money in a bank where it will earn the savings rate. Even better, you can purchase government bonds with a maturity of one year. If the bonds promise an interest earning of 7%, then you can allow your friend to borrow PhP140,186.91 now in exchange for the promised repayment of PhP150,000 a year hence.

$$140{,}186.91 = \frac{150{,}000}{1.07}$$

2.9. **Market price vs. Economic price.**

2.9.1. Market price is the price at which the good or service is being bought and sold at the end-users' market (as opposed to farmgate). We also sometimes refer to this as financial price.

2.9.2. Economic price reflects the value that society places on the good or service with due consideration for its scarcity and relative importance, absent market distortions. For instance, there is consideration as to whether the inputs are sourced domestically or imported, or whether the outputs are marketed only within the country or are exported. If they are traded in the international market, then procuring them (in the case of project inputs) or supplying them (in the case of project outputs) will affect the country's foreign exchange situation.

Example (c):

The cost of one kilo of fresh tomatoes, when sold in the farm in Bulacan is only PhP20. When sold in the wet market in Cubao it is PhP50. Assuming that the tomatoes come from Bulacan, this means that only PhP20 will be received by the tomato farmer and the difference goes to the trade and transport cost. The market price in this case in Cubao is PhP50 but the economic price is only PhP20.

2.10. **Shadow prices.** The more popular term for economic price is shadow price. It is based on the same principle that the true price reflects the relative scarcity of the good in society. In particular, NEDA estimates the values of the *shadow discount rate (SDR)*, reflecting the true opportunity cost of money, the *shadow exchange rate (SER)* reflecting the true opportunity cost of foreign currency and the *shadow wage rate (SWR)* reflecting the true

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opportunity cost of labor. At present, the shadow discount rate is estimated to be 15%, the shadow exchange rate is 20% more than the official exchange rate and the shadow wage rate, of unskilled labor[2] is only 60% of the current wage rate. The values of the SDR, SER, and SWR may change from time to time. Therefore, these should be verified with NEDA before proceeding.

2.11. **Present value** is the value now of future incomes and costs. It is computed by applying the appropriate discount rate that reflects the opportunity cost of money. The formula is given below, where $PV(X_t)$ is the present value of the amount X in year t and r is the discount rate.

$$PV(X_t) = \frac{X_t}{(1+r)^t}$$

Example (d):

A project is expected to generate revenues beginning Year 2 until Year 5. Every year the revenue amounts to PhP100,000. We are interested to know the present value of this revenue stream (that is, at Year 0). Assume a discount rate of 15%.

Year	Undiscounted amount	Formula	Discounted amount
0	0		
1	0		
2	100,000	$\frac{100,000}{(1+0.15)^2}$	75,614.37
3	100,000	$\frac{100,000}{(1+0.15)^3}$	65,751.62
4	100,000	$\frac{100,000}{(1+0.15)^4}$	57,175.32
5	100,000	$\frac{100,000}{(1+0.15)^5}$	49,717.67
Total	400,000		248,258.99

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2.12. **Net present value (NPV).** The stream of benefits and costs can be expressed in present value terms. The net present value (NPV) is the difference between the present value of benefits and the present value of costs.

$$NPV = \sum_{t=0}^{T} \frac{B_t}{(1+r)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+r)^t}$$

where B_t and C_t are the benefits and costs accruing at time t, respectively.

The decision rule is to reject a project that yields a negative NPV.

Example (e):

Consider the previous example (d). Let us assume that the project entails an investment cost of PhP150,000 and all is spent in year 0.

	Cost			Revenues			
Yr	Undiscounted amount	Formula	Discounted amount	Undiscounted amount	Formula	Discounted amount	Revenues less Cost
	A		B	C		D	D-B
0	150,000	$\frac{150,000}{(1+0.15)^0}$	150,000				(150,000)
1							
2				100,000	$\frac{100,000}{(1+0.15)^2}$	75,614.37	75,614.37
3				100,000	$\frac{100,000}{(1+0.15)^3}$	75,614.37	75,614.37
4				100,000	$\frac{100,000}{(1+0.15)^4}$	57,175.32	57,175.32
5				100,000	$\frac{100,000}{(1+0.15)^5}$	49,717.67	49,717.67
					Total	248,258.99	98,258.99

The net present value (NPV) is computed to be PhP98,258.99. Since the NPV is positive, we conclude that the project is viable.

2.13. **Rate of return, or financial rate of return**, is the ratio of the earnings from the asset to the value of that asset. For public projects, we normally do not compute for the financial rate of return since these are not expected to yield profits.

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2.14. **Internal rate of return (IRR)** is the discount rate at which the net present value is zero.

$$\sum_{t=0}^{T} \left(\frac{B_t}{(1+r)^t} - \frac{C_t}{(1+r)^t} \right) = 0$$

where B_t is the value of benefits at time t and C_t is the value of costs at time t. The project life is T years.

2.15. **Economic internal rate of return (EIRR)** is similarly defined as the IRR except that the benefits and costs are expressed in economic prices.

The decision rule is to reject a project that yields an EIRR that is less than the social rate of discount.

2.16. **Benefit-cost ratio (BCR)** is simply the ratio of the total benefits to total cost. Discounting is applied when considering future streams of benefits and costs.

The decision rule is to reject a project that yields BCR that is less than 1.

Example (f):
Referring to example (e), we note the following information:

Present value of benefits = PhP248,258.99
Present value of costs = PhP98,258.99

$$\text{BCR} = \frac{\text{PV of benefits}}{\text{PV of costs}} = 2.53$$

In other words, we enjoy benefits amounting to more than 2 and ½ times the amount we spent for the project.

Example (g) using Microsoft Excel:
The computation of the IRR is quite involved and requires a combination of interpolation techniques and trial-and-error. Fortunately, this function is found in Microsoft Excel so the computation is now easy.

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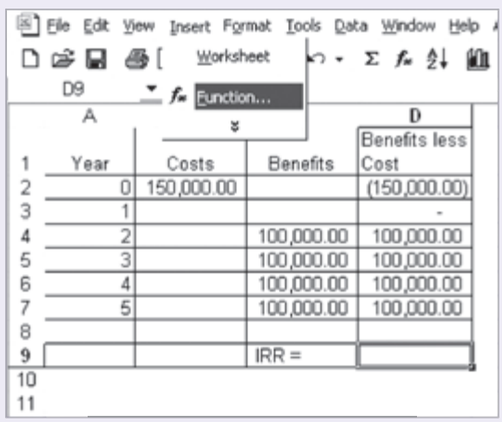
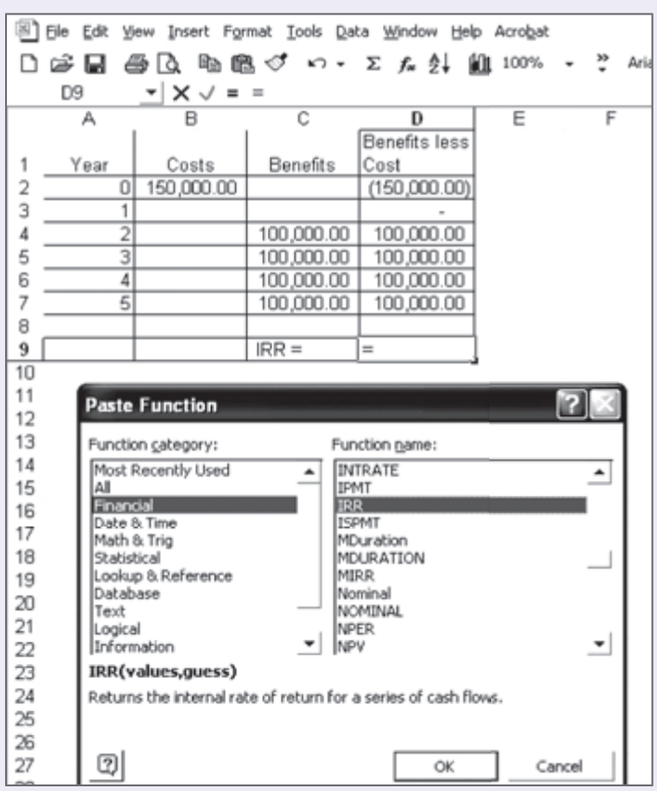
Consider the previous example. We can lay out the data on costs and benefits accruing to each year. We then compute for the undiscounted net benefits (benefits less cost).

Year	Costs	Benefits	Benefits less Cost
0	150,000.00		(150,000.00)
1			-
2		100,000.00	100,000.00
3		100,000.00	100,000.00
4		100,000.00	100,000.00
5		100,000.00	100,000.00
		IRR=	

The procedure IRR is found in Microsoft Excel under the Main Menu "Insert", submenu "function".



You will then be shown a list of functions that are in the software. Choose the function category (left side of the box) "Financial" and under function name (right side of the box), choose 'IRR".



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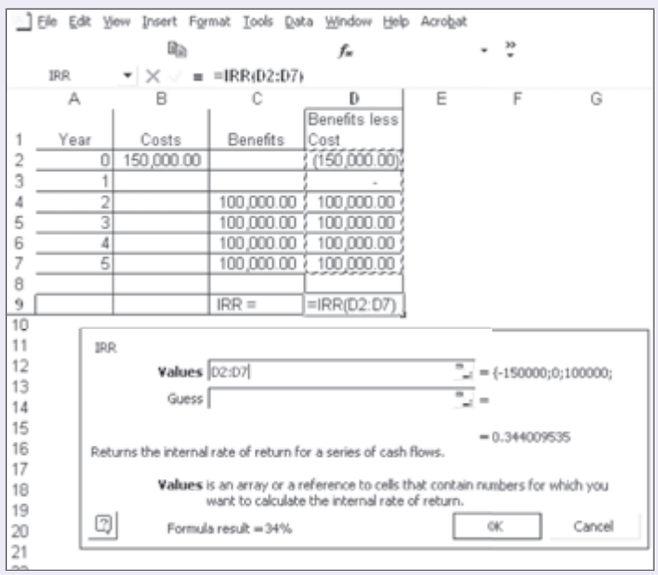
A dialog box appears and you will be asked to indicate the data range corresponding to the "values". Note that the dialog box also asks for another item of information, that is, "guess". This is because in some cases, the IRR may not exist or there may be multiple values of the IRR.



Year	Costs	Benefits	Benefits less Cost
0	150,000.00		(150,000.00)
1			-
2		100,000.00	100,000.00
3		100,000.00	100,000.00
4		100,000.00	100,000.00
5		100,000.00	100,000.00
		IRR=	34%

2.17. **Cost-effectiveness ratio (CER).** Sometimes, it is difficult to quantify project outcomes, as in the case of health, sanitation, and education projects. In cases like these, the project under evaluation is compared against other projects that will yield the same outcomes. The appropriate indicator to compare is the cost per unit outcome, e.g., cost per child immunized or cost per cases found and treated.

The decision rule is to reject a project that yields the highest CER, or cost per unit outcome, among all possible strategies that produce the same outcome.

2.18. **Financial and economic viability.**

2.18.1. If the project yields a positive NPV where the costs and benefits are expressed in market prices, the project is said to be financially viable. We also say that a project is financially viable if the project yields an internal rate of return (financial internal rate of return) that is higher than the financial rate of discount.

2.18.2. If the project yields a NPV where the costs and benefits are expressed in economic prices, the project is said to be economically viable. We also say that a project is economically viable if the project yields an internal rate of return (economic internal rate of return) that is higher than the social rate of discount.

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3. PED Procedures

In these Guidelines, we classify the PED procedures into four stages. A comprehensive PED requires that you

- KNOW the project and
- UNDERSTAND it in sufficient detail, enough to be able to
- ANALYZE it thoroughly, and
- JUDGE it fairly.

Note that each stage connects to the next and progresses in terms of detail. Meanwhile, the first two stages make up what we call basic PED.

4. Projects to be subjected to Project Evaluation and Development

4.1. ALL projects need to be subjected to PED. But, with consideration for the time and resources needed for a comprehensive PED, we suggest that small projects be subjected only to basic PED.

4.2. Recall that basic PED refers to the first two stages: KNOW and UNDERSTAND the project.

4.3. The distinction between big and small projects should be made in relation to the competing needs for the fiscal resources of the province. A suggestion is to subject projects to the complete PED if the project cost meets the following:

$$\text{Project Cost} > \frac{\text{20\% development fund}}{\text{number of municipalitites}}$$

This scheme is easily justified:

4.3.1. If we consider one municipality to be just as important as the next, and
4.3.2. If the project will require resources greater than the amount computed at equal sharing, then
4.3.3. We will need to be able to defend the project to the other municipality that will have to forego some of its share from the fiscal pie.

Annex A shows IRA data (2003) of provincial LGUs and the corresponding cut-off between small and big projects. It is suggested that the cutoff be re-computed as new data become available.

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4.4. All projects that are proposed for external funding will be subjected to whatever evaluation is required by the funder. Usually, the requirement is for a comprehensive PED. Moreover, the PED results will likely undergo appraisal by the funder.

B. BASIC PED PROCEDURES

All projects will be subjected to basic PED. This is to ensure effective and efficient use of scarce resources, whether these are resources coming from the LGUs, the national government, or even official development assistance (ODA).

Basic PED consists of two stages: (1) KNOW the project; and (2) UNDERSTAND the project.

1. Know the Project

1.1. Conducting PED requires that you know the project very well and the first thing you need to know about the project is the good or service that the project will provide. In short, what is the project's output?

1.2. After identifying the project's output, you will need to characterize this output as to:

1.2.1. Whether the good is private, public, or mixed. Be guided by the following set of questions:[3]

a. If I consume the good, does it mean that others cannot consume it?
b. Is the project's output divisible?
c. Can consumption be measured?
d. Can I limit consumption only to those who paid for the good?
   - If the answers to the above questions are all YES, then the good is strictly a private good.
   - Note that if the answer to (a) is NO, then the answer to (b) is also a NO, then the good is a public good. But it does not necessarily follow that the answers to (c) and (d) are NO.
   - If the answers to (c) and (d) are YES, then the good is mixed.
e. Is it feasible to collect fees from the consumers?
   - If the answer to (e) is NO, then the good qualifies as a public good.
   - If the answers to all the questions are NO, then the good is strictly a public good.

1.2.2. Whether the good is tradeable, nontradeable, or of limited tradeability. Be guided by the following set of questions:

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a. Is the good being traded in the international market?
   - If it is, then the good is TRADEABLE.
   - If it is not, then the good is NONTRADEABLE.

b. From the Philippine point of view, do we import a good of similar type?
   - If we do, then the good is IMPORTABLE.

c. From the Philippine point of view, do we export a good of similar type?
   - If we do, then the good is EXPORTABLE.

d. Are there restrictions governing the import and export of this good?
   - If the answer to (d) is YES, then the good is NONTRADEABLE, even if the answer to (a) is YES.

1.3. Whether it is appropriate to charge a user's fee for the good, and other pricing considerations.

1.3.1. If the good possesses the characteristic of a private good, then users can be charged a fee. There can be revenues from the project.

1.3.2. If the good is a public good, then it is either not possible or administratively infeasible, to charge a user's fee. The project benefits will not be expressed by way of revenues.

1.3.3. If the good is being traded in the international market, procuring it (in the case of inputs) and producing it (in the case of outputs) will have foreign exchange implications on the country. These will need to be considered in the economic analysis.

2. Understand the Project in Sufficient Detail

Having identified and characterized the output, the next step is to ascertain that the output will result in the outcomes we are interested in. The outcome is always stated in terms of how the project will affect the beneficiaries, e.g., changes in the quality of life and income. Presumably, we first utilized the project's output so that it would result in the observed outcomes.

This step is interested in answering the following:

- Are the project goals and objectives in line with the goals and objectives articulated in the PDPFP?
- Is there a logical path coming from the proposed activities of the project to the desired outputs and the promised outcomes and impacts?
- How can the transformation from input to output to outcome and impact be improved? Will the project require other components or other projects to effect the transformation?

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Following is a series of questions that need to be answered satisfactorily to help understand what the project is all about. Note that the proponent should be able to answer all of these questions.

If the project proponent is not able to provide a satisfactory answer to any of the questions below, then the project concept is not yet fully developed. In this case, the proponent will need to go back to the drawing board to finalize the project concept.

2.1. What is the rationale for the project?

2.1.1. Develop the logical framework or logframe for the project.[4] With the project proponents, you must be able to model the project in matrix form (i.e., Logframe, Table 1), clearly specifying:

a. Goal of the sector to which the project belongs;
b. The purpose or expected outcome of the project that will contribute to meeting this goal;
c. The project's outputs that will result in the expected outcome;
d. The project's activities to mobilize inputs (financial, human, technical and material resources) that are needed to produce the output;
e. Important assumptions;
f. A list of verifiable indicators of success; and
g. The proposed strategy to measure accomplishment.

2.1.2. Note that the project proponent must be able to trace the goal of the project back to the development goals articulated in the PDPFP.

Table 1. Project Logframe

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Key Assumptions and Risks
Goal			
Purpose			
Outputs			
Activities			

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Example (h):

Consider a project that will construct a communal irrigation system. The logframe may resemble the following:

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Assumptions
Goal			
To promote food security	Mean and variance of domestic supply of rice	BAS records	
To reduce poverty among rice farmers	Poverty incidence among rice farmers	FIES and APIS	
Purpose			
To increase and reduce volatility in the domestic production of rice	Volume of rice produced per year is increased by 1.8 times	Special evaluation survey	Adequate supply of farm inputs; available capital to purchase farm inputs; proper farm management
	Number of harvest is at least 2 per year	Special evaluation survey	
	Reduced variance in rice production per year	Special evaluation survey	Adequate postharvest and storage facilities
To increase and reduce volatility in the income stream of rice farmers	Income of farmers from rice is increased 1.8 times	Special evaluation survey	Aggressive marketing strategy
	Reduced variance in annual income of rice farmers from rice	Special evaluation survey	Savings mobilization schemes for farmers
Outputs			
Irrigation service area covering 100 hectares of rice plains	Construction of Communal Irrigation System (CIS) with service area of 100 hectares	Project accomplishment reports	Proper O&M and watershed management
Activities			
Disbursement of PhP10 million	Funds disbursement rate	Project accomplishment reports	Right-of-way (ROW) secured on time
Engineering support	% Accomplishment		
Administrative support			

2.2. What is the likely trend of the outcome if the project is not implemented?

2.2.1. Recall the first principle mentioned above that society will continue functioning even without the project. The proponent needs to adequately describe the "without project" scenario and contrast this against the "with project" scenario. Again, this procedure is facilitated by the project's logframe. Table 2, which provides several profiles of the community involved, can also help. Note that not all cells in the table

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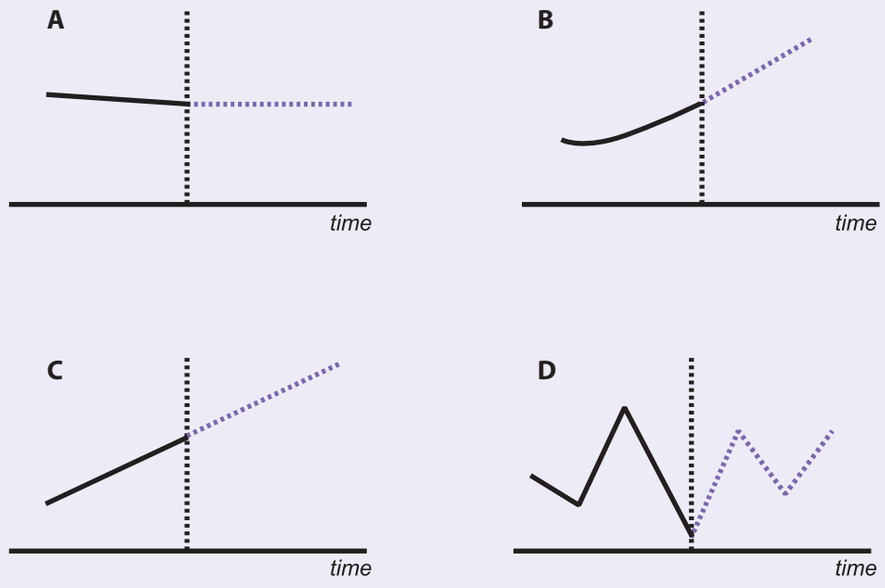
need to be filled up--only those that are relevant to the project. However, it will be useful to collect (and regularly update) the information indicated in the table from every barangay in the province.

a. Start with the outcome, describe the current situation.
b. Forecast what will be the outcome going into the future if the project will not be undertaken (Refer to the Technical Appendix, pages 154-160 for pointers and some simple techniques on demand forecasting). We refer to this as the "without project" scenario. Be sure to consider the following:
   - The "without project" scenario should consider future developments.
   - It is not always correct to assume that over time, the "without project" scenario will simply be the value of the outcome at the "initial year".
   - The "initial year" should not coincide with extraordinary events, like an El Niño, or an earthquake, unless these are normal occurrences.
c. We will need a time series to be able to forecast outcomes given the status quo.

Example (i):

Consider the following possible time series indicating volume of rice production.
We have plotted four possible scenarios – A, B, C, and D. The actual time series is given by the solid line. The forecast trend is given by the broken line. Note that scenarios B and especially C are cases where the status quo may lead to desirable outcomes, even without the project. Scenario A warrants a project to change the situation into a desirable one. In Scenario D, the project may be more interested in sustaining desirable outcomes.



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2.2.2. Why should government be engaged in providing this output?[5]

a. If the "without project" scenario will already result in desirable outcomes, the government need not undertake the project.

b. Consider also the alternative strategy of instituting the proper policy and regulatory framework in order to produce the same outcomes, instead of undertaking the project. Some guideposts to aid the analysis are:
   - Can the output be packaged commercially? Note that to merit public provision, the answer to this question should be NO. If the answer is YES, we need to resolve the following issues next:
   - Will it be profitable to private entrepreneurs? At what price should the output be sold for it to be an attractive commercial undertaking?
   - At this price, will consumers be able to afford it? What is the adverse effect if the intended beneficiaries will not "buy" the good or service?
     If the adverse effect does not concern a basic need and especially if the majority of the likely consumers are those who are non-poor, the government does not need to provide this good or service.
   - Is there enough private capital to undertake the investment to produce the output?
   - Just how soon can private investment be expected to start?
     If there is enough private investment and if the project is truly profitable, then the good or service is bound to be provided and the government does not need to provide it.
   - In case of regulation, how will compliance be monitored?
   - If the good or service will be privately provided, government still has the responsibility to protect the interests of consumers, especially if this concerns their health and safety.

Example (j.1):
If the interest is to produce irrigation services, an obvious alternative is for individual farmers to put up their own shallow tube wells. If government updates the hydrological map of the province, will this be enough to encourage farmers to undertake the investment?

Example (j.2):
The private sector is also engaged in providing education. However, this means that they will charge tuition fees. Can the families of the potential students afford the fees? Will this discourage school participation?

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Example (j.3):
The province plans to showcase its scenic spots by hosting a national event. However, there are not enough lodging places to house the prospective delegates. Should the LGU construct lodging facilities? Or can the private sector be encouraged to construct the facility? What will it take? Suppose the LGU constructs a conference facility and present plans to encourage tourism and use of the conference facility. Will this be sufficient come-on for the private sector?

Example (j.4):
In highly urbanized areas, the private sector may be enticed to build and operate the public market. But, they will want to be assured that the LGU will not allow sidewalk vendors to operate in close proximity to the strategic site identified.

2.3. It is also important to trace the output and outcome pathways of the project. This will identify any pre-conditions for the project to generate output. On this basis, we can classify the project as:

2.3.1. (S) Stand-alone – meaning that it can produce output on its own.

2.3.2. (R) Required project – meaning that it provides the enabling mechanism for other projects to produce output. The project can be analyzed as a stand-alone or as component of a package of projects.

2.3.3. (N) Needs-a-companion project – meaning that its ability to produce output depends on the success of another project. The project needs to be packaged with the other project that provides the enabling mechanism.

In the preceding step, you will need to refer back to the PDIP. One should watch out for projects that have been forcibly subdivided in order to escape being subjected to a comprehensive PED. A possible red flag is for projects that are proposed to be implemented in the same locality.

Example (k):
Consider again the PhP10 million communal irrigation project. The expected output is a communal irrigation system (CIS) that will generate 100 hectares of irrigation service area. The expected outcome is increased cropping intensity, leading to increased palay production and reduced volatility in the supply of palay. The expected impact is increased farm income of the farmer beneficiaries and reduced volatility in income stream. The logcial pathway may be illustrated as follows:

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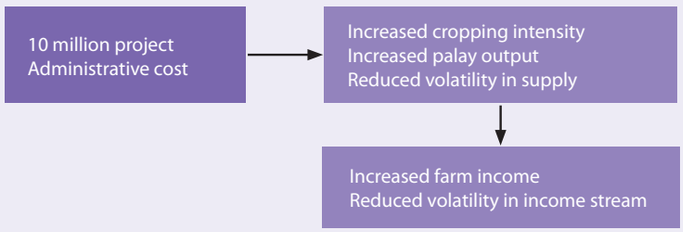
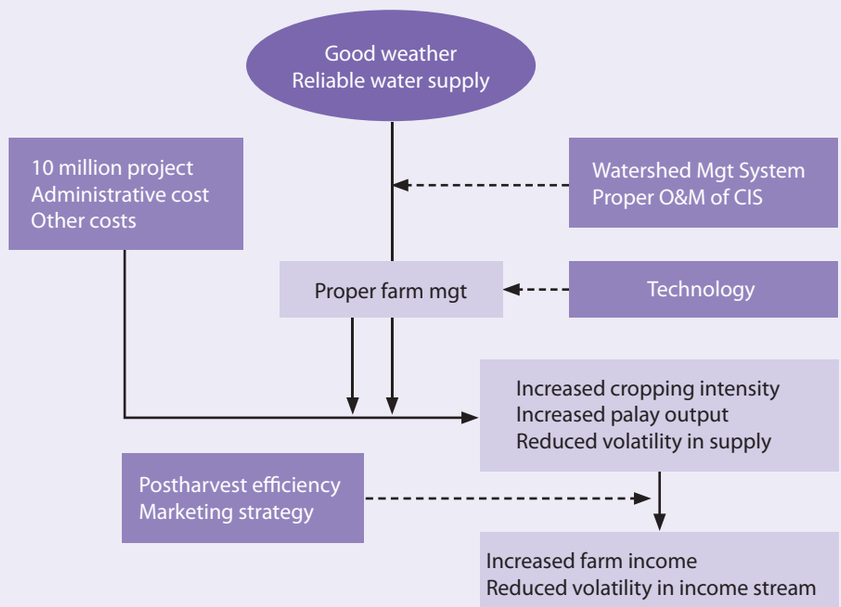


The main diagnostic question is: Is the irrigation system the only factor that is needed to increase cropping intensity, increase palay output, and reduce volatility in supply? In other words, does it qualify as a stand-alone project? Obviously not. Constructing an irrigation system will not be enough to produce the outcome that the project promises. We know that, in addition to good weather, there has to be adequate water supply for the CIS to be able to provide irrigation service. Thus, we should include as project component systems for watershed management, and proper operations and maintenance of the CIS. Proper farm management has a direct effect on farm output. We may want to enhance current practices by providing technical assistance to farmers. Now, from increased farm output to increased farm income, there is the intermediate process of postharvest and marketing. We may want to include components in the project that enhance the efficiency of postharvest facilities and improve the marketing strategies of the farmers.



With the inclusion of these additional components, we must realize that the project will now cost more than PhP10 million. It will also produce additional outputs, including:

- Watershed management systems and procedures;
- Manual of systems and procedures for the O&M of the CIS;
- Number of farmer field schools established;
- Modern postharvest facility; and
- Organization of marketing and/or farmers' trading cooperatives.

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Table 2. Situational Profile - Without and With Project (page 1 of 4)

Name of Community:

PERMANENT PROFILE

Municipality _____ Income class:_____

Barangays Covered _____

Distance from town center _____

Topography _____

Climate _____

Soil type _____

Water resources _____

Land area _____ of which: _____ are agricultural area

	Without Project Situation	With Project Situation
PUBLIC AND PRIVATE FACILITIES		
Facilities for agricultural production		
Postharvest facilities		
Agri-processing facilities		
Irrigation systems		
Roads and bridges		
Training facilities		
Potable water supply and household served	Level I: No. of household served Level II Level III	Level I: No. of household served Level II Level III
Health facilities		
Educational facilities		

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Table 2. Situational Profile - Without and With Project (page 2 of 4)

Name of Community:

VARIABLE PROFILE

Human Capital

Population ____ people ____households

Growth rate

Age-Sex Distribution

	Male	Female	Total
<1			
1 - 5			
6 - 9			
10 - 12			
13 - 16			
17 - 40			
41 - 65			
> 65			

	Without Project Situation	**With Project Situation**
Labor Force of which	_____ % are in agricuture	_____ % are in agricuture
	_____ No. of days employed per year	_____ No. of days employed per year

Health Status

Mortality rate	_____	_____
Morbidity rate	_____	_____

Nutritional Status of Population Served (PS)

Status	No. of PS
Normal	
1st degree	
2nd degree	
3rd degree	
TOTAL	

Status	No. of PS
Normal	
1st degree	
2nd degree	
3rd degree	
TOTAL	

Other Remarks	

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Table 2. Situational Profile - Without and With Project (page 3 of 4)

Name of Community:

VARIABLE PROFILE

Human Capital

Population ____ people ____households
Growth rate
Age-Sex Distribution

Without Project Situation **With Project Situation**

Income Profile

Ave. HH farm income _____ _____
Ave. HH nonfarm income _____ _____
Ave. HH income _____ _____

Income opportunities

Without Project Situation

Farming
Cropping pattern

Major crops	Area planted	Yield	Gross Return	Cost of Production

Livestock

Livestock	Number	Gross Return	Cost of Production

Enterprise

Enterprise	Capitalization	Net Income	No. Employed

With Project Situation

Major crops	Area planted	Yield	Gross Return	Cost of Production

Livestock	Number	Gross Return	Cost of Production

Enterprise	Capitalization	Net Income	No. Employed

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Table 2. Situational Profile - Without and With Project (page 4 of 4)

Name of Community:

Without Project

Fixed wage	Establishment	No. Employed	Ave. Wage

With Project

Establishment	No. Employed	Ave. Wage

Technological profile

	Without Project	With Project
Farming Technology		
Access to Technology		

Financial Capital

Access to formal credit institutions	Lending institution	No. who accessed	Status

Lending institution	No. who accessed	Status

	Without Project	With Project
Access to informal credit institutions		
Marketing Outlet		

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SUMMARY OF BASIC PED

The first two stages of PED constitute the basic PED:

- KNOW the project.

  This first stage requires that you identify and characterize the OUTPUT of the project.

- UNDERSTAND the project

  There are three critical issues that need to be resolved at this stage:

a. Will the output result in OUTCOMES that are consistent with the goals expressed in the PDPFP?
b. Given that it does, should government undertake the project?
c. If it is worthy of government undertaking and if the outcomes are important to the constituency, how can the project be enhanced to ensure that the outcomes will be achieved?

   These questions should be resolved one after another. If the project fails in one, it is not necessary to proceed to the next.

Note that basic PED does not require much quantitative analysis, except for the trend analysis. This means that the analysis will not demand more resources than the LGU should already have. Moreover, conducting basic PED will help ensure that resources are efficiently utilized and that outcomes will likely be achieved. This being the case, ALL projects should be subjected to basic PED. The next two stages complete the comprehensive PED.

C. REMAINING STEPS OF COMPREHENSIVE PED

At this stage, we are left with only "big" projects and/or those that are to be funded externally and all of these passed the basic PED. We proceed with the next two stages – ANALYZE it thoroughly, then JUDGE it fairly. To emphasize that these stages simply take off from basic PED, we follow the same number sequence.

3. Analyze It Thoroughly

This stage involves a series of analyses that needs to be done, first concerning the output of the project, then the translation of inputs into outputs and finally operating the project output so that outcomes may be realized.

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Following is a series of questions that need to be answered satisfactorily.

A project may be screened out if the answer to any of these is not satisfactory. Moreover, since the questions need to be asked in sequence, once the answer to one is unsatisfactory, the remaining questions need not be asked.

3.1. What is the market situation like for the project's output? (This is similar to market analysis)

3.1.1. As in basic PED, we begin analyzing the project's output but this time, more extensively. Begin by describing the current situation, then project what the future situation would be.

3.1.2. Describing the market situation means describing the demand for and supply of the project's output, especially projecting what it will be like at least over the medium term, say 10 years. We can have an idea of the likely demand for the project's output by observing the existing demand and supply of the same good. If the demand is more than the supply of the good, then clearly, there is a supply gap and this can be filled up by the project's output. The questions that need to be answered are:

a. Is there a demand for the project's output?
b. Is there a current supply of a good similar to the project's output? For how much is the good being sold?
c. Is there a supply gap?

Example (I):
Long queues at hospitals and clinics imply a shortage in the supply of health care facilities. Overcrowded classrooms indicate a shortage in the supply of classrooms (and even teachers). High incidence of absenteeism during certain school days (say, rainy season) may indicate poor road conditions thus reducing accessibility.

3.1.3. A feasibility study would require a market study to answer these questions. For a pre-feasibility study, however, secondary data may be used. The initial estimate simply assumes that the good is costless. Then, you just need information on the demographics of the target consumers, e.g., children of school-age in the case of classrooms, rice farmers in agricultural plains in the case of irrigation systems, households in the case of water supply and sanitation facilities, livestock raisers for slaughterhouses, and public utility vehicles for transport terminal. You will

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then need to forecast the trend using the simplified trend analysis discussed in the Technical Appendix**.** Note that this technique may be combined with others. Consider the following example:

Example (m):

Consider a proposal from Community C to construct a school building. At present, the nearest school is more than an hour's walk from the house nearest to their barangay hall. Below is the current population of the age group 0-12 years old in the barangay. Note that the initial estimate of projected demand is based on population projection of the age cohort 6-12 years old.

Age	Population
0	42
1	44
2	43
3	41
4	49
5	38
6	29
7	41
8	37
9	35
10	38
11	37
12	45

The base assumption is that these are zero death and migration rates. This means that the present cohort 5-11 years old will constitute 6-12 cohort on Year 2; the present cohort 4-10 will make up the 6-12 cohort on Year 3, and so on. Note that we need to make assumptions on the birth rates for t+1, t+2 and t+3. These "babies-to-be" will be added to the 6-12 cohort on Years 8, 9, and 10, respectively.

Usually, the NSO provides estimates of population growth rates at the regional level. These estimates are based on projected birth rates which can be inquired directly from the NSO. Alternatively, you can use historical data of the province's birth rate and use trend analysis to forecast. There may be other methods you can adopt and assumptions you can make. The important thing is to be transparent and conservative: State your assumptions.

Included is the population table of the same barangay, this time with the projection for the 0 (or below 1 year old) for Years t+1, t+2 and t+3. Note that we simply followed a declining trend of 1 less baby born.

Year	Age	Population
t+3	0	39
t+2	0	40
t+1	0	41
0	0	42
0	1	44
0	2	43
0	3	41
0	4	49
0	5	38
0	6	29
0	7	41
0	8	37
0	9	35
0	10	38
0	11	37
0	12	45

Projected demand is given in the following table where we simply singled out the cohort 6-12 years old for that year.

Given the above profile, we may consider putting up a six-classroom building. However, we should prepare for the expected increase in the Grade 1 class on year 3, Grade 2 class on year 4, and so on. This being the case, one of the rooms can be slightly bigger. Moreover, the room

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assignments should vary from year to year, depending on the grade level of the biggest class size.

Age	Year									
	1	2	3	4	5	6	7	8	9	10
6	29	38	49	41	43	44	42	41	40	39
7	41	29	38	49	41	43	44	42	41	40
8	37	41	29	38	49	41	43	44	42	41
9	35	37	41	29	38	49	41	43	44	42
10	38	35	37	41	29	38	49	41	43	44
11	37	38	35	37	41	29	38	49	41	43
12	45	37	38	35	37	41	29	38	49	41
Total	262	255	267	270	278	285	286	298	300	290

3.1.4. The discussion and examples given previously can result in an initial estimate but this needs to be finalized, this time with consideration for cost. The relevant questions are the following (again we continue the letter sequence):

d. How responsive do you think is the level of demand to the price of the good? This is what we refer to as elasticity of demand.
e. How responsive do you think is the level of current supply to the price of the good? This is what we refer to as elasticity of supply.

We may construct a matrix, like Table 3 below, to summarize these answers.

Table 3. Estimates of Demand and Supply of Project Outputs

	Without project		With project	
	Current demand	Current supply		
level				
price				
elasticity				
	Forecast demand	Forecast supply	Supply from project	Supply from other sources
level				
price				
elasticity				
Assumptions and Sources of Data				

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A market study can be designed to estimate demand and supply elasticities[6]. For a pre-FS, we need only to know if demand (or supply) is price elastic (responsive) or inelastic (non-responsive). If you are conducting a key informants interview, you simply ask the following series of questions (again, maintaining the same letter sequence):

f. If the good or service is provided for free, how many do you think will avail themselves of the good or service?
g. If we charge a price, say PhP100 per unit (or per use or per month), how many do you think will be willing to avail of the good or service?
h. You can then vary the price quotation (in g) until you arrive at the following table:

Label	Price (P)	Potential Demand (D)
(P_0, D_0)	Free	100 users
(P_1, D_1)	100	50 users
(P_2, D_2)	50	75

In computing the elasticity, we disregard the information on potential demand when the price is free. The estimate of the price elasticity of demand is given by the following formula:

$$\varepsilon_{DP} = \frac{D_2 - D_1}{D_1} \div \frac{P_2 - P_1}{P_1}$$

In the above example, we compute the following:

$$\varepsilon_{DP} = \frac{75-50}{50} \div \frac{50-100}{100} = -1.0$$

There are two things that need to be pointed out. First, the sign of the price elasticity of demand is negative. This is because as price increases, we expect demand to decrease. Second, we arrive at an elasticity of -1. The technical term for this is unitary elastic – demand moves one-for-one with price. Note that when the price is reduced by 50%, demand increases by 50%.

3.2. Is the project technically feasible? Is it the best alternative to meet project objectives?

3.2.1. The PED technician may enlist the help of other experts, especially engineers, to identify the alternative to the project. What other projects will produce the output that the project under analysis is promising to produce?

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Example (n-1):

For roads, there are several types to choose from. Concrete roads require higher investment costs and take longer to build but the operations and maintenance (O&M) cost may be lower. In contrast, feeder roads require less investment cost and take less time to build but the O&M costs are higher. The duration of usable life of the feeder road, however, is definitely shorter than that of the concrete road. There may also be different choices as to the location of these roads.

There are different irrigation technologies such as gravity type, shallow tube well (STW), small water impounding project, and low-lift pumps. Each of these requires different water sources, varying investment and O&M costs, among others.

3.2.2. In general, the type of provision may differ according to the following:

a. Fixed capital requirements (land, location, resource base);
b. Production technique;
c. Level and quality of supply;
d. Investment lag;
e. Requirements for operations and maintenance; and
f. Economic life.

These options, and the corresponding features, can be presented in a table similar to the one below (Table 4). This facilitates comparison and selection.

Table 4. Alternative Methods of Providing the Desired Output

Project Output	Option	Fixed Capital Requirements		Production Technique	Supply		O&M Cost	Economic Life
		Land	Location		Level	Quality		

3.2.3. The project must be rated as the most cost-effective among all technically feasible options. The above table may be revised as necessary. What is important is the process of considering other possible alternatives.

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Example (n-2):

Consider the following two examples. The first project aims to provide irrigation service. There are four options that can be considered. The first two – A1 and A2 - differs only with respect to location of the CIS, whether Barangay A or B. If the project is located in Barangay B, the project will be more expensive in unit terms and coverage will be reduced. The other two options – B and C are not technically feasible.

Project Output	Option	Type of Project	Location	Total Cost	Amounts of Supply	Remarks
Irrigation service	A1	CIS (Communal Irrigation System)	Barangay A	PhP10 million	100 has.	More cost-effective
	A2		Barangay B	PhP6 million	50 has.	Less cost-effective
	B	STW (Shallow Tube Well)				No shallow aquifer
	C	SFR (Small Farm Reservoir)				No feasible site

The second project aims to build a school building with seven classrooms. The target pupils are in Barangay A. We can consider three options:

- Option D will build the school in Barangay A.
- Option D1 will add classrooms to the nearby school in Barangay B, but this will entail at most a 2-hour walk for Barangay A pupils.
- Option D2 will add classrooms to school in Barangay B and construct an access road from Barangay A to B.

Project Output	Option	Type of Project	Location	Total Cost	Amount of Supply	Remarks
Classrooms	D		Barangay A	2,800,000.00	7 classrooms	For further evaluation
	D1		Barangay B	2,800,000.00	7 classrooms	Target pupils are from Barangay A. From A to B is maximum of 2 hours walk
Classrooms + access road	D2		Barangay B	12,800,000.00	7 classrooms + 10 kms. of road	For further evaluation

The least desirable is Option D1. Meanwhile, we will need to consider option D in comparison with option D2.

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3.3. How much will the project cost? Can we sustain project operations?

3.3.1. The project proponent must be able to answer the following questions with reasonable accuracy but you will need to verify the basis of the answers.

a. How much is needed to operate and maintain the project in usable form?
b. If we can charge user fees, how much should they be? How much more is needed to collect the fees (administrative cost of collecting the fees)?
c. Given the fees, what is the projected number of users?
d. If we do not collect the fees, what is the projected number of users?
e. If the project cannot be expected to pay for itself, will the provincial government be willing to subsidize its operations and maintenance? By how much?

This phase of the study is similar to financial analysis. It differs only in terms of rigor and emphasis where our interest concerns public provision of goods and services and not profitability. The answers to (c) and (d) depend on the assumed elasticity of demand.

3.3.2. Projects that will be subjected to the review and approval procedures of the NEDA Board-Investment Coordination Committee (ICC) need to accomplish prescribed forms. ICC Form 3 asks for the cost of the project during the investment phase while ICC Form 4 asks for the operating and maintenance costs. These forms are attached as Annexes B and C, respectively, and are downloadable from the NEDA website.

3.3.3. For projects that will not be subjected to ICC review and approval, we can use Table 2 in answering the above questions.

We can summarize the answers to the above questions in a simple table of costs, benefits, and revenue projections with explicit consideration for timing. The simple table can be in the following form (Table 5):

Table 5. Costs, Benefits, and Revenue Projections

Year	Costs		Benefits			Revenues			
	Investment	Operations & Maintenance	per user	Number of Users	Total	Unit fee	Number of users	Admin Cost	Net Revenues
A	B	C	D	E	F = D*E	G	H	I	J=G*H-I
1									
2									
3									
4									
5									

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3.3.4. Alternatively, we can use a more sophisticated table of financial flows. The following is taken from NEDA (2000)[7]. The information will have to be provided by a finance officer or accountant of the department concerned. Note that this step can be taken up in the feasibility study, that is, if the project passed the pre-feasibility stage.

3.3.5. At the pre-feasibility stage, it may be too much to require the project proponent to submit the information listed in 3.3.3. An alternative is to require a simple schedule of cash flows, clearly indicating the timing and the amount of cash receipts and cash expenditures. Note that we also need to consider anticipated renewals and replacements as well as the scrap value of the equipment. The latter is reflected on the last year of the economic life of the equipment.

3.3.6. Strictly speaking, we conduct a cash flow analysis only for projects that are expected to generate revenues. However, even for projects that will not generate revenues, it is still useful to have an estimate of the cash flow. At the very least, this informs us of the timing of the need for subsidies.

Financial receipts:
- Sales
  - Less: Changes in Account Receivables
- Residual Values
- Land
- Equipment
- Buildings

Total Inflows

Financial expenditures:
- Investment Expenditures/Opportunity Costs
- New investment
- Land
- Type 1 Equipment
- Type 2 Equipment
- Buildings
- Existing assets (if any)
- Land
- Equipment
- Buildings

Operating Expenditures
- Raw material (1)
- Raw material (2)
- Raw material (n)
- Management
- Skilled labor
- Unskilled labor
- Maintenance
  - Less Changes in Account Payable
  - Less Changes in Cash Balance

Total Outflows

Net Cashflow

The next example, Example (o), illustrates a simplified cash flow analysis that can be useful in anticipating the need for subsidies. This will serve the purposes of a pre-feasibility study. For the feasibility study, a more rigorous cash flow analysis needs to be undertaken. Following are the simplified steps:

a. Forecast the cash outflow - investment costs, cost of operations, maintenance and administration by year.
b. Forecast the cash inflow (revenue from all users/uses of the project's output) by year.
c. Analyze the cash flow:

   Beginning balance (year t) = Ending balance (year t-1)

   Ending balance (year t-1) = Beginning balance (year t-1) + [Cash inflow (year t-1) – Cash outflow (year t-1)]
d. Convert the figures derived from (c) into present values.

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At this point, we have an idea of the cost of investment, operations and maintenance as well as the potential revenue of the project. The decision rule is:

If operations and maintenance of the project cannot be sustained, either from project revenues or subsidies from the province, the project investment should not be undertaken.

If we take the present values of the differences between cash inflow and cash outflow for each year, then take the sum, we arrive at the net present value (NPV). However, note that these are expressed in financial prices. It must be emphasized that we do not disapprove the project on the basis of a negative NPV if these are computed based on financial prices. In the next section, we explain this further as well as the concept of economic prices.

Example (o):

Consider the following schedule of projected cash flows of the irrigation project. It has a service area of 100 hectares. It costs a total of PhP10 million to build, requires regular maintenance costing PhP1,500 per hectare per year and periodic maintenance costing PhP5,000 per hectare every 5 years. The irrigation service fee (ISF) is 100 kg of palay per hectare during the wet season and 150 kg/ha during the dry season. Let us first assume no escalation of relative prices, that is, the cost of operating and maintaining the facility will just move with the price of palay, equal to PhP11 per kg. We also assume a residual value of 1% of investment cost. Table o.1 shows the projected cash flow.

The first thing we note is that the irrigation project is really a losing proposition if benefits are reckoned only at the possible ISF collection. The NPV is negative. This also means that it is not an attractive undertaking for the private sector. Consider the next two tables where we look at cash flow and where we should be prepared to offer subsidies:

The Table o.2 implies that the project will not be able to pay for the cost of development, operations, and maintenance out of the ISF collection. It appears that government will need to subsidize both the operations and maintenance. The alternative is to consider the cost of development as a grant. Another option is to require counterpart payment. This latter option also fosters a sense of ownership among the farmer-users and may lead to more efficient operations and maintenance of the facility. Table o.3 is the cash flow analysis. Note that it is constructed from the point of view of the farmers (or irrigators' association) so that the development grant, amounting to PhP4 million and PhP6 million during Years 0 and 1, respectively, are treated as an inflow. The ISF collection will then be able to finance the operations and maintenance as well as shoulder the remainder of the loan. The debt

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Table o.1 Projected Cash Flow

Year	Cash Outflow (in PhP)							Cash Inflow (in PhP)				IN LESS OUT	PV at 15%
	Investment Phase	Operating Phase				Total Outflow	PV at 15%	Irrigation Service Fee	Residual value	Total Inflow	PV at 15%		
		Personnel	Other Admin Cost	MOOE									
A	B	C	D	E		F=B+C+D+E	G=F/(1+0.15)^A	H	I	J=H+I	K=J/(1+0.15)^A	L=J+F	M=L/(1+0.15)^A
0	4,000,000.00					4,000,000.00	4,000,000.00				-	(4,000,000.00)	(4,000,000.00)
1	6,000,000.00					6,000,000.00	5,217,391.30	55,000.00		55,000.00	47,826.09	(5,945,000.00)	(5,169,565.22)
2		20,000.00	4,000.00	150,000.00		174,000.00	131,569.00	275,000.00		275,000.00	207,939.51	101,000.00	76,370.51
3		20,000.00	4,000.00	150,000.00		174,000.00	114,407.82	275,000.00		275,000.00	180,816.96	101,000.00	66,409.14
4		20,000.00	4,000.00	150,000.00		174,000.00	99,485.06	275,000.00		275,000.00	157,232.14	101,000.00	57,747.08
5		20,000.00	4,000.00	150,000.00		174,000.00	86,508.75	275,000.00		275,000.00	136,723.60	101,000.00	50,214.85
6		20,000.00	4,000.00	500,000.00		524,000.00	226,539.66	275,000.00		275,000.00	118,890.09	(249,000.00)	(107,649.57)
7		20,000.00	4,000.00	150,000.00		174,000.00	65,413.04	275,000.00		275,000.00	103,382.69	101,000.00	37,969.64
8		20,000.00	4,000.00	150,000.00		174,000.00	56,880.91	275,000.00		275,000.00	89,897.99	101,000.00	33,017.08
9		20,000.00	4,000.00	150,000.00		174,000.00	49,461.66	275,000.00		275,000.00	78,172.16	101,000.00	28,710.50
10		20,000.00	4,000.00	150,000.00		174,000.00	43,010.14	275,000.00		275,000.00	67,975.79	101,000.00	24,965.66
11		20,000.00	4,000.00	500,000.00		524,000.00	112,630.25	275,000.00		275,000.00	59,109.39	(249,000.00)	(53,520.86)
12		20,000.00	4,000.00	150,000.00		174,000.00	32,521.84	275,000.00	100,000.00	375,000.00	70,090.18	201,000.00	37,568.34
												TOTAL NPV	(8,917,762.86)

Table o.2 Undiscounted Cash Flows (in PhP)

Year	Beginning Balance	IN LESS OUT	Ending Balance
A	$B=D_{A-1}$	C*=Table o.1!L	D=B+C
0		(4,000,000)	(4,000,000)
1	(4,000,000)	(5,945,000)	(9,945,000)
2	(9,945,000)	101,000	(9,844,000)
3	(9,844,000)	101,000	(9,743,000)
4	(9,743,000)	101,000	(9,642,000)
5	(9,642,000)	101,000	(9,541,000)
6	(9,541,000)	(249,000)	(9,790,000)
7	(9,790,000)	101,000	(9,689,000)
8	(9,689,000)	101,000	(9,588,000)
9	(9,588,000)	101,000	(9,487,000)
10	(9,487,000)	101,000	(9,386,000)
11	(9,386,000)	(249,000)	(9,635,000)
12	(9,635,000)	201,000	(9,434,000)

*Note that this formula for C mimics an Excel formula wherein "Table o.1!L" refers to respective values of Column L of Table o.1, which is the previous table or worksheet.

payment is pegged at PhP110,000 each year. Note that labor payments for operations and maintenance is now PhP10,000. This means that we expect the irrigator's association to provide labor counterpart as well. Still, government needs to extend assistance (which can be in terms of a loan) to finance the periodic maintenance in Years 6 and 11. In both years, the assistance will amount to PhP345,000 in real terms, undiscounted. We recommend that the assistance on year 6 be treated as a grant while the assistance in Year 11 be treated as partly grant, partly loan.

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Table o.3 Cash Flow Analysis from the Point of View of the Irrigators Association (in PhP)

Year	Cash Outflow (in PhP)						Cash Inflow (in PhP)				IN LESS OUT	PV at 15%
	Investment Phase	Operating Phase				Total Outflow	Irrigation Service Fee	Residual value	Grant	Total Inflow		
		Personnel	MOOE	Maintenance Costs	Debt Payment							
A	B	C	D	E	F	G=B+C+D+E+F	H	I	J	K=H+I+J	L=K-G	M=L/(1+0.15)^A
0	4,000,000.00					4,000,000.00			4,000,000 .00	4,000,000 .00	-	-
1	6,000,000.00					6,000,000.00	55,000.00		5,945,000.00	6,000,000.00	-	-
2		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	1,000.00
3		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	2,000.00
4		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	3,000.00
5		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	4,000.00
6		10,000.00	4,000.00	500,000.00	110,000.00	624,000.00	275,000.00		345,000.00	620,000.00	(4,000.00)	-
7		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	1,000.00
8		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	2,000.00
9		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	3,000.00
10		10,000.00	4,000.00	150,000.00	110,000.00	274,000.00	275,000.00			275,000.00	1,000.00	4,000.00
11		10,000.00	4,000.00	500,000.00	110,000.00	624,000.00	275,000.00		345,000.00	275,000.00	(4,000.00)	-
12		10,000.00	4,000.00	150,000.00	210,000.00	374,000.00	275,000.00	100,000.00		375,000.00	1,000.00	1,000.00

Table o.4 Cash Flow Analysis from the Point of View of the LGU

Yr	Debt Receipts	Grant	IN LESS OUT	PV at 15%
A	B	C	D=B-C	E=D/(1+0.15)^A
0	-	4,000,000	(4,000,000)	(4,000,000.00)
1	-	5,945,000	(5,945,000)	(5,169,565.22)
2	110,000	-	110,000	83,175.80
3	110,000	-	110,000	72,326.79
4	110,000	-	110,000	62,892.86
5	110,000	-	110,000	54,689.44
6	110,000	345,000	(235,000)	(101,596.99)
7	110,000	-	110,000	41,353.07
8	110,000	-	110,000	35,959.20
9	110,000	-	110,000	31,268.87
10	110,000	-	110,000	27,190.32
11	110,000	345,000	(235,000)	(50,511.66)
12	210,000	-	210,000	39,250.50
			NPV	**(8,873,567.02)**

Table o.4 above shows the cash flow analysis from the point of view of LGU, so that debt payment of the irrigators' association (IA) is treated as debt receipt and grants are treated as outflows. Note that this latter scheme results in slightly less burden on the LGU (PhP8.87 million, discounted at 15%). Still, the very important question that should be answered is: "Is the province willing to extend this type of assistance? How can this subsidy and assistance be justified?"

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Thus far, we have discussed the following:

Know the project, meaning that the output has been

- Identified; and
- Characterized.

Understand it in sufficient detail, meaning that

- We are convinced that the output will indeed result in the desired outcomes;
- It is an efficient use of fiscal resources; and
- We have taken steps to enhance the effectiveness of the project to result in the desired outcomes.

Analyze it thoroughly, meaning that we know:

- That there will likely be an excess demand for the project's output up to at least 10 years from now;
- That the choice of project design, technology, etc. is the most cost-effective;
- How much it costs to operate and maintain the project's output and that there is sufficient cover to sustain this.

4. Judge It Fairly

We are now ready to judge the project on the basis of its true cost and benefits to society.

4.1. How much is the true cost of the project to society?

4.1.1. Clarification of Concepts

a. The true cost of a good or service is sometimes referred to as its economic cost. The use of the term "economic" is deliberate in that we are interested in knowing the scarcity of the good or service in relation to other goods or services.
b. The basic premise behind economic pricing is that the market price does not accurately inform us of the true value of the good or service. Rather, the market price is distorted by taxes, subsidies, and transport and handling costs. (Please refer to the Technical Appendix, pages 147-149, for a more detailed explanation.)
c. The economic cost is given by the undistorted price at which suppliers are willing to sell a given quantity of their produce. This means that we need to know the supply price, corrected for distortions such as taxes, subsidies, and transport and handling costs.

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Example (p):
Consider a unit of good that costs PhP220 per bag, inclusive of a 10% value-added tax (VAT). What this means is that only PhP200 is received by the seller of the good, and the PhP20 is remitted to government. Thus, the economic cost of this good, which we implicitly assume as nontradeable, is PhP200, and not PhP220.

4.1.2. Classification of Inputs

To guide the determination of economic costs, we need to indicate the following for each major project input:

a. If the good is wholly tradeable, partly tradeable, or wholly nontradeable.

   By tradeable, we mean that the good is being demanded and/or supplied in the international market. The National Statistics Office keeps track of external trade statistics and provides information on whether the good is being imported or exported.

b. If wholly tradeable, is it an exportable or importable good?

   If the domestic price of the good is less than the freight on board (FOB) price at the border, then the good must be exportable. On the other hand, if the domestic price of the good is higher than the cost, insurance, and freight (CIF) price at the border, then the good must be importable. Again, external trade statistics can provide the necessary information.

c. If partly tradeable, what proportion of the cost is due to tradeable inputs?

d. For projects to be funded internally, we can skip questions a-c and simply answer: How much is the cost of the good at the project site? Net of taxes?

The following matrix (Table 6) may be useful in summarizing this information:

Table 6. Type and Cost of the Project's Inputs

Major Project Input	Tradeable?	% Tradeable	Exportable? Importable?	Cost at project site known?	How much is the unit cost?

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4.1.3. Computation of Economic Cost. The computation of economic cost depends on whether the good is wholly tradeable (importable or exportable), partly tradeable or nontradeable.

a. Good is nontradeable.

- The true cost is a weighted average of the demand and supply prices.

$P=w^dP^d+W^sP^s;$
$w^d+w^s=1$

where w^d is the weight given to demand and w^s is the weight given to supply; P^d is the demand price and P^s is the supply price.

- Recall that the demand price is the price that consumers pay for the good while supply price is the price that producers receive for the good. The demand and supply prices differ from the market price by the amount of the tax or subsidy.

Example (q):
10% VAT on lighting bulbs that cost PhP25, net of taxes.
Demand price = PhP25 * (1+10%) = PhP27.50
Supply price = PhP25

Example (r):
PhP3 subsidy to producers per kilo of sugar. Market price is PhP30
Demand price = PhP30
Supply price = PhP30 + 3

- In the Technical Appendix (see Section F.4: Imputation of demand and supply elasticities) we explain in detail why weighting is done between the demand and supply prices. The over-simplified reason is that the project will result in additional input demand, say demand for cement. Under certain conditions, it can push prices up, thus forcing other consumers to buy at a higher price. Just how much higher will depend on the relative elasticities of the demand and supply.
- We usually just choose among the following weights, corresponding to different assumptions on demand and supply elasticities (Table 7).
- Scheme 1 assumes that price is entirely determined by demand and that supply is inelastic (quantity supplied does not respond to changes in

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Table 7. Suggested Weights on Demand and Supply Prices

Weighting Scheme	Demand price	Supply price
1	1	0
2	0.67	0.33
3	050	0.50
4	0.33	0.67
5	0	1

prices). In this case, supply may be very constrained especially in the short term. At the other extreme (Scheme 5), we have the case where price is entirely determined by supply, meaning that demand is inelastic. There are intermediate states

Scheme 2: Demand is more responsive than supply
Scheme 3: Demand is just as responsive as supply
Scheme 4: Demand is less responsive than supply

b. Input good is tradeable.

- In this case, the scarcity of foreign currency also needs to be considered in determining the true cost of the input. This is done by imposing a foreign exchange premium (FEP) on the official exchange rate. The value of the FEP is determined by the NEDA and may change from time to time. The most recent value is 1.2.

Example (s):

Suppose the current exchange rate is PhP54.75. With an FEP of 1.2, this means that any imported input will cost 20% more when expressed in domestic currency. That is, a $100 worth of goods is equivalent to $100 x 54.75 x 1.2 = PhP6,570 in domestic currency, where PhP54.75 is the exchange rate.

- Moreover, the true cost will not include taxes and subsidies as these are merely transfers from one economic agent to another.
- We need to further distinguish between importable and exportable inputs.

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c. Input good is importable.

If the input good is something that we import, this means that domestic supply is not enough to meet domestic demand. Since we are using it up for the project, then we will need to increase imports. In turn, the increased importation will require more foreign exchange.

The financial price (FP) of the input is roughly equal to the sum of the following:

- Cost, insurance, and freight (CIF) price multiplied by the current exchange rate;
- Handling cost inclusive of taxes; and
- Transport cost inclusive of taxes.

To convert this to economic price, we need to apply the foreign exchange premium (FEP) to the current exchange rate and then deduct the taxes from the handling and transport costs. The economic price (EP) is equal to the sum of the following:

- Cost, insurance, and freight (CIF) price multiplied by the current exchange rate multiplied by the FEP;
- Handling cost less taxes; and
- Transport cost less taxes.

The above description can be expressed in a formula:

EP = CIF_price*ER*FEP + (handling_cost less taxes) + (transport_cost less taxes)

where

EP is the economic price
CIF_price is the CIF price of the good at the port
ER is the prevailing exchange rate
FEP is the foreign exchange premium
Handling_cost is the cost of handling at the port
Transport_cost is the cost of transporting the good from port to project site

d. Input good is exportable.

If the input is being exported, then this means that domestic supply exceeds domestic demand and furthermore, there is international demand for our product. The financial price of an exportable input is the same as with an importable input,

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except that the FOB (freight on board) price is used instead of the CIF (cost, insurance and freight) price. The FP is the sum of the following:

- FOB price multiplied by the current exchange rate;
- Handling cost inclusive of taxes; and
- Transport cost inclusive of taxes.

But since the project will be using up some of these inputs, then volume of exports and hence the amount of foreign exchange earnings will decrease.

EP = FOB_price*ER*FEP+ (handling_cost less taxes) - (transport_cost less taxes)

where

EP is the economic price
FOB_price is the FOB price of the good at the port
ER is the prevailing exchange rate
FEP is the foreign exchange premium
Handling_cost is the cost of handling at the port
Transport_cost is the cost of transporting the good from port to project site

e. The good is partly tradeable, or, the good itself may be nontradeable but the process of producing the good requires tradeable goods.

$$EP=s^{t}*ECF*FP+(1-s^{t})*[w^{d}FP^{d}+w^{s}FP^{s}]$$

where s^{t} is the proportion that is tradeable, ECF is the conversion factor or the amount used to express financial prices to economic prices and the others are as defined before.

f. Labor inputs

The true cost of labor is equal to the opportunity cost of labor. Skilled labor is more scarce than unskilled labor, but the income of skilled labor is taxable while the income of unskilled labor is non-taxable. In effect, there are negative and positive tradeoffs. In the Philippines, wages of skilled labor are taken to be the true cost of skilled labor while wages of unskilled labor are multiplied by a factor of 0.6 to arrive at the true cost of unskilled labor. This conversion factor may change over time and you should check with NEDA about the current value.

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Example (t):

Consider the following example of a rural roads project where the cost of inputs at the project site is known. Most of the inputs that will be used, e.g., gravel and sand are nontradeable but they make use of some tradeable inputs. Meanwhile, labor is considered tradeable and is valued at the opportunity cost of labor. In Column A, we specify the cost structure of the project in terms of materials, equipment, and labor. This is further broken down in Column B into local and foreign (tradeable) component and for labor, into skilled and unskilled. Assume a foreign exchange premium of 1.2.

Input		Factors		Financial Cost (in PhP)		ECF	Economic Cost (in PhP)
		A	B	C	D	E	F=D*E
Materials		40%		326,000			
	Local		40%		130,400	1	130,400
	Foreign		60%		195,600	1.2	234,720
Equipment		35%		285,250			
	Local		25%		71,312.50	1	71,312.50
	Foreign		75%		213,937.50	1.2	256,725
Labor		25%		203,750			
	Skilled		30%		61,125	1	61,125
	Unskilled		70%		142,625	0.6	85,575
TOTAL				815,000	815,000		839,857.50

g. The case of projects that generate negative effects

The technical term for these negative effects is negative externalities. What is needed is to identify the cost of preventing these externalities and include them as part of project cost.

Example (u):

A communal irrigation project promotes the growth of parasites that cause schistosomiasis. The prevention measure takes the form of frequent cleaning of the canals to get rid of snails. The cleaners need to use special equipment for cleaning. This cost as well as the labor component needs to be included as part of the O&M cost.

Example (v):

The construction of a solar dryer for palay exposes the neighboring residents to respiratory hazards. This can be mitigated by installing finely-meshed nets around the solar dryer. The cost of the nets as well as the replacement has to be included.

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4.2. How much is the benefit of the project truly worth to society?

We value the economic benefit of the project's output at the price that consumers are "willing to pay" for the good. Again, we consider several cases:

4.2.1. Good is nontradeable.

The same rules as in valuing nontradeable inputs apply. Refer to 4.1.3-a.

4.2.2. Output good is importable.

If the project produces or results in the production of an importable output, then the country's import bill is reduced. The value of the output at the port is given by the CIF price. To be comparable, the price of the output at the project site should be equal to the CIF price less the handling and transport costs from port to project site.

The EP is given by the following formula:

EP=CIF_price * ER * FEP – (handling_cost less taxes) – (transport_cost less taxes)

where

EP is the economic price
CIF_price is the CIF price of the good at the port
ER is the prevailing exchange rate
FEP is the foreign exchange premium
Handling_cost is the cost of handling at the port
Transport_cost is the cost of transporting the good from port to project site

4.2.3. Output good is exportable.

If the project produces or results in the production of an exportable output, then the country's export bill is increased. The value of the output at the port is given by the FOB price. To be comparable, the price of the output at the project site should be equal to the FOB price less the handling and transport costs from port to project site.

The EP is given by the following:

EP=FOB_price * ER * FEP – (handling_cost less taxes) – (transport_cost less taxes)

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where

EP is the economic price
FOB_price is the FOB price of the good at the port
ER is the prevailing exchange rate
FEP is the foreign exchange premium
Handling_cost is the cost of handling at the port
Transport_cost is the cost of transporting the good from port to project site

4.2.4. Some proportion of the good is tradeable.

The same rules as in valuing "partly tradeable" inputs apply. Refer to 4.1.3-e.

4.2.5. Labor outputs or increased labor productivity

The same rules as in valuing labor inputs apply. Refer to 4.1.3-f.

4.2.6. Commodity-Specific Conversion Factor (CSCF)

It is practical to compute for commodity-specific conversion factors for some goods (whether inputs or outputs) that are frequently used. The commodity-specific conversion factor (CSCF) is simply the ratio between the economic price and financial price. Now, for the same good but pertaining to different project sites, the CSCFs will vary somewhat. Nonetheless, the previously computed CSCFs may serve as a guide for evaluating future projects.

For emphasis, recall the following differences between financial and economic prices in the case of tradeable goods (Table 8).

Table 8. Comparison of Financial and Economic Prices of Tradeable Goods

Variable	Financial Price	Economic Price
Price at port	Converted using prevailing exchange rate	Exchange rate is multiplied by the Foreign Exchange Premium (FEP)
Tariffs, Taxes, subsidies	Taken at full value	Multiplied by a conversion factor equal to 0
Labor	Taken at full value	Multiplied by a conversion factor, distinguishing between skilled and unskilled labor

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Example (w):

Consider our communal irrigation project with financial cost of PhP10 million. Note that the classification "foreign" pertains to the tradeable component, while the classification "local" pertains to the nontradeable component. The CSCF is computed as follows:

Input		Factors		Financial Cost (in PhP)		ECF	Economic Cost (in PhP)
		A	B	C	D	E	F=D*E
Materials		40%		4,000,000			
	Local		40%		1,600,000	1	1,600,000
	Foreign		60%		2,400,000	1.2	2,880,000
Equipment		35%		3,500,000			
	Local		25%		875,000	1	875,000
	Foreign		75%		2,625,000	1.2	3,150,000
Labor		25%		2,500,000			
	Skilled		30%		750,000	1	750,000
	Unskilled		70%		1,750,000	0.6	1,050,000
TOTAL				10,000,000	10,000,000		10,305,000

Memo: Commodity-Specific Conversion Factor (EP/FP) = 1.03

The CSCF, or the ratio between the economic and financial price is estimated to be 1.03 in this case.

Example (x):

In this second example, we consider a project that provides technical assistance to farmers to improve corn productivity. We compute for the CSCF of corn as follows:

In Column A, we specify the prevailing price, i.e., the financial price. In Column B, we indicate the conversion factor. Note that taxes are given a conversion factor of 0. This is because taxes are simply considered transfers from the taxpayer to government; there was no additional output that was produced. In Column D, we specify the proportion that is tradeable and this amount is multiplied by the foreign exchange premium, estimated to be 1.2.

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Importable Output
Project Site = Community C
Product: CORN

Particulars	Financial Price [A]	Unadjusted Conversion Factor [B]	Unadjusted Economic Value [C=A*B]	Percent Tradeable [D]	FEP (20%) [E=A*D*.02]	Economic Value (Adjusted) [F=C+E]
1 CIF $ (Manila)	212.00					
2 CIF PhP (Manila)	11,766.00	1.00	11,766.00	100.00	2,353.20	14,119.20
Plus						
3 Tariff @ 3%	352.98	0.00				
4 VAT @ 10%	1,211.90	0.00				
5 Port Charges	300.00	1.00	300.00	30.00	18.00	318.00
6 VAT @ 10%	30.00	0.00				
7 Net Importer's Price (2+3+4+5+6)	13,660.88	1.00	13,660.88	100.00	2,732.18	16,393.05
8 VAT @ 10%	1,366.09	0.00			0.00	0.00
9 Importer's Price (7+8)	15,026.97	1.00	15,026.97	100.00	3,005.39	18,032.36
Less	1,560.00	1.00	1,560.00	50.00	156.00	1,716.00
10 Inter-Island freight						
11 VAT @ 10%	156.00	0.00				
12 Port Charges and inland transpo	575.00	1.00	575.00	30.00	34.50	609.50
13 VAT @ 10%	57.50	0.00				
14 Price Net of Tax [9-(10+11+12+13)]	12,678.47	1.00	12,678.47	100.00	2,535.69	15,214.16
15 VAT @ 10%	84.96	0.00				
16 Factory Gate Price (14+15)	**12,763.43**	1.00	12,763.43	100.00	2,552.69	**15,316.11**

Memo: CSCF (EP/FP) = 1.20

4.3. The case of public goods (Although this part falls neatly into 4.2, it merits special attention particularly since most public sector projects will fall into this category.)

4.3.1. There are cases when it is difficult to determine the true willingness-to-pay so that whatever information we can get will clearly underestimate the true value of the benefit to society. We have seen this to be the case with public goods. There is always an incentive to free-ride. We can do either or both of two things:

- Find a proxy for willingness-to-pay; and/ or
- Add to the original variable a fixed amount that will incorporate the true value of the benefit to society.

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4.3.2. The following table provides some examples.

Good	Willingness-to-pay	Benefit to society	Adjustment
Irrigation service	Irrigation service fee	Food security Reduced poverty incidence among farmers	Value of rice production Increased income of farmers
Safe and easy access to water supply	Water consumption fee	Good health to beneficiaries Environmental sanitation Reduced workload for women	Improved productivity (less absences from work and school) Option value for tourism potential Option value for time of women
Electricity	Electricity consumption fee	Improved access to information	Option value for the increased number of hours that can be used for productive purposes

4.3.3. For completeness, we summarize the methodologies as surveyed by de Castillo (1998)[8] involving several project evaluation studies:

Type of Project	Methodology
Water supply system	Consumer's surplus is estimated on the basis of: beneficiary population, water supply and demand and prospective growth in the next 20 years Water consumption per capita Water tariffs Savings in time and effort
Urban roads	Reduction of transport time Decrease in vehicle operations cost Decrease in vehicle repair and maintenance cost
Road project	Increase in agricultural production Increase in income
Market places and transport stations	Increase in market and transport station revenue
Land development for housing	Increase in rental value after project
Administrative buildings	Savings on rents
Rehabilitation of buildings and facilities	Savings on discounted cost of building new buildings and facilities in the future
Rural electrification	Improvement in quality of life Generation of additional employment Generation of additional income through increased operation of local businesses and industries
Farm equipment for communal use	Increase in area under cultivation Increase in yields Increase in income
Postharvest facilities	Reduction in processing costs Savings in time and effort Increase in crop areas Increase in production, income and employment
Skills program	Additional income and employment
Day care centers	Increase in work capacity of mothers Additional income Increase in leisure time, educational activities and food preparation

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4.3.4. The case of project outputs with benefits that cannot be monetized.

Examples of these are projects that improve health and sanitation, or peace and order, preserve culture, or promote harmony. Some studies still venture to estimate consumers' willingness-to-pay for such goods. However, the application may be so limited to a certain group of people as to be useful in general. The projects can still be evaluated in comparison to alternative types of provision.

a. Identify a measure of effectiveness.
b. Determine the effectiveness level for each type of provision.
c. Determine the economic cost of each type of provision.
d. Compute for the cost-effectiveness ratio, or the ratio of the economic cost to the measure of effectiveness.

Example (y):

Objective of the project: Promote good health among elementary students in depressed barangays

Measure of effectiveness: proportion of elementary students that have normal weight for height

Type of provision	Coverage	Entire Cost
Daily hot meals	All elementary students	PhP5,400 daily
Ration of 1 kg rice daily	All families of elementary students	PhP4,320 daily

Suppose that at the end of one semester, we found out that the proportion of students with normal weight for height increased from 60% to 80% in the case of the hot meals project, while it increased from 60% to 75% in the case of the rice ration project, we arrive at the following analysis table:

Type of provision	Cost	Effectiveness	Cost-effectiveness ratio
Daily hot meals	PhP5,400 daily	20% increase	270
Ration of 1 kg rice daily	PhP4,320 daily	15% increase	288

Conclusion: The hot meals project is more cost-effective in increasing the proportion of children with normal weight for height.

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Example (z):

Objective of the project: To promote population management

Measure of effectiveness: reduction in total fertility rate (TFR)

Type of provision	Coverage	Entire Cost
IEC campaign using mass media	Entire province	PhP2 million
House-to-house campaign	Entire province	PhP480,000 (Representation and transportation allowance of barangay health worker) + PhP2 million (condoms and pills)

Type of provision	Cost	Effectiveness	Cost-effectiveness ratio
IEC/mass media	PhP2 million	Reduction in TFR from 4 to 3.5	4 million
House-to-house campaign	PhP2.48 million	Reduction in TFR from 4 to 3	2.48 million

Conclusion: The house-to-house campaign is more effective.

4.3.5. Project's output produces other benefits.

a. The project's logframe (Table 1) as well as the impact pathway demonstrated in Part II-A can help determine if the positive externality is due to the project alone, or in conjunction with other factors. In general, we only consider benefits that are due to the project alone. For instance, road construction may lead to an increase in real estate prices within the vicinity of the road, but only if there are business opportunities in the area. A water supply project will increase the influx of tourists, but only if there will be tourism development in the area.
b. If the benefit is attributable to the project alone, the valuation will follow the same rules given above.
c. In general, if the economic benefits outweigh the financial benefits, the project is said to generate positive externalities.

4.4. What is the net impact of the project to society?

In 4.1 we determined the economic cost of the project's inputs to society. In 4.2, we determined the economic benefit of the project's output to society. We are now ready to determine the net impact of the project to society. We simply compare these economic costs and economic benefits.

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4.4.1. Parameters to use

The project's net benefits take into consideration the incremental benefit of the project, the cost of the project and any externalities (positive or negative) that may result from the project. All of these figures should be expressed in economic values (Table 9).

Recall that the recommended indicator of "worth" is the net present value (NPV). This is because of the following advantages:

a. The NPV always exists, unlike the IRR and EIRR.
b. The NPV is not sensitive to project scale unlike the IRR, EIRR and BCR.
c. The NPV is additive unlike the IRR, EIRR, BCR and the CER.

Meanwhile, the cost-effectiveness ratio (CER) is used only when the benefits are difficult to quantify and/or monetize. And when used, the CER is used to compare between different technologies to produce the same good or service.

The IRR and EIRR are convenient measures because they can easily be compared against commercial interest rates and other measures of financial profitability.

Table 9. Analysis of Net Economic Benefits of the Project

Year	Cost of Investment				Benefits		Incremental Benefit	Benefit less Cost	Discounted B-C
	Financial Prices		Economic Prices		Economic Prices				
	Construct-ion	O&M	Construct-ion	O&M	Without Project	With Project			
A	B	C	D	E	F	G	H=G-F	I=H-(D+E)	J=I/(1+r)^A
0									
1									
2									
3									
4									
5									
								NPV	**Sum of all J**

4.4.2. Consideration for differences in economic life

Caution must be exercised when comparing projects that have different economic lives. The project with the shorter life-span can be adjusted, as if we will implement the project again in order to make it comparable. Alternatively, we can shorten the benefit stream of the project with the longer life with the proper adjustment also done on the cost side.

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4.4.3. Distribution of benefits

The project's benefits may differ depending on the point of view. It is important to qualify these points of view insofar as they differ according to the type of beneficiaries (e.g., individuals, suppliers or constituencies). In summing up the benefits, the usual principle is "a peso is a peso." This is devoid of distributional biases. If the province has very strong equity bias then different weights can be assigned to the different types of stakeholders.

Example (aa):

Consider Example (o). In the first table, we value the benefits at the average willingness-to-pay of farmers for the irrigation service. We already know that it yields a negative NPV when expressed in financial prices. Applying the CSCF we computed in example (w), we find that even when expressed in economic prices, the NPV is negative. See Table aa.1.

Now, consider the income redistribution effects of the project, considering that the primary beneficiaries come from the agricultural sector. The sector hosts at least two-thirds of the country's poor. One hectare of rice farm yields 3,347 kilos of paddy rice. In 2000 prices, the farmgate price is PhP7.07 per kilo. The average ratio of cost to gross return is as follows:

Item	Ratio of Cost to Gross Returns
Family labor	0.001262
Hired labor	0.213828
Other labor	0.005185
Farm equipment	0.222321
Financial capital	0.057043
Land	0.082918
Other operating cost	0.254110
Taxes	0.002967
Profit margin	0.160379

Source: computed from BAS cost and returns table for rice

Suppose we consider only the amount that goes to the agriculture sector, namely, family labor, hired labor, other labor, farm equipment, and profit margin. This means that there will be additional income of PhP14,971.49 per additional "hectare" for those in the agriculture sector, broken down in the second table:

Sub-sector	Income (in PhP)
Farmer-owners	4,106.88
Hired labor	5,263.95
Other labor	127.63
Physical capital	5,473.03

Source: computed from BAS cost and returns table for rice

The analysis still yields a negative NPV. We arrive at a positive NPV only when we factor in a premium of 27% for the fact that the beneficiaries are among the poorest of the poor. See Table aa.2

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Table aa.1

Year	Economic Cost of Project						Economic Benefit of Project				Economic Benefits less Economic Cost	NPV at 15%
	Investment Phase	Operating Phase			Total Economic Cost	PV at 15%	Irrigation Service Fee	Incremental Income to Farmer-owners and hired labor	TOTAL	PV at 15%		
		Personnel	Other Admin Cost	MOOE								
A	B	C	D	E	F=B+C+D+E	G=F/(1+0.15)^A	H	I	J=H+I	K=J/(1+0.15)^A	L=J-F	M=L/(1+0.15)^A
0	4,120,000.00	-	-	-	4,120,000.00	4,120,000.00				-	(4,120,000.00)	(4,120,000.00)
1	6,180,000.00	-	-	-	6,180,000.00	5,373,913.04	55,000.00	598,859.82	653,859.82	568,573.76	(5,526,140.18)	(4,805,339.29)
2	-	20,600.00	4,120.00	154,500.00	179,220.00	135,516.07	275,000.00	1,497,149.00	1,772,149.00	1,339,999.24	1,592,929.00	1,204,483.18
3	-	20,600.00	4,120.00	154,500.00	179,220.00	117,840.06	275,000.00	1,497,149.00	1,772,149.00	1,165,216.73	1,592,929.00	1,047,376.67
4	-	20,600.00	4,120.00	154,500.00	179,220.00	102,469.62	275,000.00	1,497,149.00	1,772,149.00	1,013,231.94	1,592,929.00	910,762.33
5	-	20,600.00	4,120.00	154,500.00	179,220.00	89,104.01	275,000.00	1,497,149.00	1,772,149.00	881,071.25	1,592,929.00	791,967.24
6	-	20,600.00	4,120.00	515,000.00	539,720.00	233,335.85	275,000.00	1,497,149.00	1,772,149.00	766,148.92	1,232,429.00	532,813.07
7	-	20,600.00	4,120.00	154,500.00	179,220.00	67,375.44	275,000.00	1,497,149.00	1,772,149.00	666,216.45	1,592,929.00	598,841.01
8	-	20,600.00	4,120.00	154,500.00	179,220.00	58,587.34	275,000.00	1,497,149.00	1,772,149.00	579,318.65	1,592,929.00	520,731.32
9	-	20,600.00	4,120.00	154,500.00	179,220.00	50,945.51	275,000.00	1,497,149.00	1,772,149.00	503,755.35	1,592,929.00	452,809.84
10	-	20,600.00	4,120.00	154,500.00	179,220.00	44,300.44	275,000.00	1,497,149.00	1,772,149.00	438,048.13	1,592,929.00	393,747.69
11	-	20,600.00	4,120.00	515,000.00	539,720.00	116,009.16	275,000.00	1,497,149.00	1,772,149.00	380,911.42	1,232,429.00	264,902.26
12	-	20,600.00	4,120.00	154,500.00	179,220.00	33,497.50	275,000.00	1,497,149.00	1,772,149.00	331,227.32	1,592,929.00	297,729.82
											NPV	(1,909,174.87)
											EIRR	10%

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Table aa.2

Year	Economic Cost of Project						Economic Benefit of Project				Economic Benefits less Economic Cost	NPV at 15%
	Investment Phase	Operating Phase			Total Economic Cost	PV at 15%	Irrigation Service Fee	Incremental Income to Farmer-owners and hired labor	TOTAL	PV at 15%		
		Personnel	Other Admin Cost	MOOE								
A	B	C	D	E	F=B+C+D+E	G=F/(1+0.15)^A	H	I= Table aa.1!I*0.27	J=H+I	K=J/(1+0.15)^A	L=J-F	M=L/(1+0.15)^A
0	4,120,000.00	-	-	-	4,120,000.00	4,120,000.00				-	(4,120,000.00)	(4,120,000.00)
1	6,180,000.00	-	-	-	6,180,000.00	5,373,913.04	55,000.00	760,551.97	815,551.97	709,175.63	(5,364,448.03)	(4,664,737.42)
2	-	20,600.00	4,120.00	154,500.00	179,220.00	135,516.07	275,000.00	1,901,379.23	2,176,379.23	1,645,655.37	1,997,159.23	1,510,139.30
3	-	20,600.00	4,120.00	154,500.00	179,220.00	117,840.06	275,000.00	1,901,379.23	2,176,379.23	1,431,004.67	1,997,159.23	1,313,164.61
4	-	20,600.00	4,120.00	154,500.00	179,220.00	102,469.62	275,000.00	1,901,379.23	2,176,379.23	1,244,351.89	1,997,159.23	1,141,882.27
5	-	20,600.00	4,120.00	154,500.00	179,220.00	89,104.01	275,000.00	1,901,379.23	2,176,379.23	1,082,045.12	1,997,159.23	992,941.11
6	-	20,600.00	4,120.00	515,000.00	539,720.00	233,335.85	275,000.00	1,901,379.23	2,176,379.23	940,908.80	1,636,659.23	707,572.95
7	-	20,600.00	4,120.00	154,500.00	179,220.00	67,375.44	275,000.00	1,901,379.23	2,176,379.23	818,181.57	1,997,159.23	750,806.13
8	-	20,600.00	4,120.00	154,500.00	179,220.00	58,587.34	275,000.00	1,901,379.23	2,176,379.23	711,462.23	1,997,159.23	652,874.89
9	-	20,600.00	4,120.00	154,500.00	179,220.00	50,945.51	275,000.00	1,901,379.23	2,176,379.23	618,662.81	1,997,159.23	567,717.30
10	-	20,600.00	4,120.00	154,500.00	179,220.00	44,300.44	275,000.00	1,901,379.23	2,176,379.23	537,967.66	1,997,159.23	493,667.22
11	-	20,600.00	4,120.00	515,000.00	539,720.00	116,009.16	275,000.00	1,901,379.23	2,176,379.23	467,797.97	1,636,659.23	351,788.81
12	-	20,600.00	4,120.00	154,500.00	179,220.00	33,497.50	275,000.00	1,901,379.23	2,176,379.23	406,780.84	1,997,159.23	373,283.34
											NPV	71,100.52
											EIRR	15%

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Table aa.3

Year	Economic Cost of Project						Economic Benefit of Project		Economic Benefits less Economic Cost	NPV at 15%
	Investment Phase	Operating Phase			Total Economic Cost	PV at 15%	Incremental production of rice	PV at 15%		
		Personnel	Other Admin Cost	MOOE						
A	B	C	D	E	F=B+C+D+E	G=F/(1+0.15)^A	H	I=H/(1+0.15)^A	J=H-F	K=J/(1+0.15)^A
0	4,120,000.00	-	-	-	4,120,000.00	4,120,000.00		-	(4,120,000.00)	(4,120,000.00)
1	6,180,000.00	-	-	-	6,180,000.00	5,373,913.04	1,726,035.60	1,498,291.83	(4,456,964.40)	(3,875,621.22)
2	-	20,600.00	4,120.00	154,500.00	179,220.00	135,516.07	4,307,589.00	3,257,156.14	4,128,369.00	3,121,640.08
3	-	20,600.00	4,120.00	154,500.00	179,220.00	117,840.06	4,307,589.00	2,832,309.69	4,128,369.00	2,714,469.63
4	-	20,600.00	4,120.00	154,500.00	179,220.00	102,469.62	4,307,589.00	2,462,877.99	4,128,369.00	2,360,408.37
5	-	20,600.00	4,120.00	154,500.00	179,220.00	89,104.01	4,307,589.00	2,141,633.04	4,128,369.00	2,052,529.02
6	-	20,600.00	4,120.00	515,000.00	539,720.00	233,335.85	4,307,589.00	1,862,289.60	3,767,869.00	1,628,953.75
7	-	20,600.00	4,120.00	154,500.00	179,220.00	67,375.44	4,307,589.00	1,619,382.26	4,128,369.00	1,552,006.82
8	-	20,600.00	4,120.00	154,500.00	179,220.00	58,587.34	4,307,589.00	1,408,158.49	4,128,369.00	1,349,571.15
9	-	20,600.00	4,120.00	154,500.00	179,220.00	50,945.51	4,307,589.00	1,224,485.64	4,128,369.00	1,173,540.13
10	-	20,600.00	4,120.00	154,500.00	179,220.00	44,300.44	4,307,589.00	1,064,770.12	4,128,369.00	1,020,469.68
11	-	20,600.00	4,120.00	515,000.00	539,720.00	116,009.16	4,307,589.00	925,887.06	3,767,869.00	809,877.91
12	-	20,600.00	4,120.00	154,500.00	179,220.00	33,497.50	4,307,589.00	805,119.18	4,128,369.00	771,621.68
									NPV	10,559,467.00
									EIRR	39%

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We may also be interested to know the benefit to the entire society of the communal irrigation system. This will be in terms of increased rice production. We assume a milling recovery ratio of 0.715 and a final demand price of PhP18 per kilo. Table aa.3 shows that it will yield a positive NPV and an EIRR of 39%. Note that we did not apply any foreign exchange premium to the price of rice. The above economic analysis (that considers the product resulting from the utilization of the project's output) yields a positive NPV. Based on 4.3.5 c, we know that this means that the project generates positive externalities, even though it is not financially viable.

If the economic analysis yields a negative NPV, the project should not be undertaken. This means that the benefit the project can give to society is less than the amount it costs to implement it.

4.5. Is the project worth pursuing even if the assumptions on the benefits or costs or both are not met?

4.5.1. We need to subject the above results to sensitivity analysis. As the name of the procedure implies, we need to know how sensitive the results are given changes in benefit and cost assumptions. Note that we did not factor in the effect of inflation. This implicitly assumes that inflation will affect all prices, and therefore relative prices are maintained. A sample summary table (Table 10) is given below:

Table 10. Sensitivity Analysis

% Change	Increase in Net Present Value Resulting from:					
	Increase in Cost	Decrease in Benefits	Increase in Cost + Decrease in Benefits	Increase in Cost	Decrease in Benefits	Increase in Cost + Decrease in Benefits
	Financial Prices			Economic Prices		
10%	NPV (B, C+10%)	NPV (B-10%, C)	NPV (B-10%, C+10%)			
20%						
30%						
40%						
50%						
60%						
70%						
80%						
90%						
100%						

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4.5.2. Table 10 implies that the preceding analyses will be undertaken under varying assumptions of the increase in cost, decrease in benefits, and both. This means recalculating the NPV while varying the assumptions on cost, benefits, and both. This information will also guide our decision to undertake the project if the original estimates of costs and benefits no longer holds. We can also reinforce our project by including risk-mitigating components.

Example (bb.1): NPV (B, C+10%).

- All cost estimates are increased by 10%.
- Estimates of benefit stream remain the same.
- Compute the corresponding NPV.

Example (bb.2): NPV (B-10%, C).

- All cost estimates remain the same.
- Estimates of benefit stream are reduced by 10%.
- Compute the corresponding NPV.

Example (bb.3): NPV (B-10%, C+10%).

- All cost estimates are increased by 10%.
- Estimates of benefit stream are reduced by 10%.
- Compute the corresponding NPV.

Example (bb.4):

Consider again our communal irrigation project (CIP). The low NPVs computed in the first tables (in Example o) imply that the economic viability is indeed very vulnerable, even to only slight changes in cost and benefits. We conduct the sensitivity analysis only with respect to the latter table in Example aa. The result is given in the following table. It shows that the economic viability of the project is more sensitive to decreases in benefits rather than to increases in cost. This being the case, we advise that a technical assistance component be added to the CIP along with the other management systems related to the operations of the CIP. This will help ensure the benefit stream that we hope to receive from the project.

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Sensitivity Analysis: Communal Irrigation Project

% Change	Increase in Cost		Decrease in Benefits		Increase in Cost and Decrease in Benefits	
	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR
10%	9,917,177.60	36.81%	8,449,230.90	34.62%	7,806,941.49	32.45%
20%	9,274,888.19	34.66%	6,338,994.79	30.00%	5,054,415.99	26.11%
30%	8,632,598.79	32.66%	4,228,758.69	25.25%	2,301,890.48	20.01%
40%	7,990,309.39	30.80%	2,118,522.59	20.29%	(450,635.03)	14.02%
50%	7,348,019.98	29.06%	8,286.48	15.02%		
60%	6,705,730.58	27.43%	(2,101,949.62)	9.27%		
70%	6,063,441.18	25.91%				
80%	5,421,151.77	24.47%				
90%	4,778,862.37	23.12%				
100%	4,136,572.97	21.84%				

If the project's economic viability is compromised, given small deviations from the assumed cost and benefit streams, the project should be reinforced or else shelved. It can still be undertaken if the deviation is deemed highly unlikely to happen within the implementation period.

D. SUMMARY OF PART II

In summary, we reiterate the stages and corresponding steps involved in comprehensive PED:

Basic PED

1. KNOW THE PROJECT

- Identification of the good or service that the project will provide
- Characterization of good or service
  - Whether private, public or mixed public-private good
  - Whether tradeable, nontradeable, or partly tradeable
  - If tradeable, whether importable or exportable

2. UNDERSTAND THE PROJECT IN SUFFICIENT DETAIL

- Logical framework analysis of the project
- Forecast of "without project" scenario
- Analysis of alternative provision schemes

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Continuation to Comprehensive PED

3. ANALYZE IT THOROUGHLY

- Forecast of excess demand for the project's output
- Technical feasibility analysis
- Estimate of cost of investment, operations and maintenance
- Estimate of potential revenue
- Discounted cash flow analysis

4. JUDGE IT FAIRLY

- Estimate of economic cost
- Estimate of economic benefits
- Benefit-cost analysis
- Risk analysis
- Sensitivity analysis

The PED Team

Having discussed what Project Evaluation and Development entails, we now identify the ideal composition of the PED Team.

- Project proponent who will supply the required information about the project
- Planning Officer who will advise on the relevance of the project to the goals of the province
- Statistician who will provide the needed data and analysis thereof, and design of surveys, as necessary
- Engineer who will provide the data needed on the physical aspects of the project (as well as alternative project designs) including costs of construction, operations and maintenance, estimate of usable life, estimate of benefit stream
- Accountant who will advise on the financial aspects of the project; finalize the estimates made by the Engineer and Project Proponent
- Environmental specialist who will advise on the technical aspects to ensure that the project does not result in environmental degradation, or else advise about mitigating mechanisms
- Economist who will conduct the economic analyses

Note that capability-building programs can be designed to develop the necessary skills for some of the above procedures. Still, the best training is one that is complemented with "learning by doing".

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part 3

project proposal development

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project proposal development

This part of the volume provides guidance on how to develop a project proposal. Developing the project proposal is easier once you have conducted the comprehensive PED. We begin with a short discussion on the need for and benefits of a project brief, followed by a discussion on the need for a more in-depth feasibility study. Next, we enumerate the information needed to package the project proposal. We then proceed to describe the usual format of project proposals.

A. PROJECT BRIEF AND DESIGN

You will need to develop a project brief for all projects, as discussed in the third volume on Investment Programming and Revenue Generation. Projects that will be proposed for external funding may need to be packaged in a different format and may require more details than what is asked for in the project brief. For instance, some funders require some description of the project engineering and design.

Developing the project design early on ensures the efficient implementation of projects because of the following:

1. It takes off from results of the PED where we get the following inputs:

1.1. Necessary components to enhance the effectiveness of the project to achieve the desired outcomes;
1.2. Project cost and potential revenues, if any;
1.3. Forecast schedule of required subsidy, if any;
1.4. Possible risks to the environment, personal life, property, etc.; and
1.5. Impact of underestimation of costs, overestimation of benefits and both.

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2. It specifies the following to ensure that the project will be successfully implemented:

2.1. Implementation and institutional arrangements, to include among others, protocol for:

2.1.1. Financial management;
2.1.2. Procurement of inputs;
2.1.3. Project administration;
2.1.4. Operations and maintenance; and
2.1.5. Collection of fees, if any.

2.2. Plans for monitoring and evaluation of accomplishments.

For projects with approved external funding, a detailed operations manual covering item 2.2 above is usually required.

B. NEED FOR A FEASIBILITY STUDY

In Part 2, we discussed the procedures involved in conducting a PED that can take the form of a pre-feasibility study. The principles and concepts are discussed in the Technical Appendix. The same procedures, principles, and concepts apply to the conduct of a feasibility study. The only difference is the rigor applied, for instance:

1. A pre-feasibility study relies only on secondary data to forecast demand and supply. A feasibility study may conduct a beneficiary survey to estimate a demand and supply model. Alternatively, it may make use of reputable studies to forecast demand and supply.

2. A pre-feasibility study needs a simple financial table, like Table 5, to demonstrate financial viability. A feasibility study requires a financial cash flow statement.

3. A pre-feasibility study can make use of rough estimates of the costs of investment, operations and maintenance. A feasibility study requires more detailed engineering specifications to arrive at more accurate estimates.

4. A pre-feasibility study may make use of secondary data to estimate willingness-to-pay for the project's output. A feasibility study may conduct a beneficiary survey or estimate a more sophisticated model to capture willingness-to-pay (based on secondary data).

Obviously, conducting a feasibility study requires more resources, both in terms of time and technical skills. A consulting firm is usually engaged to conduct the feasibility study since they have the technical manpower and more comprehensive data in stock.

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For projects being proposed to international funding agencies, it may be wise to contract a reputable firm to conduct the feasibility study for two reasons. First, it increases the chances of approval of the project proposal. Remember that the prospective funder will conduct his own appraisal of the project. This time, the interest is in validating the assumptions used in the feasibility study. An independent feasibility study provides you this comfort zone, knowing that the project will stand the test to be done by independent technical experts. And second, it ensures that the project being proposed, which will entail huge public investments, is indeed economically viable.

If you have conducted the pre-feasibility study comprehensively, you should not be surprised if the results and even estimates of the feasibility study turn out to be the same. This should be taken as an affirmation of the earlier study.

C. REQUIREMENTS FOR PACKAGING A PROJECT PROPOSAL

You will need two sets of inputs – one concerns the project, and the other the prospective funder.

1. Inputs about the project

You will need the tables you filled up in Part 2. These are:

Table 1	Project Log Frame
Table 2	Situational Profile - Without and With Project
Table 3	Estimates of Demand for and Supply of Project's Output
Table 4	Alternative Methods of Providing the Desired Output
Table 5	Costs, Benefits and Revenue Projections
Table 6	Analysis of the Project's Inputs
Table 9	Analysis of Net Economic Benefits of the Project
Table 10	Sensitivity Analysis

2. Information about the Prospective Funder

It is best to know your prospective funder. You will need to know the following:

2.1. *Current thrusts of the funder*. Note that these are subject to change and you must not rely on previous information. Each funder develops its own "Country Assistance Strategy", although the name may differ. This indicates the type of projects that they prefer to support in a country (sometimes region) over a certain period.

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2.2. *Review procedure*. As in 2.1, this is also subject to change depending on emerging literature on the role of projects in development and the impact of ODA on development.
2.3. *Requirements for application*. You are interested in form templates, proposal templates, other forms or requirements such as Sangunian Panlalawigan or the Provincial Development Council resolution.
2.4. *Other nuances*. Some funders indicate their own preference, for example, on the discount rate to be used, conversion factors for some commodities, and foreign exchange premium.
2.5. *Procedures for follow-up*. First find out if they regard the process of following up as acceptable and desirable. At the very least, though, you will need to make yourself and the one who conducted the feasibility study available for further clarifications regarding the project and/or the feasibility study.

D. FORMAT OF A PROJECT PROPOSAL

Each funder requires a different format for the project proposal. The format is intended to facilitate their review and especially if they have to decide among competing proposals. However, the difference may be more in terms of style and sequence rather than content. Most of them will require the following sections[9]:

1. Project Title

The title should characterize the project. In coming up with a title, it is better to be comprehensive rather than fancy (or catchy), but with serious attempts to be simple and brief.

2. Location/ Target Population

Briefly describe the community and target population that the project intends to serve. You will have the opportunity to describe in detail the intended beneficiaries in the main body of the proposal.

3. Implementing Agency

This refers to the agency responsible for carrying out the activities of the project.

4. Executing Agency

This refers to the agency that will be responsible for the financial management of and any coordination that needs to be done for the project.

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5. Start Date

Expected starting date.

6. Duration

Expected total duration of the project in months and years.

7. Project Cost

7.1. External Financing Requirement – proposed budget for external funding.
7.2. Domestic Financing Requirement – proposed budget for financing by LGU.
7.3. Total Project Cost – sum of all funds required, whether for external or internal financing.

8. Current Situation (Problems and Needs)

Refer to Table 2. Describe the without project scenario, particularly the problems and needs identified.

9. Justification and Benefits

Refer to Table 2. Describe what will be the "with-project" scenario.

Justify the project in terms of the following:

9.1. Forecast excess demand for the project's output that the project will fill in (Table 3).
9.2. Technical feasibility and cost-effectiveness of the project over other alternatives considered (Table 4)
9.3. Economic viability of the project (Table 9)
9.4. Economic viability of the project given reasonable departures in existing conditions (Table 10)

Remember to indicate the assumptions used and the basis for these assumptions.

10. Project Objectives

Refer to Table 1. What are the goals of the sector under which the project is being proposed? What are the general and specific objectives of the project?

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11. Project Description/Main Components

Refer to Table 1. Describe the project. You may also refer to the output and impact pathways that you have developed for the project (Technical Appendix).

12. Project Management and Organization

Describe the expertise of the implementing and executing agencies. If a pilot project has been implemented along similar lines, it is better to mention this to demonstrate experience in implementation.

13. Expected Environmental Impacts

Describe the expected negative and positive impacts of the project. For the expected negative impacts, indicate the risk-mitigating measures that will be implemented. Refer to Part 2-C, 4.1.3-g. As much as possible, the funding for these risk-mitigating measures has to be sourced internally. Often, you only need to institute regulatory mechanisms.

14. Monitoring and Evaluation

Describe the plans for monitoring and evaluation of the project's accomplishment. If monitoring forms have already been developed, include this in the appendix.

15. Budget

Using Table 5 as input, list down the financial requirements of the project, including the operational costs for the first year after completion of the project. This will be broken down by proposed funding source – foreign, and domestic; LGU and other sources.

16. Cost Recovery and Sustainability

Describe how you intend to sustain the operations of the project. Focus on the following:

16.1. Priority being given by the province to the project (see Table 8 of Volume 3 on Investment Programming and Revenue Generation for sample project scoring table).
16.2. Arrangements for cost recovery (Table 5).
16.3. Commitment of the provincial LGU to implement projects that will enhance the impact of the project.

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17. Terms of Reference for Consultants to Be Hired Under the Project

If the project will require the services of highly specialized experts, indicate this in the proposal. At the very least, there is the assurance that the project will be taken care of by an expert in the field. The Terms of Reference of these experts need to be included in the proposal.

18. Appendices

18.1. Tables of Commodity-Specific Conversion Factors (CSCF) for major inputs and outputs of the project.
18.2. Analysis of Net Economic Benefits.
18.3. Sensitivity Analysis.
18.4. Other supplemental studies.

By now, you will have understood what we said earlier about proposal development being facilitated greatly by how you have conducted the PED. After all, the best convincing factor you can present to prospective funders is your own conviction that the project is indeed a worthwhile undertaking.

E. SOME GENERAL TIPS

The following are some of the criteria used by funders to rate projects:

1. Focus of the project

1.1. Funders prefer projects where the focus coincides with the thrust of the funding agency (particularly if the request is for a grant). This focus may be in terms of the output being produced (e.g., health care, family planning, and education) or the sector that will most likely benefit (e.g., children, women, and farmers).
1.2. It helps to know if the prospective funder has already supported other projects in your province. You may argue on the basis of enhancing the effectiveness of the other projects to meet the desired outcomes.

2. Likelihood of success

2.1. Funders will have to be convinced that the project will be a success. For loan applications, you must demonstrate capacity to repay the loans. There must be sufficient evidence of groundwork, that is, undergoing your project evaluation and development (PED).

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2.2. You also need to convince them that you have the institutional capacity to undertake the project.
2.3. If the province has implemented something similar in the past, it will help to mention this and any meritorious evaluation you may have received.
2.4. You should also describe the monitoring and evaluation process that you plan to undertake to demonstrate to the funder that you are serious about implementation and the success of the project.
2.5. If the project will require counterpart funding or funding from other sources, you will need to convince this prospective funder that the chances of securing the other funds are high.

3. Social impact

There are other considerations pertaining to the project aside from its expected financial and/or economic viability. Even the NEDA Board-Investment Coordination Committee (ICC) looks at other criteria, particularly the social impact, as demonstrated in any or all of the following:[10]

3.1. Income distribution, or more accurately, income redistribution - These are projects that benefit the poorest of the poor or result in redistribution of income or assets from the non-poor to the poor.
3.2. Employment – The number of jobs created during project implementation and the subsequent operations and maintenance.
3.3. Access to land – This is consistent with the priority accorded to land reform. If the project includes a land settlement or land reform element, the distribution of land rights with and without the project should be demonstrated.
3.4. Internal migration – The project contributes to stemming the rural-urban migration.
3.5. Nutrition and health – The project is expected to benefit families and individuals that suffer from health and nutrition problems.
3.6. Other indicators of quality of life – The project is expected to improve the quality of life. Especially in the rural areas, these are projects that provide electricity, access to potable water, schools, and other infrastructure and services.

4. Contribution of the project to overall development

4.1. There is now an emerging strand in PED literature to adopt a programmatic approach in rating "projects". This means looking at the entire investment portfolio of the proponent. This arises from the realization that funds can be used for purposes other than what they were originally intended to be. They may think they are funding a "worthy" project, when in fact, it frees up internal resources for the province to undertake "marginal" projects.

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4.2. You may be asked to present your entire investment portfolio. Should the need arise, you need to convince the funder that all projects went through a critical process of screening and prioritization. You may discuss the investment programming procedures.

ENDNOTES

[1] NEDA. 1984. "Project Development Manual".
[2] There is no official definition that distinguishes skilled from unskilled labor. A skilled worker may derive his or her skills from professional or technical education, or acquired on the job. In practice, we consider a skilled worker as one who bring expertise to the performance of a given job.
[3] Please refer to the Technical Appendix, pages 141-146 for a more detailed discussion of the typology of goods and services.
[4] Please refer to the Technical Appendix, pages 150-154, for a more detailed discussion of logical framework analysis.
[5] The Technical Appendix, pages 149-150, discusses the Role of Government and Role of Projects in Development.
[6] See Technical Appendix, pages 161- 162, for a more detailed discussion of elasticity.
[7] NEDA. July 2000. "Reference Manual on Project Development and Evaluation"
[8] De Castillo, C. 1998. "Economic Analysis of Social Investment Fund Projects." Report prepared for the WB.
[9] Adapted from the small project format prescribed by the Ministry of Planning and National Development of the Republic of Maldives.
[10] Based on ICC Project Evaluation Procedures and Guidelines.

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annexes

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ANNEX A. Cutoff Cost for "big" Projects of Provinces Sample Computation, based on FY 2003 data

Region	LGU Name	Internal Revenue Allotment for FY 2003	20% Development Fund	Number of municipalities	"cutoff" for big projects
Region I	Ilocos Norte	354,847,867.00	70,969,573.40	22	3,225,889.70
	Ilocos Sur	371,074,141.00	74,214,828.20	32	2,319,213.38
	La Union	336,778,617.00	67,355,723.40	19	3,545,038.07
	Pangasinan	915,076,240.00	183,015,248.00	44	4,159,437.45
Region II	Batanes	106,566,000.00	21,313,200.00	6	3,552,200.00
	Cagayan	614,616,000.00	122,923,200.00	28	4,390,114.29
	Isabela	750,905,000.00	150,181,000.00	35	4,290,885.71
	Nueva Vizcaya	317,240,000.00	63,448,000.00	15	4,229,866.67
	Quirino	239,230,000.00	47,846,000.00	6	7,974,333.33
Region III	Aurora	229,499,000.00	45,899,800.00	8	5,737,475.00
	Bataan	309,840,000.00	61,968,000.00	11	5,633,454.55
	Bulacan	818,204,000.00	163,640,800.00	22	7,438,218.18
	Nueva Ecija	695,676,000.00	139,135,200.00	27	5,153,155.56
	Pampanga	603,407,000.00	120,681,400.00	20	6,034,070.00
	Tarlac	471,601,000.00	94,320,200.00	17	5,548,247.06
	Zambales	337,944,000.00	67,588,800.00	13	5,199,138.46
Region IV-A	Batangas	707,697,000.00	141,539,400.00	31	4,565,787.10
	Cavite	710,501,000.00	142,100,200.00	20	7,105,010.00
	Laguna	706,677,000.00	141,335,400.00	28	5,047,692.86
	Quezon	746,461,000.00	149,292,200.00	40	3,732,305.00
	Rizal	594,849,000.00	118,969,800.00	13	9,151,523.08
Region IV-B	Marinduque	194,566,000.00	38,913,200.00	6	6,485,533.33
	Occidental Mindoro	360,259,000.00	72,051,800.00	11	6,550,163.64
	Oriental Mindoro	402,321,000.00	80,464,200.00	14	5,747,442.86
	Palawan	738,454,000.00	147,690,800.00	23	6,421,339.13
	Romblon	182,101,000.00	36,420,200.00	17	2,142,364.71
Region V	Albay	472,163,000.00	94,432,600.00	15	6,295,506.67
	Camarines Norte	299,288,000.00	59,857,600.00	12	4,988,133.33
	Camarines Sur	625,430,000.00	125,086,000.00	35	3,573,885.71
	Catanduanes	234,701,000.00	46,940,200.00	11	4,267,290.91
	Masbate	414,169,000.00	82,833,800.00	20	4,141,690.00
	Sorsogon	354,872,000.00	70,974,400.00	14	5,069,600.00
Region VI	Aklan	297,995,310.00	59,599,062.00	17	3,505,827.18
	Antique	317,461,190.00	63,492,238.00	18	3,527,346.56
	Capiz	377,805,650.00	75,561,130.00	16	4,722,570.63
	Guimaras	155,031,440.00	31,006,288.00	5	6,201,257.60
	Iloilo	696,757,440.00	139,351,488.00	42	3,317,892.57
	Negros Occidental	905,559,260.00	181,111,852.00	19	9,532,202.74
Region VII	Bohol	541,205,298.00	108,241,059.60	47	2,303,001.27
	Cebu	905,481,000.00	181,096,200.00	47	3,853,110.64
	Negros Oriental	583,791,692.00	116,758,338.40	20	5,837,916.92
	Siquijor	137,476,764.00	27,495,352.80	6	4,582,558.80

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Region	LGU Name	Internal Revenue Allotment for FY 2003	20% Development Fund	Number of municipalities	"cutoff" for big projects
Region VIII	Biliran	156,687,197.00	31,337,439.40	8	3,917,179.93
	Eastern Samar	340,274,555.00	68,054,911.00	23	2,958,909.17
	Leyte	710,983,249.73	142,196,649.95	41	3,468,210.97
	Northern Samar	371,932,000.00	74,386,400.00	24	3,099,433.33
	Southern Leyte	265,880,627.00	53,176,125.40	18	2,954,229.19
	Western Samar	450,086,303.00	90,017,260.60	25	3,600,690.42
Region IX	Zamb. Del Norte	535,753,999.00	107,150,799.80	25	4,286,031.99
	Zamb. Del Sur	451,943,645.00	90,388,729.00	26	3,476,489.58
	Zamboanga Sibugay	320,344,573.00	64,068,914.60	16	4,004,307.16
Region X	Bukidnon	649,951,214.00	129,990,242.80	20	6,499,512.14
	Camiguin	132,094,955.00	26,418,991.00	5	5,283,798.20
	Lanao Del Norte	327,905,318.00	65,581,063.60	22	2,980,957.44
	Misamis Occidental	299,196,168.00	59,839,233.60	14	4,274,230.97
	Misamis Oriental	367,148,572.00	73,429,714.40	24	3,059,571.43
Region XI	Compostela Valley	370,199,868.00	74,039,973.60	11	6,730,906.69
	Davao Del Norte	378,984,308.00	75,796,861.60	7	10,828,123.09
	Davao Del Sur	422,448,798.00	84,489,759.60	14	6,034,982.83
	Davao Oriental	380,064,001.00	76,012,800.20	11	6,910,254.56
Region XII	North Cotabato	577,307,288.00	115,461,457.60	17	6,791,850.45
	Sarangani	302,080,691.00	60,416,138.20	7	8,630,876.89
	South Cotabato	393,962,794.00	78,792,558.80	10	7,879,255.88
	Sultan Kudarat	390,155,796.00	78,031,159.20	11	7,093,741.75
CAR	Abra	273,372,003.00	54,674,400.60	27	2,024,977.80
	Apayao	229,834,130.00	45,966,826.00	7	6,566,689.43
	Benguet	274,715,617.00	54,943,123.40	13	4,226,394.11
	Ifugao	237,193,943.00	47,438,788.60	11	4,312,617.15
	Kalinga	249,534,251.00	49,906,850.20	8	6,238,356.28
	Mt. Province	216,913,745.00	43,382,749.00	10	4,338,274.90
CARAGA	Agusan Del Norte	269,745,598.00	53,949,119.60	11	4,904,465.42
	Agusan Del Sur	502,340,506.00	100,468,101.20	14	7,176,292.94
	Surigao Del Norte	333,447,965.00	66,689,593.00	27	2,469,984.93
	Surigao Del Sur	379,907,367.40	75,981,473.48	18	4,221,192.97
ARMM	Basilan	249,472,846.00	49,894,569.20	6	8,315,761.53
	Lanao Del Sur	592,993,629.00	118,598,725.80	38	3,121,019.10
	Maguindanao	486,294,082.00	97,258,816.40	27	3,602,178.39
	Sulu	298,706,000.00	59,741,200.00	18	3,318,955.56
	Tawi-Tawi	246,405,900.00	49,281,180.00	10	4,928,118.00

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ANNEX B: ICC-PE Form No. 3 - Estimated Project Cost

INVESTMENT PHASE

All costs are expressed in constant _____ (indicate year) prices. In _____ Units.

	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4
1. Civil Works					
a. Equipment/Machineries					
Foreign Exchange Costs	$				
Local Costs	P				
b. Materials/Supplies					
Foreign Exchange Costs	$				
Local Costs	P				
c. Labor costs c.1 Supervision and Consultancy Fees					
Foreign Exchange Costs	$				
Local Costs	P				
c.2 Laborers Local Costs (skilled)	P				
(unskilled)	P				

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	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4
2. Machineries/Equipments					
Foreign Exchange Costs	$				
Local Costs	P				
3. Land Acquisition Costs	P				
4. Other Investment Phase Costs (Specify)					
Foreign Exchange Costs	$				
Local Costs	P				
5. Total costs (1-4)					
Total Foreign Exchange Costs	$				
Total Local Costs	P				
6. Subsidies	P				
What are the subsidized items?					

Assumptions:

_____

_____

_____

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Prepared by:_____

Telephone Number: _____

Office Address: _____

Date Prepared:_____

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ANNEX C: ICC-PE-form No. 4 - Annual Operations and Maintenance Cost

OPERATIONAL PHASE

Indicate the year when the Project starts operation _____

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR ...	YEAR N
1. Equipment/Machineries							
Foreign Exchange Costs	$						
Local Costs	P						
2. Materials/Supplies							
Foreign Exchange Costs	$						
Local Costs	P						
3. Labor Cost							
Supervision/Consultancy							
Foreign Exchange Costs	$						
Local Costs							
Laborers (Skilled)	P						
Laborers (Unskilled)	P						
4. Utilities (Electricity, Water etc.)							
Foreign Exchange Costs	$						
Local Costs	P						
5. Oil Costs							
Foreign Exchange Costs	$						
Local Costs	P						

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ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR ...	YEAR N
6. Other O & M Costs (Specify)							
Foreign Exchange Costs	$						
Local Costs	P						
7. Total O & M Costs							
Foreign Exchange Costs	$						
Local Costs	P						
8. Subsidies	P						

What are the subsidized items? _____

_____

Prepared by:_____

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Date Prepared:_____

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ZAMBOANGA DEL SUR

Developing a Potable Water Supply System

CASE STUDY 1

This and the next case study illustrate the principles and application of Project Evaluation and Development. To the extent possible, existing data pertaining to the community have been used. In the absence of community-specific data for selected variables, those pertaining to rural and/or poor areas in the province have been utilized instead. In such cases, the reference is properly indicated. These allusions to existing data notwithstanding, the author has also taken liberties to assume some scenarios.

Proposal to Develop a Potable Water Supply System

The province of Zamboanga del Sur lies at the southern portion of the Zamboanga peninsula where the latter forms the western portion of the island of Mindanao. Before 2001, the province used to be among the ten most populous provinces in the Philippines. With the constitution of Zamboanga Sibugay in 2002, its share in population has declined a bit. It now consists of 26 municipalities and one city – the capital city of Pagadian.

A major problem in the province is poor access to potable water and sanitary toilet facilities. In 2000, only 15% of its constituents had access to safe water and only 20% had access to sanitary toilet facilities. A survey of some of the poorest municipalities in the province revealed that only 30% of households had access to a community water system (at least level II). Almost 50% complained about the distance of the source of water supply to their residences. Not surprisingly about 30% of respondents complained about inadequate access to water and sanitation as among their top three problems.

The barangays of Alicia, Simata, and Sto. Rosario have joined together and identified a possible spring source. The cost of development, main and primary pipelines, is estimated to

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be PhP3,500,000. Based on Annex 1, we find that the project qualifies as a "big" project given the cutoff of PhP3,476,489.58. We then need to subject the project to a comprehensive PED.

KNOW THE PROJECT

What is the rationale for the project?

The project aims to improve the quality of life of the residents of Alicia, Simata, and Sto. Rosario by providing easy access to safe water supply. This goal is consistent with the goal of the province as articulated in the Provincial Development Plan. In particular, the plan has expressed concern that the life expectancy of residents of Zamboanga del Sur is about three years less than those of Benguet.[1] Part of the reason could be the poor access to safe water and sanitation facilities. In particular, a survey[2] conducted in 2003 among the poorest municipalities of the province showed that almost 90% of preschoolers (aged one to six years old) suffered from abdominal pain, something that could be traced to poor access to safe water and sanitation facilities. Among the productive age group, about 10% complained of the same ailment.

What will be the output of the project?

The project will develop a community water system that will service the residents of the three barangays.

Characterize the output of the project

The project is a stand-alone project. The output is nontradeable and possesses private good characteristics. Water meters can be installed in every household to monitor consumption. However, the investment is lumpy and the intended beneficiaries are among the poorest in the country. As such, a private investor on the lookout for profit may not find the venture attractive. (Note: The financial analysis will verify this hypothesis.)

UNDERSTAND THE PROJECT

What is the current situation like without the project?

At present, households, in particular the mothers, spend at least one hour everyday to fetch water. Those who can afford buy water from peddlers who source it either from the artesian well or a spring in another barangay. The average "water bill" in the rural areas of the province is estimated to be PhP286.04 per year in 2000.[3] Applying the appropriate price index, this amounts to PhP354.78 per year in 2004 prices.

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Among the productive age group, 10% complained of water-related illnesses. In 2003, almost 90% of preschoolers living in the poorest municipalities of the province contracted water-related illnesses.[4]

In 2000, the average medical expenditure (which includes drugs and medicine, hospital and room charges, and medical charges) for the province is estimated to be PhP661.55,[5] equivalent to PhP715.71 in 2004. This does not include the productivity loss that is assumed to average six days per year.

Following is the logframe of the proposed project.

Table cs.1.1. Logframe, Potable Water Supply Project

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Key Assumptions and Risk
Goal			
To improve the conditions for human development	HDI for the province	Philippine Human Development Report (PHDR)	
	HDI ranking of the province		
	Life expectancy of the province		
Purpose			
To improve the health and sanitation conditions of the residents of Barangays Alicia, Simata and Sto. Rosario	Reduced morbidity and mortality due to illnesses resulting from poor water and sanitation	Health statistics as reported by the Barangay Health Worker (BHW), Municipal Health Office (MHO) and Provincial Health Office (PHO)	Favorable peace and order condition; Economic development
			Time savings diverted into productive activities
Outputs			
Community water system consisting of spring development, main and primary pipelines	Number of households connected to the community water system	Project accomplishment report	Sustained service from the water facility
		Report of the Project Monitoring Committee (PMC)/ Regional Project Monitoring and Evaluation System (RPMES)	Absence of epidemic or incidence of food poisoning
			Willingness and ability of households to install sanitary facilities
Activities			
Allocation of PhP3.5 million to supply potable water	Amount of funds disbursed	Accounting and audit reports	On time acquisition of site
			On time resolution of ROW
			Favorable peace and order condition
			Favorable weather condition

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Is the project the only input necessary to produce the output and realize the outcomes?

The answer to the first part of the question is yes. Still, we need to ensure that arrangements are properly made for the smooth and fast acquisition of the site and resolution of any right-of-way issues. Favorable peace and order condition will also ensure that the project is completed on time. Adequate community preparation is needed to achieve the above.

Meanwhile, we need to guard against major weather disturbances in order to prevent delays. We need to schedule the implementation during the months when typhoons and even rains are least expected.

The answer to the second part of the question is a qualified yes. We should coordinate with health (and even school) authorities to minimize (if not altogether prevent) the incidence of an epidemic. Meanwhile, we can monitor the willingness and ability of households to install sanitary toilet facilities after the project is implemented in order to develop the proper response of government.

The above analysis suggests that we do not need to add any major component to the project. The community preparation is understandably part of the project. The other strategies only require proper schedule or form part of the regular functions of regular LGU personnel.

ANALYZE IT THOROUGHLY

What is the forecasted demand for the project's output?

All households in the three barangays have expressed demand for the project's output. This means that the demand will increase according to the increase in the number of households.

The province exhibited a population growth rate of 1.97% and an annual growth rate in the number of households of 4.65% between 1995 and 2000.[6] Potential labor force is 57.4% of the population with a participation rate of 61.7%.[7] In 2000, there were 3,119 individuals living in 520 households in the three barangays based on the Census of Population and Housing. It is estimated that at least 80% were employed in agriculture.

Following is the projected population, number of households and labor force beginning 2005 and 10 years afterwards.

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Table cs.1.2.

Year	Population	Number of HH	Number in the Labor Force
A	$B = B_{A-1}*(1+0.0197)$	$C = C_{A-1}*(1+0.0456)$	D=B*0.574*0.617
2005 = year 0	3,439	653	1,218
1	3,506	683	1,242
2	3,575	715	1,266
3	3,646	748	1,291
4	3,718	783	1,317
5	3,791	820	1,343
6	3,866	858	1,369
7	3,942	898	1,396
8	4,019	940	1,423
9	4,099	983	1,452
10	4,179	1,029	1,480

Note: $B_{year0} = 3,119*(1+0.0197)^5$

$C_{year0} = 520*(1+0.0465)^5$

Why should the government provide this good?

The intended beneficiaries reside in some of the poorest barangays in a poor province. In 2003, it was estimated that the proportion of the poor in the province was 44.3%. The inequality within the province was also worse than national average – the Gini coefficient of per capita expenditure was 0.44 in Zamboanga del Sur and average 0.38 in all the provinces.[8] We therefore expect that in the poor municipalities, the poverty incidence is much higher. In the special survey (earlier mentioned), the poverty incidence is 87%. While the good can be sold as a private good, it is doubtful if the project will generate enough profit as to make it attractive to private entrepreneurs. To conclude, we say that government should implement the project because it addresses a basic human need, health and sanitation, among some of the poorest households.

Is the project technically feasible?

The municipal engineer has conducted a preliminary inspection of the proposed site and has indicated his affirmation. The location of the proposed site is also strategic since it straddles the three barangays that should benefit from the project.

How much will the project cost? Can we sustain project operations?

The project is estimated to cost PhP3.5 million. Operations and maintenance (O&M) for this type of project normally costs 12% of investment cost per year. On the fifth year of

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Table cs.1.3.

Year	Project Cost (in PhP)	
	Investment Phase	Operating Phase
0	3,500,000	
1		420,000
2		420,000
3		420,000
4		420,000
5		525,000
6		420,000
7		420,000
8		420,000
9		420,000
10		420,000

continuous operation, there is a need to undertake minor rehabilitation work that normally costs 15% of investment. The expected economic life, with proper operations and maintenance, is 10 years. Table cs.1.3 is the cost table.

The minimum charge for residential users is PhP100 per month. This amounts to PhP1,200 which is way above the estimated willingness-to-pay of users from poor rural communities – PhP354.78 per year, on the average. Suppose we assume that this would be a private business undertaking. Let us assume the best possible scenario, (1) each household pay the minimum; (2) there is no delinquency in payments; and (3) the discount rate is only 12%.

The financial analysis is given in Table cs.1.4. We note at least three results: (1) the proposed business undertaking is expected to yield positive net cash flows only beginning year 7, (2) the net present value is negative, and (3) the internal rate of return is 9%, much lower than the expected rate of return for other investments (12%). The bottomline is that this project will not be attractive to private investors. Note that we did not even factor in the fact that the estimated willingness-to-pay is less than 30% of the "minimum charge", meaning that a default rate of 70% is highly likely.

Another obvious implication is that the project cannot be expected to generate profits and possibly not even pay for itself, regardless of who undertakes the project. Let us now consider the most plausible scenario. If the LGU undertakes the investment and its O&M, we should at least be aware of how much it will cost. For Table cs.1.5, we peg the revenues only at the estimated willingness-to-pay.

The analysis reveals that at the end of 10 years, we will have subsidized the investment, operations and maintenance of the project to the tune of more than PhP1.5 million (discounted at 12%).

An alternative is to organize and train a waterworks association (i.e., Barangay Waterworks and Sanitation Association or BWSA) in the community and let them manage the operations and maintenance. We can expect a lower cost of O&M because of the lower overhead and administrative costs. Perhaps, we can also charge a higher fee for the use of the water facility, say at PhP50 per month, still 50% lower than the minimum market rate. We can require the BWSA to remit part of the payments. Assume a 20% increase every year until Year 7. Table cs.1.6 is the cash flow analysis that could make the BWSA arrangement viable. Note that in

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Table cs.1.4. Financial Analysis (All values in PhP)

Year	Cost		PV of Cost	Revenues	PV of Revenues	Revenues less Cost (in PV)	Undiscounted Cash Flows			PV of Cash Ending
	Investment	O&M					Cash Beginning	IN less OUT	Cash Ending	
A	B	C	D=(B+C)/(1+0.12)^A	E	F=E/(1+0.12)^A	G=F-D	H	I	J=H+I	K=J/(1+0.12)^A
0	3,500,000.00	-	3,500,000.00	-	-	(3,500,000.00)	0	(3,500,000.00)	(3,500,000.00)	(3,500,000.00)
1	-	420,000.00	375,000.00	819,600.00	731,785.71	356,785.71	(3,500,000.00)	400,071.72	(3,100,400.00)	(2,768,214.29)
2	-	420,000.00	334,821.43	858,000.00	683,992.35	349,170.92	(3,100,400.00)	438,240.97	(2,662,400.00)	(2,122,448.98)
3	-	420,000.00	298,947.70	897,600.00	638,893.95	339,946.25	(2,662,400.00)	478,186.76	(2,184,800.00)	(1,555,097.46)
4	-	420,000.00	266,917.59	939,600.00	597,132.79	330,215.20	(2,184,800.00)	519,991.79	(1,665,200.00)	(1,058,264.90)
5	-	525,000.00	297,899.10	984,000.00	558,348.03	260,448.93	(1,665,200.00)	458,742.57	(1,206,200.00)	(684,430.27)
6	-	420,000.00	212,785.07	1,029,600.00	521,627.40	308,842.33	(1,206,200.00)	609,529.69	(596,600.00)	(302,256.13)
7	-	420,000.00	189,986.67	1,077,600.00	487,451.51	297,464.84	(596,600.00)	657,447.91	61,000.00	27,593.30
8	-	420,000.00	169,630.96	1,128,000.00	455,580.28	285,949.32	61,000.00	707,596.42	769,000.00	310,586.20
9	-	420,000.00	151,456.21	1,179,600.00	425,375.59	273,919.38	769,000.00	760,079.04	1,528,600.00	551,228.48
10	-	420,000.00	135,228.76	1,234,800.00	397,572.55	262,343.79	1,528,600.00	815,004.40	2,343,400.00	754,512.08
						IRR	**9%**			
						NPV	**(434,913.33)**			

Note: E_A=PhP100*12 months*C_A of Table cs.1.2 (which is the number of households)

Table cs.1.5. Financial Analysis (All values in PhP)

Year	Cost		PV of Cost	Revenues	PV of Revenues	Revenues less Cost (in PV)	Undiscounted Cash Flows			PV of Cash Ending
	Investment	O&M					Cash Beginning	IN less OUT	Cash Ending	
A	B	C	D=(B+C)/(1+0.12)^A	E*	F=E/(1+0.12)^A	G=F-D	H	I	J=H+I	K=J/(1+0.12)^A
0	3,500,000.00	-	3,500,000.00	-	-	(3,500,000.00)	0	(3,500,000.00)	(3,500,000.00)	(3,500,000.00)
1	-	420,000.00	375,000.00	242,314.74	216,352.45	(158,647.55)	(3,500,000.00)	(177,685.26)	(3,677,685.26)	(3,283,647.55)
2	-	420,000.00	334,821.43	253,667.70	202,222.34	(132,599.09)	(3,677,685.26)	(166,332.30)	(3,844,017.56)	(3,064,427.26)
3	-	420,000.00	298,947.70	265,375.44	188,889.00	(110,058.70)	(3,844,017.56)	(154,624.56)	(3,998,642.12)	(2,846,154.48)
4	-	420,000.00	266,917.59	277,792.74	176,542.31	(90,375.28)	(3,998,642.12)	(142,207.26)	(4,140,849.38)	(2,631,584.64)
5	-	525,000.00	297,899.10	290,919.60	165,075.59	(132,823.51)	(4,140,849.38)	(234,080.40)	(4,374,929.78)	(2,482,452.65)
6	-	420,000.00	212,785.07	304,401.24	154,219.14	(58,565.93)	(4,374,929.78)	(115,598.76)	(4,490,528.54)	(2,275,041.51)
7	-	420,000.00	189,986.67	318,592.44	144,115.04	(45,871.63)	(4,490,528.54)	(101,407.56)	(4,591,936.10)	(2,077,158.69)
8	-	420,000.00	169,630.96	333,493.20	134,692.31	(34,938.65)	(4,591,936.10)	(86,506.80)	(4,678,442.90)	(1,889,544.62)
9	-	420,000.00	151,456.21	348,748.74	125,762.29	(25,693.92)	(4,678,442.90)	(71,251.26)	(4,749,694.16)	(1,712,787.33)
10	-	420,000.00	135,228.76	365,068.62	117,542.33	(17,686.43)	(4,749,694.16)	(54,931.38)	(4,804,625.54)	(1,546,960.84)
						IRR	**undefined**			
						NPV	**(4,307,260.69)**			

*Note: E_A=C_A of Table cs.1.2 (number of households) multiplied by PhP354.78 (estimated willingness-to-pay)

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addition to the development grant of PhP3.5 million, the LGU should also be prepared to extend an assistance of PhP50,000 and PhP40,000 in Years 6 and 7, respectively:

Table cs.1.6. Cash Flow Analysis (point of view of BWSA), in PhP

Year	Outflow		Inflow		IN less OUT	Cash Ending	
	Project Cost and O&M	Debt Payment	Grant	Revenues		Undiscounted	PV at 12%
A	B	$C_A=C_{A-1}$*(1+0.20)	D	E	F=(D+E)-(B+C)	$G_A=G_{A-1}+F_A$	H=G/(1+0.12)^A
0	3,500,000.00	-	3,500,000.00	3,500,000.00	3,500,000.00	0	-
1	300,000.00	100,000.00	-	409,800.00	9,800.00	9,800.00	8,750.00
2	300,000.00	120,000.00	-	429,000.00	9,000.00	18,800.00	14,987.24
3	300,000.00	144,000.00	-	448,800.00	4,800.00	23,600.00	16,798.01
4	300,000.00	172,800.00	-	469,800.00	(3,000.00)	20,600.00	13,091.67
5	300,000.00	207,360.00	-	492,000.00	(15,360.00)	5,240.00	2,973.32
6	300,000.00	248,832.00	50,000.00	514,800.00	15,968.00	21,208.00	10,744.63
7	300,000.00	298,598.40	40,000.00	538,800.00	(19,798.40)	1,409.60	637.63
8	300,000.00	298,598.40	-	564,000.00	(34,598.40)	(33,188.80)	(13,404.40)
9	300,000.00	298,598.40	-	589,800.00	(8,798.40	(41,987.20)	(15,141.01)
10	300,000.00	298,598.40	-	617,400.00	18,801.60	(23,185.60)	(7,465.14)

Following is the estimated cash flow from the point of view of the LGU:

Table cs.1.7. Cash Flow Analysis (point of view of LGU, if BWSA will operate), in PhP

Year	Outflow	Inflow	IN less OUT	Cash Ending	PV at 12%
A	B	C	D=B-C	$E_A=E_{A-1}+D_A$	F=E/(1+0.12)^A
0	3,500,000.00	-	(3,500,000.00)	(3,500,000.00)	(3,500,000.00)
1	-	100,000.00	100,000.00	(3,400,000.00)	(3,035,714.29)
2	-	120,000.00	120,000.00	(3,280,000.00)	(2,614,795.92)
3	-	144,000.00	144,000.00	(3,136,000.00)	(2,232,142.86)
4	-	172,800.00	172,800.00	(2,963,200.00)	(1,883,167.17)
5	-	207,360.00	207,360.00	(2,755,840.00)	(1,563,737.63)
6	50,000.00	248,832.00	198,832.00	(2,557,008.00)	(1,295,459.83)
7	40,000.00	298,598.40	298,598.40	(2,298,409.60)	(1,039,683.78)
8	-	298,598.40	298,598.40	(1,999,811.20)	(807,690.20)
9	-	298,598.40	298,598.40	(1,701,212.80)	(613,474.39)
10	-	298,598.40	298,598.40	(1,402,614.40)	(451,604.30)

The ending balances are still negative because of the huge development grant. In contrast to the first arrangement, however, we have brought down the amount of subsidy to less than half a million pesos (PhP451,604.30, discounted at 12%) at the end of 10 years.

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JUDGE IT FAIRLY

How much is the true benefit of the project to society?

Given the expected subsidy that the LGU must shoulder to undertake the project, the important question to ask is, "Is it worth it? Will society really be better off as a result of the project?"

The willingness-to-pay is the approximate measure of the true value of the good to society. If there are indications that the expressed willingness-to-pay does not reflect the true value of the good, then we add other indicators. For instance, we note that the estimated willingness-to-pay for convenient access to water comes up to PhP1,914.29 in the urban areas of Zamboanga del Sur.[9] The value of resources that are freed up as a result of the project is also included. In the context of human development, this means that we have provided additional options to the individual, household, and society in their pursuit of improved quality of life.

The following resources have been freed-up as a result of the project:

1) Medical expenses due to water-related illnesses;
2) Income loss resulting from the illness of a productive member of the household; and
3) Time spent to fetch water.

Next, we assume a morbidity incidence of 10% and an average medical bill of PhP715.71 per household.

To compute the loss in productivity, we first estimate the number in the labor force. Roughly 57.4% of the population is of working age and labor force participation rate is 61.7%. The daily wage rate is PhP120 so that the economic price of labor is PhP72 per day. We assume an average of six-day absences per worker.

Table cs.1.8. Projected Water Revenue

Willingness-to-pay = PhP354.78/yr/HH

Year	Number of households	Water Revenues (in PhP)
A	B	C=B*354.78
0		
1	683	242,314.74
2	715	253,667.70
3	748	265,375.44
4	783	277,792.74
5	820	290,919.60
6	858	304,401.24
7	898	318,592.44
8	940	333,493.20
9	983	348,748.74
10	1,029	365,068.62

Table cs.1.9. Savings in Medical Expenses

Average medical bill per Household 715.71
Morbidity incidence of water-related illnesses 10%

Year	Number of households	Incidence due to water-related illnesses	Medical Expenses (in PhP)
A	B	C=B*0.10	D=C*715.71
0			
1	683	68	48,668.30
2	715	72	51,531.15
3	748	75	53,678.28
4	783	78	55,825.41
5	820	82	58,688.25
6	858	86	61,551.09
7	898	90	64,413.93
8	940	94	67,276.77
9	983	98	70,139.61
10	1,029	103	73,718.17

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Table cs.1.10. Loss in Productivity

Loss in Productivity

Percent of population of working age	57.40%
Labor force participation rate	61.70%
Daily wage rate	120
Economic price of unskilled labor	72
Number of days absent	6
Morbidity due to water-related illnesses	10%

Year	Population	Working Age	Labor force	Number who are sick due to water-related illnesses	Man-days absent	Loss of Income due to Illness (in PhP)
A	B	C=B*.5740	D=C*0.6170	E=D*0.10	F=E*6	G=F*72
0						
1	3,506	2,012.44	1,241.68	124.17	745.01	53,640.49
2	3,575	2,052.05	1,266.11	126.61	759.67	54,696.16
3	3,646	2,092.80	1,291.26	129.13	774.76	55,782.43
4	3,718	2,134.13	1,316.76	131.68	790.06	56,884.01
5	3,791	2,176.03	1,342.61	134.26	805.57	58,000.88
6	3,866	2,219.08	1,369.17	136.92	821.50	59,148.35
7	3,942	2,262.71	1,396.09	139.61	837.65	60,311.12
8	4,019	2,306.91	1,423.36	142.34	854.02	61,489.20
9	4,099	2,352.83	1,451.69	145.17	871.02	62,713.17
10	4,179	2,398.75	1,480.03	148.00	888.02	63,937.14

To value the time spent for fetching water, we consider only the wage rate paid to the lowest paid worker, PhP80, so that the economic price is pegged at PhP48. We assume that only one person per household fetches water for an average of 1 hour per day. Only the poor households are assumed to fetch the water themselves. This proportion is estimated to be 88%.

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Table cs.1.11. Time Savings

Time Savings

Time spent fetching water (hours per day)	1
Number of persons per HH who fetch water	1
Proportion who fetch water	88%
Daily wage rate of lowest paid worker	80
Economic wage rate	48
Economic hourly wage rate	6

Year	Number of households	Number who fetch water	Total man-hours spent fetching water	Value of time (in PhP)
A	B	C=B*0.88	D=C*1(hr/day)*365 (days/year)	E=D*6
0				
1	683	601	219,365	1,316,190
2	715	629	229,585	1,377,510
3	748	658	240,170	1,441,020
4	783	689	251,485	1,508,910
5	820	722	263,530	1,581,180
6	858	755	275,575	1,653,450
7	898	790	288,350	1,730,100
8	940	827	301,855	1,811,130
9	983	865	315,725	1,894,350
10	1,029	906	330,690	1,984,140

Following is the summation of economic benefits resulting from the project:

Table cs.1.12. Total Economic Benefits (in PhP)

Year	Willingness-to-pay (Water Revenues)	Value of freed-up resources			TOTAL
		Medical expenses	Income Loss	Time spent fetching water	
A	B=Table cs.1.8!C	C=Table cs1.9!D	D=Table cs.1.10!G	E=Table cs.1.11!E	F=B+C+D+E
0					
1	242,314.74	48,668.30	53,640.49	1,316,190	1,660,813.53
2	253,667.70	51,531.15	54,696.16	1,377,510	1,737,405.01
3	265,375.44	53,678.28	55,782.43	1,441,020	1,815,856.15
4	277,792.74	55,825.41	56,884.01	1,508,910	1,899,412.16
5	290,919.60	58,688.25	58,000.88	1,581,180	1,988,788.73
6	304,401.24	61,551.09	59,148.35	1,653,450	2,078,550.68
7	318,592.44	64,413.93	60,311.12	1,730,100	2,173,417.49
8	333,493.20	67,276.77	61,489.20	1,811,130	2,273,389.17
9	348,748.74	70,139.61	62,713.17	1,894,350	2,375,951.52
10	365,068.62	73,718.17	63,937.14	1,984,140	2,486,863.93

Note: Again, we used Excel formula guides wherein Table cs.1.8!C, for example, refers to respective values on Column C of Table cs.1.8

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How much is the true cost of the project to society?

Similar to the above, we now value the true cost of the project to society. Previous projects of this sort have the following cost breakdown. We make the necessary computation considering an investment cost of PhP3.5 million.

Table cs.1.13. Economic Cost

Input		Factor		Financial Cost (in PhP)		ECF	Economic Cost (in PhP)
Materials/ Equipment		40%		1,400,000			
	Local		25%		350,000	1	350,000
	Foreign		75%		1,050,000	1.2	1,260,000
Labor		60%		2,100,000			
	Skilled		30%		630,000	1	630,000
	Unskilled		70%		1,470,000	0.6	882,000
TOTAL				3,500,000	3,500,000		3,122,000

Memo:

Conversion Factor (EP/FP) 0.892

Cost of Operations and Maintenance

		Financial Cost	Economic Cost
Routine O&M	12% of investment cost	420,000	374,640
Periodic O&M	15% of investment cost	525,000	468,300

How do the true benefits and true cost compare against each other?

We now compare the estimated true benefits and estimated true cost of the project to determine if the project is economically viable. Following is the analysis table. Note that the discount rate used is now 15%, the estimated social discount rate.

The project yields a positive NPV, meaning that it is indeed economically viable. This means that society is better off as a result of the project. The estimated economic internal rate of return is 45%, way above the social discount rate of 15%. Furthermore, we note that the EIRR is much higher than the IRR computed at financial prices (9%) which implies that the externality effects are positive and high.

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Table cs.1.14. Economic Analysis (All values in PhP)

Year	Cost (Refer to Table cs 1.13)		PV of Cost	Benefits	PV of Benefits	Benefit less Cost
	Investment	O&M				In Present Value
A	B	C	D=C/(1+0.15)^A	E=Table cs.1.11!F	F=E/(1+0.15)^A	G=F-D
0	3,122,000.00		3,122,000.00		-	(3,122,000.00)
1		374,640	325,773.91	1,660,813.53	1,444,185.68	1,118,411.77
2		374,640	283,281.66	1,737,405.01	1,313,727.80	1,030,446.13
3		374,640	246,331.88	1,815,856.15	1,193,954.89	947,623.01
4		374,640	214,201.64	1,899,412.16	1,085,995.07	871,793.43
5		468,300	232,827.87	1,988,788.73	988,779.49	755,951.62
6		374,640	161,967.21	2,078,550.68	898,614.82	736,647.61
7		374,640	140,841.05	2,173,417.49	817,068.14	676,227.09
8		374,640	122,470.48	2,273,389.17	743,174.95	620,704.47
9		374,640	106,496.07	2,375,951.52	675,393.71	568,897.64
10		374,640	92,605.28	2,486,863.93	614,714.73	522,109.45
					EIRR	**45%**
					NPV	**4,726,812.22**

Will the project still be economically viable given reasonable departures from the assumptions?

The sensitivity analysis shows that the project's economic viability is more sensitive with respect to decreases in expected benefits. Both the NPV and EIRR decrease more rapidly with decreases in benefits than with increases in cost. It is therefore important to coordinate efforts with the local health and school personnel to ensure that no untoward incident like food poisoning would preclude the benefits that are expected to result from the potable water supply system. The monitoring system should also keep track of the demonstrated ability and willingness of beneficiaries to put up sanitary toilet facilities by themselves. If the ability and willingness appear to be low and if there is evidence to show that the expected health benefits from the potable water supply are not experienced because of the lack of sanitary toilet facilities, we may need to introduce another project to positively influence this ability and willingness.

The following table gives the results of the sensitivity analysis.

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Table cs.1.15. Sensitivity Analysis

% Change	Increase in Cost		Decrease in Benefits		Increase in cost and Decrease in benefits	
	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR
10%	4,221,932.52	39.86%	3,749,251.29	39.33%	3,244,371.59	34.53%
20%	3,717,052.81	35.43%	2,771,690.37	33.44%	1,761,930.96	25.21%
30%	3,212,173.11	31.59%	1,794,129.44	27.32%	279,490.32	16.59%
40%	2,707,293.40	28.21%	816,568.51	20.84%	(1,202,950.31)	8.18%
50%	2,202,413.70	25.21%	(160,992.42)	13.79%		
60%	1,697,533.99	22.50%				
70%	1,192,654.29	20.04%				
80%	687,774.58	17.79%				
90%	182,894.87	15.71%				
100%	(321,984.83)	13.79%				

SUMMARIZE THE ANALYSIS

In summary, we conclude that the project is indeed economically viable. It cannot be expected to be self-sustaining, though. The second best solution is for the LGU to organize and train a group within the community to operate and maintain the water supply system. Some portion of the water revenues can be required as debt payment. This means that the project will be regarded as part-loan part-grant, as far as the community is concerned. The economic viability of the project can be compromised if the expected benefits are not realized in full or if there will be radical increases in the cost of investment and O&M. Consequently, we recommend the following:

To prevent time and cost overrun:

1. Adequate community preparation particularly with respect to site acquisition and any ROW issues.
2. Adequate capacity building for community group who will operate and maintain the facility.
3. Proper scheduling of construction during the time when weather disturbances are least expected.

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To prevent decreases in economic benefits:

1. Coordinate efforts with local health and school officials to avoid incidence of preventable diseases, e.g., food poisoning.
2. Monitor, and possibly influence, ability and willingness of beneficiaries to put up sanitary toilet facilities by themselves.

ENDNOTES

[1]PHDR. 2005
[2]Edillon, et. al. 2004.
[3]Author's estimate based on FIES 2000 version 3.
[4]Edillon, et. al. 2004.
[5]Author's estimate based on FIES 2000 version 3.
[6]www.census.gov.ph
[7]Edillon, et. al. 2004.
[8]Author's estimates based on FIES 2003, preliminary data.
[9]Author's estimates based on FIES 2000, version 3 and applying the relevant inflation rates.

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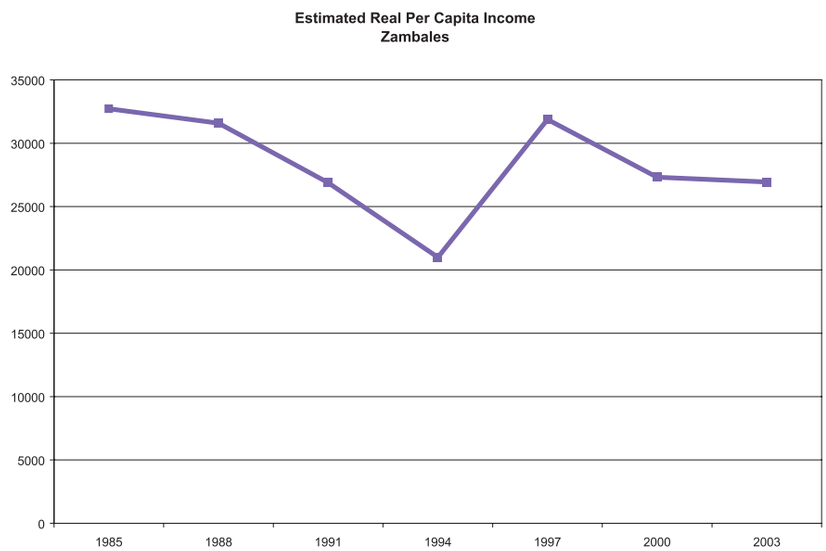
ZAMBALES

Rehabilitating Barangay Roads

CASE STUDY 2

Proposal to Rehabilitate Barangay Roads in Bulawen

Barangay Bulawen is in Palauig, Zambales. In 2000, the Census of Population and Housing reported that there were 3,188 individuals living in Bulawen and that the estimated population growth rate averaged 2.32% per annum. The province, as a whole, lagged behind in terms of economic growth. In the chart below, we plot the real per capita income of the province over time, as estimated from the Family Income and Expenditure Survey.[1]



The trend in per capita income in Zambales has always been disturbed by major calamities, both local and national. Between 1985 and 1988, the provincial profile simply reflected the national profile. The years that followed, 1991 and 1994 were crisis years for Zambales, notably the Mt. Pinatubo eruption in 1991. Between 1997 and 2000, the province suffered from El Niño while the country, as a whole, confronted the Asian financial crisis. Consequently, between 1985 and 2003, we see per capita income decreasing in real terms by about (-) 1.1%. In conducting the PED, we cannot use this

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income profile since the benefits will be heavily weighed downwards because of the economic underperformance. At any rate, we know that the historical performance has been marred by the consecutive crises that fell on the province.

We will test the feasibility of the project given two economic growth projections.

The proposed project is the rehabilitation of a total of 15 kilometers of roads. The roads are in four segments within the barangay and are in very bad condition. During bad weather, the roads are not passable. At present, even during good weather, the vehicle owners and operators complain of the high maintenance costs on their vehicles. Naturally, these costs are passed on to the passengers. The high transport cost has discouraged a number of farmers from selling their produce at the local market. About 83% of the labor force is engaged in agriculture.

The proposed project will cost PhP16 million. The municipality of Palauig has requested assistance from the province. Since the project exceeds the cutoff of PhP5.2 million, it is classified as a big project and will need to undergo the comprehensive PED.

KNOW THE PROJECT

What is the rationale for the project?

The project aims to contribute to the development of the municipality of Palauig and eventually, the province of Zambales. With the improved road conditions, the residents of Bulawen will be provided more options to improve their lives. The reduced vehicle operating cost will translate into lower transport fares. In turn, the lower transport fares will encourage some farmers to sell their produce, not at the farmgate but at the market. This will also introduce more competition among traders and the result will be better prices for the farmers. Meanwhile, the lower transport fares will also free up resources for the household to consume other goods and services.

The barangay has 341 hectares of agricultural land. These are in agricultural plains and a number of the farms are contiguous to each other. It is also adjacent to both developing and developed towns like Masinloc and Iba. The barangay can therefore serve as a stable source of raw materials for agri-processing industries.

What will be the output of the project?

The project will improve the conditions of the road in Bulawen, from very bad to good. With proper maintenance, the effects of the project are expected to last up to at least ten years.

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Characterize the output of the project

The project is actually made up of four subprojects, representing road segments in the barangay. However, each road segment cannot be evaluated separately from all the others.

The project can qualify as a stand-alone project. There may not be a need to include additional components for the project's output to realize the outcomes desired. However, the next stages of the analysis will direct this decision.

The output is nontradeable and possesses pure public good characteristics. Still, it requires inputs that are tradeable. Moreover, its benefits expressed in terms of savings in vehicle operating cost also includes a tradeable component.

It is not administratively feasible to collect fees for the use of the roads. This being the case, no revenue is expected from the project. The financial analysis will still be carried out, however, in order to inform the LGU of the expected cost stream after the project is completed.

UNDERSTAND THE PROJECT

What is the current situation like without the project?

There are several vehicles that ply the barangay regularly. Usually, this is to shuttle the children to and from school, the nonfarm workers to the main highway and the mothers to the market. During harvest time, traders bring their trucks to buy produce from the farmers. Following is the data on traffic count:

Table cs.2.1. Traffic Growth Rate and Annual Average Daily Traffic Computations

Vehicle Type	No. of Vehicles per Type	Daily Frequency of Trips	Operating Days per Year	Average Annual Daily Traffic at Year 0
A	B	C	D	E=B*C*D
cars/vans	5	2	120	1,200
jeepneys	2	4	280	2,240
motorcycles	4	8	160	5,120
tricycles	10	40	280	112,000
trucks	2	2	12	48
TOTAL	23		732	119,408

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As already mentioned, the roads are in very bad shape. It has come to the point where the drivers have been charging extra for their service, as much as 100% the regular fare. Traders who buy farm produce also factor in the added vehicle operating cost and this has bargained down the price. The prices of farm produce being sold in the big markets of Iba, Zambales and Olongapo City have remained high, though, implying that the difference is really due to the high transaction cost in the farms of Zambales.

The high transport cost has also constrained the farmers of Bulawen to planting only food crops. It would be too risky for them to plant cash crops and shoulder the high transport cost going to the market, though unsure that the crops would be sold by the end of the day. The barangay has 341 hectares of agricultural land and 300 of these are planted to rice.

During the rainy season, the road condition turns from bad to worse. The ones who suffer the most are the schoolchildren who have no other recourse than to walk all the way to school and back, since no vehicle would be willing to ply the route. At present, there are about 3,575 individuals in the barangay and about 1,073 of them are schoolchildren.

Following is the logframe of the proposed project.

Table cs.2.2. Logframe, Rural Road Rehabilitation Project

Narrative Summary	Indicators	M&E	Assumptions
Goal			
To spur economic development in Zambales	HDI for the province HDI ranking of the province per capita income growth	PHDR FIES	
Purpose			
To provide better access to markets, schools and other facilities	Increased trade flow; Reduced transaction cost; Better farmgate prices; Increased traffic flow; Reduced absences in school	School attendance data; Farm survey; BAS data	Increased investment in neighboring barangays and even towns; Favorable peace and order condition; Good weather
Outputs			
Improved road condition covering 15 kms of barangay roads, from very bad to good	Length of roads rehabilitated; Savings in vehicle operating cost	Project accomplishment report; Report of the PMC/ RPMES	Favorable peace and order condition; Good weather, health and sanitation conditions; Efficient production and marketing strategies; Diversified farming practice

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Narrative Summary	Indicators	M&E	Assumptions
Activities			
Rehabilitation of the following road segments, costing PhP16 million: Lot 4451-L - Lot 8/Blk 3 Rd. (1 km) Lot 1/Blk 20 - Lot 6/Blk 18 Rd. (1 km) National Highway –Farmlots Rd (5 kms.) Bulawen Proper - Prov. Rd Jct. (8 kms.)	Amount of funds disbursed	Accounting and audit reports	Favorable weather condition

Is the project the only input necessary to produce the output and realize the outcomes?

The answer to the first part of the question is yes. Still, we need to secure the cooperation of the community to ensure smooth operations. Needless to say, the implementation needs to be scheduled during the months when typhoons and even rains are least expected.

The answer to the second part of the question is a qualified yes. We should coordinate with agricultural and agrarian reform officials to teach the farmers planting methods for crops other than rice. An advantage of Bulawen is that it has recently been launched as an agrarian reform community (ARC). This means that the farmers will be organized and will be trained in modern farming, marketing, and management techniques. The rehabilitation of the roads will encourage the farmers to practice these new techniques.

The above analysis suggests that we do not need to add any major component to the project since the other strategies are part of the regular program of the ARC development program of the DAR and the Municipal Agriculture Officer.

ANALYZE IT THOROUGHLY

What is the forecasted demand for the project's output?

We have identified the incidence of benefits to be the following: (1) farmers, in terms of reduced transport cost, better prices for their produce; (2) traders, in terms of reduced transaction cost; (3) individuals who travel in and out of the barangay, in terms of reduced transport cost; and (4) vehicle owners and operators, in terms of reduced vehicle operating

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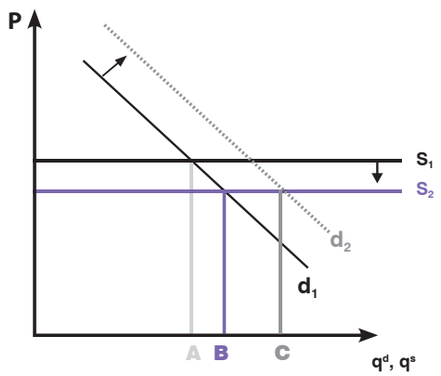
cost. Note however that these incidences are interdependent, therefore, adding them up will result in double-counting. Analyzing it further, we see that the benefits accruing to (1), (2), and (3) result from the benefits accruing to (4). Therefore, we only need to estimate (4).

To estimate the savings in vehicle operating cost, we first need to forecast the flow of traffic from the time of project completion and ten years hence. We first assume that the flow of traffic depends on each household's demand for transport services. In turn, per household demand for transport services depends on transport price, controlling for income. We then need to aggregate each household's demand to arrive at the overall demand for transport services.

For the quantitatively inclined, we illustrate the preceding by the following:

where: q^d is quantity demand
q^s is quantity supply
P is price



Let d_1 be the per capita demand for transport services and s_1 the supply curve without the project. Note that the equilibrium quantity is given by point A. For simplicity, let us assume an elastic supply curve. This means that the equilibrium price is determined from the supply side and the equilibrium quantity is determined more from the demand side. This is not without basis. In the Philippines, transport fares are heavily regulated while supply of transport, especially in the non-built up areas outside Metro Manila, is unregulated.

The road rehabilitation project will result in a secular decrease in the price of transport services, in effect shifting down the supply curve to s_2. If demand stays the same, then equilibrium quantity increases to B. However, if demand shifts upward to d_2, say due to income growth, then equilibrium quantity increases even more to point C.

We say then that the equilibrium quantity of travel (q*) depends on the price of travel (p), given the level of income (y). The change in the quantity of travel (demand) will then depend on the change in the price of travel, the change in the level of income but subject to the responsiveness of demand to changes in price and income. In mathematical form, we mean the following:

$$q^* = q\,(\,p\,;\,y\,) \qquad \text{(Equation 1)}$$

$$dq^* \quad \frac{\partial q}{\partial p}\ dp + \frac{\partial q}{\partial y}\ dy \qquad \text{(Equation 2)}$$

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Further manipulation gives the following:

$$\frac{dq^*}{q^*} \varepsilon_{qp}\, dp + \varepsilon_{qy}\, dy \qquad \text{(Equation 3)}$$

where ε_{qp} is the elasticity of demand with respect to price and ε_{qy} is the elasticity of demand with respect to income. Edillon (2000) has estimated the price elasticity of demand for transport services (ε_{qp})to be -0.7703 and the income elasticity (ε_{qy}) to be 0.5205 in the rural areas.

Now, the quantity q* is expressed in per capita terms. What we need is the aggregate quantity of travel, say, Q, which is simply the per capita demand multiplied by the total number, N, of "demanders" or persons who demand the service. We derive Q based on the following:

$$Q = q^* * N \qquad \text{(Equation 4)}$$

$$\ln Q = \ln q^* + \ln N \qquad \text{(Equation 5)}$$

$$\frac{dQ}{Q} = \frac{dq^*}{q^*} + \frac{dN}{N} \qquad \text{(Equation 6)}$$

The first quantity in (Equation 6) is the percentage change in aggregate quantity of travel, $\frac{dQ}{Q}$; the quantity $\frac{dq^*}{q^*}$ will be the result of (Equation 3); $\frac{dN}{N}$ while the quantity is simply the percentage change in population.

We therefore need estimates on percent changes in price, income, and population.

Change in price

We can assume that the price in travel will change in response to the savings in vehicle operating cost. We can then make use of the table below which is adapted from the Department of Public Works and Highways (DPWH). The figures are expressed in 2004 prices.

Table cs.2.3. Vehicle Operating Cost (in PhP per 1 kilometer)

Surface	Condition	Unit Cost per Type of Vehicle					
		car/vans	jeepneys	motorcycles	tricycles	buses	trucks
Paved	Good	5.007	4.387	1.088	2.358	16.634	7.904
	Fair	5.971	5.195	1.305	2.743	20.522	10.182
	Bad	7.383	6.859	2.126	4.207	28.015	12.764
	Very Bad	8.794	8.523	2.644	7.390	35.362	15.334

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If the roads are improved from very bad to good, then we estimate the following savings per kilometer. The corresponding percentage change is also computed:

Table cs.2.4. Savings in VOC per 1 kilometer*

Type of vehicle	car/ vans	jeepneys	motorcycles	tricycles	buses	trucks
Savings (in PhP)	3.788	4.137	1.557	5.032	18.728	7.430
% change	43.07%	48.53%	58.87%	68.09%	52.96%	48.46%

* $p_{Very\ Bad}$ *minus* p_{Good} *in Table cs.2.3*

We expect the effect of change in price to occur a bit gradually, about 50% on Year 1 and the full effect on Year 2.

Change in income

Beginning Year 1 and onto Year 10, there will be changes in quantity of travel owing to increases in income. We simulate two scenarios of forecast income. Earlier we have seen that the trend in income has been marred by crisis after another. The first scenario is based on truncated data beginning 1994. A logarithmic trend[2] is estimated, given by y:

$$y = 10606 * \ln(X) + 6297.5$$

where $X = \dfrac{\text{year} - 1982}{3}$

The forecast figures are given below:

Table cs.2.5. First Scenario of Income Growth

Year	Forecast		Year	Forecast	
	Per capita income (in PhP)	Growth rate		Per capita income (in PhP)	Growth rate
2004	27,429.21		2010	29,986.98	0.013030
2005	27,900.67	0.017188	2011	30,359.16	0.012411
2006	28,352.06	0.016178	2012	30,718.72	0.011844
2007	28,785.02	0.015271	2013	31,066.49	0.011321
2008	29,200.99	0.014451	2014	31,403.21	0.010839
2009	29,601.26	0.013708	2015	31,729.58	0.010393

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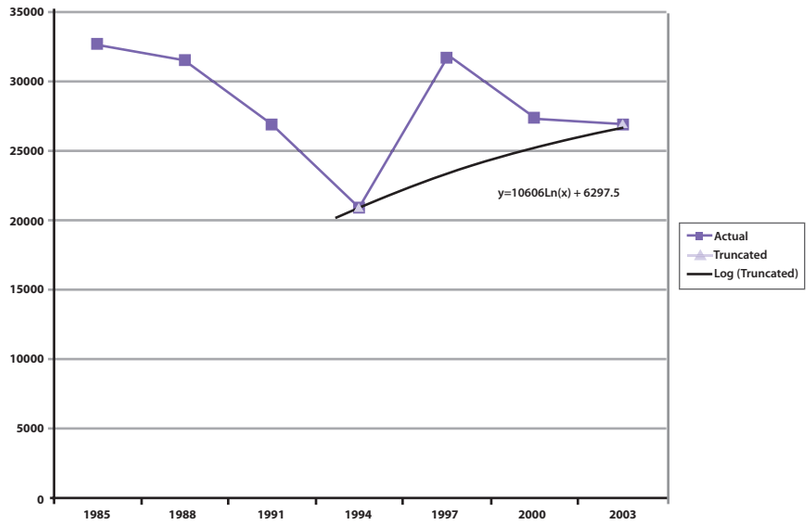

The chart above shows the actual, truncated, and forecast figures.

The second scenario, meanwhile, mimics the boom-bust cycle of economic performance. We simply use a "two-period" moving average (MA) method. Since the per capita income statistics are given in three-year lags, the "two-period" MA is actually a six-period moving average. Following are the chart and forecast figures (Table cs.2.6), respectively.[3] The single-year forecast is estimated by imputing the annualized growth rate from forecast of the corresponding three-year period.

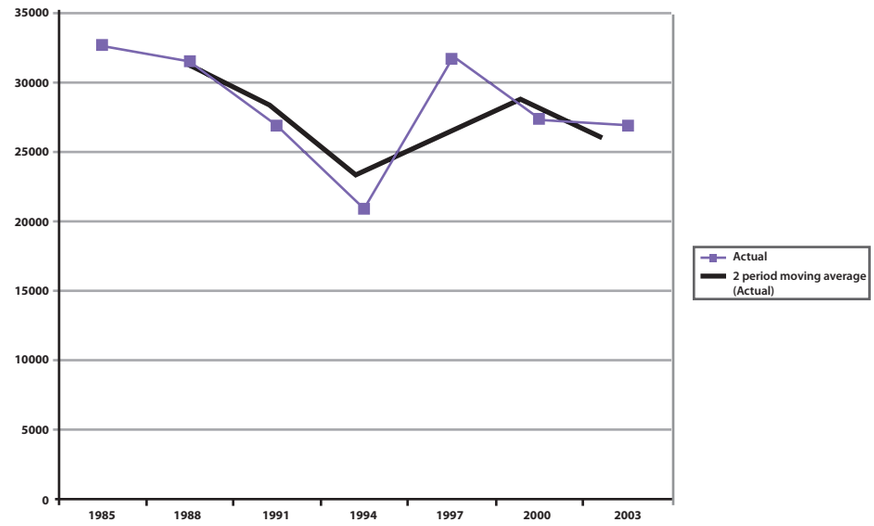

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Table cs.2.6. Second Scenario of Income Growth

Year	Forecast		Year	Forecast	
	Per capita income	Growth rate		Per capita income	Growth rate
2004	26,999.79		2010	27,047.63	0.00059
2005	27,063.22	0.0023	2011	27,063.50	0.00059
2006	27,127.02	0.0024	2012	27,079.39	0.00059
2007	27,095.21	-0.0012	2013	27,071.45	-0.00029
2008	27,063.44	-0.0012	2014	27,063.51	-0.00029
2009	27,031.77	-0.0012	2015	27,055.58	-0.00029

Change in population

NSCB (2004) reports a 2.32% average annual population growth rate for the province of Zambales between 1995 and 2000. For purposes of this case study, we will simply adopt this figure.

Why should the government provide this good?

What the above analysis tells us is that there will always be demand for the project's output. Furthermore, no private sector can be expected to provide the output, in lieu of government. A large proportion of the residents in the barangay is in agriculture, meaning that they are among the poor sectors. Since the project will facilitate trade and access to markets and facilities, it will produce greater equity in the distribution of assets.

Is the project technically feasible?

The roads have been constructed more than two decades ago. Its present bad condition is the effect of continuous neglect and not because of any unfavorable geological conditions in the area. We also do not expect any right-of-way problems since the project will rehabilitate existing roads.

How much will the project cost? Can we sustain project operations?

The project is estimated to cost PhP16 million. Routine maintenance will cost PhP50,000 per kilometer. There is a need to undertake periodic maintenance every five years, costing PhP1,069 per kilometer-traffic. The project will not earn any revenues; hence the financial analysis is simply to inform the LGU of the needed financial resources to maintain the roads in serviceable form.

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The first step is to forecast the number of vehicles expected to ply the roads. We simply assume that this increases with the increase in average annual daily traffic (AADT). The following table shows the computation pertaining to the first income growth scenario.

We recall the following formulas, the first pertaining to the change in per capita demand for transport services:

$$\frac{dq^*}{q^*} = \varepsilon_{qp}\, dp + \varepsilon_{qy}\, dy$$

and the second, pertaining to aggregate demand for transport services:

$$\frac{dQ}{Q} = \frac{dq^*}{q^*} + \frac{dN}{N}$$

These are Equations 3 and 6 above. Without the project, **dp = 0**, that is, there is no change in the price of travel. In fact, without the project, the price could even increase because of the deterioration in road quality. For purposes of the project evaluation, however, we take the conservative assumption that **dp = 0**. Therefore, the growth in demand for transport services is due only to income growth rate and population growth rate.

Table cs.2.7. Growth in Traffic Without the Project

Year	Income Growth Rate	Population Growth Rate	Change due to Income	Average Annual Daily Traffic					
				cars/ vans	jeepneys	motor-cycles	tricycles	buses	trucks
A	B*	C	D	E**	F**	G**	H**	I	J**
0	0.017188	0.0232	0.008946	1,200	2,240	5,120	112,000	-	48
1	0.016178	0.0232	0.008421	1,238	2,311	5,282	115,542	-	50
2	0.015271	0.0232	0.007949	1,277	2,383	5,446	119,141	-	51
3	0.014451	0.0232	0.007522	1,316	2,456	5,614	122,801	-	53
4	0.013708	0.0232	0.007135	1,356	2,531	5,784	126,526	-	54
5	0.013030	0.0232	0.006782	1,396	2,606	5,957	130,319	-	56
6	0.012411	0.0232	0.006460	1,438	2,684	6,134	134,185	-	58
7	0.011844	0.0232	0.006165	1,480	2,763	6,314	138,125	-	59
8	0.011321	0.0232	0.005893	1,523	2,843	6,498	142,144	-	61
9	0.010839	0.0232	0.005642	1,567	2,925	6,685	146,243	-	63
10	0.010393	0.0232	0.005410	1,612	3,009	6,877	150,427	-	64

* Refer to Table cs.2.5

** Refer to Table cs.2.1 for the average annual daily traffic at Year 0

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In the table, B and C are exogenously derived. We compute the others as follows:

$D=0.5205*B$

$E_A = E_{A-1} *(1+C_A+D_A)$

F, G,…, J are computed the same way as E. We are now ready to estimate the cost of investment and O&M.

Table cs.2.8. Project Cost (All values in PhP)

Year	Investment	Routine O&M	Periodic Maintenance	Total	PV at 12%
A	B	C	D	E=B+C+D	F=E/(1+0.12)^A
0	16,000,000.00			16,000,000.00	16,000,000.00
1		750,000.00		750,000.00	669,642.86
2		750,000.00		750,000.00	597,895.41
3		750,000.00		750,000.00	533,835.19
4		750,000.00		750,000.00	476,638.56
5		750,000.00	481,050.00	1,231,050.00	698,530.83
6		750,000.00		750,000.00	379,973.34
7		750,000.00		750,000.00	339,261.91
8		750,000.00		750,000.00	302,912.42
9		750,000.00		750,000.00	270,457.52
10		750,000.00		750,000.00	241,479.93
				TOTAL	**20,510,627.96**

	Unit	Number of Units	Unit Cost
Routine Maintenance	kilometer	15	50,000
Periodic Maintenance	kilometer-traffic	15*30	1,069

The above table implies that the LGU should be prepared to shoulder the cost of investment and O&M amounting to PhP20.5 million in present value terms over the period of 10 years. Assuming that the LGU has the means to finance this, the next question to ask is, "Is the investment worth the cost?"

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JUDGE IT FAIRLY

How much is the true benefit of the project to society?

Earlier, we mentioned that the quantifiable benefit is in terms of savings in vehicle operating cost (VOC). There is also the increased demand for transport services due to the better roads. Another offshoot of the project is the labor that will be created and skills that will be developed among workers to be hired. It is estimated that 25% of investment cost is in labor. Of the total labor requirement, 70% may be sourced from the community itself. We are then looking at a maximum of PhP2.8 million worth of jobs that can be created during project implementation.

To be sure, there are a number of non-quantifiable benefits such as the convenience to passengers and motorists, the reduced incidence of absenteeism during the rainy season, and easier access to trade and facilities. In the computation of benefits, we will be conservative and only impute the benefits as savings in VOC in the case of vehicles that are bound to use the roads, even without the project and the willingness-to-pay for additional transport service.

We need two estimates: (1) estimated traffic without the project; and (2) estimated increase in traffic due to the project.

The estimated traffic even without the project is already given in Table cs.2.7. We now compute for the VOC savings (starting year 1), assuming that on the average, a vehicle would ply six kilometers (of the total 15 kilometer road) per trip. Note again that we used Excel formula guides wherein Table cs2.7!E, for example, refers to respective values on Column E of Table cs.2.7.

Table cs.2.9. VOC Savings

Year	Savings per Type of Vehicle (in PhP)					
	car/vans	jeepneys	motorcycles	tricycles	buses	trucks
A	B= 3.788*6 *Table cs.2.7!E	C= 4.137*6* Table cs.2.7!F	D=1.557*6*Table cs.2.7!G	E=5.032*6*Table cs.2.7!H	F	G= 7.430*6*Table cs.2.7!J
0	-	-	-	-	-	-
1	28,137.26	57,363.64	49,344.44	3,488,444.06	-	2,229.00
2	29,023.66	59,150.83	50,876.53	3,597,105.07	-	2,273.58
3	29,910.05	60,962.83	52,445.99	3,707,607.79	-	2,362.74
4	30,819.17	62,824.48	54,034.13	3,820,072.99	-	2,407.32
5	31,728.29	64,686.13	55,650.29	3,934,591.25	-	2,496.48
6	32,682.86	66,622.25	57,303.83	4,051,313.52	-	2,585.64
7	33,637.44	68,583.19	58,985.39	4,170,270.00	-	2,630.22
8	34,614.74	70,568.95	60,704.32	4,291,611.65	-	2,719.38
9	35,614.78	72,604.35	62,451.27	4,415,368.66	-	2,808.54
10	36,637.54	74,689.40	64,244.93	4,541,691.98	-	2,853.12

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Next, we need the estimated increase in traffic due to the project, then the estimated benefits, expressed as willingness-to-pay for the road. We impute the latter as the VOC for good roads.

Table cs.2.10. Estimated Traffic With the Project

Year	Income growth rate	Population growth rate	Change due to Income	Change due to improved road conditions						Change due to improved road conditions					
				cars/vans	jeepneys	motorcycles	tricycles	buses	truck	cars/ vans	jeepneys	motorcycles	tricycles	buses	truck
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
0	0.017188	0.0232	0.008946							1,200	2,240	5,120	112,000	-	48
1	0.016178	0.0232	0.008421	0.331768	0.373827	0.453476	0.524497	0.407951	0.373287	1,636	3,148	7,604	174,285	-	67
2	0.015271	0.0232	0.007949	0	0	0	0	0	0	1,688	3,248	7,844	179,796	-	70
3	0.014451	0.0232	0.007522	0	0	0	0	0	0	1,741	3,351	8,092	185,482	-	72
4	0.013708	0.0232	0.007135	0	0	0	0	0	0	1,796	3,456	8,348	191,347	-	74
5	0.013030	0.0232	0.006782	0	0	0	0	0	0	1,853	3,566	8,612	197,397	-	76
6	0.012411	0.0232	0.006460	0	0	0	0	0	0	1,912	3,679	8,884	203,639	-	79
7	0.011844	0.0232	0.006165	0	0	0	0	0	0	1,972	3,795	9,165	210,078	-	81
8	0.011321	0.0232	0.005893	0	0	0	0	0	0	2,034	3,915	9,455	216,721	-	84
9	0.010839	0.0232	0.005642	0	0	0	0	0	0	2,099	4,039	9,754	223,574	-	87
10	0.010393	0.0232	0.005410	0	0	0	0	0	0	2,165	4,166	10,063	230,644	-	89

Notes:

B, C, and D are the same figures in Table cs.2.7, wherein D was computed by multiplying B with the estimated income elasticity of demand ($\mathcal{E}_{qy}$ = 0.5205).

E at year 1 is equal to 43.07% (see Table cs.2.4. Savings in VOC) multiplied by the estimated price elasticity of demand ($\mathcal{E}_{qp}$ = -0.7703)
F, G, H, I, and J are computed the same way as E

$K_A = K_{A-1} * (1+C+D+E)$
L, M, N, O, and P are computed the same way as K

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Table cs.2.11. Growth in Traffic Due to the Project

Year	car/vans	jeepneys	motorcycles	tricycles	buses	trucks
A	B=(Table cs.2.10!K)-(Table cs.2.7!E)	C=(Table cs.2.10!K)-(Table cs.2.7!E)	D=(Table cs.2.10!K)-(Table cs.2.7!E)	E=(Table cs.2.10!K)-(Table cs.2.7!E)	F	G=(Table cs.2.10!K)-(Table cs.2.7!E)
0	-	-	-	-	-	-
1	398	837	2,322	58,743	-	17
2	411	865	2,398	60,655	-	19
3	425	895	2,478	62,681	-	19
4	440	925	2,564	64,821	-	20
5	457	960	2,655	67,078	-	20
6	474	995	2,750	69,454	-	21
7	492	1,032	2,851	71,953	-	22
8	511	1,072	2,957	74,577	-	23
9	532	1,114	3,069	77,331	-	24
10	553	1,157	3,186	80,217	-	25

The aggregate willingness-to-pay for good roads is equal to the estimated VOC cost for good roads multiplied by the increased traffic due to the project, again assuming utilization of an average of six kilometers per vehicle per trip.

Table cs.2.12. Aggregate Willingness-to-Pay

Year	VOC (good road) Due to Growth in Traffic (in PhP)					
	car/vans	jeepneys	motorcycles	tricycles	buses	trucks
A	B=5.007*6* Table cs.2.11!B	C=4.387*6* Table cs.2.11!C	D=1.088*6* Table cs.2.11!D	E=2.358*6* Table cs.2.11!E	F=16.634*6* Table cs.2.11!F	G=7.904*6* Table cs.2.11!G
0	-	-	-	-	-	-
1	11,956.72	22,031.51	15,158.02	840,612.33	-	806.21
2	12,347.26	22,768.53	15,654.14	867,973.05	-	901.06
3	12,767.85	23,558.19	16,176.38	896,965.11	-	901.06
4	13,218.48	24,347.85	16,737.79	927,588.51	-	948.48
5	13,729.19	25,269.12	17,331.84	959,886.18	-	948.48
6	14,239.91	26,190.39	17,952.00	993,886.74	-	995.90
7	14,780.66	27,164.30	18,611.33	1,029,647.43	-	1,043.33
8	15,351.46	28,217.18	19,303.30	1,067,196.87	-	1,090.75
9	15,982.34	29,322.71	20,034.43	1,106,606.61	-	1,138.18
10	16,613.23	30,454.55	20,798.21	1,147,905.27	-	1,185.60

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Now, we need to express the total benefits in economic prices. We assume that 60% for the vehicle operating cost is tradeable (fuel, spare parts) and a foreign exchange premium of 1.2. We then arrive at a conversion factor of 1.12 = 0.6*1.2 + 0.4*1.

Table cs.2.13. Total Economic Benefits (All values in PhP)

Year	car/vans	jeepneys	motor-cycles	tricycles	buses	trucks	Total Economic Benefits
A	B=Table cs.2.9!B +Table cs.2.12!B	C=Table cs.2.9!C +Table cs.2.12!C	D=Table cs.2.9!D +Table cs.2.12!E	E=Table cs.2.9!E +Table cs.2.12!E	F	G=Table cs.2.9!G +Table cs.2.12!G	H=(B+C+D+ E+F+G)*1.12
0	-	-	-	-	-	-	-
1	40,093.98	79,395.15	64,502.46	4,329,056.39	-	3,035.21	5,058,013.17
2	41,370.92	81,919.36	66,530.67	4,465,078.12	-	3,174.64	5,217,042.56
3	42,677.90	84,521.02	68,622.37	4,604,572.90	-	3,263.80	5,380,096.95
4	44,037.65	87,172.33	70,771.92	4,747,661.50	-	3,355.80	5,547,359.10
5	45,457.48	89,955.25	72,982.13	4,894,477.43	-	3,444.96	5,719,075.32
6	46,922.77	92,812.64	75,255.83	5,045,200.26	-	3,581.54	5,895,425.80
7	48,418.10	95,747.49	77,596.72	5,199,917.43	-	3,673.55	6,076,395.68
8	49,966.20	98,786.13	80,007.62	5,358,808.52	-	3,810.13	6,262,344.03
9	51,597.12	101,927.06	82,485.70	5,521,975.27	-	3,946.72	6,453,363.69
10	53,250.77	105,143.95	85,043.14	5,689,597.25	-	4,038.72	6,649,522.69

How much is the true cost of the project to society?

Previous road projects have the following cost breakdown. We apply the foreign exchange premium of 1.2 for the tradeable component (foreign). The economic cost of labor is equal to 60% the prevailing wage rate. We then arrive at a conversion factor of 1.03. We assume that the maintenance works follow the same cost breakdown.

Table cs.2.14. Economic Cost

Input		Factor		Financial Cost (in PhP)		ECF	Economic Cost (in PhP)
Materials		40%		6,400,000.00			
	Local		40%		2,560,000.00	1	2,560,000.00
	Foreign		60%		3,840,000.00	1.2	4,608,000.00
Equipment		35%		5,600,000.00			
	Local		25%		1,400,000.00	1	1,400,000.00
	Foreign		75%		4,200,000.00	1.2	5,040,000.00
Labor		25%		4,000,000.00			
	Skilled		30%		1,200,000.00	1	1,200,000.00
	Unskilled		70%		2,800,000.00	0.6	1,680,000.00
TOTAL				16,000,000.00	16,000,000.00		16,488,000.00

Memo: CSCF (EP/FP) = 1.03

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Following is the table showing the expected project cost per year expressed in financial and economic prices:

Table cs.2.15. Total Project Cost (All values in PhP)

Year	Using Financial Price	Using Economic Price	PV at 15%
A	B=Table cs.2.8!E	C=B*1.03	D=C/(1+0.15)^A
0	16,000,000.00	16,480,000.00	16,480,000.00
1	750,000.00	772,500.00	671,739.13
2	750,000.00	772,500.00	584,120.98
3	750,000.00	772,500.00	507,931.29
4	750,000.00	772,500.00	441,679.38
5	1,231,050.00	1,267,981.50	630,410.90
6	750,000.00	772,500.00	333,973.07
7	750,000.00	772,500.00	290,411.36
8	750,000.00	772,500.00	252,531.62
9	750,000.00	772,500.00	219,592.71
10	750,000.00	772,500.00	190,950.19
		TOTAL	20,603,340.64

How do the true benefits and true cost compare against each other?

Now, we need to put together the tables on economic benefits and economic costs.

Table cs.2.16. Economic Analysis (All values in PhP)

Year	Project Cost			Net Economic Benefits			Benefits less Cost	
	Using Financial Price	Using Economic Price	PV at 15%	Undiscounted	Using Economic Price	PV at 15%	Undiscounted	PV at 15%
A	B=Table cs.2.15!B	C=Table cs.2.15!C	D=Table cs.2.15!D	E=Table cs.2.13!H/1.12	F=Table cs.2.13!H	G=F/(1+0.15)^A	H=F-C	I=H/(1+0.15)^A
0	16,000,000.00	16,480,000.00	16,480,000.00	-	-	-	(16,480,000.00)	(16,480,000.00)
1	750,000.00	772,500.00	671,739.13	4,516,083.19	5,058,013.17	4,398,272.32	4,285,513.17	3,726,533.19
2	750,000.00	772,500.00	584,120.98	4,658,073.71	5,217,042.56	3,944,833.69	4,444,542.56	3,360,712.71
3	750,000.00	772,500.00	507,931.29	4,803,657.99	5,380,096.95	3,537,501.08	4,607,596.95	3,029,569.79
4	750,000.00	772,500.00	441,679.38	4,952,999.20	5,547,359.10	3,171,720.57	4,774,859.10	2,730,041.19
5	1,231,050.00	1,267,981.50	630,410.90	5,106,317.25	5,719,075.32	2,843,391.20	4,451,093.82	2,212,980.29
6	750,000.00	772,500.00	333,973.07	5,263,773.04	5,895,425.80	2,548,755.26	5,122,925.80	2,214,782.20
7	750,000.00	772,500.00	290,411.36	5,425,353.29	6,076,395.68	2,284,342.21	5,303,895.68	1,993,930.84
8	750,000.00	772,500.00	252,531.62	5,591,378.60	6,262,344.03	2,047,171.37	5,489,844.03	1,794,639.75
9	750,000.00	772,500.00	219,592.71	5,761,931.87	6,453,363.69	1,834,448.73	5,680,863.69	1,614,856.01
10	750,000.00	772,500.00	190,950.19	5,937,073.83	6,649,522.69	1,643,660.31	5,877,022.69	1,452,710.13
TOTAL			20,603,340.64			28,254,096.74	**EIRR**	26%
							NPV	7,650,756.10

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We see now that the proposed project is economically viable. It yields a NPV of 7.65 million. The estimated EIRR of 26% is way above the social discount rate, presently pegged at 15%.

Table cs.2.17. Sensitivity Analysis

% Change	Increase in Cost		Decrease in Benefits		Increase in cost and Decrease in Benefits	
	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR	NPV (in PhP)	EIRR
10%	5,590,422.04	22.21%	4,825,346.43	21.86%	2,765,012.37	18.66%
20%	3,530,087.98	19.26%	1,999,936.76	17.92%	(2,120,731.37)	12.30%
30%	1,469,753.92	16.67%	(825,472.92)	13.75%		
40%	(590,580.15)	14.37%				
50%						
60%						
70%						
80%						
90%						
100%						

Will the project still be economically viable given reasonable departures from the assumptions?

The sensitivity analysis shows that the economic viability of the project is compromised more with decreases in benefits than with increases in cost. In fact, it can admit about 40% escalation of prices, but only less than 30% decrease in benefits. If the two deviations occur simultaneously, we find that the project is no longer economically viable with departures around 20%.

We then need to ensure the benefit stream. This means proper O&M so that the road remains in good condition.

Implicit in the computation of the benefit stream is the assumption on income growth rate. It would be of interest to find out just how sensitive the economic viability of the project is using a less "rosy" income growth forecast. Recall the second income growth scenario where a two-period moving average extrapolation methodology was used.

$$\hat{Y}_T = \frac{Y_T + Y_{T-1}}{2}$$

where $\hat{Y}_T$ is the forecast per capita income at year T, Y_T and Y_{T-1} are the actual figures at years T and T-1, respectively. The years coincide with the three-year interval of the FIES. We do straight line interpolation for the in-between FIES years.

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In the table below, we show the comparison between economic cost and economic benefits:

Table cs.2.18: Economic Analysis using Second Income Growth Scenario (All values in PhP)

Year	Project Cost			Net Economic Benefits			Benefits less Cost	
	Using Financial Price	Using Economic Price	PV at 15%	Undiscounted	Using Economic Price	PV at 15%	Undiscounted	PV at 15%
A	B	C=B*1.03	D=C/(1+0.15)^A	E	F=E*1.12	G=F/(1+0.15)^A	H=F-C	I=H/(1+0.15)6A
0	16,000,000.00	16,480,000.00	16,480,000.00	-	-	-	(16,480,000.00)	(16,480,000.00)
1	750,000.00	772,500.00	671,739.13	4,480,137.76	5,017,754.29	4,363,264.60	4,245,254.29	3,691,525.47
2	750,000.00	772,500.00	584,120.98	4,581,278.66	5,131,032.10	3,879,797.43	4,358,532.10	3,295,676.44
3	750,000.00	772,500.00	507,931.29	4,684,702.86	5,246,867.20	3,449,900.35	4,474,367.20	2,941,969.06
4	750,000.00	772,500.00	441,679.38	4,796,314.03	5,371,871.71	3,071,385.09	4,599,371.71	2,629,705.70
5	1,231,050.00	1,267,981.50	630,410.90	4,909,061.44	5,498,148.81	2,733,551.68	4,230,167.31	2,103,140.77
6	750,000.00	772,500.00	333,973.07	5,024,459.21	5,627,394.32	2,432,877.86	4,854,894.32	2,098,904.79
7	750,000.00	772,500.00	290,411.36	5,140,268.25	5,757,100.44	2,164,307.30	4,984,600.44	1,873,895.93
8	750,000.00	772,500.00	252,531.62	5,258,746.57	5,889,796.16	1,925,384.81	5,117,296.16	1,672,853.19
9	750,000.00	772,500.00	219,592.71	5,379,955.71	6,025,550.40	1,712,837.49	5,253,050.40	1,493,244,78
10	750,000.00	772,500.00	190,950.19	5,505,182.32	6,165,804.20	1,524,092.50	5,393,304.20	1,333,142.31
	TOTAL	20,603,340.64				27,257,399.10	**EIRR**	24%
							NPV	6,654,058.46

We see now that a less rosy profile of income growth will not render the project non-viable, in terms of economic costs and economic benefits.

Recall that the sensitivity analysis (Table cs.2.17) shows that the project is more sensitive to decreases in benefits than to increases in costs. Taking these two results together, we conclude that the project's economic viability is more sensitive to decreases in VOC savings, rather than to less income growth.

SUMMARIZE THE ANALYSIS

In conclusion, we endorse the proposed road rehabilitation project. It is important that the proper O&M be implemented after the project is completed. We may even ask the municipal LGU to take on the O&M as its counterpart. The provincial LGU will need to monitor the road and make sure it is kept in good condition, in order to keep it viable.

To maximize the benefits from the good roads, we need to coordinate efforts with the Municipal Agriculturist's Office (MAO), Municipal and Provincial Agrarian Reform Office (M/PARO), and the Department of Trade Industry (DTI) officials to improve the land productivity of Bulawen. We also need to integrate their programs for Bulawen together with the Municipal Development Plan of Palauig with the programs and development plans in the nearby towns.

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ENDNOTES

[1]Strictly speaking, the FIES is representative only at the regional level. However, the FIES is, by far, the best basis we have in estimating per capita income.
[2]Author's estimate based on FIES 2000 version 3.
[3]Author's estimate based on FIES 2000 version 3.

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Technical Appendix

principles, concepts & techniques

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principles, concepts & techniques

This technical appendix discusses in some detail the principles and concepts behind the PED procedures. In order to provide the basis for these principles and concepts, we review the role of projects in development and then cross-reference this with the role of government in development.

There are many references on project evaluation and development.[1] This Technical Appendix is not meant to repeat nor replace these references, but rather to emphasize the major issues in Project Evaluation and Development. We begin with (a) an overview of the major components involved in PED, followed by discussions on (b) a typology of goods and services, (c) the causes of distortions, (d) the role of government, (e) the role of projects in development, and (f) techniques in project evaluation.

A. MAJOR COMPONENTS INVOLVED IN PROJECT EVALUATION AND DEVELOPMENT

Books or manuals on how to conduct a feasibility study provide useful references for PED. A feasibility study pertains to a whole gamut of analyses undertaken to determine if the project is worth pursuing or not. The usual broad classification (or sub-studies are) is the following:

- Market analysis
- Technical analysis
- Financial analysis
- Economic analysis
- Analysis of externalities
- Risk and sensitivity analysis

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We enumerate below the questions that should be resolved by these studies/analyses. The questions have been adapted to explicitly consider that the projects being evaluated are to be undertaken by government.

1. Market analysis answers the questions:

1.1. Does the current situation imply that there is a shortage in supply of the project's intended output?
1.2. Is there a demand for the project's output even in the medium term (say 10 years)?
1.3. If I charge a fee for the use of the project's output, by how much will demand likely decrease?

2. Technical analysis answers the questions:

2.1. Is the proposed project strategy technically sound?
2.2. What are the alternatives to produce the desired project outputs?
2.3. Is the proposed project strategy the most cost-effective among the alternatives identified?

3. Financial analysis answers the questions:

3.1. How much does the project cost?
3.2. How much does it cost to operate and maintain the project so that it will be useful?
3.3. If the project can generate revenue, how much is the projected revenue?
3.4. If the project cannot generate revenue, how much is the required subsidy to operate and maintain the project?
3.5. What is the financial internal rate of return? (See Part 2-2.13.)

4. Economic analysis answers the questions:

4.1. How much is the true cost of the project to society (economic cost)?
4.2. How much is the true benefit of the project's output to society (economic benefit)?
4.3. How do these economic costs compare with the economic benefits?

5. Assessment of externalities answers the questions:

5.1. Will any of the project's activities and outputs pose a hazard to the environment?
5.2. What are the potential risks to other people's health, lives, and property?
5.3. What is the likelihood of these potential hazards?
5.4. How can these hazards be mitigated and if possible, prevented?
5.5. How much is the cost of mitigation and/or prevention?

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5.6. Will any of the project's activity and output generate benefits even to the unintended beneficiaries of the project?

6. Risk and sensitivity analysis answers the questions:

6.1. Will the project still be financially viable if there are deviations in input and output costs, including the possibility of time overrun?
6.2. Will the project still be economically viable if there are deviations in input and output costs, including the possibility of time overrun?

B. TYPOLOGY OF GOODS AND SERVICES

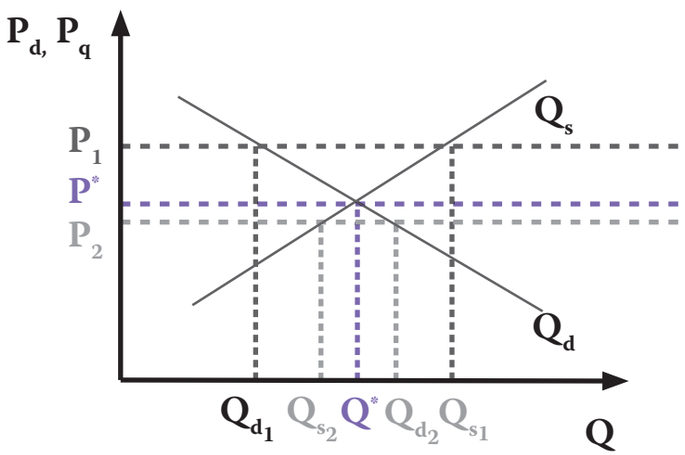
PED of public projects differs from that of private projects in one important aspect – the project will produce public goods. We now discuss the typology of goods, specifically the properties that distinguish private from public goods.

1. The Role of Prices

The ideal world is one where each individual possesses skills and can tap resources needed to produce a good or service that somebody else demands. The question that immediately comes to mind is, "How does one know what and how much to produce?"

In the ideal world, the price embodies this information. If somebody is willing to pay for the good, then there is a demand for the good.

- If the demand for the good is lesser than the supply, say Q_{d1} vs. Q_{s1}, then the price is bidded down, say from P_1 to P*.
- If the demand for the good is higher than the supply, say Q_{d2} vs. Q_{s2}, then price is bidded up, say from P_2 to P*.
- The price and output adjust until they reach an equilibrium price, P*, where supply equals demand, Q*.



2. Private vs. Public Goods

Goods and services are classified according to whether or not there is rivalry in consumption and whether enjoyment of benefits is excludable or not.

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2.1. If the consumption of an individual prevents another from consuming the good, we say there is rivalry in consumption. This is true of most marketed goods where only the person who bought the good can consume the good. Examples are softdrinks, sandwiches, and clothes. Some counter-examples are clean air, beautiful scenery, highway driving (up to a point), and swimming in an Olympic-size pool (up to a point),

2.2. The exclusion principle is where enjoyment of the good is exclusive to a particular consumer (say, one who paid for it). We can cite the same examples as before – drinking soda, eating a sandwich, taking vitamins, and studying computer courses. Some counter-examples are peace and order, watershed management, and national defense.

2.3. On the basis of these two characteristics – rivalry in consumption and exclusion – we can classify goods and services into four:

Consumption is	Enjoyment of good or service is	
	Exclusive	Non-exclusive
Rival	Private goods	Common resource
Non-rival	Toll goods	Public goods

From the above table, we see that:

2.3.1. Private goods are those for which consumption is rival and enjoyment of the good is exclusive to the person who bought the good. In such cases, the market mechanism works to determine what and how much to produce.

2.3.2. On the other extreme is the public good. Immediately, we see the inherent problem in dealing with public goods – consumption is non-rival and enjoyment of the good is non-exclusive, meaning that even those who do not pay for the good can consume it and enjoy its benefits. Thus, it is difficult to "price" a public good. There is always an incentive to free-ride because once it is provided, everyone who wishes can enjoy the benefits of the good. Consumption cannot even be limited to diligent taxpayers.

2.3.3. Toll goods fall somewhere in between. The enjoyment of the good can be made exclusive, but up to a point, consumption is non-rival. A good example is the case of toll roads. Only those who pay the toll can enjoy the good, but it does not affect one motorist if there is another motorist using the highway (up to a point).

2.3.4. Another intermediate classification is the common resource good. The best example is a park. If somebody sets up a table on one portion of the park, no other person can set up in that portion. However, enjoyment of the park is not exclusive and there are other portions of the park where somebody can set up a table and still enjoy the park.

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2.4. In the case of private goods and when there are no distortions in the market, the market price reveals the consumer's willingness-to-pay for the good or service. This is also referred to as the economic value of the project's good or service. By the same token, the supply price indicates the economic cost of the good or service that will be required by the project, in the absence of market distortions.

3. Tradeable vs. Nontradeable goods

3.1. In project evaluation, we are particular about the classification of the good according to its tradeability. Some project outputs will find its way into the market of goods and services. These goods (or services) are mobile and can be traded in the market, even with the rest of the world given certain conditions. Strictly speaking, we are more concerned about tradeability in the international market. This limiting definition is what we mean when we say tradeable goods.

3.2. The tradeable good may be exported or act as an import substitute. A good indication is the statistics on external trade released by the NSO. This information can be downloaded from their webpage at http://www.census.gov.ph.

3.3. A good that is exported means that domestic supply is already higher than domestic demand. Another explanation is that the domestic price (which includes production cost) is lower than the freight on board (FOB) price of the good at the border. Even if the good produced in the province will not find its way to the international ports, it will most probably increase the volume (or quantity) of goods being exported.

3.4. If we are importing a good, then it must be the case that domestic supply is less than domestic demand. Also, the cost, insurance, and freight (CIF) price of the good at the border is most probably lower than the domestic price. When the producer produces an import substitute, the immediate effect is to increase domestic supply. If demand remains the same, then the price of the good is reduced. Eventually, the volume (or quantity) of the good that is being imported is reduced.

3.5. Caution must be exercised in the case of goods that are nontradeable. These may be goods that spoil easily or have very short shelf-life. Actually, post-processing and proper packaging may solve this problem. The more defining reason that makes a good nontradeable is still restriction in international trade mostly in the form of quotas or very high tariff rates. In the Philippines, the example that readily comes to mind is rice.[2]

3.6. Meanwhile, some goods make use of other goods that are tradeable for its production. We then need to specify the proportion of this tradeable intermediate good that went into

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the production of the final good. One good example is land transport. The service is not tradeable but it uses fuel, which is tradeable, as a major input for production.

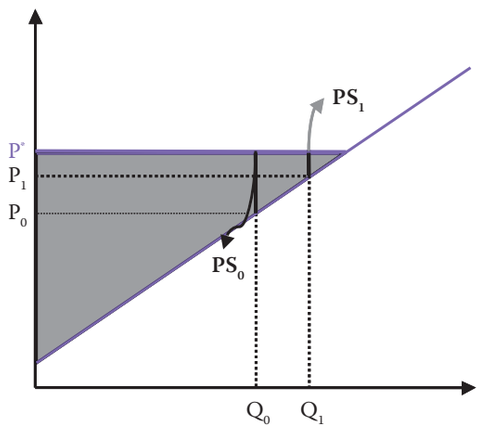
4. Producer Surplus and Consumer Surplus

4.1. Aggregate Supply Curve and Producers' Surplus

4.1.1. The supply curve plots the relationship between price and the quantity that suppliers are willing to produce of the good. It is logical to think of the supply curve as upward-sloping. This means as price of the good increases, the more will be produced of the good. If we are talking about many suppliers, then we say that more suppliers will be encouraged to produce the good.

4.1.2. The aggregate supply curve simply sums up all these "willingness-to-produce" information – price and corresponding quantity – across all suppliers. Consider the following illustration of an aggregate supply curve:

- Producer 0 is willing to supply the Q_{0th} unit at the price P_0; producer 1 is willing to supply the Q_{1st} unit at the price P_1.
- Now, suppose the market price is P^*. This means that producer 0 is able to generate a surplus equal to PS_0 and producer 1 is able to generate a surplus equal to PS_1.
- We can sum these surpluses across all producers and we arrive at the shaded triangle in the chart. This shaded triangle is what we call the producers' surplus.



4.2. Aggregate Demand and Consumers' Surplus

4.2.1. The aggregate demand curve illustrates the relationship between the price of a good and the quantity demanded of the good across all possible consumers, given the same income, household composition, preferences, etc. Normally, we expect the relationship to be negative, that is, the more expensive the good, the less will be demanded of the good. Similarly, the less expensive the good is, the more will be demanded of it. In other words, the aggregate demand curve is downward sloping.

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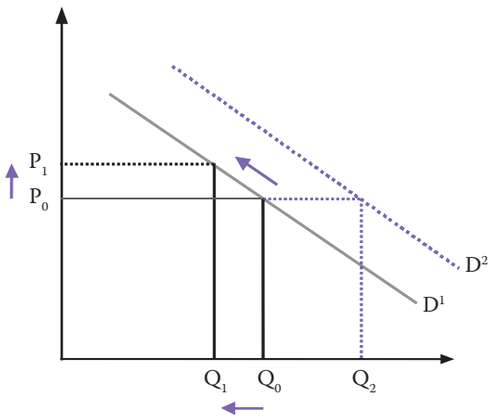
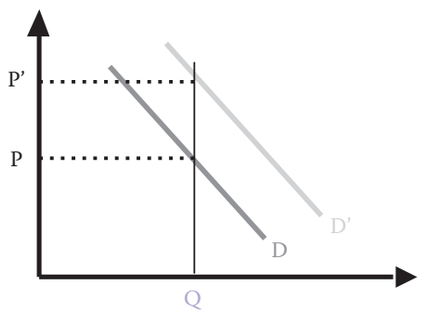
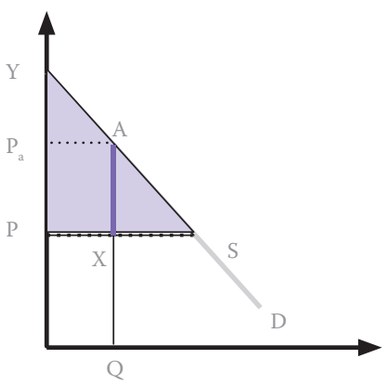
4.2.2. Now, this demand curve is drawn for a given quality of the good and a given type of consumers (e.g., characterized by income and preferences). When we speak of the aggregate demand curve, another important factor to consider is the population growth. These other factors (i.e., quality, income, preferences, and population) shift the demand curve in or out. In the chart, suppose income increased then we see that at the old price P_0, quantity demanded increases to Q_2.



4.2.3. In the graph below, D shifts out to D' when there is a general increase in real incomes. Consumers are willing to pay a higher price, P', for the same quantity demanded, Q_2.



4.2.4. Now, consider the following graph depicting the demand curve for a good.



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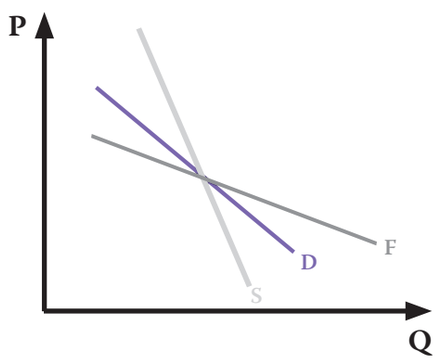
Consider Consumer A whose demand is represented by the point A on the graph. We observe the following:

- He is the Q^{th} consumer and is willing to buy the good at the price P_a.
- Now, if the selling price is P, this means that for Consumer A, he has the additional benefit of enjoying the good without having to pay the full amount of his willingness-to-pay.
- This additional benefit is given by the line segment XA.
- Now, since the demand curve represents the demand of each and every consumer, and the vertical lines from the curve to the P line, the additional benefit corresponding to each consumer, the additional benefit enjoyed by the entire society is given by the area covered by the lines PYS. This is what we call the aggregate consumer surplus.

4.2.5. We can characterize the demand for a good depending on how sensitive it is to changes in prices. When there is an increase in the price of the product, we expect demand to fall as a result.

- If demand is inelastic (drawn as the steeper demand curve S), the percentage reduction in demand will be less than the percentage increase in the price.
- If the demand is elastic (drawn as the flatter demand curve F), the percentage reduction in demand will be more than the percentage increase in the price.
- If the demand is unitary elastic (drawn as the demand curve D), quantity demanded is reduced on a one-for-one (in percentage terms).



In general, we expect demand for necessities to be inelastic with respect to prices. Demand for "habit-forming" goods like cigarettes and alcohol, for example, is also expected to be inelastic. In contrast, demand for luxuries such as jewelry is expected to be elastic with respect to prices.

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C. WHAT CAUSES DISTORTIONS?

Markets for Goods and Services

Each good or service is being transacted in a market. Examples are the rice market, shoe market, and poultry market. Conceptually, we define the market as the place where the demanders of the good transact business with the suppliers of the good. A successful transaction is concluded with a sale.

For simplicity, we classify these markets according to the major groups – land market, labor market, capital market, goods market, and service market. When the demanders of the good are in close contact with the suppliers of the good, there is a good chance of easily concluding the transaction. Prices can be bidded up or down as necessary to reach the equilibrium. In this case, we say that the bid price gives sufficient information as to whether supply is greater than demand or demand is greater than supply.

1. High transaction costs introduce distortions in the market.

1.1. Consider the case where the supplier of the good does not have accurate information about the demander of the good. In this case, there is a middleman who, at the very least, knows where to market which product. The price now contains not just the demand or supply price but also the transaction cost.

1.2. There can even be the extreme case where the middleman exploits the situation so that the demander of the good pays a very high price but the supplier receives a very low price and the trader pockets the difference.

1.3. Because of the very high price faced by the consumer, he is willing to buy only a small quantity. If the price were lower, he would have bought more. Meanwhile, because of the very low price received by the supplier, he is willing to sell only a small quantity. If he received the higher price, he would have produced more of the good.

1.4. Note that the equilibrium is still attained but at a less desirable level.

1.5. In general, the proxy we use to measure transaction cost is the cost of transport and handling.

2. Value added and sales taxes also introduce distortions.

2.1. The consumers buy the good at its supply price plus the tax, but the producer receives only the supply price.

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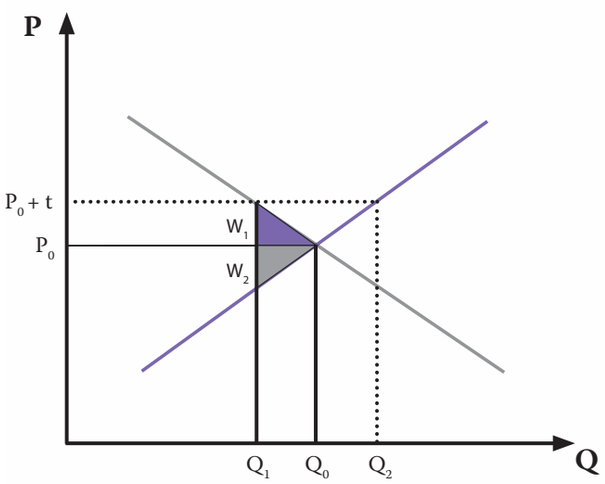
2.2. In technical jargon, we call this distortion a "wedge". Consider the following chart:

2.2.1. At the equilibrium price P_0, suppliers are willing to sell Q_0 of the good. The imposition of the tax pushes up to the price to P_0+t. At this level, consumers are only willing to buy Q_1 of the good.



2.2.2. Now, producers only receive P_0 for their good (even though consumers paid P_0+t). They would have been willing to supply Q_0 of the good but this can no longer be absorbed by the market. In fact, if all of P_0+t were paid to the suppliers, they would have been willing to sell Q_2 of the good.

2.2.3. We see that the tax has distorted the information on the demand and supply of the good. In other words, it drove a wedge between the equilibrium condition and what will be resulting transaction with the imposition of the tax. This is illustrated in the chart by the triangle W_1. The distortion resulting from the tax is given by the sum of the two triangles – W_1 and W_2. The W_1 represents the distortion on the demand side while the W_2 shows the distortion on the supply side.

3. Income tax also introduces distortion in the labor market, as do minimum wage laws.

3.1. The employer pays the worker his wages, gross of taxes, but the worker receives only his wages, net of taxes. The higher price of labor results in demanders willing to buy less labor. Meanwhile, the lower wages received by labor results in suppliers willing to sell less labor.

3.2. Theoretically, labor should be paid according to the value of its marginal product. Minimum wage laws, however, stipulate that labor cannot be paid at less than the minimum wage regardless of the value of its marginal product. This distortion is manifested, in a way, in high unemployment rates.

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4. Subsidies also distort the market.

For instance, this is the great debate concerning farm subsidies extended by developed countries to their agricultural sector. The price support mechanism means that producers are willing to produce more of the good, possibly more than is demanded of the good. If all these are sold in the market, the prices will be depressed making it difficult for government to maintain the producer's subsidy. The alternative is to export the excess supply. The importing country will enjoy the advantage of the lower price, but at the expense of domestic producers who have to supply the good at non-subsidized levels.

D. ROLE OF GOVERNMENT

The reality is that there are obstacles to the free flow of information and to the ease of transacting in the market. The role of government is to address these imperfections through the following:

1. Ensure macroeconomic stability

If there is excessive investment in an industry or sector (more than is demanded by society), then the additional output can be sold only at a very low price or not at all. The situation can be so severe as to result in labor retrenchment and factory shutdown. There may also be substantial time lag before the excess labor finds work again.

2. Encourage efficiency

If individuals and firms are able to produce goods efficiently, then the cost of production is lower. With perfect competition, these goods can then be sold at a lower price.

In the case of public goods, as discussed above, we know that the market mechanism will not be able to provide these goods and services. At best, the provision will not be at an efficient level. The role of government is clearly to provide these public goods and services. This role is also in line with the objective of encouraging efficiency.

3. Promote equity

Severe income inequality can lead to social discord. There are government policies that address this, one of which is pro-poor economic growth. A specific policy would be to present progressiveness in our taxation so that the burden would lie more on the wealthy.

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ILLUSTRATION

Consider child immunization. Consumption is rival but enjoyment of the benefits of immunization is not limited to those who received the vaccine. It has been said that certain viruses need a critical mass in order to survive. Once a person with a built-up defense system (due to the immunization) contracts a virus, the virus dies. In other words, there is externality to ensuring that a substantial proportion of the population, or if possible, all, receive the vaccine in order to altogether eliminate the disease. Clearly, there is rationale for government to embark on a massive immunization campaign - reduce the cost of the vaccine and even aggressively seek out the clients/subjects.

E. ROLE OF PROJECTS IN DEVELOPMENT

Projects are catalysts of development.

Ultimately, it is the behavior of individuals, families, and firms that define the development path of society. However, there can be conditions that constrain them from behaving optimally. There may be hindrances to the free flow of information. For instance, the point of demand may be too far removed from the point of supply resulting in high transaction costs. The role of projects is to address these constraints, say, to bridge this gap.

There may also be cases where the development path is less than desired by society. Private investments may be slow in coming. If carefully selected and properly implemented, government projects can redirect this development path. For instance, projects that beautify the landscape of a province will encourage tourism and private investment in hotels. Provinces endowed with a good harbor may invest in a modern port. This will increase the mobility of goods, especially cargo, and will spur trade in the province. The province may even serve as a hub.

F. TECHNIQUES USED IN PROJECT EVALUATION

1. Logical Framework Analysis

The most useful tool to justify the project in the context of the developmental goals of the province is to use logical framework analysis.

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1.1. Logframe Perspective

The logframe is based on the following management perspectives:

1.1.1. It is results-oriented.
1.1.2. It employs the basic scientific method in analysis.
1.1.3. It adopts a systems approach.
1.1.4. It serves as a contract between and among the project proponent, the funder and the intended beneficiaries.

1.2. Components of a Logframe

The logframe models the project in matrix form:

1.2.1. clearly specifying the goal of the sector to which the project belongs,
1.2.2. the expected impact of the project that will contribute to meeting this goal,
1.2.3. the project's outputs that will support the project's purpose and will result in the expected impact, and
1.2.4. the project's inputs or activities that are needed to produce the output.
1.2.5. Important assumptions are stated, and
1.2.6. a list of verifiable indicators of success is given,
1.2.7. together with the proposed strategy to measure accomplishment.

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Key Assumptions and Risks
Goal			
Purpose			
Outputs			
Activities			

1.3. Core Concept – CAUSE and EFFECT

These are the "necessary conditions" line of reasoning. Broadly, this concept says that if the CAUSE is present, then the result is the EFFECT. Corresponding to the components (working our way up the rows of Column 1), we mean:

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1.3.1. If ACTIVITIES are undertaken with the inputs provided, then OUTPUTS will be produced. That is, the ACTIVITIES with the inputs are necessary conditions to produce the OUTPUTS.

1.3.2. If OUTPUTS are produced, then the project's PURPOSE will be supported. That is, the OUTPUTS are necessary conditions to support the PURPOSE or the expected development outcomes of the project.

1.3.3. If the project's PURPOSE is supported, this should then contribute towards the GOAL. That is, the supported PURPOSE is a necessary condition to achieve the GOAL which reflects the long-term results or impact of a project.

1.4. Corollary Concept – sufficient conditions

The line of reasoning above is incomplete without the sufficient conditions. These are the assumptions that, if met, will provide the enabling conditions. Roughly we say,

1.4.1. If ACTIVITIES and ASSUMPTIONS 1, then OUTPUTS.

1.4.2. If OUTPUTS and ASSUMPTIONS 2, then PURPOSE.

1.4.3. If PURPOSE and ASSUMPTIONS 3, then GOAL.

1.5. Objective Tree Analysis

The Logframe is the "logical" result of the more familiar objective tree analysis. Some call this the solution tree analysis (in contrast with problem tree analysis). The logic of the objective tree analysis is the following:

1.5.1. We enumerate lower level results that are necessary to achieve the higher level objectives.

1.5.2. We conduct the following consistency check:

- Reading *down* answers the questions "why and how?"
- Reading *across* answers the question "what else?"
- Reading *up* answers the question "so what?"

Example:

We are asked to design a project that will contribute to the goal of poverty alleviation among the rural poor. We then proceed to enumerate the following lower level results:

- Increase incomes of the rural poor
- Increase farm production
- Teach the farmers the modern farm technology

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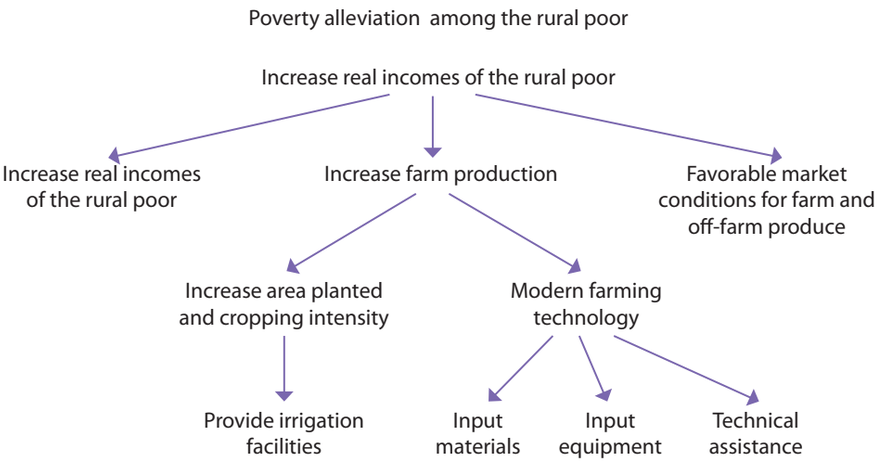
The project proposes a technical assistance package for the farmers. We employ an objective tree analysis to validate our design.



In our earlier analysis, we indicated that the objective of increasing real incomes of the rural poor will be achieved if we increase farm production. In drawing the objective tree, we need to answer the question "what else?" We then enumerate two sufficient conditions:

- Increase off-farm employment opportunities
- Favorable market conditions for farm and off-farm produce

Again, we said earlier that increased farm production will be met with the introduction of modern farming technology. To this we add the sufficient conditions

- Increase area planted, and/or
- Increase cropping intensity

These latter conditions will be met by providing irrigation facilities. Meanwhile, we enumerate the following sufficient conditions to increase the likelihood of farmers to adopt the technology:

- Input materials that are necessary to implement the technology
- Input equipment that is necessary to implement the technology

Following is the logframe of our simple project.

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Key Assumptions and Risk
Goal			
To alleviate poverty among the rural poor	Reduction of poverty incidence and/or gap in rural areas	Family Income and Expenditure Survey (FIES), Annual Poverty Indicator Survey (APIS)	
Purpose			
To increase the incomes of farmers in Province P	At least 5% increase in real incomes of farmers after 1 year	Community-Based Monitoring System (CBMS)	Favorable market conditions for farm and off-farm produce;
	Average yield of at least 4 MT/ha per cropping	Report of Bureau of Agricultural Statistics (BAS) Provincial Office	Opportunities for off-farm and non-farm employment
Outputs			
Conduct of farmer field schools (FFS)	At least 3 FFS established per municipality	Quarterly progress report of the Municipal Agriculturist Offices (MAOs)	Proper O&M of existing irrigation systems
Credit assistance to enable farmers to purchase needed implements to adopt the modern technology	Credit extended to farmers who are willing to adopt the modern technology	Quarterly progress report of credit officers	Prudent credit management systems in place
Activities			
Allocation of PhP0.5 million to support FFS			
Provision of PhP1 million credit window for farmers			

2. Demand Forecasting

Identify the potential consumer of the project's output, and as necessary, characterize them by type of occupation, age, etc.

Consider the following examples:

Project	Output	Potential Consumer
Schoolbuilding project	Education service	Schoolchildren of elementary age who reside in Barangays A, B and C
Slaughterhouse	Slaughtering service Meat inspection service	Cattle and hog raisers coming from Municipalities A and B
Communal irrigation project	Irrigation services	Rice farmers within the irrigation service area
Barangay health station	Primary health care	All residents of Barangays A and B

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Project	Output	Potential Consumer
Farm-to-market road	Road coming from Barangay A and connecting to the existing arterial Road 1 (that connects to the poblacion)	Workers coming from Barangay A who work outside Barangay A Farmers who directly sell their produce outside Barangay A Traders who buy goods directly from Barangay A Students who study outside Barangay A Other residents of Barangay A who travel outside of Barangay A

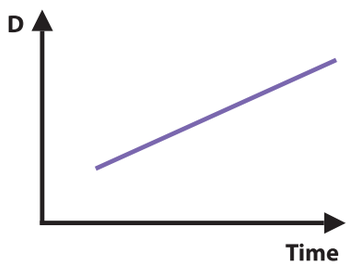
2.1. Estimate the number of potential consumers of the project's output.

2.1.1. Be guided by the historical trend. You will need information on the number of consumers (preferably) over the past five years.

Year	Number of Consumers
1	N_1
2	N_2
3	N_3
4	N_4
5	N_5

2.1.2. Plot the historical trend on the chart that shows the time (year) on the horizontal axis and the value of the demand on the vertical axis. Consider the following cases:

a. The trend resembles a line, whatever the slope.



In this case, we can apply the average annual growth rate to forecast future demand, given by:

$$g = \frac{\ln(N_5) - \ln(N_1)}{5-1}$$

The forecast demand is computed as follows:

$$N_{t+j} = (1+g)^j N_t$$

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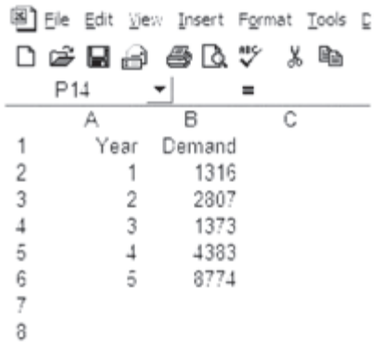
b. The trend does not resemble a line.

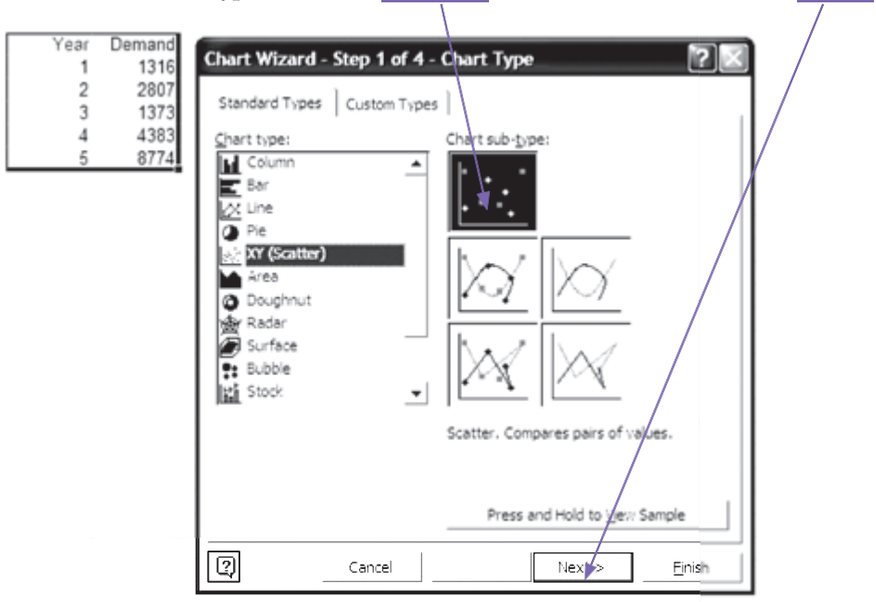
The easiest way to approach this problem is with the aid of Microsoft Excel. Enter the year, then the data corresponding to the year as follows:



	A	B	C
1	Year	Demand	
2	1	1316	
3	2	2807	
4	3	1373	
5	4	4383	
6	5	8774	
7			
8			

Construct a chart by first selecting the data cells, then point and click at the Chart Wizard indicated by the chart button on the toolbar.

For the Chart sub-type, select XY **(Scatter)** as shown below, then click **Next>**



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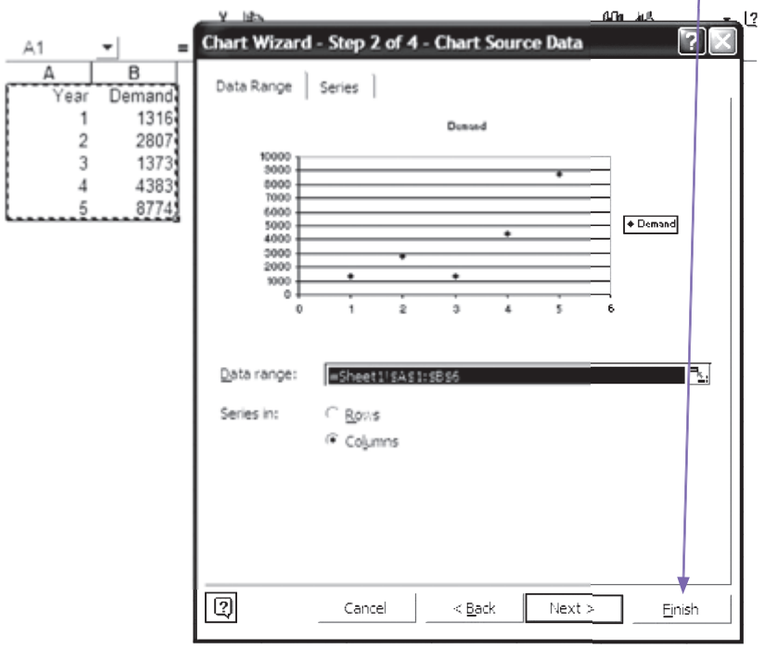
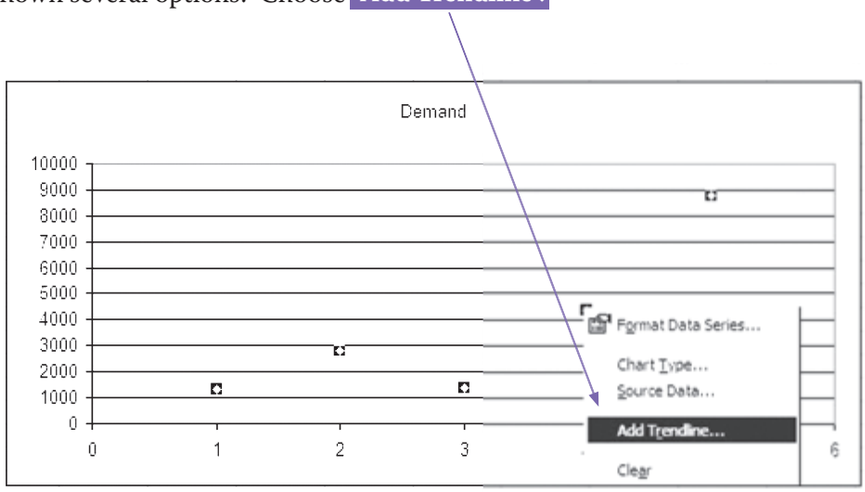
You will next be shown a preview of the scatterplot. Click **Finish.**



When you are next shown the chart, click on any data point on the chart and when the points are highlighted, press the right button on your mouse. You are then shown several options. Choose **"Add Trendline".**



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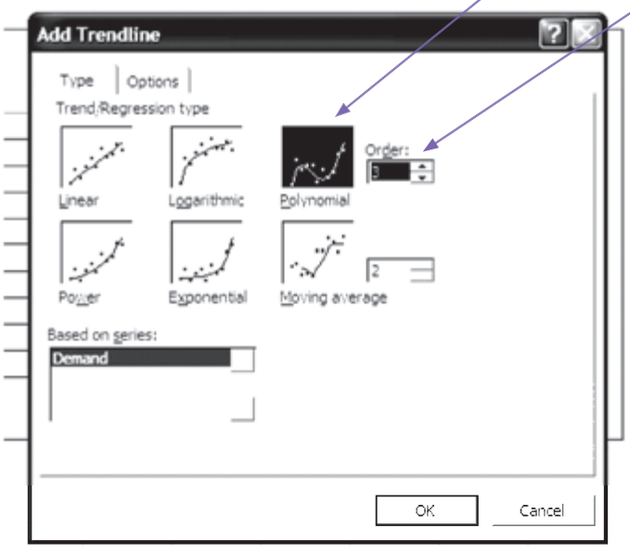
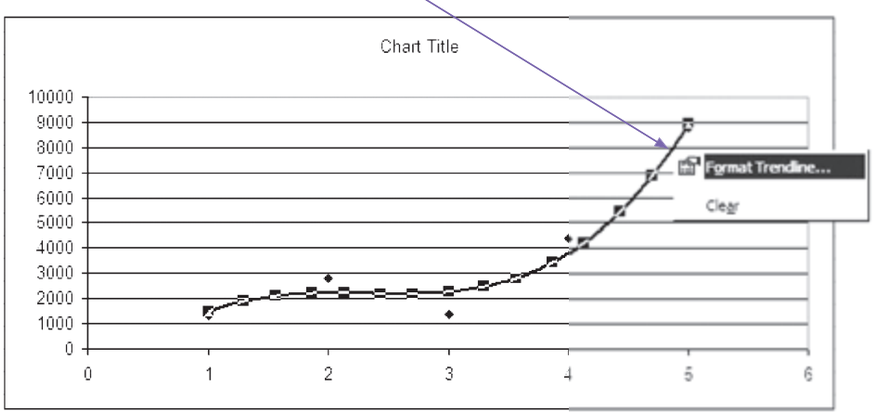
You will next be shown several choices to estimate the trendline equation. The shapes are shown and you are to choose the shape that resembles your scatterplot the closest. For this example we choose **polynomial** with **order 3.**



The trendline is now drawn. On the same panel, press on the right button of your mouse and select **"Format Trendline."**



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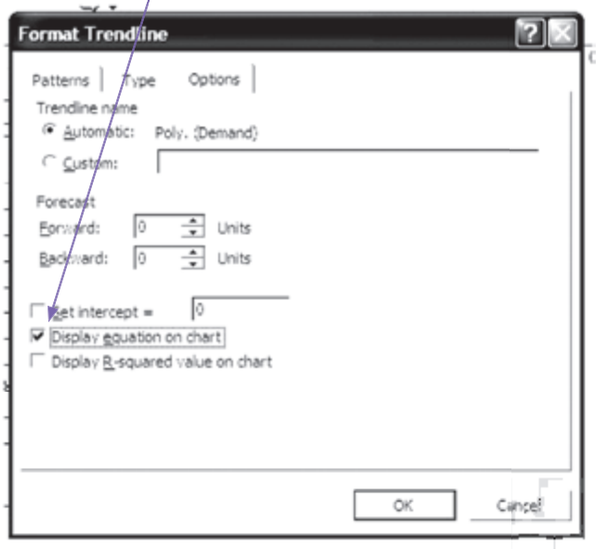
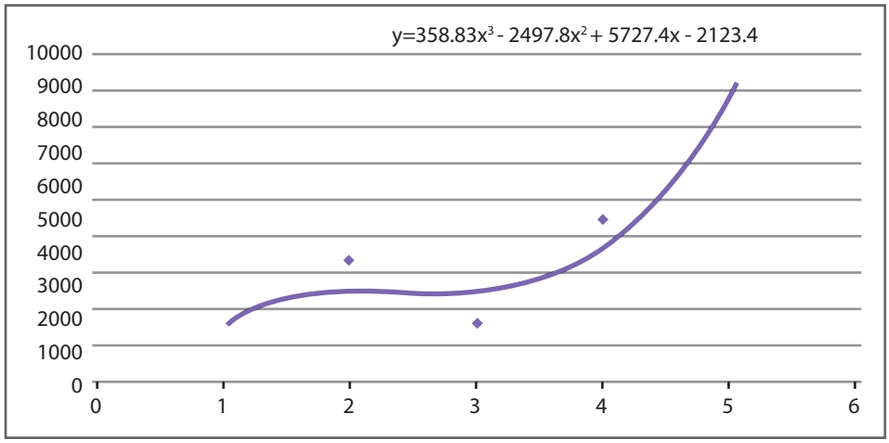
Under the tab "Options", click on the box corresponding to the option **"Display equation on chart".**



The equation will appear on the chart and this is the formula you can use to forecast demand. Note that the x that appears in the equation is the variable "year" (or time).



In the example above, demand at Year 6 is forecasted as follows:

$y = 358.83*(6)^3 - 2497.8*(6)^2 + 5727.4*(6) - 2123.4 = 19,827.48$

Note that you may revise your options as you see fit. For instance, you may instead specify a linear option under the trend/regression type.

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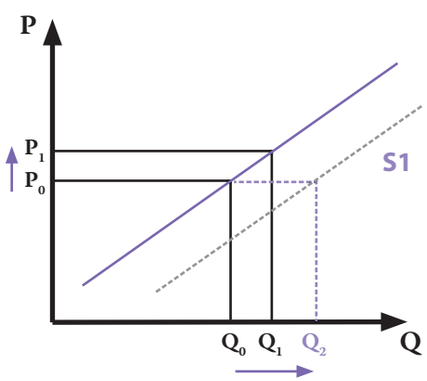
2.2. The difficulty comes in when there is no existing good in the market that mimics the characteristic of the project's output. For instance, a farm-to-market road. The existing "road" is likely to be of very inferior quality so that the demand (or usage) we are observing is for the given low quality of the road. Worse, there may be no road at all, hence no existing demand. In this case, we can adopt supply and demand conditions prevailing in other sites. We may have to make some adjustments to correct for the obvious site differences. This is acceptable for as long as the assumptions can be justified. The more important issue is transparency.

2.3. A project's output may be an intermediate good, or a good or service that is used to produce another (final) good or service. In this case, the demand for the project's output may be derived from the demand for the final good or service. For instance, demand for irrigation service facility may be proxied by the demand for rice. Another proxy indicator of demand is the additional profit the farmer can expect to generate with the use of the irrigation. This variable has the advantage of being closer to the user of the facility. The disadvantage, though, is that other information are incorporated, say, transport and trading conditions that may cause prices to vary even though the output level may not.

2.4. Another methodology to forecast demand is to find an auxiliary variable that is related to demand. For instance, income growth will affect demand for road services, aside from population growth. For the purposes of the pre-feasibility study, you may still use the techniques introduced above, but this time, the two variables are income and demand, instead of time and demand. For the FS, you can require a comprehensive analysis of the demand and a more rigorous forecast methodology.

3. Anticipating Supply Response

Recall that the supply curve plots the relationship between the price of a good and quantity that producers are willing to supply at that price, under certain market conditions. This curve is upward-sloping, meaning that as the price goes up, producers are willing to supply more of the good. In the chart below we see that if the price increases from P_0 to P_1, quantity produced also increases from Q_0 to Q_1.



Additional output generated by the project will increase the existing supply of output, all other things remaining the same. This last condition, however, is difficult to achieve. The more correct statement is to say that the project's output will shift out the supply curve. In the chart above, let us assume that the project shifts out the supply curve to S_1. Without consideration for

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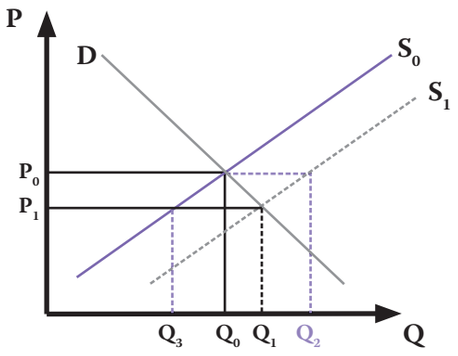
the demand curve, let us assume that prices remained the same. The original suppliers of the good will still supply the quantity Q_0 and the project will supply the additional quantity Q_2-Q_0.

The complication is given by the fact that transactions are determined by the simultaneous interaction of supply and demand. In the chart, we include the demand curve.



The existing situation is characterized by the demand curve D and the supply curve S_0. We observe that the equilibrium price is given by P_0 and quantity is given by Q_0. Let us assume that the project shifted out the supply curve to S_1. The equilibrium price now reduces to P_1. At this price, existing suppliers can no longer sell Q_0 of the good. They are only willing to sell at Q_3. This means that the project produces the remainder Q_1-Q_3 of the good. Now, if the original suppliers of the good were selling Q_0 quantity at price P_0, and with the project can only afford to sell Q_3 of the good at price P_1, we know that their current sales have gone down. The extreme case is where some of these suppliers are forced out of business and jobs are lost. The PED analyst must be aware of this possibility and this must be explicitly considered in the analysis.

4. Imputation of demand and supply elasticities

4.1. Elasticity is the responsiveness of the supply (and demand) of the good to changes in prices. The elasticity is also related to the slope of the supply (and demand) curve.

4.1.1. A steeper demand curve implies that quantity demanded does not decrease drastically with an increase in price. In other words, the demand is price-inelastic. Demand for essential goods, like rice, behaves this way.

4.1.2. A flatter demand curve implies that quantity demanded will decrease disproportionately with an increase in prices. Demand for luxury goods, say jewelry, behaves this way.

4.1.3. Elasticity of the supply curve is interpreted the same way.

4.1.4. There are cases when the supply curve is simply a horizontal line. This is the special case of perfect competition. At the existing market price, suppliers can produce the good in whatever quantity is needed.

4.1.5. There are cases when the supply curve is simply a vertical line. This is the special case of very limited supply, say, land, coconut farms (over the short term). The quantity is very much dictated by the available supply, which is very limited.

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4.2. For purposes of the PED, we only need to assume how much more responsive is demand than supply.

4.2.1. If demand is inelastic, the price change is dictated more by the suppliers.

4.2.2. If demand is elastic, the price change is dictated more by the demand. For instance, in the case of luxury goods, consumers can always decide not to buy since it is not a necessity. We can then expect the price change to be lower. In terms of the table below, we choose weighting scheme 2.

Weighting Scheme	Demand price	Supply price
1	1.00	0.00
2	0.67	0.33
3	050	0.50
4	0.33	0.67
5	0.00	1.00

4.2.3. In general, we can adopt the following convention:

- If the good is a necessity, demand is inelastic. That is, quantity demanded does not decrease by much if price increases. (The converse is also true with respect to decrease in price).
- If the good is a luxury, demand is elastic.
- If the supply of a good depends on an input that is of limited availability at any point in time, then supply is inelastic. For instance, the supply of virgin coconut oil is inelastic in the short term since it depends on the number of fruit-bearing coconut trees (which takes about seven years from time of planting to maturity).
- If the supply of good can readily be increased, even with short notice, we say that the supply is elastic.

5. Estimating the true cost of the project to society

5.1. In estimating the true cost of project inputs to society, we always consider what will happen to the other consumers that will also require the same project inputs.

5.1.1. An important distinction has to be made of resources – labor and materials -that need to be sourced outside the province and outside the country.

- Labor that will be sourced outside the province is labor taken away from the sending province.
- If the project will require materials and equipment that need to be sourced outside the country, this will have foreign exchange implications on the rest of society that requires foreign currency.

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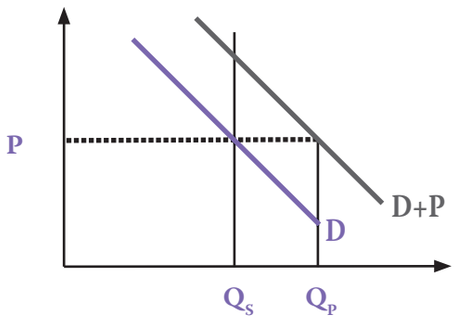
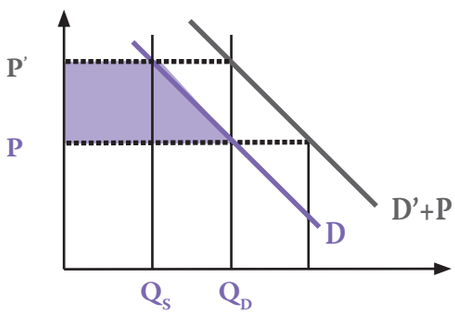
- Project demand for goods that are importable means that the country's imports will increase.
- Project demand for goods that are exportable means that the country's exports will decrease.
- Note that we do not stipulate any changes on the price, simply a change in either imports or exports. This is because the project's demand is bound to be small relative to world demand and supply. We call this assumption the small-country assumption.

Now, consider the following two graphs. Suppose that the project requires huge quantities of cement for construction. Thus, because of the project, demand for cement shifts out to D+P. If the price remains the same (meaning there is ample supply of cement), quantity demanded increases from Q_S to Q_P, the difference being channeled to the project.



In terms of resource allocation, there is no change in the rest of society because even with the increased demand of the project, they are still able to procure the same quantity of cement at the old price.

Now, what happens when there is restriction in the supply of cement. The additional project demand will push prices up to the level P'. At this price, the rest of society will only be able to buy Q_S. We also note that there is a reduction in consumer surplus given by the shaded area.



5.2. The economic cost of the project is determined at the price that suppliers of the input are willing to sell the additional quantity (demanded by the project) at the project site, if there were no market distortions.

Earlier, we enumerated the sources of distortion that drive a wedge between the prevailing market (financial) price and the economic cost of a good. Tradeable goods or those that can be bought or sold in international markets are subject to even more distortions – tariffs, customs and duties, domestic taxes and foreign exchange restrictions. Another complication is the fact that the cost of these required inputs at the project site may not be

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known. The alternative is to use the prices of the inputs at border price and correct these for taxes and duties, transport and handling costs from port to project site.

The foreign exchange component will also need to be adjusted for distortions in the foreign currency market. We usually adjust the official exchange rate with the foreign exchange premium, FEP, in order to arrive at the true economic cost of the foreign currency.

Variable	Financial Price (FP)	Economic Price (EP)
Price at port	FOB price, if exportable CIF price, if importable Converted using prevailing exchange rate	Exchange rate is multiplied by the Foreign Exchange Premium (FEP)
Tariffs, Taxes, subsidies	Taken at full value	Multiplied by a conversion factor equal to 0
Labor	Taken at full value	Multiplied by a conversion factor, distinguishing between skilled and unskilled labor

5.2.1. For imported inputs, the formula is as follows:

EP = CIF_price*ER*FEP + (handling_cost less taxes) + (transport_cost less taxes)

Note the following in computing for the economic price (EP):

- The original price comparator used is the cost, insurance, and freight (CIF) price at the border.
- When converting the CIF price to domestic currency, we correct for distortion in the foreign exchange market by multiplying the exchange rate (ER) with the foreign exchange premium (FEP), which is usually greater than 1.
- We need to consider the cost of handling at the port, but less the distortion caused by the tax imposed on handling.
- We need to consider the cost of transport from the port to the project site, but less the distortion caused by the tax imposed on transport.

5.2.2. For exportable inputs, the formula is as follows:

EP = FOB_price*ER*FEP + (handling_cost less taxes) + (transport_cost less taxes)

Note that the formula is almost the same as above, except that we use the freight on board (FOB) price at the border as the original price comparator.

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5.2.3. Nontradeable goods, by their very nature, are not subject to international trade distortions. In most cases, the prevailing price reveals the economic cost of the resource. That is, the financial cost equals the economic cost. Still, we know that there are distortions (in the form of taxes and subsidies) that cause the market price (P^m) to differ from the supply price (P^s) and/or demand price (P^d). The table below, taken from NEDA (2000) is a useful guide:

Case	Type of Tax or Subsidy	Supply Price	Demand Price
1	Percentage sales tax (t_s) levied at market price at retail level	$P^s = P^m$	$P^d = P^m (1+t_s)$
2	Unit sales tax of T_s levied on market price at retail level	$P^s = P^m$	$P^d = P^m + T_s$
3	Percentage subsidy K given on total resources spent on production	$P^s = P^m / (1-K)$	$P^d = P^m$
4	Unit subsidy K_u given per unit output produced	$P^s = P^m + K_u$	$P^d = P^m$
5	Percentage tax (t_p) levied at producers level	$P^s = P^m / (1+t_p)$	$P^d = P^m$
6	Unit tax (T_p) levied at producers level	$P^s = P^m - T_p$	$P^d = P^m$
7	Two percentage taxes t_1 and t_2 levied on output at retail level (compounded)	$P^s = P^m$	$P^d = P^m (1+t_1) (1+t_2)$

6. Estimating/assessing the value of the project output to society

As in the case of project inputs, we value project outputs (those that can be priced) with consideration for its relative importance to society.

6.1. Output is importable

If the project produces an output that we have been importing in the past, then the project results in a reduction in imports (and therefore, savings in foreign currency).

EP = CIF_price*ER*FEP - (handling_cost less taxes) - (transport_cost less taxes)

From the formula, we note the following:

6.1.1. The proper price comparator is the CIF price at the border.

6.1.2. If the project's output competes with the imported good, it must be the case that its price at the price site is at least equal to, if not less than, the CIF price less the cost of handling and transport (from port to site).

6.1.3. As before, we do not consider taxes in the computation of the economic price.

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6.2. Output is exportable

If the project produces an output that is exportable, then the project results in an increase in exports (and therefore, foreign currency earnings).

EP = FOB_price*ER*FEP - (handling_cost less taxes) - (transport_cost less taxes)

From the formula, we note the following:

6.2.1. The proper price comparator is the FOB price at the border.

6.2.2. If the project's output is to be exported, it must be the case that its price at the price site is at least equal, if not less, than the FOB price less the cost of handling and transport (from port to site).

6.2.3. As before, we do not consider taxes in the computation of the economic price.

ENDNOTES

[1] In 2000, NEDA produced a three-volume manual on Project Evaluation and Development. Volume 1 is the Reference Manual on PED; Volume 2 is the Advanced Manual on Project Evaluation; and Volume 3 is entitled Case Studies:Public Sector Projects.

[2] The WTO does not allow member countries to impose quantitative restrictions on tradeable goods, except for very limited cases. One is the case of rice and only for two countries – the Philippines and South Korea.

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