

Guidelines for the Economic Analysis of IDB-Funded Projects

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Overview

The objective of this document is to provide guidance on the preparation of the Economic Analysis Annex that must be completed with Bank Proposals for Operational Development (PODs) and included as an electronic link to the POD. For the Economic Analysis, project teams have the option of conducting a cost benefit analysis (CBA) or a cost effectiveness analysis (CEA). The annex should use the Template for Economic Analysis—provided with the Guidelines for the Application of the DEM—as the basis for presenting the economic analysis following the CBA or CEA template as appropriate. If neither CBA nor CEA is done, the annex must include a justification for not employing either approach as well as a discussion of the alternatives that were considered in project preparation and the benefits and externalities of the project.

The primary objective of conducting an economic analysis is to help design projects that will be effective in promoting development in a country. The usefulness of this exercise is greatest when it is done early in the project cycle and contributes to the decisions about whether and how to proceed with a project. While the outcome of an economic analysis—net present value or economic rate of return for CBA and cost per unit effect for CEA—are important, it is the process of conducting the analysis and the insights that it provides that are most likely to be useful in designing a better project. The value of the Economic Analysis Annex is not just in the details of how the summary measures are calculated, but in the lessons learned in making these calculations.

The Economic Analysis Annex will be assessed by the Office of Strategic Planning (SPD) as part of the validation of the Development Effectiveness Matrix (DEM). An electronic link to the Economic Analysis Annex of the POD, which must have been completed during project

preparation, should be provided. The DEM section on economic performance creates incentives for economic analysis to be performed and measures the adequacy and quality of the analysis performed. The DEM assigns:

- a zero for no economic analysis (even if a justification is provided),
- a 4 for CBA or CEA having been carried out on the main components of the projects, and
- from 5 to 10 depending on the quality of the analysis performed and whether the rate is positive and robust to changes in underlying assumptions.

Cost Benefit or Cost Effectiveness Analysis?

Cost benefit analysis (CBA) and cost effectiveness analysis (CEA) rely on the presumption that both a proposed intervention (situation with the project) and a non intervention (situation without the project), against which the intervention is assessed, are well specified. There are two fundamental differences between the two methods:

- The two methodologies differ as to the unit of measurement of incremental outcomes, or impacts, of an intervention or project. CBA measures net benefits and CEA measures net effects. In CEA, while the cost is a monetary unit, the incremental effects are expressed in non-monetary terms. The result is typically a ratio, cost per effect. In CBA the incremental benefits or net social benefits, are associated with the gain in social surplus (consumer surplus plus producer surplus or monetized benefits from an impact evaluation) generated by the intervention or project. These incremental net benefits are typically expressed in monetary terms. So in CBA both costs and benefits are expressed in monetary units. The result is typically expressed as a monetary value such as Net Present Value (NPV) or as a rate at which that NPV switches from positive (go) to negative (no go).
- Having a monetary unit as unit of account or *numeraire* for CBA highlights the second fundamental difference. CEA compares (mutually exclusive¹) alternatives in terms of their cost per effect, and this effect has to be common to all alternatives. One cannot

¹ Alternatives are mutually exclusive if the adoption of one precludes the adoption of another one.

compare two interventions with different effects, or the same effect measured in distinct ways. Only if both can be expressed in a common effect, can they be compared. For example, an intervention that affects school attendance cannot be compared with an intervention that affects class size unless both their impacts can be measured in increases in test scores. In CBA, as all benefits and costs are expressed in common monetary terms, alternatives with differing effects can be compared and ranked by their net benefits: the Net Present Value of a road can be compared with the Net Present Value of a school.

In addition to the above mentioned two fundamental differences, CBA and CEA differ in other ways.

- **Number of effects:** Projects or interventions can have more than one effect. CEA is restricted to capturing only one effect (there will be a different CE ratio for each effect), while CBA can encapsulate more than one effect. For example, in a rural electrification project, CBA would use Willingness to Pay (expressed in monetary terms) as a comprehensive measure of project benefits. This measure would monetize all potential welfare gains including from education, health, income etc. In the same project, CEA analysis would focus on only one of these benefits, such as education and estimate a cost per effect for a particular education indicator.
- **Number of assumptions:** CEA will typically derive its ratios from specific interventions, and thus the number of assumptions that need to be made are limited by the intervention under consideration. On the other hand, CBA has to go a step further and put a monetary value on all effect requiring additional assumptions (e.g. prices). The number of assumptions in CBA tends to be greater.
- **Source of information:** In CEA analysis, alternatives are typically derived from impact evaluations that are based on rigorous comparisons of treatment and control groups while in CBA that is not typically the case.

Societal Perspective

Regardless of whether a CBA or CEA is used, the perspective to consider in an economic analysis of a Bank-funded project is a societal perspective. This means that costs should incorporate not only costs to the public sector, but other societal costs including non-governmental organizations, firms, households and individuals. Similarly, the benefits in a CBA should incorporate net benefits to all societal actors. This means attempting to incorporate the positive and negative externalities associated with a project. Taking a societal perspective can be challenging: data is often unavailable for costs to these entities and for certain types of benefits. But societal costs and benefits should be noted and attempts made to identify benefits (costs) that accrue to society and benefits (costs) that accrue to the project agency.

OPTION I: Cost Benefit Analysis

I. INTRODUCTION

The introduction section of the Economic Analysis Annex should provide the reader with a “quick view” of the type of analysis that was undertaken, its rationale and main assumptions, the main results of the evaluation and the potential limitations of the analysis. In other words, it should provide the reader with an “Executive Summary” of the Economic Analysis Annex.

Beyond noting that the analysis to be performed is CBA, the introduction should strive to provide short answers (that are to be developed, if applicable, in the appropriate sections in this Annex) to some or all of the following questions:

1. What is the objective of the project?

- The analysis and the nature of the analysis tools both differ if the objective is narrow or broad. If it is narrow, such as improving the delivery of schools supplies the analysis will probably look at alternative ways of delivering the books to a target population, and success will be contingent on meeting that objective. If it is broad, such as reducing logistical costs in a region or a country, narrowing down alternatives and measuring success are both going to be based on a broader set of assumptions.
- The scope of the objective will also determine the choice of the analysis methods and tools. Ideally, the project’s objective should be linked with the expected impact. As objectives broaden in scope, attribution becomes harder to determine, mainly because multiple causality chains can be present and multiple effects captured.

2. What will happen if the project is financed? What if not?

- The most fundamental question in CBA is the establishment of the counterfactual as it is the basis for the “without” project situation. Ideally this counterfactual should be derived from a rigorous impact evaluation that can be validly applied to the project, possibly from a pilot or another similar project that are externally valid to the one under analysis. In most cases, explicit assumptions will need to be made to compensate for the limited information on the counterfactual often relying on a “business as usual” scenario. All of these assumptions and others that are germane to the analysis should be spelled out in **Section II: Assumptions and Methodology**.

3. What are the components, how critical are they? How separable?

- The realization of expected project benefits (detailed in **Section III: Economic Benefits**) is contingent on the effective application of a combination of inputs, grouped in components (See **Section IV: Economic Costs**). Ideally, each component should be justified and analyzed on its own, based on an additional or marginal analysis (with/without component). Nevertheless, some components are more critical than others, and if benefits can be more clearly identified, quantified and monetized for one or several of these components, then the economic analysis can be applied to those critical components.
- In some cases, benefits are the result of the combination of components and attribution to a specific component is not possible. When undertaking a CBA that is based on only one of the components of the projects, special attention should be placed on benefits attribution of that component.
- The introduction should clarify which components are being analyzed and whether they are done separately or jointly.

4. Why is this project the best alternative to meet the stated objective?

- In the selection of the alternative(s), it is important to consider any plausible mutually exclusive alternatives that involve differing technological/institutional choices, financial arrangements, locations and beneficiaries (Section II). These alternatives can generate different net benefit streams and CBA allows the selection of the best available option (which is to be presented in detail in **Section V: Economic Returns**).

5. How risky is the project and how vulnerable to changes in assumptions. Is this a “proven concept” or an innovation?

- A CBA is a forward looking attempt in capturing the economic impact of an investment or of a public policy initiative in a risky and uncertain environment. Although **Section VI: Sensitivity Analysis** should present a complete sensitivity analysis, if the project is particularly risky, sensitive to changes in assumptions and/or innovative, this should be stated in the introduction.

6. Are the data/results in this appraisal consistent with the data/results presented in the POD, the DEM and the Results Matrix?

- The Economic Analysis Annex is an integral part of a set of instruments that justify that the Bank funds a specific project. Its costs and benefits should be explicitly linked to the project budget and projected cash flows, to the results framework, to the set of outcome and impact indicators included in the DEM and to the proposed impact evaluation, if applicable.

7. Is the project worthwhile undertaking on the basis of the economic calculations?

- This is the key question and its answer should be provided up front in the introduction. A discussion on the strength and credibility of the economic viability indicators should be included.

8. Did the analysis serve in changing the proposed project?

- Economic analysis is a tool that is designed to help select projects that add to national welfare. It is most useful if used early in the project cycle to identify bad alternatives and bad components. If used late in the cycle, its usefulness is restricted to helping decide whether to proceed or not with a particular design. When a CBA is undertaken solely for the purpose of estimating an Economic Rate of Return or a Net Present Value, its usefulness is restricted to that particular purpose. If the analysis influenced the design of the project, it should be noted. If not, particular attention will be given to critical assumptions when no additional alternatives are presented as analyzing a particular project is significantly different from justifying it.

II. ASSUMPTIONS AND METHODOLOGY

Any forward looking economic analysis needs to be explicit on the assumptions that are required for both attribution and causal linkages (the theory of change); the methodologies used to estimate future benefits and costs, the rationale behind these assumptions, and an analysis of their relative strengths and weaknesses. Key data and data sources need to be reported in order to promote transparency and facilitate review. The Economic Analysis Annex and related files should include the necessary details so that a third party can replicate the results.

The most fundamental question in CBA is the establishment of the counterfactual as it is the basis for comparing “without” as opposed to “with” calculations. Ideally this counterfactual should be derived from a rigorous impact evaluation that can be validly applied to the project, possibly from a pilot or another similar project that are externally valid to the one under analysis. In most cases, explicit assumptions will need to be made to compensate for the limited information on the counterfactual. All of these assumptions – and any others that are germane to the analysis – should be spelled out in this section.

This section should at a minimum provide answers to the following questions:

9. What are the alternatives?

- Economic analysis compares the net social benefits in investing resources in a particular project or program with the net social benefits of the alternative. In some situations, this may be a project or program that would be displaced if the project under analysis is undertaken. In this case, the displaced project is often called the counterfactual.
- Satisfying any particular need (clean water, for example), or solving any particular challenge (reducing the crime rate, for instance) can be done in a myriad of ways. Alternatives should always be specified as to addressing the same problem, solving the same challenge. Alternatives share the problem and differ as to the solution. Alternatives can only be compared when addressing the same or similar challenge.
- At a minimum, the difference between the availability of inputs and outputs with and without the project should be addressed. The without alternative is typically the “as is” or “as will be” if nothing is done, often referred to as the “business as usual” scenario.
- As any problem can be addressed in many ways, it should be taken into account that the number of alternatives considered does have a cost and time implication and should be limited.
- All of these assumptions – and others that are germane to the analysis – should be spelled out in this section. Alternatives typically involve choices on scales, degrees of involvement (doing nothing, doing nothing plus, upgrading, replacing, building new etc.), timing in investing, institutional designs and technological choice.

10. What is the theory of change and how is attribution ensured?

An explicit or implicit theory of change (how the project is supposed to deliver the results) is at the core of a good CBA. The estimation of both costs and benefits – particularly benefits – requires that those benefits can be credibly attributed to the project and the causal links from inputs (the project's costs) and outputs (the project deliverables), to outcomes and impact can be credibly established. The theory of change embedded in the CBA should explore the conditions and assumptions needed for the change to take place. If the analysis is being based on a rigorous impact evaluation, the attribution and change theory should be embedded in the impact evaluation study.

11. What numeraire is used?

- The choice of unit of account or *numeraire* is one of the first decisions early in a CBA. Any good or service can be valued at domestic or at border price levels and the analysis can be conducted in domestic or foreign currency. In any case, the unit of account has to be consistent throughout the analysis.
- The three most used alternatives are: (i) domestic currency at domestic price levels, where prices of traded goods and services are taken at the border price and converted into domestic currency by a shadow exchange rate, and non-traded goods and services are typically taken at their market prices, if no major distortions are present; (ii) domestic currency at border price levels, where all imports and exports are taken at the border price and converted into national currency at the market exchange rate, and non-tradeables are converted into border prices by a “conversion factor”; (iii) foreign currency at border price levels, the prices of all tradeables remain in foreign currency and non tradeables are converted to the border price using a conversion factor and to foreign exchange with the market rate.
- The choice is mostly a matter of convenience and should have no impact on relative prices or on the decision to accept or not a project. Nevertheless, as most financial flows, and most non-financial benefits, are typically expressed in domestic prices at domestic price levels, it is suggested that this be used as *numeraire*.

12. What prices are used?

- Regardless of the choice of numeraire and price level, all the analysis should be consistently expressed in either nominal or real terms (adjusted for inflation).
- If relative prices are expected to remain relatively constant, the analysis should be presented in real terms, using a general price deflator for all nominal flows, such as an implicit GDP deflator or a consumer/producer price index. If relative prices are expected to change (for example oil), it is suggested that the project flows be constructed in nominal terms and then converted to real terms with a general price index.

13. What are the key aspects of the methodology?

- Any estimation of costs, and particularly benefits, is based not only on the assumptions on the future evolution of market (and shadow) prices and quantities, but also on the methods used in estimating costs, benefits, and impacts that cannot be derived directly from market valuations. The choice of methodology is critical in ascertaining the validity of the results and key aspects of the employed methodology should be noted in this section.
- The estimation of benefits, which express in monetary terms the project's outcomes, can be done in two ways depending on if there is or is not a market for the good or service. If there is market, putting a value to the goods and services is straightforward. If there is not a market for the goods and services, there is a need to proceed with a non-market valuation. Approaches to do this include revealed preferences (e.g. travel cost, hedonic pricing) and stated preferences (e.g. contingent valuation).
- In many specific markets, it might be important to correct for significant price distortions that can range from foreign exchange under or over valuation, traded goods and non-traded (for example labor market) disequilibria, or market prices that do not reflect true economic opportunity costs as they include taxes and subsidies. If any of these issues is relevant to a specific project, it should be noted and proper corrections introduced in the analysis. In many occasions, shadow prices can be derived from published studies or can be derived from the estimation of conversion factors. In any case, it is important to be consistent in the choice of the unit of record, or numeraire (local consumption or foreign exchange).
- Impact evaluations provide in many instances critical information on potential benefits that if monetized can provide with a good approximation of project benefits
- In any case and whichever methodology, it is important to benchmark unit benefits with existing literature and ensure consistency with existing evidence, and relevant case studies.

14. How are future values discounted?

- Projects require that future benefit and costs flows be discounted to account for the opportunity cost of capital. It is recommended that a 12% real discount rate be used in all of Bank projects.
- In certain cases, where benefits accrue in the very long term, sensitivity analysis can be performed simulating lower real discount rates, contingent that the rates are consistent with best practices in the specific technical literature. The justification for taking this approach should be noted.

15. What is the analysis period?

- Typically the investment period of a Bank project will range between 1 and 5 years. Benefits accrue over a longer period. The definition of the evaluation period depends on whether benefits are temporary or permanent. In the case of temporary benefits (typical in hard infrastructure investments), the evaluation period should be consistent with the expected life of the investment (replacement). In the case of permanent benefits (more prevalent in health and education) the evaluation period will depend on the expected duration of the estimated impacts (or benefits, if monetized).
- The length of the evaluation period should be noted and justified. In practice, the relevant horizon is obviously affected by the discount rate used. With a 12% discount rate, a horizon of more than 20 years is probably not going to impact your NPV calculation.

Common Pitfalls in Cost Benefit Analysis

- **Double counting benefits:** Double counting of benefits can happen in one of two ways. First, when the value of an intermediate good or service is measured twice. For example, if the benefits of an irrigation project are based on an estimated demand curve, also counting the additional income that accrues to farmers from irrigation is counting the benefits twice. Second, when the benefit is counted once as a stock and then again as a flow. For examples, adding a higher property value that results from reduced travel times to the location along with the monetized benefit of reduced travel times. Higher property values would include, to a large extent, the value of location with regard to travel time; and if you count both you overestimate the project's benefits.
- **Incorporating transfers as benefits (or costs):** Some payments that appear in the financial cost (benefit) streams do not represent direct claims on the country resources, but only reflect a resource control transfer from one sector of the society to another. Loan and interest payments, taxes, subsidies and depreciation allowances all fall into this category. In general, any cost or benefit flow that does not reflect a real resource use should be considered a transfer and netted out when benefits and costs are presented from a societal perspective.
- **Failing to incorporate externalities:** In many projects, externalities, particularly environmental externalities, can be a significant source of benefits or costs and should not be ignored. Typically an externality is a by-product of production or consumption that has no market. For example, beekeepers whose bees pollinate near-by fields.
- **Dealing with second and third round effects.** In some cases, a project might affect markets that are one or two steps removed. Caution should be exercised when valuing these benefits.
- **Employment as benefits:** Some projects have an explicit – or implicit – goal of providing employment. In all cases employment is a cost, not a benefit as it entails the

use of a scarce resource. In those cases where employment is pursued, an appropriate shadow wage rate should be used to reflect the real opportunity cost of labor.

- **Lack of evidence for projection rates:** In many projects, future benefits are projected into the future using ad-hoc growth rates. The assumptions and sources for the validity of these rates should be made explicit in the assumptions section of the document.
- **Costs beyond the project budget:** Project costs should be total project costs to society, not only those costs that are borne by the Bank or by counterpart funds.
- **Mixing nominal and real flows:** All analysis should be made in a consistent base currency. If the discount rate is real, flows in the same currency base should be estimated and presented.

III. ECONOMIC BENEFITS

The estimation of benefits is what separates CBA and CEA and the analysis presented here requires explicitly noting all of the benefits to be included in the analysis as well as the monetary values of those benefits. As started in Box 13, the estimation of benefits, which express in monetary terms the project's outcomes, can be done from direct or indirect market observation.

This section should include data on the value over time of all noted benefits and at a minimum provide answers to the following questions:

16. What is the objective of the project?

- All relevant project benefits should be noted. Since a societal perspective is taken in CBA for Bank-funded projects, the benefits should include all societal benefits.
- In some cases, benefits may be noted, but difficult to quantify or are not expected to be substantial so will not be included in the analysis. It should be clear what benefits will be valued and included.

17. Which method is used to value the benefit?

- The general approach to assessing benefits may already be spelled out in Section II: Assumptions and Methodology. If so, they need not be repeated here provided sufficient detail is included in that section. If not, the details should be noted here.
- Although it is outside the scope of these Guidelines to provide a detailed account of each method, the choice of method will depend on many factors. The critical factors are four.
- First, whether a market exists or does not for the goods and services to be provided by the project. If there is a market, price can be elicited directly from published sources or from direct observation. If not, price information will have to be derived from either revealed or stated preferences.
- Second, the nature of the theory of change. The logic of the intervention and the identified pathways through which the proposed intervention brings the expected impact are central in identifying the mechanisms by which those impacts can be monetized. A credible transition from outputs to outcomes and impacts will hinge on the quality of the assumptions embedded in the theory of change and this sequence and logic needs to be consistent with the step required to monetize impacts. Irrespective of which method is used, all assumptions that link outputs to monetized outcomes/impacts or benefits should be explicitly stated.
- Third, the quality, availability and timeliness (how recent is it?) of the information/data required for benefit estimation.
- Fourth, sector specific considerations and standard professional practice.
- Irrespective of the method, benefits estimations should be clearly linked to the logic chain: input → output → outcome → impact (benefits) chain
- The rest of this section presents the main issues and considerations to be taken into account in the consideration of each method.

18. If benefit estimation is based on impact evaluations, how is the information used?

- Impact evaluations of previous projects are sometimes helpful when selecting alternatives, establishing causality and attribution, and to calibrate expectations of impacts expected from the project.
- If used, monetary values are placed, under reasonable assumptions, on the estimated – or expected – impact of the project.
- This impact is derived using one of the methods – experimental, non- experimental, before and after and simple difference – as described in the Impact Evaluation Guidelines. These impacts are then expressed in monetary terms.
- If an impact evaluation is used for the estimation of project benefits, external validity considerations should be addressed and required assumptions need to be spelled out.
- Most impact evaluations focus on very few (usually one or two) impact indicators and, as a result the chosen outcome measure may not reflect the full set of impacts nor the corresponding benefits. Along with the impact indicators, other potential project benefits should be incorporated as well as benefits that accrue to non-participants.
- In the cases where impact evaluations report significant spillover effects on non-participants, an assessment has to be made on whether spillovers would take place when programs are scaled up, and whether the benefits attributed to these spillovers should be included or not.
- The use of impact evaluations is more useful in sectors, such as health and education, where there is ample evidence derived from impact evaluations, and relevant literature that connects the outcome measures with future benefits.

19. If benefits are derived from observed behavior, how is the information used?

- If benefits are derived from observed behavior, the demand curve is directly estimated and benefits are directly derived from individual consumer's Willingness-to-Pay (WTP). This estimation can be done either directly or indirectly.
- If the estimation is direct, the WTP can be derived from one observation, combined with previous research that indicates functional form and elasticity.
- WTP can also be derived from two or more observations, where extrapolation, model specification, and data consistency are the critical elements in the validity of the benefit estimation.
- WTP can also be estimated indirectly by various methods such as analogous pricing, trade-off method, hedonic pricing, travel costs, avoided costs, and others.
- When using analogous pricing, the market price for an analogous good or service can be used as a shadow price for a publicly provided good or service.
- Under the trade-off method, the economic analysis uses the opportunity cost as a measure of value.
- Hedonic pricing can be estimated when: (i) the relationship between asset price and asset attribute can be established and (ii) estimation of WTP for each attribute is also possible.
- Under the travel cost method – mostly used in recreational projects – total costs replace entrance price or fee as an explanatory variable for the demand equation.
- The estimation of avoided costs – also called defensive expenditures – is an approximation to benefits assuming that the intervention reduces a current expenditure.

20. If benefits are elicited through approaches such as contingent valuation, how is the information used?

- Eliciting WTP through approaches such as contingent valuation is commonly used in benefit estimation and is based on the use of surveys to determine WTP.
- Although there are many approaches to contingent valuation, and a significant body of literature that explores potential biases, the critical elements are usually associated with survey instrument design and application, valuation methods (referendum and non-referendum models), and payment vehicle.

IV. ECONOMIC COSTS

The perspective to consider in an economic analysis of a Bank-funded project is a societal perspective, which means that costs should incorporate not only costs to the public sector, but costs to the other sectors in the economy including non-governmental organizations, firms, households and individuals. Costs included in the analysis should not necessarily only be those included in the budget of the project, but also other costs to the government, such as future operation and maintenance, and other associated societal costs. All costs should be incremental costs of the intervention and methods should be used to ensure that only incremental costs are included.

This section should include the appropriate cost data in the CBA table and strive to provide short answers to the following key questions:

21. What costs are identified in the project?

- There are different approaches to identifying costs including the ingredient method which relies on the identification of all resources or ingredients consumed in an intervention and the valuation of each ingredient. The specification of ingredients is often facilitated by dividing ingredients into categories including (1) personnel, (2) facilities, (3) equipment and materials, (4) other program inputs, and (5) beneficiary or client inputs.
- For Bank-funded projects, public sector costs are identified in project documents and the ingredient method is most useful in identifying other costs such as operation and maintenance costs and non-public sector societal costs.
- Note that sunk costs should not be included in the costs of the project. Sunk costs are costs that were incurred in the past and are connected with the proposed project. Since such costs have already been incurred and can no longer be avoided they should be ignored in the analysis.

22. What public sector costs for the project investments are included?

- Project documents lay out investments and non-recurring costs explicitly as part of project preparation and there should be consistency between what is noted in the project and what is identified as project costs, including costs that are part of the loan as well as counterpart costs.

23. What are the additional operational and maintenance costs or other recurring costs to the public sector?

- If the project establishes new government entities or invests in new infrastructure that requires funds for operation and maintenance or other recurring costs beyond the project timeframe these should be included. These are incremental costs beyond what would have been paid for in operation and maintenance without the project.
- Failing to include these costs assumes that either there are no incremental costs within the project or some form of cost recovery for services rendered is in place.
- The manner in which these costs are estimated should be clearly noted including the prices used and the sources of those prices.

24. What other costs to society including nongovernmental organizations, firms, households or individuals should be incorporated?

- Any additional costs to non-public entities that result from the project should be included. Each cost to society should be identified and the manner in which costs are noted clarified. In general, all inputs (costs) that contribute to the generation of benefits should be included. Otherwise benefits would have to be adjusted accordingly.
- These costs depend largely on the project and linked to the response required by project beneficiaries to obtain the benefits of the project. For example, if a land formalization program requires time to register land, this should be included.
- The manner in which these costs are estimated should be clearly noted including the prices used and the sources of those prices.

25. What are the total flows of costs in the project?

- All types of costs should be noted and aggregated to get the total cost flows and the present value of those costs flows. It should be clear that all of these costs are incremental and the manner in which they are measured should be transparent. The costs flows should be presented within a clearly designated table.

V. ECONOMIC RETURNS

Once costs and benefits have been identified and valued, alternatives need to be assessed based on an appropriate decision criterion. There are three main criteria: Net Present Value, Benefit-Cost (or Cost-Benefit) Ratio and Economic Rate of Return. Net Present Value (NPV) compares all costs with benefits, with all resource flows discounted by the appropriate discount rate. This comparison is presented in net present value terms typically the current year. If positive, the project should be accepted, if negative rejected on economic merit. The alternative/project with the highest NPV should be selected. The Benefit-Cost Ratio (BCR) is the ratio of the sum of benefits (in present value) to the sum of costs (in present value). Typically if this ratio is more than one, using this criterion the project would be approved. The Economic Rate of Return (ERR) is defined as the discount rate that causes the NPV to be zero.

This section should include a completed CBA table with all cost and benefit flows for each period and strive to provide short answers to the following key questions:

26. Which decision criteria are used and what conclusions can be drawn from them?

- In practice, it is helpful to compute and present all three criteria. It should be noted which investment criteria are used.
- The computation of the ERR is required and should be reported.
- Neither the ERR nor the BCR provide any indication of the project scale so presenting the NPV is desirable.
- Based on the presentation of results using the chosen investment criteria, an initial conclusion should be drawn on the viability of the project.

VI. SENSITIVITY ANALYSIS

Sensitivity analysis allows the testing, under different scenarios, of the strength and robustness of the assumptions, the data and the logic of the intervention that underlie the economic analysis and to acknowledge the underlying uncertainty of the expected results. Any forward looking estimation presumes behavioral assumptions, assumptions on the vertical logic, and on the causality links that allow the attribution of a particular benefit or cost to the goods and/or services delivered or used by the project. Given their forward looking nature, all estimates are also based on assumptions on the underlying data and on the future behavior and trajectory of both prices and quantities to be used or delivered by the project, and on how they affect both the counterfactual (without project) and the project itself. In addition, many variable estimates are subject to some uncertainty and risks, which are external to the project.

In addition it is necessary to undertake sensitivity analysis to compensate for the natural tendency for project appraisers to be overly optimistic. Many project parameters are affected by optimism, overstating benefits and understating timings and costs, both capital and operational. To redress this “optimism bias” sensitivity analysis allows the project analyst to test the situation under which the drivers that determine benefits are “punished” (lowered or delayed), and those assumptions that determine costs are more stringent than the average expectation.

This bias is not a trivial matter. A statistically significant study on cost escalation in 258 transportation projects worldwide shows that cost underestimation cannot be explained by error but by overly optimistic projections. Sensitivity analysis should not be looking for the brighter picture, but rather explaining what might happen in the rainy days.

This section should at a minimum provide answers to the following questions:

27. What are the critical drivers and the switching triggers of costs and benefits?

- In many instances both costs and benefits are driven by a few critical factors. Identifying these factors – that can be called “drivers” - is a central element in performing a good sensitivity analysis. The assumptions behind the future performance of these drivers need to be critically assessed and the sensitivity analysis can illuminate at which points in these assumptions the project is no longer worth pursuing. These values are typically called “switching values”.
- In a sensitivity analysis, it is important to focus on “what if” situations, particularly in adverse or more stringent and acid scenarios than those assumed under a Base Case scenario. This focus will allow the analysis to illuminate those values in critical variables and assumptions that might “switch” the recommendation from Go to No Go (or vice-versa) or to reformulate project design and / or components in order to make the project viable. As there are many sources of uncertainty and numerous risks, it can be very useful to identify the key sources of uncertainty and base the analysis on those. Sometimes having too much information does not provide guidance as to the viability of the project under different situations.
- The sensitivity analysis, which is really a risk assessment, should be coherent with the Risk Matrix and other risks discussed in the project proposal.
- Many projects face significant start and implementation delays. If warranted, a simulation should be undertaken delaying start and implementation dates.
- In a CBA derived from impact evaluations – sensitivity can be done by ranking alternatives by their relative net benefit indicators (NPV, ERR or C/B) using the point estimate of their impact, and then re-compute this ratio using the lower and upper bounds of the impact estimate.

28. How “Base” is the Base Case scenario?

- A Base Case reflects the most plausible estimates for unknown quantities and prices and should reflect the average expectation on their future behavior, particularly of cost and benefit drivers. This average expected behavior should be empirically based. The more useful sensitivity analysis are those that present few explicit and reasoned changes on the assumptions of the most critical values of the drivers of the dominant benefits and costs, many times in a “best case, worse case” situation.

29. Are these factors interrelated?

- Sensitivity analysis can be “one way” or “multi-way”.
- One way sensitivity analysis allows for the variation of one critical variable at a time, holding everything else constant. Some authors call this “partial sensitivity analysis”. This kind of analysis is most appropriately applied to situation in which the analyst believes there is one critical driver.
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- In a single factor sensitivity analysis, it is generally assumed that all other factors stay constant. In many projects, this might not be true and the variables might not be independent. In those cases, a discussion on correlation issues is warranted.

30. How can the project uncertainties and risks be mitigated and how do these mitigation measures affect the project's outcome?

- Sensitivity analyses can also help, if the feasibility of a project is very sensitive to a particular assumption on the value of a variable that is uncertain, in identifying mitigating actions that should be considered. If there is exceptional uncertainty, the project might have to be redesigned if implemented on a pilot basis.

31. Are the projected scenarios empirically based?

- Sensitivity analysis is most useful if the proposed scenarios and adjustments are empirically based and/or reflect the unique characteristics of the project in hand—how good and reliable is the data. As with the initial assumptions used in an analysis, ideally the scenarios are empirically based.

VI. ADDITIONAL ANALYSIS (OPTIONAL)

The purpose of this optional section is to provide the opportunity for the project team to include additional economic analysis that helps to justify investment in the proposed project. This section can play a particularly important role in providing empirical evidence that the program addresses a clear identifiable problem and targets the right beneficiary population. It can also provide evidence on the potential effectiveness of the proposed solution. If it provides this type of evidence, it can be referred to in Section 3: Program Logic of the Development Effectiveness Matrix.

The types of additional analysis that might be presented will vary by sector but some possibilities can be seen in the following questions:

32. Has a distributional analysis been completed?

- One issue with CBA is that it does not consider the distribution of benefits and costs among different income groups. Distributional analysis is possible by disaggregating benefits (and possibly costs) across, for example, different expenditure groups or by poor and non-poor beneficiaries. Such an analysis can help support arguments that a project primarily benefits poor households.

33. Is there an empirical basis for project targeting?

- Projects often require targeting of a beneficiary population, usually poor households but sometimes based on additional criteria. If an analysis of data is used to target that population, this can be presented in this section. The data used should be noted, the procedure to conduct the targeting analysis and the conclusions from the analysis should be presented.

34. Are their externalities or other non-quantified benefits or costs that have not been included?

- Some project benefits or costs, including environmental externalities, may not be formally included in the CBA because of difficulties in monetizing values. If there is empirical evidence or an additional analysis that suggests these additional benefits would result from the project or that additional costs are negligible, this analysis can be presented.

35. Have calculations been made for cost recovery?

- Cost recovery is often included within projects for certain services provided by the public sector that stem from the project. The analysis done to determine the costs of services can be provided here.

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VII. CONCLUSIONS

The final section should clearly state the conclusions that should be drawn based on the presented analysis. The section should summarize the main lessons to be taken away from the analysis.

This section should provide a short answer to the following key question:

36. What are the main results and the corresponding recommendation for the Bank for financing this operation?

- The key conclusions from the analysis should be noted.
- The primary conclusions from the sensitivity analysis should be highlighted focusing on areas where the project may be particularly sensitive to achieving a sufficient return to the investment.
- The main conclusions from the additional analysis should be noted.
- Recommendations for financing the operation should be explicitly stated.

OPTION II: Cost Effectiveness Analysis

I. INTRODUCTION

The introduction section of the Economic Analysis Annex should provide the reader with a “quick view” of the type of analysis that was undertaken, its rationale and main assumptions, the main results of the evaluation and the potential limitations of the analysis. In other words, it should provide the reader with an “Executive Summary” of the Economic Analysis Annex.

Beyond noting that the analysis to be performed is CEA, the introduction should strive to provide short answers (that are to be developed, if applicable, in the appropriate sections in this Annex) to some or all of the following questions:

1. What is the objective of the project?

- The analysis and the nature of the analysis tools both differ if the objective is narrow or broad. If it is narrow, such as improving the delivery of schools supplies, the analysis will probably look at alternative ways of delivering the books to a target population, and success will be contingent on meeting that objective. If it is broad, such as reducing logistical costs in a region or a country, narrowing down alternatives and measuring success are both going to be based on a broader set of assumptions.
- The scope of the objective will also determine the choice of the analysis methods and tools. Ideally, the project’s objective should be linked with the expected impacts used in the subsequent analysis. As objectives broaden in scope, attribution becomes harder to determine, mainly because multiple causality chains can be present and multiple effects captured.

2. What are the components, how critical are they? How separable?

- The realization of expected project impacts (detailed in Section IV: Measures of Cost Effectiveness) is contingent on the effective application of a combination of inputs, grouped in components (See Section III: Economic Costs). Each component could potentially be justified and analyzed on its own, determining the cost effectiveness of the component in achieving a particular outcome.
- However, some components are more critical than others, and if outcomes can be more clearly identified and quantified for one or several of these components, then the CEA can be applied to those critical components.
- In many cases, particular effects are the result of the combination of components and attribution to a specific component is not possible. When undertaking a CEA that is based on only one of the components of the projects, special attention should be placed on attribution of that component to the measure being used.
- The introduction should clarify which components are being analyzed and whether they are done separately or jointly.

3. Why is this project the best alternative to meet the stated objective?

- In the selection of the alternatives, it is important to consider any plausible mutually exclusive alternatives that involve differing technological/institutional choices, financial arrangements, locations and beneficiaries (**Section II: Assumptions and Alternatives**). These alternatives should all be expected to influence the same indicator of impact. CEA allows the selection of the best available option which provides the lowest incremental costs per unit of incremental effect (which is to be presented in detail in **Section V: Assessment of Cost Effectiveness**).

4. How risky is the project and how vulnerable to changes in assumptions. Is this a “proven concept” or an innovation?

- A CEA is a forward looking attempt in capturing the economic impact of an investment or of a public policy initiative in a risky environment. Although **Section VI: Sensitivity Analysis** should present a complete sensitivity analysis, if the project is particularly risky, sensitive to changes in assumptions and/or innovative, this should be stated in the introduction.

5. Are the data/results in this appraisal consistent with the data/results presented in the POD, the DEM and the Results Matrix?

- The Economic Analysis Annex is an integral part of a set of instruments that justify that the Bank funds a specific project. Its costs and indicators of impact should be explicitly linked to the project budget and projected cash flows, to the results framework, to the set of outcome and impact indicators included in the DEM and to the proposed impact evaluation, if applicable.

6. Is the project worthwhile undertaking on the basis of the economic calculations?

- This is the key question and its answer should be provided up front in the introduction. A discussion on the strength and credibility of the economic analysis should be included.

7. Did the analysis serve in changing the proposed project?

- Economic analysis is a tool that is designed to help select projects that add to national welfare. It is most useful if used early in the project cycle to identify bad alternatives and bad components. If used late in the cycle, its usefulness is restricted to helping decide whether to proceed or not with a particular design. When a CEA is undertaken solely for the purpose of justifying a particular alternative, its usefulness is restricted to that particular purpose. If the analysis influenced the design of the project, it should be noted.

II. ASSUMPTIONS AND ALTERNATIVES

Any forward looking economic analysis needs to be explicit in the assumptions that are required for both attribution and causal linkages (the theory of change); the methodologies used to estimate costs and impact on chosen outcomes, the rationale behind these assumptions, and an analysis of their relative strengths and weaknesses. Key data and data sources need to be reported in order to promote transparency and facilitate review. The Economic Analysis Annex and related files should include the necessary details so that a third party can replicate the results.

The most fundamental question in CEA is the establishment of alternative scenarios. Ideally alternative scenarios should be derived from rigorous impact evaluations that can be validly applied to the project, possibly from pilot or other similar projects that are externally valid to the one under analysis. In most cases, explicit assumptions will need to be made to compensate for the limited information on the alternatives. All of these assumptions – and any others that are germane to the analysis – should be spelled out in this section.

This section should at a minimum provide answers to the following questions:

8. What are the alternatives?

- CEA compares the cost per unit of effect in a particular project or program option with the costs per unit of effects for alternatives. In some situations, this may be a project or program that would be displaced if the project under analysis is undertaken. In this case, the displaced project is often called the counterfactual.
- Satisfying any particular need (clean water, for example), or solving any particular challenge (reducing the crime rate, for instance) can be done in a myriad of ways. Alternatives should always be specified as to addressing the same problem, solving the same challenge. Alternatives share the problem and differ as to the solution. Alternatives can only be compared when addressing the same or similar challenge.
- As any problem can be addressed in many ways, it should be taken into account that the number of alternatives considered does have a cost and time implication and should be limited.
- All of these assumptions – and others that are germane to the analysis – should be spelled out in this section. Alternatives typically involve choices on scales, degrees of involvement (doing nothing, doing nothing plus, upgrading), timing in investing, institutional designs and technological choice.

9. What is the theory of change and how is attribution ensured?

- An explicit or implicit theory of change (how the project is supposed to deliver the results) is at the core of a good CEA. The estimation of both costs and impacts on key indicators requires that those impact indicators can be credibly attributed to the project and the causal links from inputs (the project's costs) and outputs (the project deliverables), to outcomes and impact can be credibly established. The theory of change embedded in the CEA should explore the conditions and assumptions needed for the change to take place. If the analysis is being based on a rigorous impact evaluation, the attribution and change theory should be embedded in the impact evaluation study.

10. What numeraire is used?

- Although less critical than in CBA, the choice of unit of account or *numeraire* is one of the first decisions early in a CEA. Any good or service can be valued at domestic or at border price levels and the analysis can be conducted in domestic or foreign currency. In any case, the unit of account has to be consistent throughout the analysis.
- The three most used alternatives are: (i) domestic currency at domestic price levels, where prices of traded goods and services are taken at the border price and converted into domestic currency by a shadow exchange rate, and non-traded goods and services are typically taken at their market prices, if no major distortions are present; (ii) domestic currency at border price levels, where all imports and exports are taken at the border price and converted into national currency at the market exchange rate, and non-tradeables are converted into border prices by a “conversion factor”; (iii) foreign currency at border price levels, the prices of all tradeables remain in foreign currency and non tradeables are converted to the border price using a conversion factor and to foreign exchange with the market rate.
- The choice is mostly a matter of convenience and should have no impact on relative prices or on the decision to accept or not a project. Nevertheless, as most financial flows, and most non-financial costs, are typically expressed in domestic prices at domestic price levels, it is suggested that this be used as *numeraire*.

11. What prices are used?

- Regardless of the choice of *numeraire* and price level, all the analysis should be consistently expressed in either nominal or real terms (adjusted for inflation).
- If relative prices are expected to remain relatively constant, the analysis should be presented in real terms, using a general price deflator for all nominal flows, such as an implicit GDP deflator or a consumer/producer price index. If relative prices are expected to change (for example oil), it is suggested that the project flows be constructed in nominal terms and then converted to real terms with a general price index.

12. What are the key aspects of the methodology?

- Any estimation of costs is based not only on the assumptions on the future evolution of market (and shadow) prices and quantities, but also on the methods used in estimating costs that cannot be derived directly from market valuations. The choice of methodology is critical in ascertaining the validity of the results and key aspects of the employed methodology should be noted in this section.
- In many specific markets, it might be important to correct for significant price distortions that can range from foreign exchange under or over valuation, traded goods and non traded (for example labor market) disequilibria, or market prices that do not reflect true economic opportunity costs as they include taxes and subsidies. If any of these issues is relevant to a specific project, it should be noted and proper corrections introduced in the analysis. In many occasions, shadow prices can be derived from published studies or can be derived from the estimation of conversion factors. In any case, it is important to be consistent in the choice of the unit of record, or numeraire (local consumption or foreign exchange).
- CEAs report effectiveness for an intermediate outcome or a final outcome measure, but often not both. If an intermediate outcome is used, the link between this and final effects should be noted within the theory of change. Ideally, intermediate effects will be carefully linked to final effects through assuming an unknown parameter or estimating it with a further statistical model. The assumed link between any intermediate outcome and final outcome should be noted in this section.
- Impact evaluations provide in many instances critical information on potential outcome and impact indicators and the evidence from impact evaluations and the relevance of these for the CEA should be noted. It is important to benchmark impacts with existing literature and ensure consistency with existing evidence, and relevant case studies.

13. Should effects be discounted?

- In cost effectiveness analysis, if both costs and effects occur over time, both should be discounted to Present Value terms (or annual equivalent if that is relevant). A failure to discount effects – when costs are discounted – will lead to inaccurate results.

14. What is the analysis period and how are future values discounted?

- Typically the investment period of a Bank project will range between 1 and 5 years. Impacts occur over a longer period. The length of the evaluation period should be noted and justified. In practice, the relevant horizon is obviously affected by the discount rate used. With a 12% discount rate, a horizon of more than 20 years is probably not going to impact your cost calculations.
- Projects require that future costs flows be discounted to account for the opportunity cost of capital. It is recommended that a 12% real discount rate be used in all of Bank projects.

II. ECONOMIC COSTS

The perspective to consider in an economic analysis of a Bank-funded project is a societal perspective, which means that costs should incorporate not only costs to the public sector, but costs to the other sectors in the economy including non-governmental organizations, firms, households and individuals. Costs included in the analysis should not necessarily only be those included in the budget of the project, but also other costs to the government, such as future operation and maintenance, and other associated societal costs. All costs should be incremental costs of the intervention and methods should be used to ensure that only incremental costs are included.

This section should include the appropriate cost data in the CEA table and strive to provide short answers to the following key questions:

15. What costs are identified in the project?

- There are different approaches to identifying costs including the ingredient method which relies on the identification of all resources or ingredients consumed in an intervention and the valuation of each ingredient. The specification of ingredients is often facilitated by dividing ingredients into categories including (1) personnel, (2) facilities, (3) equipment and materials, (4) other program inputs, and (5) beneficiary or client inputs.
- For Bank-funded projects, public sector costs are identified in project documents and the ingredient method is most useful in identifying other costs such as operation and maintenance costs and non-public sector societal costs.
- Note that sunk costs should not be included in the costs of the project. Sunk costs are costs that were incurred in the past and are connected with the proposed project. Since such costs have already been incurred and can no longer be avoided they should be ignored in the analysis.

16. What public sector costs for the project investments are included?

- Project documents lay out investments and non-recurring costs explicitly as part of project preparation and there should be consistency between what is noted in the project and what is identified as project costs, including costs that are part of the loan as well as counterpart costs.
- Transfers are included in many social interventions. The transfers are a cost to the government but are a benefit to recipients so should be excluded from a social cost estimate. Inclusion of the transfer payment in the costs of a CEA explicitly assumes a government perspective. Given the importance of these costs to the government, CEAs are sometimes done with and without transfer payments to get an estimate of their effect on the cost effectiveness ranking.

17. What are the additional operational and maintenance costs or other recurring costs to the public sector?

- If the project establishes new government entities or invests in new infrastructure that requires funds for operation and maintenance or other recurring costs beyond the project timeframe these should be included. These are incremental costs beyond what would have been paid for in operation and maintenance without the project.
- Failing to include these costs assumes that either there are no incremental costs within the project or some form of cost recovery for services rendered is in place.
- The manner in which these costs are estimated should be clearly noted including the prices used and the sources of those prices.

18. What other costs to society including nongovernmental organizations, firms, households or individuals should be incorporated?

- Any additional costs to non-public entities that result from the project should be included. Each cost to society should be identified and the manner in which costs are noted clarified. In general, all inputs (costs) that contribute to the generation of impact should be included.
- These costs depend largely on the project and linked to the response required by project beneficiaries to obtain the benefits of the project. For example, if a land formalization program requires time to register land, this should be included.
- The manner in which these costs are estimated should be clearly noted including the prices used and the sources of those prices.

19. What are the total flows of costs in the project?

- All types of costs should be noted and aggregated to get the total cost flows and the present value of those costs flows. It should be clear that all of these costs are incremental and the manner in which they are measured should be transparent. The costs flows should be presented within a clearly designated table.

III. MEASURES OF COST EFFECTIVENESS

Cost effectiveness analysis allows for the comparison of both the results or effects of the project or intervention and the economic costs incurred in order to achieve those results. The comparison between costs and effectiveness will allow the ranking of the alternatives or a comparison with similar interventions or projects. It is important to underline that cost effectiveness measures allow for the ranking of interventions that result in the same effect. Interventions with differing effects, or similar effects not measured equally **cannot** be compared and assessed comparatively.

This section should at a minimum provide answers to the following questions:

20. How are the objectives of the program or project linked to the measures of effectiveness?

- The measure of effectiveness (and cost effectiveness) should be directly linked with the stated objective of the project. In any project, there are many possibilities as to which measure of effectiveness to choose from. Effectiveness selection should be guided by two criteria: reliability and validity
- An indicator is said to be **reliable** if it yields similar results when applied repeatedly on the same individuals or populations. As most measures of effectiveness do not have entirely reliable indicators, it is suggested that the cost effectiveness analysis includes a reasonable range for these effects, if warranted. This can be included in **Section VI: Sensitivity Analysis**.
- An indicator is said to be **valid** if it has a close match to the underlying impact it is trying to capture. For instance, if a program's objective is to improve job performance and effectiveness is measured with a specific test, it is possible that beneficiaries perform well on the test but have poor job performance. In this case, the effectiveness measure (test score) has poor validity, as it does not capture the intended effect (improved job performance)
- When the analysis uses intermediate outcomes that have limited validity, it is suggested that the analysis – and justification – for the selected indicator be based on empirical evidence from secondary sources. This introduces a new level of assumptions to the analysis, which in turn can affect its reliability.

21. At what level should we measure cost effectiveness?

- Effectiveness can be measured at both outcome and impact levels. In some cases it can be necessary to resort to intermediate outcomes, if relevant outcome or impact information is scarce. If intermediate outcomes are used, evidence should be presented on the relationship and correspondence of these intermediate outcomes to the expected impact, if the objective is stated in those terms. Here again, by introducing additional assumptions into the analysis, its reliability decreases, so in these cases it is suggested that a deeper sensitivity analysis be undertaken.
- Cost effectiveness analysis, particularly at the intermediate outcome level, should not be confused with cost efficiency analysis. Cost efficiency analysis relates costs to level of inputs.

IV. ASSESSMENT OF COST EFFECTIVENESS

Once the cost effectiveness ratios have been calculated alternatives need to be assessed based on the calculated ratios. The alternative/project with the lowest cost effectiveness ratio should be noted and selected as the preferred approach.

This section should include a completed CEA table with all calculated cost effectiveness ratios and strive to provide short answers to the following key question:

22. Which alternative approach is acceptable and why?

- Alternatives should be ranked according to their cost effectiveness ratios with lower ratios being better.
- All of the considered alternative approaches should have cost effectiveness ratios that reflect the same impact, and the alternative with the lowest ratio should be selected.
- If more than impact or outcome is included, particular care should be placed in cost allocation to each.
- All costs and effects should be expressed in marginal or incremental terms.

V. SENSITIVITY ANALYSIS

Sensitivity analysis allows the testing, under different scenarios, of the strength and robustness of the assumptions, the data and the logic of the intervention that underlie the cost effectiveness analysis and to acknowledge the underlying uncertainty of the expected results. Any forward looking estimation presumes behavioral assumptions, assumptions on the vertical logic, and on the causality links that allow the attribution of an effect or cost to the goods and/or services delivered or used by the project. Given their forward looking nature, all estimates are also based on assumptions on the underlying data and on the future behavior and trajectory of the various variables. Many variable estimates are subject to some uncertainty and risks, which are external to the project.

In addition, it is necessary to undertake sensitivity analysis to compensate for the natural tendency for project appraisers to be overly optimistic. Many project parameters are affected by optimism, overstating impact and understating timings and costs, both capital and operational. To redress this “optimism bias” sensitivity analysis allows the project analyst to test the situation under which the drivers that determine impacts are “punished” (lowered or delayed), and those assumptions that determine costs are more stringent than the average expectation.

This bias is not a trivial matter. A statistically significant study on cost escalation in 258 transportation projects worldwide shows that cost underestimation cannot be explained by error but by overly optimistic projections. Sensitivity analysis should not be looking for the brighter picture, but rather explaining what might happen in the rainy days.

This section should at a minimum provide answers to the following questions:

23. What are the critical drivers and the switching triggers of costs and effects?

- In many instances both costs and effects are driven by a few critical factors. Identifying these factors – that can be called “drivers” - is a central element in performing a good sensitivity analysis. The assumptions behind the future performance of these drivers need to be critically assessed and the sensitivity analysis can illuminate at which points in these assumptions the project is no longer worth pursuing. These values are typically called “switching values.”
- In a sensitivity analysis, it is important to focus on “what if” situations, particularly in adverse or more stringent and acid scenarios than those assumed under a Base Case scenario. This focus will allow the analysis to illuminate those values in critical variables and assumptions that might “switch” the recommendation from Go to No Go (or vice-versa) or to reformulate project design and / or components in order to make the project viable. As there are many sources of uncertainty and numerous risks, it can be very useful to identify the key sources of uncertainty and base the analysis on those. Sometimes having too much information does not provide guidance as to the viability of the project under different situations.
- The sensitivity analysis, which is really a risk assessment, should be coherent with the Risk Matrix and other risks discussed in the project proposal.
- Many projects face significant start and implementation delays. If warranted, a simulation should be undertaken delaying start and implementation dates.

24. How “Base” is the Base Case scenario?

- A Base Case reflects the most plausible estimates for unknown quantities, cost pricing and effects and should reflect the average expectation on their future behavior, particularly of cost and effect drivers. This average expected behavior should be empirically based. The more useful sensitivity analysis are those that present few explicit and reasoned changes on the assumptions of the most critical values of the drivers of the dominant effects and costs, many times in a “best case, worse case” situation.

25. Are these factors interrelated?

- Sensitivity analysis can be “one way” or “multi-way”.
- One way sensitivity analysis allows for the variation of one critical variable at a time, holding everything else constant. Some authors call this “partial sensitivity analysis”. This kind of analysis is most appropriately applied to situation in which the analyst believes there is one critical driver.
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- In a single factor sensitivity analysis, it is generally assumed that all other factors stay constant. In many projects, this might not be true and the variables might not be independent. In those cases, a discussion on correlation issues is warranted.

26. How can the project uncertainties and risks be mitigated and how do these mitigation measures affect the project's outcome?

- Sensitivity analyses can also help, if the feasibility of a project is very sensitive to a particular assumption on the value of a variable or effect that is uncertain, in identifying mitigating actions that should be considered. If there is exceptional uncertainty, the project might have to be redesigned if implemented on a pilot basis.

27. Are the projected scenarios empirically based?

- Sensitivity analysis is most useful if the proposed scenarios and adjustments are empirically based and/or reflect the unique characteristics of the project in hand—how good and reliable is the data. As with the initial assumptions used in an analysis, ideally the scenarios are empirically based.

VIII. ADDITIONAL ANALYSIS (OPTIONAL)

The purpose of this optional section is to provide the opportunity for the project team to include additional economic analysis that helps to justify investment in the proposed project. This section can play a particularly important role in providing empirical evidence that the program addresses a clear identifiable problem and targets the right beneficiary population. It can also provide evidence on the potential effectiveness of the proposed solution. If it provides this type of evidence, it can be referred to in *Section 3: Program Logic* of the Development Effectiveness Matrix.

The types of additional analysis that might be presented will vary by sector but some possibilities can be seen in the following questions:

28. Is there an empirical basis for project targeting?

- Projects often require targeting of a beneficiary population, usually poor households but sometimes based on additional criteria. If an analysis of data is used to target that population, this can be presented in this section. The data used should be noted, the procedure to conduct the targeting analysis and the conclusions from the analysis should be presented.

29. Are their externalities or other non-quantified impacts or costs that have not been included?

- Some project impacts or costs, including environmental or health externalities, may not be formally included in the CEA because of difficulties in quantifying values or because they are not the primary indicator considered in the CEA. If there is empirical evidence or an additional analysis that suggests these additional benefits would result from the project or that additional costs are negligible, this analysis can be presented.

30. Have calculations been made for cost recovery?

- Cost recovery is often included within projects for certain services provided by the public sector that stem from the project. The analysis done to determine the costs of services can be provided here.

IX. CONCLUSIONS

The final section should clearly state the conclusions that should be drawn based on the presented analysis. The section should summarize the main lessons to be taken away from the analysis.

This section should provide a short answer to the following key question:

31. What are the main results and the corresponding recommendation for the Bank for financing this operation?

- The key conclusions from the analysis should be noted—what is the most cost effective approach?
- The primary conclusions from the sensitivity analysis should be highlighted focusing on areas where the project may be particularly sensitive to being the most cost effective approach.
- The main conclusions from the additional analysis should be noted.
- Recommendations for financing the operation should be explicitly stated.

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