**Understanding Cost-Benefit Analysis**

Before building a new plant or taking on a new project, prudent managers conduct a cost-benefit analysis to evaluate all the potential costs and revenues that a company might generate from the project. The outcome of the analysis will determine whether the project is financially feasible or if the company should pursue another project.

In many models, a cost-benefit analysis will also factor the [opportunity cost](https://www.investopedia.com/terms/o/opportunitycost.asp) into the decision-making process. Opportunity costs are alternative benefits that could have been realized when choosing one alternative over another. In other words, the opportunity cost is the forgone or missed opportunity as a result of a choice or decision.

Factoring in opportunity costs allows project managers to weigh the benefits from alternative courses of action and not merely the current path or choice being considered in the cost-benefit analysis. By considering all options and the potential missed opportunities, the cost-benefit analysis is more thorough and allows for better decision-making.

Finally, the results of the aggregate costs and benefits should be compared quantitatively to determine if the benefits outweigh the costs. If so, then the rational decision is to go forward with the project. If not, the business should review the project to see if it can make adjustments to either increase benefits or decrease costs to make the project viable. Otherwise, the company should likely avoid the project.

With cost-benefit analysis, there are a number of forecasts built into the process, and if any of the forecasts are inaccurate, the results may be called into question.

**The Cost-Benefit Analysis Process**

There is no single universally accepted method of performing a cost-benefit analysis. However, every process usually has some variation of the following five steps.

Identify Project Scope

The first step of a cost-benefit analysis is to understand your situation, identify your goals, and create a framework to mold your scope. The project scope is kicked off by identifying the purpose of the cost-benefit analysis. An example of a cost-benefit analysis purpose could be "to determine whether to expand to increase [market share](https://www.investopedia.com/ask/answers/031815/what-strategies-do-companies-employ-increase-market-share.asp)" or "to decide whether to renovate a company's website".

This initial stage is where the project planning takes place, including the timeline, resources needed, constraints, personnel required, or evaluation techniques. It is at this point that a company should assess whether it is equipped to perform the analysis. For example, a company may realize it does not have the technical staff required to perform an adequate analysis.

During the project scope development phase, key stakeholders should be identified, notified, and given a chance to provide their input along the process. It may be wise to include those most impacted by the outcome of the analysis depending on the findings (i.e. if the outcome is to renovate a company's website, IT may be required to hire multiple additional staff and should be consulted).

Determine the Costs

With the framework behind us, it's time to start looking at numbers. The second step of a cost-benefit analysis is to determine the project costs. Costs may include the following.

* Direct costs would be direct labor involved in manufacturing, inventory, [raw materials](https://www.investopedia.com/terms/r/rawmaterials.asp), manufacturing expenses.
* Indirect costs might include electricity, overhead costs from management, rent, utilities.
* [Intangible costs](https://www.investopedia.com/terms/i/intangiblecost.asp) of a decision, such as the impact on customers, employees, or delivery times.
* Opportunity costs such as alternative investments, or buying a plant versus building one.
* Cost of potential risks such as regulatory risks, competition, and environmental impacts.

When determining costs, it's important to consider whether the expenses are reoccurring or a one-time cost. It's also important to evaluate whether costs are variable or fixed; if they are fixed, consider what step costs and relevant range will impact those costs.

*"Costs" can be financial (i.e. expenses recorded on an income statement) or non-financial (i.e. negative repercussions on the community).*

Determine the Benefits

Every project will have different underlying principles; benefits might include the following:

* Higher [revenue](https://www.investopedia.com/terms/r/revenue.asp)and sales from increased production or new product.
* Intangible benefits, such as improved employee safety and morale, as well as customer satisfaction due to enhanced product offerings or faster delivery.
* [Competitive advantage](https://www.investopedia.com/terms/c/competitive_advantage.asp) or market share gained as a result of the decision.

An analyst or project manager should apply a monetary measurement to all of the items on the cost-benefit list, taking special care not to underestimate costs or overestimate benefits. A conservative approach with a conscious effort to avoid any subjective tendencies when calculating estimates is best suited when assigning a value to both costs and benefits for a cost-benefit analysis.

Analysts should also be aware of the challenges in determining both explicit and implicit benefits. Explicit benefits require future assumptions about market conditions, sales quantities, customer demands, and product expectations. Implicit costs, on the other hand, may be difficult to calculate as there may be no simple formula. For example, consider the example above about increasing employee satisfaction; there is no formula to calculate the financial impact of happier workers.

Compute Analysis Calculations

With the cost and benefit figures in hand, it's time to perform the analysis. Depending on the timeframe of the project, this may be as simple as subtracting one from another; if the benefits are higher than the cost, the project has a net benefit to the company.

Some cost-benefit analysis require more in-depth critiquing. This may include:

* Applying [discount rates](https://www.investopedia.com/terms/d/discountrate.asp) to determine the net present value of cashflows.
* Utilizing various discount rates depending on various situations.
* Calculating cost-benefit analysis for multiple options. Each option may have a different cost and different benefit.
* Level-setting different options by calculating the cost-benefit ratio.
* Performing sensitivity analysis to understand how slight changes in estimates may impact outcomes.

Make Recommendation and Implement

The analyst that performs the cost-benefit analysis must often then synthesize findings to present to management. This includes concisely summarizes the costs, benefits, net impact, and how the finding ultimately support the original purpose of the analysis.

Broadly speaking, if a cost-benefit analysis is positive, the project has more benefits than costs. A company must be mindful of limited resources that might result in mutually-exclusive decisions. For example, a company may have a limited amount of capital to invest; although a cost-benefit analysis of an upgrade to its warehouse, website, and equipment are all positive, the company may not have enough money for all three.

Not all cost-benefit analysis that result in net benefit should be accepted. For example, a company must consider the project's risk, coherence to its company imagine, or capital limitations,

**Advantages of Cost-Benefit Analysis**

There's plenty of reasons to perform cost-benefit analysis. The technique relies on data-driven decision-making; any outcome that is recommended relies on quantifiable information that has been gathered specific to a single problem.

A cost-benefit analysis requires substantial research across all types of costs. This means considering unpredictable costs and understanding expense types and characteristics. This level of analysis only strengthens the findings as more research is performed on the state of outcome for the project that provides better support for [strategic planning](https://www.investopedia.com/financial-edge/0612/the-importance-of-strategic-planning.aspx) endeavors.

A cost-benefit analysis also requires quantifying non-financial metrics (i.e. what is the financial benefit of increased employee satisfaction?). Although this may be difficult to assess, it forces the analyst to consider aspects of the project that are more difficult to measure. The ultimate result of a cost-benefit analysis is to deliver a simple report that makes it easier to make decisions.

**Limitations of the Cost-Benefit Analysis**

For projects that involve small- to mid-level capital expenditures and are short to intermediate in terms of time to completion, an in-depth cost-benefit analysis may be sufficient enough to make a well-informed, rational decision. For very large projects with a long-term time horizon, a cost-benefit analysis might fail to account for important financial concerns such as inflation, interest rates, varying cash flows, and the [present value](https://www.investopedia.com/terms/p/presentvalue.asp) of money.

One of the benefits of using the net present value for deciding on a project is that it uses an alternative rate of return that could be earned if the project had never been done. That return is discounted from the results. In other words, the project needs to earn at least more than the rate of return that could be earned elsewhere or the discount rate.

However, with any type of model used in performing a cost-benefit analysis, there are a significant amount of forecasts built into the models. The forecasts used in any cost-benefit analysis might include future revenue or sales, alternative rates of return, expected costs, and expected future cash flows. If one or two of the forecasts are off, the cost-benefit analysis results would likely be thrown into question, thus highlighting the limitations in performing a cost-benefit analysis.

**Cost-Benefit Analysis**

Pros

* Requires data-driven analysis
* Limits analysis to only the purpose determined in the initial step of the process
* Results in deeper, potentially more reliable findings
* Delivers insights to financial and non-financial outcomes

Cons

* May be unnecessary for smaller projects
* Requires capital and resources to gather data and make analysis
* Relies heavily on forecasted figures; if any single critical forecast is off, estimated findings will likely be wrong.

What Are the 5 Steps of Cost-Benefit Analysis?

The broad process for a cost-benefit analysis is to set the analysis plan, determine your costs, determine your benefits, perform analysis of both costs and benefits, and to make a final recommendation. These steps may vary from one process to another.

What Is the Main Goal of Using a Cost-Benefit Analysis?

The main goal of cost-benefit analysis is to determine whether it is worth undertaking a project or task. This decision is made by gathering information on the costs and benefits of that project. Management leverages the findings of a cost-benefit analysis to support whether there are more benefits to a project or if it is more detrimental to a company.

How Do You Weigh Costs vs. Benefits?

Cost-benefit analysis is a systematic method for quantifying and then comparing the total costs to the total expected rewards of undertaking a project or making an investment. If the benefits greatly outweigh the costs, the decision should go ahead; otherwise, it should probably not. Cost-benefit analysis will also include the opportunity costs of missed or skipped projects.

What Are Some Tools or Methods Used in Cost-Benefit Analysis?

Depending on the specific investment or project being evaluated, one may need to discount the time value of cash flows using net present value calculations. A [benefit-cost ratio](https://www.investopedia.com/terms/b/bcr.asp) (BCR) may also be computed to summarize the overall relationship between the relative costs and benefits of a proposed project. Other tools may include [regression](https://www.investopedia.com/terms/r/regression.asp) modeling, valuation, and [forecasting](https://www.investopedia.com/terms/f/forecasting.asp) techniques.

What Are the Costs and Benefits of Doing a Cost-Benefit Analysis?

The process of doing a cost-benefit analysis itself has its own inherent costs and benefits. The costs involve the time needed to carefully understand and estimate all of the potential rewards and costs. This may also involve money paid to an analyst or consultant to carry out the work. One other potential downside is that various estimates and forecasts are required to build the cost-benefit analysis, and these assumptions may prove to be wrong or even biased.

The benefits of a cost-benefit analysis, if done correctly and with accurate assumptions, are to provide a good guide for decision-making that can be standardized and quantified. If the cost-benefit analysis of doing a cost-benefit analysis is positive, you should do it!

**The Bottom Line**

Some complex problems require deeper analysis, and a company can use cost-benefit analysis when it isn't abundantly clear whether or not to pursue an undertaking. By determining the expenses and identifying what will be favourable, a company can simplify the decision-making process by synthesizing a cost-benefit analysis.

**TEMPLATE OF COST-BENEFIT ANALYSIS**

The Cost Benefit Analysis (CBA) analyses and evaluates, from a cost and benefit perspective, the candidate solutions to meet the stated need. It will also describe the feasible alternatives, all tangible and intangible benefits, and the results of the analysis. The feasible alternatives may be documented in more detail in a separate document, shown in Appendix C-4, Feasibility Study. This CBA will discuss which system costs are analyzed, present the total costs for all the years the analysis covers, and outline the comparison between the costs of each alternative and the tangible benefits of the same.

**Note:**An urgent business need or external stakeholder pressure may dictate the use of an alternative development work pattern that may not identify, evaluate, or document alternative solutions. If no feasible alternatives are identified, the CBA methodology must be tailored to evaluate the costs and benefits of the proposed IT investment, without extensive analysis of alternative solutions.

**1.0      OVERVIEW**

This section describes and discusses the value added to the systems project by the CBA, and the justification for it as documented in various OMB publications.

**1.1      Purpose**

This section discusses the business need the CBA is trying to address, that is, the decision the DOJ (or component) is trying to make.

**1.2      Scope**

This section states the scope of CBA.

**1.3      Methodology**

This section describes and discusses the CBA methodology employed and its relationship to the SDLC work pattern to be used by the project team.

**2.0      ASSUMPTIONS, CONSTRAINTS, AND CONDITIONS**

This section discusses assumptions, constraints, and conditions that may effect the results of this CBA. These assumptions, constraints, and conditions form the foundation on which the CBA is based; a change in any one of these could cause a change in benefits as well as costs.

**2.1      Assumptions**

The assumptions are explicit statements used to describe the present and future environment on which an analysis is based. The assumptions relative to the project system may include:

**•**All data (that is, cost figures, workload statistics, benefit values, etc.) used in this analysis  
 are assumed to be accurate, reliable, and valid.  
**•**The reslts of this analysis could be skewed by inaccurate or different data.  
**•**The expected useful life of the system is 5-7 years.

**2.2      Constraints**

The constraints are factors, external to the program, which can limit the development of the application or the availability of performance data from the current system. The constraints relative to the project may include:

**•**Any technology considered must be able to meet the minimum business requirements of the DOJ (or components).  
**•**The programs and investments become cost ineffective if this is not the case.

**2.3      Conditions**

**•**The conditions are unique factors in the operating environment that may influence system  
 processes. The conditions relative to the project may include:

**•**The technology used must allow integration into the existing or proposed environment.

**•**Redundant investment if more than one production platform is used

**•**All alternatives must adhere to the DOJ Technical Reference Model.

**•**Alternatives implementing intranet or internet services will be in accordance with  
 Departmental policy.

**3.0      FEASIBLE ALTERNATIVES**

This section identifies alternative solutions that will meet the needs and requirements outlined for the Program. The results of the corresponding Feasibility Study are used as a starting point into an analysis of costs and benefits for the Feasible Alternatives identified in that document. Each Feasible Alternative is analyzed as described in the subsequent sections.

This section discusses the Feasible Alternatives, which are technology solutions that meet the outlined high-level functional requirements. Feasible Alternatives could also be identified in a Feasibility Study (see Appendix C-4).

Also describe, in a few sentences, the architecture on which the system will operate. This can be related to the local area network, wide area network, office automation, workstation, and e-mail architecture already in place at the locations of deployment. The analysis should address conformance with the Technical Reference Model (TRM) and all costs associated with upgrades or new development efforts. This section may need to be updated during the life of the system development project to include any changes or additions to the architecture.

**Note:**An urgent business need or external stakeholder pressure may dictate the use of an iterative alternative development work pattern that may not identify, evaluate, or document alternative solutions. If no Feasible Alternatives are identified, mark this section as Not Applicable.

**3.1      Alternative 1**

This section briefly describes the alternative, its components, and how it will work. Describe how this alternative meets the high-level functional requirements. Explain how this alternative was chosen from a wide variety of alternatives, if a separate feasibility study is not developed.

**3.2      Alternative n**

Repeat Section 4 for as many alternatives as exist for the Feasibility Study. At a minimum every system investment has a minimum of two alternatives: fund on-going maintenance or status quo, and fund on-going maintenance plus enhancements.

**4.0      COST ANALYSIS**

The Cost Analysis presents the costs for design, development, installation, operation, maintenance and disposal, and consumables for the system to be developed. This profile is used to analyze the costs of the system for each year in its life cycle, so those costs can be weighed against the benefits derived from using it. In accordance with OMB Circular A-94, the system is fully cost-accounted, including all spending resources, whether appropriated or non-appropriated.

**4.1      Cost Categories**

Exhibit 4A, Cost-Related Terms, defines cost-related terms used in the Cost Analysis [the suggested line items may not be a complete list]:

**Exhibit 4A: Cost-Related Terms**

|  |  |
| --- | --- |
| **Terms and Definitions** | **Line Item** |
| **Nonrecurring Costs**: Nonrecurring costs are developmental and capital investment costs incurred only once during the analysis, design, development, and implementation of the system. | * System development * Prototypes * Hardware purchase * Module design, development, and integration * System installation * Personnel |
| **Recurring Costs:**Recurring costs are incurred more than once throughout the life of the system and generally include operation and maintenance costs. | * Operations and Maintenance * Telecommunications * Supplies * Hardware and software upgrades, maintenance, and licenses * Personnel * Travel and training |

[[D]](https://www.justice.gov/archive/jmd/irm/lifecycle/dlinkpage.htm#exhibit4a)

**4.2      Project Cost Analysis**

The costs for system design, development, installation, operations, and maintenance are presented in Exhibit 4B, Cost Analysis. This section gives a brief explanation of the cost calculations for each year.

This section explains that the costs for future years are discounted as per OMB A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. The Year of OMB Circular real discount rate for the number of years, and the percentage rate from OMB A-94, are used to derive the discount factors used in the cost calculations. Discount factors are applied to the future years to provide an appropriate net present value (NPV) for the system costs. Because of inflation, a dollar today is worth less than in the future. It is important to recognize that dollar values of both benefits and costs associated with a project decrease over time because of inflation.

**Exhibit 4B: Cost Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Alternative 1** | **Alternative 2** | **Alternative 3** |
| **Year One** |  |  |  |
| Nonrecurring costs |  |  |  |
| Recurring costs |  |  |  |
| **Year Two** |  |  |  |
| Nonrecurring costs |  |  |  |
| Recurring costs |  |  |  |
| **Year Three** |  |  |  |
| Nonrecurring costs |  |  |  |
| Recurring costs |  |  |  |
| **Total Costs** |  |  |  |

[[D]](https://www.justice.gov/archive/jmd/irm/lifecycle/dlinkpage.htm#exhibit4b)

A detailed description of cost breakdowns should be developed to explain exactly how all cost calculations are presented. Discount rates should be applied where appropriate and documented as part of the explanation. Current OMB acceptable rates to be used can be found in a current version of the OMB Circular A-94. If necessary, a line by line cost accounting should be presented if the analysis is placed under any scrutiny.

**5.0      BENEFIT ANALYSIS**

This section analyzes the alternatives' individual ability to meet the goals of the project.

**5.1      Key Benefit Terms**

Exhibit 5A, Key Benefit Terms, lists and defines key terms used in this section. Definitions for other terms used in this section may be found in Section 11, Glossary and Acronyms *.*

**Exhibit 5A: Key Benefit Terms**

|  |  |
| --- | --- |
| **Term** | **Definition** |
| Tangible Benefits | Benefits are expressed in dollars or in units. The result of tangible benefits may be: increased revenue, streamlined production, or saved time and money. For purposes of this analysis, tangible benefits are expressed in dollar values so that a valid comparison can be made with costs.  The benefits for future years are discounted as per OMB A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. |
| Intangible Benefits | Benefits are expressed in terms of improved mission performance,  improved decision making, or more reliable or usable information. These  benefits may be quantifiable, but cannot be expressed in dollar values.  Many public goods are difficult to reliably and validly quantify in dollar  units; however, intangible benefits are vital to understanding the total  outcome of implementing a particular IT system. |

[[D]](https://www.justice.gov/archive/jmd/irm/lifecycle/dlinkpage.htm#exhibit5a)

**5.2      Tangible Benefits**

This section provides a detailed description of the tangible benefits. Because each alternative may not provide the same benefits, it is necessary to note which alternatives provide which benefits.

This section also describes, in detail, the source(s) of data used to quantify the benefit for each alternative and presents a chart that depicts the calculations for that benefit. It is important to provide sufficient documentation of data sources and calculations so that readers can follow the logic of the quantification of benefits.

Exhibits 5A, Tangible Benefit 1, and 5B, Annual Savings (Based on Average X Million Transactions per Annum), detail this information. Repeat this for each tangible benefit.

**Exhibit 5A: Tangible Benefit 1**

|  |  |  |
| --- | --- | --- |
| **Measurement** | | |
| **Current Value** | **Alternative 1** | **Alternative n** |
|  |  |  |
| Savings |  |  |

**Exhibit 5B: Annual Savings (Based on Average X Million Transactions per Annum)**

|  |  |  |
| --- | --- | --- |
| **Annual Transaction Times** | | |
| **Current** | **Alternative 1** | **Alternative n** |
|  |  |  |
| Savings |  |  |
| **FTE Savings** | | |
|  |  |  |
| **FTE Savings** | **X FTEs** | **Y FTEs** |
| **Dollar Savings (Based on FTE Salary of $X per Annum)** | | |
|  |  |  |
| Dollar Savings |  |  |

In a paragraph or two following the benefit description, each calculation should be explained and data sources, such as the current Federal general schedule, should be cited for any data used. Each benefit should be calculated out for the number of projected years for each alternative. Benefits and costs for each alternative should be calculated for the same number of years to provide an accurate cost benefit comparison.

**5.3      Summary of Tangible Benefits**

Exhibit 5C, Tangible Benefits, summarizes the quantifiable benefit value for each alternative.

**Exhibit 5C: Tangible Benefits**

|  |  |  |
| --- | --- | --- |
|  | **Alternative 1** | **Alternative n** |
| Benefit 1 |  |  |
| Benefit n |  |  |
| **Total Benefit** |  |  |

Exhibit 5D, Summary of Project Tangible Benefits: Expected Return, summarizes the tangible benefits described above. Exhibit 5E, Intangible Benefits Alternative 1, shows the expected return from tangible benefits for three years, allowing for an accurate comparison with the three year costs in Section 4, Feasible Alternatives. Exhibit 5F, Intangible Benefits Alternative n, illustrates a comparison of the tangible benefits for each alternative as well as each technology solution as part of each alternative.

**Exhibit 5D: Summary of Project Tangible Benefits: Expected Return**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tangible Benefit 1** | | | | |
|  | **FY99** | **FY00** | **FY01** | **Total** |
| **Alternative 1** |  |  |  |  |
| **Alternative n** |  |  |  |  |
| **Tangible Benefit n** | | | | |
|  | **FY99** | **FY00** | **FY01** | **Total** |
| **Alternative 1** |  |  |  |  |
| **Alternative n** |  |  |  |  |
| **Total Benefits** | | | | |
|  | **FY99** | **FY00** | **FY01** | **Total** |
| **Alternative 1** |  |  |  |  |
| **Alternative n** |  |  |  |  |

If any of the alternatives does not provide one of the benefits, be sure to indicate this by placing a zero in the box and providing a brief explanation of why.

**5.4      Intangible Benefits**

Although no quantifiable dollar value has been placed on these benefits, if they need to be related to value in some way if they influence the decision. The intangible benefits for each alternative may either be the same or different. It is important to include all intangible benefits.

**Exhibit 5E: Intangible Benefits Alternative 1**

|  |  |
| --- | --- |
| **Intangible Benefits** | **Description** |
| Intangible Benefit 1 |  |
| Intangible Benefit n |  |

**Exhibit 5F: Intangible Benefits Alternative n**

|  |  |
| --- | --- |
| **Intangible Benefits** | **Description** |
| Intangible Benefit 1 |  |
| Intangible Benefit n |  |

For each alternative, include a table in the same format as the above exhibits.

**5.5      Summary of Intangible Benefits**

Exhibit 5G, Summary of Intangible Benefits: Expected Return, summarizes the values of intangible benefits.

**Exhibit 5G: Summary of Intangible Benefits-- Expected Return**

|  |  |  |
| --- | --- | --- |
| **Intangible Benefits** | **Alternative 1** | **Alternative n** |
| Intangible Benefit 1 |  |  |
| Intangible Benefit n |  |  |

This table should be used to indicate if an alternative provides an intangible benefit for comparison purposes. A checkmark can be placed in each alternative box that does provide the particular benefit. It should be noted that if a tangible benefit can be valued in unit terms but cannot be valued in dollars, the unit valuation should be presented in some manner and the alternatives should be ranked for that intangible alternative.

**6.0      COMPARISON OF COSTS AND BENEFITS FOR PROJECT**

Once you have determined the discounted values of costs and benefits, you need to compare each alternative. Several tools commonly used to rank projects and compare alternatives are Net Present Value (NPV), Benefits cost Ratio (BCR), Return on Investment (ROI), Discounted Payback Period (DPP), and Internal Rate of Return (IRR).

This section compares the discounted costs and benefits for the project. The first part of the comparison examines the tangible benefits and the second part examines intangible benefits. The purpose of this comparison is to identify if tangible and intangible benefits outweigh the total cost of the system.

**6.1      Results of the Comparison for Project-- Tangible Benefits**

Exhibit 6A, Project Cost to Tangible Benefit Comparison, compares the costs and tangible benefits of the Project. Identify which comparison tool was used.

**Exhibit 6A: Project Cost to Tangible Benefit Comparison**

|  |  |  |
| --- | --- | --- |
|  | **Alternative 1** | **Alternative n** |
| Total Tangible Benefits |  |  |
| Total Costs |  |  |
| Difference Between Costs and Benefits |  |  |

**6.2 Results of the Comparison for Project-- Intangible Benefits**

Exhibit 6B, Intangible Benefit Comparison-- Expected Return, compares the intangible benefits of the Project.

**Exhibit 6B: Intangible Benefit Comparison-- Expected Return**

|  |  |  |
| --- | --- | --- |
|  | **Alternative 1** | **Alternative n** |
| Intangible Benefits |  |  |
|  |  |  |

**7.0      SENSITIVITY ANALYSIS**

A sensitivity analysis assesses the potential effect on inputs (costs) and outcomes (benefits) that depends on the relative magnitude of change in certain factors or assumptions. A change in any factor (that is, area of uncertainty) can necessitate a revision to the cost-benefit projections or can influence system performance outcomes. This section examines key sources of uncertainty in the operational environment of the Project and what it is going to do. This may also rank the alternatives and see how sensitive they are to basic assumptions or externalities (political, social, and environmental). After costs and benefits are determined for each alternative, the alternatives are ranked and a sensitivity analysis is performed.

**7.1      Key Sources of Uncertainty**

Exhibit 7A, Sensitivity Results, lists the key factors that have implications for the Project. Projected costs and benefits could change depending on the extent of change in these factors.

**Exhibit 7A: Sensitivity Results**

|  |  |  |  |
| --- | --- | --- | --- |
| **Key Sources of Uncertainty** | **Extent of Impact** | **Nature of Impact** | **Implications** |
|  |  |  |  |
|  |  |  |  |

**7.2      Sensitivity Results**

Each of the key sources of uncertainty could have an effect on the benefits and costs of the project. The effect of each source of uncertainty is discussed in the subsequent section.

**8.0      RESULTS OF THE ANALYSIS**

The project CBA results are based on the work described in the previous sections. This work assesses the costs and benefits, both tangible and intangible, of the project and what it will do. The sensitivity of its costs and benefits to key sources of uncertainty are described in Section 8, Sensitivity Analysis. This section should list what the system will provide the agency. It should also discuss how well each alternative will achieve the goals of the system in context to the relative cost of that alternative. No specific recommendation should be made. Any CBA should be used by decision makers as a tool in conjunction with other studies and factors to determine the most appropriate investment choice for the agency to achieve its mission.

**Appendix A: REFERENCES AND DOCUMENTATION**

Documents used to obtain information for this CBA, including project alternatives, costs, benefits, uncertainties, and information regarding cost-benefit methodologies, are listed in the subsequent sections.

**Appendix B: GLOSSARY AND ACRONYMS**

The definitions and acronyms presented in this section are specific to this analysis. Although these terms and acronyms may have other meanings, those included in the subsequent sections are used in this analysis.