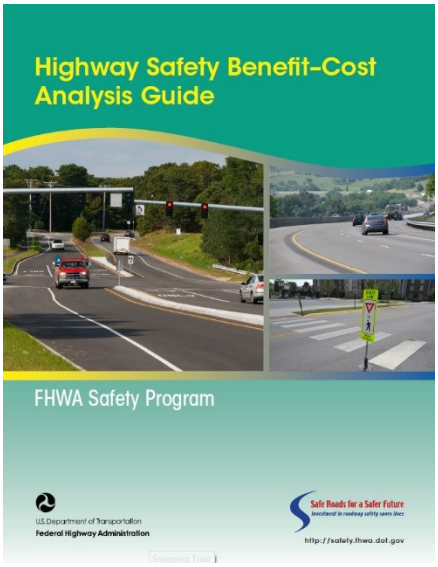
Highway Safety BCA Guide and Tool

Benefit Cost Analysis for Safety Countermeasures



GUIDE HIGHLIGHTS

Introduces BCA concepts such as: project costs and benefits, setting a base condition, project analysis period, and discounting.

Describes agency costs included in BCA such as initial construction, continuing, and end-of-life costs.

Describes methods for estimating and monetizing direct and indirect safety benefits with the implementation of a project. Direct safety benefits include changes in crash frequency and severity. Indirect benefits related to crash reductions include reduced travel time delay, improved travel time reliability, reduced fuel-related vehicle operating costs, and reduced mobile source emissions.

Provides example BCAs to assess alternatives, including projects with single countermeasures, projects with multiple countermeasures at the same location, and projects with multiple potential locations (e.g., systemic safety improvements).

Background

Transportation agencies consider various factors in comparing project alternatives and justifying investment decisions. Such factors may include:

- Safety performance.
- Operational efficiency.
- Environmental impacts and mitigation.
- Economic impacts.

Agencies quantify the operational, environmental, and economic impact of project alternatives using readily-available tools and resources. While the Highway Safety Manual and related tools are available to analyze the safety performance of project alternatives, there is a need to consider the complete lifecycle cost and benefits of projects, including direct and indirect safety benefits. Indirect safety benefits may include reduced delay, travel time, and emissions as a result of fewer crashes.

BCA Guide

The Office of Safety developed a Highway Safety Benefit-Cost Analysis Guide (the Guide) to assist transportation agencies in evaluating the direct and indirect safety benefits of project alternatives. The Guide is intended to meet the needs of transportation professionals conducting benefit-cost analysis (BCA) for highway safety projects and programs.

The target audience is transportation professionals, such as traffic and safety engineers or planners. The Guide assumes these professionals are not economists and may not have formal training in economic analysis. Readers will learn about basic BCA concepts and terminology as well as methods to monetize the direct and indirect safety benefits of projects.

The Guide is organized into nine chapters with the meat of the Guide concentrated in chapters 2 - 8. Chapter 2 presents fundamental BCA concepts. Chapter 3 and chapter 4 describe project costs and benefits, respectively. Chapter 4 also provides default values to monetize benefits. Chapter 5 identifies factors to consider when preparing for BCA. Chapter 6 describes how to estimate and monetize safety-related project benefits, including the expected change in crashes and resulting operational and environmental benefits. Chapter 7 provides four hypothetical examples to illustrate BCA concepts and demonstrate the use of the methods. The examples cover a range of scenarios, including site-specific and systemic safety approaches with single or multiple countermeasures. Chapter 8 presents considerations and options for communicating BCA results.

BCA Tool

Complementary to the Guide, the Office of Safety developed a spreadsheet-based tool (the Tool) to help conduct BCA for project alternatives. The Tool calculates present value costs and benefits as well as economic measures such as the benefit-cost ratio (BCR) and net present value (NPV). Decision-makers can use these measures to compare and rank project alternatives. In this way, the Tool provides a consistent, comprehensive, and reliable approach to estimate project costs and benefits.

The Tool requires basic data related to each project alternative. Users enter project costs, service life, discount rate, estimated crashes without the project, and expected safety effectiveness of the project. Users also enter general site characteristics such as annual average daily traffic (AADT) and facility type. Like the Guide, the Tool does not require any special economic expertise and provides default values for many of the inputs. While the tool provides default values, it also provides the flexibility to allow users to enter their preferred values for inputs such as crash costs and the value of time, fuel, and emissions.

Using the Tool, analysts may update the BCA as project alternatives are refined, and more accurate project costs and benefits become available. By refining the inputs at each step in the project development process, analysts can easily update data inputs and generate revised BCA results. After deployment, when the analyst knows the final project costs and actual effectiveness of the countermeasure, they can use the Tool to compare the actual benefits and costs to the expected benefits and costs.

Availability

Access the Highway Safety BCA Guide and Tool now at:
https://safety.fhwa.dot.gov/hsip/planning.cfm

Upon request, FHWA will provide training or technical assistance to State and local agencies on the Highway Safety BCA Guide and Tool. Please make a training request via: https://safety.fhwa.dot.gov/rsdp/technical.aspx.

The Guide's target audience is transportation professionals that may not have formal training in economic evaluation techniques.

BENEFITS OF BCA

Documentation of the decision process. Quantifying and valuing the benefits and costs of highway projects provides excellent documentation to explain the decision process to legislatures and the public.

Balance tradeoffs between project alternatives. BCA is used to consider and balance tradeoffs between project alternatives such as lowest delay cost or highest safety benefit to highway users.

Best return on investment. Economic analysis can assist in planning and implementing transportation programs with the best rate of return for any given budget, or can determine an optimal program budget.

Understanding of complex projects. In a time of growing public scrutiny of new and costly road projects, highway transportation agencies and other decision makers need to understand the comprehensive costs and benefits of these projects.

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