



## Methodology Guide:

# INPUT-OUTPUT ANALYSIS

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## Overview

Input-output analysis estimates how increased spending or employment ripples through the economy of a defined geographic area. It examines how activity in one industry impacts spending in others using inter-industry data and estimates the proportion of activity taking place within the study area versus activity that takes place outside of the study area.

This guide covers both economic impacts and economic contributions. *Economic impact* refers to economic activity in an area that results in impacts that would not be there without the spending being studied. *Economic contribution* refers to more general changes in the economy of a study area that can be attributed to the spending. An example of an input-output analysis is the result of spending by visitors living outside of the study area recreating in a protected natural area. In this same example, economic contributions would also include the results of spending by residents in the area who visit the protected natural area, who would likely be spending money in the study area regardless of the presence of the natural area.

This exercise can be done via what is called input-output modeling, which uses multipliers to estimate industry-level economic impacts, including direct, indirect, and induced impacts. For example, if a new visitor center is constructed, a construction company will be hired to do the work (a direct impact in the local economy from the construction company/industry). The money that the construction company spends on supplies and labor will generate increased output and help create jobs for the suppliers of the construction company (e.g., wood manufacturers, an indirect impact). The construction company workers then spend their earned wages in the local economy (e.g., restaurants, grocery stores, hotels, retail, transportation, etc., an induced impact).

Various ways to measure these impacts include total output, value added, employment, and earnings. *Output* is the total value of goods and services involved in transactions. *Value added* is the output minus the cost of the intermediate goods used as inputs. *Employment* is the number of jobs added through this economic activity. *Earnings* is the amount of salary paid to these employees.

There are several input-output modeling tools available, including [Economic Impact Analysis for Planning \(IMPLAN\)](#), [Regional Input-Output Modeling System \(RIMS II\) User's Guide](#), and [REMI PI+](#). Each has its own strengths and weaknesses in terms of cost, ease of use, and efficacy, so choosing which tool to use should incorporate these considerations.

## When to Consider

- You are interested in estimating how spending from a proposed project could ripple through a particular area as measured through various economic indicators, such as the number of jobs created.
- You have an issue that has implications for economic activity (e.g., restoration) and need to know what those implications are for that issue.
- You are engaging with audiences who are interested in the connection between the project and potential impacts (positive and negative) on the business community.
- You are examining the increase in business activity and tax revenue associated with a decision.

## Important Results

- This analysis provides economic indicators measuring the economic impact of the activity being studied in the analysis. These indicators include employment, earnings, value added, and output generated.
- This analysis provides direct, indirect, and induced effects as described in the “Overview.”

## Strengths

- Conducting an input-output analysis allows you to estimate various indicators that show how a project could contribute to a local economy.
- This information can help a community decide whether to proceed with a given project by demonstrating the value to the local economy.

## Challenges

- Implementing this method requires specific economic expertise and must be conducted by an economist.
- Input-output analysis requires the ability to know what data are required for the analysis, how to make the necessary judgments in the input-output modeling, and how to interpret the results.
- Depending on what modeling tools you use and the size of your study area, the software and input-output data can be expensive.

## Key Suggestions, Interpreting Results, and Potential Mistakes

- It is critical to define the appropriate study area, that is, the area in which the impact takes place. This step involves understanding which businesses would be impacted by the economic activity being studied. The study area can range from a single town to several communities, a county, a state, a region, or even nationwide.
- It is important to understand what each of the economic indicators means and how to accurately interpret them.
- Input-output analysis is fundamentally different from benefit-cost analysis. A benefit-cost analysis incorporates net economic values as benefits and offers results that describe whether the benefits outweigh costs for a given project or project alternatives. However, results from input-output analysis come in the form of the economic indicators described above.

## Key Steps

This section outlines some of the key tasks in conducting an input-output analysis. *It is important to note that most of these steps must be undertaken by an economist.* The instructional information presented here is meant to help provide the context for the results. The general steps are as follows:

### 1. Identify Input Data

The following data are required to perform an input-output analysis:

- Dollars paid to employees (preferable) OR number of employees supported by the activity
- Employee positions or industry
- Other industry-specific expenditures other than employees (e.g., operations, property, equipment)
- The geographic region where money is spent on employees or other expenditures. Only count the spending within your defined region.

### 2. Identify Industry Classifications

Classify the industries where you expect employment or where the money will be spent due to a project. The [Bureau of Economic Analysis](#) provides a detailed list of industry codes that best align with each organization or company. You can use this list to identify where employment will be generated or money will be spent.

### 3. Identify Region of Analysis

Identify your region of analysis where the direct spending will occur. This region will include your specific study area (where inputs will be needed to build the coastal project, such as a town) and the broader area (where you expect there will be ripple effects of spending in a larger area that you want to capture, such as the county or counties surrounding that town). You will only count spending within your defined region.

#### 4. Use Input-Output Analysis to Calculate Economic Impact

Work with your consultant or academic partner to run the inputs in the model. If desired, you can vary the inputs to see the effect of a 10% increase or a 10% decrease in spending and the cascading effects throughout your study region. Pull that information into a narrative to convey your economic story.

### Additional Resources

#### Getting Help

- Reach out to our team ([econguidance@noaa.gov](mailto:econguidance@noaa.gov)) for specific questions or to brainstorm how to start your input-output analysis.
- Hire a private consultant or request support from academic partners. Researchers, graduate students, and academic scholars may be able to provide guidance or work directly on your input-output analysis.

#### Other Resources

- Some input-output models, both free and of various cost to the user, can be found here:

REMI:

- [Regional Economic Models, Inc. \(REMI\) model](#)
- [remi.com/model/pi/](http://remi.com/model/pi/)

IMPLAN:

- [IMPLAN: Economic Impact Analysis for Planning](#)

RIMS II:

- [RIMS II](#)
- [Regional Input-Output Modeling System \(RIMS II\) User's Guide, U.S. Bureau of Economic Analysis](#)