

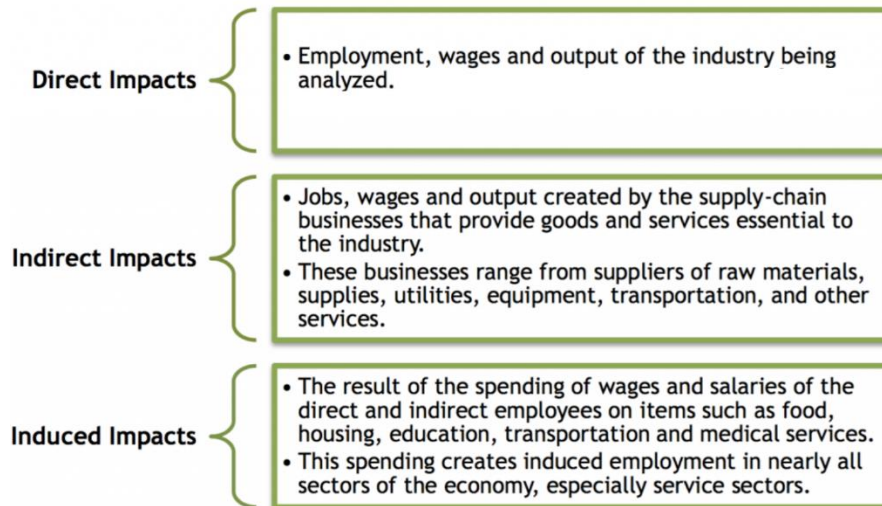
# Basics of IMPLAN

## History

- The Federal government has a long history of collecting economic data through the Census Bureau and other agencies. However, the usefulness of this data was limited because it was simply a collection of individual data points.
- In the 1970's improvements in computers began to make it possible to use this collected data to analyze the impact of an event or policy change.
- In the late 1970's, the USDA Forest Service created an early Input/Output software package to identify the potential impacts of alternative land management options.
  - The foundational Input/Output approach, developed by Nobel Prize winner Wassily Leontief in the 1930's, is the basis for impact assessment.
  - Input/Output Analysis recognizes that there are structural relationships that exist between the various sectors of the economy. Creating output always requires inputs.
- In 1993, the Minnesota IMPLAN Group (MIG, Inc.) initiated database development, thus allowing the creation of regional models using the previously developed Forest Service software.
  - The software traces the linkages that lie behind the production of any good.
    - For example, to build one car requires a defined set of resources (including labor). IMPLAN tracks those resources back to the whole array of providers who are contributing the material and services that eventually creates the new car.
    - IMPLAN recognizes that those resources are not uniformly distributed. Building a new car will require new steel, and that new steel will come from a defined location that is currently producing steel.
    - Thus, building the car influences both the local economy where the car is assembled and the local economy where the steel is produced.
    - IMPLAN assumes that the set of inputs relative to output remains constant. This year, if 5% of the cost of car is for steel, IMPLAN assumes that any future cars will also require 5% of the total cost for steel.
- Tracing a change through the vast array of linkages necessary for any production is beyond the capability of the human mind, but can be modeled with software. Researchers have spent the last forty years fine-tuning the software into the current version of IMPLAN.

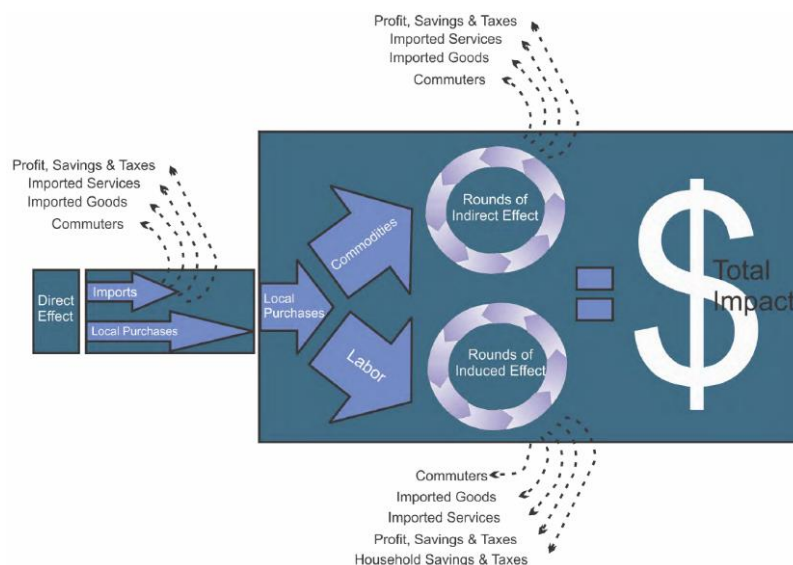
## Modeling Basics

- IMPLAN calculates direct, indirect, and induced impacts arising from a policy change or event.



- One of the terms most commonly associated with IMPLAN modeling is the term ‘multiplier’. A multiplier is the total impact including direct, indirect, and induced impacts. There is no generic multiplier, activity in one particular sector in a particular location will have a unique multiplier. Therefore, each sector of the economy has its own set of unique multipliers for employment, income, value-added, and output.

The following graphic illustrates the foundational structure of IMPLAN modeling. The researcher has to use considerable judgement in deciding how to initially categorize expenditures. This is particularly true because IMPLAN does not directly create a multiplier effect for profits, savings, or taxes. The standard IMPLAN model traces immediate impacts, but profits and savings are not spent immediately. The methodology will only capture the impact of profits and savings when they are converted into expenditures. That new expenditure must be captured by a subsequent IMPLAN model.



## Application

- The current 536-sector IMPLAN version was released in 2015, with data updates in 2016.
- The key to high quality analysis is assigning expenditures to the appropriate model sector.
  - This requires considerable professional judgment.
  - The researcher must use both theory and professional experience in model development. For example, Nebraska Public Power District is not a typical energy supplier, which means the generic model using national averages for energy is not appropriate.
  - The smaller the area of consideration the more challenging the modeling exercise.
    - When possible, the researcher should use available line item budget information.
  - The accounting expenditure for an activity is not the model expenditure.
    - Buying a \$50,000 pickup truck in Nebraska does not create \$50,000 of economic activity in Nebraska. The impact stems from the Nebraska-supplied activity or resources, not the total accounting expenditure. In this case, Nebraska's contribution is only the dealer's markup.
  - IMPLAN is not a dynamic forecasting model. It traces the ripple effect of a change through the existing structural linkages between different sectors of the economy. An IMPLAN model that presents information 10 to 15 years into the future is suspect.
  - IMPLAN results can be misleading because the model does not use calendar time.
    - For example, the model may calculate "job-years" but it may take many years before the accumulated changes would actually generate sufficient activity for that job.

# Basics of Hedonic Modeling

Hedonic modeling is a research technique used to discover the market price of an individual product characteristic. For example, if two SUVs are exactly the same except one is four-wheel drive and the other is not, the difference in selling price indicates how consumers value four-wheel drive. In looking at housing prices, hedonic modeling is used to determine the market value of access to amenities or the negative impact of undesirable conditions. Researchers will look at the selling price of a group of houses that are similar in size, quality, and age. But, these houses will not be in the same location. A house located in a desirable school district will sell at a premium relative to the whole group of similar houses - that indicates the market price that consumers have for quality education. Negative influences on home prices include items like proximity to unsightly landscapes, being downwind from a major polluter or feedlot, or being in a location subject to loud noises.

Most home buyers are unaware of pipeline locations, so pipelines have limited impact on the selling price of property. An often-cited research paper from University of Washington researchers found that proximity to a gasoline pipeline had a slight negative impact on property selling price, but proximity to an oil pipeline had no measurable impact.