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Interpreting Forestry Economic Contribution Reports: A User's Guide

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Abstract

State agencies and Extension professionals often employ IMPLAN software and associated data to conduct economic contribution analyses of the forest sector. Economic contribution reports often vary with regard to modeling, results presentation, and interpretation of estimates. We present practical guidelines for report users on how to better understand input–output modeling and interpret forestry economic contribution reports. We discuss strategies for understanding basic terminology, aspects of IMPLAN software, and the difference between economic contribution and economic impacts, among other concepts.

Keywords: economic contribution, forestry, regional economy, IMPLAN

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Introduction

The science behind economic contribution reports holds relevance for Extension professionals working across programmatic areas, as exemplified by implementations ranging from estimation of the economic impacts of the bio-energy and wood pellet industries (Henderson, Joshi, Parajuli, & Hubbard, 2017; Joshi, Grebner, Henderson, Grado, & Munn, 2012) to estimation of the economic impacts of Extension programming (Harder & Hodges, 2011; Hill & Goodwin, 2015; Kerna, Frisvold, Jacobs, & Farrell, 2015). Specific to those involved with the forestry sector, professionals from state agencies, universities, and economic development offices commonly use forestry economic contribution reports to measure the size and performance of the forestry sector in terms of its contribution to a local economy (Henderson et al., 2017; Joshi et al., 2017; McConnell, 2013). (Periodic economic contribution reports from most of the southern states are posted at forestryimpacts.net.) Herein, we focus on forestry economic contribution reports that Extension professionals and others may use or develop.

Most forestry economic contribution reports vary greatly with regard to IMPLAN modeling method used,

results presentation, and interpretation of estimated numbers. These reports often gloss over needed details such as IMPLAN sectors included, economic contribution method employed, and explanation of input–output terminology (Henderson, Joshi, Tanger et al., 2017; Parajuli, Henderson, Tanger, Joshi, & Dahal, 2018). Without these details, readers and practitioners, especially those not familiar with IMPLAN and input–output modeling, struggle to comprehend economic contribution reports. This article provides practical guidelines on how to interpret forestry economic contribution reports for Extension professionals who frequently use the reports to justify forestry and natural resources programs.

Eight Strategies for Interpreting Forestry Economic Contribution Reports

We discuss eight strategies that can help report users better understand economic contribution analysis. These strategies represent answers to frequently asked questions and comprise a list of key considerations for interpreting economic contribution reports.

- *Become familiar with input–output modeling and related terminology.* Common technical terms associated with input–output modeling and brief definitions are listed in Table 1 (IMPLAN, 2018; Watson, Wilson, Thilmany, & Winter, 2007). A glossary of terminology can be obtained from IMPLAN's website. Essential terms include *direct effect*, *indirect effect*, *induced effect*, and *total effect*. Direct effect represents initial economic activities (income, expenditure, and employment) within the industry sector of interest. Indirect and induced effects are usually ripple effects stemming from direct effects on other, related sectors of the economy. Total effect is the sum of direct, indirect, and induced effects.

Table 1.

Technical Terms Related to Input–Output Modeling and Their Descriptions

Term	Description
Direct effect	A change in income, expenditure, or employment made by producers or consumers in the sector of interest. For manufacturing industries such as sawmills and pulp and paper industries, direct effects include sales and changes in inventory.
Indirect effect	An economic activity in a related sector resulting from the purchase of goods or services by an entity in the sector of interest. For example, a sawmill uses electricity and transportation services.
Induced effect	An economic activity in the region resulting from consumption of goods and services by employees in the sector of interest; that is, induced effects are further local economic activities resulting from the recirculation of money through household spending patterns. For example, employees from the logging and furniture industries purchase food from restaurants and grocery stores.
Industry output	The total annual value of industry production for a given period of time, involving the entirety of economic transactions, including intermediate activities conducted in local businesses. Industry output is a combined value of gross state product (value added) and intermediate outputs.
Employment (jobs)	Annual average number of full- and part-time employees, including those who are self-employed and those who hold seasonal jobs. Of note, IMPLAN jobs are not full-time

	equivalents. For example, one job lasting 12 months is equivalent to two jobs lasting 6 months each.
Value added	Equivalent to gross domestic product or gross state product—the industry gross output minus the costs of intermediate inputs. The value added metric consists of compensation of employees, taxes on production and imports minus subsidies, and gross operating surplus.
Labor income	Employment income, including employee compensation (wages and benefits) and proprietor income.

- *Become familiar with IMPLAN software, sectors, and data.* An annual economic database for IMPLAN software is mainly compiled from a number of secondary sources, including agencies and governmental departments. The current version of IMPLAN includes 536 industry sectors, which are ordered following the North American Industry Classification System. IMPLAN software is designed to estimate indirect and induced effects by tracking business-to-business transactions from the forest sector backward through its supply chains and household spending (McConnell, 2013).

- *Know the difference between economic contribution and economic impact.* Economic contribution and economic impact are conceptually different. Whereas economic impact analysis is primarily used for determining the *net* changes created by entry or exit of a firm or industry in an existing regional economy, contribution analysis is used for tracking the *gross* change associated with an industry, an event, or a policy in an existing regional economy (Watson et al., 2007). Hence, economic contribution analysis, not economic impact analysis, should be used to report annual activities from existing forest industry–related sectors.

- *Understand that direct effects are in the forest sector itself and total effects are in the entire economy*. Direct effects are analogous to "head count" values, reporting of employment in a particular industry as well as income and shipments. Total effects comprise an industry's contribution to a regional economy (Watson & Beleiciks, 2009). Total effects represent what losses the economy would experience were the forest sector to not exist. Total effects are the statistics industry supporters often use when lobbying legislatures and local councils.

- *Understand social account matrix (SAM) multipliers.* SAM multipliers are the ratios of total effects to direct effects used for gauging additional effects in terms of jobs and dollar values. These multipliers explain additional jobs and dollar values created in the rest of the economy due to activities in the sector of interest. For example, an employment multiplier of 2.1 simply indicates that every job created in that particular sector results in an additional 1.1 jobs in the economy.

- *Become familiar with two methods of economic contribution analysis commonly used in forestry—internal adjustments to the IMPLAN software and external adjustments of input values using a matrix inversion approach.* Parajuli et al. (2018) tabulated the stepwise procedures of both methods, and their comparative analyses revealed that both methods produce similar total contribution values in terms of output, jobs, and labor income. Both approaches reportedly have strengths and weaknesses.

- *Know the list of IMPLAN sectors related to forestry and forest product industries included in the analysis.*

The selection of sectors IMPLAN provides and the way in which they are grouped or aggregated for reporting are primarily based on the structure of the forest sector in the study region. Hence, different sets of IMPLAN sectors are included to represent the local forestry and forest product industry.

- *Recognize that at least a 2-year lag exists in most economic contribution reports.* The IMPLAN-based forestry economic analysis reports usually present information from at least 2 years back. IMPLAN usually takes about 2 years to compile sector-specific regional economic data. For example, IMPLAN's 2016 data set became available in 2018, and North Carolina's 2018 forestry contribution report described the 2016 North Carolina forest sector (Parajuli & Bardon, 2018).

Conclusions

Readers and users of forestry economic contribution analysis reports should be familiar with the basics of input–output modeling and related terms and with IMPLAN software, its sectors, and its data set. It is particularly important to understand the difference between contribution and impact analysis. For authors of economic contribution reports, we recommend specifying the IMPLAN sectors included in an analysis and describing the method of economic contribution analysis used so that the results can be replicated and are easier for readers to follow.

Recommendations for Further Reading

- "Standard Procedures and Methods for Economic Impact and Contribution Analysis in the Forest Products Sector," by J. E. Henderson., O. Joshi, S. M. Tanger, L. Boby, W. Hubbard, M. Pelkki,. . . P. Tappe, 2017, *Journal of Forestry*, *115*(2), pp. 112–116. Lists the methodological issues in standard procedures and methods for forestry economic impact and contribution analysis.

- "A Synopsis of Methodological Variations in Economic Contribution Analyses for Forestry and Forest-Related Industries in US South," by O. Joshi, J. E. Henderson, S. M. Tanger, L. Boby, M. Pellki, and E. Taylor, 2017, *Journal of Forestry*, *115*(2), pp. 80–85. Tabulates the commonly included IMPLAN sectors related to forestry and forest product industries.

- "Economic Contribution Analysis of the Forest-Product Industry: A Comparison of the Two Methods for Multisector Contribution Analysis Using IMPLAN," by R. Parajuli, J. E. Henderson, S. M. Tanger, O. Joshi, and R. Dahal, 2018, *Journal of Forestry*, *116*(6), pp. 513–519. Compares and contrasts the two methods for multisector contribution analysis of the forest sector using IMPLAN.

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