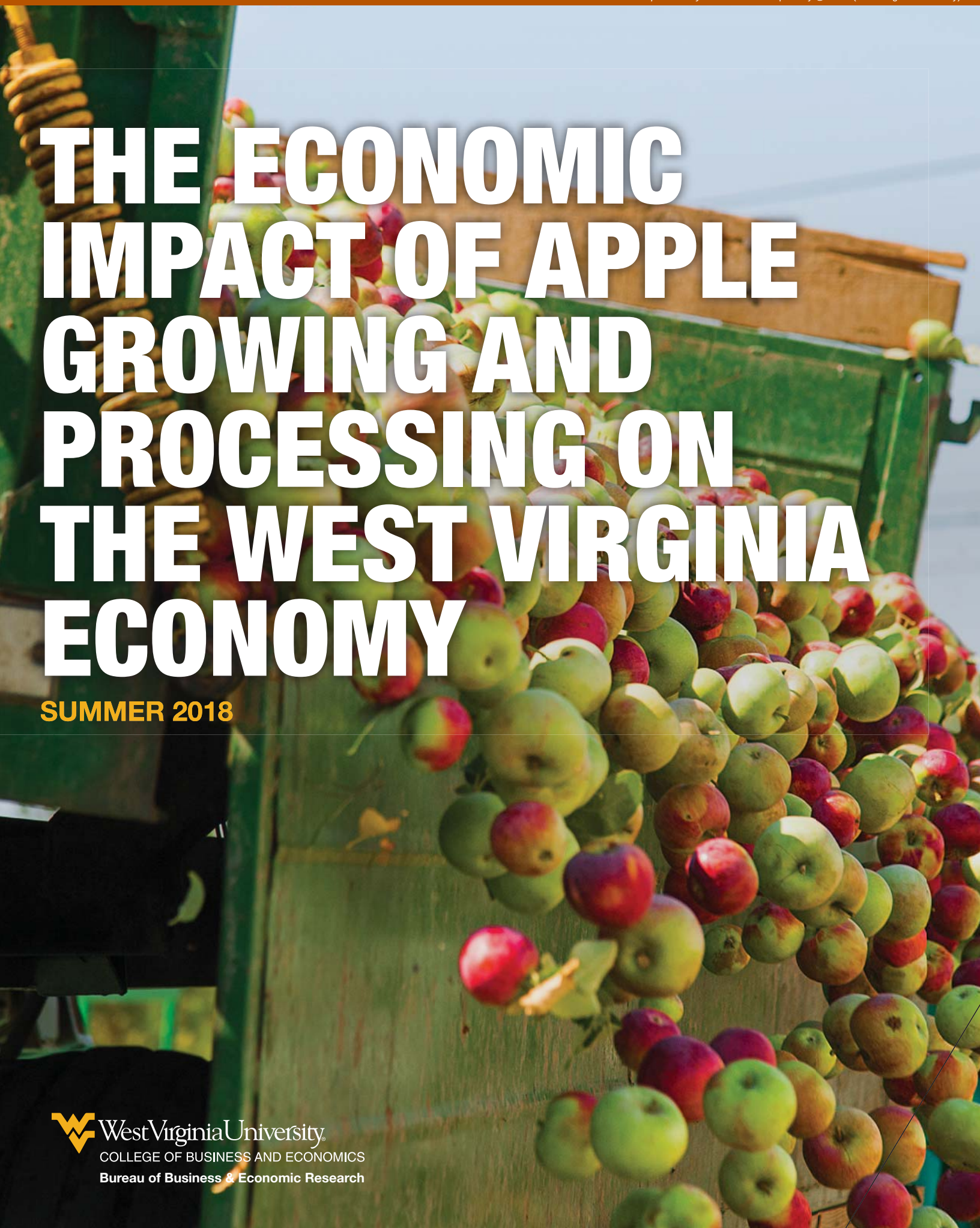
View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by The Research Repository @ WVU (West Virginia University)



THE ECONOMIC IMPACT OF APPLE GROWING AND PROCESSING ON THE WEST VIRGINIA ECONOMY

SUMMER 2018

WestVirginiaUniversity.
COLLEGE OF BUSINESS AND ECONOMICS
Bureau of Business & Economic Research

THE ECONOMIC IMPACT OF APPLE GROWING AND PROCESSING ON THE WEST VIRGINIA ECONOMY

is published by:
Bureau of Business & Economic Research
West Virginia University College of Business and Economics

(304) 293-7831
bebureau@mail.wvu.edu
bber.wvu.edu

WRITTEN BY

Christiadi, PhD
Research Associate
John Deskins, PhD
Director

The opinions herein are those of the authors and do not necessarily reflect those of the West Virginia Higher Education Policy Commission or the West Virginia University Board of Governors.

© Copyright 2018 WVU Research Corporation

Table of Contents

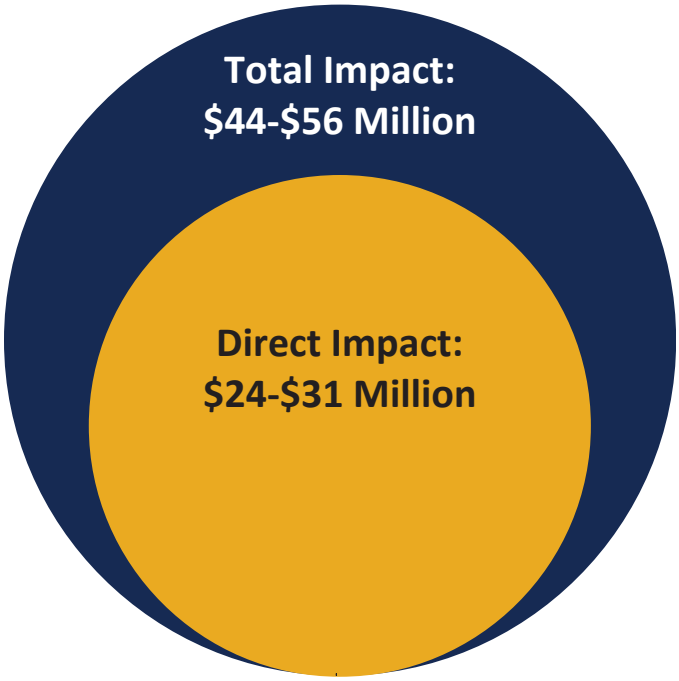
List of Figures and Tables

Executive Summary

Nicholas County, West Virginia, has the potential to attract an apple growing and processing industry to its agricultural region. Development of this industry would consist of two major stages: First is the initial capital investment of soil preparation, fencing, timber clearing, tree planting, and construction of an apple processing facility, and second is the apple growing and processing operation. In this study we estimate the economic impact of these two stages on the West Virginia economy as a whole. For the second stage, we examine two possible scenarios: a lower-bound scenario where the apple processing plant employs 100 workers, and the upper-bound scenario where the plant employs 130 workers. Our findings are summarized as follows:

- **The initial capital investment stage is expected to generate around $15.5 million in economic output annually over a five-year period.**
- **The capital investment stage is expected to support more than 200 jobs annually with nearly $8 million in employee compensation, and generate around $800 thousand in select tax revenue for the State of West Virginia and local governments within the state.**
- **Ongoing growing and processing activities are expected to generate between $44 million and $56 million in economic output annually**.
- **Ongoing operations in apple growing and processing are expected to support between 379 to 481 total jobs, depending on the level of employment at the processing facility. Further, ongoing activities are expected to support between $9.3 million and $11.7 million in employee compensation.**
- **Finally, ongoing operations are expected to support between $1.2 million and $1.7 million in select tax revenue for the State of West Virginia and local governments within the state.**

Figure 1: Economic Impact of Ongoing Apple Growing and Processing Operation



1 Introduction

Nicholas County, West Virginia, has the potential to attract an apple growing and processing industry to its agricultural region. This would include both upstream activities – apple growing – and downstream activities – apple processing. In this report we estimate the economic impact that the development of this industry would likely have on the West Virginia economy. Our study is focused in two areas: First, we consider the initial capital investment required to create an apple growing business. This includes activities such as construction of the processing facility, soil preparation, fencing, timber clearing, and tree planting. The first stage is expected to be completed over a five-year period. The second stage is the apple processing plant operation. In this stage a fully functional plant will process the apples, turning them into more refined products such as apple juice, apple sauce, vinegar, etc. The second stage includes activities such as apple processing, packaging, labeling, and marketing the products.

In this study we estimate the economic impact of all these activities on the West Virginia economy as a whole. We estimate the impact in terms of output, employment, employee compensation, and tax impacts.

It should be noted that Nicholas County has experienced a great deal of economic weakness in recent years and continues to face substantial economic development challenges that plague many rural areas. Further, given the rural nature of the area, apple growing and processing seems to be an industry that fits well within the area's comparative advantage and should therefore be an industry that is well suited to thrive in the area.

2 Methodology

To estimate the economic impact of the apple processing activities we apply a detailed model of the West Virginia economy that outlines how trade-flows among industries interact with key economic indicators such as employment, income, output, and tax revenue.[1] The expenditures associated with the completion of the first stage or the operation of the apple processing plant are referred to as the direct economic impact. However, the total economic impact of these activities is not limited to the direct impact, but also includes the secondary economic impacts accrued as those initial direct expenditures are re-spent throughout the rest of the economy.

For example, to support the apple processing plant's operation, various business that interact with the processing plant (i.e., the farm that supplies the apples, businesses that supply the bottle, labels, packaging equipment, as well as those supplying the electricity, office supplies, etc.) will increase their production correspondingly. As these suppliers increase production, their subsequent suppliers will increase production, and so will their next chain of suppliers, and so on. All of this additional economic activity is referred to as indirect impacts. In addition, the apple processing plant and these suppliers employ numerous workers, part of whose income will be spent in the West Virginia economy, which generates additional output, income, and employment. This activity is referred to as induced impacts.

[1] This study was conducted using the IMPLAN modeling software, an industry-standard input-output model of the economy. More information about IMPLAN can be found at http://www.implan.com.

These indirect and induced impacts together form what is known as the "multiplier effect." The original stimulus to the economy from the plant's expenditures is re-spent multiple times through the rest of the economy. At each stage, some of the expenditures "leak" out of West Virginia as they are spent outside of the state. The combined direct impact and secondary impacts together constitute the total economic impact of the apple processing activities.

3 Economic Impact

3.1 Economic Impact of Capital Investment Activities

In this subsection we estimate the economic impact of the first stage activities. The data used in this section were provided by West Virginia Army National Guard (WVARNG) and were not independently audit by the authors. WVARNG made available data on five years of expenditures disaggregated by types of activities, employee compensation, and number of workers. To simplify the analysis, we assume that total expenditures are spread evenly over the five-year period. We then represent the impact as the impact of annual expenditure, which implies that the impact will recur a total of five times.

Based on the data provided, average annual expenditures for the first stage activities are $9.6 million per year. The activities will employ a total of 160 workers, who will earn a total employee compensation of $6.3 million annually (see Table 1).

We estimate that the first-stage activities will generate $5.9 million in secondary output impacts, resulting in a total economic impact of $15.5 million in output in the West Virginia economy. We estimate the first-stage activities support 44 additional jobs in the state economy, resulting in a total employment impact of 204 jobs. The overall economic activity associated with this operation is estimated to generate a total of $0.8 million in selected state and local tax revenue.

Table 1: Annual Impact of Capital Investment-Stage Expenditures

Type of Impact	Direct	Indirect and Induced	Total
Output ($, millions)	9.6	5.9	15.5
Employment (jobs)	160	44	204
Employee Compensation ($, millions)	6.3	1.5	7.8
State and Local Tax Revenue ($, millions)	--	--	0.8

Notes: Output, Employee Compensation, and Tax Revenue are measured in 2018 dollars. Tax Revenue impact includes sales, personal income, property, and corporation net income taxes. Individual components may not sum to total due to rounding.

3.2 Economic Impact of Apple Growing and Processing Operation

In this subsection we estimate the economic impact of the ongoing apple growing and processing operation. The data used in this section were provided by West Virginia economic development officials and were not independently audit by the authors. Specifically, West Virginia economic development officials made available data on the expected number of workers and their wage and salary compensation. Two scenarios were introduced. First is the lower-bound scenario where the plant will employ 100 workers, and second is the upper-bound scenario where the plant employs 130 workers. Combining this information with a set of other relevant information on the apple processing industry, we develop several guidelines below. We use them as the basis to estimate the direct impact of the plant's operation.

- The apple processing plant will employee between 100 to 130 workers.
- The average pay per worker in the processing plant is $35,000 per year. Taking into account various benefit supplements to wages and salaries, this yields an average annual employee compensation of $43,000 per worker.[2]
- Based on an input-output model of similar industry and anecdotal data on the production cost of an apple processing business, we estimate that labor cost (total employee compensation) accounts for 18 percent of total plant expenditures.
- By the same token, the cost of apples accounts for approximately 35 percent of total expenditure
- In this stage the apple farm operation is considered as part of the indirect impacts of the apple processing plant. To simplify the analysis we take into account only the farm's operation associated with the production of the apples that processed in the plant. Other farm activities not associated with the production of these apples are not part of the analysis. For example, the farm may produce another side product other than apples. The impact of that part of activities is not included in this section.

Table 2 reports the impact of apple processing plant operation under the lower-bound scenario. We estimate that a plant with 100 workers will have an annual expenditure of $23.9 million and a total employee compensation of $4.3 million. We estimate that the apple processing plant operation will generate $19.8 million in secondary impacts, resulting in a total economic impact of $43.7 million in output in the West Virginia economy. We estimate that the operation will support 279 additional jobs in the economy, most of which are on the apple farm, resulting in a total employment impact of 379 jobs. The overall economic activity associated with this operation is estimated to generate a total of $1.2 million in select state and local tax revenue.

[2] Based on the BEA data, total employee compensation in the US is about 23 percent above wages-and-salaries.

Table 2: Impact of Apple Growing and Processing Operation, Lower Bound Scenario

Type of Impact	Direct	Indirect and Induced	Total
Output ($, millions)	23.9	19.9	43.7
Employment (jobs)	100	279	379
Employee Compensation ($, millions)	4.3	5.0	9.3
State and Local Tax Revenue ($, millions)	--	--	1.2

Notes: Output, Employee Compensation, and Tax Revenue are measured in 2018 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes. Individual components may not sum to total due to rounding.

Table 3 reports the impact of apple processing plant operation under the upper-bound scenario. We estimate that a plant with 130 workers will have an annual expenditure of $31.1 million and a total employee compensation of $5.6 million. We estimate that the apple processing plant operation will generate $24.5 million in secondary impacts, resulting in a total economic impact of $55.5 million in output in the West Virginia economy. We estimate that the operation will support 351 jobs in the secondary economy, resulting in a total employment impact of 481 jobs. The overall economic activity associated with this operation is estimated to generate a total of $1.7 million in selected state and local tax revenue.

Table 3: Impact of Apple Growing and Processing Operation, Upper Bound Scenario

Type of Impact	Direct	Indirect and Induced	Total
Output ($, millions)	31.1	24.5	55.5
Employment (jobs)	130	351	481
Employee Compensation ($, millions)	5.6	6.1	11.7
State and Local Tax Revenue ($, millions)	--	--	1.7

Notes: Output, Employee Compensation, and Tax Revenue are measured in 2018 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes. Individual components may not sum to total due to rounding.

About the Bureau of Business and Economic Research

Since the 1940s, the BBER's mission has been to serve the people of West Virginia by providing the state's business and policymaking communities with reliable data and rigorous applied economic research and analysis that enables the state's leaders to design better business practices and public policies. BBER research is disseminated through policy reports and briefs, through large public forums, and through traditional academic outlets. BBER researchers are widely quoted for their insightful research in state and regional news media. The BBER's research and education/outreach efforts to public- and private-sector leaders are typically sponsored by various government and private-sector organizations.

The BBER has research expertise in the areas of public policy, health economics, energy economics, economic development, economic impact analysis, economic forecasting, tourism and leisure economics, and education policy, among others. The BBER has a full-time staff of three PhD economists, and one master's-level economist. This staff is augmented by graduate student research assistants. The BBER also collaborates with affiliated faculty from within the College of Business and Economics as well as from other parts of WVU.

To learn more about our research, please visit our website at http://www.be.wvu.edu/bber.