OHIO UNIVERSITY | Voinovich School of Leadership and Public Service

RISE Ohio Task 4

Targeted Industry Clusters Characterization

October 2023

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RISE Ohio Task 4. Targeted Industry Clusters Characterization

Final Report – October 2023

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Executive Summary

This document offers the Targeted Industry Clusters Characterization final report for the RISE Ohio project. It includes the description and findings of the data analysis on industrial clusters as well as details on introducing targeted industry clusters. The information is summarized below and explained in detail in other sections of the report. The first sections of the report discuss 30 Targeted Industry Clusters Characterization using 3-digit NAICS Codes and continue with a similar outline to discuss 20 Targeted Manufacturing Cluster Characterization using 4-digit NAICS Codes, before the results analysis section, conclusions, and recommendations. The main outcomes of this report are listed below:

- The most influential industries in Coshocton County, as of 2020, are Advanced Manufacturing, Aerospace and Aviation, Automotive, Biohealth, Energy, Financial Services, Hardwood Products Manufacturing**,** Information Technology and Services, Logistics, and Polymers and Chemicals. This list totals 11 cluster industries.

- The largest cluster industry within Coshocton County, Hardwood Products Manufacturing, has 405 firms and 1,111 employments (that accounts for 32 percent of total employment in the most influential industries) followed by Fossil Fuels with 33 firms and 856 employees. Although Logistics has a larger number of firms than Fossil Fuel (130 firms), the total employment in the Logistics cluster industry is 576.

- Using 3-digit NAICS codes, the Primary Metal Manufacturing industry for Coshocton County has the highest location quotient (LQ) in 2020 and has a positive change in the LQ from 2010-2020. Conversely, Merchant Wholesalers, Durable Goods have the least LQ, a negative change in LQ, and a thirty-two percent loss in employment in 2020.

- Using 4-digit NAICS codes for the Manufacturing cluster (31-33 NAICS codes), Animal Slaughtering and Processing; Foundries; and Steel Product Manufacturing from Purchased Steel are the only cluster industries with more than 50 employment that have the potential for high returns for investing. However, the industries experienced a loss in employment in 2020 from 2010.

- Food Processing and Advanced Manufacturing industry clusters are Coshocton County's highest-concentrated industries when compared to the OMEGA region, the Buckeye Hills region, Ohio, and the United States. Conversely, the Aerospace and Aviation, followed by the Information Technology industry, are the least-concentrated of the 11 industry clusters and are classified as a transforming industry.

- The Fossil Fuels industry cluster is considered mature only when compared to Ohio and the United States. Logistics is considered a transforming cluster. Figure 16 shows that the industry is positioned closer to the x-axis or at a location quotient of 1 for Coshocton County when compared to the Buckeye Hills region.

- The rural urban classification area (RUCA) indicates that, of the 11 industry clusters, only the Advanced Product Manufacturing industry cluster resides in an urban area. The remaining industry clusters reside in rural or less densely populated areas (RUCAs 4, 5, 6, 7, and 10). The Hardwood Product manufacturing industry cluster has the highest number of firms in the region, more than half the number of its firms classify as RUCA 4.

Introduction

Project Description

This report is prepared by the Center for Economic Development and Community Resilience of Ohio University's Voinovich School of Leadership and Public Service, in collaboration with OMEGA/Buckeye Hills. The report aims to provide a broadly applicable understanding of industry employment in the county and identify industry clusters that have the potential to expand their activities and improve economic growth in Coshocton County. Additionally, this activity provides opportunities to identify and immediately serve expanding cluster businesses in the region seeking to relocate or expand.

Coshocton County is in Southeast Ohio and has a population of approximately 36,602[1] and a median household income of $43,251.[2] According to the Quarterly Census of Employment and Wages (QCEW) in 2020, using the 3-digit NAICS code in 2010 as the base year for comparison, Primary Metal Manufacturing, Educational Services, Nursing and Residential Care Facilities, Food Manufacturing, Food Services and Drinking Places, Ambulatory Health Care Services, General Merchandise Stores, Social Assistance, Hospitals, Specialty Trade Contractors, and Administrative and Support Services, represent the 11 highest 3-digit NAICS code industries in Coshocton County, with Primary Metal Manufacturing cluster as the cluster with the highest employment (910) and Administrative and Support Services as the cluster industry having the lowest employment (249 employees) in this list. The major industries[3] in the county are Manufacturing, Health Care and Social Assistance, and Retail Trade. Coshocton County records its highest employment in the manufacturing industry (see footnote 3). The county has available land, transportation, and utility infrastructures as it looks to advance economic development and attract investments to improve employment opportunities in the communities.

[1] Available at https://www.coshoctoncounty.net/about-coshocton/

[2] Available at https://www.coshoctonportauthority.com/

[3] Available at https://datausa.io/profile/geo/coshocton-county-oh#industries

Project Implementation

For this task, the team identified existing primary industry clusters within the county to assess industry and firm-level needs. The primary purpose of this section is to identify and serve expanding clusters seeking to relocate or expand. The team identified 11 clusters[4] composed of a total of 675 firms based on the Mergent Intellect dataset. Besides Mergent Intellect, this report uses the Quarterly Census of Employment and Wages (QCEW), RUCA codes from USDA ERS, and targeted industry clusters for different related and integrated regions within the state of Ohio to identify and examine the industry cluster enhancement of Coshocton County and provide emphasis on the county's highest industrial sector employment, manufacturing industry to establish more investment opportunities that can spur economic growth in the county.

Project Methodology

This study assesses the industry cluster characterization and enhancement for Coshocton County through an examination of current economic activities to identify positive regional industrial sectors and associated potential business opportunities. The study includes:

- a trend analysis of the employment of main clusters (3-digit and 4-digit manufacturing) in 2010 and 2020
- a location quotient analysis of regional employment sectoral distribution and concentrations
- export jobs and local jobs of the main clusters in 2020
- definition of targeted industry clusters within the region
- scan and map existing firms in each targeted cluster
- a characterization of relevant business demographics such as the number of firms, employment, revenue, and ownership structures

[4] These cluster industries are Advanced Manufacturing, Aerospace & Aviation, Automotive, Biohealth, Financial Services, Food Processing, Fossil Fuels, Hardwood Products Manufacturing, Information Technology and Services, Logistics, and Polymers and Chemicals.

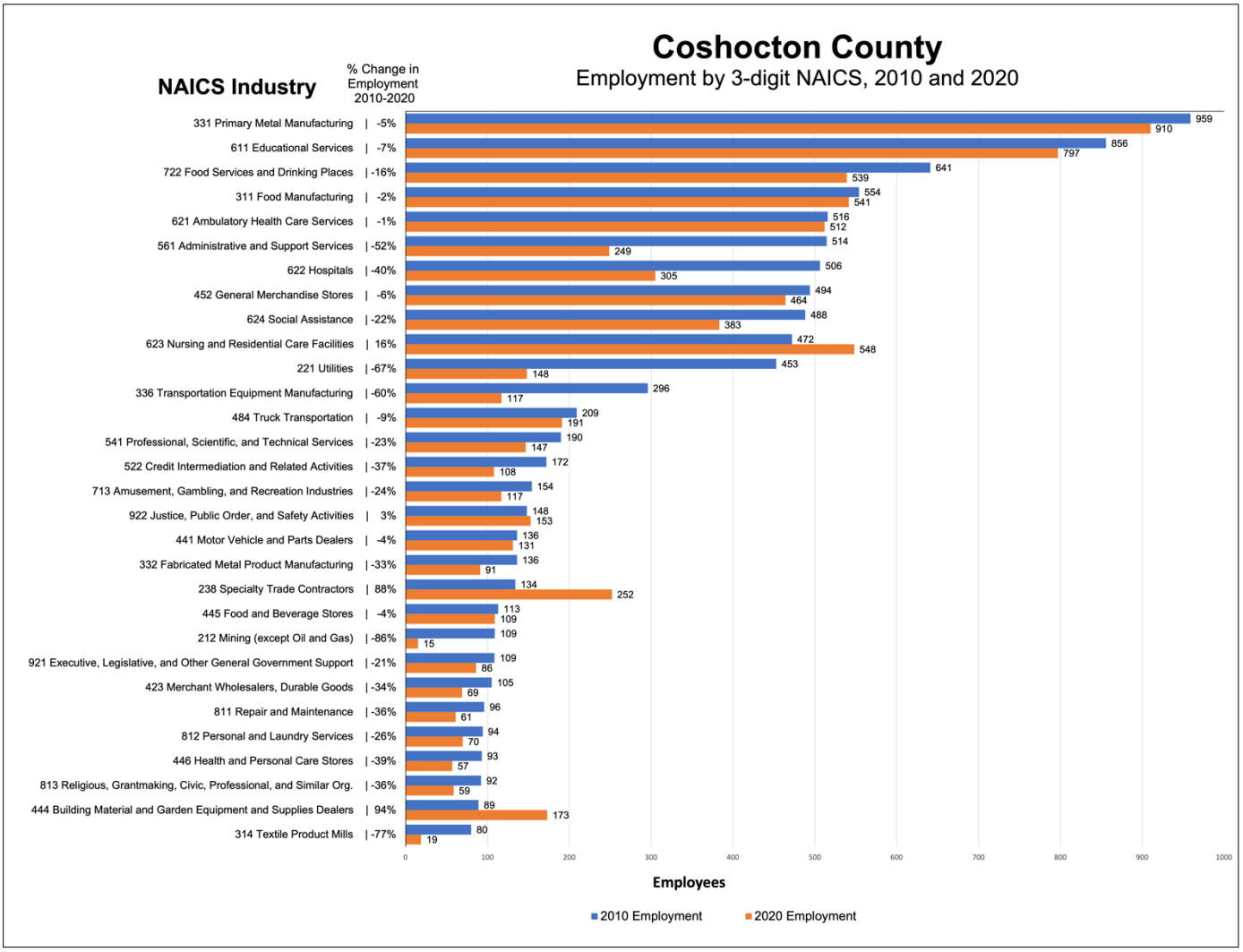
The report presents the outcome of each assessment and analyzes the findings as outlined below.

Employment Profile of the Study Region

Industry Employment by 3 Digit NAICS Code

This section examines the largest industries by employment in Coshocton County by 3-digit NAICS Code in 2010 and 2020. It not only shows the change in employment but also compares the relative strength of each industry as compared to Ohio. Figure 1 depicts the change in employment from 2010 to 2020 for the selected industries as well as changes in employment during this time. The findings show that only four of the selected thirty industry clusters experienced employment growth. Furthermore, the largest industry clusters in 2020 (Primary Metal Manufacturing; Educational Services; Nursing and Residential Care Facilities; Food Manufacturing; Food Services and Drinking Places, Food Manufacturing; and Ambulatory Health Care Services) with over 500 employees each, all experienced a decline in employment except the Nursing and Residential Care Facilities cluster industry (16% growth in employment), accounting for the loss of 222 jobs. Food Services and Drinking Places (-16% loss in employment) had the highest decline among the cluster industries with over 500 employees. Overall, the largest declines were seen in the following industry clusters: Mining [except Oil and Gas] (-86%), Textile Product Mills (-77%), Utilities (-67%), and Transportation Equipment Manufacturing (-60%). The largest growths were seen in the Building Material and Garden Equipment and Supplies Dealers (94%), and Specialty Trade Contractors (88%).

Figure 1. Employment by 3-digit NAICS Codes 2010—2020[5]



[5] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN

Figure 2 shows the industries' Location Quotients (LQ), or the relative strength of each industry as compared to the industry's strength in Ohio. Industries with a higher LQ are stronger or more concentrated in the county than in the state at large. This may indicate how specialized that industry is in Coshocton County. Industries with an LQ above 1 have a higher proportion of employees in that industry than the proportion in the industry at the state level. Likewise, industries with an LQ below 1 have a lower proportion of employees in that industry than at the state level. Additionally, Figure 2 also shows the employment of the industries in 2020 and whether the industry experienced employment loss (yellow circles) or gain (blue circles) from 2010 to 2020. This may indicate whether the industries are growing or shrinking and may signal the need for investment dependent on the Location Quotient of the industry. The size of each of these bubbles indicates the volume of employment in 2020. For example, the total employment in the Primary Metal Manufacturing industry for Coshocton County has the highest LQ (at 15) in 2020, has a positive change in the LQ from 2010-2020, and has about 910 employees. Conversely, Merchant Wholesalers, Durable Goods have the least LQ, a negative change in LQ, and a thirty-two percent loss in employment in 2020. See Figure 2 for a detailed graphical representation of the other twenty-eight 3-digit industry clusters discussed herein.

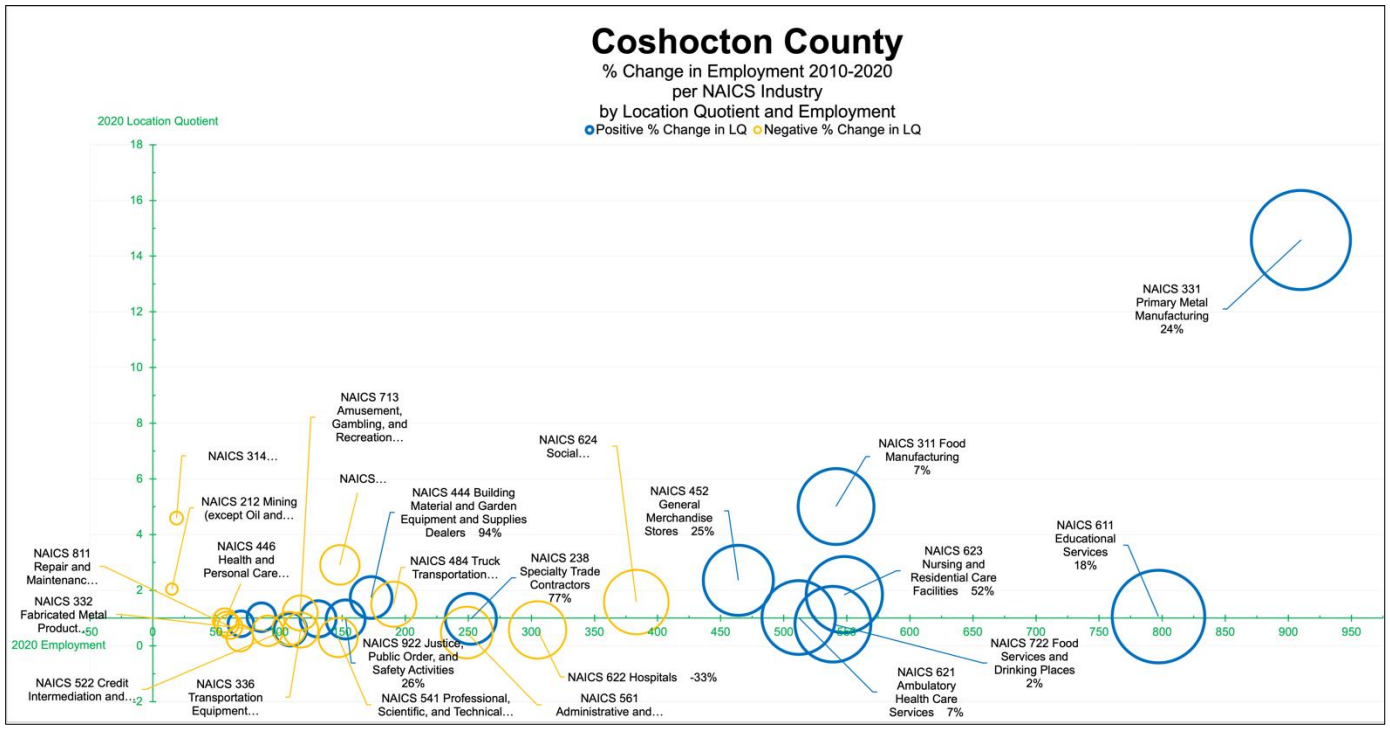
Investments may yield a higher impact if:

the given industry is a large source of employment;
the given industry has a high LQ, but is experiencing a loss in employment;
the given industry is experiencing growth in employment but still has a low LQ.

Investments may yield a lower impact if:

the given industry is a small source of employment;
the given industry has a high LQ and is experiencing growth in employment;
the given industry has a low LQ and is experiencing a loss in employment.

Figure 2. Changes in Employment by NAICS Industry by Location Quotient 2010—2020[6]



Export Jobs and Local Jobs 2020 Industry Employment

Industries that have a higher LQ are typically more likely to produce jobs for export.[7] However, this may not always be the case. Not all industry clusters with an LQ greater than or equal to one produce the export needs. Therefore, estimating the export jobs addresses this by giving more clarity about the number of jobs in a particular industry that is produced for export. In a nutshell, the estimate for export jobs identifies the industries that are producing more of a good or service than the quantity needed to correspond to the demand for those goods and services in an area, in this case, Coshocton County. The Local Jobs provide just about enough to meet the teeming demand.

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[6] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN and authors' calculations

[7] See https://www.incontext.indiana.edu/2006/march/1.asp

The analysis of the report was further extended to observe other economic base analyses such as the export and local jobs to identify export cluster industries that are likely to produce jobs for external demand in 2020. For instance, Primary Metal Manufacturing (848 for Export Jobs vs. 62 for Local Jobs) and Educational Services (756 for Local Jobs vs. 41 for Export Jobs), have the highest employment, but in opposite directions where less of each is needed.

Figure 3. Export Jobs and Local Jobs 2020[8]

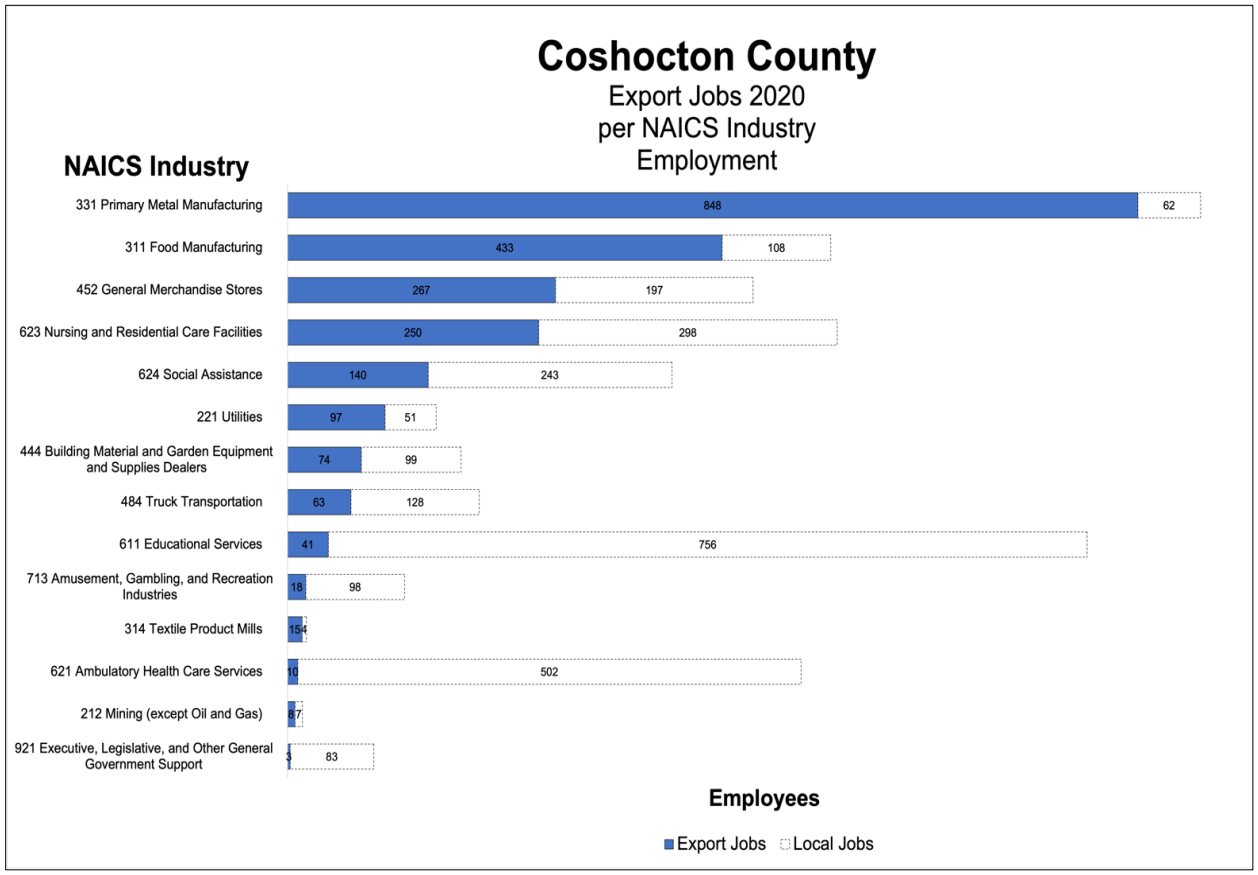


Table 1 shows how the industries fit into these categories. Bolded industries had at least 50 employees in 2020, while the italicized industries had fewer than 50 employees in 2020. The green categories indicate industries that may benefit more from investment. For Category 1, this means using investment to counteract the loss of employment in an

[8] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN and authors' calculations

already strong industry in the county. For example, even though there is a loss in employment in Primary Metal Manufacturing, the cluster industry still has an LQ higher than 1, hence, a higher expected return on investment. For category 4, this means using investment to help specialize or strengthen the concentration of a currently growing industry in the region. This signals that, for instance, the Specialty Trade Contractors cluster industry needs a corresponding increase in investment to match the growing employment levels to spur growth in the county. The blue category indicates industries that may see less return on investment than those in the green categories. For category 3, this means industries that are both growing and strong in the county may continue along that trajectory without the need for investment (See, for instance, the Nursing and Residential Care Facilities industry). For Category 2, a substantial investment may be necessary to change both the loss of employment and strengthen the county's industry. It may take a great deal to have a higher return for investing in the Food Services and Drinking Places or the Administrative and Support Services cluster industry. This is not to say that investments should not be made in these two categories but to acknowledge that achieving the same results of an investment into a green category industry may require a much larger investment in the blue category industry.

Table 1. Industries by Investment Category 2020

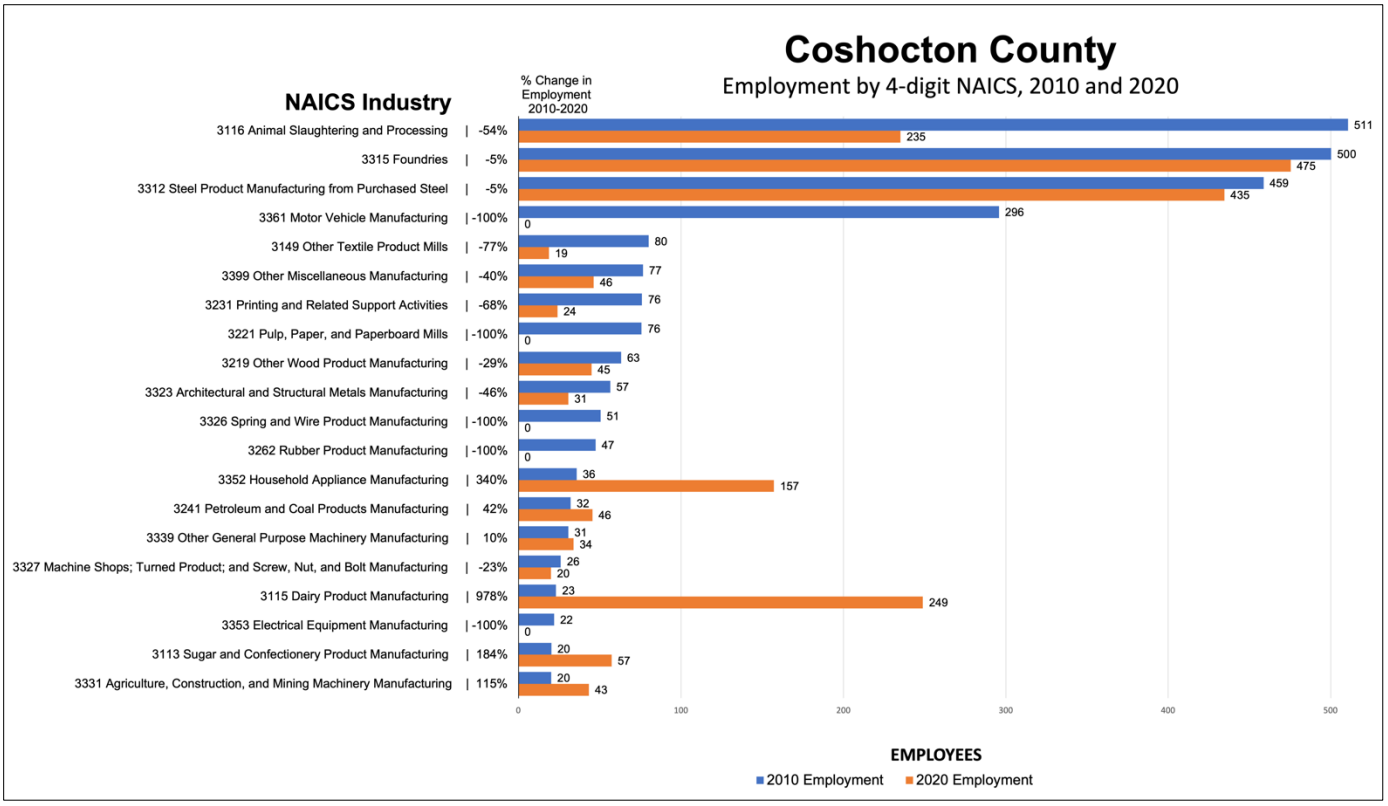
	High LQ (LQ > 1)	Low LQ (LQ < 1)
Loss in Employment	***Category (1)*** **331 Primary Metal Manufacturing** **611 Educational Services** **311 Food Manufacturing** **621 Ambulatory Health Care Services** **452 General Merchandise Stores** **921 Executive, Legislative, and Other General Government Support** **624 Social Assistance** **221 Utilities** **484 Truck Transportation** **713 Amusement, Gambling, and Recreation Industries** *212 Mining (except Oil and Gas)* *314 Textile Product Mills*	***Category (2)*** **722 Food Services and Drinking Places** **561 Administrative and Support Services** **622 Hospitals** **336 Transportation Equipment Manufacturing** **541 Professional, Scientific, and Technical Services** **522 Credit Intermediation and Related Activities** **441 Motor Vehicle and Parts Dealers** **332 Fabricated Metal Product Manufacturing** **445 Food and Beverage Stores** **423 Merchant Wholesalers, Durable Goods** **811 Repair and Maintenance** **812 Personal and Laundry Services** **446 Health and Personal Care Stores** **813 Religious, Grantmaking, Civic, Professional, and Similar Organizations**
Growth in Employment	***Category (3)*** **623 Nursing and Residential Care Facilities** **444 Building Material and Garden Equipment and Supplies Dealers**	***Category (4)*** **922 Justice, Public Order, and Safety Activities** **238 Specialty Trade Contractors**

Manufacturing Industry Employment by 4 Digit NAICS Code

Manufacturing cluster is an essential contributor to the Coshocton County economy. In this section, we discuss it in more detail. The manufacturing cluster discussed in this section includes 31-33 NAICS codes. It shows the change in employment and compares the relative strength of each industry as compared to Ohio from 2010 to 2020 for the selected industries. Six industries experienced employment growth, and fourteen industries experienced a decline in employment in 2020. In addition, no single industry cluster that employed over 100 people in 2010 had an increase in employment in 2020. Dairy Product Manufacturing; Household Appliance Manufacturing; Sugar and Confectionery Product Manufacturing; and Agriculture, Construction, and Mining Machinery Manufacturing all have over 100 percent increase in employment from 2010 to 2020. However, only Dairy Product Manufacturing (249 employments) and Household Appliance Manufacturing (157 employments) have more than sixty employments in 2020. Neither of the cluster industries that have an increase in employment in 2020 had more

than 40 employees in 2010. The cluster industries that experienced a decline in employment (Motor Vehicle Manufacturing; Pulp, Paper, and Paperboard Mills; Spring and Wire Product Manufacturing; Rubber Product Manufacturing; and Electrical Equipment Manufacturing) had no new employment in 2020 (Figure 4).

Figure 4. Employment by 4-digit Manufacturing NAICS Codes 2010—2020[9]

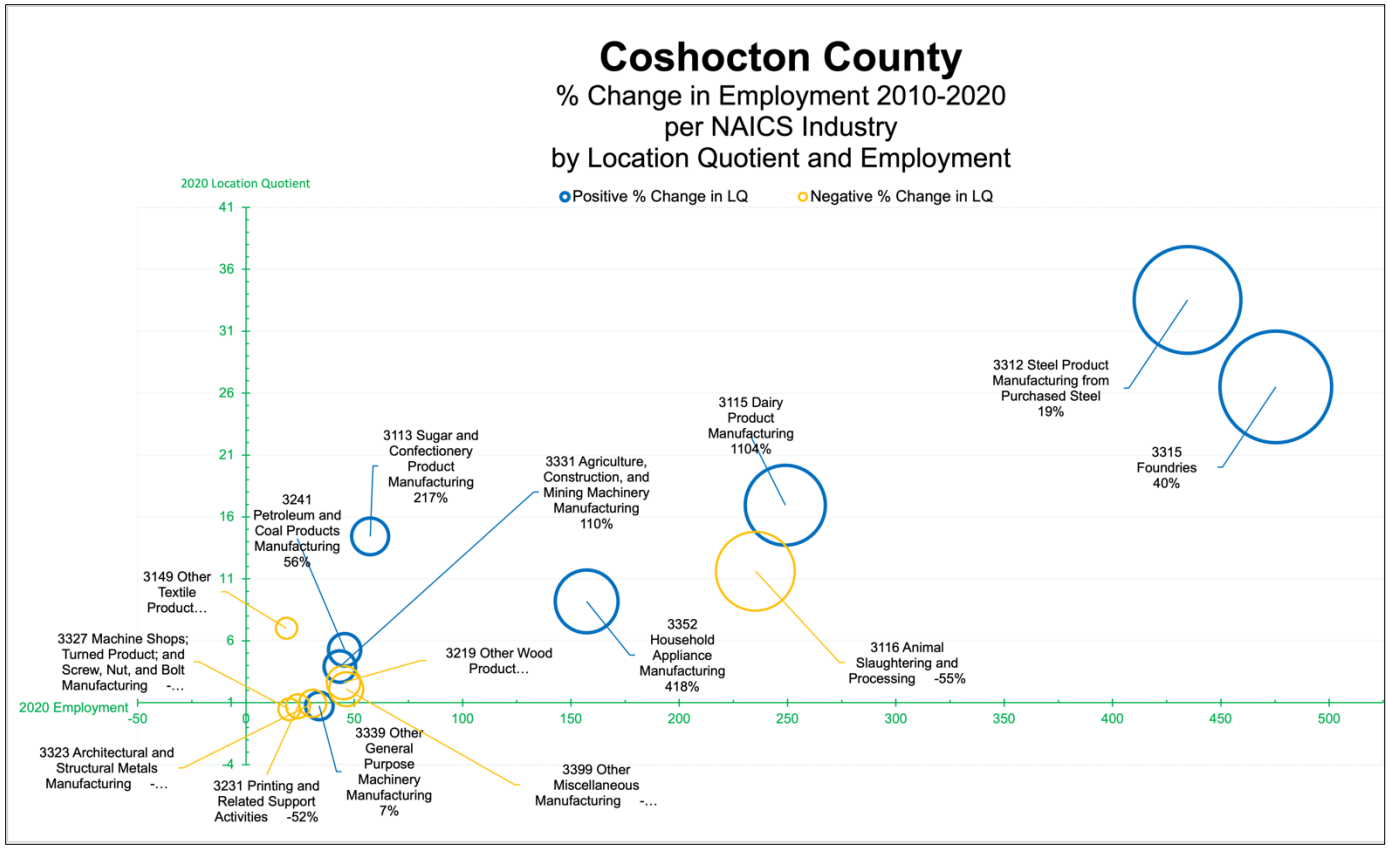


In a similar way, as discussed in Figure 2, Figure 5 shows the industries' Location Quotients (LQ), or the relative strength of each industry as compared to the industry's strength in Ohio using 4-digit NAICS Codes. The yellow circles represent industries that experienced loss or gain (blue circles) in employment in 2020. Industries with a higher LQ are stronger or more concentrated in the county than in the state at large. See, for instance, Steel Product Manufacturing from Purchased Steel, and Foundries are the two cluster industries that have the highest LQs (approximately 34 and 27, respectively), and both industries experienced a positive change in LQ in 2020 from 2010. This may indicate

[9] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN

how specialized these manufacturing industries are in Coshocton County. Conversely, Other Textile Product Mills (19 employees), Machine Shops, Turned Products, and Screw, Nut, and Bolt Manufacturing (20 employees), and Printing and Related Support Activities (24 employees) have low employment, a negative change in LQ in 2020 and have an LQ below 1 except Other Textile Product Mills which has an LQ of 7.01. It is noteworthy that Motor Vehicle Manufacturing, Pulp, Paper, and Paperboard Mills, Spring and Wire Product Manufacturing, Rubber Product Manufacturing; and Electrical Equipment Manufacturing are not in Figure 5 because there is no employment in 2020, hence we cannot give an account for their LQs.

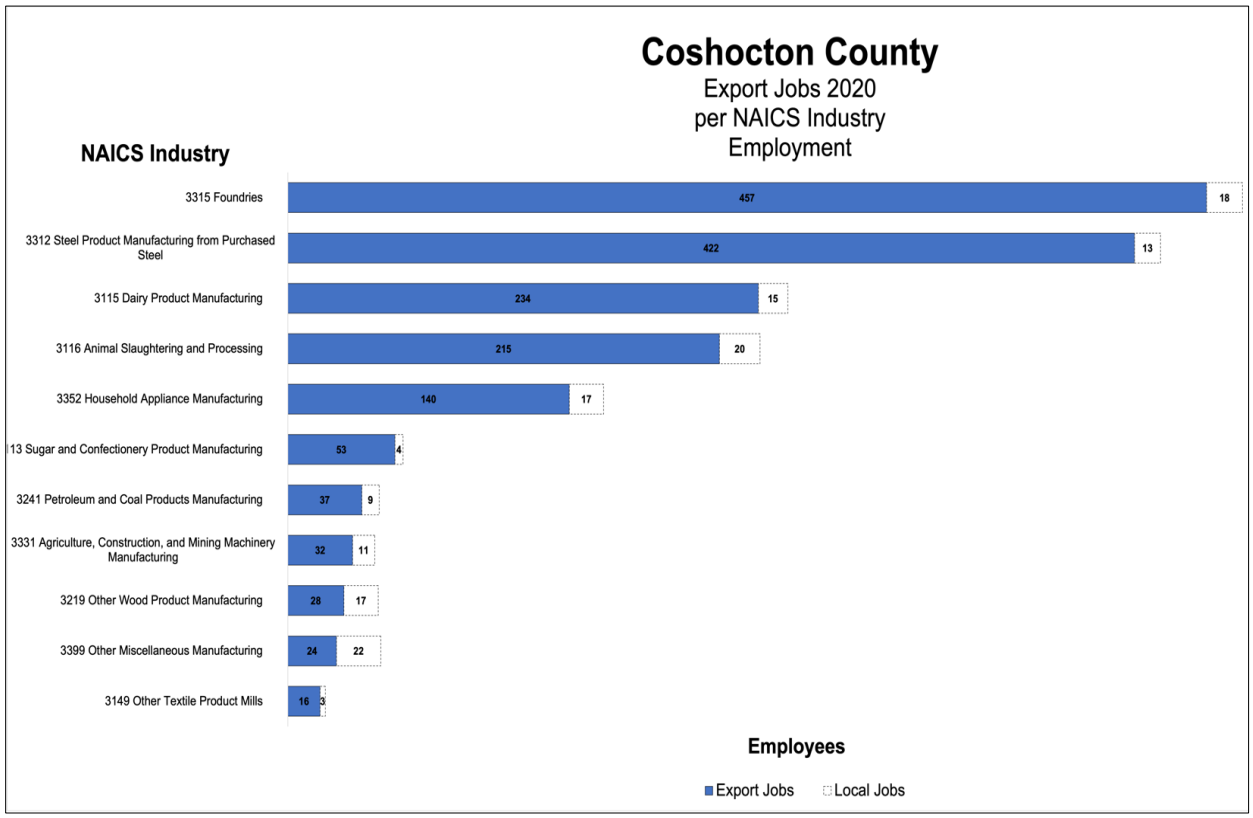
Figure 5. Changes in Employment by 4-digit Manufacturing NAICS Industry by Location Quotient 2010—2020[10]



[10] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN and authors' calculations

Figure 6 shows that as expected there is a high concentration of export jobs in all manufacturing industries including Foundries (which has the largest concentration of Export Jobs (457)); Steel Product Manufacturing from Purchased Steel; Dairy Product Manufacturing; Animal Slaughtering and Processing; Household Appliance Manufacturing; Sugar and Confectionery Product Manufacturing; Petroleum and Coal Products Manufacturing; Agriculture, Construction, and Mining Machinery Manufacturing; Other Wood Product Manufacturing; Other Miscellaneous Manufacturing; and Other Textile Product Mills (has the least Local Jobs (3)). Motor Vehicle Manufacturing; Pulp, Paper, and Paperboard Mills; Spring and Wire Product Manufacturing; Rubber Product Manufacturing; and Electrical Equipment Manufacturing are not in featured in Figure 6.

Figure 6. Export Jobs and Local Jobs 2020[11]



[11] Source: The Quarterly Census of Employment and Wages (QCEW) from IMPLAN and authors' calculations

Table 2 shows in category 1 that Animal Slaughtering and Processing; Foundries; and Steel Product Manufacturing from Purchased Steel has the potential for high returns for investing. Similarly, Other Textile Product Mills; Other Miscellaneous Manufacturing; and Other Wood Product Manufacturing has the potential to spur growth but needs investment to increase employment levels. There are eight industry clusters in category 2 that need substantial investment to change both the loss of employment and strengthen the county's industry contribution to promote growth. All the cluster industries in category 2 have less than 50 employees in each industry. Category 3 has five cluster industries that experienced growth in employment. Although the industries in category 3 have a high LQ, however, the expected returns on investing in these industries may not well be high because, among these five industry clusters, only Sugar and Confectionery Product Manufacturing and Household Appliance Manufacturing have at least 50 employees. Other General Purpose Machinery Manufacturing has growth in employment but has an LQ lower than 1. Other General Purpose Machinery Manufacturing is the only cluster industry in category 4 and has less than 50 employees regardless of its growth in employment. There is a need to increase investment in this industry cluster to improve employment and growth.

Table 2. Industries Investment Category 2020

	High LQ (LQ > 1)	Low LQ (LQ < 1)
Loss in Employment	***Category (1)*** **3116 Animal Slaughtering and Processing** **3315 Foundries** **3312 Steel Product Manufacturing from Purchased Steel** *3149 Other Textile Product Mills* *3399 Other Miscellaneous Manufacturing* *3219 Other Wood Product Manufacturing*	***Category (2)*** *3361 Motor Vehicle Manufacturing* *3231 Printing and Related Support Activities* *3221 Pulp, Paper, and Paperboard Mills* *3323 Architectural and Structural Metals Manufacturing* *3326 Spring and Wire Product Manufacturing* *3262 Rubber Product Manufacturing* *3327 Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing* 3353 Electrical Equipment Manufacturing
Growth in Employment	***Category (3)*** **3352 Household Appliance Manufacturing** *3241 Petroleum and Coal Products Manufacturing* **3115 Dairy Product Manufacturing** **3113 Sugar and Confectionery Product Manufacturing** *3331 Agriculture, Construction, and Mining Machinery Manufacturing*	***Category (4)*** *3339 Other General Purpose Machinery Manufacturing*

Identify and Map the Existing Industry Clusters in Coshocton County, OMEGA (CEDS), APEG/OhioSE, Buckeye Hills, Team NEO, and JobsOhio Regional Focus Areas

This section first explores OMEGA (CEDS), APEG/OhioSE, Buckeye Hills, the Team NEO, and JobsOhio-related subregions' clustering algorithm. This exploration enables us to discuss the procedure on how each region defines targeted clusters of industries. Then the targeted industry clusters will be defined for Coshocton County. The analysis demonstrates the overall strength or weaknesses of Coshocton County's industries. The goal is to gain more insight into examining and identifying opportunities for economic growth and gaps that could be filled, as well as providing opportunities for sustainable growth in Coshocton County.

Targeted Industry Clusters OMEGA (CEDS)[12]

First, we explore the OMEGA region-related resources to understand how targeted industries are defined by the OMEGA (CEDS) entity. There are eight counties in the region: Carroll, Columbiana, Coshocton, Guernsey, Harrison, Holmes, Muskingum, and Tuscarawas. The definition of the targeted clusters in the OMEGA Comprehensive Economic Development Strategy (CEDS) 2020 Report is outlined as follows:

- Business Services
- Construction
- Education
- Financial Services
- Health
- Information Technology and Services
- Leisure and Hospitality
- Manufacturing
- Natural Resources
- Trade
- Transportation
- Utilities

According to the most up-to-date information about industries provided by OMEGA, manufacturing, health care and social assistance, and retail trade has the highest number of employments within the region (each over 25,000 jobs). Mining, quarrying, and oil and gas extraction, manufacturing, and agriculture, forestry, fishing, and hunting have the largest location quotient within the region.[13]

[12] See 2020 CEDS ANNUAL UPDATE (omegadistrict.org)

[13] See Cover (omegadistrict.org)

Targeted Industry Clusters APEG/OhioSE[14]

According to the OhioSE website, the APEG region includes Adams, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties. APEG defines the targeted industries in the whole APEG region as follows:

- Automotive and Aerospace
- Energy and Chemicals
- Food Manufacturing
- Logistics and Distribution
- Metals Fabrication
- Wood and Paper Products

When it comes to the Automotive and Aerospace industry, access to major assembly plants in Ohio, Michigan, Indiana, Pennsylvania, Kentucky, and Tennessee is named a key factor for comparative advantages and growth within the region (footnote 14).

According to OhioSE website, in terms of the energy and chemical industry's intensity in the APEG region, the region is located on top of a sizable portion of the Utica and Marcellus shale formations. These resources have accounted for 85 percent of U.S. shale gas production growth since 2012.

Food manufacturing has a long and successful history with a concentration of food processing workforce 81 percent above the national average. In addition to well-known food manufactures, smaller, specialized food manufactures also support the region and are major employers (footnote 14).

Logistics and distribution are named as one of the state's strengths. Based on OhioSE website, the region is within a 10-hour drive of eight of the largest metro areas in the US: New York, Chicago, Washington DC, Philadelphia, Atlanta, Detroit, St. Louis, and Charlotte. In addition, the region benefits from an easy drive to other metro areas within

[14] Available at https://ohiose.com/

and neighboring the State of Ohio, such as Columbus, Pittsburgh, Cleveland, Cincinnati, Indianapolis, and Louisville (footnote 14).

The metal fabrication industry has a long history of utilizing local ore and energy resources benefiting from the Ohio River for transport. This industry has over 300 businesses, and approximately 8,000 employees and relies on a skilled workforce, abundant low-cost energy, and the powerful Ohio River. The U.S. Energy Information Administration (EIA) report indicates that Eastern Ohio, combined with Pennsylvania, and West Virginia as Appalachian Basis produced "more than a third of all U.S. gas production" (approximately, 35.5 billion cubic feet) of natural gas per day. That is more than a third of all U.S. gas production. In terms of the energy and chemical industry's intensity in the APEG region, the region is located on top of a substantial portion of the Utica and Marcellus shale formations (footnote 14).

According to the OhioSE website, wood-related industries in the OhioSE region have access to over 30 billion board feet of standing timber (trees grown for commercial use) and over 400 million board feet of hardwood harvested each year. The hardwood and paper products supply chain are well developed with logging, sawmills, kilns, stave mills and specialized trucking operations across the region, which provides opportunities for growth.

In general, the labor surplus, favorable tax climate, low operating costs, and abundant and affordable energy are opportunities that make the OhioSE region an ideal location to grow a business.

Targeted Industry Clusters Buckeye Hills[15]

This region has eight member counties (Athens, Hocking, Meigs, Monroe, Morgan, Noble, Perry, and Washington County) and is predominantly rural. According to the Buckeye Hills website, the region has become a fast-growing location for oil and gas exploration and extraction from the Marcellus and Utica Shale formations that span the eastern counties of our district. There are 19 industry clusters within the Buckeye Hills region.

[15] See CEDS_2014.pdf (squarespace.com)

- Accommodation and Food Services
- Administrative and Waste Services
- Agriculture Related Businesses
- Arts, Entertainment and Recreation
- Construction
- Education
- Financial Services
- Health
- Information Technology and Services
- Management of Companies and Enterprises
- Manufacturing
- Mining
- Other services, except public administration
- Professional and Technical Services
- Real Estate
- Retail
- Transportation
- Utilities
- Wholesale

According to the 2020 Comprehensive Economic Development Strategy (CEDS) report[16] for the region, in 2018 alone, the largest sectors of employment in the region are the government, health care and social assistance, retail trade, accommodation and food services, and manufacturing, accordingly. The government sector is by far the largest employer and nearly double the next largest category (health care and social assistance). The region is faced with inadequate or absence of broadband connectivity, high underemployment, and an expansive growth in infrastructure to attract large-scale investment from private and government projects.

[16] Available at https://buckeyehills.org/ceds

Targeted Industry Clusters Team NEO[17]

According to the Team NEO website, the region has 18 counties (Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, Wayne). The 18-county region has over 800 business headquarters and contributes almost 40% of the economy of Ohio State. The key industries in the Team NEO region include:

- Advanced Manufacturing
- Aerospace & Aviation
- Automotive
- Healthcare & Biotechnology
- Financial Services
- Food Processing
- Headquarters & Professional Services
- Information Technology
- Logistics
- Metal Production & Fabrication
- Oil & Gas
- Polymers & Materials

According to the TeamNEO website[18], Advanced Manufacturing is the driving force of the Northeast Ohio region's growth, accounting for 20% of its gross domestic product. The key industries in the region listed above are committed to advancing innovation, connecting cluster industries with academic and research institutions while creating opportunities for a sustainable economy to attract more business activities and workforce strength in the region.

[17] See Key Industries - The Northeast Ohio Region

[18] Available at https://northeastohioregion.com/grow-your-business-here/key-industries/

Targeted Industry Clusters JobsOhio (Website)[19]

According to the JobsOhio website, there are 11 industries in Ohio listed as targeted clusters in 2021:

According to the JobsOhio website, the Advanced Manufacturing industry is the leading manufacturer in plastic and rubber production and has the third largest manufacturing workforce countrywide.

- Advanced Manufacturing with 3,527 jobs created
- Aerospace and Aviation with 210 jobs created
- Automotive with 3,293 jobs created
- Financial Services with 962 jobs created
- Food Science and Agriculture with 1,554 jobs created
- Healthcare with 2,406 jobs created
- Information Services and Software with 1,593 jobs created
- Logistics and Distribution with 3,287 jobs created
- Military and Federal with 300 jobs created
- Shale Energy and Petrochemicals with 959 jobs created
- Other industries with 930 jobs created

JobsOhio lists the top characteristics that are benefits of doing business in Ohio as friendly approaches, decisive interventions, a job-friendly regulatory environment, access to top level talented workforce, dependable infrastructure, Ohio's attractive location for minimizing supply chain disruptions, supportive system for research and innovation, loan and grant opportunities and incentives, small state corporate income or profits taxes, no tax on products sold outside of Ohio, no state tax on machinery and equipment investments, no state tax on R&D investments, and having only one state business tax – the Commercial Activity Tax (0.26 percent).

[19] Available at https://www.jobsohio.com/annual-report-2020/

Targeted Industry Clusters JobsOhio (Document)[20]

According to the JobsOhio document, there are nine targeted clusters and four targeted business functions in Ohio. These industries are identified by the JobsOhio 2021 Report according to their strength and contribution to the overall state economy:[21]

Clusters

- Advanced Manufacturing
- Aerospace and Aviation
- Automotive
- BioHealth
- Energy
- Financial Services
- Food Processing
- Information Technology and Services
- Polymers and Chemicals

Business Functions

- Back Office
- Headquarters and Consulting
- Logistics
- Research & Development

Targeted Industry Clusters Coshocton County (This Study)

To create the targeted clusters for Coshocton County, we use the JobsOhio document as a baseline and then observe industries with more overlapping with other resources. These industries are Advanced Manufacturing, Aerospace & Aviation, Automotive, Biohealth, Fossil Fuels, Financial Services, Food Processing, Information Technology & Services, Logistics, and Polymers & Chemicals. In addition, the Wood Industry also overlapped with APEG/OhioSE is an influential industry in Coshocton County. Table 3 presents a summary of all the entities we investigate.

[20] Available at https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/rfp/JobsOhio-NAICS-codes.pdf
[21] See JobsOhio 2021 Report

Table 3. Targeted Clusters Defined by this Project, OMEGA (CEDS), APEG/ OhioSE, Buckeye Hills, Team NEO, JobsOhio Website, JobsOhio Document

Cluster	This Study	OMEGA (CEDS)	APEG/ OhioSE	Buckeye Hills	Team NEO	JobsOhio Website	JobsOhio Document
Accommodation and Food Services				*			
Administrative and Waste Services				*			
Advanced Manufacturing	*		*		*	*	*
Aerospace & Aviation	*		*		*	*	*
Agriculture Related Businesses				*			
Arts, Entertainment and Recreation				*			
Automotive	*		*		*	*	*
Back Office							*
Biohealth	*				*	*	*
Business Services		*					
Construction		*		*			
Education		*		*			
Energy	*		*			*	*
Financial Services	*	*		*		*	*
Food Processing	*		*		*	*	*
Hardwood Products Manufacturing	*		*				
Headquarters & Consulting					*		*
Health		*		*			
Information Technology and Services	*	*		*	*	*	*
Leisure and Hospitality		*					
Logistics	*	*			*	*	*
Management of Companies and Enterprises			*				
Manufacturing			*				
Metal Production and Fabrication				*			
Military and Federal					*		
Mining			*				
Natural Resources							
Oil and Gas				*			
Other services, except public administration			*				
Polymers and Chemicals	*	*		*		*	*
Professional and Technical Services			*				
Real Estate			*				
Research & Development						*	
Retail			*				
Trade							
Transportation			*				
Utilities			*				
Wholesale			*				

Source: OMEGA Website, APEG/ OhioSE Website, Buckeye Hills Website, Teams NEO Website, JobsOhio Website

Table 4 lists our 11 targeted clusters in Coshocton County with more detail on their corresponding NAICS codes.

Table 4. Targeted Industry Clusters

Cluster	NAICS Code
Advanced Manufacturing	3272, 3279, 3311, 3312, 3314, 3324, 3329, 3332, 3339, 3351, 3352, 3353
Aerospace & Aviation	3345, 3364, 4811, 4812, 5174, 9271
Automotive	3336, 3361, 3362, 3363
Biohealth	3254, 334510, 334516, 334517, 3391
Financial Services	5221, 5222, 5223, 5231, 5232, 5239, 5241, 5251, 5259
Food Processing	3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3121
Fossil Fuels	2111, 2121, 2131, 2211, 2212, 2371, 3241
Hardwood Products Manufacturing	321, 337, 4232, 4233, 4239, 325194, 238330, 423990, 493190, 561990, 115310, 532412, 111421, 541715, 561710, 811310
Information Technology and Services	5112, 5182, 5191, 5415
Logistics	4841, 4842, 4881, 4882, 4883, 4884, 4885, 4889, 4921, 4922, 4931
Polymers and Chemicals	3251, 3252, 3253, 3255, 3256, 3259, 3261, 3262

Source: JobsOhio Document

Scan and Map Targeted Industry Clusters in Coshocton County

When examining Coshocton County-targeted clusters, it is important to recognize the variance between the different types of clusters. Table 5 presents the number of firms in each cluster, their share of total firms in 11 clusters, the number of employees in each cluster, their share of total employees in 11 clusters, the number of headquarters in each cluster, their share of total headquarters in 11 clusters, sales/revenues in each cluster, and their share from total sales/revenue in 11 clusters.

Through our examination, we find that a vast number of firms in targeted clusters in the area are found in the NAICS clusters of hardwood product manufacturing and logistics. Hardwood product manufacturing includes about 405 firms within Coshocton County. However, the logistics cluster is mostly compromised of small operations, as they account for around 60% of the firms in the area and employed around 32% of the working population within 11 targeted clusters. A much greater concentration of employment lies in the field of fossil fuels, where about 5% of the firms comprise almost 24% of employees

within 11 targeted clusters in the region. Figure 7 shows the number of firms in each targeted cluster in Coshocton County, Figure 8 shows the number of employees in each targeted cluster in Coshocton County, and Figures 9 and 10 present the map of the firms in the region.

Table 5. Number of Firms, Employees, Headquarters, and Sales/Revenue in Each Targeted Cluster

Industry Cluster	Number of Firms	Firms from Total (%)	Number of Employees	Employees from Total (%)	Number of HQs	HQs from Total (%)	Sales/ Revenue ($)	Sales/ Revenue from Total ($)
Advanced Manufacturing	14	2.07	1,245	23	0	0	$ 20,344,151	4
Aerospace & Aviation	1	0.15	2	0.04	0	0	$ 178,830	0.03
Automotive	1	0.15	1	0.02	0	0	$ 71,000	0.01
Biohealth	4	0.59	85	2	1	8	$ 376,876	0.07
Financial Services	58	8.59	227	4	3	25	$ 43,905,822	9
Food Processing	10	1.48	1,130	21	2	18	$ 110,751,698	22
Fossil Fuels	33	4.89	791	15	3	25	$ 245,202,269	50
Hardwood Products Manufacturing	405	60	1,187	22	2	17	$ 43,107,194	9
Information Technology and Services	14	2.07	40	1	0	0	$ 1,926,599	0.004
Logistics	130	19.26	621	12	0	0	$ 28,027,254	6
Polymers and Chemicals	5	0.74	35	1	1	8	$ 788,594	0.002
TOTAL	**675**	**100**	**5,373**	**100**	**12**	**100**	**$ 494, 680, 287**	**100**

Source: Authors' Computation using data from Mergent Intellect

When we investigate the Mergent Intellect dataset, we realize not all the firms report their sales/revenue. Table 6 shows the statistics of the firms that reported their sales/revenue and how that seems to relate to the firms being publicly or privately owned. Out of the 675 companies examined, 674 of the total firms were found to be privately owned and only 1 firm (specifically, in the Financial Services industry cluster) is a public corporation, which reported their revenue. Upon examining private corporations, it becomes more difficult to gain an accurate picture of the total revenue of firms in the area. Out of the 674

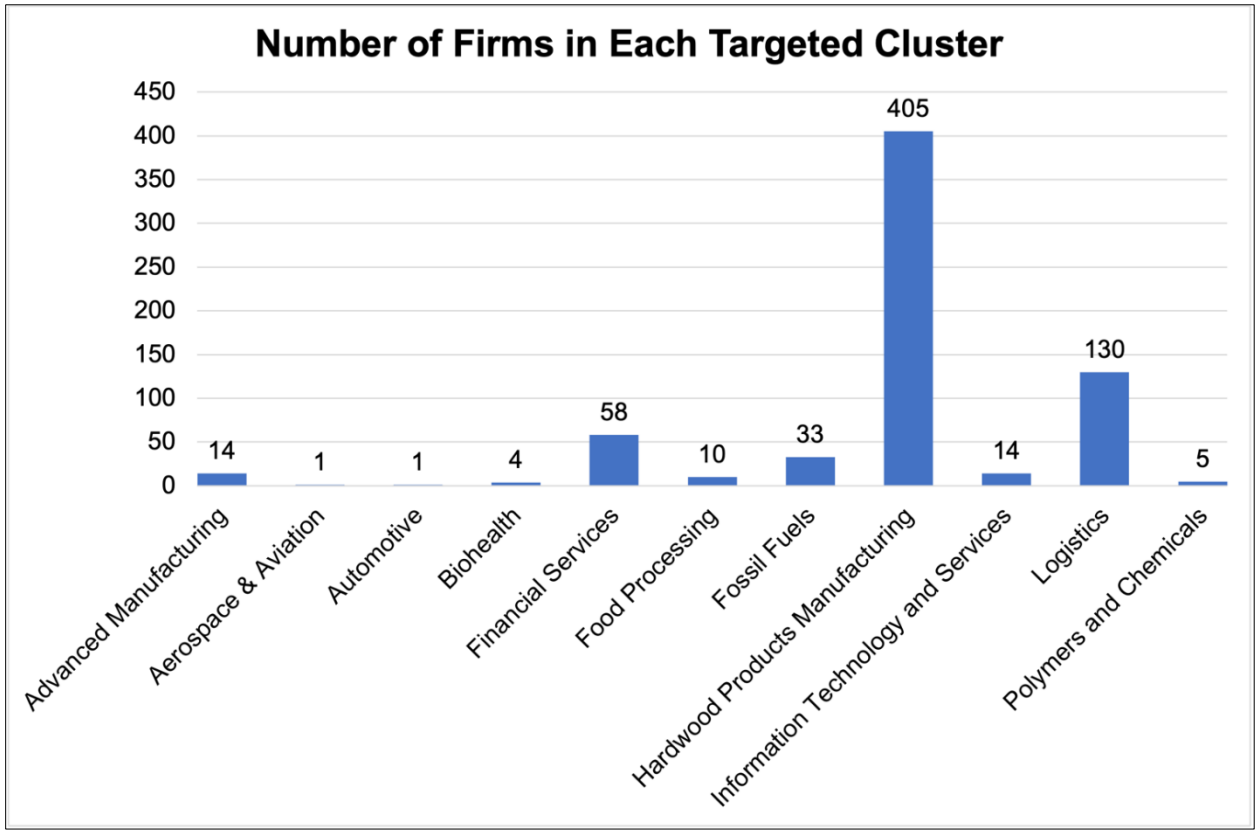
private firms, it was found that 624 firms reported their revenue, and 51 firms reported no revenue, which is around 92.4% of the total companies' reporting revenue.

Figure 7 shows the number of firms in each of the 11 targeted cluster industries in Coshocton County. Hardwood Products Manufacturing has the largest number of firms (405 companies) and is followed by Logistics which has 130 companies, both of which account for about 79% of the total number of firms in Coshocton County. Aerospace & Aviation and Automotive industry clusters each have only one firm, hence, the least number of firms in the county.

Figure 8 shows that Advanced Manufacturing (1,254 employees) is the leading industry cluster for the total number of employees. Although logistics has the second-largest number of firms in the county, however, Hardwood Product Manufacturing has the larger number of employees when comparing both industries. There are 1,187 employees in the Hardwood Product Manufacturing industry cluster compared to 621 employees in the logistics industry cluster. The data indicate that Aerospace & Aviation has two employees and Automotive has only one employee, therefore, considered the industry cluster in Coshocton County with the least number of employees.

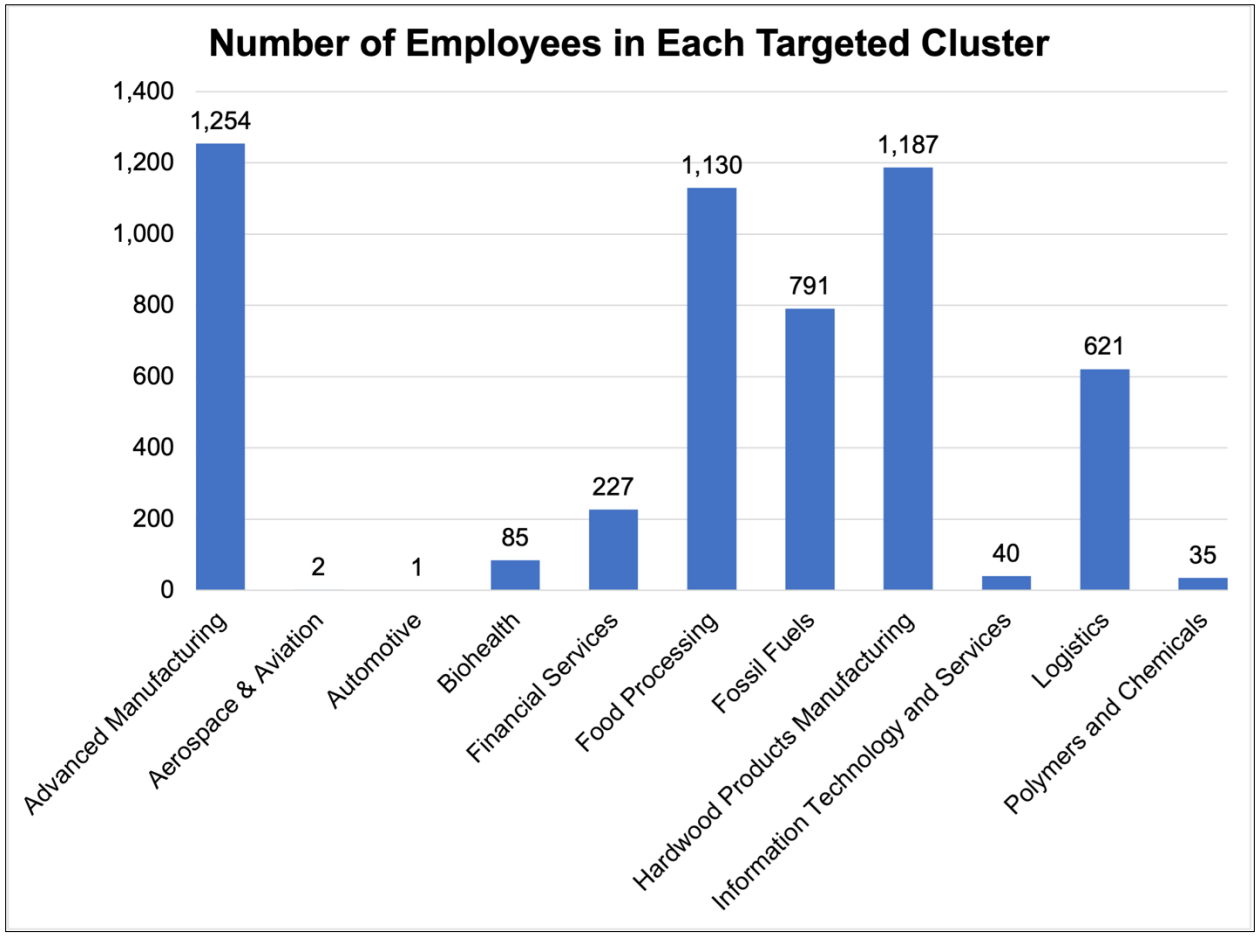
A thorough analysis of the region becomes more difficult because many firms in the region do not report their revenues, likely because 99.8% are privately owned firms. Much of the revenue of targeted clusters seems to come from Fossil fuels (49.6%), which has the largest share of revenue of the 11 cluster industries in Coshocton County, and more than doubles (by 7.2%) the next largest category of total targeted cluster revenue, food processing (22.4%). Automotive (0.01%) and Aerospace & Aviation (0.04%) have the least total revenue. See Figure 10 for more details.

Figure 7. Number of Firms in Each Targeted Cluster



Source: Authors' Computation using data from Mergent Intellect

Figure 8. Number of Employees in Each Targeted Cluster



Source: Authors' Computation using data from Mergent Intellect

In Figure 9, the map shows data points to visually understand the patterns and identify the level of concentration of the firms in each of the 11 industry clusters within Coshocton County. Each of the colors represents the name of an industry cluster. Therefore, the more a colored data point appears repeatedly, the higher the number of firms in that industry cluster in the region, and the reverse is true. Food processing, Fossil Fuels, and Advanced Manufacturing are more concentrated clusters, while Hardwood Products Manufacturing, Logistics, and Financial Services are among dispersed clusters.

Figure 9. Map of the Targeted Industry Clusters

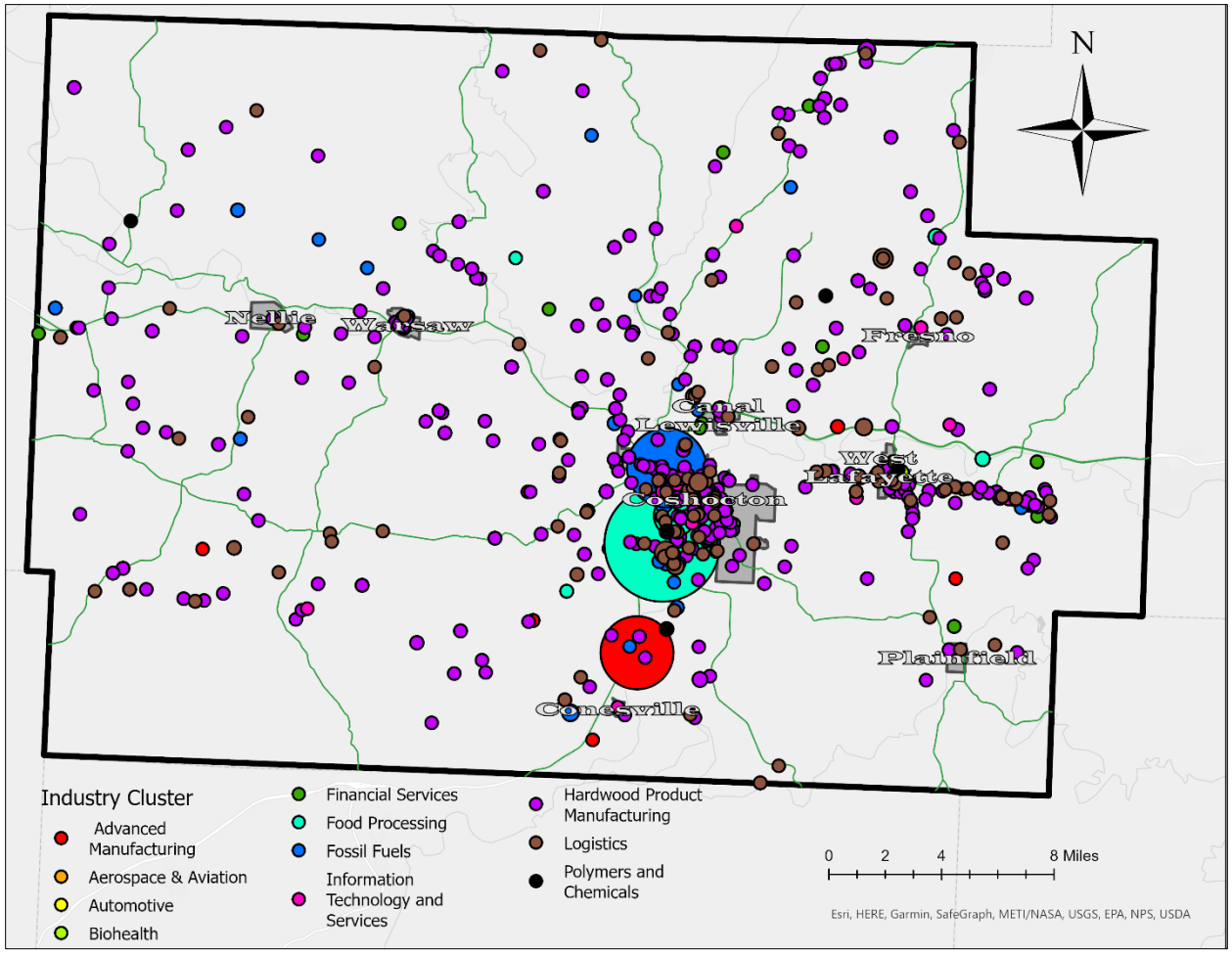
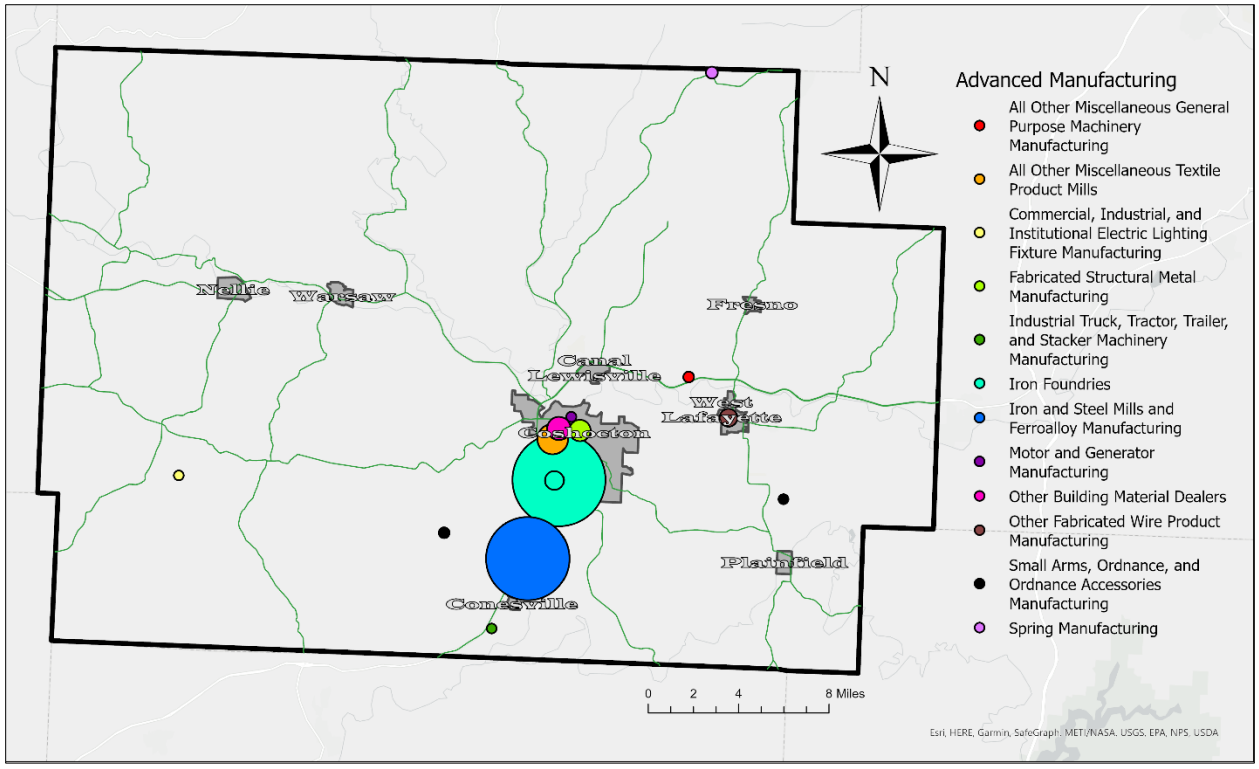


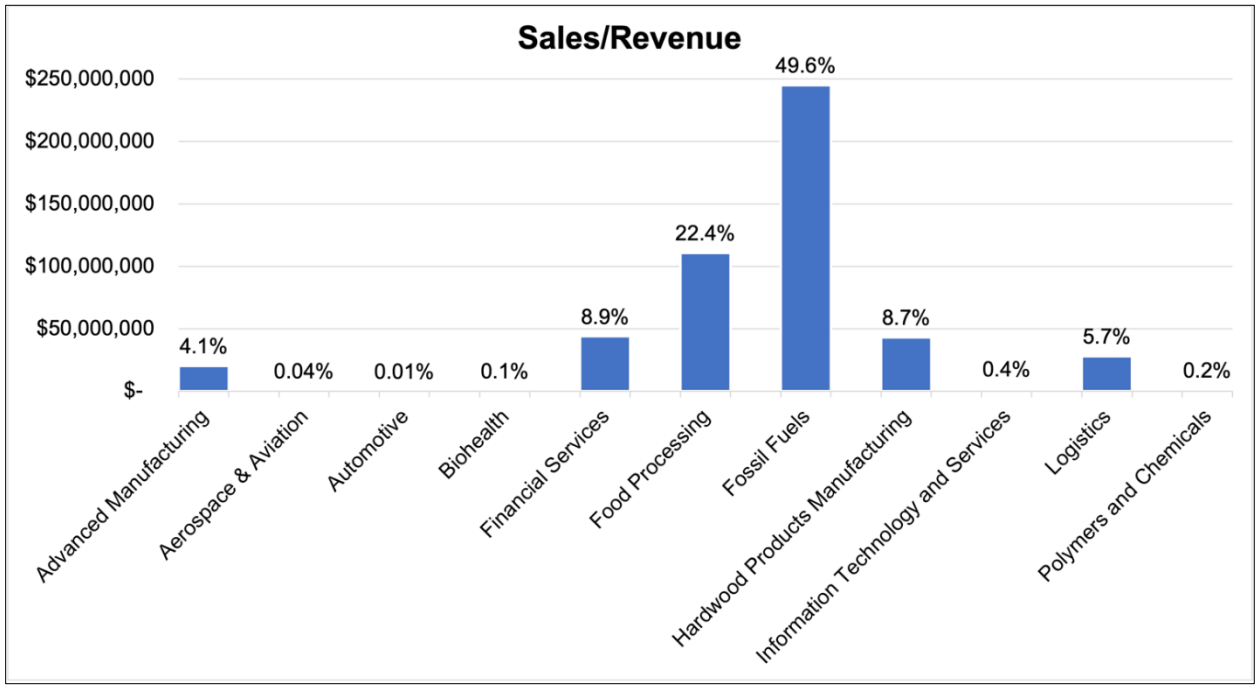
Figure 10 presents the map of firms in the advanced manufacturing cluster. 12 clusters of advanced manufacturing industries are located within the region. Iron Foundries, Iron and Steel Mills, and Ferroalloy Manufacturing, as well as All Other Miscellaneous Textile Product Mills, are the firms with the highest concentration.

Figure 10. Map of the Advanced Manufacturing Cluster



As mentioned earlier, not all the industry clusters have a full report of the total sales of each firm in their industries. Based on the data available for analysis, Figure 11 indicates that the Fossil Fuels industry cluster represents nearly half (at 49.6%) of the total sales of all the industry clusters in Coshocton County and more than doubles the second-highest, Food Processing industry cluster, which accounts for 22.4% of the total revenue in the county.

Figure 11. Sales/Revenue in Each Targeted Cluster



Source: Authors' Computation using data from Mergent Intellect

Figure 12 reads the company locations according to each of the targeted industry clusters in Coshocton County as of 2020. In total, there are 675 firms in Coshocton County. As mentioned above, Hardwood Product Manufacturing has the largest number of firms, 2 of which are headquarters, 3 branches, and 400 firms with a single location in Coshocton County. In the Logistics industry cluster, there is only 1 headquarter, 4 branches, and 126 single locations in the county. The Aerospace and Aviation, and Automotive industry clusters have the least number of firms in the county, each of which is classified as a single location.

Figure 12. HQ, Branch, Single Location in Each Targeted Cluster

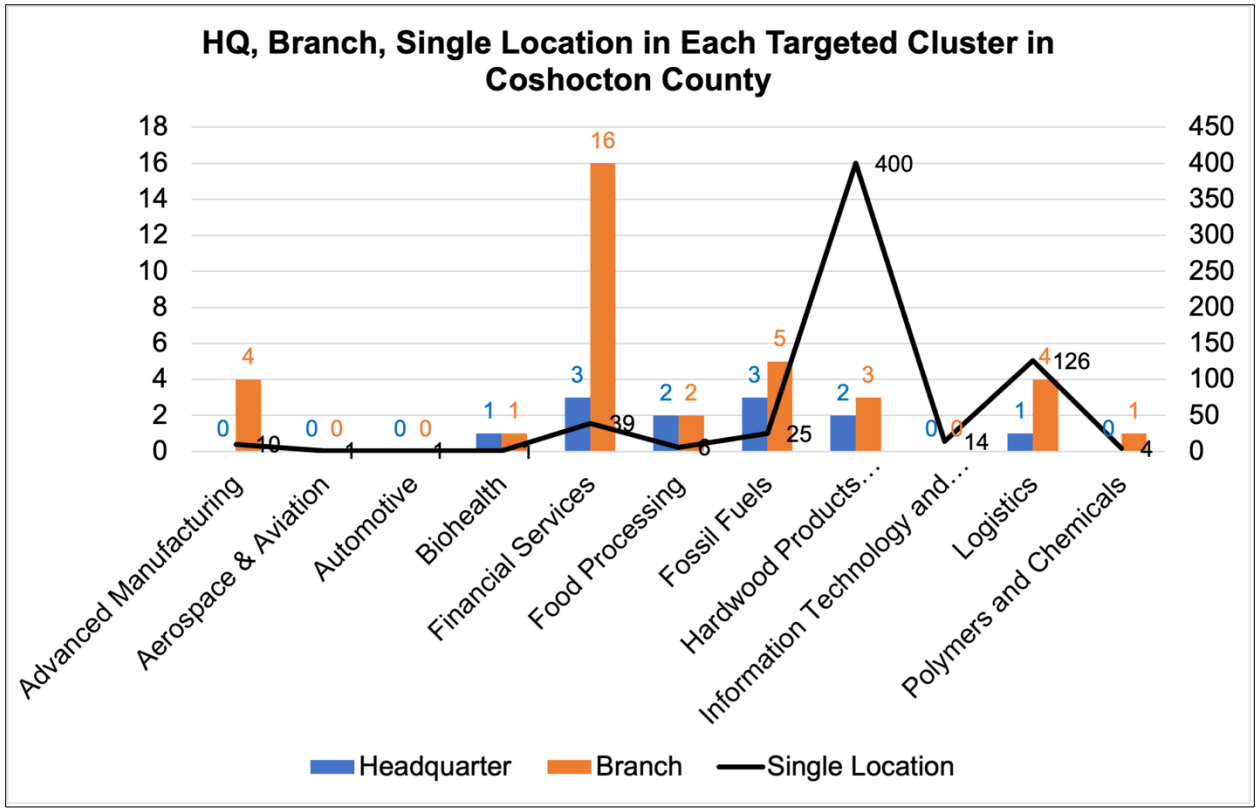
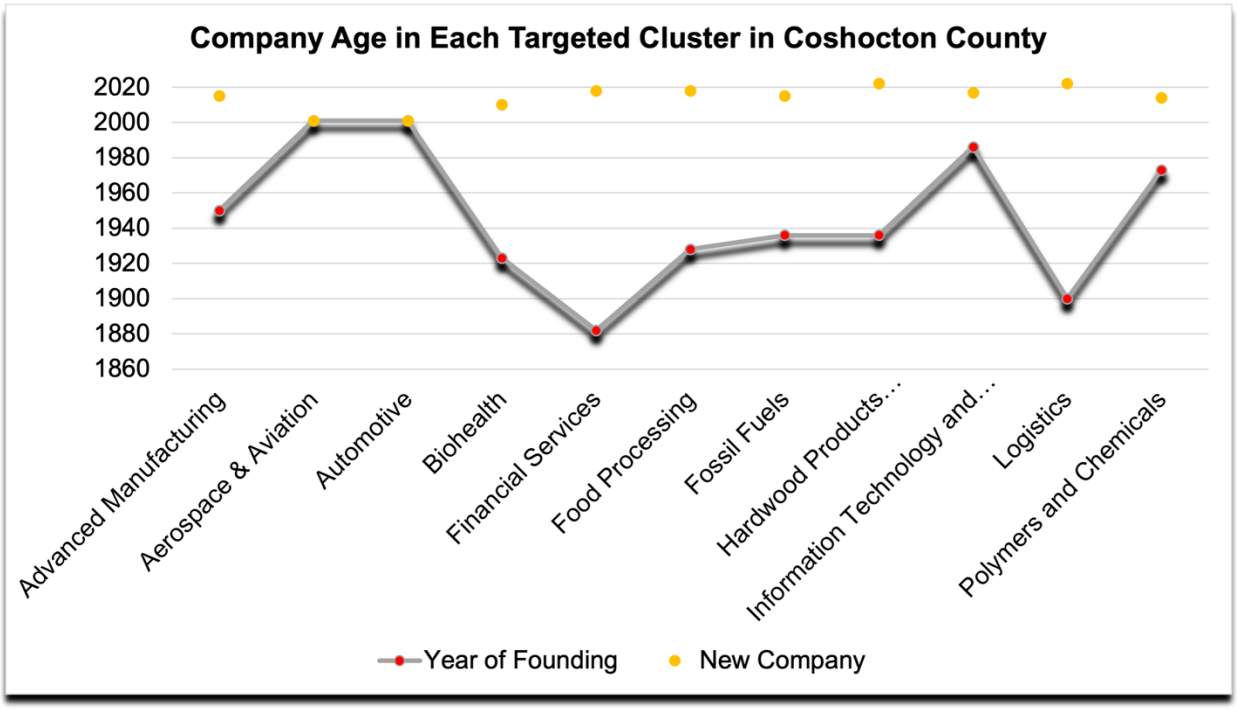


Figure 13 shows that the Financial Service industry cluster has the earliest firm established in Coshocton County[22] in 1882, then, Logistics in 1900, and Biohealth in 1923. Approximately 75 firms started before the year 2000, excluding those firms whose year of founding is not available.[23]

Figure 13. Company Age in Each Targeted Cluster

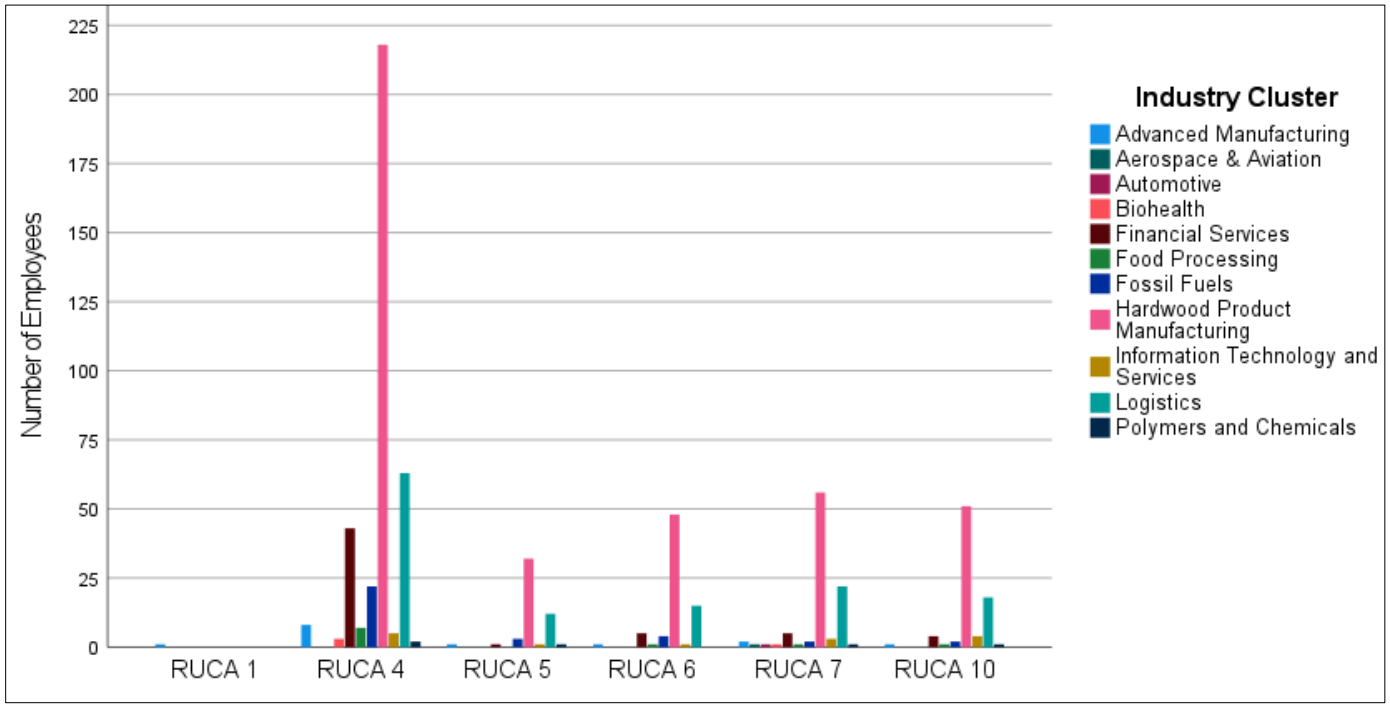


In Figure 14, we use RUCAs[24] as geographical identifiers to classify the location of an industry cluster. In a nutshell, the framework of RUCAs is developed using ZIP codes, which are used to portray the population demography of an area or region.[25] Of all the 11 industry clusters, only the Advanced Product Manufacturing industry cluster has a ZIP code categorized as urban (RUCA 1— Metropolitan area core: primary flow within an urbanized area (UA)), and the remaining industry clusters have ZIP codes categorized as rural settlements. There are no suburban locations. As mentioned earlier in the previous chapters, Hardwood Product manufacturing industry cluster has the highest number of

[22] This is solely based on the available from Mergent Intellect as at the time of preparing this report.
[23] Of the 675 number of firms in Coshocton County, 91 firms have missing values for the year of founding.
[24] RUCA (Rural-Urban Commuting Area codes) assigns a primary code between 1 and 10 using ZIP code approximations. See https://depts.washington.edu/uwruca/ruca-approx.php
[25] Additional sources for RUCA classifications are available at https://www.umt.edu/rural-disability-research/focus-areas/research-methods/defining-rural.php

firms in Coshocton County. More than half of the total number of firms (218 firms) in the Hardwood Product Manufacturing industry cluster reside in an area classified as RUCA 4 (Micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC)), and the remaining 187 firms in the industry cluster are spread between RUCA 5 (Micropolitan high commuting: primary flow 30% or more to a large UC), 6 (Micropolitan low commuting: primary flow 10% to 30% to a large UC), 7 (Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC)), and 10 (Rural areas: primary flow to a tract outside a UA or UC). Similarly, the Logistics industry cluster also has almost half of its number of firms classified in RUCA 4 (Micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC)).

Figure 14. Location (Rural, Suburban, Urban) in Each Targeted Cluster



Of the 675 firms in Coshocton County, the county has only one public firm (in the Financial Service industry cluster) and the remaining 674 firms are private firms. Table 6 shows approximately 92.4% of the firms reported, and only 51 firms reported no revenues. With the Hardwood Products Manufacturing industry cluster as the cluster with the highest number of firms (405 firms), only 11 firms reported no revenue.

Table 6. Companies Reporting Revenue

Industry Cluster	Number of Firms	Number of Private Firms	Private Firms out of Total Cluster (%)	Number of Firms that Reported No Revenue	Number of Firms that Reported that Revenue	Percentage of Total Companies Reporting Revenue by Cluster (%)
Advanced Manufacturing	14	14	100	4	10	71.4
Aerospace & Aviation	1	1	100	0	1	100
Automotive	1	1	100	0	1	100
Biohealth	4	4	100	2	2	50
Financial Services	58	57	98	17	41	70.7
Food Processing	10	10	100	2	8	80
Fossil Fuels	33	33	100	7	26	78.8
Hardwood Products Manufacturing	405	405	100	11	394	97.3
Information Technology and Services	14	14	100	0	14	100
Logistics	130	130	100	7	123	94.6
Polymers and Chemicals	5	5	100	1	4	80
TOTAL	**675**	**674**	**99.8**	**51**	**624**	**92.4**

Source: Authors' Computation using data from Mergent Intellect

Table 7 shows a summary of the number of employees in each industry within the Advanced Manufacturing industry cluster in Coshocton County. Although the Printing and Related Support Activities and the Other Miscellaneous Manufacturing industry share an equal number of firms (totaling 7 for each industry), Foundries as a component of the advanced manufacturing industry cluster has the highest number of employees in the county totaling 450 employees (34% of the total number of employees) and followed by the Animal Slaughtering and Processing industry which has 265 employees. The Pulp, Paper, and Paperboard Mills industry and the Electrical Manufacturing industry have the

least number of employees, which accounts for approximately less than 1% of the total number of employees.

Table 7. Number of Firms, Employees, and Headquarters in Each Industry within the Advanced Manufacturing Cluster

Industry Cluster	Number of Firms	Number of Employees	Number of HQs	Number of Employees Totals (%)
Animal Slaughtering and Processing	2	265	1	20
Foundries	2	450	0	34
Steel Product Manufacturing from Purchased Steel	-	-	-	-
Motor Vehicle Manufacturing				
Other Textile Product Mills	2	165	0	12
Other Miscellaneous Manufacturing	7	17	0	1
Printing and Related Support Activities	7	91	0	7
Pulp, Paper, and Paperboard Mills	1	1	0	0.076
Other Wood Product Manufacturing	6	23	0	2
Architectural and Structural Metals Manufacturing	4	23	0	2
Spring and Wire Product Manufacturing	3	90	0	7
Rubber Product Manufacturing	-	-	-	-
Household Appliance Manufacturing	-	-	-	-
Petroleum and Coal Products Manufacturing	3	105	1	8
Other General Purpose Machinery Manufacturing	2	7	0	1
Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	5	45	0	3
Dairy Product Manufacturing	1	20	0	2
Electrical Equipment Manufacturing	1	2	0	0.15
Sugar and Confectionery Product Manufacturing	-	-	-	-
Agriculture, Construction, and Mining Machinery Manufacturing	2	17	0	1

Source: Authors' Computation using data from Mergent Intellect

Note:"-" indicates that there is no data available.

Results

The following graphs show the relationship between the growth in the industry (percent change in employment 2010-2020) and the relative strength or concentration of the industry cluster (the location quotient). This relationship can be divided into four categories: Mature, Star, Transforming, and Emerging clusters. Industries in Mature cluster have a strong concentration but need investment to reverse downward growth trends. Star industries have strong growth and concentration. Star industries are the strength of the community. Transforming industries have low concentration and negative growth. Only a large investment could help change these trends and this large investment might be better invested in an industry in another category. Emerging industries have a low concentration, but high growth. These industries are poised for future growth and can use investment to support and strengthen the concentration of the industry. The graphs also show the relative number employed in the industry cluster by the size of the bubble.

Figures 15, 16, 17, and 18 show the comparison of Coshocton County to the OMEGA region, Buckeye Hills, Ohio, and the United States from 2010 to 2020, respectively. In all four cases, Food Processing and Advanced Manufacturing are Coshocton County's highest-concentrated industries. However, the Food Processing industry cluster is situated on the y-axis in all the figures, thereby indicating little or no percentage change in total employment between 2010 to 2020. Advanced Manufacturing has the highest concentration in the OMEGA region and in the US, whereas Food Processing is, in the Buckeye Hills region and in Ohio. The Food Processing industry is almost 5 times stronger in Coshocton County than in both the entire Buckeye Hills region and in Ohio. Likewise, the Advanced Manufacturing industry is over 3 times stronger compared to the OMEGA region and almost 8 times stronger compared to the United States. The Food Processing industry is the only industry where the direction of growth could not be determined. However, investments in these industries could help spur growth whether the industry is considered mature or star. Likewise, in all four cases (that is, Figures 15-18), Advanced Manufacturing is considered a star industry for Coshocton County from 2010 to 2020, and Hardwood Product Manufacturing was a star industry when compared to the Buckeye Hills region, in Ohio, and in the United States, and considered as emerging when

compared to the OMEGA region. The Polymers and Chemicals industry is considered emerging in all cases except for Coshocton County compared to the United States from 2010 to 2020. This indicates that when compared to the OMEGA region, Buckeye Hills region, and Ohio, the Polymers and Chemicals industry is a low concentration, but a high growth cluster. However, it is a star cluster when compared to the U.S. The Hardwood Product Manufacturing industry, however, is a star cluster when it is compared to the Buckeye Hills region, Ohio, and the U.S. and is an emerging cluster when it is compared to the OMEGA region.

In addition, Figures 15,16, 17, and 18 also show that the Information Technology and Financial Services industries are classified as transforming. The Fossil Fuels industry cluster is considered mature except for Coshocton County when compared to the OMEGA region. Similarly, Logistics is considered transforming, but as seen in Figure 16, the Logistics industry is positioned closer to the x-axis or at a location quotient of 1 for Coshocton County when compared to the Buckeye Hills region from 2010 to 2020. The Polymers and Chemicals industry is considered a star only when compared to the U.S. from 2010 to 2020. It is important to note that the data used for this section is from before and during the peak of the Covid-19 pandemic. Therefore, it is predicted that the size of the industry bubbles might change and that the industries may be reclassified depending on the various strengths or concentrations of other sector jobs in the county.

Figure 15. Coshocton County's Strengths Compared to the OMEGA Region (2010-2020)

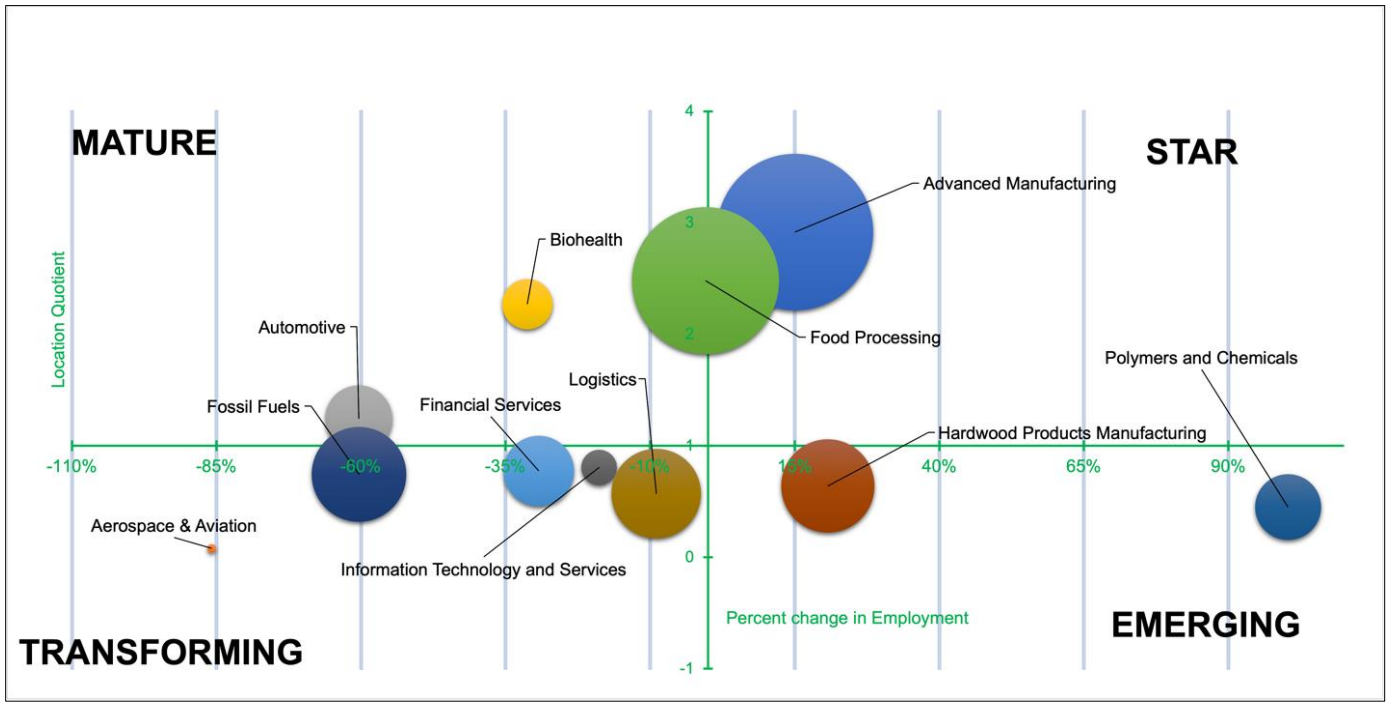


Figure 16. Coshocton County's Strengths Compared to the Buckeye Hills Region (2010-2020)

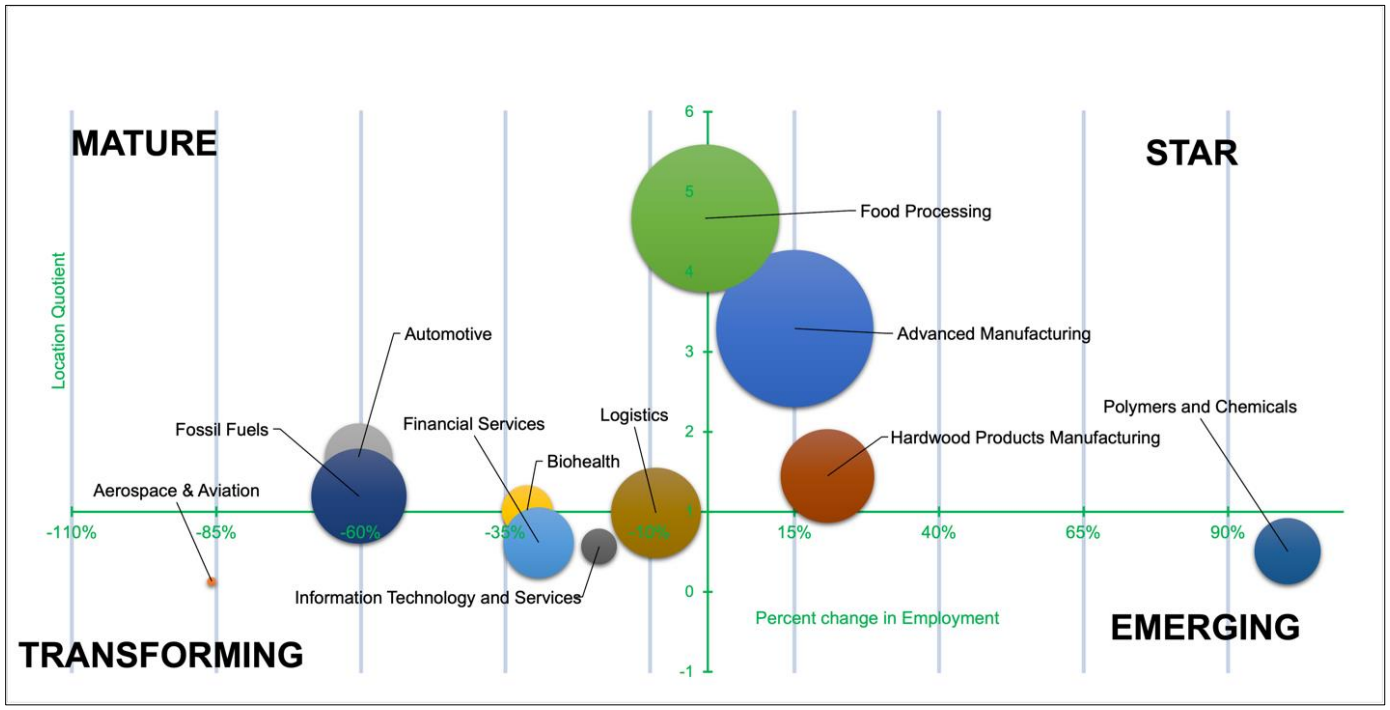


Figure 17. Coshocton County's Strengths Compared to Ohio (2010-2020)

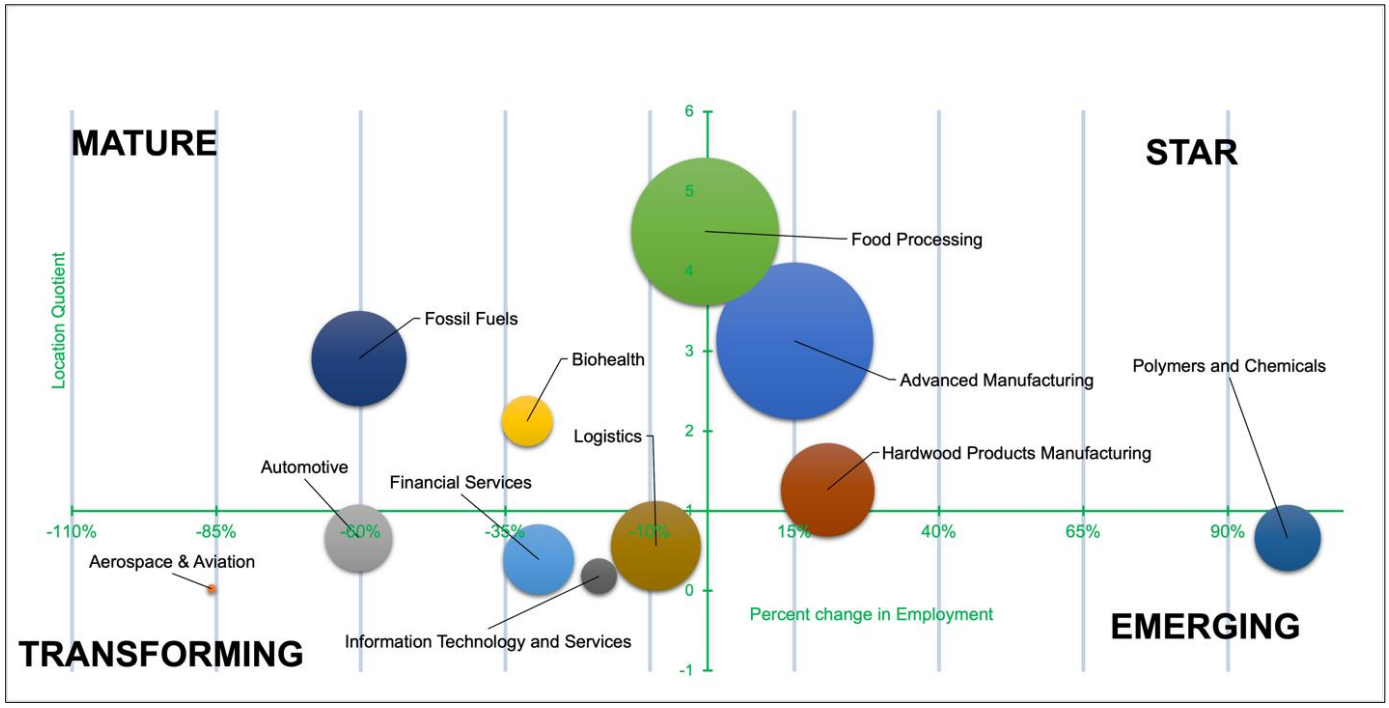
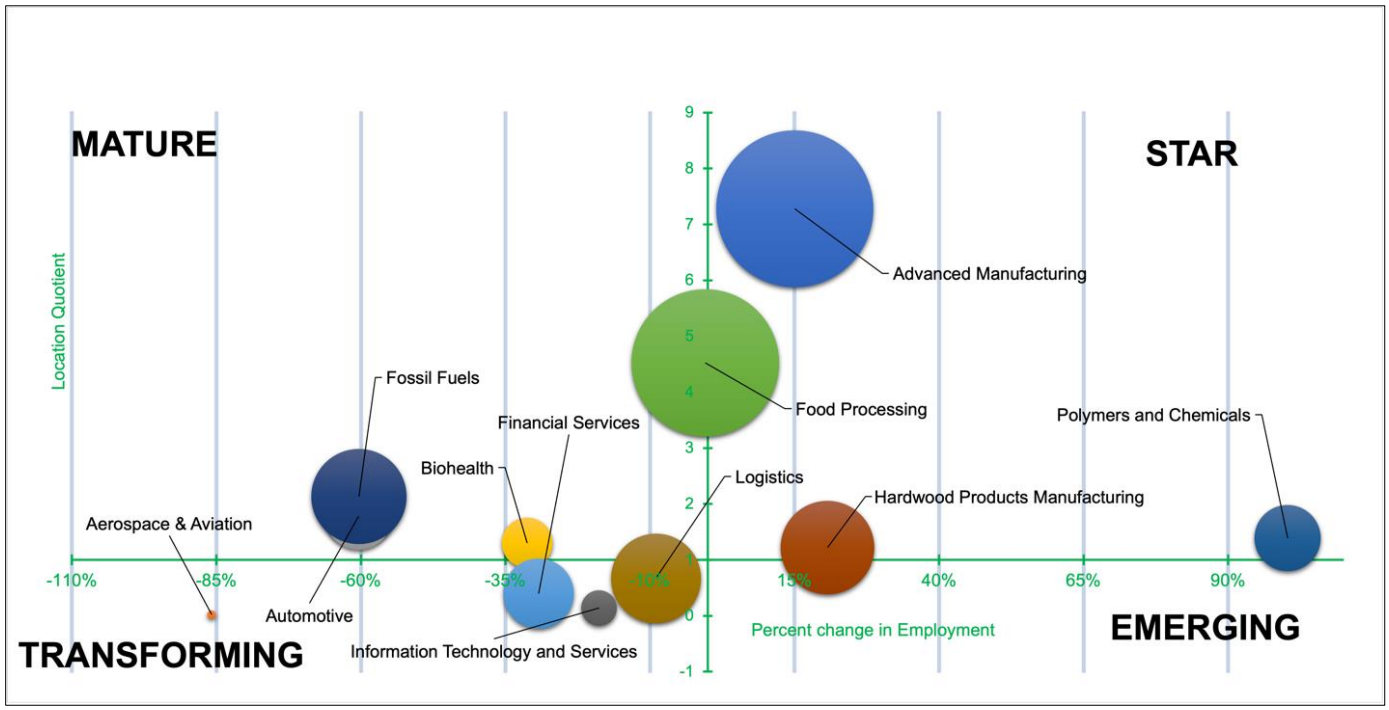


Figure 18. Coshocton County's Strengths Compared to the US (2010-2020)



Recommendations

Food Processing and Advanced Manufacturing have a strong concentration in Coshocton County and are the major employers for the county. Investment should be made wisely to ensure future growth in current operations and in growing and supporting supply chain businesses.

Logistics and Fossil Fuels are also major employers and investments could be made to increase the strength of the industry.

Hardwood Product Manufacturing is on the border of being considered a star industry by all four comparisons and has nearly the same number of employees compared to the Fossil Fuels industry, and a little more when compared to the Financial Service industry cluster. Investments could be made to grow existing businesses and increase employment in the industry. The Financial Services industry also needs a similar strategy to spur employment and growth.

Both the Food and the Hardwood industries are relatively strong in Coshocton County but need investment to reverse the downward trend in growth. It would be beneficial to reverse the downward trend before there is a loss of concentration of the industry in Coshocton County.

In Figures 15,16,17 and 18, Aerospace and Aviation is a cluster with the lowest employment of all the industry clusters and is classified as a transforming industry, which is followed by the Information Technology industry cluster. Investment in the Information Technology industry may require broadband or fiber and other infrastructure to support the industry. Investment may be more cost-effective in other industries. However, if the concentration is low, the size of the investment may outweigh the benefits to the community. It is important to note that this analysis is based on the imputed Quarterly Census of Employment and Wages (QCEW) data and Mergent Intellect.