INFINITE erie



2026 | Prepared by Colleen Dougherty and Jack Mong for Infinite Erie

ERIE COUNTY INDUSTRY **CLUSTER ANALYSIS**

An Approach to Balanced Economic Development

Data as of August 2026

EXECUTIVE SUMMARY

This report presents a comprehensive analysis of Erie County's economy using Purdue University's Industry Cluster Mapping framework. By applying Purdue's twenty-one industry clusters and evaluating them using employment, weighted average annual earnings (WAAE), location quotient (LQ), and Purdue's cluster classification methodology, the analysis provides a data-driven assessment of the county's competitive advantages, emerging opportunities, and changing economic landscape.

Unlike traditional industry analysis, the cluster approach examines groups of related industries that share common supply chains, workforce needs, technologies, and markets. This provides a broader understanding of how industries interact within Erie County's economy and offers a practical framework for supporting long-term economic development planning.

KEY FINDINGS

01 **Manufacturing remains Erie County's strongest competitive advantage.** Six of the county's most specialized clusters are related to manufacturing.

02 **Several industries are strengthening their competitive position.** Emerging Clusters, including Information Technology, Agribusiness, and Business Services, demonstrate increasing specialization and may represent future areas of economic opportunity.

03 **Erie County's largest industries are not always its most competitive.** While the Biomedical, Biotechnical and Healthcare and the Arts, Entertainment, Recreation and Visitor Industries clusters support a significant share of regional employment, several manufacturing clusters exhibit much higher levels of regional specialization.

04 **Many of Erie County's highest-paying jobs are concentrated in advanced manufacturing and technology-oriented industries.** Transportation Equipment Manufacturing, Machinery Manufacturing, and related sectors report the highest weighted average annual earnings.

05 **Long-established industries continue to play an essential role in Erie County.** Clusters such as Education and Knowledge Creation may not be nationally specialized, but they remain important contributors to local employment and likely help meet regional needs that would otherwise be filled from outside the county.

USING THESE RESULTS

This analysis is intended to help inform economic development decision-making. Industry clusters should not be interpreted as rankings of importance, but rather as tools for understanding Erie County's economic structure and competitive position. Employment, specialization, earnings, and cluster classifications each measure different aspects of economic performance and should be considered together rather than in isolation.

Similarly, individual businesses often contribute to multiple industry clusters through complex supply chains, occupations, and business relationships. As a result, cluster analysis identifies broad economic patterns rather than fully capturing the impact of any single employer or institution. These findings should therefore be interpreted alongside local knowledge, employer needs, workforce conditions, infrastructure capacity, investment priorities, and broader regional and national economic trends.

Ultimately, this report provides a repeatable framework for monitoring Erie County's economy over time. Used alongside stakeholder engagement and regional planning efforts, it offers a practical foundation for identifying competitive advantages, tracking emerging opportunities, and supporting informed economic development decisions.

PURPOSE OF THE ANALYSIS

This report seeks to provide an updated, in-depth assessment of Erie County's economy by examining the industries that drive regional employment, prosperity, and long-term competitiveness. Understanding the strengths, weaknesses, and relationships within the local economy is essential for making informed decisions about economic development, workforce investment, business attraction, and future growth.

The last comprehensive assessment of Erie County's overall economy was completed in 2019 through the *Target Industry Strategy* prepared by Garner Economics. One section of the report identified Erie County's competitive industries, evaluated economic strengths, and recommended target sectors for future economic development which has served as an important guide for local economic development efforts over the past several years.

While the Garner report remains a valuable strategic resource, its approach evaluated industries independently and at a broad level. While this method effectively identified promising industries and provided a useful picture of Erie County's economic strengths, it offered less insight into how individual industries relate to one another and contribute to the broader regional economy.

This industry cluster analysis builds upon that foundation by taking a more comprehensive approach; it examines how industries interact as interconnected economic systems. By utilizing an industry cluster framework, this analysis provides a deeper understanding of Erie County's economic structure, competitive advantages, and opportunities for future growth while establishing a repeatable methodology that can support future economic development planning.

This analysis will help Erie answer three questions:

01 What industry clusters drive Erie's economy?

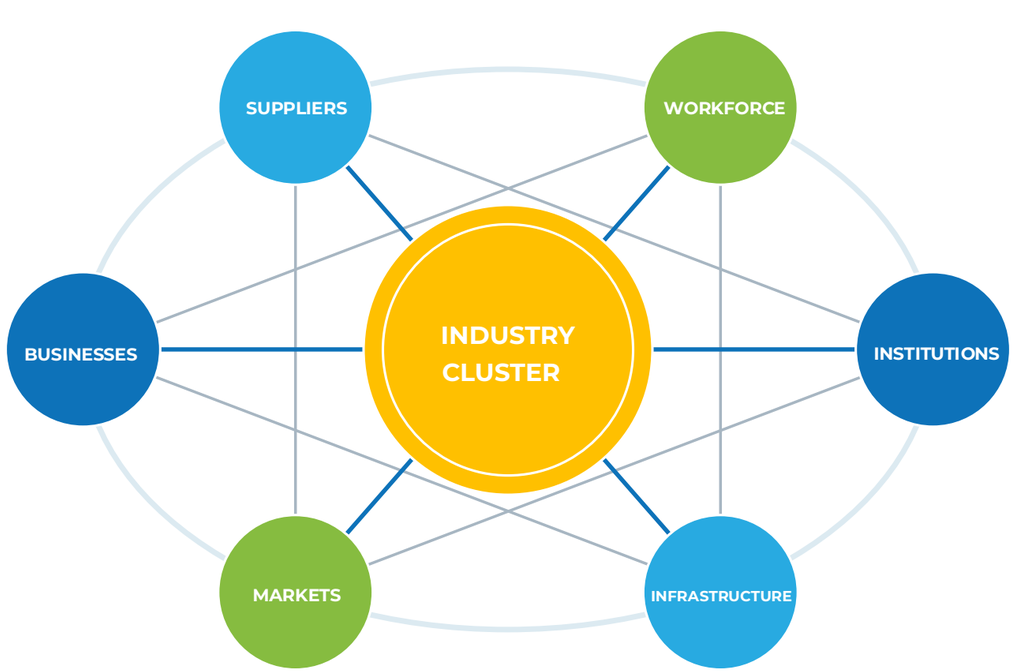
02 Where does Erie have competitive advantages?

03 Which industry clusters warrant further consideration for investment by public, private, and philanthropic leaders?

WHAT IS AN INDUSTRY CLUSTER?

Industry clusters are groups of industries that are economically connected rather than simply grouped together based on similar activities. **Industries within a cluster frequently buy from and sell to one another, rely on common supply chains, utilize similar technologies, draw from shared labor pools, depend on specialized infrastructure, and often serve related markets.** Because these industries function as part of a larger economic ecosystem, evaluating them together provides a more complete understanding of a regional economy than examining industries individually.

Industry clusters became widely adopted as researchers recognized that industries do not operate in isolation. Instead, clusters are networks of interconnected businesses, suppliers, workforce pipelines, research institutions, and supporting services that collectively create economic advantages. Industry cluster analysis relies on statistical models that identify economic relationships and by analyzing supply chains, occupational similarities, purchasing relationships, geographic concentration, and other measurable characteristics. These models group individual industries into clusters that more accurately reflect how the economy functions.



CLUSTER GRAPHIC EXAMPLE *Figure 1*

Models are built using the **North American Industry Classification System (NAICS)**[1], the U.S. standard used to classify industries according to their primary economic activity. Every industry is assigned a unique two- to six-digit NAICS code (see Figure 2), with each additional digit providing a more detailed classification of economic activity. This level of detail allows researchers to identify individual industries consistently and evaluate how they contribute to broader economic patterns. Cluster frameworks then use these detailed industry classifications as inputs to identify groups of industries connected through economic relationships. Rather than grouping businesses because they produce similar products or services, cluster frameworks identify industries that consistently operate together as part of larger economic systems.

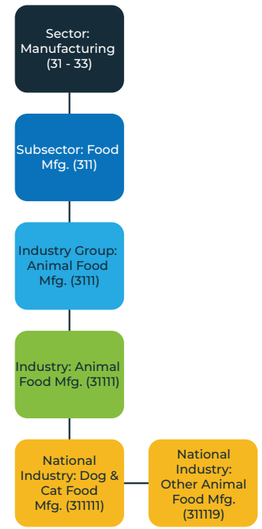


Figure 2

THE BREAKDOWN: DOG AND CAT FOOD MANUFACTURING

2-Digit (Sector), 31–33, Manufacturing
3-Digit (Subsector), 311, Food Manufacturing
4-Digit (Industry Group), 3111, Animal Food Manufacturing
5-Digit (Industry), 31111, Animal Food Manufacturing
6-Digit (National Industry), 311111, Dog and Cat Food Manufacturing; 311119, Other Animal Food Manufacturing

Figure 2: Illustration of the hierarchical structure of the North American Industry Classification System (NAICS). Industries are classified from broad economic sectors at the two-digit level to highly specific national industries at the six-digit level. Each additional digit further refines the classification, allowing researchers to consistently organize and analyze economic activity at

[1] For more information on NAICS visit https://www.census.gov/naics/

varying levels of detail while maintaining a standardized classification system. This hierarchy makes it possible to identify individual industries with precision while also understanding how specific industries relate to broader economic categories. The example shown traces the progression from the Manufacturing sector (NAICS 31–33) to Dog and Cat Food Manufacturing (NAICS 311111). Because Animal Food Manufacturing contains only one five-digit industry, the four- and five-digit levels share the same title; at the six-digit level, that industry divides into two national industries.

In cluster analysis, this six-digit level of detail is important because it allows individual industries to be accurately identified before being evaluated within a broader cluster framework. By starting with specific industries rather than broad sectors, researchers can better capture the economic relationships and specialization patterns that define regional industry clusters.

By looking at these interconnected systems, industry clusters provide a more complete picture of regional competitiveness. They identify concentrations of specialized expertise, reveal supply chain relationships, highlight workforce strengths, and provide a stronger foundation for economic development strategy, workforce planning, business attraction, and investment decisions.

INDUSTRY CLUSTER FRAMEWORKS

Industry cluster analysis became widely adopted in economic development following the development of Harvard University's U.S. Cluster Mapping Project, which established the first nationally standardized framework for identifying and comparing industry clusters across the country.

As industries, supply chains, occupations, and NAICS evolved, the need emerged for an updated methodology. In April 2026, the Purdue Center for Regional Development, in partnership with the U.S. Economic Development Administration (EDA), released an updated Industry Cluster Framework that reflects today's economic relationships.

This report uses Purdue's framework as the foundation for analyzing Erie County's economy to provide the most current, nationally standardized approach to understanding regional industry clusters.[2]

ANALYTICAL FRAMEWORK

THE PURDUE INDUSTRY CLUSTER FRAMEWORK

The Purdue Industry Cluster Framework identifies clusters based on **measurable economic relationships, including shared supply chains, buyer–seller relationships, occupational similarities, geographic co-location, common technologies, and other patterns of economic interdependence.**

To develop cluster definitions, Purdue combined quantitative analysis with expert review using data from the Bureau of Economic Analysis (BEA), County Business Patterns (CBP), the Bureau of Labor Statistics (BLS), and Lightcast. The result is a standardized framework consisting of **21 industry clusters and 68 subclusters** that reflects how industries interact within today's economy. See Purdue's list of 21 Clusters in Figure 3.

[2] To learn more about Purdue's industry clusters, visit https://pcrd.purdue.edu/regionalclusters/.

THE PURDUE INDUSTRY CLUSTER FRAMEWORK

PURDUE CLUSTER	EXAMPLE INDUSTRY
Agribusiness, Food Processing and Technology	115113, Crop Harvesting, Primarily by Machine; 311811, Retail Bakeries; 312130, Wineries
Apparel and Textiles	313240, Knit Fabric Mills; 323113, Commercial Screen Printing; 541430, Graphic Design Services*
Arts, Entertainment, Recreation and Visitor Industries	541430, Graphic Design Services*; 711211, Sports Teams and Clubs; 722511, Full-Service Restaurants
Biomedical, Biotechnical and Healthcare	325412, Pharmaceutical Preparation Manufacturing; 621493, Freestanding Ambulatory Surgical and Emergency Centers; 622110, General Medical and Surgical Hospitals
Business, Financial Technology and Specialized Services	523150, Investment Banking and Securities Intermediation; 523940, Portfolio Management and Investment Advice; 524210, Insurance Agencies and Brokerages
Chemicals and Chemical-based Products	326199, All Other Plastics Product Manufacturing; 325180, Other Basic Inorganic Chemical Manufacturing; 326291, Rubber Product Manufacturing for Mechanical Use
Computer and Electronic Product Manufacturing	334418, Printed Circuit Assembly (Electronic Assembly) Manufacturing; 334412, Bare Printed Circuit Board Manufacturing; 334514, Totalizing Fluid Meter and Counting Device Manufacturing
Defense and Security	336611, Ship Building and Repairing; 332912, Fluid Power Valve and Hose Fitting Manufacturing; 336412, Aircraft Engine and Engine Parts Manufacturing
Education and Knowledge Creation	513110, Newspaper Publishers; 611310, Colleges, Universities, and Professional Schools; 519210, Libraries and Archives
Electrical Equipment, Appliance and Component Manufacturing	335210, Small Electrical Appliance Manufacturing; 335921, Fiber Optic Cable Manufacturing; 335910, Battery Manufacturing
Energy (Fossil and Renewable)	221210, Natural Gas Distribution; 238220, Plumbing, Heating, and Air-Conditioning Contractors; 541330, Engineering Services
Fabricated Metal Product Manufacturing	332710, Machine Shops; 332322, Sheet Metal Work Manufacturing; 332912, Fluid Power Valve and Hose Fitting Manufacturing
Forest and Wood Products	113310, Logging; 236220, Commercial and Institutional Building Construction; 321113, Sawmills
Glass and Ceramics	327110, Pottery, Ceramics, and Plumbing Fixture Manufacturing; 332813, Electroplating, Plating, Polishing, Anodizing, and Coloring; 332812, Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
Information Technology and Telecommunication	541511, Custom Computer Programming Services; 513210, Software Publishers; 541519, Other Computer Related Services
Machinery Manufacturing	333111, Farm Machinery and Equipment Manufacturing; 333912, Air and Gas Compressor Manufacturing; 333511, Industrial Mold Manufacturing
Mining and Quarrying (Except Fossil Fuels)	212210, Iron Ore Mining; 212322, Industrial Sand Mining; 423510, Metal Service Centers and Other Metal Merchant Wholesalers
Primary Metal Manufacturing	331523, Nonferrous Metal Die-Casting Foundries; 331110, Iron and Steel Mills and Ferroalloy Manufacturing; 331511, Iron Foundries
Printed Products, Media Creation and Distribution	517111, Wired Telecommunications Carriers; 541613, Marketing Consulting Services; 512110, Motion Picture and Video Production
Transportation and Logistics	488410, Motor Vehicle Towing; 541614, Process, Physical Distribution, and Logistics Consulting Services; 484110, General Freight Trucking, Local
Transportation Equipment Manufacturing	336510, Railroad Rolling Stock Manufacturing; 336390, Other Motor Vehicle Parts Manufacturing; 423110, Automobile and Other Motor Vehicle Merchant Wholesalers

Figure 3

Note: *All cluster definitions are established through Purdue's methodology. These clusters remain consistent across the country; what changes from one region to another is not the cluster definitions themselves, but the economic data within each cluster.*

**Clusters are not mutually exclusive, meaning that codes can exist within multiple clusters (e.g., graphic design services appear in both the Arts, Entertainment, Recreation and Visitor Industries cluster and the Apparel and Textiles cluster).*

ECONOMIC DATA MEASURES

Building upon Purdue University's industry cluster evaluation framework, this analysis uses three primary measures to evaluate Erie County's industry clusters: employment, weighted average annual earnings (WAAE), and location quotient (LQ). Each metric captures a different aspect of cluster performance. Employment measures the overall size of a cluster, WAAE reflects the quality of the jobs it supports, and LQ measures Erie County's level of specialization relative to the national economy. Together, these measures provide a balanced assessment of each cluster's scale, economic quality, and regional competitiveness, forming the foundation for comparing clusters and applying Purdue's industry cluster classifications.

EMPLOYMENT

Employment measures the **total number of jobs supported within an industry cluster in Erie County.** It provides a simple measure of a cluster's overall size and its contribution to the regional economy. Generally, clusters with larger employment bases support more workers, generate greater economic activity, and have a broader impact on the local labor market.

However, employment alone does not indicate whether an industry is a regional competitive advantage. Some industries employ large numbers of workers because they primarily serve local demand, while smaller industries may represent highly specialized export-oriented sectors. For this reason, employment should always be interpreted alongside measures of specialization and earnings.

Key Question: *How significant is this cluster to regional employment?*

WEIGHTED AVERAGE ANNUAL EARNINGS (WAAE)

Weighted Average Annual Earnings (WAAE) measures the average annual earnings of workers across an entire industry cluster. Because each cluster is made up of multiple industries with different employment levels, average earnings are weighted by employment before being combined into a single value. This ensures that industries employing more workers have a proportionally greater influence on the cluster's overall average, producing a more representative measure of what the typical worker within the cluster earns.

In practice, WAAE is calculated by multiplying each industry's average annual earnings by its employment level, adding those values together across all industries within the cluster, and then dividing by the total employment within the cluster. This approach prevents smaller industries with unusually high or low earnings from disproportionately influencing the overall cluster average. WAAE = (Industry 1 Employment × Industry 1 Average Earnings + Industry 2 Employment × Industry 2 Average Earnings + ...) / Total Cluster Employment

WAAE provides insight into the overall economic quality of jobs supported by a cluster. Higher average earnings often indicate industries that generate greater household income, purchasing power, and economic value within the regional economy. While earnings alone do not measure competitiveness, they provide important context when evaluating the economic impact of different industry clusters.

Key Question: *Does the industry cluster provide quality, family-sustaining jobs?*

LOCATION QUOTIENT (LQ)

Location Quotient (LQ) measures how concentrated an industry cluster is in Erie County compared to the concentration of the cluster in the overall United States. It compares the share of Erie County's employment within a cluster to that cluster's share of employment nationally. The result indicates whether the cluster is concentrated more or less locally than would be expected based on the national economy. See the LQ equation in Figure 4 below.

$$LQ_i = (e_{ir} / e_r) / (E_in / En)$$

Figure 4

e_{ir} : Local employment in industry i (region r)

e_r : Total local employment in all industries (region r)

E_in : Reference area employment in industry i (nation n)

En : Total reference area employment in all industries (nation n)

LQ is one of the most widely used measures in economic development because it identifies regional specialization and potential competitive advantages. Clusters with higher LQ values are more concentrated in Erie County than they are nationally, suggesting the region has developed specialized expertise, workforce capabilities, supply chains, or export-oriented industries.

LQ values can be interpreted in Figure 5 as follows:

LQ OVERVIEW

LQ Value	Interpretation
Less than 1.0	Erie County is less specialized than the national average. The cluster primarily serves local or regional demand.
1.0	Erie County has the same employment concentration as the national average.
Greater than 1.0	Erie County is more specialized than the national average, indicating a potential competitive advantage.
1.2 or greater	Generally considered a strong level of regional specialization and is commonly used by Purdue when identifying highly competitive Star and Mature clusters.[3]

Figure 5

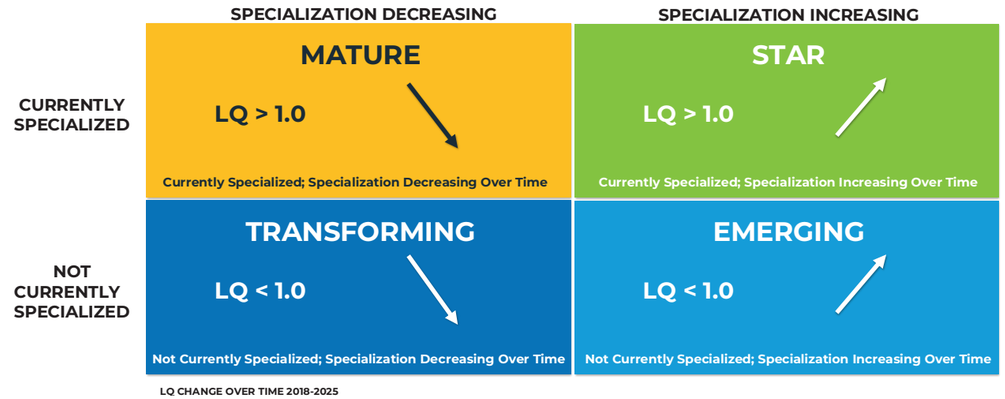
For example, an LQ of 2.0 means Erie County has twice the concentration of employment in that cluster compared to the national average. Likewise, an LQ of 3.0 means the cluster is three times more concentrated in Erie County than across the United States.

Because regional specialization is a defining characteristic of industry clusters, LQ serves as one of the primary measures used throughout Purdue's evaluation framework.

Key Question: *Is Erie County more specialized in this industry cluster compared to the U.S.?*

PURDUE CLUSTER CLASSIFICATIONS

LQ SPECIALIZATION VISUALIZED



[3] For more on this definition, visit Purdue's FAQ page: https://pcrd.purdue.edu/regionalclusters/about/faq.php

In addition to the previous metrics, Purdue classifies industry clusters according to their current level of regional specialization and how that specialization changes over time. Rather than evaluating only the current strength of a cluster, this framework recognizes that regional economies are constantly evolving. Some clusters are becoming more specialized and strengthening their competitive position, while others are becoming less specialized relative to national trends.

Using this framework, each cluster is classified into one of four categories based on its current location quotient (LQ) and the direction of change in LQ over the study period:

Star Clusters – Star Clusters are industries with a location quotient (LQ) greater than 1.0 that increased their specialization during the study period. These clusters are more concentrated in Erie County than the national average and continue to strengthen their regional competitive position.

Emerging Clusters – Emerging Clusters are industries with a location quotient (LQ) below 1.0 that increased their specialization during the study period. Although these clusters are not yet regionally specialized, they are becoming more concentrated in Erie County relative to the national average indicating a strengthening competitive position and the potential to become regionally specialized.

Transforming Clusters – Transforming Clusters are industries with a location quotient (LQ) below 1.0 that decreased their specialization during the study period. These clusters are becoming less concentrated in Erie County relative to the national average, indicating a weakening competitive position relative to the national economy.

Mature Clusters – Mature Clusters are industries with a location quotient (LQ) greater than 1.0that decreased their specialization during the study period. Although these clusters remain more concentrated in Erie County than the national average, their regional specialization has weakened over time.

These classifications provide the framework for interpreting the results presented later in this report. Rather than serving as a ranking of industries, they indicate where Erie County's competitive strengths are growing, remaining stable, or declining relative to national trends. Figure 6 illustrates how Purdue's cluster classifications are determined using current location quotient (LQ) and changes in specialization over time.

	SPECIALIZATION DECREASING	SPECIALIZATION INCREASING
Currently Specialized (LQ > 1.0)	Mature	Star
Not Currently Specialized (LQ < 1.0)	Transforming	Emerging

CLUSTER TYPE	CURRENT LQ	CHANGE IN LQ (2018–2025)	INTERPRETATION
Star	> 1.0	Increasing	Specialized and becoming more specialized
Emerging	< 1.0	Increasing	Not yet specialized, but moving toward specialization
Transforming	< 1.0	Decreasing	Not specialized and becoming less specialized
Mature	> 1.0	Decreasing	Specialized, but losing specialization

Figure 6

Note: *An increasing LQ indicates Erie County is becoming more specialized in a cluster relative to the national economy, while a decreasing LQ indicates the county is becoming less specialized relative to national trends.*

APPLYING THE FRAMEWORK TO ERIE COUNTY

Purdue's framework analysis is presented at the Economic Development District (EDD) level. Erie County is included within the Northwest Pennsylvania Economic Development District, meaning Purdue's published results represent multiple counties rather than Erie County alone. While this regional approach is valuable for understanding broader economic trends and shared industry strengths across Northwest Pennsylvania, it can also mask differences between individual counties. Economic development strategies are often implemented at the county and local level, making it important to understand how industry clusters specifically contribute to Erie County's economy.

NORTHWEST PA ECONOMIC DEVELOPMENT DISTRICT

ERIE COUNTY

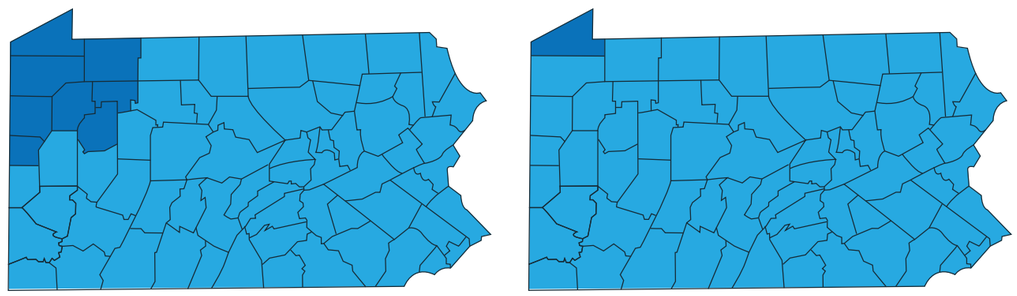


Figure 7

Note: *The Northwest Pennsylvania Regional Planning and Development Commission contains eight counties: Erie, Crawford, Warren, Mercer, Venango, Forest, Lawrence, and Clarion.*

To produce a county-specific analysis, Purdue's cluster definitions were applied directly to Erie County. Each six-digit NAICS industry assigned to Purdue's twenty-one clusters was identified individually. Erie County-specific economic information was then collected for each industry and aggregated back into Purdue's predefined cluster structure.

This approach preserves the integrity of Purdue's nationally standardized framework while producing results that reflect Erie County's unique economic profile. The result is a set of twenty-one Erie County industry clusters that can be evaluated consistently while remaining directly comparable to other regions using the same methodology.

Once Erie County's industry information had been organized into Purdue's twenty-one clusters, each cluster was evaluated using the same core measures Purdue uses to assess regional industry performance. These measures provide insight into earnings across jobs within each cluster and regional specialization while serving as the foundation for Purdue's cluster classification framework.

RESULTS

The following sections detail the Erie County-specific industry data collected[4] for each of Purdue's twenty-one clusters, including industry employment, average annual earnings, and measures of regional specialization. These industry-level inputs serve as the foundation for calculating cluster-level measures and evaluating Erie County's current economic strengths, areas of specialization, and opportunities for future growth.

[4] All data used in this analysis are from Lightcast (accessed August 2026).

INDUSTRY CLUSTER EMPLOYMENT

CLUSTER	TOTAL EMPLOYMENT
Biomedical, Biotechnical and Healthcare	20,599
Arts, Entertainment, Recreation and Visitor Industries	15,212
Business, Financial Technology and Specialized Services	9,011
Transportation Equipment Manufacturing	4,603
Chemicals and Chemical-based Products	4,510
Transportation and Logistics	3,866
Fabricated Metal Product Manufacturing	3,671
Education and Knowledge Creation	3,583
Agribusiness, Food Processing and Technology	3,526
Energy (Fossil and Renewable)	3,256
Information Technology and Telecommunication	2,757
Forest and Wood Products	2,544
Defense and Security	1,764
Machinery Manufacturing	1,761
Printed Products, Media Creation and Distribution	1,747
Computer and Electronic Product Manufacturing	1,003
Primary Metal Manufacturing	866
Apparel and Textiles	721
Glass and Ceramics	503
Mining and Quarrying (Except Fossil Fuels)	223
Electrical Equipment, Appliance and Component Manufacturing	191

Figure 8

Because Purdue's cluster definitions overlap, some industries are included in more than one cluster. Cluster employment totals should therefore not be added together to estimate Erie County's total employment.

Employment provides a measure of the overall size and economic footprint of each industry cluster within Erie County. As shown in Figure 8, employment is concentrated across several sectors rather than a single dominant industry, illustrating the diversity of the county's economy. Biomedical, Biotechnical and Healthcare is the region's largest cluster, employing more than 20,500 workers, followed by Arts, Entertainment, Recreation and Visitor Industries (15,212) and Business, Financial Technology and Specialized Services (9,011). Manufacturing-related clusters, including Transportation Equipment, Chemicals, Fabricated Metal Product Manufacturing, and Machinery Manufacturing, also represent significant sources of employment despite their smaller workforces compared to the region's largest service-based industries.

TOP TEN ERIE COUNTY INDUSTRY CLUSTERS BY TOTAL EMPLOYMENT

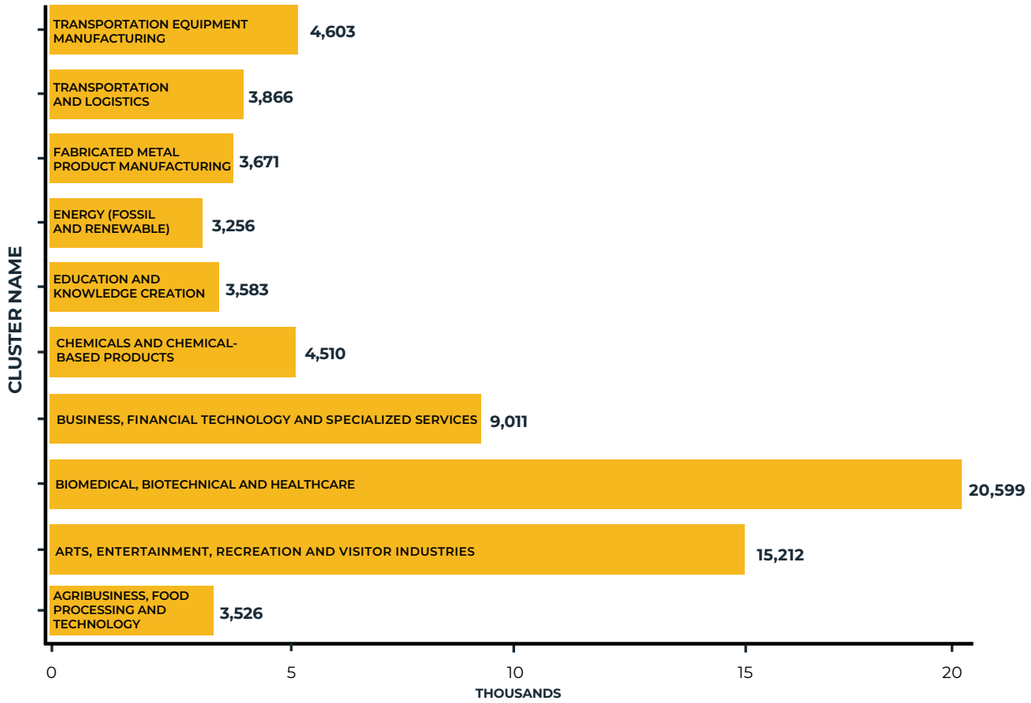


Figure 9

INDUSTRY CLUSTER EARNINGS

CLUSTER	WEIGHTED AVERAGE ANNUAL EARNINGS
Transportation Equipment Manufacturing	$114,426
Business, Financial Technology and Specialized Services	$106,555
Machinery Manufacturing	$99,297
Electrical Equipment, Appliance and Component Manufacturing	$99,069
Energy (Fossil and Renewable)	$96,137
Mining and Quarrying (Except Fossil Fuels)	$94,003
Defense and Security	$91,359
Information Technology and Telecommunication	$88,608
Primary Metal Manufacturing	$85,187
Forest and Wood Products	$82,211
Chemicals and Chemical-based Products	$80,809
Fabricated Metal Product Manufacturing	$78,478
Computer and Electronic Product Manufacturing	$76,204
Glass and Ceramics	$67,834
Agribusiness, Food Processing and Technology	$66,153
Transportation and Logistics	$66,097
Printed Products, Media Creation and Distribution	$66,040
Biomedical, Biotechnical and Healthcare	$63,661
Apparel and Textiles	$58,067
Education and Knowledge Creation	$57,673
Arts, Entertainment, Recreation and Visitor Industries	$26,066

Figure 10

Weighted Average Annual Earnings (WAAE) provide insight into the economic quality of employment within each cluster by accounting for wage differences across industries. The highest-paying clusters are largely concentrated within manufacturing and technology-oriented industries. Transportation Equipment Manufacturing reports the highest weighted average annual earnings at approximately $114,400 per worker, followed by Business, Financial Technology and Specialized Services ($106,600), Machinery Manufacturing ($99,300), Electrical Equipment, Appliance and Component Manufacturing ($99,100), and Energy (Fossil and Renewable) ($96,100).

In contrast, several of the county's largest employment clusters generate comparatively lower average earnings. Biomedical, Biotechnical and Healthcare, while the largest employer in Erie County, ranks in the lower half of clusters for weighted annual earnings. Arts, Entertainment, Recreation and Visitor Industries, the county's second-largest employer, report the lowest average annual earnings among all twenty-one clusters. These findings reinforce that employment size alone is not indicative of overall economic impact, as industries contribute differently to regional income and wealth creation.

TOP TEN ERIE COUNTY INDUSTRY CLUSTERS BY WEIGHTED AVERAGE ANNUAL EARNINGS

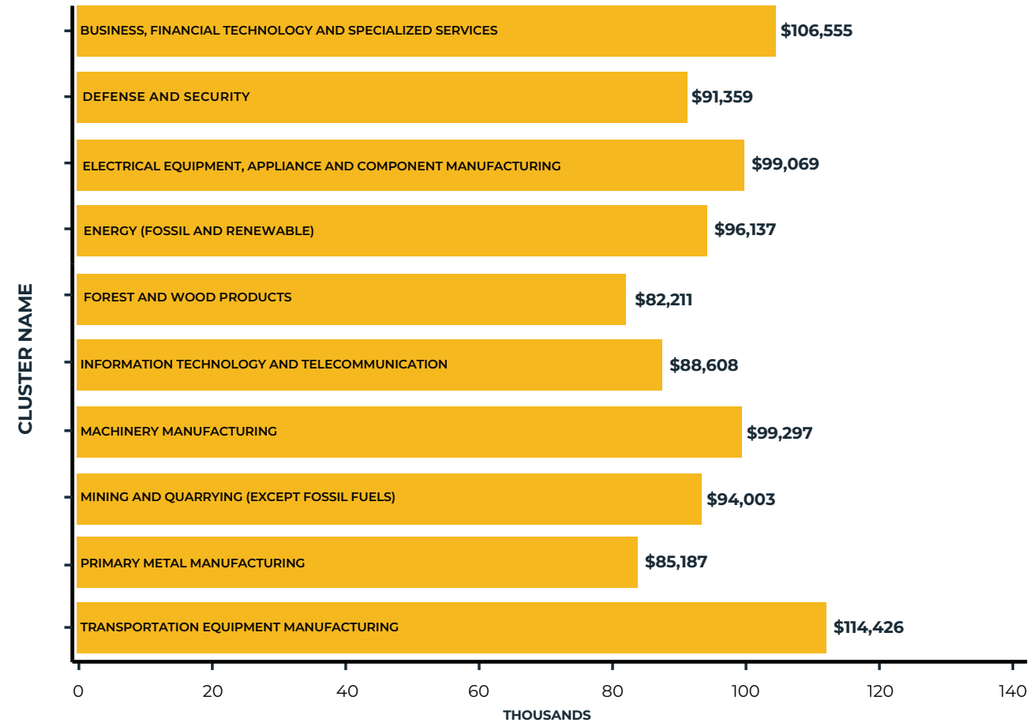


Figure 11

INDUSTRY CLUSTER SPECIALIZATION

CLUSTER NAME	LQ (2025)
Fabricated Metal Product Manufacturing	3.35
Primary Metal Manufacturing	3.18
Chemicals and Chemical-based Products	3.11
Glass and Ceramics	2.48
Machinery Manufacturing	2.12
Transportation Equipment Manufacturing	1.63
Biomedical, Biotechnical and Healthcare	1.51
Computer and Electronic Product Manufacturing	1.30
Arts, Entertainment, Recreation and Visitor Industries	1.00
Agribusiness, Food Processing and Technology	0.95
Education and Knowledge Creation	0.92
Forest and Wood Products	0.70
Business, Financial Technology and Specialized Services	0.66
Transportation and Logistics	0.64
Printed Products, Media Creation and Distribution	0.58
Electrical Equipment, Appliance and Component Manufacturing	0.57
Apparel and Textiles	0.55
Energy (Fossil and Renewable)	0.54
Mining and Quarrying (Except Fossil Fuels)	0.50
Information Technology and Telecommunication	0.43
Defense and Security	0.37

Figure 12

Location Quotient (LQ) measures the concentration of employment within an industry relative to the national economy and provides an indication of regional competitive advantage. Erie County's highest levels of specialization remain concentrated within advanced manufacturing. Fabricated Metal Product Manufacturing (3.35), Primary Metal Manufacturing (3.18), Chemicals and Chemical-based Products (3.11), Glass and Ceramics (2.48), and Machinery Manufacturing (2.12) all demonstrate employment concentrations well above the national average, indicating long-standing competitive strengths within these industries.

Conversely, several of Erie County's largest employers exhibit relatively low levels of specialization. Business, Financial Technology and Specialized Services, Transportation and Logistics, Information Technology and Telecommunication, and Energy all maintain location quotients below 1.0, *suggesting these industries primarily serve local or regional demand rather than representing established areas of national competitive advantage*. This distinction demonstrates that an industry's size does not necessarily correspond to its competitiveness within the broader economy.

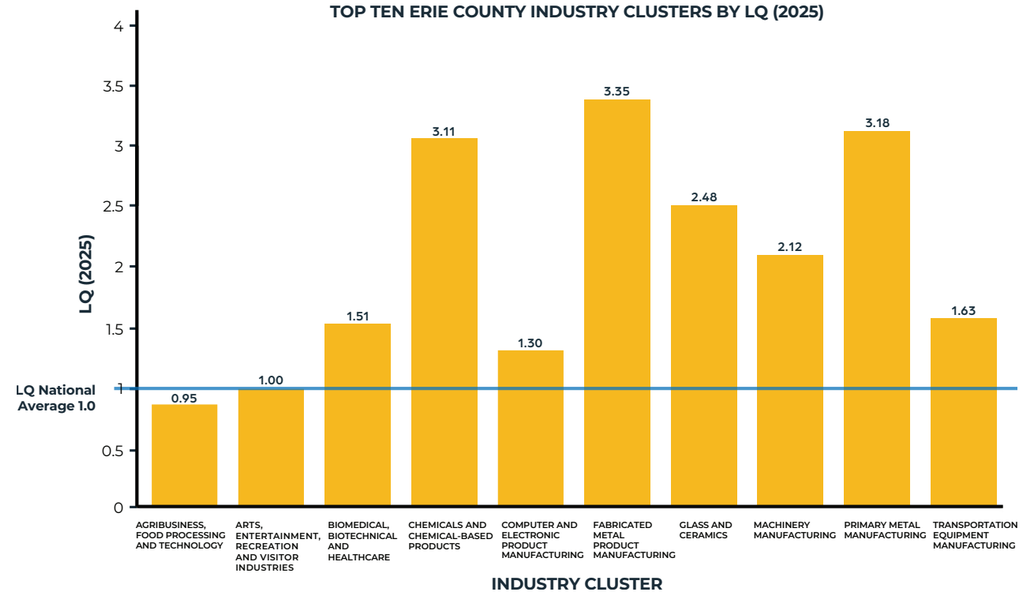


Figure 13

COMPARING EMPLOYMENT, SPECIALIZATION, AND EARNINGS

No single metric provides a complete assessment of cluster importance; instead, comparing employment, specialization, and earnings demonstrates how each metric measures a different dimension of Erie County's economy. Employment identifies the industries that support the largest number of jobs, LQ highlights those in which Erie County maintains a competitive advantage, and WAAE reflects the economic quality of employment within each cluster.

Viewed together, these measures provide a more complete picture of Erie County's economic structure than any single indicator alone. A cluster may employ many workers without representing a regional competitive advantage, while another may employ relatively fewer workers but demonstrate a high level of specialization or support higher-paying jobs. Likewise, some industries combine all three characteristics, making them especially significant to the regional economy.

Taken together, these measures reveal several important characteristics of Erie County's economy. Healthcare, the visitor economy, and business services provide a substantial share of regional employment, while Erie County's strongest competitive advantages remain concentrated in advanced manufacturing industries. At the same time, many of the highest-paying jobs are also found within manufacturing and technology-oriented clusters. These differences illustrate why economic development decisions should consider multiple measures simultaneously. Focusing on employment alone could overlook highly specialized or high-value industries, while relying only on specialization or earnings could underestimate the importance of sectors that support large portions of the local workforce.

Erie County Industry Clusters 2025

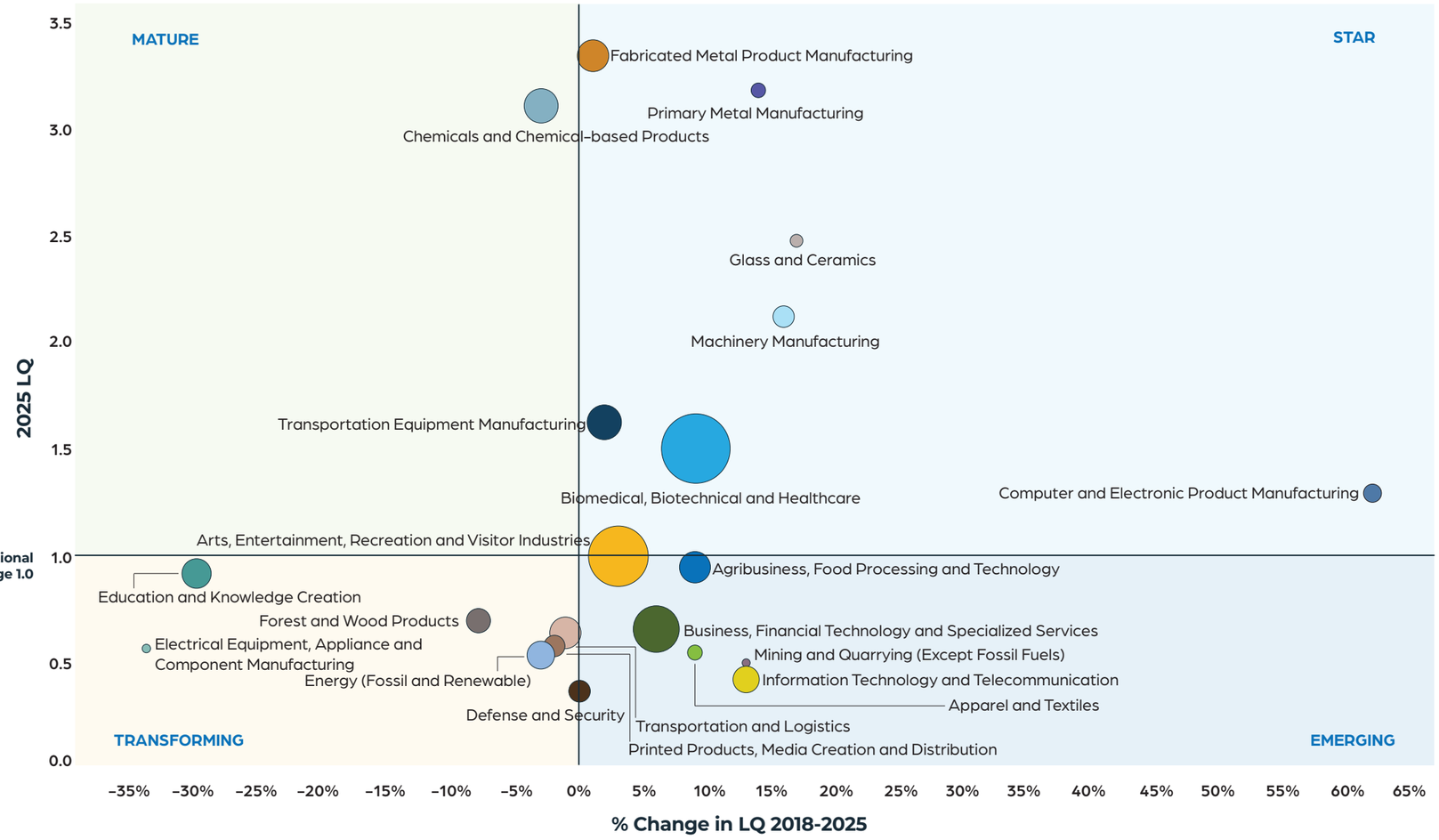


Figure 14

OVERALL CLUSTER CLASSIFICATION

The Purdue cluster classifications provide a broader perspective on Erie County's economic structure by evaluating changes in regional specialization from 2018–2025. Rather than examining a single metric in isolation, this framework identifies whether industry clusters are strengthening, maintaining, or losing their competitive position over time. As shown in Figure 14 and Figure 15, Erie County's clusters are distributed across all four classifications, illustrating an economy that contains both long-established competitive industries and clusters experiencing structural change.

While several manufacturing clusters continue to demonstrate strong competitive positions, the results also identify industries that are increasing their specialization, as well as others that have experienced declining competitiveness despite remaining important components of the regional economy. This variation underscores the importance of evaluating clusters based on both current performance and recent trends rather than relying solely on employment or specialization.

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PURDUE CLASSIFICATION BY INDUSTRY CLUSTERS

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
STAR	Fabricated Metal Product Manufacturing	3.35	+1%	3,671
STAR	Primary Metal Manufacturing	3.18	+14%	866
STAR	Glass and Ceramics	2.48	+17%	503
STAR	Machinery Manufacturing	2.12	+16%	1,761
STAR	Transportation Equipment Manufacturing	1.63	+2%	4,603
STAR	Biomedical, Biotechnical and Healthcare	1.51	+9%	20,599
STAR	Computer and Electronic Product Manufacturing	1.30	+62%	1,003
EMERGING	Arts, Entertainment, Recreation and Visitor Industries	1.00	+3%	15,212
EMERGING	Agribusiness, Food Processing and Technology	0.95	+9%	3,526
EMERGING	Business, Financial Technology and Specialized Services	0.66	+6%	9,011
EMERGING	Apparel and Textiles	0.55	+9%	721
EMERGING	Mining and Quarrying (Except Fossil Fuels)	0.50	+13%	223
EMERGING	Information Technology and Telecommunication	0.43	+13%	2,757
TRANSFORMING	Education and Knowledge Creation	0.92	-30%	3,583
TRANSFORMING	Forest and Wood Products	0.70	-8%	2,544
TRANSFORMING	Transportation and Logistics	0.64	-1%	3,866
TRANSFORMING	Printed Products, Media Creation and Distribution	0.58	-2%	1,747
TRANSFORMING	Electrical Equipment, Appliance and Component Manufacturing	0.57	-34%	191
TRANSFORMING	Energy (Fossil and Renewable)	0.54	-3%	3,256
MATURE	Chemicals and Chemical-based Products	3.11	-3%	4,510
SPECIAL CASE	Defense and Security	0.37	0%	1,764

Figure 15

Notes:

Star clusters are specialized (LQ > 1.0) and increased their specialization over the study period.
Mature clusters remain specialized (LQ > 1.0) but experienced a decline in specialization.
Emerging clusters are not yet specialized (LQ < 1.0) but are becoming more specialized over time.
Transforming clusters are neither specialized (LQ < 1.0) nor becoming more specialized.

OVERALL FINDINGS

The Purdue cluster classifications reveal that Erie County's economy is characterized by a combination of established manufacturing strengths, expanding service industries, and several clusters undergoing structural change. Overall, the results suggest that while Erie County continues to build upon its historic manufacturing base, growth and specialization are occurring across a broader range of industries than manufacturing alone.

The distribution of clusters across the four classifications also demonstrates that Erie County's economy is not defined by a single economic trajectory. Several manufacturing clusters are both highly specialized and becoming more specialized, while other industries are developing greater specialization but have not yet reached the national average. At the same time, several established industries are losing specialization relative to national trends while continuing to support significant employment within the county.

These results highlight the importance of considering both the current position and trajectory of Erie County's industry clusters. A cluster with a high level of specialization may represent an established competitive advantage, while a cluster with lower specialization but increasing concentration may represent an area of emerging opportunity. Likewise, clusters experiencing declining specialization should not necessarily be viewed as declining industries, particularly when they continue to support substantial employment and economic activity.

It is also important to note that changes in specialization do not always reflect changes in employment. Because location quotient compares Erie County to the nation, a cluster can become more specialized if its employment holds steady while the same industry declines nationally. Several Star clusters, including Fabricated Metal Product Manufacturing, Primary Metal Manufacturing, Glass and Ceramics, and Transportation Equipment Manufacturing, became more specialized between 2018 and 2025 while their employment remained flat or declined. Clusters such as Computer and Electronic Product Manufacturing, Biomedical, Biotechnical and Healthcare, and Information Technology and Telecommunication increased both specialization and employment.

The following sections examine each classification in greater detail, highlighting the clusters within each category and the strategic considerations associated with their current position and trajectory.

STAR CLUSTERS

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
STAR	Fabricated Metal Product Manufacturing	3.35	+1%	3,671
STAR	Primary Metal Manufacturing	3.18	+14%	866
STAR	Glass and Ceramics	2.48	+17%	503
STAR	Machinery Manufacturing	2.12	+16%	1,761
STAR	Transportation Equipment Manufacturing	1.63	+2%	4,603
STAR	Biomedical, Biotechnical and Healthcare	1.51	+9%	20,599
STAR	Computer and Electronic Product Manufacturing	1.30	+62%	1,003

Erie County's Star Clusters are heavily concentrated in advanced manufacturing, reinforcing manufacturing's continued role as the region's primary competitive advantage. Fabricated Metal Product Manufacturing, Primary Metal Manufacturing, Glass and Ceramics, Machinery Manufacturing, Transportation Equipment Manufacturing, and Computer and Electronic Product Manufacturing all demonstrated increasing specialization between 2018 and 2025, although for several of these clusters, this reflects steadier performance than the same industries nationally rather than local job growth. Most of them also have some of the county's highest location quotients, indicating that Erie continues to have nationally significant concentrations of manufacturing activity.

At the same time, Biomedical, Biotechnical and Healthcare stands out as the county's largest Star Cluster, employing more than 20,500 workers while continuing to increase its regional specialization. Unlike many of the manufacturing clusters, healthcare combines both substantial employment scale and growing competitiveness, indicating it has become one of Erie County's defining economic assets alongside its traditional manufacturing industries.

One of the most important findings of this analysis is that highly specialized industries are not always the county's largest employers. Several manufacturing clusters maintain exceptionally high LQs while employing relatively small numbers of workers. These industries may represent niche competitive advantages where targeted investments, workforce development, supply chain expansion, or business attraction efforts could generate meaningful economic returns despite their relatively modest employment base.

Conversely, larger employment clusters may have lower levels of specialization but remain essential to Erie County's economy because of the number of jobs they support. As a result, employment size and specialization should be viewed as complementary measures rather than competing indicators when evaluating economic development priorities.

EMERGING CLUSTERS

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
EMERGING	Arts, Entertainment, Recreation and Visitor Industries	1.00	+3%	15,212
EMERGING	Agribusiness, Food Processing and Technology	0.95	+9%	3,526
EMERGING	Business, Financial Technology and Specialized Services	0.66	+6%	9,011
EMERGING	Apparel and Textiles	0.55	+9%	721
EMERGING	Mining and Quarrying (Except Fossil Fuels)	0.50	+13%	223
EMERGING	Information Technology and Telecommunication	0.43	+13%	2,757

The Emerging Clusters illustrate areas where Erie County is **gradually strengthening its competitive position despite remaining below the national average in specialization**. Business Services, Information Technology and Telecommunication, Agribusiness, Apparel and Textiles, and Mining and Quarrying all experienced increases in location quotient between 2018 and 2025, suggesting these industries are becoming more concentrated within the regional economy. Although their current specialization remains limited, continued improvement may indicate opportunities for future growth and diversification.

One particularly notable finding is the Arts, Entertainment, Recreation and Visitor Industries cluster. With more than 15,200 employees, it is the county's second-largest cluster by employment and reached a location quotient of approximately 1.0, indicating that Erie County is approaching national average specialization in this sector. Its Emerging classification suggests that the visitor economy has continued to strengthen and may represent an increasingly important component of the county's broader economic base.

Emerging Clusters provide insight into industries that are becoming increasingly concentrated within Erie County but have not yet reached the level of specialization associated with established competitive advantages. While these industries may currently represent a smaller share of employment or economic output, continued increases in specialization suggest they may become more significant contributors to the regional economy over time.

Supporting these industries does not imply shifting attention away from Erie County's traditional strengths. Instead, Emerging Clusters represent opportunities to diversify the regional economy while building upon existing assets and responding to changing market conditions.

TRANSFORMING CLUSTERS

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
TRANSFORMING	Education and Knowledge Creation	0.92	-30%	3,583
TRANSFORMING	Forest and Wood Products	0.70	-8%	2,544
TRANSFORMING	Transportation and Logistics	0.64	-1%	3,866
TRANSFORMING	Printed Products, Media Creation and Distribution	0.58	-2%	1,747
TRANSFORMING	Electrical Equipment, Appliance and Component Manufacturing	0.57	-34%	191
TRANSFORMING	Energy (Fossil and Renewable)	0.54	-3%	3,256

The Transforming Clusters represent industries that remain important employers but experienced declining specialization between 2018 and 2025 relative to national trends. Education and Knowledge Creation experienced the largest decline in specialization, with its location quotient decreasing by 30 percent between 2018 and 2025. Electrical Equipment, Appliance and Component Manufacturing experienced an even greater percentage decline (-34%), although the cluster employs fewer than 200 workers.

Several other Transforming Clusters, including Transportation and Logistics, Energy, Forest and Wood Products, and Printed Products, experienced only modest declines in specialization. These findings suggest that although these industries remain important components of Erie County's economy, potentially just serving local demand, they are growing more slowly than comparable industries nationally, resulting in a gradual erosion of their relative competitive position.

The classification of a cluster as Transforming should not be interpreted as evidence that an industry has become negligible. In many cases, these clusters continue to employ thousands of workers and support supplier networks throughout the regional economy. Their classification simply indicates that Erie County's competitive position has weakened relative to national trends during the study period.

These industries warrant continued attention to better understand the factors contributing to declining specialization. Changes in technology, productivity, supply chains, workforce availability, or national industry growth may all influence a cluster's trajectory. Monitoring these trends allows regional stakeholders to identify emerging challenges early and respond proactively to maintain competitiveness.

MATURE CLUSTER

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
MATURE	Chemicals and Chemical-based Products	3.11	-3%	4,510

Chemicals and Chemical-based Products was the only cluster classified as Mature. With a location quotient of 3.11, employment in this cluster is more than three times as concentrated in Erie County as it is nationally, and the cluster supports more than 4,500 jobs. However, its specialization declined slightly (-3%) between 2018 and 2025, meaning the cluster remains one of the county's most significant strengths but did not keep pace with national trends during the study period.

Much of this cluster's strength reflects Erie County's plastics industry. Purdue's Chemicals and Chemical-based Products cluster includes plastics and rubber product manufacturing, such as All Other Plastics Product Manufacturing (NAICS 326199). Erie has long been recognized as a center for plastics processing and mold making, supported by a deep base of specialized firms, an experienced workforce, and dedicated training programs such as plastics engineering technology at Penn State Behrend. The cluster's high location quotient indicates that these firms sell their products well beyond the county, bringing outside dollars into the regional economy.

Because the plastics industry is closely tied to several of Erie County's other specialized clusters, including Machinery Manufacturing (which includes industrial mold manufacturing) and Fabricated Metal Product Manufacturing, changes in this cluster can ripple through the broader manufacturing base. Purdue notes that Mature clusters often benefit from policy and infrastructure support.[5] Understanding what is behind the recent decline in specialization, whether productivity gains, automation, consolidation, supply chain shifts, or workforce availability, will help regional stakeholders sustain one of Erie County's most distinctive competitive advantages.

[5] For more information, visit Purdue's FAQ page: https://pcrd.purdue.edu/regionalclusters/about/faq.php.

DEFENSE (SPECIAL CASE)

PURDUE CLASSIFICATION	INDUSTRY CLUSTER	2025 LQ	CHANGE IN LQ (2018–2025)	2025 EMPLOYMENT
SPECIAL CASE	Defense and Security	0.37	0%	1,764

The Defense and Security cluster represents a special case within Erie County's cluster analysis because it does not fit neatly into Purdue's four standard classifications. The cluster employed approximately 1,800 workers in 2025, but its location quotient of 0.37 indicates that defense-related employment is less concentrated in Erie County than in the national economy. At the same time, its LQ remained essentially unchanged between 2018 and 2025, meaning the cluster did not demonstrate the increase or decrease in regional specialization needed to place it within Purdue's Star, Emerging, Transforming, or Mature classifications. Rather than forcing the cluster into a classification that does not accurately describe its position, it is treated separately.

The lack of change in LQ over the study period should also be interpreted with caution. Comparable historical employment information is not available for certain industries because some of the NAICS codes included in the Defense and Security cluster were created or substantially revised through recent classification changes and did not exist in their current form prior to 2022. As a result, the cluster cannot be meaningfully evaluated for changes in specialization across the full 2018–2025 study period using these industries. The reported 0% change in LQ should therefore not be interpreted as evidence that the cluster's competitive position remained unchanged. Rather, it reflects a limitation in the available historical data and the ability to consistently track the cluster over time.

Defense-related activity is also closely connected to several of Erie County's strongest manufacturing clusters, including fabricated metals, machinery, transportation equipment, and computer and electronic products. These relationships are important because defense-related economic activity does not necessarily occur within the boundaries of a single cluster. A manufacturer may serve defense customers while being classified within a different Purdue cluster, meaning the economic contribution associated with defense can be distributed across multiple parts of the regional economy. The cluster framework therefore provides useful information about the industries directly captured within the Defense and Security cluster, but it does not fully describe the broader defense ecosystem operating throughout Erie County.

For these reasons, the Defense and Security cluster should be interpreted as a strategic consideration rather than a conventional cluster classification. Its current LQ does not indicate a regional specialization, and its stable LQ does not demonstrate a clear change in competitive position. However, its connections to Erie County's established manufacturing base and its relevance to broader defense supply chains make it important to consider in economic development planning. This distinction is particularly relevant when evaluating targeted opportunities related to defense, advanced manufacturing, and supply-chain development. The special-case designation acknowledges an important limitation of cluster analysis: standardized classifications provide a consistent way to compare regional economies, but they cannot capture every dimension of a region's economic or strategic reality. These results should therefore be considered alongside local industry knowledge, existing assets, supply-chain relationships, and current economic development priorities rather than viewed as a definitive measure of the cluster's importance.

CONCLUSIONS

CLUSTER ANALYSIS PROVIDES A STRATEGIC PERSPECTIVE, NOT A COMPLETE PICTURE

Although industry clusters offer a valuable framework for evaluating Erie County's economy, they should be viewed as one component of a broader economic development strategy. Cluster analysis simplifies complex regional economies by grouping related industries into broader economic systems. As a result, individual firms, occupations, and specialized activities may not be fully represented by a single cluster.

For example, major employers such as healthcare systems, manufacturers, universities, and defense-related firms contribute to multiple aspects of the regional economy that extend beyond individual clusters alone because they often support supply chains and workforce relationships that span multiple clusters. Consequently, cluster analysis should be viewed as a strategic planning tool that identifies broad patterns and competitive advantages rather than a comprehensive assessment of every economic activity occurring within Erie County.

USING THE FRAMEWORK TO GUIDE DECISION-MAKING

The value of this framework lies not in identifying a single "best" industry, but in providing a structured way to understand how Erie County's economy is organized, where it is competitive, and how those competitive positions are changing over time. Employment, specialization, earnings, and long-term trends each provide different information, and considering them together can help economic development organizations identify where additional attention, research, or investment may be warranted.

No matter your role in Erie County's economy, this framework provides a common language for making informed decisions.

HOW TO USE THIS ANALYSIS

IF YOU'RE A...	YOU CAN USE THIS CLUSTER ANALYSIS TO...
Chamber of Commerce	Prioritize business outreach and membership strategies by identifying industries and businesses that are important to Erie County's economic base and may benefit from stronger engagement.
Economic Development Organizations	Target business attraction and retention efforts, identify high-potential clusters, and prioritize industries for deeper analysis.
Local Government	Inform further strategic planning including land use, infrastructure, housing, and workforce investments based on industry concentration and future growth potential.
Workforce and Education Partner	Align training programs with employer demand, identify emerging occupations, and strengthen talent pipelines.
Philanthropy and Funding Partners	Provide additional context when considering where investments, grants, or other resources may have the greatest potential to strengthen existing competitive advantages or support emerging opportunities.
Manufacturers and Employers	Identify suppliers, customers, and partners within and across related clusters; collaborate on shared workforce training and talent attraction; and compare their industry's competitive position in Erie County against national trends.
Researchers and Policymakers	Build on the framework with additional occupational, supply chain, innovation, or firm-level analysis to understand opportunities to strengthen supplier networks or identify gaps.

A FRAMEWORK FOR ONGOING ECONOMIC DEVELOPMENT

Ultimately, the findings suggest that successful economic development will require a balanced approach: continuing to strengthen Erie County's established competitive industries while supporting emerging industries, responding to changing market conditions, and investing in the assets that position the region for long-term competitiveness.

No analytical framework can fully capture the complexity of a regional economy. However, by organizing Erie County's industries into interconnected clusters, this analysis provides a clearer understanding of the relationships, competitive advantages, and emerging opportunities that shape the region's economy. Rather than serving as a static snapshot or a prescriptive list of priorities, the framework establishes a repeatable methodology that can be updated over time to monitor change, evaluate progress, and guide additional analysis.

Purdue also provides additional analysis of occupational clusters and detailed subcluster data for both industries and occupations. Incorporating these resources into future research would further strengthen and refine the findings presented in this report.

Two additional areas of research would further strengthen future updates to this analysis. First, a defined set of criteria, such as employment size, specialization, earnings, and change over time, could be applied to identify a short list of clusters for targeted investment, building on the third question posed at the outset of this report. Second, the Defense and Security cluster's change in specialization could be recalculated using a NAICS crosswalk for the industry codes revised in 2022. This would allow the cluster to be evaluated across the full study period and placed within one of Purdue's four standard classifications.

Used alongside local knowledge, stakeholder engagement, and more detailed industry, workforce, and supply chain research, this methodology provides a practical foundation for more informed economic development decision-making. As Erie County's economy continues to evolve, it offers a consistent way to assess change, identify new opportunities, and support strategies to strengthen the region's long-term economic competitiveness.

INFINITE erie

ABOUT INFINITE ERIE

Infinite Erie strengthens Erie's community and economic development system by identifying, cultivating, and prioritizing the projects and initiatives in the Playbook.

The Playbook is a living roadmap, outlining a pipeline of projects and aligning efforts toward shared goals – a dynamic strategy to continuously move Erie toward the infinite horizon. The Playbook is published annually, establishing priority projects and sharing progress updates with the community. Infinite Erie and its partners provide resources and expertise to guide the implementation of the Playbook.

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