

# Hanover County Industry Cluster Analysis

Virginia Tech Center for Economic and Community Engagement

Anna Nagorniuk, Allison Ulaky, Sarah Lyon-Hill

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# Project Overview

The Virginia Tech Center for Economic and Community Engagement (CECE) partnered with Hanover County Economic Development to conduct an economic and target industry cluster analysis. This analysis confirmed existing industry clusters in the County as well as the County's potential and suitability for emerging clusters based on industry needs, trends, and opportunities.

The analysis was conducted in the following four stages. CECE first conducted an update of demographic and economic data for the Hanover County and greater region, along with a Strengths/Weaknesses/Opportunities/Threats analysis to set the stage of current trends, opportunities, and challenges that impact Hanover County and its business climate.

This report focuses particularly on the second and third stages of work--the second being the target industry cluster analysis. Using proprietary data from sources including Lightcast, CECE identified existing industry clusters and emerging target clusters for the county. This analysis was supplemented and refined using insights gathered from a variety of community stakeholders during a series of four in-person industry-specific focus groups.

CECE also modeled the potential impacts of attracting additional businesses within each different target industry cluster, as compared to agricultural and residential uses. CECE used input/output analysis methodology, industry sales and employment data, and a hypothetical 50-acre land use scenario to model these impacts. Additionally, CECE identified industry-specific cases of cluster businesses and their greater community impacts that are not captured in economic data, such as charitable giving and community programs.



## Hanover County Regional Overview and SWOT Analysis

*Update of demographic and economic data for a regional overview, and SWOT analysis of the County's economic and industry-specific assets and challenges*



## Target Industry Cluster Analysis

*Identifying the County's existing and growing clusters and target emerging industry clusters, coupled with community insights from Industry Focus Groups*



## Industry Development- Use Impacts

*Potential economic impacts per use case for certain target industries, as well as industry-specific cases illustrating community impact*



## Final Report and Recommendations

*Synthesis of key findings into final deliverables, with data-driven, industry-specific recommendations for mitigating challenges and fostering industry sector growth and success*

# NAICS Target Clusters: Key Data and Trends

The Harvard Business School U.S. Cluster Mapping Project defines a cluster as “a regional concentration of related industries in a particular location” that typically consists of “companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialized training and education, information, research, and technical support.”<sup>11</sup> We identified two main categories of industry clusters in the county--existing clusters and emerging clusters--by pulling and analyzing relevant industry data from federal and proprietary economic data sources such as Lightcast<sup>TM2</sup> These clusters are:

- Existing Clusters:
  - Wholesale Trade
  - Transportation, Warehousing, and Logistical Services
  - Advanced Manufacturing and Machine Manufacturing
  - Tourism, Hospitality, and Recreation
- Emerging Clusters:
  - Business Services & Professional, Scientific, and Technical Services & Management of Companies
  - Information Technology (IT), Computer Sciences, and Data Processing/Hosting
  - Biology/Pharmaceutical and Life Sciences

To supplement these findings, CECE personnel conducted 4 focus groups with regional industry representatives to better understand the trends and needs of these clusters.

The following report provides descriptions of each target cluster, as well as evidence-based target sector recommendations that leverage county assets to enhance growth opportunities and mitigate industry challenges by addressing local needs. The four existing and three emerging target clusters provide a range of opportunities for Hanover County to focus on in the future and foster industry sector success in the county.



*Community Stakeholders engage in a discussion during a focus group facilitated by Anna Nagorniuk (upper middle).*

<sup>11</sup> *Clusters 101 | U.S. Cluster Mapping*. (n.d.). Clustermapping.us. Retrieved May 16 2023, from <https://clustermapping.us/content/clusters-101>

<sup>2</sup> Lightcast is a labor market analytics software solution that includes job postings analytics and traditional labor market and economic data synthesized from raw data collected by Lightcast as well as existing sources including Bureau of Labor Statistics data, U.S. Census Bureau data, and DatabaseUSA. <https://lightcast.io/>

# Key Definitions

**Location Quotient (LQ):** This indicator is a way to measure how concentrated an industry is in a region compared to the nation.<sup>3</sup> A higher LQ shows that the industry accounts for a greater share of jobs regionally as compared to the national share. An LQ greater than 1.0 shows that an industry has a greater share of local employment than nationwide and is a strong existing industry in terms of employment.

**Existing clusters:** a group of industries that already have a strong presence in the locality. These typically have a Location Quotient (LQ) greater than 1.2 and show high employment. There can be existing growing clusters, those that are expected to grow in the next five years, and existing clusters in decline, those that are expected to decline in employment in the next five years.

**Emerging clusters:** these groups of industries tend to have a LQ less than 1.2 but are growing faster or at the same rate as the nation. This indicates that in the region, there may not currently be an industry presence, but growth suggests a future concentration for this industry in the region. If the industry is not expected to grow faster than the nation, then this industry was not considered.

**Competitive effect:** This measure indicates whether the change in jobs in a given industry is due to a unique regional competitive advantage.<sup>4</sup> In other words, it measures the job change that happens within a regional industry that cannot be explained by broader national trends. A positive effect indicates that the regional industry is outperforming national trends while a negative effect indicates that the industry is underperforming.

**Gross Regional Product:** measures the final market values of all goods and services produced by a cluster in the region annually. This measure helps to indicate the size of the local economy and how well it is performing.

<sup>3</sup>*Location Quotient.* (n.d.). Lightcast Knowledge Base. Retrieved February 17, 2023, from <https://emsiburningglass.co.uk/docs/all-about-location-quotient-national-concentration/>

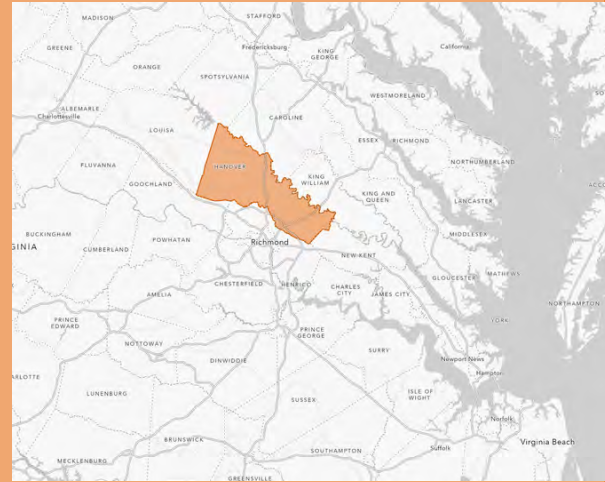
<sup>4</sup>Lightcast. (2022). *Competitive Effect.* <https://kb.emsidata.com/glossary/competitive-effect/#:~:text=Competitive%20effect%20indicates%20how%20much,competitive%20advantage%20of%20the%20region.>

# Hanover At A Glance

Hanover County is strategically situated in the Greater Richmond Region, sharing a southern border with Richmond. With approximately 474 square miles of territory, the county is known for its suburban-rural character and quality of life. Commuting patterns show a somewhat balanced inflow and outflow of workers: about 76% of residents work outside of the county, and a similar percentage work in the county but live elsewhere. This aligns with housing affordability concerns across the county--median home prices have risen significantly over time. Overall, Hanover offers a diverse economy and attractive quality of life assets, such as its school system, but the county continues to pursue initiatives such as Internet connectivity improvements and affordable housing solutions to support its growing population.

**113,543**  
population in  
2022

**+7%**  
growth  
2017-2022



**46.6%**

Households with  
annual income  
over \$100k

**26%**

% of residents  
with a Bachelor's  
degree

**2.4%**

Unemployment  
Rate (2022)

## Top 5: Industries by Employment



- 1** Retail Trade
- 2** Construction
- 3** Healthcare & Social Assistance
- 4** Government
- 5** Transport, Logistics, & Warehousing

Sources: Lightcast Community Profiles; U.S. Census Bureau ACS Estimates; U.S. Bureau of Labor Statistics

# Existing Clusters

## 1. Wholesale Trade

The Wholesale Trade sector (NAICS 42) is made up of businesses engaged in wholesaling merchandise, generally as an intermediate step in the distribution supply chain. These businesses sell merchandise like resale goods and/or raw materials and supplies to other businesses to sell or use in production.

### Key companies in Hanover County:

- Produce Source Partners: procurement, warehousing, and distribution of fresh local produce and other products
- Republic National Distributing Company: national wholesale beverage alcohol distributor, specializing in wine and spirits
- Wine and Beer Supply, LLC: wine and beer wholesaler providing mobile services; equipment and glassware; warehousing; and wine and wine club fulfillment
- Fire Solutions: electrical equipment, wiring supplies, and related equipment wholesaler
- The Supply Room: national independent office furniture and supplies wholesaler

Wholesale trade is a valuable industry that supports all other industry sectors. Wholesale trade operators in the county provide a wide variety of raw materials or goods used by other sectors, including grocery and farm supplies, industrial materials, medical equipment, construction materials, and more. Since this cluster serves so many different sectors, it is dependent on larger-scale trends and the overall performance of the national economy.

Thus, this cluster experienced a 14% decline in employment in the county over the last 5 years in response to market volatility and supply chain challenges due to the Coronavirus pandemic.

In this cluster, Hanover County had about 260 establishments with 4,309 jobs in 2022. As a top-emplying industry cluster, wholesale trade plays a crucial role in the county's economy as well as the Richmond MSA. In fact, the wholesale trade cluster in Hanover County accounted for 23% of regional cluster employment. Although jobs in this cluster have decreased by 14% in the county over the past five years, employment is expected to grow by 2% by 2027. Industries projected to grow in the larger Richmond region include Miscellaneous Durable Goods Merchant Wholesalers (65%), Beer and Ale Merchant Wholesalers (51%), and Industrial and Personal Service Paper Merchant Wholesalers (46%). Employment in this cluster at the state level is expected to grow faster, by 7% in the next 5 years, while jobs are expected to grow by 4% nationally. This shows a possible opportunity for the county to market itself more extensively to incoming wholesale businesses to meet the national growth rate.

The wholesale trade cluster in Hanover is well-established, accounting for about 7% of the total employment in the county. The cluster had the highest GRP of clusters analyzed in 2022, at a total of \$933,979,392. This shows that wholesale trade is a high-performing cluster bringing revenue to the county. The cluster makes up 20.3% of the county's total GRP. The general line grocery merchant wholesaler industry group accounted for 16% of jobs in this cluster, with 688 jobs in 2022, marking a decrease of 6% since 2017.

While employment for the overall cluster has decreased in the last 5 years, several industry groups saw major growth in that time period, including the beer and ale merchant wholesale industry group, which saw an increase of 244 jobs since 2017 with the growth of companies such as Republic National Distributing Company. The construction and mining machinery and equipment wholesale sector, which accounts for 10.8% of employment for the cluster, grew by 32% since 2017. Motor vehicle supplies and parts wholesale sector employment increased by 60%. Some of this growth could be attributed to larger trends, including demand for new construction<sup>5</sup> and national supply constraints in the automobile market<sup>6</sup>, but the greater-than-expected job growth<sup>7</sup> in these sectors points to some unique advantages in the county.

The industrial and personal service paper merchant wholesale group also grew from 32 jobs in 2017 to 102 in 2022 (a 221% increase). Hanover County also saw several new businesses emerge in the electrical apparatus and equipment, wiring supplies, and related equipment wholesale industry group, including Fire Solutions and Ferguson Fire and Fabrications, increasing employment by 130% over the last 5 years. This industry group is also expected to continue growing, with a 58% projected increase in jobs by 2027.

As a major employment driver, it is important that Hanover County continues to support this cluster, which plays a crucial role in the supply chains of many different sectors across the county and the Richmond MSA. The presence of different companies within this cluster could draw other businesses across different sectors that are looking for access to upstream supply chain partners into the region.

Of the eight clusters identified, the wholesale trade cluster was the most concentrated, with an LQ of 2.6--more than twice as concentrated as the national wholesale trade industry. Several subsectors of wholesale trade were particularly concentrated in the county as well. The industry group with the highest LQ in 2022 was Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers (13.81), meaning that this industry accounts for a larger-than-average share of total jobs it is almost 14 times more concentrated than the nation. Other industries in this cluster with high LQs include Other Professional Equipment and Supplies Merchant Wholesalers (8.78) and Wine and Distilled Alcoholic Beverage Merchant Wholesalers (7.96), indicating that these specific industries are also highly concentrated in the region.

Meanwhile, the competitive effect of the cluster is -660. This indicates that the change in jobs in this cluster was likely due to broader national trends, which explains why the expected growth rate for the region and the nation are closely aligned. Demand for wholesale goods tends to be driven by overall performance of the economy, as wholesalers provide goods to businesses across all sectors.<sup>8</sup> The economic downturn as a result of the Coronavirus pandemic in 2020 and ensuing supply chain disruptions likely influenced the employment decrease for this sector at the local and regional level.

<sup>5</sup> US housing starts rebound building permits at highest level in over 12 years. (2019, November 19). CNBC. <https://www.cnbc.com/2019/11/19/us-housing-starts-total-1point314m-in-october-vs-1point320m-expected.html>

<sup>6</sup> Wayland, M. (2023, January 6). *Automakers are cautiously optimistic for a 2023 rebound after worst new vehicle sales in more than a decade.* CNBC. <https://www.cnbc.com/2023/01/06/2022-us-auto-sales-are-worst-in-more-than-a-decade-.html>

<sup>7</sup> Competitive effect for the sectors. Lightcast 2022

<sup>8</sup> Diment, D. (2023). Wholesale Trade in the US. In *IBIS World*. IBIS World. <https://my-ibisworld-com.ezproxy.lib.vt.edu/us/en/industry/42/about>



### Community Insights

#### **Strategic Location, Logistics**

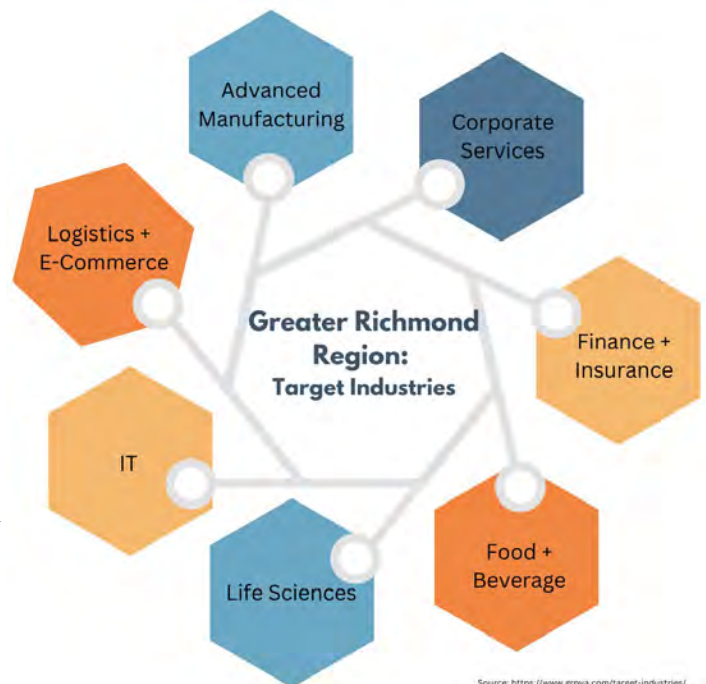
Focus group participants frequently identified the proximity to Richmond as a strength for the county. Hanover County is in proximity to major thoroughfares and is strategically located with access to major highways like I-95, with access to population centers. This is a key consideration to wholesalers and suppliers, who depend on accessible transportation infrastructure to keep supply chain operations running smoothly. The proximity of major population centers gives wholesalers access to a large consumer base for wholesale goods.

#### **Workforce Challenges**

Many employers say they chose Hanover because of the population base, but there are workforce challenges with blue collar positions specifically. Employers reported challenges filling positions and struggling with candidates not showing up. Some businesses felt that there was a lack of commitment to stay on, resulting in staff shortages.

### Strategies and Best Practices

- 1) **Market to wholesale businesses that are projected to grow** in the coming 5-10 years and align with growing industry clusters within the Greater Richmond Region. The wholesale sectors projected to see growth include: construction-related wholesale (brick, stone, machinery), beer/ale wholesale, and sporting & recreational goods wholesale. The County should continue aligning with wholesale businesses that would complement regional target industries. In the Greater Richmond Region, the following wholesale sectors are also expected to continue growing: construction-related wholesale and beer/ale wholesale. Particularly, the beer/ale wholesale sector aligns with the region's target industry, Food & Beverage.
- 2) **Identify and map available parcels along major transportation routes** in the County. Inventory and prioritize sites that could be made "site-ready" at best cost and ease to the County.
- 3) Check in with existing wholesale and logistics operators to **identify areas of congestion or blight along major transport routes**, and encourage infrastructure improvements to address issues.
- 4) Consider potential for additional collaboration. One example of creative wholesale and logistics development strategies includes the **New York City Hunts Point Market--a co-location market where wholesale businesses distribute goods**. These City-owned markets partner with local organizations and workforce development agencies to create job training and placement programs, helping to upskill employees and offer opportunities for career advancement.



## Existing Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	2022 Location Quotient	Competitive Effect
424410	General Line Grocery Merchant Wholesalers	730	688	-6%	7.66	-68
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	354	469	32%	13.81	81
423830	Industrial Machinery and Equipment Merchant Wholesalers	393	426	8%	3.66	15
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers	802	268	-67%	7.96	-602
424810	Beer and Ale Merchant Wholesalers	14	258	1728%	6.4	244
425120	Wholesale Trade Agents and Brokers	776	186	-76%	1.07	-244
423730	Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers	111	137	23%	4.95	6
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	86	136	59%	2.07	47
424480	Fresh Fruit and Vegetable Merchant Wholesalers	172	135	-22%	4.03	-22
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	112	121	8%	2.93	2
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	266	116	-56%	2.49	-172
423490	Other Professional Equipment and Supplies Merchant Wholesalers	132	113	-15%	8.78	-49
424130	Industrial and Personal Service Paper Merchant Wholesalers	32	102	221%	4.4	68
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	93	92	-1%	2.35	-9
423690	Other Electronic Parts and Equipment Merchant Wholesalers	35	85	138%	1.67	49
424450	Confectionery Merchant Wholesalers	<10	81	Insf. Data	3.75	74
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	92	72	-21%	1.74	-32
424910	Farm Supplies Merchant Wholesalers	75	71	-6%	1.66	-5
423210	Furniture Merchant Wholesalers	58	61	4%	3.25	0
423990	Other Miscellaneous Durable Goods Merchant Wholesalers	28	56	102%	1.72	27
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	24	56	130%	0.86	30
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers	71	49	-32%	2.81	-29
423930	Recyclable Material Merchant Wholesalers	39	47	19%	1.21	9
423330	Roofing, Siding, and Insulation Material Merchant Wholesalers	39	45	13%	2.93	-2
423510	Metal Service Centers and Other Metal Merchant Wholesalers	48	39	-19%	0.87	-9
423440	Other Commercial Equipment Merchant Wholesalers	101	39	-61%	2	-63
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	<10	38	Insf. Data	1.64	30
423840	Industrial Supplies Merchant Wholesalers	49	36	-27%	1	-19
423320	Brick, Stone, and Related Construction Material Merchant Wholesalers	<10	35	Insf. Data	1.5	33
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	30	35	16%	0.34	-7
424940	Tobacco and Tobacco Product Merchant Wholesalers	<10	32	Insf. Data	3.56	31
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	30	32	4%	1.35	1
424690	Other Chemical and Allied Products Merchant Wholesalers	22	30	37%	0.71	6
423460	Ophthalmic Goods Merchant Wholesalers	<10	29	Insf. Data	3.63	28
423850	Service Establishment Equipment and Supplies Merchant Wholesalers	19	26	37%	1.35	8
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	74	24	-68%	0.29	-53
424120	Stationery and Office Supplies Merchant Wholesalers	0	23	Insf. Data	1.48	23
423710	Hardware Merchant Wholesalers	97	21	-78%	0.65	-85
<b>Total</b>		<b>5,025</b>	<b>4,309</b>	<b>-14%</b>	<b>2.68</b>	<b>-660</b>

Source: Lightcast Industry Estimates, Q1 2023

## 2. Transportation, Warehousing, and Logistical Services

Closely related to the Wholesale Sector, the Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation.

Operators in this sector are instrumental to multiple industries' supply chains and the economy as a whole, as they are responsible for storing, transporting, and providing logistical services for distribution of products.

### Key companies in Hanover County:

- Orbit Logistics: eCommerce fulfillment, warehousing and retail distribution solutions.
- COX Transportation Services, LLC: nationwide motor carrier service (its Ashland, VA location serves as a terminal facility)
- Hanover County Municipal Airport: designated General Aviation Reliever Airport providing executive passenger service, flight school, and more
- Quality Transportation Services, Inc. (QTS): privately-held logistics company headquartered in Mechanicsville, VA, specializing in rail logistics needs

In 2022, there were 99 establishments and 4,886 jobs in this cluster. Over the past five years, this cluster saw rapid growth, with jobs increasing by 224%. The cluster is also anticipated to continue growing through 2027, with employment projected to increase by 23% in the county--at more than twice the rate of the growth projected for the Richmond MSA (10%) and the state (8%). In 2022, the GRP for this cluster was \$266,270,387. The cluster makes up 5.8% of the county's total GRP.

Particular industries in this cluster are expected to grow significantly more than the nation or region, indicating the local strength for these industries. In the past 5 years, major growth was experienced in the general warehousing and storage industry at 2,359%, with an increase of 2,227 jobs. This industry has the largest the largest share of cluster employment in the county at 47.5% of jobs for the entire cluster. The freight transportation arrangement industry also experienced 252% increase in growth, along with the interurban and rural bus transportation industry at 162% and the couriers and express delivery services industry at 116%. Over the next 5 years, most of the industries in the overall cluster are expected to grow, especially the other transit and ground passenger transportation industry with a 72% increase, the special needs transportation industry at 42%, and the general freight trucking local industry at 39%. As the economy continues to recover, consumer spending is rebounding and the nationwide trend of online commerce growth continues. This, coupled with increasingly complex supply chains and need to minimize supply chain disruptions, will drive demand for this industry cluster.<sup>9</sup>

Hanover County is strategically located within proximity of the population center of Richmond, and nestled halfway between Hampton Roads, which is home to the global gateway Port of Virginia, and Northern Virginia. The county's location and the availability of land as compared to nearby urban centers has allowed it to capture a significant share of this warehousing and logistics growth in the region. Hanover County has an opportunity to continue to capitalize on this expected growth and leverage its transportation and logistics industry success to support existing businesses in other sectors and attract new businesses looking to strengthen their supply chains.

## Community Insights

### *Strategic Location and Cost of Doing Business*

Similar to the wholesale trade industry, the transportation and logistics cluster benefits from Hanover County's proximity to major thoroughfares and is strategically located with access to major highways like I-95, with access to major population centers in all directions. Many focus group participants reported this as a strength for the county. Some participants also highlighted low cost of doing business as a strength for the county.

### *Workforce Challenges*

The transportation and logistics cluster has also experienced challenges with workforce, as reported during focus groups. Though many employers originally located in the county because of the population base, it is challenging to fill and maintain blue collar positions.

Hanover County's transportation and logistics cluster plays a major role in the Greater Richmond region: the county's cluster accounts for 16.5% of total cluster employment across the 16 localities within the Richmond MSA. The competitive effect (2,744) shows that this is likely due to the county's unique advantages, including proximity to major interstates, the Port of Richmond, and the Port of Virginia in Hampton Roads, the presence of UPS and FedEx district hubs in the county, and the county's competitive land costs.<sup>10</sup> This cluster has the highest competitive effect, indicating a strong advantage for the region.

Of the seven clusters identified, the transportation and logistics cluster is the second-most concentrated cluster in the county accounting for 8% of all county employment. The LQ for the cluster is 2.18, indicating high concentration. Within the overall cluster, industry groups with high LQs include Special Needs Transportation (7.69), Interurban and Rural Bus Transportation (5.66), and General Warehousing and Storage (3.78). Many of the industries within this cluster have high LQs, indicating high concentration of these industries in the region compared to the nation.

<sup>10</sup> *Supply Chain & Logistics : Hanover County Virginia Economic Development.* (n.d.). [Www.hanovervirginia.com](https://www.hanovervirginia.com/locate-your-business/industry-emphasis/supply-chain-logistics/). Retrieved June 8, 2023, from <https://www.hanovervirginia.com/locate-your-business/industry-emphasis/supply-chain-logistics/>

### Strategies and Best Practices

- 1) Similar to the wholesale cluster, the transport & logistics industry in Hanover would benefit from a **targeted site inventory**.
- 2) **Improvements to transportation infrastructure** would also help to better support this industry.
- 3) **Encourage a warehousing and logistics focus through ongoing Connect Hanover initiatives.** Logistics is becoming more and more automated with the advancement of broadband and IT technology to monitor and provide simultaneous reporting of product loads and packages along transportation routes. The County will need to maintain up-to-date Internet infrastructure to stay competitive.
- 4) **Promote creative partnership opportunities.** With supply chain disruptions caused by the 2020 pandemic, some communities worked to build coalitions around their logistics and transportation industries to help mitigate disruptions and discontinuities. In the Richmond region, the Commonwealth Center for Advanced Logistics Systems (CCALS) serves as a collaborative for faculty and students to collaborate with private, public, and nonprofit sector professionals to proactively engage logistics and supply chain challenges through projects, research experiences, and career-ready workforce opportunities. This multi-university, multi-disciplinary center may serve as a resource for exiting and incoming companies in Hanover.

Also, Orbit Logistics in Hanover County founded the Virginia Supply Chain Initiative in response to Coronavirus-related disruptions. This collective should be revisited and promoted to other transport and logistics partners in the county and region.

### Creative Partnerships: Columbus Region Logistics Council (CRLC)

The CRLC, an initiative of the Columbus Chamber of Commerce, began in 2008 with the goal of catalyzing logistics industry growth in Central Ohio by providing advocacy, information, and connections for its members.

The CRLC now has more than 200 members including major Central Ohio-based shippers like Target, Cardinal Health, and Wendy's to trucking companies, e-commerce shippers, public planners, warehouse construction and management companies, and other stakeholders.

The CRLC produces industry-relevant information for companies outside the area, elected officials, educators, public planners, and those involved with workforce development, among others. The group helps members foster connections to academics, workforce services, to other professionals in the industry, and to business opportunities.



## Existing Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	2022 Location Quotient	Competitive Effect
493110	General Warehousing and Storage	94	2,321	2359%	3.78	2,145
492110	Couriers and Express Delivery Services	573	1,239	116%	3.38	306
484121	General Freight Trucking, Long-Distance, Truckload	209	318	52%	1.22	91
485991	Special Needs Transportation	<10	187	Insf. Data	7.69	185
484110	General Freight Trucking, Local	65	138	114%	1.12	64
492210	Local Messengers and Local Delivery	96	91	(5%)	1.15	(157)
482110	Rail transportation	120	91	(24%)	1.17	(14)
541614	Process, Physical Distribution, and Logistics Consulting Services	67	79	18%	1.44	(4)
488490	Other Support Activities for Road Transportation	69	69	0%	4.48	(6)
484220	Specialized Freight (except Used Goods) Trucking, Local	76	66	(13%)	0.81	(10)
481111	Scheduled Passenger Air Transportation	<10	55	Insf. Data	0.36	54
488510	Freight Transportation Arrangement	12	43	252%	0.39	29
485999	All Other Transit and Ground Passenger Transportation	<10	42	Insf. Data	3.33	42
488119	Other Airport Operations	23	34	50%	0.97	11
485210	Interurban and Rural Bus Transportation	11	29	162%	5.66	21
488410	Motor Vehicle Towing	36	29	(19%)	1.03	(10)
484122	General Freight Trucking, Long-Distance, Less Than Truckload	16	26	64%	0.25	8
488210	Support Activities for Rail Transportation	12	15	20%	1.21	2
484210	Used Household and Office Goods Moving	26	10	(61%)	0.27	(17)
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	<10	<10	Insf. Data	0.10	3
<b>Total</b>		1,508	4,886	224%		2,744

Source: Lightcast Industry Estimates, Q1 2023

### 3. Advanced Manufacturing and Machinery Manufacturing

This industry cluster is part of the larger Manufacturing sector (NAICS 31-33), which is comprised of businesses that transform materials to create new products. Particularly, Hanover County has a niche in machinery manufacturing, which is a subsector consisting of businesses that produce mechanical products or tools, like gears, levers, and other equipment.

Key companies in Hanover County:

- Hanover Foils: packaging for industrial, food/beverage, pharmaceutical, and automotive uses, including battery foils, medication blister packs, candy wrappers, and more.
- Lutron Electronics: Pennsylvania-based manufacturer of lighting control, automated shading solutions, and intelligent fixtures
- QubicaAMF: world's leading manufacturer and marketer of bowling and mini bowling products, headquartered in Mechanicsville.
- Sonic Tools: machine tool manufacturing

In 2022, this cluster employed 1,127 people across 58 businesses. Hanover County's cluster accounted for 25.8% of advanced manufacturing employment in the Richmond MSA, playing a significant role in the regional economy. The GRP was \$171,100,051 in 2022 for this cluster, making up 3.7% of the county's GRP.

Contrary to trends across the Richmond MSA and state, the advanced and machinery manufacturing cluster in Hanover County grew over the last 5 years, with a 16% increase in employment. Some manufacturing industry groups grew at a faster rate compared to others. Industrial Furnace & Oven Manufacturing increased by 359% from 12 to 57 jobs

between 2017 and 2022, and Prefabricated Metal Building & Component Manufacturing increased 225%, from 13 to 43 jobs, and is expected to continue growing. The Semiconductor and Related Device Manufacturing industry group also saw some growth, with the expansion of EMSCO, an electrical, multi-conductor, and circuit board manufacturer in Ashland. There is an expected increase of 3% for the county over the next five years, as compared to 9% in the state and 5% nationally.

#### Community Insights

##### *Workforce Challenges*

Manufacturing industry stakeholders reported challenges finding and retaining “blue collar” workers as well. Particularly, manufacturing employers said that their workers often cannot afford housing in Hanover County, which hurts their recruitment.

##### *A Strong Outlook*

Focus group participants from the manufacturing industry said that the outlook looks strong compared to how it did ten years ago. Several participants wished for better ways to publicize employment opportunities—Indeed is widely used but participants would be interested in other programs or platforms to help attract employees. Employers also identified the Hanover trade school as an asset that offers degrees that support their business; however, there are occupations missing that would help the advanced manufacturing industry, like welders and electricians. Addressing these needs would help the advanced manufacturing cluster to continue thriving in the future.

The overall cluster is expected to grow more in the region and state as compared to the nation. Nationally, the manufacturing industry experienced declines in revenue stemming from Coronavirus pandemic impacts and supply chain disruptions. Nonetheless, economic recovery and pent-up consumer demand has helped manufacturers bounce back. Industry experts predict manufacturing revenue to grow, though at a slower rate, as inflation stabilizes in the future and economic growth continues.<sup>11</sup> Furthermore, experts predict that manufacturers will continue to invest in supply chain resiliency and new technologies such as Artificial Intelligence (AI) to optimize their production processes.<sup>12</sup>

This cluster also had a high competitive effect, showing that the advanced and machinery manufacturing growth in Hanover County is likely due to local assets and advantages.

This cluster likely benefits from the concentration of warehousing, logistics, and the wholesale trade: these other industries serve essential roles in the interconnected supply chain, as well as the county's location in relation to major transportation routes and the ports. Hanover County can continue fostering the connections between these three clusters and continuing to support its manufacturing base.

The Advanced Manufacturing cluster was also 1.38 times more concentrated in the county than the nation. Industrial Furnace and Oven Manufacturing group had one of the highest LQs in the region of 17.58, showing that the share of this industry in the county is roughly 17 times more concentrated than average. Other industries with high LQs include Overhead Traveling Crane & Monorail System Manufacturing (11.95) and Ornamental & Architectural Metal Work Manufacturing (8.71).

<sup>11</sup> Khaustovich, V. (2023). Manufacturing in the US. In *IBIS World*. <https://my-ibisworld-com.ezproxy.lib.vt.edu/us/en/industry/31-33/about>

<sup>12</sup> Khaustovich, V. (2023). Manufacturing in the US. In *IBIS World*. <https://my-ibisworld-com.ezproxy.lib.vt.edu/us/en/industry/31-33/about>





Vogelsong, S. (2023). The Tyson processing plant in Glen Allen. In *Virginia Mercury*. <https://www.virginiamercury.com/2023/03/14/tyson-still-eligible-for-state-incentives-for-pittsylvania-chicken-plant-despite-glen-allen-closure/>

## Manufacturing: A Changing Landscape

In the process of this study, Hanover County experienced the closure of a major employer in the county. As part of nationwide restructuring, Tyson Foods closed its poultry processing plant in May of 2023, terminating almost 700 jobs. In response, Hanover County Department of Economic Development, Virginia Employment Commission, and Virginia CareerWorks collaborated to host career fairs and match resources to help displaced employees find new employment. The company made the decision to close its plant due to financial optimization, citing a need to maximize operations at its other plant locations.

Though food manufacturing & processing is not captured in the scope of the advanced manufacturing cluster as outlined in this study, this event has a significant impact on the economic landscape of the County and its manufacturing industry.

Nonetheless, the 50-acre site is an asset for the county and could be an opportunity to attract a new prospect. With up-to-date infrastructure, manufacturing zoning designation, and strategic location, the site presents some opportunities for redevelopment.

**As a first step, the site will require brownfield cleanup and remediation.**

**Virginia Brownfields  
Restoration & Economic  
Redevelopment Assistance  
Fund (VBAF):**

Grants & loans to local governments to promote brownfield site redevelopment and address environmental problems or obstacles to reuse



**U.S. EPA Brownfields  
Program:**

Direct funding for brownfields assessment, cleanup, revolving loans, environmental job training, technical assistance, training, and research related to brownfield redevelopment

### Strategies and Best Practices

#### Workforce Solutions: MassBridge and Workforce Education

In 2020, the Commonwealth of Massachusetts was awarded \$3.2 million from the U.S. Department of Defense to develop a manufacturing technician training program. The MassBridge initiative, led by the Massachusetts Center for Advanced Manufacturing along with educational partners and federal and state agencies, will be a well-connected, state-based training and career pathway model - a “Bridge” for technicians that spans the gaps between state-wide advanced manufacturing programs and the needs of the Manufacturing USA Institutes.

The curriculum will be deployed through vocational schools, high schools, and community colleges across the state, with connectivity to supporting universities (for those workers who want to continue their education) to pull students along a pathway toward careers in Manufacturing USA technologies.

The training program ranges from entry-level traditional manufacturing training and progresses to highly specialized training for careers in robotics, functional fabrics, materials manufacturing, and more.

For more information, visit:  
<https://cam.masstech.org/massbridge>



- 1) In addition to identifying and preparing site-ready land parcels, **prioritize connecting industry with education resources.**

Institutions should be encouraged to offer short-term programs and certificates to fit the schedules of those with limited time availability or who may already be in the workforce. Embedding an industry-recognized credential within these certificates can be a stepping stone to more formal pathways for employment opportunities.

- 2) Explore strategies to **help expand Hanover Center for Trades and Technology offerings.** Continue to engage with manufacturing businesses to prioritize in-demand jobs that are missing from the existing curriculum. Are there funding sources, like the DoD or Virginia CareerWorks, that could be leveraged to support program expansion?
- 3) **Other examples of collaborative programs:**

#### **Lorain County Community College, OH**

Lorain offers certificates in manufacturing skills such as welding and automation, which can be stacked to lead to one-year and two-year degrees. Industry certifications are built into the curriculum so that students can learn relevant material and apply it to local companies. Lorain also ties to the local high schools by offering a “college credit plus” program where students receive college credits, building a pathway from graduation to community college to employment. Improving these connections between education and industry can ensure that the training received in school is relevant to employers, and employers can connect to students for opportunities such as apprenticeships prior to graduation. This can improve retainment of students in the region by forming early connections to local employers.

## Existing Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	2022 Location Quotient	Competitive Effect
332323	Ornamental and Architectural Metal Work Manufacturing	64	137	113%	8.71	69
332313	Plate Work Manufacturing	164	114	-30%	7.05	-52
332710	Machine Shops	130	88	-32%	0.91	-36
325510	Paint and Coating Manufacturing	0	80	Insf. Data	5.19	80
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	47	72	51%	3.52	25
332322	Sheet Metal Work Manufacturing	125	68	-45%	1.65	-62
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	109	62	-43%	11.95	-50
333994	Industrial Process Furnace and Oven Manufacturing	12	57	359%	17.58	46
331318	Other Aluminum Rolling, Drawing, and Extruding	39	55	42%	5.57	17
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing	58	47	-18%	4.83	-7
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	15	46	203%	3.1	30
332311	Prefabricated Metal Building and Component Manufacturing	13	43	225%	3.43	28
335314	Relay and Industrial Control Manufacturing	20	33	69%	2.19	15
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	<10	24	Insf. Data	0.8	22
333249	Other Industrial Machinery Manufacturing	20	23	18%	1.08	2
333241	Food Product Machinery Manufacturing	<10	22	Insf. Data	3.09	14
334413	Semiconductor and Related Device Manufacturing	0	22	Insf. Data	0.32	22
333922	Conveyor and Conveying Equipment Manufacturing	14	22	56%	1.67	6
326199	All Other Plastics Product Manufacturing	21	21	-1%	0.18	-1
333414	Heating Equipment (except Warm Air Furnaces)	0	20	Insf.	3.42	20

Source: Lightcast Industry Estimates, Q1 2023

## Existing Clusters

	Manufacturing			Data		
333515	Cutting Tool and Machine Tool Accessory Manufacturing	25	19	-24%	2.46	-3
333517	Machine Tool Manufacturing	43	18	-59%	1.21	-25
332312	Fabricated Structural Metal Manufacturing	<10	16	Insf. Data	0.47	6
335311	Power, Distribution, and Specialty Transformer Manufacturing	<10	<10	Insf. Data	0.04	-9
339112	Surgical and Medical Instrument Manufacturing	<10	<10	Insf. Data	0.11	5
336112	Light Truck and Utility Vehicle Manufacturing	0	<10	Insf. Data	0.08	2
335313	Switchgear and Switchboard Apparatus Manufacturing	<10	<10	Insf. Data	0.07	0
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	0	<10	Insf. Data	0.01	0
334517	Irradiation Apparatus Manufacturing	<10	<10	Insf. Data	0.46	-1
334516	Analytical Laboratory Instrument Manufacturing	<10	<10	Insf. Data	0.04	-1
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	0	<10	Insf. Data	0.03	0
333997	Scale and Balance Manufacturing	0	<10	Insf. Data	0.22	0
333318	Other Commercial and Service Industry Machinery Manufacturing	18	<10	Insf. Data	0.02	-17
339113	Surgical Appliance and Supplies Manufacturing	<10	<10	Insf. Data	0.11	0
<b>Total</b>		975	1,127	16%	1.38	145

Source: Lightcast Industry Estimates, Q1 2023

## 5. Tourism, Hospitality, and Recreation

This cluster is comprised of a mix of industries from the Arts, Entertainment, and Recreation sector (NAICS 71) and Accommodation and Food Services sector (NAICS 72), all which support tourism and recreation for visitors as well as provide quality of life for residents.

### Key companies in Hanover County:

- Kings Dominion: amusement park with 13 roller coasters, over 60 attractions, and a 20-acre waterpark
- Patrick Henry's Scotchtown: historic site and museum, the only original standing home of Patrick Henry
- Hanover Golf/Country Club: Locally-owned golf club featuring a golf course, event space, dining facilities, pool, and golf shop
- The Henry Clay Inn: replica historic inn, located on the site of the historic Ashland Hotel, featuring 13 guest rooms, balcony/parlor, and a shared banquet room/event space

The tourism and hospitality industry was one of the industries that was hit hardest by the 2020 Coronavirus pandemic. This translated to a drop in employment across the county, state, and nation between 2017 and 2022. However, Hanover County saw a smaller decline than both the Richmond MSA and the state, with employment decreasing by 4%. Limited-service restaurant employment actually grew slightly, by 9%, in the county since 2017, while the Richmond MSA and state saw decreases in employment. Fitness and recreational sports centers also flourished, growing by 48% in the last 5 year--a rate faster than the region and state. The tourism & hospitality cluster is a major driver of employment for Hanover County, accounting for over 5,600 jobs in 2022. Almost 60% of these jobs were in limited- and full-service restaurants.

The amusement and theme park sector was also a major employer in the county, with Kings' Dominion acting as the largest employer in this sector, with near 1,000 jobs in 2022.

The tourism, hospitality, and recreation cluster contributed \$284,857,751 in GRP to the county in 2022, indicating high productivity from this cluster.

The cluster makes up 6.2% of the county's GRP.

Amusement parks were the greatest contributor of GRP within the cluster, accounting for almost \$69 million in 2022, likely due to King's Dominion, which draws visitors from across Virginia and the East Coast (particularly, North Carolina, Washington D.C., and Maryland).<sup>13</sup>

Overall, the tourism and hospitality cluster had a lower competitive effect of 8, which indicates that the changes in this cluster mostly follow national trends. Meanwhile, the fitness center industry group had the highest competitive effect of 169, showing that employment in this group has grown due to some advantages in the county--likely the faster rate of population growth. The tourism and hospitality cluster had an LQ of 1.12, making it somewhat concentrated in the county. Particularly, historical sites and mobile food services were more concentrated in the county. These industry groups accounted for larger shares of employment in the county than nationally. Notably, Hanover County has a rich concentration of cultural assets and historic sites--the historical sites sector within the cluster was 4.7 times more concentrated than the nation. This includes, but is not limited to, the Beaverdam Depot, Scotchtown, Hanover Tavern, and several Civil War battlefield sites such as North Anna Battlefield and Enon Church. The county's concentration of historical attractions likely contributed to the employment growth over time.

<sup>13</sup> U.S. Securities and Exchange Commission. (2006). *Form 10-K: CEDAR FAIR, L.P.* U.S. Securities and Exchange Commission. <https://www.sec.gov/Archives/edgar/data/811532/000095015207001685/124898ae10vk.htm>

### Community Insights

#### *Strong Local Support*

Support from the local community for tourism- and hospitality-related businesses assists these enterprises in growing and building connections across the county. Focus group participants were interested in leveraging this support to increase opportunities for networking within the industry and create packages to provide to customers, which would expand the industry in Hanover.

Creating a pass similar to the “Visit RVA Pass” for Hanover was suggested; an easily accessible list of businesses and destinations and what they offer the local community can help these companies gain recognition and grow awareness of everything occurring in the county.

#### *Personnel Challenges*

The County lacks a tourism position that would coordinate and capture grant opportunities and offer supportive services to businesses. Creating this position can assist tourism and hospitality businesses with applying for funding and having a contact person to support them.

### Strategies and Best Practices

- **Work with the County to establish a county tourism director position** for coordinating tourism efforts, pursuing funding, and marketing. This person would help foster collaboration among key stakeholders, including museum directors, lodging businesses, recreation businesses, nonprofits, and others. This employee could represent the County at tourism conventions and other learning and networking events outside the region.
  - **Develop marketing and tourism packages that highlight the assets of the county.** The county has already taken steps to make activities and recreation more accessible, with the Here In Hanover, VA app. To build on this, the county could build on the **VisitRVA Pass** concept, with a special pass or card that provides discounts or special entry to the destinations in the county.
- This pass could be piloted with tourism stakeholders and ambassadors of the county, to grow internal awareness of existing assets in the county.
- Focus group participants requested that **the County help host an annual or bi-annual event or roundtable** to encourage tourist business networking and collaboration among tourism leaders to help develop tourism and address challenges.
  - Several participants noted the need for **more lodging** for visitors. The County should consider a study or an existing lodging stock inventory to better identify specific lodging needs and gaps. A dedicated tourism position could help support this work and interface with developers and identify funding for potential lodging projects.

## Existing Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	2022 Location Quotient	Competitive Effect
722513	Limited-Service Restaurants	1,732	1,816	5%	1.15	85
722511	Full-Service Restaurants	1,494	1,423	-5%	0.79	52
713110	Amusement and Theme Parks	1,201	940	-22%	14.33	-190
713940	Fitness and Recreational Sports Centers	290	430	48%	1.92	169
713910	Golf Courses and Country Clubs	231	273	18%	1.95	37
721110	Hotels (except Casino Hotels) and Motels	260	177	-32%	0.37	-39
722310	Food Service Contractors	246	166	-33%	0.86	-69
722515	Snack and Nonalcoholic Beverage Bars	130	123	-6%	0.39	-43
713990	All Other Amusement and Recreation Industries	95	94	-2%	1.18	-8
713950	Bowling Centers	51	50	-3%	2.12	2
722330	Mobile Food Services	42	48	13%	3.34	-21
711219	Other Spectator Sports	<10	26	Insf. Data	1.83	25
712120	Historical Sites	14	22	54%	4.69	10
721191	Bed-and-Breakfast Inns	18	13	-28%	2.48	-3
711212	Racetracks	12	11	-8%	1.22	2
712110	Museums*	0	0	0%	0	0
<b>Total</b>		5,818	5,610	-4%	1.12	8

Source: Lightcast Industry Estimates, Q1 2023

It should be noted that quantitative data sourced from Lightcast does not always fully capture all industry activity in a community. In this instance, the quantitative data showed 0 employment and establishments in the museum industry sector, which is not representative: Hanover County is home to both the Hanover Museum of History & Culture and the Ashland Museum.

# Emerging Clusters

## 6. Business Services - Professional, Scientific, and Technical Services & Management of Companies

The Professional, Scientific, and Technical Services sector includes operators that provide expertise and services in a variety of industries and disciplines, as well as white-collar management divisions of larger companies. These activities include legal advice and representation, accounting, consulting services, advertising, and more. Similar to wholesale trade and transportation and logistics, operators in this cluster often support other companies across other industries through their services. For example, key finance industries such as Nondepository Credit Intermediation and Offices of Public Accountants also play a role, as they also serve a support function to other clusters.

### Key companies in Hanover County:

- McKinney & Company, Inc.: multi-discipline planning, design and construction consulting firm
- AFTCO Transition Consultants: dental practice transition consulting firm providing assistance with purchasing, selling and merging dental practices throughout the United States
- Pharmacy Data Solutions: provider of manufacturer rebate services, pharmacy adjudication and audit services, and related consulting services
- Creative: Central Virginia professional services firm providing space planning, AV design/engineering, network analysis & design, project management, moving services, and more.

In this cluster, there were 2,627 jobs in 2022 and approximately 255 establishments. The county saw 9% growth in jobs in the past five years in this cluster, at a faster rate than the Richmond MSA and state, but on par with national trends. In the next 5 years, the county is expected to see another 11% increase in jobs, which is higher growth compared to 6% in the state and 8% nationally. This cluster benefits when the national economy is performing well. Both businesses and households are more likely to spend money on consulting services, photography, and other services when business is good and households have more discretionary income. This cluster includes a variety of different industry groups, from veterinary services to tax preparation services to marketing. However, corporate, subsidiary, and regional managing offices accounted for the largest share of cluster employment in the county, with 42% of the total jobs in the cluster. This sector is made up of establishments that act as central administrative offices, headquarters, district or regional offices, or holding companies for a specific company or enterprise. Based on Lightcast in-region sales data, companies in this industry group often support and serve as administrative or regional offices for restaurants, temporary help services, and some wholesalers within the county. The county is anticipating some employment decreases in the corporate managing offices sector in response to a wider trend of companies downscaling their office space footprints due to remote work. Some managing offices may sell or downscale their headquarters as a result, leaving more sites open in the county.



## Emerging Clusters

Much of the growth seen in this cluster was driven by services related to advertising, which experienced the most growth over the past five years at 303% (114 jobs) and is expected to continue growing by 43% over the next 5 years. Other industries expecting growth by 2027 include media representatives (68%), outdoor advertising (66%), and public relations agencies (65%). Advertising and media related services continue to benefit from the rapid growth of digital media and social media--this industry group is one of the most innovative industry groups in the cluster as operators have to constantly adjust to changing consumer preferences and quickly adapt new media platforms for disseminating information. Nationally, businesses are predicted to see increasing corporate profit in the next 5 years, which will continue to drive demand for advertising and other professional services at different levels.<sup>14</sup>

Other industry groups within the cluster that experienced growth since 2017 include all other professional, scientific, and technical services (83%), which encompass services like consumer credit counseling, powerline inspection services, and specialized services, and veterinary services, which grew by 13%. Meanwhile, environmental consulting services, tax prep services, and engineering services saw a decline in employment during that time. As an emerging cluster, this industry was not particularly concentrated in the county as of yet--its location quotient is 0.83. Nonetheless, the county has the opportunity to capitalize on past success and continue targeting businesses that provide professional services. Additional growth and development in this cluster could also benefit businesses in other clusters that need easy access to nearby professional services such as advertising or legal services.

### Community Insights

#### *Availability of Office Space*

Companies within the professional and technical services cluster typically reside in office or commercial facilities. In Hanover, there is a lack in quality office spaces that are already built, making relocation a challenge for growing businesses. Focus group participants mentioned that being located near a rural area can be a positive as there is limited traffic and available space, but not having enough offices for new companies to move into makes choosing Hanover more difficult.

#### *Business Support Services*

The Business First program was mentioned in focus groups as a local asset to companies in the business services industry. The program works closely with local businesses to learn company goals, identify challenges, and assist in building a better business community. This is done through visits to businesses followed by a survey to provide a better support system for county businesses.<sup>15</sup> Connecting with companies and discussing workforce needs in these industries assists with building a better business community and retaining businesses in the county due to that sense of connection and camaraderie between Hanover staff and business owners.

<sup>14</sup> O'Malley, M. (2023). Professional, Scientific and Technical Services in the US. In IBIS World. <https://my-ibisworld-com.ezproxy.lib.vt.edu/us/en/industry/54/about>

<sup>15</sup> Business First Hanover. <https://www.hanovervirginia.com/grow-your-business/business-support/#:~:text=Business%20First%20Hanover%20works%20closely,a%20connection%20of%20multiple%20resources.>

The GRP in 2022 was \$416,818,002, and makes up 9.1% of the county's GRP. This cluster has the second-highest GRP out of the target clusters analyzed, showing that the cluster is performing well and is substantial to the local economy.

The competitive effect was -27, which suggests that national trends are contributing to the growth of this cluster. Meanwhile, public relations agencies, outdoor advertising, and other services related to advertising saw higher positive competitive effects, indicating some local advantages that have led to employment growth.

The industries with the highest LQs are Services Related to Advertising (4.91), Media Representatives (3.22), and Public Relations Agencies (2.35)--these industry groups were at least twice as concentrated in the county as compared to the nation. Industries related to Professional, Scientific, and Technical Services (1.7) and Corporate, Subsidiary, and Regional Managing Offices (1.3) also had high LQs in the region.

### Strategies and Best Practices

- Professional services firms often occupy office space: companies in this cluster often look for existing office buildings or large sites that could support offices. Hanover currently has a lack of such sites. The County should prioritize prepping pad-ready sites for development and assessing available sites and future opportunities.
- Nationally, professional services and corporate offices are downscaling their office footprint in response to remote work opportunities. Hanover County is anticipating to see similar impacts, with additional sites or parcels becoming available as some existing offices sell off their buildings. A vacant site with existing office buildings & infrastructure could be a valuable asset for the county, providing space and opportunity for smaller businesses or startups or other reuse needs.

<sup>16</sup> McCabe, B. (2017). "W. Va. Needs more developable, pad ready sites." The State Journal. [https://www.wvnews.com/statejournal/w-va-needs-more-developable-pad-ready-sites/article\\_d0106e18-c4cc-52cd-b485-6c5a8e7abe91.html](https://www.wvnews.com/statejournal/w-va-needs-more-developable-pad-ready-sites/article_d0106e18-c4cc-52cd-b485-6c5a8e7abe91.html)

<sup>17</sup> Business First Hanover. <https://www.hanovervirginia.com/grow-your-business/business-support/>

<sup>18</sup> West Virginia University. (n.d.). "West Virginia Forward." <https://wvforward.wvu.edu/>

### Best Practices: *West Virginia Forward*

Representatives from the West Virginia Development Office cited the lack of development-ready industrial sites as one of the top three barriers to attracting business, creating jobs, and garnering investment in West Virginia. WV Forward, in partnership with West Virginia University, Marshall University, and the West Virginia Department of Commerce, works with local, county and state officials to create an inventory of sites ready for development. The program and inventory includes assessment of site infrastructure and a time estimate for how long it would make a site pad-ready. As part of the program, WV Forward has a site development fund to expand the inventory of sites for target sectors. Such a program increases transparency around the status of sites and buildings in the region and the costs of development, making it easier for prospective businesses to evaluate options.

Unlike West Virginia, Virginia already has a state-wide site development initiative. Nonetheless, state programs cannot always keep up with the changing sites and conditions at a local level. Proactive monitoring is needed to identify site development opportunities early on.

## Emerging Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	Location Quotient	Competitive Effect
551114	Corporate, Subsidiary, and Regional Managing Offices	1,143	1,081	-5%	1.3	-131
541940	Veterinary Services	215	243	13%	1.45	-13
541990	All Other Professional, Scientific, and Technical Services	122	223	83%	1.7	63
541330	Engineering Services	242	203	-16%	0.5	-65
541890	Other Services Related to Advertising	37	151	303%	4.91	121
541611	Administrative Management and General Management Consulting Services	145	149	2%	0.41	-33
541110	Offices of Lawyers	82	90	10%	0.19	6
541214	Payroll Services	107	75	-30%	1.03	-53
541820	Public Relations Agencies	<10	67	Insf. Data	2.35	59
541211	Offices of Certified Public Accountants	45	59	31%	0.32	10
522298	All Other Nondepository Credit Intermediation	37	47	25%	1.86	9
541850	Outdoor Advertising	0	45	Insf. Data	4.12	45
541370	Surveying and Mapping (except Geophysical) Services	36	38	7%	1.95	-2
541613	Marketing Consulting Services	<10	32	Insf. Data	0.25	22
541219	Other Accounting Services	48	31	-36%	0.2	-21
541620	Environmental Consulting Services	70	27	-61%	0.8	-49
541840	Media Representatives	<10	22	Insf. Data	3.22	21
541720	Research and Development in the Social Sciences and Humanities	0	16	Insf. Data	0.69	16
541213	Tax Preparation Services	34	15	-55%	0.34	-18
541612	Human Resources Consulting Services	26	14	-47%	0.41	-15
<b>Total</b>		<b>2,403</b>	<b>2,627</b>	<b>9%</b>	<b>0.83</b>	<b>-27</b>

Source: Lightcast Industry Estimates, Q1 2023

### 7. Information Technology (IT), Computer Services, and Data Processing/Hosting

This industry cluster is a subsector of the larger information industry sector (NAICS 51), which includes operators involved in the production and distribution of information, software, and data processing.

Specifically, this IT and data processing/hosting cluster includes operators that provide computing infrastructure, data processing services, Web hosting services (except software publishing), other related services like streaming support services.

Key companies in Hanover County:

- Blue Triangle Technologies: software company specializing in optimization solutions
- Code Blue Technology, LLC: computer technology consultant, providing technology and support services for small to medium sized businesses
- Pixel Factory: co-location data center, with a specialty for image hosting and storage

The IT and data industry has been a growing focus for communities across the country. Particularly, Virginia has gained global attention for its explosive growth of the data center market, with much of that activity concentrated in the Northern Virginia region--the largest data center market in the world (by megawatts of power capacity).<sup>18</sup> As stated in the 2020 Northern Virginia Technology Council report on data center impacts, "Life is increasingly digitized....Our finances, communications, health care,...work, and social lives are often and increasingly online."<sup>19</sup> Therefore, it is unsurprising that this cluster has seen growth at the county, state, and national level over the last 5 years. In Hanover County, the IT and data processing/hosting cluster experienced a 32% employment increase (166 jobs)--

a faster rate than both the state (8%) and nation (17%). Meanwhile, the Richmond MSA actually saw decline in this cluster: employment decreased by 8% since 2017. This, coupled with Hanover's competitive effect for this cluster, indicates a competitive advantage for the county. This aligns with the proximity of Hanover to major population concentrations near Richmond and the greater region's abundant internet infrastructure, which includes the connection hub for the high-capacity-low-latency subsea cables MAREA and BRUSA, which connect from Europe and South America, land in Hampton Roads, and route through Henrico County to the Northern Virginia region. It is clear that Hanover County has been successful in capturing a share of the activity generated in this cluster. This cluster contributed \$142,048,553 in GRP to the county, making up 3.1% of the county's GRP. Hanover County is expected to outperform both the state and the nation in the next 5 years, with an expected growth of 21%. The information technology/data cluster has seen consistent demand from government agencies, businesses, and households over time, and, unlike other industries, this cluster saw growth during the 2020 pandemic as businesses and households had to quickly transition to online modes of work and learning amid national shutdowns and restrictions. This transition and the drive for more broadband connectivity across the nation, will continue to drive demand for various software, computer services, and data storage and processing.

<sup>18</sup> NVTC 2020 Data Center Report. Retrieved from <https://www.nvtc.org/topics/data-center-and-cloud/report/>

<sup>19</sup> NVTC 2020 Data Center Report. Retrieved from <https://www.nvtc.org/topics/data-center-and-cloud/report/>

Unsurprisingly, data processing, hosting, and related services saw the fastest growth rate of 122% in the past 5 years. This aligns with the rapid growth in data processing/hosting needs and growth of cloud computing seen across the nation, with jobs increasing by 37% nationally since 2017. Other sectors experiencing growth include other computer related services (58%) and computer systems design services (35%). The Internet publishing & broadcasting, & web search portals sector is expecting 63% growth by 2027, followed by the computer systems design services industry (29%) and the data processing, hosting, and related services industry (23%). Providing a business climate and resources that attract and support IT and data processing/hosting businesses in the county can help Hanover capture the large capital investment associated with this cluster to help offset the cost of services and amenities for the county's growing population.

The cluster has a moderate competitive effect at 77. Specifically, the Data Processing, Hosting, and Related Services industry group had a competitive effect of 31. This indicates some local advantage that has led to job growth. Hanover County is positioned near Hampton Roads, where four transcontinental subsea cables land and route through Richmond to Northern Virginia, which is home to the largest data center market in the world, moving an estimated 70% of global internet traffic on a daily basis.<sup>20</sup>

Most sectors in this cluster had lower shares of employment as compared to the nation, though many still showed a positive competitive effect. Notably, Computer and Office Machine Repair and Maintenance was 2.6 times more concentrated in the county as compared to the nation.

<sup>20</sup> Data Centers | Virginia Economic Development Partnership. (n.d.). [www.vedp.org](https://www.vedp.org/industry/data-centers). Retrieved June 8, 2023, from <https://www.vedp.org/industry/data-centers>

### Community Insights

#### *Infrastructure Challenges*

Some participants pointed out that many sites that might be suitable for tech companies in Hanover are not pad-ready and lack the utility connections needed for the businesses to locate there. Particularly, easy access to stable power and high-speed Internet is a necessity for companies in this cluster that have high computing needs. Investing in these properties to ensure they are equipped with appropriate infrastructure will assist in attracting IT and data-processing/hosting companies to the county.

#### *Benefits of Schools and Apprenticeships*

Participants noted the development of in-house apprenticeship programs, which can assist in workforce development and training students in both IT and business services industries prior to entering the workforce. Many focus group participants stated the success of the local school system and that incorporating more apprenticeship and internship programs can strengthen the pipeline into these key industries.

## Strategies and Best Practices

- **Continue to promote Greater Richmond Region tech assets:** The region identified IT as a target industry: plugging into these ongoing attraction efforts can help the county target IT businesses. Such companies look for large available sites, with connectivity to reliable power, water, and renewable energy as a top priority for site selection. Tax incentives can help, but primary needs are infrastructure, a business-friendly climate that includes a simplified permitting and development process, and access to renewable energy to offset the data/tech industry's power consumption.
- **Creating a technology zone** can help show intentionality in attracting IT and technology businesses, with targeted benefits and incentives to locating to the county. Virginia code states that any city, county, or town may establish one or more technology zones and can grant tax incentives and provide certain regulatory flexibility within these zones. The creation of these specific zones prioritizes these industries for the county. The following are examples of communities that have seen success in attracting IT and data-related industries with targeted incentives and technology zones:

### Virginia Beach, VA

Virginia Beach offers incentives specifically to attract data centers in their designated technology zones, which includes a rebate on business license taxes, reimbursement of development, water, and sewer fees.



### Spotsylvania County, VA

Spotsylvania County has 2 designated technology zones; the program serves both new and existing R&D and tech businesses. Incentives include tax rebates on Business, Professional, & Occupational License (BPOL) and Machinery and Tools Tax (M/T). Businesses are also enrolled in the Targeted Industry Program, which initiates a faster development review. Participating businesses are required to provide full-time wages at or greater than 20% above the County's average annual salary, helping to attract both companies and a quality workforce. [1]



### Ashland, VA

The Town has a technology zone incentive that offers rebates on personal property, BPOL, M/T, real property tax (equaling 100% of the amounts due for the first 3 years and 50% of the amounts for the following 2 years), development plan fees, site plan, and zoning fees. Expanding such an incentive to the county could creating a larger landing space for companies considering a location in the region.

[1] Spotsylvania Economic Development. (n.d.). "Technology Zones." Virginia Beach offers incentives specifically to attract data centers in their designated technology zones, which includes a rebate on business license taxes, reimbursement of development, water, and sewer fees.

[2] Marea: The Future of subsea cables. (2017). Marea: The Future of Subsea Cables. <https://news.microsoft.com/marea/>

[3] Swinhoe, D. (2023 1). New 2.9 million sq ft technology park proposed in Spotsylvania County, Virginia. *Data Center Dynamics*. <https://www.datacenterdynamics.com/en/news/new-29-million-sq-ft-technology-park-proposed-in-spotsylvania-county-virginia/>

[4] O'Neal, J. E. (2017, July 31). Amazon to open new operation in Ashland. *Richmond BizSense*. <https://richmondbizsense.com/2017/07/31/amazon-to-open-new-facility-in-ashland/>

## Emerging Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017 - 2022 % Change	2022 Location Quotient	Competitive Effect
541512	Computer Systems Design Services	218	293	35%	0.69	45
541511	Custom Computer Programming Services	101	118	17%	0.28	(4)
518210	Data Processing, Hosting, and Related Services	37	82	122%	0.52	31
811212	Computer and Office Machine Repair and Maintenance	44	47	7%	2.59	8
541519	Other Computer Related Services	22	35	58%	0.72	9
511210	Software Publishers	45	27	(39%)	0.13	(44)
519130	Internet Publishing and Broadcasting and Web Search Portals	<10	25	Insf. Data	0.20	23
334111	Electronic Computer Manufacturing	0	13	Insf. Data	0.33	13
517311	Wired Telecommunications Carriers	18	12	(32%)	0.07	(3)
541513	Computer Facilities Management Services	13	10	(22%)	0.36	(4)
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing	0	<10	Insf. Data	0.39	5
517312	Wireless Telecommunications Carriers (except Satellite)	<10	<10	Insf. Data	0.09	(2)
517919	All Other Telecommunications	0	<10	Insf. Data	0.06	1
519190	All Other Information Services	<10	<10	Insf. Data	0.47	(1)
<b>Total</b>		512	677	32%	0.39	77

Source: Lightcast Industry Estimates, Q1 2023

## 8. Biology/Pharmaceuticals and Life Sciences

This cluster draws on different industry sectors, including professional, scientific, and technical services (NAICS 54), health care (NAICS 62), and even manufacturing (NAICS 31-33). There is overlap with several other industries, but this cluster is tailored to include biological and life-science research and development, medical testing, and chemical manufacturing. Additionally, this cluster includes the other direct insurance carrier(s) industry sector, which is comprised of businesses like product warranty insurance carriers and homeowners warranty insurance carriers. Although this sector is traditionally considered a part of the finance and insurance cluster, much of the activity in this sector served the medical industry by providing medical/biotech equipment warranty insurance, as shown in industry sales data from Lightcast.

According to recent Lightcast data, Hanover County lacked businesses and jobs across several industry groups within this cluster, including: Medicinal and Botanical Manufacturing Pharmaceutical Preparation Manufacturing In-Vitro Diagnostic Substance Manufacturing and Biological Product (except Diagnostic) Manufacturing. The county also had low employment in the Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) industry group.

### Key companies in Hanover County:

- Green Analytics Virginia (formerly, ECC Test Lab): first third-party cannabis testing lab in Virginia
- Owens & Minor: Fortune 500 global healthcare solutions company, headquartered in Mechanicsville, VA.
- Walgreens Fulfillment Center (coming soon): fulfillment center for high-value pharmaceuticals

- Anton Paar: scientific instrument manufacturing for measuring and controlling industrial process variables

The biopharmaceutical and life sciences cluster in Hanover County contributed 464 jobs and 47 business locations in 2022. Employment in the biopharmaceutical and life sciences cluster has decreased over time, dropping by 20% since 2017--at a greater rate than the Richmond MSA (-0.4%). Meanwhile, employment in the cluster for the state and nation grew by 15% and 21%, respectively, during this time. Most of the employment decrease in Hanover County was seen in the research and development (R&D) industry groups: R&D in nanotechnology dropped from 179 jobs in 2017 to less than 10 in 2022, and R&D in biotechnology decreased from 223 jobs to less than 10 by 2022. During that time, testing laboratories' employment increased by 85 jobs (120%), and other scientific and technical consulting services (which include biological consulting services, energy consulting services, and other similar consulting) grew by 53%, or 42 jobs. Granted, quantitative data sources can be limited and may not fully capture all tech- and science-related R&D activity in the county--rather, Lightcast estimates reflect companies that primarily identify as biotech and life sciences R&D operators. Despite decreased employment in the overall cluster, Hanover County shows an existing niche in several industry groups, including testing laboratories and scientific and technical consulting services. Both of these sectors grew in the last five years, increasing by 85 and 42 jobs, respectively, and are expected to continue growing through 2027. Testing laboratories accounted for 33.4% of employment within the cluster, and drugs and druggists' sundries wholesalers made up an additional 31% of jobs.



## Emerging Clusters

It should be noted that employment data for the drugs and druggist sundries wholesale sector may be skewed by the incoming Walgreens micro-fulfillment center that was announced in February of 2022.<sup>21</sup> At the time of this study, Lightcast data showed no existing employers for this sector despite showing high employment numbers for 2022.

Despite past decline, this cluster is projected to grow by 222% in the next five years, at a faster rate than the Richmond MSA (10%), state (9%), and nation (10%). In the county, testing laboratories are expected to grow by 16% and other scientific and technical consulting services are expected to increase by 23%.

This cluster contributed \$169,108,246 in GRP to Hanover County's economy in 2022. Across the Richmond MSA, the biopharmaceutical and life sciences cluster is a \$1.6 billion dollar industry--the cluster in Hanover accounts for 10.4% of this regional GRP, and 3.7% of the county's GRP.

Hanover County lacked businesses and jobs across several industry groups typically found within this cluster, including: medicinal and botanical manufacturing pharmaceutical preparation manufacturing in-vitro diagnostic substance manufacturing and biological product (except diagnostic) manufacturing. The county also saw low employment in the research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology) group. These indicate some areas for Hanover County to potentially target as a way to grow this cluster and diversify.

The competitive effect for this cluster is -266. This shows that the employment changes in the county cluster were largely attributed to greater trends. Particularly, research and development sectors shrank at a greater rate than expected when compared to national trends.

<sup>21</sup> Consulting, W. (n.d.). *Walgreens to Establish Micro-fulfillment Center in Hanover County, VA* : Hanover County Virginia Economic Development. [Wwww.hanovervirginia.com](https://www.hanovervirginia.com). Retrieved June 8, 2023, from <https://www.hanovervirginia.com/news-events/walgreens-to-establish-micro-fulfillment-center-in-hanover-county-va/>

### Community Insights

#### *Incentives for Attraction*

Some focus group participants indicated that Hanover County lacked a recognizable “tech identity.” Some stated that offering incentives specific to scientific and biotechnology companies would assist in attracting them to the area. These incentives can assist the county target different types of companies to grow and diversify this cluster.

#### *Housing Challenges*

Across all industries, affordable housing is a challenge. Recruiting workers is difficult when there is limited affordable housing for them to move into the county. The biopharma and life sciences cluster can provide a range of jobs in different paygrades. Eliminating the gap between executive level housing and entry-level jobs can assist workers in multiple industries with finding a place to live that they can afford.

As an emerging cluster, the biopharmaceuticals and life sciences cluster is not particularly concentrated in Hanover County--its LQ is 0.6. Nonetheless, there were several industry groups in the cluster that were more concentrated as compared to the nation, including testing laboratories and other scientific and technical consulting services, which had LQs of 2.45 and 1.47, respectively. This indicates that Hanover County might serve a particular niche within the Richmond MSA, which houses biopharma industry players like Boehringer Ingelheim, Wako Chemicals, and DuPont as well as research and development institutions including Virginia Commonwealth University (VCU) and the Virginia Bio+Tech Park, a life sciences and technology research and incubation center in Richmond.

Leveraging these existing niches within the cluster can help to support future development of other biopharma and life sciences industries. This will help to diversify this cluster and better capture some of the R&D and other biotech activity going on in the Greater Richmond region.



### Strategies and Best Practices

- The Virginia Commonwealth University (VCU) College of Engineering developed strategies under a GOVA Enhanced Capacity Building Grant to build the **advanced pharmaceutical manufacturing cluster in Richmond and Petersburg**.<sup>22</sup> With Hanover being in this GOVA region, many of these strategies could easily be applied to the county. Key strategies include **attention to utility issues and site readiness** with expanding lab and manufacturing spaces, as well as **scaling up a “development park”** to create a specific location for this development to occur in. Strategies for workforce development are important as well, considering the highly skilled nature of occupations in this cluster. Taking advantage of programs at the VCU College of Engineering, Virginia State University, or Virginia Tech, and other universities across the state can assist the cluster, especially if there are high-paying jobs available. Inter-university and university-industry collaborations are important for biotech and life sciences. Establishing these stakeholders and creating a council so that cross-collaboration can occur can facilitate the exchange of ideas and research to develop this cluster within the county.

<sup>22</sup> VCU College of Engineering. (2021). “Building a global cluster of advanced pharmaceutical manufacturing and R&D in Richmond/Petersburg.” <https://medicines4all.vcu.edu/media/medicines4all/assets/documents/Final%20Report%20and%20Appendices%20GO%20Virginia%20ECB%20Grant%2020-GOVA-04A%20VCU%20College%20of%20Engineering.pdf>

# Montgomery County, MD:

## BioTech Hubs

Montgomery County, Maryland has the fourth largest biotech hub in the country, with the county's life sciences sector continuing to grow. The county states eight reasons why the cluster has successfully attracted businesses and continues to grow:

- 1** **Partnerships**  
Strong partnerships across the workforce pipeline between schools and employers creates a better business environment. Building these partnerships encourages collaboration and not only creating a network between potential workers and companies, but also between companies who can learn from each other and grow the entire cluster.
- 2** **Workforce**  
Advanced degrees are beneficial and necessary for this industry. Having access to talent is important for cluster growth.
- 3** **Co-locating with the National Institutes of Health and the Food and Drug Administration**  
Montgomery County is located in proximity to major federal agencies and research organizations; access to this research and development has created a critical mass for discovering new industries and improving synergies.
- 4** **Tax credits and incentives**  
The county is the first in the country with a local biotechnology investment incentive tax credit (BIITC). It provides investors with income tax credits equal to 50% of an eligible investment. This program supports investment in seed and early-stage biotech companies to grow the industry in Maryland. The county also offers other biotech facility development incentives, such as the Development Impact Tax Exemption.
- 5** **Funding & venture capital investment**  
Investing in companies assists with growth and stability, especially with newer companies.
- 6** **Global keystone companies**  
The county has attracted major global players in the industry, such as AstraZeneca, that are attractive to other companies looking to join the ecosystem.
- 7** **Presence of federal labs**  
The presence of multiple labs in the county allows for technology transfers and improved R&D. This is beneficial to companies looking for the next advancement in the industry and updated technology.
- 8** **Wet land expansion and affordability**  
Montgomery County passed an amendment to streamline the approval process for biohealth facilities, creating a Biohealth Priority Zone to create zoning specifically for biotech companies. The county is prioritizing building wet lab spaces in these zones with more affordable rents than what is found in places like Boston or San Francisco.

## Emerging Clusters

NAICS	Description	2017 Jobs	2022 Jobs	2017-2022 % Change	2022 LQ	Competitive Effect
541380	Testing Laboratories	71	155	120%	2.45	81
424210	Drugs and Druggists' Sundries Merchant Wholesalers	<10	144	Insf. Data	1.58	143
541690	Other Scientific and Technical Consulting Services	80	122	53%	1.47	38
621511	Medical Laboratories	12	21	79%	0.24	7
524128	Other Direct Insurance (except Life, Health, and Medical) Carriers	0	14	Insf. Data	1.93	14
541713	Research and Development in Nanotechnology	179	<10	Insf. Data	0.08	-206
541714	Research and Development in Biotechnology (except Nanobiotechnology)	223	<10	Insf. Data	0.01	-329
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	<10	<10	Insf. Data	0.02	-3
621512	Diagnostic Imaging Centers	11	<10	Insf. Data	0.06	-11
325411	Medicinal and Botanical Manufacturing	0	0	0%	0	0
325412	Pharmaceutical Preparation Manufacturing	0	0	0%	0	0
325413	In-Vitro Diagnostic Substance Manufacturing	0	0	0%	0	0
325414	Biological Product (except Diagnostic) Manufacturing	0	0	0%	0	0
<b>Total</b>		<b>582</b>	<b>464</b>	<b>-20%</b>	<b>0.60</b>	<b>-266</b>

Source: Lightcast Industry Estimates, Q1 2023

# Industry Cluster Impacts

The following section is intended to highlight and compare the potential value of each target cluster. As traded industries, each cluster attracts new money to Hanover County, which then circulates within and out of the county. The money that stays within the county generates new economic activity for the county and thus has a “multiplier effect”, contributing to increased employment, GRP, and tax revenues. To understand the impact of each cluster, we consider the following factors:

- The Social Account Matrix (SAM) multiplier which models what happens to new money coming into the county. As a proximate translation, we can say for every \$1 coming into the region, the SAM multiplier shows how much money overall is generated in the region thanks to this inflow of new money. For example, if an industry has a multiplier of 1.2, \$1.20 would be generated in the region for every \$1 spent on that industry.
- The amount of new money that could potentially come into a region due to the activities of a given cluster. For this component, we can examine industry GDP by business and by employee, export sales, and average wage per employee. These indicators can help to compare how much money each cluster reasonably attracts to the county, helps circulate in the economy, and facilitates in generating new money.
- An examination of a hypothetical scenario in which 50 acres of land may be used for agriculture, housing, or any of the target clusters. For this scenario, we assume that the 50 acres of land is already in use by the given industry<sup>23</sup> and assess what contribution each use could make to the counties GRP, employment, and tax revenue.

It is important to note that these factors only serve as metrics for comparing different clusters and their possible impacts. Any instance where the county is attracting a particular business should be thoroughly examined and assessed on an individual basis. This analysis cannot replace that due diligence.

## SAM Multipliers

A SAM Multiplier accounts for direct, indirect and induced effects of a given industry.

- Direct Effect: New money coming into the region that is spent by the regional industry/ cluster on other local industries.
- Indirect Effect: The additional economic activity from Industries buying from other Indirectly-impacted local Industries.
- Induced Effect: The spending of Labor Income by the employees working in the Indirectly-impacted Industries, under the assumption that the more income households earn, the more money those households spend.

Particularly for smaller regions representing one economy, SAM Multipliers typically stay well below 2.0 because money generated through economic activity tends to leak out of the region as well as stay in the region. For instance, target cluster businesses may purchase supplies from outside the region, or employees may spend their labor income on vacations of items from Amazon. These expenditures result in money leaving the region, or “leakage”. Therefore, a given business may have a higher multiplier than its reported SAM Multiplier IF it were to target its procurement spending on local businesses.

<sup>23</sup>Note that each industry has a certain level of public investment required to prepare the 50 acres of land for use by the respective industry. In this scenario, we are NOT accounting for these investment costs. The assumption for any use scenario would be that the locality would calculate the upfront investment costs and rate at which the locality can expect returns on its investment.

## Industry Cluster Impacts

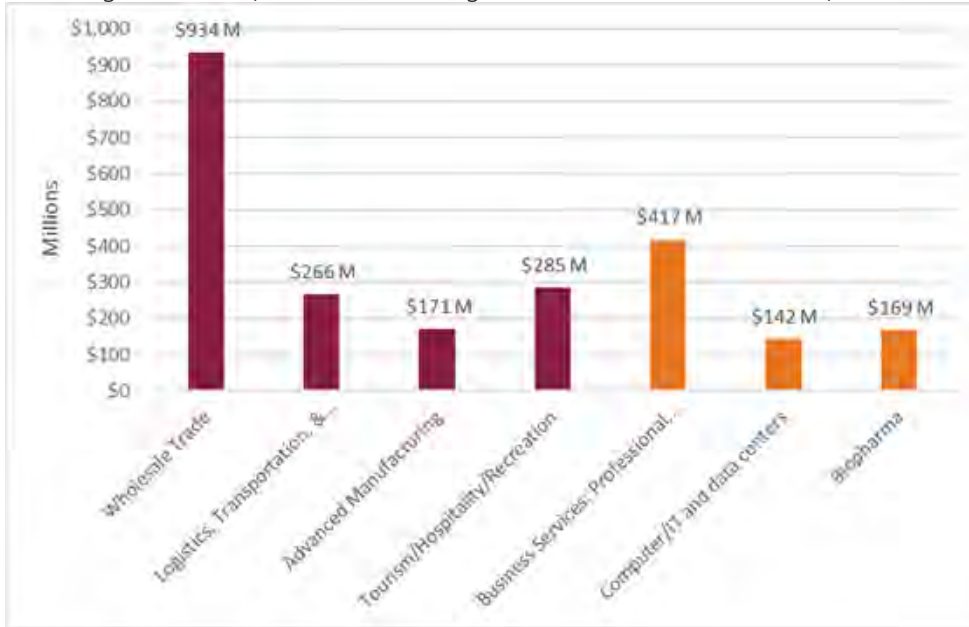
For the most part, all identified clusters have strong multiplier effects on Hanover County. Most tend to purchase from supply chain industries in the county, employ Hanover residents or those close to the county, and offer good wages that are spent in the county. Given the current economic trends in Hanover, the two clusters with the highest SAM Multipliers are Transportation, Warehousing, and Logistics, and Tourism and Hospitality. These higher multipliers are largely because Hanover’s supply chain businesses for these clusters are relatively robust in the county. The Wholesale Trade cluster, for example, is a strong existing cluster and serves as a supply chain cluster for Transportation, Warehousing, and Logistics. Thus, more local businesses are benefiting from the presence of these clusters. Meanwhile, the advanced manufacturing and machinery manufacturing cluster has the smallest SAM Multiplier, probably because most of its supply chain purchases are from outside Hanover.

NAICS	Description	Type SAM Multiplier
42	Wholesale Trade Cluster Average Multiplier	1.30
48 & 49	Transportation, Warehousing, and Logistical Services Average Multiplier	1.39
33	Advanced Manufacturing and Machinery Manufacturing Average Multiplier	1.19
71 & 72	Tourism, Hospitality, and Recreation Average Multiplier	1.36
54 & 55	Business Services Average Multiplier	1.33
33, 51, & 54	IT, Computer Services, and Data Processing/Hosting Average Multiplier	1.30
32, 42, 54, & 62	Biology/Pharmaceuticals and Life Sciences Average Multiplier	1.30

## New Money from Clusters

Similar to examining SAM Multipliers for cluster, examining a cluster’s Gross Regional Product (GRP), purchases, and sales can help illustrate the impact of clusters in a given region. While some clusters may have lower or higher SAM multipliers, the money that clusters attract to the region may also vary. Understanding the principles of agglomeration, the already strong clusters may have the fewest barriers to growth and higher potential for bringing new money to Hanover. Given the current state of Hanover’s economy, the wholesale trade cluster generates the

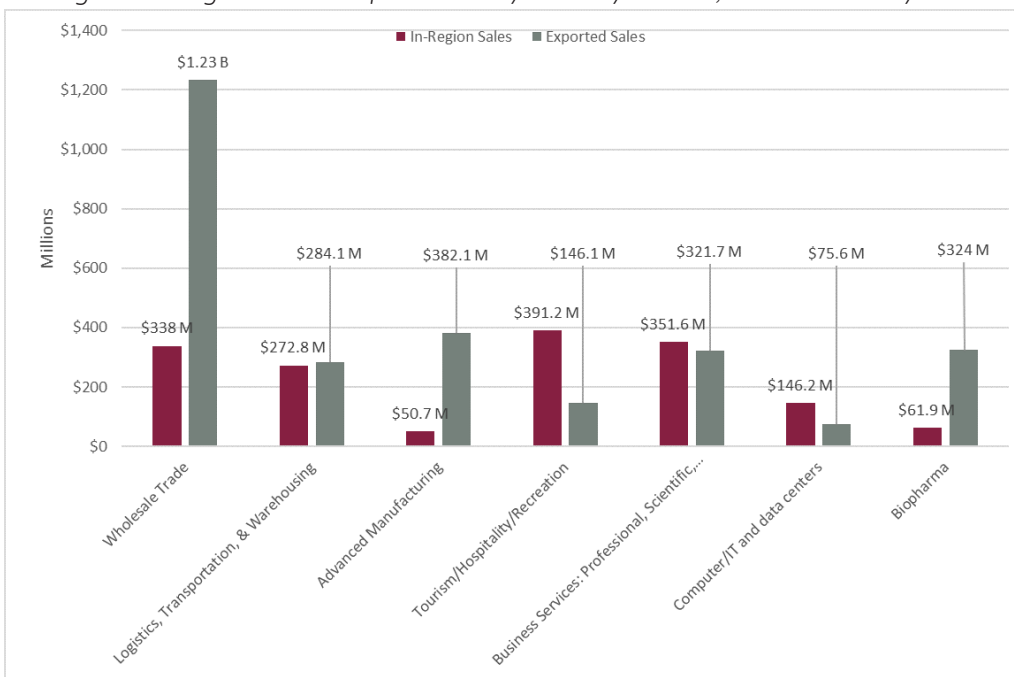
Figure: Industry Cluster Gross Regional Product, Hanover County 2022



most revenue for the region, as illustrated by a gross regional product (GRP) of \$934 million. Most likely, wholesale and manufacturing drive the transportation, warehousing and logistics cluster. The business services (\$417 million GRP) and tourism (\$285 million GRP) clusters generate the second and third highest revenue for the county. Most likely, wholesale and manufacturing drive the transportation, warehousing and logistics cluster. The business services (\$417 million GRP) and tourism (\$285 million GRP) clusters

generate the second and third highest revenue for the county. Traded clusters are important to an economy because they draw money into a region, growing and stabilizing the economy. By examining export versus in-region sales, it is evident that wholesale trade is the largest traded cluster in Hanover. Advanced manufacturing and biopharma also have strong export sales, indicating potential strength as traded clusters. It is important to note that Hanover’s biopharma cluster largely deals in wholesale trade of biopharma goods. Data for tourism and hospitality is deceptive, considering tourism businesses do not necessarily “export” services as draw tourist into the region to

Figure: In-Region versus Export Sales by Industry Cluster, Hanover County 2022



make purchases in-region. Meanwhile transportation and logistics, business services, IT and data center hosting support as much of the local Hanover economic activity as they export their goods and services elsewhere. In other words, they could potentially grow and becoming more traded clusters if they were to find external markets.

## Industry Cluster Impacts

Examining total employment and average salaries by industry cluster illustrates the breadth and extent to which new money coming into the region is distributed and hints at the induced effects of an industry cluster. Induced effects are the spending impacts from employees of the given industry cluster and all subsequent employees from other industries that financially benefit from that cluster. Tourism, for instance, has a low average salary; however, its high employment indicates much of the money going to this industry goes towards employment, and those employees subsequently make purchases in Hanover County, resulting a valuable impact for the county. Wholesale trade is another strong employing cluster, and its higher than national average salary means that much of that money goes towards households in Hanover and the surrounding region. Advanced manufacturing and the three emerging clusters have relatively lower employment numbers, but higher than average salaries. If these clusters were to grow, their overall economic impacts would likely increase (i.e. their SAM multipliers would likely increase).

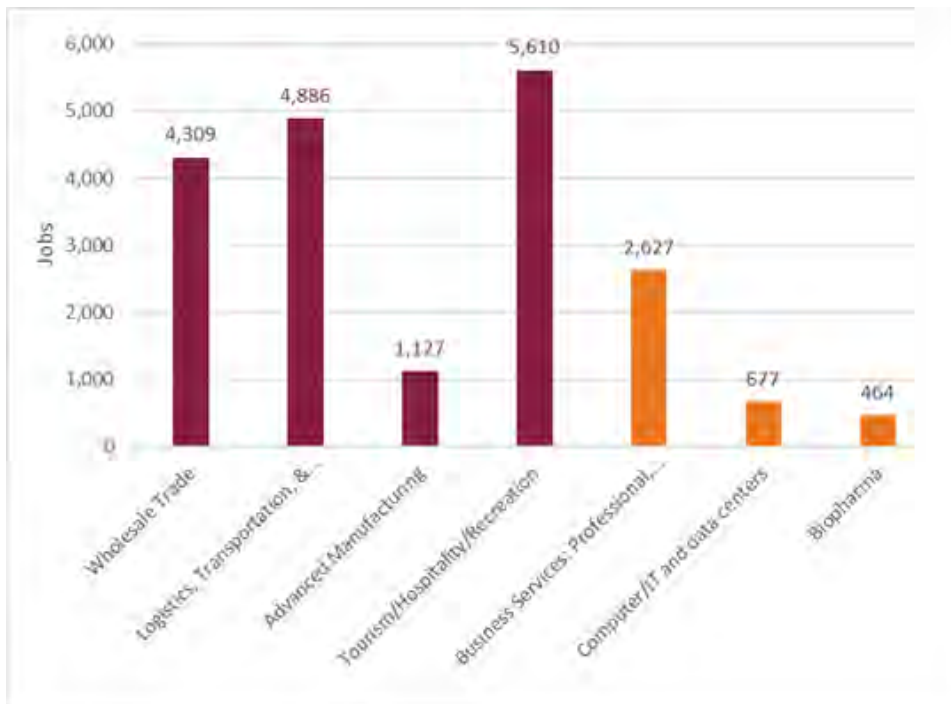


Figure 3. Employment by Industry Cluster, Hanover County 2022



Figure 4. Average Salary by Industry Cluster, Hanover County 2022



### 50 Acre Scenario

For this scenario, we assume that the 50 acres of land is already in use by the given industry.

It is important to note that each industry has a certain level of public investment required to prepare the 50 acres of land for use by the respective industry. Manufacturing, for instance, may need roads, water, electric, and pad infrastructure. In contrast, agriculture may require fewer infrastructure investments. In this scenario, we are NOT accounting for these investment costs. The assumption for any specific use in the future should include the locality calculating upfront investment costs and the rate at which the locality could expect returns on its investment.

In this scenario, we assess what contribution each cluster could make to the county's GRP, employment, and tax revenue. We must answer the following questions:

- What can reasonably fit on 50 acres of land for each cluster?
- What could be the equivalent employment?
- What do those dollars and jobs mean in terms of indirect and induced effects?
- What tax revenue could the county receive from each cluster use?

Virginia Tech CECE used sales, average employment, and square footage data from existing businesses in Hanover to develop reasonable scenarios for land use. CECE then used input-output tables and impact scenarios from Lightcast to estimate possible county tax revenue, which primarily include non-personal property taxes, license, and sales and growth receipt taxes. IMPLAN calculates taxes, specifically Taxes on Production & Imports, Net of Subsidies (TOPI), to include primarily non-personal property taxes, license, and sales and growth receipt taxes. For all industries other than government enterprises, subsidies are counted as a negative value towards TOPI. Some industries receive more tax breaks, subsidies, and other incentives from government as compared to other. For more information on how the tax impact is calculated with IMPLAN, please see Appendix A.

Table: Estimated impacts of an industry if given 50-acres of land

Cluster Use	Potential Impacts
Agriculture	Average acreage of one farm in Virginia was 186 acres in 2021, and Hanover agriculture uses are largely cropland (wheat, barley, etc). Those with less acreage (around 70 acres) generated \$23,200 on average in sales. <sup>1</sup> This means 50 acres would be relatively small for this use. A farm may employ 0-3 people, leading to a negative local tax impact of <b>\$2,417</b> , due to the farming industry being heavily subsidized.
Single Family Housing	Typical acreage for a single-family house is ¼ to ½ an acre. Considering roads and other infrastructure, we can estimate about 100 houses on 50 acres of land. We also assume that each household owns 2 cars, each valued at \$48,000. According to sales data from the Central Virginia Regional MLS (Richmond Association of Realtors), the median single-family home sales price was \$440,250 at the end of 2022. At this price, the total property tax revenue would be approximately <b>\$699,120</b> .
Wholesale Trade Cluster – 2-3 warehouses and office space	Mid- to Large-sized wholesalers require 20,000-500,000 square feet of building, meaning 2-3 warehouses with office space could go on 50 acres. Assuming total employment was about 350 total and sales totaled \$25 million per wholesaler, tax revenue to the county in real estate, sales, and labor would be approximately <b>\$400,660</b> .
Transportation, Warehousing, and Logistical Services	It is not likely this cluster would require a full 50 acres because it would support the wholesale, manufacturing, and other clusters. As such businesses in this cluster may act as a neighbor to fellow cluster companies. Current Hanover businesses in this cluster employ about ten people on average but can employ as many as 150. Square footage for these businesses can be between 400 and 75,000 (no more than 2 acres). Average annual sales are a little over \$2 million. If 2-3 larger transportation and logistics businesses were to come to Hanover, one could expect at most 90 employees and <b>\$451,454</b> in local tax revenue.
Advanced Manufacturing and Machinery Manufacturing – One facility	Currently, Hanover host mostly small to medium businesses in machinery and other advanced manufacturing. All but a few employ between 10 and 50 people, require 1-5 acres of land, and make \$6.3 million in sales on average. If Hanover were to attract 3-5 medium sized manufacturers, for a total of 180 employees, then potential County tax revenue could be up to approximately <b>\$691,155</b> .
Tourism, Hospitality, and Recreation – One hotel and commercial space	Hanover County stakeholders indicated a desire for additional lodging. Hotels rarely take up more than 1 acre. The remaining acreage could be used as a site for small retail in proximity to the hotels. Therefore, a reasonable scenario for use of 50 acres for hospitality/tourism may include 2 hotels/motels and a shopping center of 5-10 small retailers (less than 20 employees).

<sup>24</sup> USDA (May 2022). 2022 VA Annual Bulletin. Retrieved from: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nass.usda.gov/Statistics\_by\_State/Virginia/Publications/Annual\_Statistical\_Bulletin/2022%20VA%20Annual%20Bulletin.pdf

## Industry Cluster Impacts

	<p>On 50 acres with 2 hotels and 7 small retailers, aggregate impact would include <b>\$1.3M in local tax revenue.</b></p>
Business Services	<p>Professional and business services are very varied, but most types of companies in this cluster are located in office buildings. Therefore, a 50-acre scenario might likely include an office park or mixed-use campus where multiple businesses co-locate. For professional services, an office park could attract 2-3 small marketing agencies (20 added jobs), 1-2 corporate regional managing offices (100 added jobs), and 4 other technical services companies (40 added jobs), which could bring <b>\$103,719 in local tax revenue.</b></p>
IT, Computer Services, and Data Processing/Hosting	<p>Average sales and employment for data centers in the Richmond MSA are about \$129 million and 24 people. Assuming a small to medium data center was put on 50 acres of land in Hanover County, total sales could be as much as \$129-\$500 million with 10-50 employees. Possible tax revenue to Hanover could anywhere between <b>\$1.6 million and \$6.3 million.</b></p>
Biology/Pharmaceuticals and Life Sciences	<p>Mid- to Large-sized biopharma wholesalers require 20,000-500,000 square feet of building, meaning 2-3 warehouses with office space could go on 50 acres. Assuming total employment was about 350 total and sales totaled \$24 million per wholesaler, revenue to the county in real estate, sales, and labor would be approximately <b>\$129,396.</b></p> <p>If Hanover were to attract more businesses in biopharmaceutical research, taxes would be different. Average biopharma research offices employ approximately 35 people on average and have annual sales of about \$3 million. If 3-5 biopharmaceutical research centers housed themselves in Hanover, with 140 employees and \$12 to \$15 million in sales overall, then county tax revenue would be between <b>\$55,000 and \$132,600.</b> This does not include the impact from employees with higher-than-average wages.</p>

### Other Community Impacts

In addition to economic impacts, Hanover County's industry sectors have a greater impact on the community. Existing businesses across the County's existing and emerging industry clusters are ingrained in the community and have had deeper impacts on workforce, quality of life, education, and culture.

#### *Wholesale Trade: Produce Source Partners*

Produce Source Partners, the Ashland-based produce wholesaler and distributor, partnered with Commonwealth Senior Living to develop the Farm-to-Table dining program in 2015 to bring fresh, locally-sourced fruits and vegetables to residents across 21 of Commonwealth's senior living and memory communities across the state, including those in the Richmond region. As Virginia's largest independent produce distributor, the company sources numerous fruit and vegetable varieties from local Virginia growers to deliver to convenience stores, restaurants, supermarkets, schools, and colleges.<sup>25</sup> Since Produce Source Partners' original initiative started, Commonwealth Senior Living has expanded the Farm-to-Table program to include locally-sourced seafood as well as onsite hydroponic-grown produce in partnership with Babylon Micro-Farms.

#### *Transportation/Logistics: Orbit logistics*

Orbit Logistics opened its Hanover County location in 2011, providing eCommerce fulfillment, distribution, assembly, and returns management services to a variety of clients including James River Equipment, CleverMade, SweetFrog, and more. Since coming to the county, the company has expanded, acquiring a new 416,000 sq. ft. facility that doubled the company's original footprint in the county. In 2020, Orbit Logistics spearheaded the Virginia Supply Chain Initiative, working with partners across the region and state to organize critical end-to-end distribution services for communities and act as a centralized resource for businesses and local government in response to the major disruptions of the Coronavirus pandemic. The Initiative provided response solutions including distribution of public health and safety materials and facilitating distribution of bulk food, meal kits, medical supplies, and testing kits through participating partners.

Orbit Logistics President Travers Clemons said in an interview for a Virginia Business article: "Some of the feedback we were getting on the street was there was a need to get together a few people to get a project done, but they didn't know where to start." "What we're trying to do is do all that legwork in advance, so when there's a need, that it can come directly to us."<sup>27</sup>

#### *Tourism, Hospitality, & Recreation: Ashland Theatre*

The Ashland Theatre is a historic movie theater and event/performance space that serves to provide entertainment and engagement to the Hanover region and beyond. The Theatre is a 501(c)(3) nonprofit organization and delivers community content and events such as speakers, panels, talkbacks, and other special events, such as the Ashland Book Festival.<sup>26</sup> In addition to showing both modern and classic movies, hosting concerts, and performing arts, the Theatre also provides three main community-based programs:

- **Ausome Movies:** a free sensory-friendly film series for children with special sensory needs and their families.
- **Ashland Arts Access (AAA):** this grant-funded program allows the Theatre to offer free or reduced-price admission to lower-income community members who would otherwise not be able to attend.
- **Take The Stage:** this program provides reduced-price rental fees to help attract other nonprofit performing arts organizations to exhibit or perform in the theater.

<sup>25</sup> History. (n.d.). Produce Source Partners. Retrieved June 8, 2023, from <https://producesourcepartners.com/our-story/history/>

<sup>26</sup> About | Ashland Theatre (n.d.). [www.ashlandtheatre.org](http://www.ashlandtheatre.org). Retrieved June 7, 2023, from <https://www.ashlandtheatre.org/about>

<sup>27</sup> Lake, S. (2020, April 2). Logistics companies try to weather supply chain storm. Virginia Business. <https://www.virginiabusiness.com/article/logistics-companies-try-to-weather-supply-chain-storm/>

## Industry Cluster Impacts

### *Advanced Manufacturing- Specialty's Our Name (SON) Metal Fab*

SON Metal Fab is a family-owned and operated custom sheet metal fabricator, welding and machine shop that was founded in 1990 in Hanover County and has since grown to over 30 employees at a 32,000 sq.-ft facility in the county. It provides metal fabrication and welding services as well as finishing services through its sister company to numerous companies across diverse industries, from advanced machinery to graphic signage to retail displays. In addition, the company has been very engaged in workforce development efforts, education, and outreach, particularly among K-12 and college-age students in the community. Since 2011, the company has participated in National Manufacturing Day, organizing events annually that allow high school students to tour the facilities, see live demonstrations of welding, laser cutting, and other processes, and learn more about the educational and career opportunities in the manufacturing sector. In the Hanover County Economic Development's "Why Hanover" series, Kevin Harrison of SON said about the event: "We participate in the annual event to raise awareness with the kids so that they see there is a future with this industry."

Other ways that the company has been involved in the Hanover community includes sponsoring local and regional events, such as the upcoming Rotary Club of Mechanicsville's honorary Flying Squirrels game in Richmond. SON Metal Fab also hosted the Build Virginia Regional Meeting in May 2019, sponsored by the Office of Governor Northam and the Virginia Rural Center, during which participants from skilled trades employers, trade associations, government, K-12 education, and others interested in the skilled trades workforce had the chance to discuss and collaborate on workforce issues and development strategies with the Governor's Chief Workforce Development Advisor, members of the Governor's Build Virginia Advisory Board, and Virginia Rural Caucus Leadership.

### *Business Services: Creative*

The Virginia-based company CREATIVE provides interior furnishings and design, technology lifecycle management, project management, and other services to its clients across three locations, including its flagship Ashland location. Since locating in Hanover County, County Economic Development reported that the company has been continuously involved with the regional Chamber of Commerce, ChamberRVA, and has remained visible in the community by holding career fairs, hosting corporate roundtables, and putting on other special events. For instance, in February of 2023, the Ashland office hosted high school students from the Upper Design School at Millwood School to learn more about real-world applications of design. During their visit, students explored ecological responsibility of design and participated in a design exercise to redesign the students' existing classroom. Earlier in the year, CREATIVE also hosted the Creative Workplace Wellbeing Symposium, where designer and architect professionals came together to learn about mindful and health-focused spatial design and personal wellbeing techniques while also spending time with therapy dogs, planting workshops, and aromatherapy stations.<sup>28</sup>

<sup>28</sup> Retrieved from: <https://www.facebook.com/millwoodschool/posts/676276911173617>

## Industry Cluster Impacts

### *IT/ Data Processing/Hosting: Pixel Factory*

Pixel Factory Data Center, a locally owned data processing and hosting provider, serves customers by retrieving and storing image content. Since its inception, Pixel Factory has grown from a U.S. -based company to an international footprint, hosting content for customers including Ford North America, NASCAR, and more. As the company grew and saw success in Hanover County, Pixel Factory has engaged with the community, participating in several initiatives to give back. In partnership with the Richmond, Virginia Internet eXchange (RVA-IX), a regional nonprofit Internet exchange point, Pixel Factory developed the “Neat Rack” program, where the company provides server racks and related tech to local schools at no cost so students can learn technologies including virtualization, voice-over IP, and cybersecurity skills.

Pixel Factory is also engaged in workforce developed efforts in the area, providing internship opportunities to students in partnership with Randolph-Macon College. In an interview with Hanover County Economic Development, Pixel Factory President Scott Brown indicated that many students that participated in internships at the company went on to work at prominent data centers across the country.<sup>29</sup>

### *Biology/Pharmaceuticals and Life Sciences: Anton Paar*

Anton Paar, an international company originating from Austria, has 36 worldwide locations and provides precise scientific instruments for quality control or use in research and development projects. The company landed in the U.S. when it chose Hanover County as its location for its North and South American business operations management headquarters. Since then, the company has grown from \$12 million in annual revenue and 27 employees to \$70 million and almost 200 employees.<sup>30</sup> The company runs numerous social corporate responsibility programs, mostly concentrated in Austria, but also Colombia and India, including the VinziBus community food truck, employment training for those recovering from addiction, and partnering with nonprofit Alpha Nova, which supports housing, childcare, education, and workforce opportunities for people with disabilities.

Notably, the company’s Ashland location serves as the sole location for the Anton Paar apprenticeship program. This program allows high school students to complete paid apprenticeship training while finishing high school and completing an Associate’s degree at a local community college with full tuition subsidized. After completing the 3-year program, participants are offered a Technical Trainee position with opportunities to work at any Anton Paar locations. Anton Paar USA also offers back to school incentives, full benefits, profit sharing bonuses, and referral bonuses to trainees and employees.

<sup>29</sup> Pixel Factory Data Center : Hanover County Virginia Economic Development. (n.d.). [Www.hanovervirginia.com](https://www.hanovervirginia.com/locate-your-business/business-success-stories/pixel-factory/). Retrieved June 8, 2023, from <https://www.hanovervirginia.com/locate-your-business/business-success-stories/pixel-factory/>

<sup>30</sup> Anton Paar USA : Hanover County Virginia Economic Development. (n.d.). [Www.hanovervirginia.com](https://www.hanovervirginia.com/locate-your-business/business-success-stories/anton-paar-usa/). Retrieved June 8, 2023, from <https://www.hanovervirginia.com/locate-your-business/business-success-stories/anton-paar-usa/>

## Appendix A: IMPLAN Tax Impact Methodology

This appendix includes information from IMPLAN on the taxes included in the modeling software, as well as detailed information of our inputs for the IMPLAN tax model.

The following table from IMPLAN provides details of the types of taxes that are included in the tax, specifically Taxes on Production & Imports net of Subsidies (TOPI), calculations within the modeling software. Federal taxes are excluded from the tax impact analysis and from the following table:

Taxes included in TOPI		
Type of Tax	Specific Taxes Included	Where Levied
Sales Tax	Alcohol, amusement, bed, cigarettes, consumption, cosmetic medical procedures, fuel, gallonage, gasoline, general sales, gross receipts, hotel, insurance premium, internet, local general, lodging, liquor, luxury, meals, occupancy, other selective, parimutuels, plastic surgery, public utilities, recycling, sin tax, state general, sewer, ticket, tobacco, transfer, occupancy, resort, sin, turnover, use, utilities, waste management, value added (VAT), vanity tax, water	State, County, Sub County General, Sub County Special
Property Tax	Boats, business personal property, intangible property, machinery and equipment, property, real estate, school	State, County, Sub County General, Sub County Special
Motor Vehicle License	License fees - business, license plates, operators license - business, registration fees - business, vehicle license - business	State, County, Sub County General, Sub County Special
Severance Tax	Carbon dioxide, crude oil, natural gas, methane, severance, timber, uranium	State, County, Sub County General
Other Taxes	Alcoholic beverage license, amusements license, business license, business registration renewal, concession license, corporation license, documentary fee, documentary and stock transfer, fishing license, franchise tax, food and beverage license fees, hunting license, gun license, mortgage recording, Nonemployee Compensation (NEC), occupation and business license, other license, permit, public utility license, tourism license, stamp tax	State, Sub County General, Sub County Special
Special Assessments	Fee, fine, special assessment, toll	State, Sub County General, Sub County Special

Source: [“Taxes: Where’s the Tax?”, IMPLAN 2023](#)

The following table shows the industry scenarios and inputs for the IMPLAN model.

Industry	Assumptions	Estimated Total Sales	Estimated Total Employment	Implan Analysis	Industry Used	Direct Taxes	Indirect Taxes	Induced Taxes	Total Taxes
Agriculture	50 acres of cropland (wheat, barley, etc.) with 0-3 workers. Those with an average of 70 acres in 2017 generated \$23,200 in sales on average.	\$23,200	0	Industry Output	2 - Grain farming	\$(2,800.06)	\$(281.76)	\$(100.82)	\$(2,417.49)
Single Family Housing	100 houses on 50 acres with average sales of \$440,250	\$44,025,000	0	Industry Output	449 - Owner-occupied dwelling	\$2,203,539	\$81,026	\$6,758	\$2,291,323
Wholesale	2-3 medium to large warehouses on 50 acres of land, each making \$25 million in sales. Employing a total of 350 workers.	\$75,000,000	350	Industry Output	395 - Wholesale machinery	\$155,991.70	\$40,866.33	\$203,802.30	\$400,660.40
Transportation and Logistics	2-3 larger transportation and logistics companies, with \$2 million in sales each and employing a total of 90 employees, would take up no more than 6-7 acres. That would leave room for at least one warehouse making \$25 million in sales and employing 100 workers.	\$31,000,000	190	Industry Output	422 - Warehousing and storage	\$166,869.96	\$180,529.53	\$104,055.04	\$451,454.53



Advanced Manufacturing	One manufacturer employing 240 workers and generating \$30 million in sales (90,000 sq ft). Five manufacturers each employing 25 workers and generating \$7 million in sales (20,000 sq ft). Five very small manufacturers each employing 5 workers and generating \$3.5 million in sales (6,000 sq ft).	\$82,500,000	390	Industry Output	269 - All other industrial machinery manufacturing	\$278,636.20	\$241,637.60	\$170,881.40	\$691,155.20
Tourism	2 hotels and 7 small retailers on 50 acres. Each hotel would make \$1.6 million in sales and employ 15 workers. Each retailer would make \$3.6 million in sales and employ 15 workers.	\$28,400,000	135	Industry Output	507-Hotels and motels, including casino hotels 412-Retail - Miscellaneous store retailers	\$1,196,245.59	\$51,021.90	\$59,915.23	\$1,307,182.2
Business Services	For professional services, an office park could attract 2-3 small marketing agencies (20 added jobs), 1-2 corporate regional managing offices (100 added jobs), and 4	\$13,500,000	160	Industry Output	473-Business support services	\$11,544.04	\$29,740.54	\$62,434.18	\$103,718.76

	other technical services companies (40 added jobs). Across these industry sectors, average sales per company were \$1.93 million.								
Data Center	Assuming one small to medium data center was put on 50 acres of land in Hanover County, total sales could be as much as \$129-\$500 million with 10-50 employees.	\$129-\$500 million	10 to 50	Industry Output	436- Data processing , hosting, and related services	\$1,311,999.88	\$1,559,927.54	\$983,812.94	\$3,855,740.37
Biopharma	Average biopharma research offices employ approximately 35 people on average and have annual sales of about \$3 million. Assume 3-5 biopharmaceutical research centers housed themselves on 50 acres of land in Hanover, with 140 employees and \$12 to \$15 million in sales overall.	\$12-\$15 million	140	Industry Output	464 - Scientific research and development services	\$35,179.02	\$52,243.58	\$45,173.07	\$132,595.70

<p>The biopharma industry also relies on biomedical wholesale trade. Mid- to Large-sized biopharma wholesalers require 20,000-500,000 square feet of building, meaning 2-3 warehouses with office space could go on 50 acres. Assuming total employment was about 350 total and sales totaled \$24 million per wholesaler.</p>	<p>\$72 million</p>	<p>350</p>	<p>Industry Output</p>	<p>397 - Wholesale - Drugs and druggists' sundries</p>	<p>\$94,408.66</p>	<p>\$20,256.33</p>	<p>\$14,730.47</p>	<p>\$129,395.50</p>
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