Goochland County Cluster Identification Report

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OUTREACH & INTERNATIONAL AFFAIRS
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OFFICE OF ECONOMIC DEVELOPMENT

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Executive Summary

Goochland County experienced considerable economic and population growth over the past decade. A unique set of factors, such as proximity to the City of Richmond, the presence of several large national firms, and a high quality of life have contributed to this growth. While growing, Goochland is one of the smallest counties within the Greater Richmond Region. The County's demographic and economic makeup also differs from that of many of the other counties in this region. Nevertheless, Goochland has taken stride toward becoming a regional economic driver in recent years, especially when considering its role in certain regional clusters.

Goochland experienced a sharp increase in employment from 2010-2020, thanks to significant job creation in the County's financial services and management clusters. Growth in these two clusters accounted for much of the job creation observed in Goochland County over the past decade. The employment growth experienced between the financial services and management clusters, however, was limited to small number of rapidly expanding firms, such as Capital One and CarMax. A handful of large firms now anchor these local clusters, with small to medium-sized establishments accounting for a small portion of cluster employment. Regardless, recent growth in these two areas has shifted Goochland's longstanding secondary role in the regional economy to one of more importance.

Several other clusters experienced growth from 2010-2020, albeit at a much slower pace than the County's financial services and management clusters. The logistics, health care, and food and beverage manufacturing clusters most notably took root in Goochland over the past decade. Additionally, growth in each of these locally emerging clusters corresponds with areas of regional strength. For instance, the Greater Richmond Region boasts robust logistics and health care clusters due to a keen set of location advantages. Data suggest that Goochland County is slowly beginning to leverage similar advantages found within its own boundaries. Additionally, food and beverage manufacturing is emerging as an area of both regional and local strength, with alcoholic beverage manufacturers driving employment in both areas.

The County's construction cluster is both longstanding and diverse; local strengths in construction range from utility systems construction to cement product manufacturing. This cluster, however, did not enjoy the same growth as its more dynamic counterparts. Rather, the local construction cluster was stagnant over the past decade, which sharply contrasted with a period of healthy growth for the regional construction cluster. While several niches are beginning to appear within the local construction cluster, decline in more established areas has shrunken the County's role in the regional construction cluster.

A common theme among all clusters present in Goochland is over-centralization. Growth in each cluster was largely driven by a small number of firms active in a limited number of industries. While anchor institutions are vital to the establishment of large and productive clusters, overreliance on a small number of large employers can create vulnerabilities in smaller economies. Fortunately, Goochland has a unique opportunity to blend local strengths, such as connectivity and a talented labor pool with positive regional momentum.

Goochland County's tenacity and creativity in economic development is evident when analyzing the tremendous economic growth this area experienced over the past decade. These proven capabilities suggest that attracting industries that are complementary to both local and regional trends and better harnessing the County's many distinct advantages is well within the capabilities of County staff. Communicating with existing businesses and crafting targeted policies to better capitalize on existing trends while leveraging local resources are among a small number of recommendations the Virginia Tech Office of Economic Development poses in this document.

Introduction

In 2020, the Goochland County Economic Development Authority commissioned the Virginia Tech Office of Economic Development (OED) to perform a preliminary industry cluster analysis for Goochland County based on national and regional economic trend data. The analysis included not only an understanding of Goochland County, but also its place in the Greater Richmond Region's economy. This report includes an analysis of past, present, and future demographic and economic trends within the County, an industry analysis, and the preliminary identification of existing and emerging clusters. The final summary section offers broad recommendations include general next steps and specific industry-related suggestions. Findings from this analysis can be used for goal setting and benchmarking, crafting focused retention and expansion strategies, and attracting firms that complement the County's strengths and long-term economic goals.

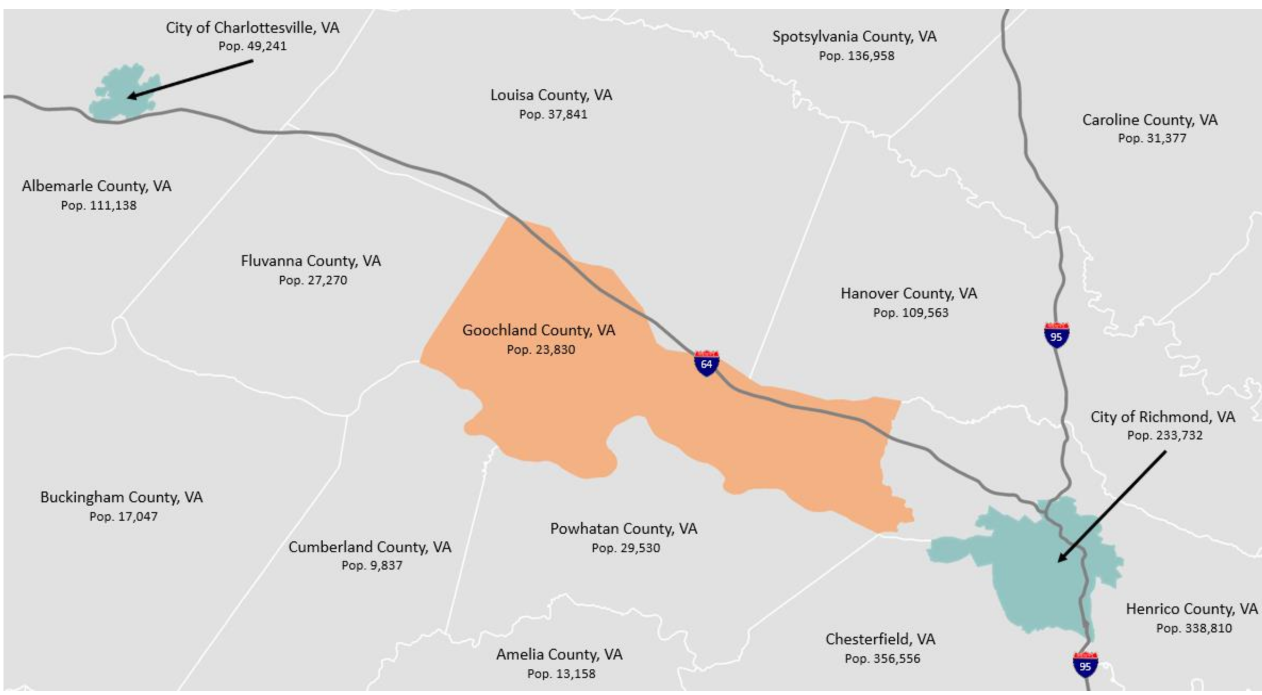
Geography

A County's geography, including its location and physical make-up, help to determine its economic advantage. With proximity and ample connectivity to two vibrant metropolitan areas, Goochland's geography poses a boon to its industry cluster prospects.

Location

Goochland County is centrally located in the state of Virginia. Goochland shares borders with six other counties: Louisa, Hanover, Henrico, Powhatan, Cumberland, and Fluvanna. Goochland is located within the Greater Richmond Region (GRR), a metropolitan area of 13 and four independent cities that share close economic ties with the City of Richmond. Additionally, Goochland's geography is unique in that it stretches from east to west. The eastern portion of the County enjoys close proximity to the City of Richmond and has experienced significant residential and commercial development over the past two decades. The West Creek Business Park, which contains the headquarters of Capital One, CarMax, and the Virginia Farm Bureau, is a leading example of this proximity-driven development. Alternatively, the western portion of the County is intentionally less developed; the County's 2035 Comprehensive Plan states that 80% of the land cover in Goochland County is to remain rural. Figure 1 illustrates Goochland's location in the Region.

Figure 1: Goochland and Surrounding Counties



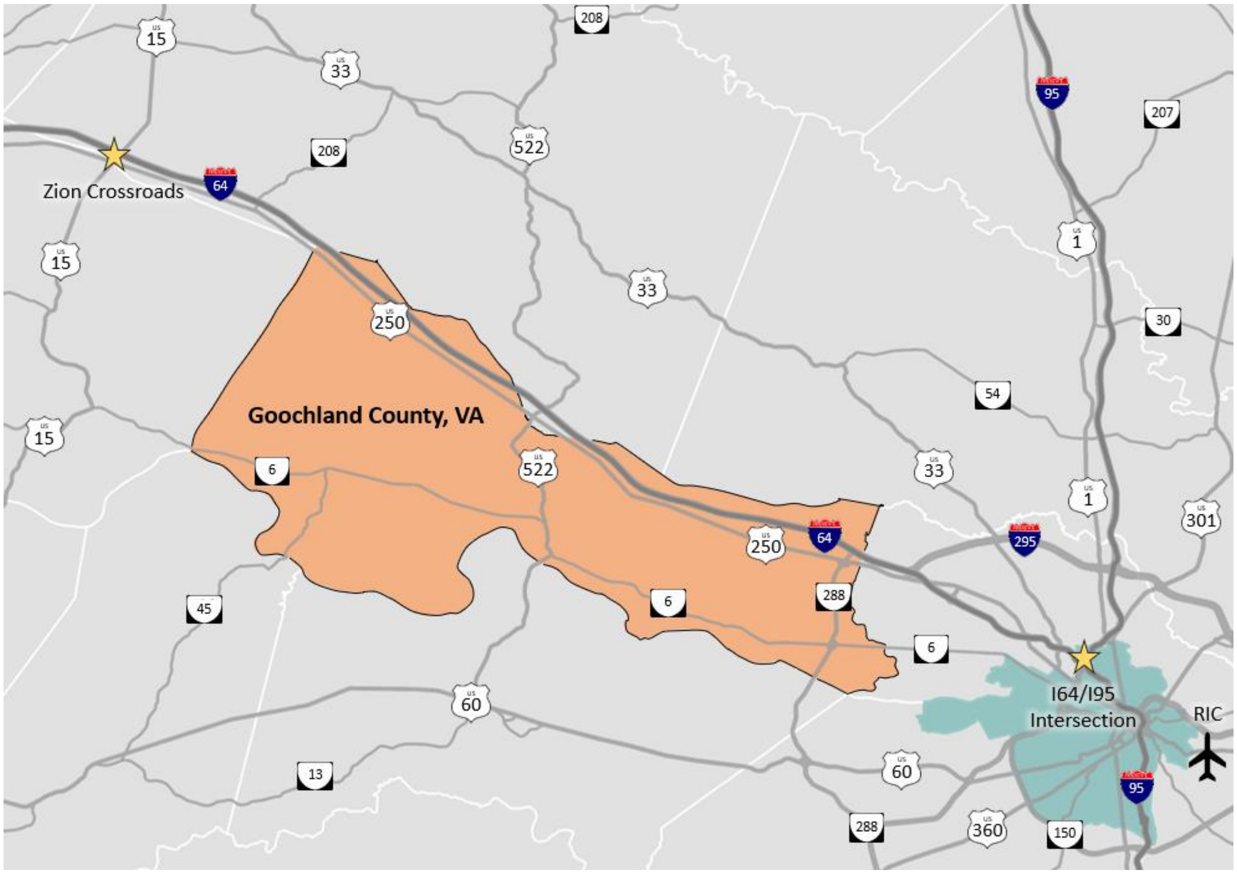
Source: ESRI ArcGIS; EMSI Developer, 2020.2 Datarun

Connectivity

Nearly 30 miles of Interstate 64 (I-64) travels along the northern border of Goochland County. Additionally, the intersection of I-64 and Interstate 95 is located in the nearby City of Richmond. The presence of these two nationally important roadways gives Goochland tremendous highway connectivity. Two U.S. highways (US-250 and US-522) and two regionally important State Routes (SR-288

& SR-6) also pass through the County. Goochland also enjoys close proximity to the Richmond International Airport (RIC) in addition to its impressive roadway connectivity. Figure 2 details the County's important transportation assets.

Figure 2: Important Roadways, Goochland County



Source: ESRI ArcGIS

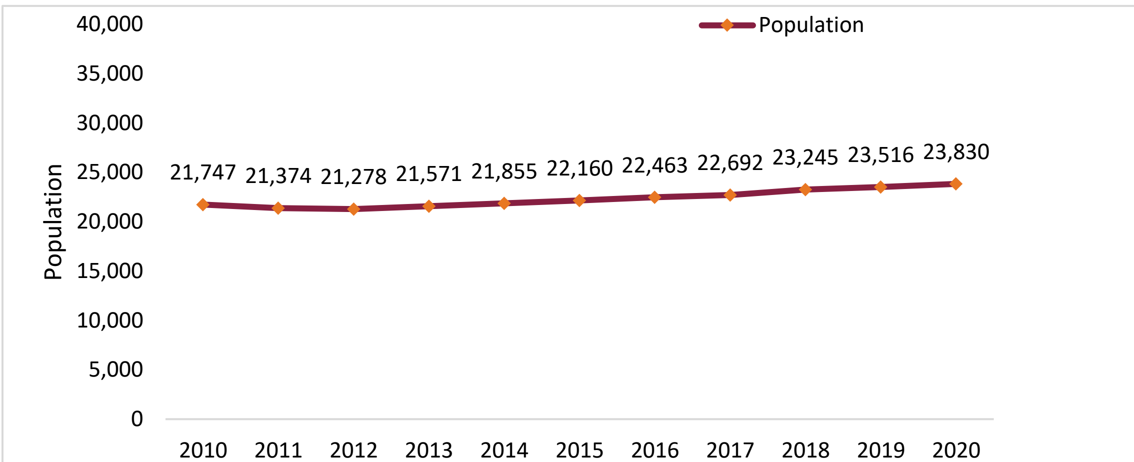
Demographics

Demographics can influence the development of industry clusters with respect to land use development, readiness of the local workforce, and proximity to desirable consumer markets.

Population

Goochland County's population was 23,830 in 2020, according to Economic Modeling Specialists International (EMSI). The County's population grew alongside the Region over the past decade, adding 2,083 people (9.6%) from 2010-2020. The GRR grew by 9.9% (119,578 people) during the same period.[1] Figure 3 illustrates population change in Goochland County from 2010-2020.

Figure 3: Population Change, Goochland County, 2010-2020



Source: EMSI Developer, 2020.2 Datarun

Age

Median age in Goochland County was 48.3 in 2018, according to the American Community Survey (ACS). This was higher compared to the GRR (41.4), State (38.1), and Nation (37.9) for the same year. Median age increased by 3.1 years in Goochland from 2010 Decennial Census figures (45.2). The County's high and rising median age was likely due to its large and growing 50-and-older population. Goochland also had proportionally fewer young people compared to the GRR on average.[2]

Education Attainment

Approximately 91.3% of County residents aged over 25 possessed at least a high school diploma in 2020, according to EMSI. Residents in Goochland tended to more educated compared to the GRR, State, and Nation. For instance, 43% of County residents aged over 25 attained a bachelor's degree or higher compared to 35%, 38%, and 31% of residents in the GRR, State, and Nation in 2020, respectively. Table 1 details education attainment for residents aged over 25 for these four geographies.

[1] Please consult Appendix B, Section 1 for more detailed information regarding population change in the Greater Richmond Region.
[2] Please consult Appendix B, Section 2 for a more detailed comparison of the distribution of age in Goochland County and the GRR.

Table 1: Educational Attainment, Goochland County, GRR, Virginia, and United States, 2018

	Goochland	GRR	State	Nation
Less Than 9th Grade	3.9%	4.8%	5.1%	6.2%
9th Grade to 12th Grade	4.8%	6.8%	6.4%	6.9%
High School Diploma	22.9%	26.1%	24.4%	27.3%
Some College	17.0%	20.2%	19.2%	20.5%
Associate's Degree	8.9%	7.0%	7.4%	8.2%
Bachelor's Degree	25.7%	22.0%	21.5%	19.1%
Graduate Degree and Higher	17.0%	13.1%	16.1%	11.8%

Source: EMSI Developer 2020.2 Datarun

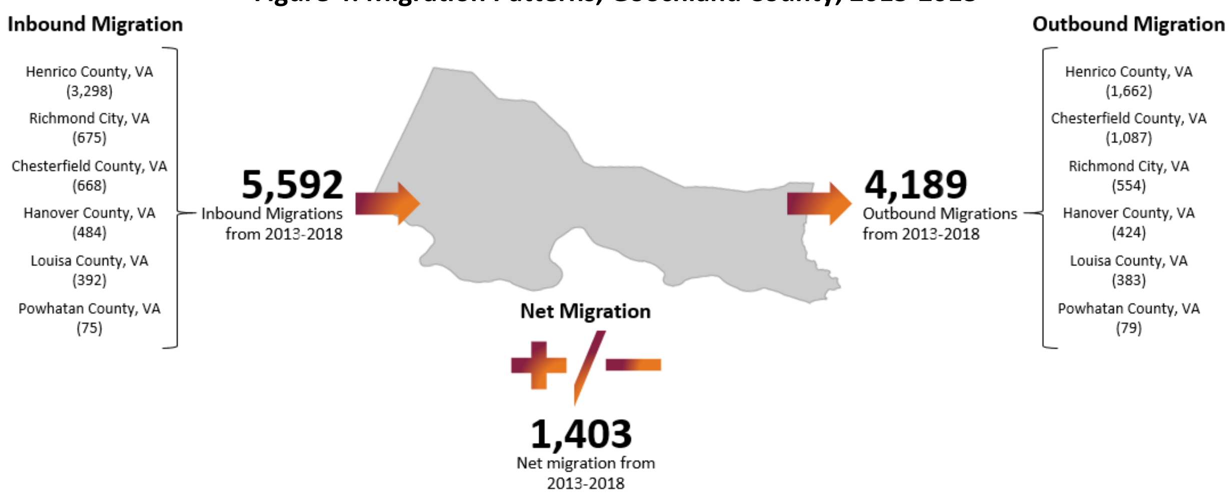
Household Income

Goochland had a median household income (MHI) of $89,741 and a mean household income (AHI) of $126,796 in 2018, according to the ACS. Over 74% of households in the County earned above $50,000 in 2018 in 2018, with 46.1% of households earning over $100,000 annually. Goochland had the highest median and mean household income of all GRR localities in 2018.[3]

Migration

Goochland saw positive net-migration from 2013-2018. The County saw 5,592 people in-migrate and 4,189 people out-migrate, yielding 1,403 net-migrators during this period. Goochland attracted the most residents from Henrico County, with 3,298 individuals in-migrating from 2013-2018. Alternatively, Goochland lost the most residents to Chesterfield County, with 1,087 residents relocating over this duration. Figure 4 details migration patterns from 2013-2018 for Goochland County.

Figure 4: Migration Patterns, Goochland County, 2013-2018



Source: EMSI Developer, 2020.2 Datarun

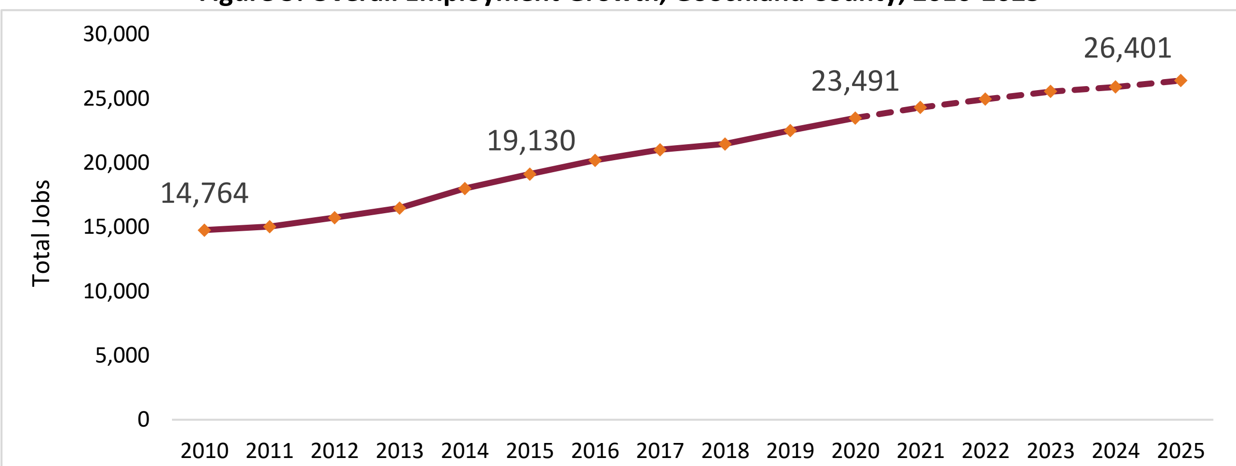
[3] Please consult Appendix B, Section 3 for a more detailed comparison of household income in Goochland County and the GRR.

Workforce

Overall Employment

Goochland housed 23,491 jobs in 2020, according to EMSI. The County's total employment increased by 59.1% (11,637 jobs) from 2010-2020. Furthermore, the County is projected to experience 12.4% employment growth (2,910 jobs) from 2020-2025. Goochland outpaced the GRR and Virginia considering employment growth during this period. The GRR experienced 18.9% growth from 2010-2020 and the State saw employment growth at 15.5%.[4] Figure 5 illustrates employment change in Goochland County over the past 10 years.

Figure 5: Overall Employment Growth, Goochland County, 2010-2025



Source: EMSI Developer, 2020.2 Datarun

Labor Force

Goochland had a labor force participation rate (LFP) of 62.9% in 2019, according to the Virginia Employment Commission (VEC). This was marginally lower than LFP for the State (63.4%) and Nation (63.1%) for the same year.[5] The median age of workforce participants below retirement age in Goochland was 47.2 years of age in 2018, according to the ACS. This was higher than the GRR (40.4 years), State (40), and Nation (39.8) for the same year. Over half (56.2%) of the County's labor force participants were aged between 35-59 in 2018; 15.9% were aged below 30 and 11.2% were at or above retirement age during the same year. ACS data estimate that 67.4% of workers in Goochland worked full-time in 2018, which was largely on par with GRR, Statewide, and National figures for the same year.

Unemployment and Underemployment

Goochland's unemployment rate decreased from 4.8% in 2014 to 2.8% in 2019, according to the Bureau of Labor Statistics (BLS). Annual unemployment in Goochland was also consistently lower than that of the GRR. During the same period, County unemployment was either lower or par with that of the State. Table 2 details annual unemployment for Goochland, the GRR, and state.

[4] Please consult Appendix C, Section 1 for a more detailed comparison of employment growth in Goochland County, the GRR, and Virginia.

[5] Please consult Appendix C, Section 2 for a more detailed comparison of labor force characteristics in Goochland, the GRR, and Virginia.

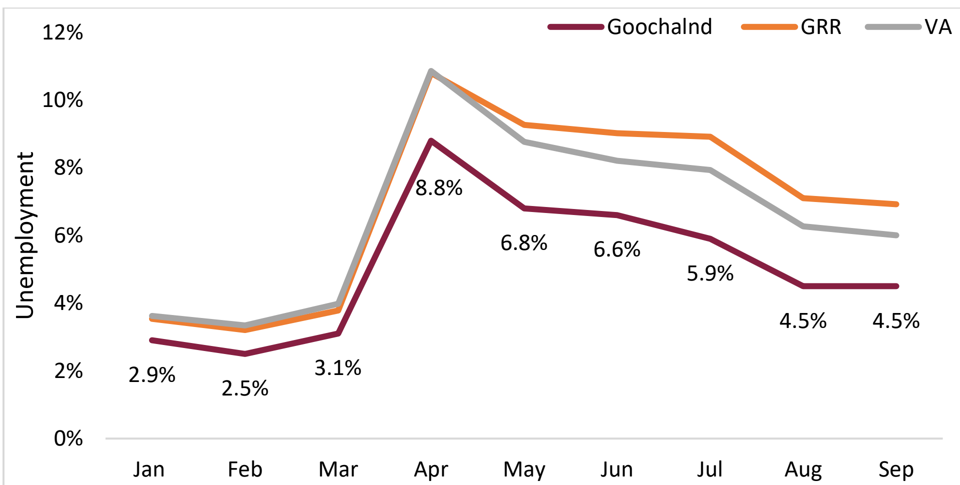
Table 2: Changes in Annual Unemployment, Goochland County, GRR, Goochland Region, and Virginia

	2014	2015	2016	2017	2018	2019	Change, 2014-2019	5-Year Avg.
Goochland	4.8%	4.2%	3.8%	3.5%	3.0%	2.8%	-2.0	3.7%
GRR	6.1%	5.2%	4.6%	4.3%	3.6%	3.3%	-2.8	4.5%
Virginia	5.2%	4.5%	4.1%	3.7%	3.0%	2.8%	-2.4	3.9%

Source: Bureau of Labor Statistics LAU

More recently, Goochland had a monthly unemployment rate of 4.5% for September of 2020. The economic ramifications of the Coronavirus pandemic have raised unemployment across all counties in Virginia. Goochland, however, experienced a milder increase in unemployment compared to the GRR and State. Goochland's unemployment rate was down from April's 8.8% to 4.5% in September of 2020. Figure 6 details monthly unemployment for the first nine months of 2020.

Figure 6: Monthly Unemployment, Goochland County, GRR, and Virginia, Jan. 2020- Sep. 2020



Source: Bureau of Labor Statistics LAU

Underemployment captures workers who are overqualified for their current position and part-time workers that would prefer to work full-time. The Virginia Economic Development Partnership (VEDP) characterized approximately 11.9% of the County's workers (1,135 people) as "underemployed" in September of 2019. The GRR saw the same rate of underemployment during this period (11.9%) while the State saw a lower underemployment rate (9.3%).

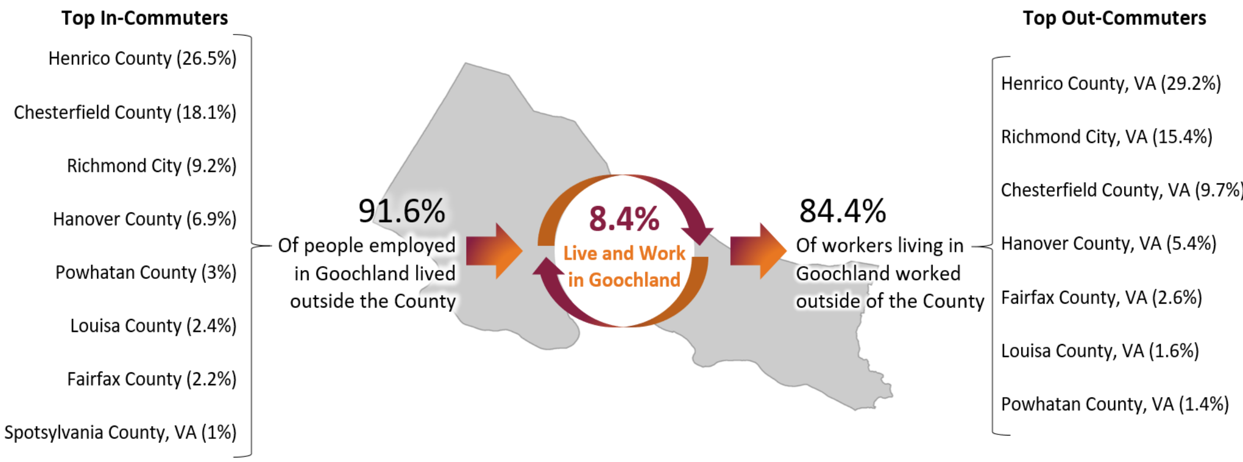
Commuting Patterns

The number of jobs in Goochland nearly exceeded the County's population in 2020. This suggests that the County's economy relies on nonresident workers -people who work in the County but live elsewhere- to satisfy its labor needs. Approximately 91.6% of jobs in Goochland County were held by nonresident workers in 2018. The remaining 8.4% of jobs were held by workers that lived and worked in the County. Nonresident workers from Henrico County, Chesterfield County, and the City of Richmond held approximately 54% of jobs in Goochland County in 2018.

Approximately 84.4% of workers living in Goochland were employed outside of the County in 2018. More of Goochland's resident workers were employed in Henrico County (29.2%) than Goochland

County (13.6%). The City of Richmond (15.4% of resident workers) and Chesterfield County (9.7%) were the second and third most popular work destinations for out-commuting resident workers for the same year. Figure 7 illustrates commuting patterns for Goochland County.

Figure 7: Commuting Patterns, Goochland County, 2018



Source: US Census Bureau, OnTheMap

Local Economy

Composition of Industry[6]

Goochland's largest 2-digit sector by employment was Finance and Insurance (52). Approximately 8,996 workers were employed at businesses belonging to this sector in 2020, which accounted for 38.3% of the County's total employment. The Finance and Insurance sector saw 185% employment growth over the past decade, adding 3,159 jobs. Management of Companies and Enterprises was Goochland's second largest sector by employment in 2020, counting 2,222 employees for that year. Employment in these two sectors accounted for nearly half (47.8%) of the County's total employment in 2020. Furthermore, only four additional sectors counted more than 1,000 employees for the same year. Table 3 details the County's 10 largest sectors by employment in 2020.

Table 3: Top-10 2-Digit Sectors by Employment, Goochland County, 2020

NAICS	Description	2010 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
52	Finance and Insurance	3,159	8,996	5,837	184.8%
55	Management of Companies and Enterprises	1,578	2,222	644	40.8%
90	Government	1,719	1,627	-92	-5.4%
23	Construction	1,663	1,392	-271	-16.3%
53	Real Estate and Rental and Leasing	743	1,187	444	59.8%
54	Professional, Scientific, and Technical Services	683	1,086	403	59.0%
44	Retail Trade	689	952	263	38.2%
56	Administrative and Support and Waste Management and Remediation Services	699	903	204	29.2%
81	Other Services (except Public Administration)	824	877	53	6.4%
62	Health Care and Social Assistance	626	693	67	10.7%

Source: EMSI Developer 2020.2 Datarun

Employment Change[7]

Approximately 9,145 jobs were created and 421 jobs were eliminated in Goochland County from 2010-2020; this yields a net change of 8,724 jobs for this period. Sixteen of the nineteen 2-digit sectors for which employment data was available saw employment growth over the past decade.[8] The remining three sectors saw some degree of decline. The finance and insurance and management of companies and enterprises sectors led the County in job creation during this period. Together, job creation in these two clusters accounted for 71% of all jobs added in the County over the past decade. Smaller sectors such as transportation and warehousing, manufacturing, wholesale, and real estate also saw relatively sharp increases in employment. Meanwhile, government and construction—the County's third and fourth largest sectors by employment—eliminated 92 and 271 jobs, respectively. Table 4 details employment change by 2-digit sector in Goochland County.

[6] Please consult Appendix D, Section 1 for a comparison of the composition of industry in Goochland and the GRR.
[7] Please consult Appendix D, Section 2 for a comparison of employment change by sector in Goochland and the GRR.
[8] Employment for the utilities and unclassified industry sectors was not available for this period.

Table 4: Employment Change, 2-Digit Sectors, Goochland County, 2010 & 2020

NAICS	Description	2010 Jobs	2020 Jobs	Change	% Change
52	Finance & Insurance	3,159	8,996	5,837	185%
48	Transportation & Warehousing	169	370	201	119%
72	Accommodation & Food Services	320	595	275	86%
31	Manufacturing	324	600	276	85%
42	Wholesale	312	575	263	84%
53	Real Estate/Rental/Leasing	743	1,187	444	60%
54	Pro., Sci., & Tech Services	683	1,086	403	59%
51	Information	55	87	32	58%
21	Mining	92	138	46	50%
55	Management	1,578	2,222	644	41%
61	Educational Services	127	178	51	40%
44	Retail	689	952	263	38%
56	Admin. Support	699	903	204	29%
71	Arts, Ent., & Rec.	556	642	86	15%
62	Health Care	626	693	67	11%
81	Other Services	824	877	53	6%
90	Government	1,719	1,627	-92	-5%
11	Agriculture	399	341	-58	-15%
23	Construction	1,663	1,392	-271	-16%

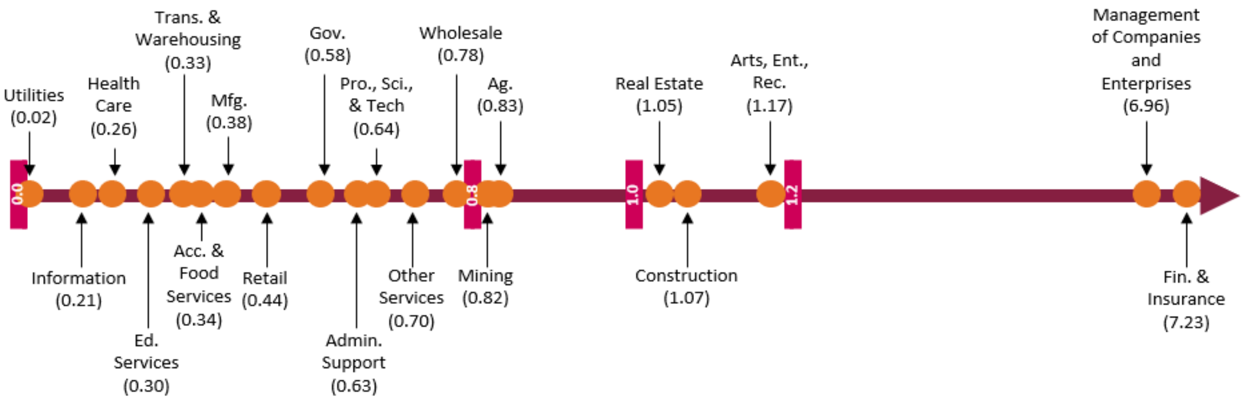
Source: EMSI Developer 2020.2 Datarun

Location Quotient[9]

Please consult Appendix A, Section 4 for a detailed definition of Location Quotient (LQ). The finance and insurance (7.23 LQ) and management of companies and enterprises (6.96) sectors led the County in LQ for 2020. Three additional 2-digit sectors had LQ values exceeding 1.0 during the same year: arts, entertainment, and recreation (1.17 LQ), construction (1.07). and real estate, rental, and leasing (1.05). The remaining 15 sectors had LQ values below 1.0 in 2020. Figure 8 details changes location quotient for 2-digit sectors in Goochland County, excluding the unclassified industry sector.

[9] Please consult Appendix D, Section 3 for a comparison of LQ by sector for Goochland and the GRR.

Figure 8. Location Quotient, 2-Digit Sectors, Goochland County, 2020



Source: EMSI Developer 2020.2 Datarun

Gross Regional Product

Gross Regional Product is the market value sum of all final goods and services produced in a Region, in this case Goochland County. Please consult Appendix A, Section 5 for a detailed definition gross regional product (GRP). Goochland's GRP totaled $3.41 billion in 2019. The finance and insurance sector accounted for 62% of the County's GRP, contributing $2.12 billion in 2019. The management of companies and enterprises contributed the second most at 12.6% or $420.85 million. Together, these two industries accounted for 47.8% of overall employment in 2020 and 74.6% of the County's total GRP in 2019. It is important to note that contribution to GRP and industry size do not always match. For instance, the County's wholesale and manufacturing sectors account for relatively small portions of overall employment (12th and 14th largest sectors by employment), however, these two sectors ranked 3rd and 7th when considering contribution to the County's GRP. Table 5 details GRP for the top-10 contributing sectors in Goochland County.

Table 5: Top 10 2-Digit Sectors by Contribution to GRP, Goochland County, 2019

	2019 GRP	% of Total
Finance & Insurance	$2,116,293,428	62%
Management	$430,847,803	13%
Wholesale	$129,512,072	4%
Construction	$108,562,696	3%
Government	$99,779,070	3%
Pro., Sci., & Tech Services	$79,536,256	2%
Manufacturing	$76,531,658	2%
Real Estate/Rental/Leasing	$72,546,070	2%
Retail	$51,189,105	2%
Admin. Support	$47,209,407	1%

Source: EMSI Developer 2020.2 Datarun

Large Employers

Two firms in Goochland (Capital One and CarMax) employed over 1,000 workers in the third quarter of 2019, according to the VEC. These two firms dominate employment in their respective sectors. Three private firms and two public entities employed between 250-499 employees. Finally, eight private firms and one public entity employed between 100-249 people for the same year. Table 6 details large employers in Goochland County.

Table 6: Employers with over 100 Employees, Goochland County, 2019

Name	NAICS	Description	Estimated Employees
Capital One Bank	52	Finance and Insurance	1,500+
Car Max Auto Superstores Inc.	55	Management	1,000-1,499
Luck Co.	21	Mining	250-499
Performance Food Group Co.	55	Management	250-499
Goochland County School Board	92	Government	250-499
James River Correctional Ctr.	92	Government	250-499
Virginia Farm Bureau Mutual Insurance	52	Finance and Insurance	250-499
Goochland County Admin.	92	Government	100-249
Hermitage Country Club	71	Arts, Ent., & Rec.	100-250
Lee Highway Paving	23	Construction	100-250
Hallmark Youthcare-Richmond	62	Health Care	100-250
PFG Customized Distribution	42	Wholesale	100-250
Food Lion	44	Retail	100-250
Liesfeld Contractor Inc.	23	Construction	100-250
Branscome	23	Construction	100-250
Elk Hill Farm School	61	Educational Services	100-250

Source: Virginia Employment Commission

It is important to note that the presence of one large, single employer in an industry with very few smaller employers poses a challenge to the development of industry clusters in a Region. An industry cluster is established and grows based on the agglomeration of multiple companies or organizations within on industry cluster. Thus, the biggest challenge facing Goochland may be leveraging the success of single anchor businesses to attract and grow several more, smaller organizations.

Industry Clusters

Industry clusters are groups of interrelated industries within a defined geographic area.[10] OED identified six industry clusters present in Goochland County: three existing clusters and three emerging clusters.[11] Existing clusters included financial services, management, and construction. Emerging clusters included, logistics, health care and life sciences, and food and beverage manufacturing.

Financial Services (Existing Cluster)

The financial services cluster is contained within the 2-digit finance and insurance sector and includes establishments vested in the creation, liquidation, or change in ownership of financial assets. The financial services cluster is by far the most dynamic and productive cluster in Goochland County. The local financial services cluster is dominated by the four-digit nondepository, credit intermediation industry group, which had an LQ of 104.83 in 2020. The local financial services cluster was established in 2000 with Capital One's expansion into Goochland County. This firm accounts for the vast majority of employment in this cluster. Another smaller, yet important employer in this cluster is the Federal Reserve Bank of Richmond.

Goochland's financial services cluster plays a considerable role in the Greater Richmond Region financial services cluster. For instance, Goochland's financial services cluster accounted for 15.3% of regional cluster employment in 2020. This cluster benefits from a strong and diverse workforce pipeline, ability to connect to a high-speed broadband infrastructure, access to an international airport, and more. The regional and national financial services saw significant growth over the past decade (2010-2020), although the recent Coronavirus pandemic could slow or reverse growth. National market trend research forecasts a wave of credit delinquencies and other financial backlash from the pandemic, which financial institutions may curb somewhat through increased technological efficiencies.[12]

Employment

Goochland's financial services cluster was composed of 8,996 employees across eight industry groups in 2020.[13] The local cluster grew by 5,837 jobs from 2010-2020, marking a 184.8% increase in employment. The nondepository credit intermediation industry group accounted for 90% of local cluster employment in 2020 and 95% of cluster growth over the past decade. Two other industry groups saw comparatively lower growth during this period; other financial investment activities and agencies, brokerages, and other insurance related activities. Table 7 details employment change for the local financial services cluster.

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[10] Please consult Appendix A, Section 1 for a detailed definition of industry clusters and subclusters.

[11] Please consult Appendix E for a description of OED's methodology for identifying industry clusters.

[12] RSM (Oct 2020). Financial services industry outlook. Retrieved from: https://rsmus.com/what-we-do/industries/financial-services/industry-outlook-financial-services.html; Deloitte (Sept 2020). The path ahead: Navigating financial services sector performance post-COVID-19. Retrieved from: https://www2.deloitte.com/us/en/insights/economy/covid-19/covid-19-financial-services-sector-challenges.html.

[13] Please consult Appendix A, Section 2 for an explanation of NAICS structure

Table 7: Employment Change, Financial Services Cluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
5222	Nondepository Credit Intermediation	2,517	5,706	8,081	5,564	221.1%
5239	Other Financial Investment Activities	383	416	610	227	59.3%
5242	Agencies, Brokerages, and Other Insurance Related Activities	124	120	187	63	50.8%
5221	Depository Credit Intermediation	50	46	45	(5)	(10.0%)
5231	Securities and Commodity Contracts Intermediation and Brokerage	33	28	34	1	3.0%
5223	Activities Related to Credit Intermediation	37	<10	28	(9)	(24.3%)
5211	Monetary Authorities-Central Bank	-	-	-	-	-
5232	Securities and Commodity Exchanges	-	-	-	-	-
5259	Other Investment Pools and Funds	-	-	-	-	-
5241	Insurance Carriers	12	<10	<10	Insf. Data	Insf. Data
5251	Insurance and Employee Benefit Funds	<10	0	<10	Insf. Data	Insf. Data
	Total	3,159	6,330	8,996	5,837	184.8%

Source: EMSI Developer 2020.2 Datarun

This cluster largely employs sales and customer service specialists, IT and business specialists, and other financial occupations. Please consult Appendix A, Section 3 for a detailed description of industry cluster employment and consult Appendix F for OED's methodology for calculating employment for each of the clusters in this document. Workforce supply for these jobs is higher in this Region than the national average, indicating a strong education pipeline. Top educational programs contributing graduates to this workforce supply are business administration and management, business/commerce, accounting, and information science degrees.[14] Please visit Appendix F, Section 1 for information regarding the top industry jobs for the financial services cluster.

Location Quotient and Gross Regional Product

The nondepository credit intermediation industry group led the local cluster in LQ in 2020. This industry group had an LQ of 104.83 during this year, indicating significant regional specialization. The other financial activities industry group was the only other industry group in this cluster with an LQ exceeding 1.0. The nondepository credit intermediation industry group accounted for the vast majority of the local financial services cluster's $2.12 billion GRP, generating $2.05 billion (96.7%) in 2019. Additionally, Goochland's financial services cluster accounted for 62% of the County's total GRP of $3.14 billion in 2019. Table 8 details location quotient and gross regional product for the local financial services cluster.

[14] EMSI Developer 2020.2 Datarun

Table 8: LQ & GRP, Financial Services Cluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
5222	Nondepository Credit Intermediation	44.60	79.47	104.83	$2,047,278,624
5239	Other Financial Investment Activities	1.95	1.55	1.67	$36,467,824
5242	Agencies, Brokerages, and Other Insurance Related Activities	0.87	0.61	0.74	$10,234,500
5223	Activities Related to Credit Intermediation	1.16	0.21	0.66	$10,846,183
5231	Securities and Commodity Contracts Intermediation and Brokerage	0.54	0.40	0.39	$2,794,290
5221	Depository Credit Intermediation	0.34	0.26	0.22	$7,219,679
5241	Insurance Carriers	0.11	0.04	0.06	$1,420,018
5251	Insurance and Employee Benefit Funds	0.11	0.00	0.05	$32,309
5211	Monetary Authorities-Central Bank	-	-	-	-
5232	Securities and Commodity Exchanges	-	-	-	-
5259	Other Investment Pools and Funds	-	-	-	-
				Total	$2,116,293,428

Source: EMSI Developer 2020.2 Datarun

Shift Share

Shift share analysis is a measure of regional competitiveness. An industry is competitive if its growth is greater than the national average; in other words, its “competitive effect” is greater than zero. Please consult Appendix A, Section 6 for a detailed overview of this indicator and its four components. Goochland’s financial services cluster was expected to create an estimated 253 jobs from 2010-2020, based on national economic performance and national industry-specific performance. Goochland’s financial services cluster outperformed this projection by 5,584 jobs, indicating significant local competitiveness. Job creation in the nondepository credit intermediation industry group was undeniably the source of this cluster’s high competitiveness. This industry group individually outperformed expected job creation by 5,506 jobs over the past decade, despite employment decline at the national level. Table 9 details shift share values for the local financial services cluster.

Table 9: Shift Share, Financial Services Cluster, Goochland County, 2010-2020

NAICS	Description	IME	NGE	Expected Change	2010 - 2020 Change	Competitive Effect
5222	Nondepository Credit Intermediation	(424.3)	482.8	59	5,564	5,505
5239	Other Financial Investment Activities	77.2	73.5	151	227	76.3
5242	Agencies, Brokerages, and Other Insurance Related Activities	17.3	23.8	41	63	21.9
5251	Insurance and Employee Benefit Funds	(1.4)	0.5	-1	Insf. Data	(0.7)
5231	Securities and Commodity Contracts Intermediation and Brokerage	(4.1)	6.2	2	1	(1.0)
5241	Insurance Carriers	(1.9)	2.3	0	Insf. Data	(2.9)
5221	Depository Credit Intermediation	(8.5)	9.7	2	-5	(6.2)
5223	Activities Related to Credit Intermediation	(7.1)	7.1	0	-9	(9.1)
5211	Monetary Authorities-Central Bank	-	-	-	-	-
5232	Securities and Commodity Exchanges	-	-	-	-	-
5259	Other Investment Pools and Funds	-	-	-	-	-
	Total	(353)	606	253	5,837	5,584

Source: EMSI Developer 2020.2 Datarun

Specialized Industries

Just as four-digit industry groups are a building block of larger two-digit sectors, six-digit industries are a building block of 4-digit industry groups. Please consult Appendix A, Section 2 for a more detailed overview of the NAICS structure. The credit card issuing industry, a component of the nondepository credit intermediation industry group, led the cluster in LQ, with an LQ value of 867.69 in 2020. This individual six-digit industry accounted for 92% of employment growth for the entire financial services cluster from 2010-2020. The sales financing industry is another area of specialization within the larger nondepository credit intermediation industry group. This industry saw rapid employment growth and LQ growth from 2010-2020. Table 10 details key trends for specialized industries within the local financial services cluster.

Table 10: Industries by Specialization, Financial Services Cluster, Goochland County

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	Competitive Effect	2020 LQ	2019 GRP
522210	Credit Card Issuing	7,675	5,365	232%	5,961	897.69	$1,970,528,300
522220	Sales Financing	394	394	-	394	32.45	$74,038,896
523920	Portfolio Management	277	118	74%	31	1.96	$19,385,849
523930	Investment Advice	286	97	51%	32	1.82	$12,923,364
523999	Miscellaneous Financial Investment Activities	15	Insf. Data	Insf. Data	(1)	1.22	$1,687,359
524298	All Other Insurance Related Activities	21	10	91%	5	1.21	$1,436,533

Source: EMSI Developer, 2020.2 Datarun

Regional Comparison[15]

Goochland accounts for a considerable portion of the employment, job creation, GRP, specialization, and competitiveness associated with the Greater Richmond Regional financial services cluster. This is due to the County's extreme specialization in the nondepository credit intermediation industry group. While this industry group is the regional cluster's largest and most productive, a number of other industry groups play similarly important roles. Alternatively, Goochland's financial services cluster was almost entirely represented by the nondepository credit intermediation industry group and, more specifically, one large employer (Capital One). The remainder of Goochland's financial services cluster was comparatively underdeveloped. The County plays an undeniable role in the regional cluster, however, lacks the diversification of the larger GRR sector.

Management/Corporate Services (Existing Cluster)

The management cluster is synonymous with the two-digit management sector. This cluster was the second largest by employment in 2020 and contributed the second most to the County's GRP in 2019. Only one six-digit industry is represented in the local management cluster: corporate, subsidiary, and regional managing offices. The County bares considerable specialization in this industry, which had an LQ value of 7.22 in 2020. Large firms in the regional cluster include CarMax, Altria, Performance Food Group, Dominion, and Owens & Minor, two of which are located in Goochland. The administrative offices of the Virginia Farm Bureau Federation also reside in Goochland County. The County's management cluster plays a notable role in the regional management cluster, accounting for 9.2% of regional cluster employment in 2020. In terms of assets, the management cluster benefits from similar

[15] Please consult Appendix G, Section 1 for an overview of employment, location quotient, and shift share for the regional financial services cluster.

assets to the financial cluster: strong talented workforce, access to high-speed broadband, proximity to an international airport, and other modern technological and live-work-play amenities. Likewise, the effects of the Coronavirus pandemic may slow the growth of this cluster in the near future (1-3 years).

Employment

Goochland's management cluster was composed of 2,222 jobs across one industry group, management of companies and enterprises, in 2020. The local cluster added 644 jobs over the past decade, growing 41%. Table 11 details employment change for the local management cluster.

Table 11: Employment Change, Management Cluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
551114	Corporate, Subsidiary, and Regional Managing Offices	1,578	1,789	2,222	644	41%
551111	Offices of Bank Holding Companies	-	-	-	-	-
551112	Offices of Other Holding Companies	-	-	-	-	-
	Total	1,578	1,789	2,222	644	41%

Source: EMSI Developer 2020.2 Datarun

Similar to the financial cluster, the management cluster largely employs sales and customer service specialists, IT and business specialists, and those with financial expertise. Workforce supply for these jobs is higher in a 45-minute drivetime from Goochland County than the national average, indicating a strong education pipeline. Workers were also better compensated in this Region ($56,619) compared to the national average ($55,301). Top educational programs contributing graduates to this workforce supply are business administration and management, social sciences (general), business/commerce, accounting, and information science degrees.[16] Please visit Appendix E, Section 2 for information regarding top management occupations.

Location Quotient and Gross Regional Product

The six-digit corporate, subsidiary, and regional managing offices industry had an LQ of 7.22 in 2020. LQ for this industry fell by 2.39 points from 2010 to 2020 despite 41% employment growth during the same period, suggesting that local growth did not keep pace with other specialized regions. The corporate, subsidiary, and regional managing offices industry contributed $430.8 million, which accounted for 13% of the County's total GRP in 2019. Table 12 details location quotient and gross regional product for the local management cluster.

[16] EMSI Developer 2020.2 Datarun

Table 12: LQ & GRP, Management Cluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
551114	Corporate, Subsidiary, and Regional Managing Offices	9.61	7.61	7.22	$430,847,803
551111	Offices of Bank Holding Companies	-	-	-	-
551112	Offices of Other Holding Companies	-	-	-	-
				Total	$430,847,803

Source: EMSI Developer 2020.2 Datarun

Shift Share

The local management cluster was expected to create and estimated 636 jobs from 2010-2020, based on national economic performance and national industry-specific performance. This cluster added 644 jobs during the past decade, surpassing expected change by only eight jobs. Average competitiveness for this cluster was due to slow job growth from 2010-2015, resulting in a competitive effect of -120 for this five-year period. The rate of job creation significantly increased from 2015-2020, yielding a more favorable competitive effect of 128 for the second half of the decade. Table 13 details shift share values for the local management cluster.

Table 13: Shift Share, Management Cluster, Goochland County, 2010-2020

NAICS	Description	IME	NGE	Expected Change	2010 - 2020 Change	Competitive Effect
551114	Corporate, Subsidiary, and Regional Managing Offices	333	303	636	644	8
551111	Offices of Bank Holding Companies	-	-	-	-	-
551112	Offices of Other Holding Companies	-	-	-	-	-
	Total	333	303	636	644	8

Source: EMSI Developer 2020.2 Datarun

Regional Comparison[17]

Goochland's management cluster plays an important role in both the County and GRR economy. However, the local cluster is one-dimensional compared to the regional cluster. Goochland's management cluster was represented by one six-digit industry, regional managing offices, in 2020. Additionally, the bulk of employment for the regional managing offices industry was divided among eight large firms. While employment in the regional management cluster similarly favors the regional managing offices industry, other industries belonging to this cluster are represented. Diversification is more easily achieved at the regional level, however, employment in the local management cluster is disproportionally concentrated among one industry and a small group of large employers such as CarMax.

[17] Please consult Appendix G, Section 2 for an overview of employment, location quotient, and shift share for the regional management cluster.

Construction (Existing Cluster)

The local construction cluster was Goochland's third largest cluster by employment in 2020. Goochland's construction cluster is composed of three distinct subclusters: utility, power transmission, and other civil and heavy contractors; residential and nonresidential building construction and contractors; and construction and finishing products manufacturing. Although Goochland's construction cluster has seen a slight decline in employment over the past decade (-110 jobs), market experts foresee demand for workers increasing in 2021 and onward.[18] Large employers in Goochland's construction cluster include:

- Residential and nonresidential building construction:
  - *Residential Construction*: Blue Ridge Custom Homes, Boone Homes, Lanes Homes & Remodeling, Paramount Builders, Classic Kitchens of VA, Westview Companies
  - *Building and Building Equipment Contractors:* Lonestar Windows, Crown Roofing, Plumbing Systems, Homescapes, H&H Heating & A/C, Heating System Installation, Johnson Controls Richmond, Allen Mechanical, J&L Mechanical Service, 1st Choice Electrical & Security, Seacom
- Utility, power transmission, and other civil and heavy contractors:
  - *Utility Systems Construction:* Branscome, Iron Horse Infrastructure, GL Howard, FCI Towers, Piedmont Construction
  - *Site Preparation & Paving Contractors:* Branscome, Liesfeld Contractor, Inc., Lee Highway Paving, J.R. Caskey, Valentine Construction, New Day Corp., KP Glass Construction, Blakemore Construction
  - *Commercial and Industrial Machinery Leasing:* Sunbelt
- Construction and finishing products manufacturing: Luck companies, Architectural Custom Woodwork, MidAtlantic Surfaces

Employment

Goochland's construction cluster was composed of 1,678 jobs across 15 industry groups in 2020. Goochland's manufacturing cluster saw a 6% decline in employment from 1,793 jobs in 2010 to 1,678 jobs in 2020.

Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster

The utility, power transmission, and other heavy or civil contractors subcluster was the largest by employment within the larger construction cluster. This cluster supplied 51% of total cluster employment in 2020. Employment change for this subcluster is misleading due to large employment fluctuations in the County's utility system construction industry group. This industry group counted 124 employees in 2008 and quickly grew to 441 employees in 2010. Employment fell to 205 jobs between 2010-2012, only to return to a peak of 464 jobs in 2015. Employment then fell steadily to 159 jobs in 2020. Calculating employment change from 2010-2020 yields a 66% decline in industry group employment, as this compares a "boom" year to a "bust" year. Comparing industry group employment for two "bust" or equilibrium years (2008 & 2020) yields 28% (35 job) growth. Alternatively, more linear employment decline for the highway, street, and bridge construction industry group was indicative of

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[18] Deloitte (2020). 2020 engineering and construction industry outlook. Retrieved from: https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/engineering-and-construction-industry-trends.html; L.inchpin (Oct 2020). Trends in the construction industry outlook in 2021. Retrieved from: https://linchpinseo.com/trends-the-construction-industry/.

typical contraction. Table 14 details employment change for the local utility, power transmission, and other heavy or civil contractors subcluster.

Table 14: Employment Change, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
2371	Utility System Construction	444	464	153	(291)	(66%)
2373	Highway, Street, and Bridge Construction	187	134	142	(45)	(24%)
2379	Other Heavy and Civil Engineering Construction	46	31	55	9	20%
2389	Other Specialty Trade Contractors	388	439	478	90	23%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	24	13	33	9	38%
	Total	1,089	1,081	861	-288	-20.9%

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

The residential and nonresidential building construction and contractors subcluster accounted for 33% of local construction cluster employment in 2020. This cluster also experienced a small net-change in employment over the past decade, largely due to decline in the foundation, structure, and building exteriors contractors and building equipment contractors industry groups. Industry groups related to residential building and contracting saw some employment growth during this period, however, not to the extent necessary to offset losses elsewhere. Table 15 details employment change for the local residential and nonresidential building construction and contractors subcluster.

Table 15: Employment Change, Residential and Nonresidential Building Construction and Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
2361	Residential Building Construction	182	162	192	10	5%
2362	Nonresidential Building Construction	21	21	18	(3)	(14%)
2372	Land Subdivision	17	<10	<10	Insf. Data	Insf. Data
2381	Foundation, Structure, and Building Exterior Contractors	118	95	90	(28)	(24%)
2382	Building Equipment Contractors	159	121	132	(27)	(17%)
2383	Building Finishing Contractors	102	68	127	25	25%
	Total	598	467	559	-38	-6.4%

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

Finally, the construction and finishing products manufacturing subcluster accounted for the remaining 16% of construction cluster employment. This subcluster enjoyed 142% employment growth (151 jobs) from 2010-2020. The other wood product manufacturing and cement and concrete product manufacturing industry groups drove employment growth for this subcluster, adding 103 jobs and 37 jobs during this period, respectively. Table 16 details employment change for the local construction and finishing products manufacturing subcluster.

Table 16: Employment Change, Construction and Finishing Products Manufacturing Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
3219	Other Wood Product Manufacturing	31	144	134	103	332%
3273	Cement and Concrete Product Manufacturing	34	86	71	37	109%
3323	Architectural and Structural Metals Manufacturing	21	28	21	0	0%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	20	47	31	11	55%
	Total	106	306	257	151	142.2%

Source: EMSI Developer 2020.2 Datarun

The construction cluster largely employs manual laborers and operators; skilled positions such as electricians, plumbers, carpenters and HVAC mechanics; experienced supervisors; and administrative workers. Although workforce supply in the Region is comparable to the national average, current demand is low. Market changes to the industry suggest focusing on further technical training for these positions to encourage future growth. Trends include: modular construction off-site; 3d printing; sustainable materials and green building; and robotics. Similar to many regions across the state, education and training programs, particularly for middle-skill professions are limited.[19] Please visit Appendix F, Section 3 for information regarding top construction occupations.

Location Quotient and Gross Regional Product

LQ values fell for all but two industry groups in this cluster from 2010-2020, largely due to employment decline, stagnancy, or slow growth. The construction cluster's GRP was more evenly divided among industry groups in this subcluster compared to other existing industries. Together, these subclusters generated $144.3 million in 2019, which accounted for 4.2% of the County's GRP in 2020.

Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster

The utility, power transmission, and other heavy and civil contractors subcluster is the greatest area of specialization in the larger construction cluster. The highway street and bridge construction industry group led this subcluster in specialization, with an LQ of 3.25 in 2020. LQ declined for all industry groups in this subcluster, although decline in the utility system construction industry group was exaggerated by the nature of employment change for this group. The utility, power transmission, and other heavy or civil contractors subcluster supplied the largest portion (58%) of the construction cluster's total GRP in

[19] EMSI Developer 2020.2 Datarun

2019. Table 17 details location quotient and gross regional product for the local utility, power transmission, and other heavy or civil contractors subcluster.

Table 17: LQ & GRP, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
2371	Utility System Construction	12.47	8.95	2.07	$17,240,222
2373	Highway, Street, and Bridge Construction	6.96	4.00	3.25	$11,286,933
2379	Other Heavy and Civil Engineering Construction	3.64	1.96	2.60	$3,011,562
2389	Other Specialty Trade Contractors	3.69	3.30	2.77	$41,082,718
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	1.35	0.59	1.09	$11,214,801
				Total	$83,836,236

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

Only one industry group in the residential and nonresidential building construction and contractors subcluster had an LQ value that exceeded 1.0 in 2020: residential building construction. The remaining five industry groups in this subcluster had LQ values ranging from 0.16-0.60 in 2020. The residential and nonresidential building construction subcluster generated $35.9 million in 2019, nearly half of which was supplied by the residential building construction industry group. Overall, this subcluster accounted for 25% of construction cluster GRP for 2019. Table 18 details location quotient and gross regional product for the local residential and nonresidential building construction and contractors subcluster.

Table 18: LQ & GRP, Residential and Nonresidential Building Construction and Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
2361	Residential Building Construction	1.83	1.14	1.07	$13,940,786
2362	Nonresidential Building Construction	0.32	0.24	0.16	$1,509,835
2372	Land Subdivision	2.13	0.60	0.53	$384,139
2381	Foundation, Structure, and Building Exterior Contractors	1.30	0.80	0.58	$6,062,991
2382	Building Equipment Contractors	0.91	0.51	0.41	$7,991,518
2383	Building Finishing Contractors	0.78	0.41	0.60	$6,051,992
				Total	$35,941,261

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

The construction and finishing products manufacturing subcluster is an area of emerging specialization in the larger construction cluster. The other wood product manufacturing and cement and concrete product manufacturing industry groups experienced LQ growth during this period. Additionally, this subcluster generated $24.5 million in 2019, which accounted 17% of the construction cluster's total

GRP. Table 19 details location quotient and gross regional product for the local construction and finishing products manufacturing subcluster.

Table 19: Location Quotient, Construction and Finishing Products Manufacturing Subcluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
3219	Other Wood Product Manufacturing	1.59	5.69	4.19	$13,307,955
3273	Cement and Concrete Product Manufacturing	2.28	4.52	3.02	$6,893,299
3323	Architectural and Structural Metals Manufacturing	0.75	0.73	0.45	$2,710,850
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	0.94	1.73	0.98	$1,580,363
				Total	$24,492,467

Source: EMSI Developer 2020.2 Datarun

Shift Share

Goochland's construction cluster was expected to add 597 jobs from 2010-2020, based on national economic performance and national industry-specific performance. Instead, 110 jobs were eliminated from the local construction cluster during this period. The performance of the local cluster yielded a competitive effect value of -708, suggesting that job change in Goochland's construction cluster was not competitive over the past decade.

Utility, Power Transmission, and Other Heavy or Civil Contractors Subcluster

The utility, power transmission, and other heavy and civil contractors subcluster was the least competitive in the larger construction cluster. Low competitiveness for this subcluster was exacerbated by sporadic employment change within the utility systems construction industry group. Actual competitiveness was more than likely higher, although still negative. Table 20 details shift share values for the local utility, power transmission, and other heavy or civil contractors subcluster.

Table 20: Shift Share, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
2371	Utility System Construction	85	158	243	(291)	(535)
2373	Highway, Street, and Bridge Construction	36	5	41	(45)	(86)
2379	Other Heavy and Civil Engineering Construction	9	2	11	9	(3)
2389	Other Specialty Trade Contractors	74	15	89	90	1
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	5	2	7	9	2
	Total	209	183	391	(228)	(620)

Source: EMSI Developer 2020.2 Datarun

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

Five of the six industry groups in this subcluster yielded negative competitive effect values, for a combined competitive effect of -218 from 2010-2020. Contractors tended to have lower competitiveness compared to other industry groups in this subcluster. Table 21 details shift share values for the local residential and nonresidential building construction and contractors subcluster.

Table 21: Shift Share, Residential and Nonresidential Building Construction and Contractors Subcluster, Goochland County, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
2361	Residential Building Construction	35	31	66	10	(55)
2362	Nonresidential Building Construction	4	2	6	(3)	(9)
2372	Land Subdivision	3	(6)	(3)	Insf. Data	(10)
2381	Foundation, Structure, and Building Exterior Contractors	23	13	36	(28)	(63)
2382	Building Equipment Contractors	30	28	58	(27)	(86)
2383	Building Finishing Contractors	20	2	22	25	4
	Total	115	70	185	(23)	(218)

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

The construction and finishing products manufacturing subcluster was the only source of competitiveness in the larger construction cluster from 2010-2020. The other wood products manufacturing and cement and concrete product manufacturing industry groups were the most competitive within the construction and finishing products subcluster and larger construction cluster during this period. Table 22 details shift share values for the local construction and finishing products manufacturing subcluster.

Table 22: Shift Share, Construction and Finishing Products Manufacturing Subcluster, Goochland County, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
3219	Other Wood Product Manufacturing	6	1	7	103	96
3273	Cement and Concrete Product Manufacturing	6	(0)	6	37	31
3323	Architectural and Structural Metals Manufacturing	4	2	6	0	(5)
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	4	(1)	3	11	9
	Total	20	1	22	151	130

Source: EMSI Developer 2020.2 Datarun

Specialized Industries

Fourteen 6-digit industries in the construction cluster had LQ values that exceeded 1.0 in 2020. The other millwork industry, a component of the other wood products manufacturing industry group within the construction and finishing products manufacturing subcluster, led the construction cluster specialization, with an LQ of 26.51 in 2020.

Utility, Power Transmission, and Other Heavy or Civil Contractors Subcluster

The utility, power transmission, and other heavy and civil contractors subcluster contained seven industries with LQ values exceeding 1.0 in 2020. Again, negative employment change and competitiveness for the two 6-digit components of the utility systems construction industry group (water and sewer line and related construction and power and communication line and related structures construction) was exacerbated sporadic growth and decline over the past decade. The site preparation contractors industry had the highest LQ at 3.7 in 2020. Six other industries in this subcluster had LQ values exceeding 2.0 for the same year. Table 23 details key trends for specialized industries within the local utility, power transmission, and other heavy or civil contractors subcluster.

Table 23: Industries by Specialization, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, Goochland County

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	2020 LQ	Competitive Effect	2019 GRP
237110	Water and Sewer Line and Related Structures Construction	94	(201)	(68%)	3.73	(274)	$8,849,956
237130	Power and Communication Line and Related Structures Construction	59	(90)	(60%)	2.22	(183)	$8,390,266
237310	Highway, Street, and Bridge Construction	142	(45)	(24%)	3.25	(86)	$11,286,933
237990	Other Heavy and Civil Engineering Construction	55	9	20%	2.60	(3)	$3,011,562
238910	Site Preparation Contractors	317	5	2%	3.75	(47)	$31,786,469
238990	All Other Specialty Trade Contractors	162	86	113%	1.83	63	$9,296,250
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	26	Insf. Data	Insf. Data	2.17	21	$5,413,677

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

Three industries in the residential and nonresidential building and contractors subcluster had LQ values exceeding 1.0 in 2020, however, none exceeded 1.3. Additionally, no industry in this subcluster yielded a positive competitive effect value from 2010-2020. Table 24 details key trends for specialized industries within the local residential and nonresidential building construction and contractors subcluster.

Table 24: Industries by Specialization, Residential and Nonresidential Building Construction and Contractors Subcluster, Goochland County

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	2020 LQ	Competitive Effect	2019 GRP
236115	New Single-Family Housing Construction (except For-Sale Builders)	84	13	18%	1.28	0	$7,557,090
238140	Masonry Contractors	32	0	0%	1.19	(3)	$1,698,951
238330	Flooring Contractors	33	3	10%	1.26	(5)	$1,407,053

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

The other millwork industry led the construction cluster in LQ in 2020. Ready-mix concrete manufacturing, a component of the cement and concrete manufacturing industry group, was the larger cluster’s second-most specialized industry, with an LQ value of 5.95 in 2020. Shift share data suggest that job creation in these two industries was competitive between 2010-2020. Table 25 details key trends for specialized industries within the local construction and finishing products manufacturing subcluster.

Table 25: Industries by Specialization, Construction and Finishing Products Manufacturing Subcluster, Goochland County

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	2020 LQ	Competitive Effect	2019 GRP
321918	Other Millwork (including Flooring)	132	103	355%	26.51	102	$13,189,321
327320	Ready-Mix Concrete Manufacturing	71	37	109%	5.95	30	$6,893,299
332312	Fabricated Structural Metal Manufacturing	21	0	0%	1.94	(5)	$2,710,850
337110	Wood Kitchen Cabinet and Countertop Manufacturing	29	10	53%	1.82	6	$1,549,238

Source: EMSI Developer 2020.2 Datarun

Mining Cluster

Mining is not considered a primary or emerging cluster in that it is reliant on the abundance of a natural resource and cannot expand in the same way as other, more traditional clusters. Nevertheless, Goochland’s mining cluster plays a role in the local and regional construction cluster. The six-digit crushed and broken granite mining and quarrying industry had an LQ of 97.72 in 2020. Goochland's crushed and broken granite mining and quarrying industry accounted for 36% of regional industry employment in 2020. This industry saw competitive job growth from 2010-2020, exceeding expectations by 38 jobs. Table 26 details key trends for specialized industries within the local mining cluster.

Table 26: Industries by Specialization, Mining Cluster, Goochland County, 2010-2020

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	Competitive Effect	2020 LQ	2019 GRP
212313	Crushed and Broken Granite Mining and Quarrying	97	41	73%	19	97.42	$17,750,734

Source: EMSI Developer, 2020.2 Datarun

Regional Comparison[20]

As mentioned above, the local financial services and management clusters lack the diversification observed at the regional level. The local construction cluster, however, is considerably more diversified compared to its existing cluster counterparts; regional cluster strengths are reflected in the local cluster, albeit to different extents. A point of distinction between the local and regional construction clusters was growth. The local construction cluster saw a slight decline in employment from 2010-2020. This below-average performance was magnified by healthy, although noncompetitive, growth at the regional level during the same period. This growth discrepancy reduced the local cluster's footing in the regional cluster; Goochland now accounts for a smaller share of regional construction cluster employment and has experienced waning specialization across many local construction industries. Continued decline amid regional growth could continue to shrink Goochland's role in the regional market as specialization shifts to other areas in the GRR. If left unchecked, this could further erode the local construction cluster as consumers look to more specialized counties in the GRR to satisfy construction needs no longer met in Goochland.

Logistics Cluster (Emerging Cluster)

The logistics cluster includes industries engaged in the storage, warehousing, and shipment of freight as well as the transportation of people. A total of 638 workers (3% of County employment) were employed in businesses belonging to this cluster in 2020. The logistics cluster contains three areas of specialization: support activities for road transportation, local messenger services and delivery, and management, scientific, and technical consulting services. Goochland's logistics cluster accounted for 1.3% of the regional logistics cluster employment in 2020. The Coronavirus pandemic has increased e-commerce demand for transportation and logistics companies. Demand for commercial real estate for class-A warehouses to serve as final-mile distribution centers near large population centers is growing in particular and is projected to continue growing. As such, market projections for the national logistics cluster estimate the industry cluster will be one of the first to recover from the 2020 recession.[21] Data

[20] Please consult Appendix G, Section 3 for an overview of employment, location quotient, and shift share for the regional construction cluster.
[21] CBRE Research (Aug 2020). Global Real Estate Market Outlook 2020. Retrieved from: https://www.cbre.com/research-and-reports/Global-Real-Estate-Market-Outlook-Midyear-Review-July-2020.

suggest that many of the businesses and consultants in the local logistics cluster are home-based. Nevertheless, top local employers in this cluster include:

- *Freight Trucking and Freight Transportation Arrangement*: G.R. Kenney Trucking, N&A Trucking

Employment

Goochland's logistics cluster was composed of 638 jobs across 14 industry groups in 2020. The local cluster grew by 158% (386 jobs) from 2010-2020. The management, scientific, and technical consulting services industry group accounted for 51.7% of local cluster employment in 2020. The support activities for road transportation industry group, the local messengers and local delivery industry group, and the couriers and express delivery services industry group were also notable areas of employment growth during this period. Table 27 details employment change for the local logistics cluster. Due to large number of industry groups in this cluster, those that were not represented in Goochland County were omitted from this table. Please consult Appendix G, Section 4 for a more detailed overview of logistics cluster industry groups.

Table 27: Employment Change, Logistics Cluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
4811	Scheduled Air Transportation	0	<10	<10	Insf. Data	Insf. Data
4812	Nonscheduled Air Transportation	<10	<10	<10	Insf. Data	Insf. Data
4821	Rail Transportation	11	<10	<10	Insf. Data	Insf. Data
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	0	<10	<10	Insf. Data	Insf. Data
4841	General Freight Trucking	72	39	52	(20)	(28%)
4842	Specialized Freight Trucking	12	<10	17	5	42%
4859	Other Transit and Ground Passenger Transportation	<10	<10	17	Insf. Data	Insf. Data
4862	Pipeline Transportation of Natural Gas	0	<10	<10	Insf. Data	Insf. Data
4884	Support Activities for Road Transportation	<10	29	82	76	Insf. Data
4885	Freight Transportation Arrangement	<10	<10	<10	Insf. Data	Insf. Data
4921	Couriers and Express Delivery Services	21	21	62	41	195%
4922	Local Messengers and Local Delivery	16	18	49	33	206%
4931	Warehousing and Storage	<10	<10	30	Insf. Data	Insf. Data
5416	Management, Scientific, and Technical Consulting Services	112	273	330	218	195%
5619	Other Support Services	<10	15	<10	Insf. Data	Insf. Data
	Total	252	394	638	386	158%

Source: EMSI Developer 2020.2 Datarun

The emerging logistics cluster largely employs workers with Commercial Driver's Licenses, administrative and office workers, and manual labor. Workforce supply for these jobs is higher in this Region than the national average, indicating a strong pipeline. However, demand is currently low. Top programs contributing graduates to this workforce supply are business administration and management, business/commerce, accounting, Commercial Driver's License programs, and job readiness related certifications.[22] Please visit Appendix F, Section 4 for information regarding top logistics occupations.

Location Quotient and Gross Regional Product

The support activities for road transportation industry group led this cluster in specialization (4.34 LQ) for 2020. Two additional industry groups had LQ's exceeding 1.0 during the same year: local messengers and local delivery (1.27) and management, scientific, and technical consulting services (1.05). The local logistics cluster accounted for a small portion (1.3%) of the County's GRP in 2019. Table 28 details location quotient and gross regional product for the local logistics cluster.

Table 28: LQ & GRP, Logistics Cluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
4811	Scheduled Air Transportation	0.00	0.03	0.01	$81,183
4812	Nonscheduled Air Transportation	0.17	0.14	0.35	$492,395
4821	Rail Transportation	0.59	0.35	0.22	$1,164,610
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	0.00	0.20	0.28	$213,503
4841	General Freight Trucking	0.58	0.24	0.25	$3,906,516
4842	Specialized Freight Trucking	0.32	0.16	0.28	$1,054,855
4859	Other Transit and Ground Passenger Transportation	0.23	0.19	0.30	$263,366
4862	Pipeline Transportation of Natural Gas	0.00	0.26	0.58	$1,689,673
4884	Support Activities for Road Transportation	0.59	2.03	4.34	$5,724,541
4885	Freight Transportation Arrangement	0.51	0.06	0.09	$298,557
4921	Couriers and Express Delivery Services	0.40	0.29	0.49	$2,938,238
4922	Local Messengers and Local Delivery	1.22	1.11	1.27	$1,036,860
4931	Warehousing and Storage	0.13	0.04	0.16	$1,064,238
5416	Management, Scientific, and Technical Consulting Services	0.69	1.18	1.05	$25,071,799
5619	Other Support Services	0.21	0.32	0.17	$294,110
				Total	$45,294,443

Source: EMSI Developer 2020.2 Datarun

Shift Share

The local logistics cluster was expected to create 140 jobs, based on national economic performance and national industry-specific performance. The local logistics cluster surpassed this projection by 253 jobs, indicating regional competitiveness. The management, scientific, and technical consulting services industry group and support activities for road transportation industry group led this cluster in competitiveness from 2010-2020. Table 29 details shift share for the local logistics cluster.

[22] EMSI Developer 2020.2 Datarun

Table 29: Shift Share, Logistics Cluster, Goochland County, 2010-2020

NAICS	Description	IME	NGE	Expected Change	2010 - 2020 Change	Competitive Effect
4811	Scheduled Air Transportation	(0)	0	0	Insf. Data	1
4812	Nonscheduled Air Transportation	0	0	0	Insf. Data	2
4821	Rail Transportation	(2)	2	0	Insf. Data	(6)
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	(0)	0	0	Insf. Data	1
4841	General Freight Trucking	4	14	18	(20)	(37)
4842	Specialized Freight Trucking	0	2	2	5	3
4859	Other Transit and Ground Passenger Transportation	7	0	7	Insf. Data	7
4862	Pipeline Transportation of Natural Gas	(0)	0	0	Insf. Data	2
4884	Support Activities for Road Transportation	2	1	3	76	73
4885	Freight Transportation Arrangement	3	2	5	Insf. Data	(11)
4921	Couriers and Express Delivery Services	13	4	17	41	24
4922	Local Messengers and Local Delivery	16	3	19	33	13
4931	Warehousing and Storage	9	2	11	Insf. Data	12
5416	Management, Scientific, and Technical Consulting Services	28	22	50	218	168
5619	Other Support Services	(0)	1	1	Insf. Data	1
	Total	80	54	133	386	253

Source: EMSI Developer 2020.2 Datarun

Specialized Industries

The 6-digit process, physical distribution, and logistics consulting services industry, a component of the four-digit management, scientific, and technical services consulting industry group, drove logistics cluster employment growth during this period. The motor vehicle towing and local messengers and local delivery industries also positively contributed to cluster growth. Additionally, employment growth in all three of these industries was competitive from 2010-2020. Table 30 details key trends for specialized industries within the local logistics cluster.

Table 30: Industries by Specialization, Logistics Cluster, Goochland County, 2010-2020

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	Competitive Effect	2020 LQ	2019 GRP
541614	Process, Physical Distribution, and Logistics Consulting Services	134	129	2,580%	127	6.35	$14,137,942
488410	Motor Vehicle Towing	82	76	1,266%	73	6.10	$5,734,665
492210	Local Messengers and Local Delivery	49	33	206%	13	1.79	$1,083,340

Source: EMSI Developer 2020.2 Datarun

Regional Comparison[23]

As mentioned earlier in this report, Goochland offers tremendous roadway connectivity; the County is conveniently located on the periphery of one of Virginia's largest urban markets, and an international airport with air cargo capabilities is located nearby. Additionally, the GRR's logistics cluster is firmly established and rapidly growing. Goochland's logistics cluster also saw tremendous growth during over the past decade, but remains largely underdeveloped. Local growth was limited to small number of industry groups during this period. Meanwhile, there was little to no local growth in industry groups that play a large role in regional logistics cluster and appear to be suited to Goochland County, such as general freight trucking. Evidence suggests that other localities in the GRR with fewer logistics-specific location advantages than Goochland have established stronger logistics clusters.

Healthcare and Life Sciences (Emerging Cluster)

The healthcare and life sciences cluster is composed of industries vested in healthcare, research, development, manufacturing, and provision of pharmaceutical and medical products, and other support industries, such as waste disposal. The County's healthcare cluster is small compared to the regional cluster. Approximately 880 workers were employed in businesses belonging to this cluster in 2020, which accounted for 3.7% of County employment. Nevertheless, new facilities have opened and continue to thrive in the County as part of the larger regional industry cluster. The success of these facilities and national growth trends may indicate an opportunity for growth, particularly with respect to residential and rehabilitation care. Several notable employers in this cluster include:

- West Creek Emergency Center: Built in 2013 and located on the eastern border of the County;
- Sheltering Arms Institute: A 114-bed rehabilitation hospital, specializing in traumatic brain injury, spinal cord injury, complex care, and stroke. This facility was built in collaboration with Virginia Commonwealth University;
- MEDARVA West Creek Surgery and Imaging Center: Conveniently located close to 288, 295 and I-64, this is a state-of-the-art facility that houses several private medical and surgical practices.

[23] Please consult Appendix G, Section 4 for an overview of employment, location quotient, and shift share for the regional logistics cluster.

- Hallmark Youthcare: Built in 1992, this 84-bed residency facility treats adolescents with emotional and behavioral issues triggered by past traumatic experiences.

Employment

The local healthcare and life sciences cluster was composed of 880 jobs across 16 industry groups in 2020. The local cluster grew by % (93 jobs) 2010-2020. The recent establishment of the Sheltering Arms Institute, which belongs to the specialty hospitals industry group (NAICS 6223), has greatly increased employment in the local healthcare cluster. This organization created 317 full-time jobs and 148 part-time jobs in 2020, which effectively doubled local cluster employment.[24] The 4-digit psychiatric and substance abuse hospitals industry group (Hallmark) previously led the local cluster in employment. However, this industry group experienced employment decline from 2010-2020. Table 31 details employment change for the local healthcare and life sciences cluster.

Table 31: Employment Change, Healthcare and Life Sciences Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 – 2020 Change	2010 – 2020 % Change
3254	Pharmaceutical and Medicine Manufacturing	0	0	<10	Insf. Data	Insf. Data
3332	Industrial Machinery Manufacturing	16	<10	<10	Insf. Data	Insf. Data
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	<10	<10	<10	Insf. Data	Insf. Data
3391	Medical Equipment and Supplies Manufacturing	<10	<10	0	Insf. Data	Insf. Data
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	<10	31	49	Insf. Data	Insf. Data
4461	Health and Personal Care Stores	30	24	33	3	10%
5417	Scientific Research and Development Services	<10	22	<10	Insf. Data	Insf. Data
5622	Waste Treatment and Disposal	<10	<10	39	Insf. Data	Insf. Data
6211	Offices of Physicians	85	75	93	8	9%
6214	Outpatient Care Centers	40	24	61	21	53%
6215	Medical and Diagnostic Laboratories	<10	<10	<10	Insf. Data	Insf. Data
6216	Home Health Care Services	25	50	39	14	56%
6219	Other Ambulatory Health Care Services	<10	<10	<10	Insf. Data	Insf. Data
6221	General Medical and Surgical Hospitals	-	-	-	-	-
6222	Psychiatric and Substance Abuse Hospitals	211	162	151	(60)	(28%)

[24] OED arrived at a total of 391 jobs for the corresponding specialty hospitals group by halving the number of part time positions created (148). Full time and full-time equivalency positions are needed to accurately capture total employment and those figures are not available at this time.

6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	-	-	391	Insf. Data	Insf. Data
6231	Nursing Care Facilities (Skilled Nursing Facilities)	52	94	77	25	48%
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	0	<10	<10	Insf. Data	Insf. Data
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	<10	<10	<10	Insf. Data	Insf. Data
6239	Other Residential Care Facilities	-	-	-	-	-
	Total	483	507	880	397	82.2%

Source: EMSI Developer 2020.2 Datarun

The emerging healthcare and life sciences cluster largely employs nurses, manual labor, technicians, counselors, and pharmacists. Workforce supply for these jobs is higher in this Region than the national average, indicating a strong education pipeline. However, demand is currently low. Top programs contributing graduates to this workforce supply are registered nursing, respiratory care therapy/therapist, mental and social health services, LP/LV nursing, and clinical/medical laboratory technician.[25] Please visit Appendix F, Section 5 for information regarding top healthcare occupations.

Location Quotient and Gross Regional Product

The specialty hospitals industry group led the local cluster in specialization with an LQ of 14.37 in 2020. The psychiatric and substance abuse hospitals industry group was previously the most specialized industry group in this cluster (9.79 LQ). The local healthcare cluster generated $35.8 billion in 2019, which accounted for 1% of the County's GRP. Table 32 details location quotient and gross regional product for the local healthcare and life sciences cluster.

Table 32: LQ & GRP, Healthcare and Life Sciences Cluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
3254	Pharmaceutical and Medicine Manufacturing	0.00	0.00	0.14	$23,473
3332	Industrial Machinery Manufacturing	1.76	0.06	0.34	$649,105
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	0.02	0.02	0.02	$12,915
3391	Medical Equipment and Supplies Manufacturing	0.22	0.21	0.00	$0
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	0.11	0.48	0.60	$7,651,697
4461	Health and Personal Care Stores	0.32	0.20	0.23	$1,691,481
5417	Scientific Research and Development Services	0.04	0.30	0.10	$167,339
5622	Waste Treatment and Disposal	0.59	0.52	3.27	$4,400,756

[25] EMSI Developer 2020.2 Datarun

6211	Offices of Physicians	0.43	0.28	0.29	$11,218,990
6214	Outpatient Care Centers	0.75	0.30	0.49	$5,496,699
6215	Medical and Diagnostic Laboratories	0.02	0.17	0.12	$125,379
6216	Home Health Care Services	0.20	0.27	0.16	$1,343,170
6219	Other Ambulatory Health Care Services	0.11	0.10	0.16	$336,422
6221	General Medical and Surgical Hospitals	0.00	0.00	0.00	$0
6222	Psychiatric and Substance Abuse Hospitals	24.53	14.51	9.79	$11,335,848
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	-	-	14.37	-
6231	Nursing Care Facilities (Skilled Nursing Facilities)	0.37	0.56	0.42	$2,315,592
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	0.00	0.03	0.02	$76,135
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	0.01	0.03	0.05	$164,099
6239	Other Residential Care Facilities	-	-	-	-
				Total	$47,009,099

Source: EMSI Developer 2020.2 Datarun

Shift Share

Goochland's healthcare was expected to create an estimated 129 jobs during this period, based on national economic performance and industry specific performance. Thanks to the addition of the Sheltering Arms Institute, this cluster exceeded expectations by 281 jobs, marking considerable local competitiveness. Had it not been for Sheltering Arms, however, this cluster would have fallen 31 jobs short of expectations. Competitive growth in the specialty hospital industry group and more moderate competitiveness elsewhere was most notably offset by non-competitiveness in the psychiatric and substance abuse hospitals industry group. Table 33 details shift share values for the local healthcare and life sciences cluster.

Table 33: Shift Share, Healthcare and Life Sciences Cluster, Goochland, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
3254	Pharmaceutical and Medicine Manufacturing	0	(0)	0	Insf. Data	5
3332	Industrial Machinery Manufacturing	3	1	4	Insf. Data	(14)
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	0	(0)	0	Insf. Data	(0)
3391	Medical Equipment and Supplies Manufacturing	1	(1)	0	Insf. Data	(6)
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	1	(0)	1	Insf. Data	42

4461	Health and Personal Care Stores	6	(2)	4	3	(0)
5417	Scientific Research and Development Services	0	0	0	Insf. Data	7
5622	Waste Treatment and Disposal	1	(1)	0	Insf. Data	34
6211	Offices of Physicians	13	0	13	8	(5)
6214	Outpatient Care Centers	8	21	29	21	(7)
6215	Medical and Diagnostic Laboratories	0	0	0	Insf. Data	4
6216	Home Health Care Services	5	6	11	14	3
6219	Other Ambulatory Health Care Services	1	0	1	Insf. Data	4
6221	General Medical and Surgical Hospitals	0	0	0	0	0
6222	Psychiatric and Substance Abuse Hospitals	41	27	68	(60)	(128)
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	0	0	0	391	39191
6231	Nursing Care Facilities (Skilled Nursing Facilities)	10	(12)	(2)	25	27
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	0	0	0	Insf. Data	1
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	0	0	0	Insf. Data	5
6239	Other Residential Care Facilities	-	-	-	-	-
	Total	78	38	116	397	281

Source: EMSI Developer 2020.2 Datarun

Specialized Industries

The 6-digit specialty hospitals industry led the cluster in LQ in 2020 (14.37). Previously, the psychiatric and substance hospitals industry led the cluster in LQ, although recent employment decline amid period of regional a national growth dampened local specialization. Two emerging areas of specialization in the local cluster were the kidney dialysis centers industry (a component of the outpatient care centers industry group) and the medical, dental, and hospital equipment and supplies merchant wholesalers industry (a component of the professional and commercial equipment and supplies merchant wholesalers industry group). Solid waste landfills, which are important for disposing of certain kinds of medical waste, were another area of emerging specialization. However, this industry is tangential to the healthcare and life sciences cluster. Table 34 details key trends for specialized industries within the local healthcare and life sciences cluster.

Table 34: Industries by Specialization, Healthcare and Life Sciences Cluster, Goochland County, 2010-2020

NAICS	Description	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change	Competitive Effect	2020 LQ	2019 GRP
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals	391	Insf. Data	Insf. Data	391	14.37	-
622210	Psychiatric and Substance Abuse Hospitals	151	(60)	(28%)	(128)	9.79	$11,335,848
562212	Solid Waste Landfill	39	Insf. Data	Insf. Data	34	8.15	$4,400,756
621492	Kidney Dialysis Centers	41	28	215%	21	2.44	$4,024,811
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	41	Insf. Data	Insf. Data	35	1.31	$6,850,784

Source: EMSI Developer 2020.2 Datarun

Regional Comparison[26]

The regional healthcare cluster is immeasurably more established and specialized compared to the local cluster. Data suggest that many counties in the GRR rely on the urban core of the Region to satisfy their healthcare needs. This is especially the case for more specialized healthcare services. The healthcare clusters of peripheral communities such as Goochland are largely underdeveloped as a result. Nevertheless, Goochland has experienced recent growth in its healthcare cluster over the past decade. Similar to other emerging local clusters, growth during this period was limited to a small number of industry groups and regionally important healthcare industries remained relatively underdeveloped in the County. This is less concerning in this instance as it is unlikely that Goochland could reasonably compete with more specialized regions. Instead, the development of niche services, such as outpatient care and geriatric and eldercare could be important opportunities for the County. The recent location of the Sheltering Arms Institute, a specialty rehabilitation hospital, represents positive momentum in the development of niche healthcare services.

Food & Beverage (Emerging Cluster)

The food and beverage cluster includes industries vested in crop and animal production, food and beverage manufacturers, and the wholesalers of these products. This cluster contains two distinct areas of specialization: animal production and support activities for animal production; and beverage manufacturing and beer, wine, and distilled alcoholic beverage merchant wholesalers (hereafter known as alcoholic beverage wholesalers). While the animal production industry has experienced continued and longstanding decline statewide, craft breweries represent a rapidly expanding market. Changing

[26] Please Consult Appendix G, Section 5 for an overview of employment, location quotient, and shift share for the regional Health Care and Life Sciences cluster.

consumer preferences have favored craft breweries over large national brewing conglomerates, according to IBISWorld. Brewery revenue is expected to decline as consumers limit spending amid the current period of economic uncertainty, however, market experts expect pent-up demand for industry products to drive growth as the economy beings to recover.[27] Large employers in the local food and beverage cluster include: Lickinghole Creek Craft Brewery, Hardywood Park Craft Brewery, and Kindred Spirit Brewing. Additionally, Greenswell Growers, a crop production firm, announced that it would be locating in Goochland County in August of 2020. This new food and beverage firm is expected to create 27 jobs and invest $17.4 million in the County.

Employment

Approximately 414 workers were employed in businesses belonging to Goochland's food and beverage cluster. This cluster saw sporadic growth from 2010-2020; 160 jobs were added between 2010-2015 and 140 jobs were eliminated between 2015-2020. Prominent industry groups in this cluster include animal production, support activities for animal production, beverage manufacturing, and alcoholic beverage wholesaling. Together, these industry groups accounted for 90% of cluster employment in 2020. The beverage manufacturing industry group led the cluster in job creation over the past decade. Alternatively, the animal production industry group saw decline. Table 35 details employment change for the local food and beverage cluster.

Table 35: Employment Change, Food and Beverage Cluster, Goochland County, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 – 2020 Change	2010 – 2020 % Change
1110	Crop Production	-	-	-	-	-
1120	Animal Production	337	320	279	(58)	(17%)
1151	Support Activities for Crop Production	17	19	20	3	18%
1152	Support Activities for Animal Production	25	20	27	2	8%
3111	Animal Food Manufacturing	-	-	-	-	-
3112	Grain and Oilseed Milling	-	-	-	-	-
3115	Dairy Product Manufacturing	-	-	-	-	-
3116	Animal Slaughtering and Processing	-	-	-	-	-
3118	Bakeries and Tortilla Manufacturing	<10	<10	<10	Insf. Data	Insf. Data
3119	Other Food Manufacturing	0	<10	<10	Insf. Data	Insf. Data
3121	Beverage Manufacturing	<10	<10	40	Insf. Data	Insf. Data
4244	Grocery and Related Product Merchant Wholesalers	<10	19	18	Insf. Data	Insf. Data
4245	Farm Product Raw Material Merchant Wholesalers	-	-	-	-	-

[27] Lombardo, Christopher. (July 2020). Breweries in the US. IBIS*World*. Retrieved from: https://my-ibisworld-com.ezproxy.lib.vt.edu/us/en/industry/31212/industry-at-a-glance

4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	<10	164	28	Insf. Data	Insf. Data
	Total	394	554	414	20	5%

Source: EMSI Developer 2020.2 Datarun

The emerging food and beverage cluster largely employs agricultural workers and related supply chain positions. Food manufacturing occupations account for a small portion of cluster jobs. Low education and experience requirements make these jobs easily attainable, however, wages for many of these positions are not competitive with occupations requiring similar credentials in the larger Region. Please visit Appendix F, Section 4 for detailed information regrading top food and beverage occupations.

Location Quotient and Gross Regional Product

Goochland's food and beverage cluster contained four industry groups with LQ values exceeding 1.0 in 2020, including: animal production (2.12); support activities for animal production (2.09); beverage manufacturing (1.14); and alcoholic beverage wholesaling (1.15). The County's food and beverage cluster generated $26.1 million in 2019, accounting for 0.8% of the County's total GRP. Table 36 details location quotient and gross regional product for the local food and beverage cluster.

Table 36: LQ & GRP, Food and Beverage Cluster, Goochland County, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
1110	Crop Production	-	-	-	-
1120	Animal Production	3.40	2.75	2.12	$9,304,270
1151	Support Activities for Crop Production	0.39	0.34	0.29	$481,593
1152	Support Activities for Animal Production	2.92	2.07	2.09	$685,615
3111	Animal Food Manufacturing	-	-	-	-
3112	Grain and Oilseed Milling	-	-	-	-
3115	Dairy Product Manufacturing	-	-	-	-
3116	Animal Slaughtering and Processing	-	-	-	-
3118	Bakeries and Tortilla Manufacturing	0.01	0.04	0.01	$25,659
3119	Other Food Manufacturing	0.00	0.23	0.08	$201,281
3121	Beverage Manufacturing	0.19	0.21	1.14	$5,661,693
4244	Grocery and Related Product Merchant Wholesalers	0.10	0.24	0.18	$4,981,185
4245	Farm Product Raw Material Merchant Wholesalers	-	-	-	-
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	0.48	8.09	1.15	$4,736,803
				Total	$26,078,098

Source: EMSI Developer, 2020.2 Datarun

Shift Share

The local food and beverage cluster was expected to add 11 jobs from 2010-2020, based on national economic performance and national industry-specific performance. Goochland exceeding expectations by 9 jobs, suggesting that the local cluster is keeping pace with national cluster growth. Growth in the County's beverage manufacturing industry group and alcoholic beverage wholesaling industry group, however, was competitive during the same period. Table 37 details shift share values for the local food and beverage cluster.

Table 37: Shift Share, Food and Beverage Cluster, Goochland County, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
1110	Crop Production	-	-	-	-	-
1120	Animal Production	65	(66)	(1)	(58)	(56)
1151	Support Activities for Crop Production	3	0	3	3	(0)
1152	Support Activities for Animal Production	5	(1)	4	2	(1)
3111	Animal Food Manufacturing	-	-	-	-	-
3112	Grain and Oilseed Milling	-	-	-	-	-
3115	Dairy Product Manufacturing	-	-	-	-	-
3116	Animal Slaughtering and Processing	-	-	-	-	-
3118	Bakeries and Tortilla Manufacturing	0	0	0	Insf. Data	0
3119	Other Food Manufacturing	0	0	0	Insf. Data	2
3121	Beverage Manufacturing	1	2	3	Insf. Data	35
4244	Grocery and Related Product Merchant Wholesalers	1	(0)	1	Insf. Data	11
4245	Farm Product Raw Material Merchant Wholesalers	-	-	-	-	-
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	1	1	2	Insf. Data	19
	Total	76	(65)	11	20	9

Source: EMSI Developer 2020.2 Datarun

Specialized Industries

Goochland's food and beverage cluster was most specialized in the six-digit breweries industry in 2020; this industry had an LQ value of 3.41. Relatedly, the beer and wine wholesalers industry had the second highest LQ within the County's food and beverage cluster at 2.13 in 2020. This is notable in that both industries had LQ values of 0.0 in 2020. These industries were also the leading source of competitiveness for the larger cluster. Animal production is another area of specialization for the County's food and beverage cluster, although this cluster experienced LQ decline from 2010-2020 alongside negative job change. More specifically, Goochland is specialized in dairies, ranking as the 13th largest milk producer in the State in 2017 according to the USDA's Census of Agriculture. Goochland was ranked as the state's 17th largest milk producer in 2012, suggesting that the County has become relatively more specialized in this area despite LQ and employment decline. Table 38 details key trends for specialized industries within the local food and beverage manufacturing cluster.

Table 38: Industries by Specialization, Food and Beverage Cluster, Goochland County, 2010-2020

NAICS	Description	2020 Jobs	2010 – 2020 Change	2010 – 2020 % Change	Competitive Effect	2020 LQ	2019 GRP
112000	Animal Production	279	(58)	(17%)	(56)	2.12	$9,304,270
115210	Support Activities for Animal Production	27	2	8%	(1)	2.09	$685,615
312120	Breweries	39	39	Insf. Data	36	3.41	$5,536,399
424810	Beer and Ale Merchant Wholesalers	28	28	Insf. Data	28	2.13	$4,736,803

Source: EMSI Developer 2020.2 Datarun

There were no crop production firms in Goochland County at the time of the analysis. Meanwhile, the regional crop production industry experienced a 43% (820 job) increase in employment from 2010-2020. While crop production is not a particular area of specialization within the GRR (0.44 LQ in 2020, Greenswell Growers' recent location announcement in Goochland marks the County's entry into this growing regional industry.

Regional Comparison[28]

Goochland's food and beverage cluster shares similarities with the regional food and beverage cluster, namely in the growing role of breweries and alcoholic beverage wholesaling in each cluster. Additionally, Goochland, the Region, and State all experienced decline in animal production employment from 2010-2020, indicating that a larger trend is at play. Overall growth and competitiveness, however, is a distinguishing factor. The regional food and beverage cluster was competitive with respect to job creation from 2010-2020, growing 28% during this period. Goochland's food and beverage cluster remained somewhat stagnant in terms of job creation during the same period. A small number of industry groups experienced moderate employment growth over the past decade, which narrowly offset losses in the County's comparatively large animal production industry group.

[28] Please consult Appendix G, Section 6 for an overview of employment, location quotient, and shift share for the regional food and beverage cluster.

Summary and Recommended Next Steps

Goochland County is advantageously located on the outskirts of the Greater Richmond Region and just southeast of the Charlottesville metropolitan area. Located along several busy transportation routes, the County has an opportunity for industry cluster development within its eastern Region where I64, US250 and SR6 fan out from SR288. Roadways will be of particular importance if the County intends to maintain its current demographic make-up, which consists of an aging population and younger workers commuting into the County for work.

The County may also want to consider complementary target markets for its growing real estate sector and accompanying white collar industries. The eastern portion of the County is set to develop retail and commercial buildings to complement existing industry and physical assets. It may also welcome housing for young professionals, beginning families, and retirees.

In the following paragraphs, OED offers suggestions for next steps and recommendations or ideas for fostering certain target industry clusters. In general, Goochland is already pursuing one of the most important steps: engaging businesses. With the information provided in this report, the County may better target its engagement and identify companies that staff may gather together for input and discussion of industry cluster needs.

Without question, Goochland's two strongest, existing industry clusters are financial services and management/corporate services. Both clusters exhibit nationally competitive employment concentration and growth, and they are larger contributors to the County's GRP. Another existing industry cluster that should be considered is the construction cluster, which is the third largest employing cluster despite its decline during 2010-2020. OED also highlighted three emerging industry clusters. These clusters—logistics, healthcare and life sciences, and food and beverage—are not current significant employing companies and do not necessarily contribute significantly to Goochland's GRP. However, considering recent industry growth in the Region and national market trends, these emerging clusters pose opportunities for the County. Goochland faces several challenges to developing each of these clusters. Virginia Tech OED will highlight some of these challenges to consider as the County moves forward.

Financial Services and Management/Corporate Services Industry Clusters

Treat financial services and management/corporate service cluster companies as anchor institutions, drawing in related companies with increased input and support for these businesses. While the two clusters are undoubtably the largest employers and contributors to GRP in the County, both financial services and management/corporate services outshine other County clusters due to the presence of single companies. The financial services cluster has been successful in the past several years thanks to the growth of Capital One in the Region and, to a lesser extent, the presence of the Federal Bank of Richmond. The manage/corporate services cluster relies mostly on CarMax for its large employment and GRP numbers.

An industry cluster is established and grows based on the agglomeration of multiple companies or organizations within on industry cluster. Thus, the biggest challenge facing Goochland may be leveraging the success of single anchor businesses to attract and grow several more, smaller organizations. Goochland County should maintain and grow relationships with these anchor institutions, engaging them in regular conversations with service partners to determine County strengths and weaknesses for fostering these two industry clusters.

Maintain and strengthen the education pipeline. As the data indicates, the Greater Richmond Region and more localized area surrounding Goochland already have a strong education pipeline. As specialized and technical education skills become ever more important to industry clusters like finance and management services, it is important for economic developers to ensure that education pipelines maintain their strength and vibrancy. This includes academic quality in K-12 schools, community colleges and four-year institutions. Maintaining the quality of education institutions is a multi-tiered approach. It not only ensures a quality labor force for existing and incoming businesses, but it also attracts additional talented workers (those wanting a good education for their children) and businesses who value talented workers to the Region.

Goochland County economic developers should connect with education programs and the regional workforce development board to determine any programmatic gaps or weaknesses that could be filled to support the financial services and management/corporate services industry clusters. In other instances, if needed, the County could consider working with the larger Region to pursue a talent attraction campaign.

Support regional infrastructure development and invest in roads and broadband in the County. Financial services and management/corporate services industry clusters rely on state-of-the-art infrastructure including roads, airports, and broadband internet. Goochland should pay particular attention to the quality of roads connecting the County to major residential centers, from which Goochland County workers commute. The more pleasant the commuting experience, that higher the likelihood of workers maintaining their current employment and lifestyle.

High speed broadband is vital to the success of financial services and management/corporate services cluster businesses. Laying more ground cables and facilitating last-mile connections for both companies and their employees is essential to attracting and growth businesses in these clusters. The Coronavirus Pandemic has placed an extreme importance on reliable home-internet access for remote work.

Encourage the development of complementary businesses that support a "live-work-play" lifestyle. Not all workers are willing to commute long distances to work, which could be a challenge for attracting businesses that rely on these workers. Given the "live-work-play" lifestyle trend for younger generations, Goochland may want to consider ways of increasing quality of life amenities for workers and residents in the far eastern portion of its County. Amenities include residential buildings for young professionals, walkability, and restaurants and recreation attractions.

Construction Cluster

Goochland's construction cluster is composed of three distinct subclusters: residential and nonresidential building construction; utility, power transmission, and other civil and heavy contractors; and construction and finishing products manufacturers. The local construction cluster is diverse and is largely reflective of regional strengths. This stands in contrast to other existing clusters in the County, which were far more centralized. Goochland and the GRR are both specialized in the utility, power transmission, and other civil and heavy contractors subcluster. The County is less specialized in the residential and nonresidential building construction compared to the Region, but has established a competitive advantage in construction and finishing products manufacturing.

The most obvious point of distinction between the regional and local construction cluster is growth. The local construction cluster saw overall employment decline over the past decade. While the construction and finishing products subcluster saw competitive growth during this period, it was thwarted by stagnancy or outright decline across larger industries belonging to the residential and nonresidential building construction and utility, power transmission, and other civil and heavy contractors subclusters. Meanwhile, the regional cluster experienced healthy, albeit noncompetitive, growth across all three subclusters. This poses a challenge to cluster development in that the decline experienced across the cluster must first be addressed. If left unchecked, it could further erode the local construction cluster as consumers look to more specialized counties in the GRR to satisfy needs no longer met in Goochland.

Moreover, Goochland's construction cluster appears to be relatively developed; many construction industries are already represented in the local economy, especially those that correspond with regional strengths. Targeting industries outside of Goochland's core strengths could be a risky endeavor when considering the precarious nature of the national construction market. Simply put, the national construction cluster is among the most responsive to broad economic changes, making it volatile and susceptible to "boom and bust" cycles, especially at the local level. This undermines the sustainability aspect of cluster development in that what is "in-demand" today could very well shift over the next five-year period. This is especially relevant to Goochland and the GRR considering that many of the industries that comprise the local and regional construction clusters are positioned higher up on the construction cluster value-chain. The success of these industries is reliant on the success of others positioned lower on the value-chain, which makes them more vulnerable to frequent market changes.

Therefore, Goochland should harness its strength in business retention and expansion to correct potentially corrosive trends observed in the County's construction cluster. Strategies could include:

Engaging businesses to identify ways of supporting the cluster. As mentioned above, Goochland's construction cluster includes a wide array or interrelated construction firms. An important step towards remedying decline could be engaging with local businesses to identify challenges to growth. Engaging businesses by industry, industry group, or subcluster could provide a better understanding of trade-specific challenges, although past experience suggests that many industries in this field experience similar difficulties. "On-the-ground" information gleaned from this process can be used to either modify and nuance existing support strategies or develop new strategies to support local construction businesses.

Encouraging talent development and entrepreneurial specialization could help existing businesses expand and create new construction businesses. Construction technology is rapidly changing. Trends include: modular construction off-site; 3d printing; sustainable materials and green building; and robotics. These changes pose opportunities for specialization for individual businesses, however, require access to financial capital and human capital. Specifically, new technology is largely inaccessible to businesses with cash-flow or credit issues. Additionally, these new trends entail the development of a talented labor force with technical skill sets. Recent economic uncertainty could pose a barrier to securing credit, especially for construction businesses. Regional education and training programs for middle-skill professions are also limited.[29] Goochland County could facilitate relationships and ways of

[29] EMSI Developer 2020.2 Datarun

supporting entre-/intrapreneurial development among businesses to meet market trends such as creating a talent pipeline or offering access to technical expertise and capital.

Logistics Cluster

Take advantage of transportation connectivity and national market trends to grow this emerging logistics cluster. When examining industry growth and strengths for Goochland in wholesale and logistics, the County is fortunately connected to several major transportation routes in the Region that would facilitate the growth of this cluster. Opportunities emerge particularly with respect to electronic shopping distribution, wholesale trade agents and brokers, and wholesale and commercial warehousing and distribution of household appliances and machinery. When considering the county's strength in trade agents and brokers, this cluster may connect directly to the management services cluster already present in the county (i.e freight transportation arrangement and regional managing firms). In Table 39, some of the key industries described as prime targets for growth are all GRR strengths, as illustrated by the industries' contribution to regional employment, GRP, and location quotient.

Table 39: Goochland Logistics Cluster Industries

NAICS	Description	2020 Jobs	2010 - 2020 % Change	2020 LQ	Competitive Effect	Regional Jobs
4251	Wholesale Electronic Markets and Agents and Brokers	161	257%	2.23	129	2,559
4921	Couriers and Express Delivery Services	141	538%	1.04	99	6,764
4543	Direct Selling Establishments	116	28%	0.75	9	6,284
4841	General Freight Trucking	115	8%	0.55	(17)	7,275
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	97	153%	2.30	54	1,481
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	91	565%	1.06	75	3,378
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	63	458%	0.77	51	2,665
4884	Support Activities for Road Transportation	61	Insf. Data	3.56	56	759
		845	155%		456	

Source: EMSI 2021.1 Datarun

Moreover, the national logistics industry is changing. As demand for same-day and next-day delivery increases in metropolitan areas, businesses are beginning to expand their distribution networks to encompass smaller warehousing and distribution nodes. They are exploring more efficient ways of last-mile distribution (e.g. courier services and delivery drones). Thus, demand for commercial real estate for class-A warehouses to serve as final-mile distribution centers near large population centers continues to grow with the Coronavirus pandemic, and the growth is projected to continue.[30] Goochland could easily serve as such a node for the GRR and a more distant node for the Charlottesville metropolitan Region.

The following are a few recommendations to consider if Goochland wished to support this emerging industry:

- Talk with businesses in manufacturing, management and business services to determine relational connections and gaps with the emerging logistics industry cluster. Findings may offer opportunities for cluster growth;
- Analyze the state of the transportation infrastructure of the County and identify ways of improvement particularly with respect to larger, distribution vehicles;
- Identify and invest in easily accessible land for warehousing and distribution;
- Support distribution businesses by increasing prevalence of commercial drivers licenses and training among workers in the larger region;
- Fast moving consumer good distributors in particular prefer collocating and interacting/collaborating with non-competitor distributors. Creating opportunities for the firms to interact and build a strong regional community could initiate the growth of the cluster and attract more firms;[31]
- Create and support policies that might support the growth of smaller, entrepreneurial technology firms meant to disrupt the logistics industry. For instance, offering space and opportunities to support the nascent delivery drone industry, unmanned systems and robotics related to warehousing and distribution could give the region a competitive advantage in the future.

Healthcare and Life Sciences Cluster

One opportunity for Goochland County could be to grow and supplement the GRR healthcare cluster. One potential niche for the County could be residential and rehabilitation care. Although this cluster is distinctly small compared to the larger regional cluster and the current industry data does not reflect the most recent industry activity, the healthcare cluster has seen growth in the past decade. Several distinct and unique employers have grown roots in the Region. With an aging population in Goochland and the continued drug epidemic in the state, a healthcare and life science cluster centered on residential and rehabilitation care, perhaps palliative care, could be a great opportunity for the County. Again, Goochland has good transportation networks. Some next steps the County might take are engaging current and potential cluster businesses to identify other ways the County could make itself more attractive to industry cluster businesses.

While county data does not yet reflect several of the facilities recently opened in this cluster, regional industry trends can shed light on regional strengths to leverage moving forward. In Table 40, some of the key industries described as prime targets for growth are all GRR strengths, as illustrated by the industries' contribution to employment, GRP, and location quotient.

[30] CBRE Research (Aug 2020). Global Real Estate Market Outlook 2020. Retrieved from: https://www.cbre.com/research-and-reports/Global-Real-Estate-Market-Outlook-Midyear-Review-July-2020.

[31] Abushaidkha, I. (June 2018) "The influence of logistics clustering on distribution capabilities: a qualitative study." *International Journal of Retail & Distribution Management.*

Table 40: Greater Richmond Region Healthcare Industry Data

NAICS	Description	2020 Jobs	2010 - 2020 % Change	2020 LQ	Competitive Effect	2019 GRP
3254	Pharmaceutical & Medicine Manufacturing	994	-4%	0.74	-182	$335,518,468
3332	Industrial Machinery Manufacturing	496	-8%	0.90	-176	$58,935,680
3345	Navigational, Measuring, Electromedical, & Control Instruments Manufacturing	141	19%	0.08	16	$28,339,397
3391	Medical Equipment & Supplies Manufacturing	314	-2%	0.21	-40	$45,483,936
4234	Professional & Commercial Equipment & Supplies Merchant Wholesalers	2,822	-15%	0.94	-986	$584,992,077
4461	Health & Personal Care Stores	5,291	16%	1.00	199	$261,016,874
5417	Scientific Research & Development Services	2,838	31%	0.81	148	$444,780,290
5622	Waste Treatment & Disposal	356	-37%	0.82	-234	$48,174,249
6214	Outpatient Care Centers	4,521	64%	0.99	-212	$417,778,020
6215	Medical & Diagnostic Laboratories	2,402	49%	1.77	371	$237,123,708
6216	Home Health Care Services	6,749	17%	0.76	-1,551	$242,078,775
6219	Other Ambulatory Health Care Services	1,636	20%	0.99	-64	$110,035,307
6221	General Medical & Surgical Hospitals	22,722	9%	1.11	-446	$1,964,256,692
6222	Psychiatric & Substance Abuse Hospitals	985	-4%	1.74	-370	$53,179,066
6223	Specialty -except Psychiatric & Substance Abuse Hospitals	746	-23%	0.71	-442	$58,897,433
6231	Nursing Care Facilities - Skilled Nursing Facilities	4,840	5%	0.71	398	$239,828,233
6232	Resident. Intellect. & Dev. Disability, Mental Health, & Substance Abuse Facilities	2,657	56%	0.86	625	$88,433,229
6233	Cont. Care Retirement Communities & Assisted Living Facilities for Elderly	6,284	22%	1.41	-634	$251,042,284
6239	Other Residential Care Facilities	1,697	-11%	2.26	-269	$74,022,143

Total		2%		-3,848	

The following are a few recommendations to consider if Goochland wished to support this emerging industry:

- Work with regional community colleges and universities to support and grow programs that would ensure a qualified workforce in this field.
- Convene businesses in this industry to explore ways that the county may help their industry to grow in the region.
- Support judiciary efforts to make legal consequences of substance use disorder and mental health disorders less punitive and more recovery-oriented. For instance, support the growth of drug courts. By actively supporting this legal transition, the county would be helping to create a larger market for healthcare services in this cluster.
- Similarly, support and promote marketing campaigns that reduce certain stigmas that may prevent individuals from seeking industry services; for example, stigmas against substance use disorder or aging.
- Identify ways of facilitating access to healthcare services for elderly and vulnerable populations. For example, developing accessible pedestrian walkways, transportation services, parks and other public space for living and aging in place in a healthy manner.

Food and Beverage Cluster

Supporting the food and beverage cluster would align with several County goals including maintaining a largely rural County and increasing overall GRP. The food and beverage cluster entails three characteristics that may appeal to Goochland County leaders. First, supporting food and beverage production entails that much of the land in Goochland retain its historical farmland and rural nature. Goochland officials may want to focus on specialty crop production such as fruits, vegetables, hops, etc; in other words, encourage production of crops that can be made into value-added products or have high returns on investment. Second, growth of this cluster aligns with larger market trends that will facilitate growth of other related clusters. In particular, encouraging a food and beverage cluster would support:

- Tourism, which may increase GRP;
- Financial and management services clusters described in this report, which rely on workers that value quality of life amenities like breweries and commercial food and beverage facilities; and
- The logistics cluster through wholesale distribution of groceries.

Third, food and beverage clusters are most successful with strong manufacturing and distribution companies. If the County wishes to increase overall revenue and GRP, manufacturing companies offer the greatest economic impact in terms of GRP and tax revenue. As seen in Table 41, many of the stronger regional industries highlighted, also support the above arguments.

Table 41: Greater Richmond Region Food and Beverage Industry Data

NAICS	Description	2020 Jobs	2010 - 2020 % Change	2020 LQ	Competitive Effect	2019 GRP
1110	Crop Production	2,727	43%	0.44	823	$99,094,806
1120	Animal Production	882	-42%	0.18	-642	$31,208,924

1151	Support Activities for Crop Production	495	67%	0.19	133	$14,656,476
1152	Support Activities for Animal Production	208	0%	0.43	-32	$6,009,260
3111	Animal Food Manufacturing	58	107%	0.20	21	$9,089,628
3112	Grain and Oilseed Milling	106	-32%	0.40	-61	$32,983,287
3115	Dairy Product Manufacturing	11	-	0.02	7	$769,149
3116	Animal Slaughtering and Processing	1,028	12%	0.45	13	$65,139,838
3118	Bakeries and Tortilla Manufacturing	1,184	18%	0.78	-28	$137,233,137
3119	Other Food Manufacturing	812	61%	0.72	51	$167,117,993
3121	Beverage Manufacturing	1,285	442%	0.98	876	$234,946,175
4244	Grocery and Related Product Merchant Wholesalers	3,466	15%	0.97	61	$404,295,872
4245	Farm Product Raw Material Merchant Wholesalers	76	-26%	0.22	-25	$13,733,205
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	1,581	68%	1.72	372	$241,683,821
	Total	10,852	13,916	7%	12,398	2,499

The following are a few recommendations to consider if Goochland wished to grow this emerging industry:

- Convene farmers, manufacturers and other businesses in this potential cluster to explore their needs and ways in which county government may support their growth.
- Small businesses often fail due to regulatory and basic business management hurdles. Those in the food and beverage industry cluster have an added, very cumbersome layer of government hurdles because of the health and safety issues related to their industry. Goochland could work with those knowledgeable in the industry such as Virginia Cooperative Extension agents to develop expertise that would support entrepreneurs and small businesses wishing to start and grow food and beverage businesses in Goochland.
- Identify regional resources for food and beverage businesses such as commercial kitchens, incubators, and other farming and business services.
- Talk with and be aware of opportunities offered by the Virginia Department of Agriculture and Consumer Services (VDACS). For instance, VDACS offers planning and implementation grants that can help communities examine and leverage opportunities for growing agriculture and food related industries (e.g. feasibility and business planning studies).
- Work with local cluster businesses to better market their goods online, through traditional distribution networks, and through tourism channels (e.g. regional agritourism maps for visitors).

Appendix A: Definitions

1. Clusters and Subclusters

A cluster is defined as "…a regional concentration of related industries in a particular location."[32]Clusters broadly include firms vested in the production or provision of a good or service as well as suppliers, research, development, and technical support firms, and, in some cases, regulatory bodies and institutions of higher education. According to the BEA, clusters are created when the density of related industries or economic activity reaches a "critical mass" where firms begin to enjoy location certain location advantages. These advantages include the development of regional industry-specific supply chains, a specialized labor pool, and support from regional agencies and institutions. Overall, clusters bolster regional specialization and competitiveness and are important for driving job creation and private investment.

Industry clusters are classified into two broad groups: traded clusters and local clusters. Traded clusters are groups of related industries that serve markets outside of their Region. These clusters not only compete in their respective regional markets, but also in markets across the nation. Additionally, in that these regions serve national and international markets, they are not bound to any particular Region. Instead, these clusters carefully select locations that offer specific location advantages, such as those offered by clusters. Local clusters differ from traded clusters in that they primarily serve the market in which they are located. Employment in these clusters tends to be proportional to the Region's population. Finally, these clusters largely do not compete with out-of-Region firms. No cluster is purely traded or purely local, rather, most clusters offer a mix of traded and local elements while favoring one of these structures.

Some industry clusters, such as construction and manufacturing, are broad and contain an array of diverse industry groups. In this case, clusters can be divided into subclusters, which further group related industries within a particular cluster. Subclusters are important for isolating distinct areas of specialization within larger clusters.

2. NAICS Terminology[33]

The North American Industry Classification System (NAICS) is a used by federal statistical agencies to classify and group businesses. Businesses are grouped based on their primary function. For example, two manufacturing firms would be grouped into the manufacturing sector. NAICS uses a hierarchical structure, containing five categories, which range from least specific (sector) to most specific (national industry):

- **Sector** (2-Digit Code)
  - **Subsector** (3-Digit Code)
    - **Industry Group** (4-Digit Code)
      - **NAICS Industry** (5-Digit Code)
        - **National Industry** (6-Digit Code)

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[32] U.S. Economic Development Administration. "Clusters 101." Retrieved from: http://clustermapping.us/content/clusters-101

[33] United States Census Bureau, "NAICS Codes," Retrieved from: https://www.census.gov/programs-surveys/economic-census/guidance/understanding-naics.html

Sectors are the broadest groupings and contain the most individual businesses and industries. There are 21 two-digit sectors that group businesses into broad categories such as agriculture, manufacturing, healthcare, etc. For example, the 2-digit manufacturing sector contains beverage manufacturing firms and steel manufacturing firms and foundries, amongst many others. The commonality between these two firms is manufacturing, so they are both grouped within the same general sector. Three-digit subsectors are smaller components of sectors that divide individual industries into slightly more specific categories. To keep with our previous example, a beverage manufacturing firm would be grouped into the 3-digit beverage and tobacco manufacturing subsector while a foundry would be grouped into the primary metal manufacturing subsector.

Similarly, 4-digit industry groups classify establishments under an even more specific activity. For example, a beverage manufacturing firm would be grouped in the more specific beverage manufacturing industry group and a foundry would be grouped in the iron and steel mills and ferroalloy manufacturing industry group. Industry groups are important components of the NAICS structure in that they group a manageable number of similar industries into relatively specific industry groups and represent an analytical "sweet spot" in this classification system. Four-digit NAICS codes are the primary unit of analysis for this document.

Five-digit NAICS industries and 6-digit national industries are the most specific NAICS classifications. These two categories group firms engaged in very similar or identical activities. For example, the 4-digit beverage manufacturing industry group contains four 5-digit NAICS industries, including soft drink and ice manufacturing, breweries, wineries, and distilleries. More specifically again, the five-digit soft drink manufacturing NAICS industry contains three six-digit industries: soft drink manufacturing, bottled water manufacturing, and ice manufacturing. Six-digit NAICS codes are the secondary unit of analysis for this document.

Overall, the NAICS structure groups smaller numbers of industries into more specific classifications as the number of "digits" increases. NAICS 3, 4, 5, and 6-digit codes can be thought of as the building blocks of two-digit sectors. For example, 2-digit sectors are composed of 3-digit subsectors; 3-digit subsectors are composed of 4-digit industry groups, and so on. Table 1A further details the NAICS structure.

Table 1A: 2012 North American Industry Classification System Structure

NAICS Structure	Example 1: Soft Drink Manufacturing
Sector (2-Digit)	31-Manufacturing
Subsector (3-Digit)	312-Beverage and Tobacco Manufacturing
Industry Group (4-Digit)	3121-Beverage Manufacturing
NAICS Industry (5-Digit)	31211-Soft Drink and Ice Manufacturing
National Industry (6-Digit)	312111-Soft Drink Manufacturing

Source: United States Census Bureau

3. Standard Occupational Classification[34]

Similar to NAICS, the Standard Occupation Classification (SOC) is a federal statistical standard used to classify and group workers. Similar again, SOC uses a hierarchical system. There are 23 two-digit SOC groups that classify workers into broad categories, such as healthcare workers, production workers, etc. There are 98 three-digit minor groups that group workers into more specific categories. Finally, there are 459 four-digit broad occupations and 867 five-digit detailed occupations that group workers into increasingly more specific categories.

While NAICS and SOC can both be used to count employment, there are distinct differences between these two statistical standards. The most important difference between these two statistical standards is the way in which employment is counted. NAICS counts employment at the establishment level. For example, if a soft drink manufacturing firm employed 350 people, all 350 jobs would be counted within the six-digit soft drink manufacturing NAICS group. SOC, however, counts individual workers across all establishments. For example, machine operators within the same beverage manufacturing firm would be counted alongside all other machine operators across all firms within a local economy. Simply put, NAICS considers all employees within a single firm when counting industry employment. SOC however, considers individual workers with similar responsibilities across all firms in counting occupational employment.

4. Location Quotient (LQ)

A measure of the concentration of an industry within a Region compared to the national average.

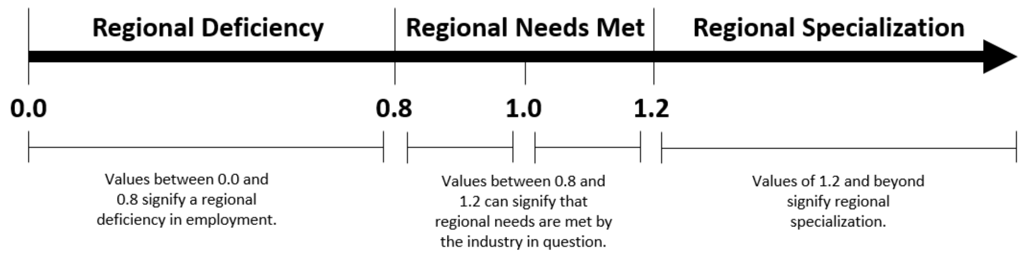
To calculate LQ for a given industry:

1. Find the percentage of industry jobs in the regional economy: $R = \frac{Jobs\ in\ industry\ X\ in\ region}{Total\ jobs\ in\ region}$
2. Find the percentage of industry jobs in the national economy: $N = \frac{Jobs\ in\ industry\ X\ in\ U.S.}{Total\ jobs\ in\ U.S.}$
3. Divide R by N to get the ratio of jobs in the Region compared to the nation: $LQ = \frac{R}{N}$

An LQ value of 1.0 signifies a) that the concentration of an industry in a Region is typical of all regions of the United States and b) that local production meets local demand for the industry's goods or services. LQ values greater than 1.2 suggest that a Region is specialized in that industry (net exporter), while a value of less than 0.8 suggest that a Region relies on other regions to meet local demand (net importer). Figure 2 visualizes LQ values.

[34] U.S. Bureau of Labor Statistics. "Standard Occupational Classification." Retrieved from: https://www.bls.gov/soc/

Figure 1A: Location Quotient



Source: EMSI "Understanding Location Quotients"

5. Gross Regional Product (GRP)

GRP is a measure of the final market value of all goods and services produced in a Region.

$$GRP = Earnings + Taxes + Profits - Subsidies$$

Gross Regional Product is a scaled-down version of Gross Domestic Product (GDP), the metric used to calculate national economic output. GRP is the sum of 4 values across all businesses and industries in a Region:

1. **Earnings**: the total "take-home pay", including wages, salaries, benefits, bonuses, and owner income.
2. **Taxes**: the total amount paid to the government, including property taxes, sales taxes, excise taxes, and licensing fees.
3. **Profits**: Remaining income after paying earnings and taxes.
4. **Subsidies**: Money from government to businesses. This value is *subtracted* because it is paid for by taxes, which have already been counted.

6. Shift Share[35]

A series of 4 measures that attribute change in regional employment to national, industry, and local factors.

1. **National Growth Effect**: An estimate of regional industry jobs gained or lost based only on overall national growth. For example, when the national economy grows or shrinks by 5%, NGE assumes that regional industry jobs will grow or shrink by the same amount.

$$NGE = National\ growth\ rate\ (\%) \times Jobs\ in\ industry\ X\ in\ region$$

2. **Industrial Mix Effect**: Not all industries experience national growth or decline equally, however. IME focuses on the change *within* the industry being studied by comparing the industry growth rate to the national growth rate *before* estimating jobs gained or lost.

$$Industry\ growth\ rate\ (\%) - National\ growth\ rate\ (\%) = Industry\ Premium$$

[35] EMSI, "Understanding Shift Share." Retrieved from: https://kb.emsidata.com/methodology/all-about-shift-share/

$$IME = Industry\ Premium\ \times Jobs\ in\ industry\ X\ in\ region$$

3. **Expected Change**: Adding together the NGE and IME gives a more accurate estimate of the number of jobs a Region should expect to gain or lose for an individual industry based on national and industry trends.

$$Expected\ Change = NGE + IME$$

4. **Competitive Effect**: Compares the actual change in jobs to the Expected Change, revealing unique regional patterns of competitiveness.

$$Competitive\ Effect = Actual\ Change - Expected\ Change$$

Shift share utilizes these values to compare job change for a particular regional industry to job change for the larger national industry. This comparison is important for contextualizing regional job growth and understanding areas of regional competitiveness.

First, shift share analyzes national industry growth based on two factors: national growth effect (NGE) and industrial mix effect (IME). As mentioned above, NGE shows the amount of jobs created or eliminated in an industry due to national economic growth. Similarly, IME shows the amount jobs created or eliminated in and industry due to national industry-specific performance. These two metrics are combined to arrive at expected change, which is the amount of jobs change that could be expected in a Region based on national economic performance and industry-specific performance.

Expected change is compared to actual change to arrive at competitive effect. As mentioned above, competitive effect indicates what amount of job change is a result of local competitive advantages. Competitiveness is achieved when actual change exceeds expected change, yielding a positive competitive effect value. Alternatively, an expected change value that exceeds actual change is indicative of low competitiveness and yields a negative competitive effect value.

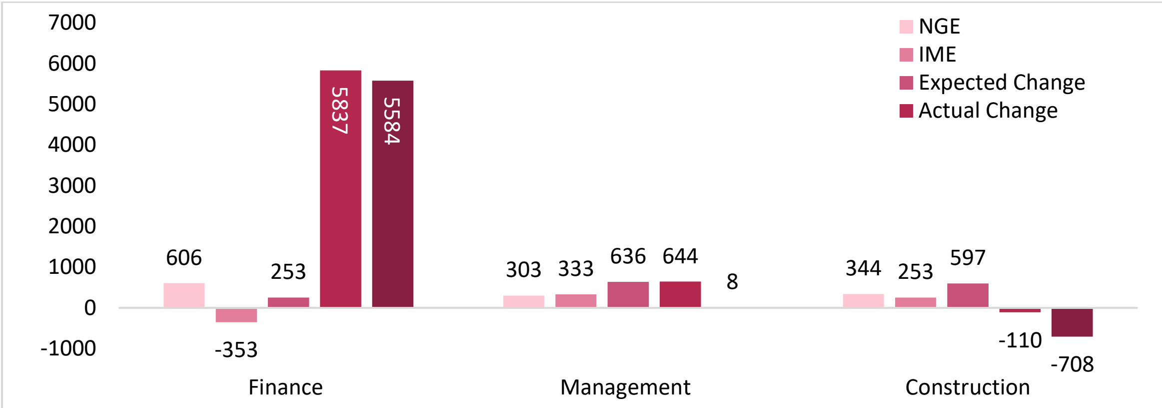
Example: Shift Share in Goochland's Primary Clusters

Goochland's financial services cluster is a strong example of high regional competitiveness. First, it is important to note that this cluster saw a relatively high NGE value and negative IME value from 2010-2020. The combination of these values yielded an expected change value of 253 jobs during this period. The local financial services cluster saw the creation of 5,837 jobs from 2010-2020, yielding a competitive effect value of 5,584 jobs. This suggests that 5,584 jobs were created due to regional competitive advantages over the past decade.

Goochland's management cluster is an example of a cluster that is performing on par with the national management cluster. Positive NGE and IME values yielded an expected change of 636 jobs from 2010-2020. Goochland's management cluster created 644 jobs during this period, yielding a competitive effect of eight. A neutral competitive effect, such as that of the local management cluster, indicates that an industry is keeping pace with the nation, however, is neither competitive or noncompetitive.

Finally, Goochland's construction cluster is an example of an industry that is not competitive. This industry saw an expected change of 597 jobs from 2010-2020. The construction cluster eliminated 110 jobs during this period, yielding a competitive effect of -708. This suggests that the regional cluster is not keeping pace with the growing national cluster and is therefore not competitive. Figure 2A visualizes shift share values for these three clusters.

Figure 2A: Shift Share, Primary Clusters, Goochland County, 2010-2020



Source: EMSI Developer 2020.2 Datarun

Appendix B: Regional Demographics

1. Population Change

Fourteen of the 17 localities in the GRR saw growth from 2010-2020, with an average of 6.2% across the Region. Overall, the GRR saw 9.9% (119,578) growth from 1,209,932 people in 2010 to 1,329,511 in 2020. New Kent County (26.3%), the City of Richmond (14.4%), and Chesterfield County (12.4%) saw the highest rates of population growth during this period. Much of the overall growth experienced in this Region can be attributed to small number of counties. Growth in Chesterfield, Richmond, Henrico, and Hanover, for example, accounted for 88% of the 119,578-person growth across the Region. Goochland saw the fifth highest population growth of the 17 cities and counties in the GRR. Table 2A details population change for each GRR locality from 2010-2020.

Table 2A: Population Change, Greater Richmond Region, 2010-2020

	2010	2020	Change	% Change
New Kent	18,544	23,417	4,873	26.3%
Richmond	204,242	233,732	29,490	14.4%
Chesterfield	317,211	356,556	39,345	12.4%
Hanover	99,902	109,563	9,661	9.7%
Goochland	**21,747**	**23,830**	**2,083**	**9.6%**
Caroline	28,642	31,377	2,735	9.5%
Henrico	307,330	333,810	26,480	8.6%
King William	16,000	17,304	1,304	8.2%
Prince George	35,644	38,424	2,780	7.8%
Powhatan	28,121	29,530	1,409	5.0%
Colonial Heights	17,339	17,987	648	3.7%
Amelia	12,747	13,158	411	3.2%
Dinwiddie	28,054	28,773	719	2.6%
Hopewell	22,643	22,733	90	0.4%
Petersburg	32,496	31,338	-1,158	-3.6%
Charles City	7,259	6,922	-337	-4.6%
Sussex	12,011	11,057	-954	-7.9%
Total	**1,209,932**	**1,329,511**	**119,578**	**9.9%**

Source: EMSI Developer, 2020.2 Datarun

2. Age

Goochland had the second highest median age in the GRR, only behind Charles City County (50.3 median age) in 2018. Additionally, Goochland saw the fourth highest increase in median age from 2010, suggesting the County's population is aging at a rate faster than the GRR. The average increase in median wage for the 17 GRR localities was 1.3 years, with four localities (Sussex, Prince George, Petersburg, and Colonial Heights) seeing a reduction in median age over this period. Table 2 details changes in median age for all GRR localities.

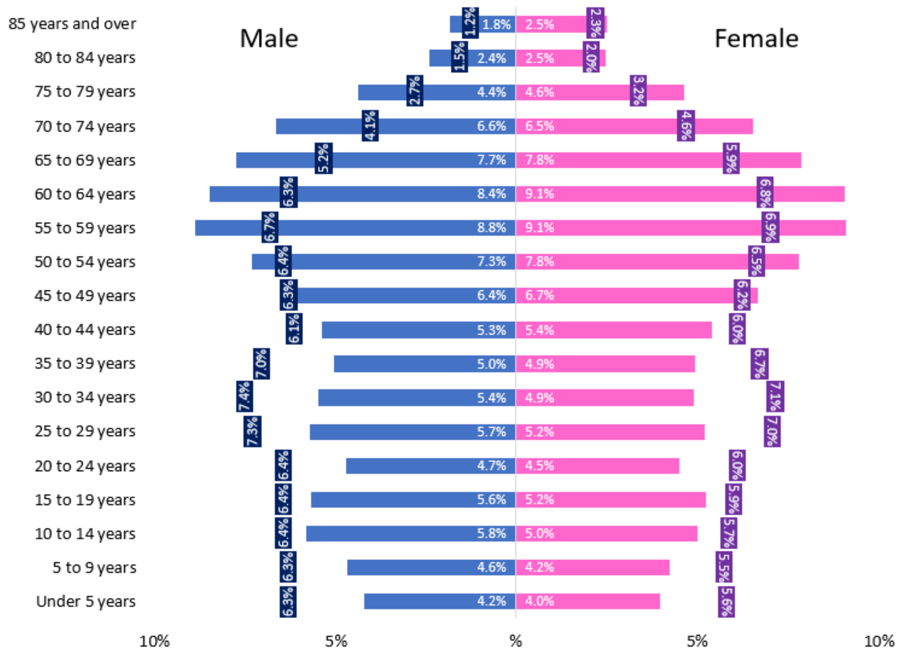
Table 3A: Median age, Greater Richmond Region, 2010-2018

	2010			2018			Change 2010-2018		
	Avg.	Male	Female	Avg.	Male	Female	Avg.	Male	Female
Amelia	42.7	41.6	43.9	46	41.4	49.3	3.3	-0.2	5.4
Caroline	38.9	38.4	39.5	40	39.2	40.5	1.1	0.8	1.0
Charles City	46.6	45.9	47.2	50.3	49.6	51.4	3.7	3.7	4.2
Chesterfield	37.6	36.3	38.8	38.8	37.4	40.1	1.2	1.1	1.3
Colonial Heights	41.9	39.6	43.9	40.3	37.5	43.2	-1.6	-2.1	-0.7
Dinwiddie	40.7	39.7	41.6	43.2	41.7	44.1	2.5	2.0	2.5
Goochland	**45.2**	**44.5**	**45.7**	**48.3**	**46.7**	**49.6**	**3.1**	**2.2**	**3.9**
Hanover	41.0	39.8	42.2	42.9	41	44.2	1.9	1.2	2.0
Henrico	37.5	35.6	39.1	38.5	36.7	40.2	1.0	1.1	1.1
Hopewell	36.5	34.6	38.3	36.5	34.6	37.7	0.0	0.0	-0.6
King William	39.4	38.7	40.0	41.4	39.9	42.6	2.0	1.2	2.6
New Kent	42.4	41.8	43.2	43.7	42	44.6	1.3	0.2	1.4
Petersburg	39.8	37.0	42.1	38.7	36.2	41.3	-1.1	-0.8	-0.8
Powhatan	41.6	40.5	42.8	45.1	43.6	47.4	3.5	3.1	4.6
Prince George	38.0	37.3	39.1	37	36.4	38.4	-1.0	-0.9	-0.7
Richmond	32.0	31.3	32.7	33.8	33.2	34.4	1.8	1.9	1.7
Sussex	40.6	37.4	45.7	39.8	37.1	47.8	-0.8	-0.3	2.1
Average	**40.1**	**38.8**	**41.5**	**41.4**	**39.7**	**43.3**	**1.3**	**0.8**	**1.8**

Source: 2010 Decennial Census; 2018 American Community Survey

Goochland's higher than average median age can be at least partially explained by the County's relatively large and growing 50-and-older population. Goochland had proportionally fewer young people compared to the GRR, however, several cities and counties in this Region skew population data towards a younger average. Nevertheless, the composition of age in Goochland County favors older populations. Figure 4A illustrates the composition of age in Goochland County compared to the Greater Richmond Region. Please note that the darker colored bars represent the composition of age in the GRR.

Figure 4A : Sex by Age, Goochland County and Greater Richmond Region, 2020



Source: EMSI Developer, 2020.2 Datarun

While Goochland has enjoyed some of the Region's recent growth in younger age cohorts, this growth was outpaced by more significant increases in the County's older residents. Goochland saw a 2,896-person (42%) increase in the 55-and-older age cohort from 2010-2018. Additionally, the 70-74 and 75-79 age cohorts nearly doubled in population during this period. Data also suggest that families and older professionals may be out-migrating. The 35-54 cohort saw a 1,482-person (-20%) reduction from 2010-2020. Additionally, 263 (-7.4%) children aged 14 and under left the County during this period. Goochland, however, appeared to be retaining and attracting young professionals. Goochland saw healthy increases in its 15-24 demographic and its 25-34 demographic, growing 19.9% and 27.1% from 2010-2020, respectively. Table 4A details changes in Goochland's population by age cohort.

Table 4A: Population by Age, Goochland County, 2010 & 2020

	2010	2020	Change	% Change
Under 5 years	998	970	-28	-3%
5 to 9 years	1,227	1,057	-170	-14%
10 to 14 years	1,347	1,282	-65	-5%
15 to 19 years	1,200	1,295	95	8%
20 to 24 years	792	1,093	301	38%
25 to 29 years	870	1,292	422	49%
30 to 34 years	1,113	1,229	116	10%
35 to 39 years	1,444	1,185	-259	-18%
40 to 44 years	1,747	1,280	-467	-27%
45 to 49 years	2,031	1,554	-477	-23%
50 to 54 years	2,075	1,796	-279	-13%
55 to 59 years	1,868	2,132	264	14%
60 to 64 years	1,735	2,086	351	20%
65 to 69 years	1,256	1,852	596	47%
70 to 74 years	793	1,563	770	97%
75 to 79 years	568	1,071	503	89%
80 to 84 years	374	577	203	54%
85 years and over	307	517	210	68%

Source: EMSI Developer, 2020.2 Datarun

Changes in the composition of age in Goochland County were largely reflected in the GRR. Both areas saw decline in the 40-44, 45-49, and 50-54 cohorts, although Goochland experienced decline in these age groups at double-to-triple of that of the GRR. As noted above, Goochland has a higher-than-average median age and experienced median age growth at the third fastest rate of GRR localities. While both areas experienced considerable growth in 55-and-over cohorts, Goochland saw higher growth in the 70-74, 75-79, 80-84, and 85-and-over cohorts. Table 5A compares changes in age across Goochland and the GRR over the past decade.

Table 5A: % Population Change by Age, Goochland County and GRR, 2010 & 2020

	Goochland	Greater Richmond
Under 5 years	-3%	6%
5 to 9 years	-14%	1%
10 to 14 years	-5%	2%
15 to 19 years	8%	-5%
20 to 24 years	38%	-2%
25 to 29 years	49%	15%
30 to 34 years	10%	25%
35 to 39 years	-18%	13%
40 to 44 years	-27%	-6%
45 to 49 years	-23%	-12%
50 to 54 years	-13%	-6%
55 to 59 years	14%	11%
60 to 64 years	20%	26%
65 to 69 years	47%	55%
70 to 74 years	97%	75%
75 to 79 years	89%	54%
80 to 84 years	54%	15%
85 years and over	68%	20%

Source: EMSI Developer, 2020.2 Datarun

3. Household Income

Goochland had the highest median and mean household income in the GRR for 2018. The GRR had an MHI of $66,258 and an AHI of $88,633 for this year. Household income in Goochland was most comparable to neighboring GRR localities. For instance, neighboring Hanover County was the second most affluent in the Region with an MHI of $88,652 and neighboring Powhatan County had the third highest MHI at $83,914. Table 6A details MHI and AHI for GRR localities.

Table 6A: Household Income, GRR, 2018

	Median Household Income	Average Household Income
	2018	2018
Amelia	$58,526	$74,185
Caroline	$64,715	$82,975
Charles City	$59,192	$89,844
Chesterfield	$80,214	$98,678
Dinwiddie	$55,880	$70,153
Goochland	**$89,741**	**$126,796**
Hanover	$88,652	$105,579
Henrico	$68,572	$93,759
King William	$68,720	$84,546
New Kent	$79,698	$95,882
Powhatan	$83,914	$98,807
Prince George	$67,001	$84,555
Sussex	$45,801	$54,770
Colonial Heights	$53,716	$67,430
Hopewell	$40,497	$53,391
Petersburg	$36,135	$50,193
Richmond	$45,117	$71,732
GRR	$66,258	$88,652

Source: American Community Survey

Appendix C: Regional Workforce

1. Employment Growth

Goochland saw higher overall employment growth from 2010-2020 compared to the GRR and Virginia. Virginia, for instance, saw a slight decline in employment in 2010, however quickly recovered in following years. The State saw overall employment growth at 15.5% from 4.74 million jobs in 2010 to 5.74 million jobs in 2020. Similar to the State, the GRR also experienced slight decline in employment in 2010. Nevertheless, this Region experienced 18.9% growth from 737,385 jobs in 2010 to 876,554 in 2020. All three areas are expected to see continued employment growth over the next five years, albeit at slower rates. Table 7A details changes in overall employment from 2010 to 2020 for Goochland, the GRR, and Virginia.

Table 7A: Overall Employment Growth, Goochland County, GRR, and Goochland Region 2010-2025

	Goochland		GRR		Virginia	
	Jobs	% Growth	Jobs	% Growth	Jobs	% Growth
2010	14,764	0.8%	737,385	-0.7%	4,739,569	-0.2%
2011	15,029	1.8%	749,978	1.7%	4,802,876	1.3%
2012	15,735	4.7%	761,236	1.5%	4,852,234	1.0%
2013	16,475	4.7%	769,684	1.1%	4,883,927	0.7%
2014	17,995	9.2%	780,648	1.4%	4,930,742	1.0%
2015	19,130	6.3%	803,918	3.0%	5,038,909	2.2%
2016	20,205	5.6%	818,959	1.9%	5,124,706	1.7%
2017	21,028	4.1%	838,251	2.4%	5,218,647	1.8%
2018	21,458	2.0%	850,359	1.4%	5,311,918	1.8%
2019	22,503	4.9%	860,804	1.2%	5,377,779	1.2%
2020	23,491	4.4%	876,554	1.8%	5,474,261	1.8%
2021	24,300	3.4%	889,507	1.5%	5,553,875	1.5%
2022	24,944	2.7%	899,386	1.1%	5,615,451	1.1%
2023	25,537	2.4%	908,992	1.1%	5,674,828	1.1%
2024	25,899	1.4%	915,386	0.7%	5,714,565	0.7%
2025	26,401	1.9%	923,668	0.9%	5,765,827	0.9%

Source: EMSI Developer, 2020.2 Datarun

2. Labor Force Characteristics

Labor Force Participation

Goochland's LFP was lower than that of the State and GRR in 2019; these two regions saw LFP at 62.3% and 63.4% for the same year, respectively. Similar to Goochland, these geographies experienced an intermediate decline in LFP between 2015 and 2018. Additionally, each geography also saw its lowest LFP in 2018 during this five-year period. Table 8A details changes in LFP for Goochland, the GRR, and Virginia.

Table 8A: Labor Force Participation, Goochland County, Virginia, GRR, and Goochland Region 2014-2019

	2014	2015	2016	2017	2018	2019	5-Year Average
Amelia	60.6%	60.7%	60.7%	60.3%	61.7%	61.5%	60.9%
Caroline	67.7%	67.4%	69.0%	63.7%	67.9%	71.0%	67.8%
Charles City	61.2%	61.2%	61.4%	62.5%	58.2%	61.4%	61.0%
Chesterfield	71.9%	70.7%	70.5%	69.6%	68.5%	71.9%	70.5%
Dinwiddie	61.6%	60.1%	60.3%	59.5%	63.3%	61.4%	61.0%
Goochland	**62.5%**	**62.4%**	**61.9%**	**59.3%**	**58.8%**	**62.9%**	**61.3%**
Hanover	71.6%	71.2%	71.4%	70.1%	67.5%	72.8%	70.8%
Henrico	71.8%	70.8%	70.9%	70.8%	69.8%	71.7%	71.0%

King William	70.1%	69.1%	69.0%	68.6%	65.1%	70.7%	68.8%
New Kent	74.1%	73.7%	72.2%	70.8%	64.5%	75.9%	71.9%
Powhatan	64.8%	60.7%	60.8%	58.0%	56.3%	61.9%	60.4%
Prince George	63.3%	62.6%	61.3%	49.5%	57.8%	60.4%	59.2%
Sussex	54.9%	53.9%	48.3%	39.0%	36.9%	52.1%	47.5%
Colonial Heights	64.0%	63.5%	64.1%	63.5%	60.6%	64.8%	63.4%
Hopewell	56.9%	56.8%	57.2%	57.3%	59.9%	57.6%	57.6%
Petersburg	56.9%	56.8%	57.2%	57.3%	59.9%	57.6%	57.6%
Richmond	69.6%	68.6%	68.4%	63.2%	65.4%	68.8%	67.3%
GRR	**64.9%**	**64.1%**	**63.8%**	**61.4%**	**61.3%**	**65.0%**	**63.4%**
Virginia	**63.1%**	**62.0%**	**61.7%**	**58.6%**	**58.8%**	**63.4%**	**62.3%**

Source: Virginia Employment Commission

Labor Force Age

Goochland's workforce is older compared to the GRR and State. Additionally, Goochland had the highest proportion of workers nearing or at retirement age of these three areas. Approximately 21.4% of the County's workforce was aged 60 and over, with 11.2% of workers aged at or above 65. This is cause for some concern as workforce gaps could emerge as older, more qualified individuals permanently leave the labor force. Table 9A compares the ages of workforce participants across Goochland, the GRR, the Goochland Region, and Virginia.

Table 9A: Age by Labor Force Participation, Goochland County, GRR, Goochland Region, and Virginia, 2018

	Goochland	GRR	Virginia
16 to 19 years	3.4%	3.9%	3.8%
20 to 24 years	6.0%	9.3%	9.9%
25 to 29 years	6.5%	10.4%	11.2%
30 to 34 years	6.6%	9.8%	11.0%
35 to 44 years	16.3%	18.7%	20.7%
45 to 54 years	26.3%	23.3%	21.4%
55 to 59 years	13.6%	10.9%	9.5%
60 to 64 years	10.2%	7.4%	6.9%
65 to 74 years	9.6%	5.3%	4.6%
75 years and over	1.6%	0.9%	0.8%

Source: 2018 American Community Survey

Labor Force Educational Attainment

Goochland's workforce was also more educated compared to the GRR. Approximately 44.5% of the County's workforce had at least a bachelor's degree in 2018 compared to 30.5% of workers in the GRR for the same year. The County shares more similarities in workforce educational attainment with the state. Goochland and Virginia, for instance, are within 0.5% of one another in terms of workers with at least a bachelor's degree. The state, however, has a higher proportion of individuals with associate's degrees or some college while Goochland has a higher proportion of individuals with high school diplomas. It is important to note that State educational attainment data is heavily skewed by the presence of Northern Virginia. Table 10A details educational attainment by workforce participation for these three geographies.

Table 10A: Educational Attainment by Labor Force Participation, Goochland County, GRR, and Virginia, 2018

	Goochland	GRR	Goochland Region	Virginia
Less than high school graduate	5.5%	7.6%	7.0%	6.9%
High school graduate (includes equivalency)	26.1%	30.9%	26.6%	21.2%
Some college or associate's degree	23.8%	31.0%	30.0%	28.0%
Bachelor's degree or higher	44.5%	30.5%	36.5%	44.0%

Source: 2018 American Community Survey

Appendix D: Regional Economy

1. Industry Composition

Goochland shares some similarities with the GRR in terms of industry composition, however this Region appears to be more diversified. It is important to note, however, that diversification is more easily reached in a regional context. The Government sector (90) ranks within the top-5 industries by overall employment for both areas, although Goochland's is proportionally smaller. A key difference in overall composition is the size of local services-based industries. For instance, The Healthcare and Social Assistance (62) and Retail Trade (44) sectors rank within the top-3 largest sectors by employment in the GRR. Ho, these sectors rank 7th and 10th, respectively. This suggests that while Goochland is highly specialized in several traded sector industries, they rely on their regional counterparts to satisfy demand for local services. Table 11A compares the ten largest industries by employment for each Region.

Table 11A: Top 10 Industries by Employment, Goochland County, 2020

Goochland		Greater Richmond	
Top-10 Industries by Employment	% Total Employment	Top-10 Industries by Employment	% Total Employment
Finance and Insurance	38.3%	Government	15.0%
Management	9.5%	Health Care	11.3%
Government	6.9%	Retail Trade	9.1%
Construction	5.9%	Pro., Sci., & Tech Services	7.1%
Real Estate/Rental/Leasing	5.1%	Acc. & Food Services	6.8%
Pro., Sci., & Tech Services	4.6%	Finance and Insurance	6.7%
Retail Trade	4.1%	Admin. Support	6.6%
Admin. Support	3.8%	Construction	6.0%
Other Services	3.7%	Other Services	5.7%
Health Care	3.0%	Real Estate/Rental/Leasing	4.7%

Source: EMSI Developer 2020.2 Datarun

2. Employment Change

Employment growth for individual sectors tended to be higher in Goochland from 2010-2020. The GRR, however, experienced decline in only one sector (information) during this period compared to decline in three sectors for the County (Agriculture, Construction, and Government). Additionally, the GRR experienced healthy growth in each sector where Goochland experienced decline. Table 12A details employment change for each 2-digit sector for which data is available across Goochland County and the GRR.

Table 12A: % Employment Change, 2-Digit Sectors, Goochland County, GRR, Goochland Region 2010 & 2020

	Goochland	GRR
Accommodation & Food Services	85.9%	33.6%
Admin. Support	29.2%	34.7%
Agriculture	-14.5%	10.2%
Arts, Ent., & Rec.	15.5%	43.3%
Construction	-16.3%	22.1%
Educational Services	40.2%	16.5%
Finance & Insurance	184.8%	17.5%
Government	-5.4%	4.4%
Health Care	10.7%	21.1%
Information	58.2%	-18.1%
Management	40.8%	5.6%
Manufacturing	85.2%	5.3%
Mining	50.0%	33.2%
Other Services	6.4%	13.2%
Pro., Sci., & Tech Services	59.0%	24.2%
Real Estate/Rental/Leasing	59.8%	30.5%
Retail	38.2%	7.8%
Transportation & Warehousing	118.9%	100.8%
Wholesale	84.3%	6.8%

Source: EMSI Developer 2020.2 Datarun

3. Location Quotient

The GRR contained far more sectors with LQ's exceeding 1.0 compared to Goochland in 2020. More diversity in specialization, however, is easier to achieve in a regional context. Goochland exceeds LQs for the GRR in six industries- most notably in the Finance and Insurance and Management of Companies and Enterprises sectors. The Mining and Agriculture sectors were two additional areas of relative specialization. As mentioned above, there is a clear disparity between Goochland and the GRR in terms of service-based sectors. For instance, the GRR was much more specialized in the accommodation and food services, retail, and healthcare sectors compared to Goochland. This suggests that County residents must leave the Goochland to satisfy their demand for these services. Table 13A compares LQs for 20 2-digit sectors across Goochland County and the GRR.

Table 13A. Location Quotients by 2-Digit Sectors, Goochland County, GRR, Goochland Region, 2020

	Goochland	GRR	Goochland Region
Accommodation & Food Services	0.34	0.90	0.86
Admin. Support	0.63	1.08	1.17
Agriculture	0.83	0.32	0.48
Arts, Ent., & Rec.	1.17	1.14	1.11
Construction	1.07	1.09	1.19
Educational Services	0.30	0.73	0.71
Finance & Insurance	7.23	1.26	1.73
Government	0.58	1.25	0.72
Health Care	0.26	0.98	0.94
Information	0.21	0.60	0.71
Management	6.96	2.03	2.43
Manufacturing	0.38	0.59	0.57
Mining	0.82	0.21	0.23
Other Services	0.70	1.08	1.11
Pro., Sci., & Tech Services	0.64	0.98	1.12
Real Estate/Rental/Leasing	1.05	0.98	1.08
Retail	0.44	0.98	1.10
Transportation & Warehousing	0.33	0.94	0.78
Utilities	0.02	0.76	1.58
Wholesale	0.78	0.96	1.16

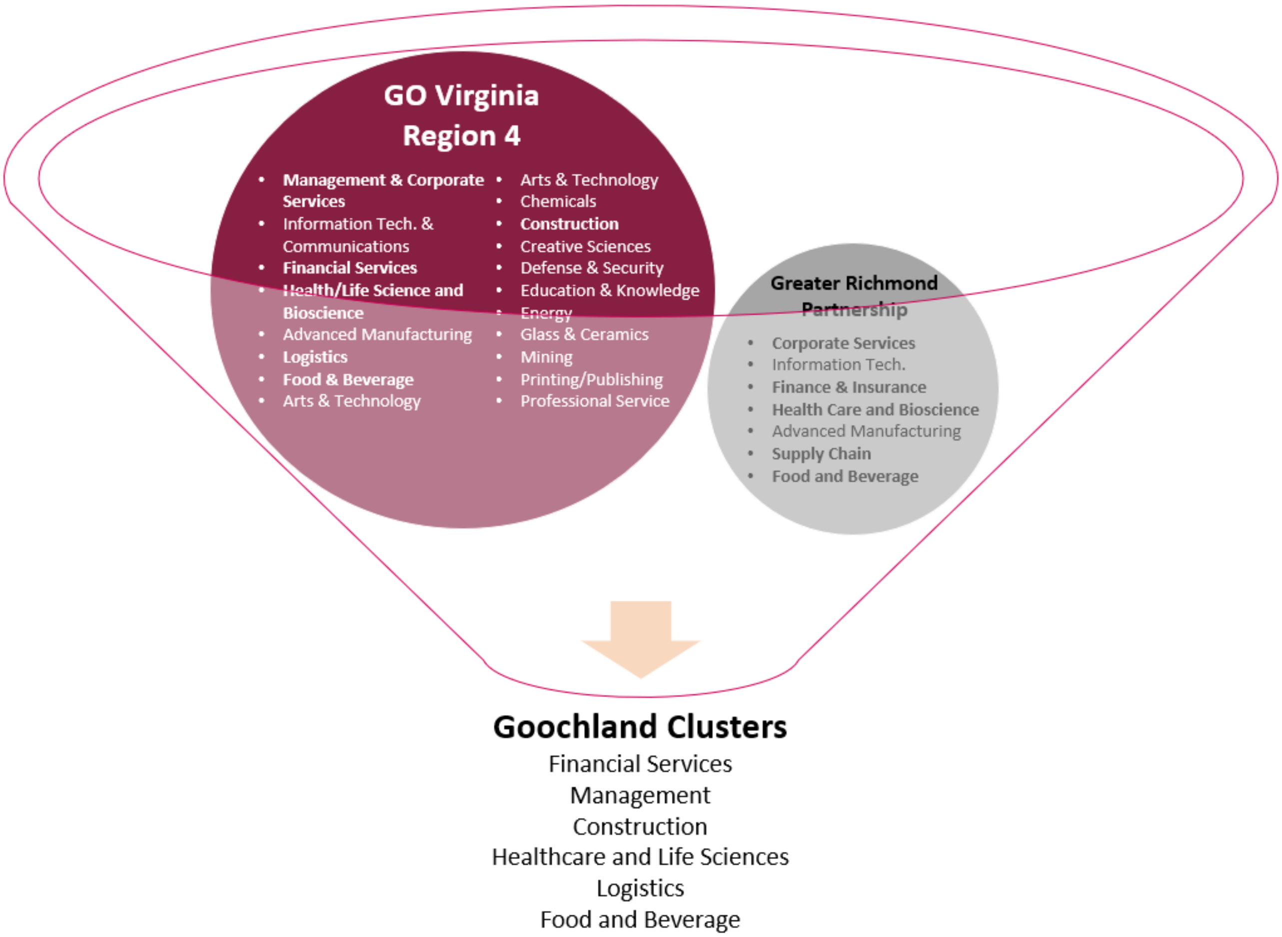
Source: EMSI Developer 2020.2 Datarun

Appendix E: Cluster Identification

Clusters are not bound by political jurisdictions, whether that be an individual County or group of counties. Rather, clusters are defined by economic activity or related industries across regions. OED used clusters identified by the two leading economic development entities in the Greater Richmond Region (the Greater Richmond Partnership and GO Virginia Regional 4) to better understand the County's role in the regional economy. OED analyzed 18 unique clusters and their 162 component industry groups in both the County and Region, paying special attention to regional clusters in which Goochland played a larger than average role. More specifically, OED evaluated regional clusters on the basis of employment change, location quotient, contribution to the County's GRP, and shift share. A description of each of these indicators can be found in Appendix A.

Six clusters were identified at the culmination of this process: three existing clusters and three emerging clusters. OED classified existing clusters as those with more longstanding specialization in the County. Existing clusters included financial services, management, and construction. Emerging clusters were identified as areas of more recent growth and specialization. Emerging clusters included logistics, healthcare and life sciences, and food and beverage. Figure X illustrates OED's methodology in identifying Goochland's industry clusters.

Figure 5A: Industry Clusters, Goochland County, GO Virginia Region 4, and the Greater Richmond Partnership



Appendix F: Occupational Employment

Please refer to Appendix A, Section 3 for a detailed explanation of the Standard Occupation Classification and how occupational employment differs from Industry employment. Goochland's labor force is largely regional; only 8.4% of jobs in Goochland were held by County residents in 2018. Additionally, workers from the City of Richmond, Henrico County, and Chesterfield County held approximately 54% of jobs in Goochland County for the same year. Therefore, OED collected occupational employment data for a 45-minute drivetime of Goochland County to better understand the supply of industry workers in this area.

1. Financial Services

Approximately 2,921 customer service representatives were employed in the Regional financial services cluster in 2020, which accounted for 11.1% of cluster employment. Sales agents, clerical workers, software developers, and loan officers were other large occupations in this cluster. Positions requiring financial expertise accounted for a smaller portion of cluster employment compared to operational and support positions. Nevertheless, there is distinct demand for specialized occupations within the Region's financial services cluster. Workforce supply for financial and support occupations was higher in this

Region compared to the national average. Top jobs within the financial services cluster were more likely to require a bachelor's degree compared to other clusters in Goochland. Top educational programs contributing graduates to this specialized workforce are business administration and management, business/commerce, accounting, and information science degrees. Table 14A details the top-20 financial services occupations by employment within a 45-minute drivetime of Goochland County.

Table 14A: Top-20 Industry Jobs, Financial Services Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
43-4051	Customer Service Representatives	2,921	11.1%	77%	$17.04	H.S. diploma
41-3021	Insurance Sales Agents	1,931	7.3%	(30%)	$27.10	H.S. diploma
41-3031	Securities, Commodities, and Financial Services Sales Agents	1,247	4.7%	78%	$32.38	Bachelor's degree
43-9041	Insurance Claims and Policy Processing Clerks	1,183	4.5%	30%	$22.54	H.S. diploma
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	1,079	4.1%	110%	$49.06	Bachelor's degree
13-2072	Loan Officers	993	3.8%	38%	$23.64	Bachelor's degree
43-1011	First-Line Supervisors of Office and Administrative Support Workers	871	3.3%	8%	$26.87	H.S. diploma
13-1111	Management Analysts	820	3.1%	29%	$38.89	Bachelor's degree
43-3071	Tellers	707	2.7%	(33%)	$15.54	H.S. diploma
13-2098	Financial and Investment Analysts, Financial Risk Specialists, and Financial Specialists, All Other	692	2.6%	22%	$42.27	Bachelor's degree
43-3011	Bill and Account Collectors	676	2.6%	(19%)	$19.77	H.S. diploma
43-3031	Bookkeeping, Accounting, and Auditing Clerks	667	2.5%	53%	$19.71	Some college, no degree
13-2052	Personal Financial Advisors	584	2.2%	51%	$42.93	Bachelor's degree

13-2011	Accountants and Auditors	584	2.2%	71%	$33.91	Bachelor's degree
11-3031	Financial Managers	584	2.2%	20%	$67.97	Bachelor's degree
13-1031	Claims Adjusters, Examiners, and Investigators	565	2.1%	(3%)	$30.82	H.S. diploma
13-2041	Credit Analysts	540	2.0%	89%	$43.54	Bachelor's degree
13-2053	Insurance Underwriters	505	1.9%	(6%)	$32.72	Bachelor's degree
43-4131	Loan Interviewers and Clerks	500	1.9%	(9%)	$21.91	H.S. diploma
15-2031	Operations Research Analysts	426	1.6%	461%	$44.17	Bachelor's degree

Source: EMSI Developer 2020.2 Datarun

2. Management

Similar to the financial cluster, the management cluster largely employs sales and customer service specialists, IT and business specialists, and those with financial expertise. The accountants and auditors and customer service representatives occupations occupied a similar portion of Regional cluster employment. Workforce supply for these jobs is higher in a 45-minute drivetime from Goochland County than the national average, indicating a strong education pipeline. Regional workers were also compensated at a slightly higher rate compared to the national average, $56,619 versus $55,301. Top programs contributing graduates to this workforce supply are business administration and management, social sciences (general), business/commerce, accounting, and information science degrees.[36] Table 15A details the top-20 management occupations by employment within a 45-minute drivetime of Goochland County.

Table 15A: Top-20 Industry Jobs, Management Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
13-2011	Accountants and Auditors	552	4.7%	20%	$34	Bachelor's degree
43-4051	Customer Service Representatives	515	4.3%	11%	$17	H.S. diploma
43-3031	Bookkeeping, Accounting, and Auditing Clerks	401	3.4%	(12%)	$20	Some college, no degree
11-1021	General and Operations Managers	399	3.4%	1%	$52	Bachelor's degree

[36] EMSI Developer 2020.2 Datarun

15-1256	Software Developers and Software Quality Assurance Analysts and Testers	398	3.4%	15%	$49	Bachelor's degree
13-1111	Management Analysts	347	2.9%	(16%)	$39	Bachelor's degree
13-1161	Market Research Analysts and Marketing Specialists	341	2.9%	93%	$31	Bachelor's degree
15-1211	Computer Systems Analysts	310	2.6%	9%	$48	Bachelor's degree
13-1028	Buyers and Purchasing Agents	299	2.5%	6%	$33	Bachelor's degree
11-3031	Financial Managers	287	2.4%	6%	$68	Bachelor's degree
13-1198	Project Management Specialists and Business Operations Specialists, All Other	286	2.4%	(8%)	$36	Bachelor's degree
43-1011	First-Line Supervisors of Office and Administrative Support Workers	272	2.3%	(7%)	$27	H.S. diploma
13-1071	Human Resources Specialists	262	2.2%	47%	$32	Bachelor's degree
13-2098	Financial and Investment Analysts, Financial Risk Specialists, and Financial Specialists, All Other	220	1.9%	2%	$42	Bachelor's degree
43-9061	Office Clerks, General	213	1.8%	(40%)	$17	H.S. diploma
15-1244	Network and Computer Systems Administrators	149	1.3%	(18%)	$42	Bachelor's degree
11-3021	Computer and Information Systems Managers	149	1.3%	(11%)	$71	Bachelor's degree
13-1151	Training and Development Specialists	144	1.2%	11%	$29	Bachelor's degree
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	141	1.2%	32%	$18	H.S. diploma
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	128	1.1%	0%	$42	Bachelor's degree

Source: EMSI Developer 2020.2 Datarun

3. Construction

The construction cluster largely employs manual laborers and operators; skilled positions such as electricians, plumbers, carpenters and HVAC mechanics; experienced supervisors; and administrative workers. Although workforce supply in the Region is comparable to the national average and current demand is low, market changes to the industry would suggest focusing on advanced technical training for these positions to encourage future growth. However, education and training programs, particularly for middle-skill professions are limited.[37] Table 16A details the top-20 construction occupations by employment within a 45-minute drivetime of Goochland County.

Table 16A: Top-20 Industry Jobs, Construction Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
47-2061	Construction Laborers	2,413	10.1%	30%	$14	None
47-2111	Electricians	2,047	8.5%	44%	$25	H.S. diploma
47-2031	Carpenters	1,737	7.2%	5%	$19	H.S. diploma or Equiv.
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	1,524	6.4%	6%	$29	H.S. diploma
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,039	4.3%	53%	$24	Postsecondary nondegree award
47-2152	Plumbers, Pipefitters, and Steamfitters	1,031	4.3%	2%	$26	H.S. diploma
47-2073	Operating Engineers and Other Construction Equipment Operators	855	3.6%	36%	$19	H.S. diploma
47-2141	Painters, Construction and Maintenance	691	2.9%	2%	$18	None
11-9021	Construction Managers	636	2.7%	7%	$32	Bachelor's degree
43-9061	Office Clerks, General	635	2.7%	8%	$17	H.S. diploma
53-3032	Heavy and Tractor-Trailer Truck Drivers	628	2.6%	86%	$19	Postsecondary nondegree award
13-1051	Cost Estimators	491	2.0%	34%	$29	Bachelor's degree

[37] EMSI Developer 2020.2 Datarun

11-1021	General and Operations Managers	366	1.5%	10%	$52	Bachelor's degree
47-3013	Helpers--Electricians	363	1.5%	(11%)	$16	H.S. diploma
43-3031	Bookkeeping, Accounting, and Auditing Clerks	314	1.3%	(11%)	$20	Some college, no degree
47-2211	Sheet Metal Workers	308	1.3%	11%	$24	H.S. diploma
47-2132	Insulation Workers, Mechanical	306	1.3%	92%	$21	H.S. diploma
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	267	1.1%	15%	$18	H.S. diploma
47-2071	Paving, Surfacing, and Tamping Equipment Operators	261	1.1%	422%	$18	H.S. diploma
47-2051	Cement Masons and Concrete Finishers	258	1.1%	(7%)	$20	None

Source: EMSI Developer 2020.2 Datarun

4. Logistics

The emerging logistics cluster largely employs workers with Commercial Driver's Licenses, administrative office workers, and manual labor. Workforce supply for these jobs is higher in this Region than the national average, indicating a strong pipeline. However, demand is currently low. Top programs contributing graduates to this workforce supply are business administration and management, business/commerce, accounting, Commercial Driver's License programs, and job readiness related certifications.[38] Table 17A details the top-20 logistics occupations by employment within a 45-minute drivetime of Goochland County

Table 17A: Top-20 Industry Jobs, Logistics Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
53-3032	Heavy and Tractor-Trailer Truck Drivers	2,419	19.0%	77%	$19	Postsecondary nondegree award
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1,299	10.2%	176%	$13	None
53-3033	Light Truck Drivers	902	7.1%	205%	$16	H.S. diploma

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13-1111	Management Analysts	737	5.8%	6%	$39	Bachelor's degree
53-7051	Industrial Truck and Tractor Operators	414	3.3%	280%	$17	None
53-3058	Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity	389	3.1%	88%	$14	H.S. diploma
53-7065	Stockers and Order Fillers	271	2.1%	156%	$13	H.S. diploma
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	255	2.0%	93%	$23	H.S. diploma
43-4051	Customer Service Representatives	249	2.0%	26%	$17	H.S. diploma
43-9061	Office Clerks, General	242	1.9%	13%	$17	H.S. diploma
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	238	1.9%	59%	$30	H.S. diploma
13-1161	Market Research Analysts and Marketing Specialists	225	1.8%	137%	$31	Bachelor's degree
11-1021	General and Operations Managers	212	1.7%	78%	$52	Bachelor's degree
43-5071	Shipping, Receiving, and Inventory Clerks	211	1.7%	145%	$16	H.S. diploma
43-5021	Couriers and Messengers	159	1.3%	89%	$14	H.S. diploma
43-5032	Dispatchers, Except Police, Fire, and Ambulance	142	1.1%	37%	$19	H.S. diploma
43-3031	Bookkeeping, Accounting, and Auditing Clerks	126	1.0%	21%	$20	Some college, no degree
13-2011	Accountants and Auditors	125	1.0%	81%	$34	Bachelor's degree
43-1011	First-Line Supervisors of Office and Administrative Support Workers	122	1.0%	2%	$27	H.S. diploma

43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	116	0.9%	100%	$18	H.S. diploma

Source: EMSI Developer 2020.2 Datarun

5. Healthcare

The emerging healthcare and life sciences cluster largely employs nurses, manual labor, technicians, counselors, and pharmacists. Workforce supply for these jobs is higher in this Region than the national average, indicating a strong education pipeline. However, demand is also low. Top programs contributing graduates to this workforce supply are registered nursing, respiratory care therapy/therapist, mental and social health services, LP/LV nursing, and clinical/medical laboratory technician.[39] Table 18A details the top-20 healthcare and life sciences occupations by employment within a 45-minute drivetime of Goochland County.

Table 31: Top-20 Industry Jobs, Healthcare and Life Sciences Cluster, Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
29-1141	Registered Nurses	3,720	13.4%	3%	$34.84	Bachelor's degree
31-1131	Nursing Assistants	2,537	9.1%	12%	$13.68	Postsecondary nondegree award
31-1128	Home Health and Personal Care Aides	1,524	5.5%	19%	$9.48	H.S. diploma
29-2061	Licensed Practical and Licensed Vocational Nurses	1,090	3.9%	(9%)	$22.07	Postsecondary nondegree award
29-2018	Clinical Laboratory Technologists and Technicians	743	2.7%	22%	$26.40	Bachelor's degree
29-2052	Pharmacy Technicians	567	2.0%	20%	$16.36	H.S. diploma
21-1018	Substance Abuse, Behavioral Disorder, and Mental Health Counselors	551	2.0%	63%	$21.98	Bachelor's degree
29-1051	Pharmacists	522	1.9%	34%	$67.23	Doctoral or professional degree
41-2011	Cashiers	427	1.5%	25%	$10.45	None

[39] EMSI Developer 2020.2 Datarun

37-2012	Maids and Housekeeping Cleaners	414	1.5%	(8%)	$10.75	None
41-2031	Retail Salespersons	402	1.4%	58%	$11.65	None
35-3041	Food Servers, Nonrestaurant	395	1.4%	27%	$10.72	None
43-4051	Customer Service Representatives	376	1.4%	59%	$17.04	H.S. diploma
31-9097	Phlebotomists	363	1.3%	47%	$18.79	Postsecondary nondegree award
11-9111	Medical and Health Services Managers	339	1.2%	(13%)	$49.76	Bachelor's degree
29-2034	Radiologic Technologists and Technicians	324	1.2%	12%	$28.31	Associate's degree
29-1228	Physicians, All Other; and Ophthalmologists, Except Pediatric	315	1.1%	110%	$71.01	Doctoral or professional degree
43-9061	Office Clerks, General	303	1.1%	(36%)	$16.67	H.S. diploma
29-2098	Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	294	1.1%	9%	$20.03	Postsecondary nondegree award
43-4171	Receptionists and Information Clerks	284	1.0%	5%	$14.50	H.S. diploma

Source: EMSI Developer 2020.2 Datarun

6. Food and Beverage

The emerging food and beverage cluster largely employs agricultural workers and related supply chain positions. Manufacturing occupations account for a small portion of cluster jobs. Low education and experience requirements make these jobs easily attainable, however, wages for many of these positions are not competitive with occupations requiring similar credentials in the larger Region. Table 19A details the top-20 food and beverage occupations by employment within a 45-minute drivetime of Goochland County

Table 19A: Top-20 Industry Jobs, Food and Beverage Cluster, 45-Minute Drivetime of Goochland County, 2010-2020

SOC	Description	2020 Jobs	% Cluster Employment	2010 – 2020 % Change	Med. Hourly Earnings	Typical Entry Level Education
11-9013	Farmers, Ranchers, and Other Agricultural Managers	1,538	33.0%	(14%)	$12.75	H.S. Diploma

45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	301	6.2%	58%	$11.96	None
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	215	4.4%	236%	$10.63	None
51-9111	Packaging and Filling Machine Operators and Tenders	188	4.0%	203%	$13.73	H.S. Diploma
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	180	3.9%	(5%)	$30.83	H.S. Diploma
53-3032	Heavy and Tractor-Trailer Truck Drivers	149	3.2%	(4%)	$19.79	Postsecondary nondegree award
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	126	2.7%	8%	$13.34	None
53-3031	Driver/Sales Workers	107	2.3%	(9%)	$13.26	H.S. Diploma
45-2099	Agricultural Workers, All Other	77	1.6%	10%	$14.32	None
53-7065	Stockers and Order Fillers	70	1.5%	13%	$12.64	H.S. Diploma
53-7051	Industrial Truck and Tractor Operators	70	1.5%	3%	$17.63	None
53-3033	Light Truck Drivers	65	1.4%	10%	$16.52	H.S. Diploma
39-2021	Animal Caretakers	62	1.3%	41%	$11.55	H.S. Diploma
27-1026	Merchandise Displayers and Window Trimmers	59	1.3%	168%	$14.27	H.S. Diploma
51-3011	Bakers	61	1.3%	110%	$13.67	None
53-7064	Packers and Packagers, Hand	55	1.2%	8%	$11.46	None
41-9011	Demonstrators and Product Promoters	54	1.2%	238%	$16.12	None
41-2031	Retail Salespersons	52	1.1%	174%	$11.91	None
43-5071	Shipping, Receiving, and Inventory Clerks	50	1.1%	16%	$15.91	H.S. Diploma
51-3092	Food Batchmakers	51	1.1%	96%	$15.14	H.S. Diploma

Source: EMSI Developer 2020.2 Datarun

Appendix G: Regional Clusters

1. Regional Financial Services Cluster

Employment

Approximately 58,706 workers were employed in the financial services cluster in 2020, which accounted for 6.7% of the GRR's total employment. The regional cluster saw the addition of 8,750 jobs from 2010-2020, marking 17.5% growth. The nondepository credit intermediation industry group accounted for the largest share of regional cluster employment and led the regional cluster in growth from 2010-2020. The other financial investment activities and the agencies, brokerages, and other insurance related activities industry groups also accounted for a notable portion of regional cluster employment and growth. Table 20A details employment change for the regional financial services cluster.

Table 20A: Employment Change, Financial Services Cluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
5211	Monetary Authorities-Central Bank	1,718	1,886	1,781	63	3.7%
5221	Depository Credit Intermediation	5,741	4,660	4,883	-858	-14.9%
5222	Nondepository Credit Intermediation	10,327	15,261	15,802	5475	53.0%
5223	Activities Related to Credit Intermediation	789	892	669	-120	-15.2%
5231	Securities and Commodity Contracts Intermediation and Brokerage	2,251	2,100	2,464	213	9.5%
5232	Securities and Commodity Exchanges	55	30	30	-25	-45.5%
5239	Other Financial Investment Activities	8,817	10,298	13,284	4467	50.7%
5241	Insurance Carriers	9,015	6,814	7,634	-1381	-15.3%
5242	Agencies, Brokerages, and Other Insurance Related Activities	9,374	11,903	11,548	2174	23.2%
5251	Insurance and Employee Benefit Funds	945	149	109	-836	-88.5%
5259	Other Investment Pools and Funds	924	1,269	501	-423	-45.8%
	Total	49,956	55,261	58,706	8750	17.5%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

The regional financial services cluster was most specialized in the monetary authorities-central bank industry group. Nondepository credit intermediation was another area of keen and emerging specialization. This cluster generated $10.54 billion in 2019, which accounted for 13.1% of the GRR's

GRP for the same year. Additionally, the nondepository credit intermediation industry group accounted for the largest portion of cluster GRP. Table 21A details LQ and GRP for the regional financial services cluster.

Table 21A: LQ & GRP, Financial Services Cluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
5211	Monetary Authorities-Central Bank	19.46	24.61	20.77	$612,305,574
5221	Depository Credit Intermediation	0.77	0.64	0.64	$1,021,888,468
5222	Nondepository Credit Intermediation	3.66	5.06	5.49	$3,146,474,332
5223	Activities Related to Credit Intermediation	0.50	0.54	0.42	$130,966,865
5231	Securities and Commodity Contracts Intermediation and Brokerage	0.74	0.70	0.76	$323,914,505
5232	Securities and Commodity Exchanges	0.55	0.32	0.27	$526,819
5239	Other Financial Investment Activities	0.90	0.91	0.97	$1,084,342,484
5241	Insurance Carriers	1.59	1.20	1.31	$2,248,530,431
5242	Agencies, Brokerages, and Other Insurance Related Activities	1.32	1.44	1.22	$1,900,956,825
5251	Insurance and Employee Benefit Funds	0.82	0.26	0.15	$8,760,229
5259	Other Investment Pools and Funds	1.03	1.10	0.39	$62,975,815
				Total	$10,541,642,346

Source: EMSI Developer 2020.2 Datarun

Shift Share

Employment growth in the regional financial services cluster outperformed expectated job change from 2010-2020 by 1,348 jobs, indicating mild competitiveness. The nondepository credit intermediation and other financial investment activities industry groups were the most competitive within the regional cluster over the past decade. Table 22A details shift share values for the regional financial services cluster.

Table 22A: Shift Share, Financial Services Cluster, GRR, 2010-2020

NAICS	Description	IME	NGE	Expected Change	2010 - 2020 Change	Competitive Effect
5211	Monetary Authorities-Central Bank	-375	330	-45	63	108
5221	Depository Credit Intermediation	-963	1101	138	-858	-996
5222	Nondepository Credit Intermediation	-1741	1981	240	5475	5236
5223	Activities Related to Credit Intermediation	-152	151	-1	-120	-119

5231	Securities and Commodity Contracts Intermediation and Brokerage	-282	432	150	213	63
5232	Securities and Commodity Exchanges	-3	11	8	-25	-32
5239	Other Financial Investment Activities	1776	1691	3467	4467	1000
5241	Insurance Carriers	-1460	1729	269	-1381	-1650
5242	Agencies, Brokerages, and Other Insurance Related Activities	1308	1798	3106	2174	-932
5251	Insurance and Employee Benefit Funds	-517	181	-336	-836	-501
5259	Other Investment Pools and Funds	229	177	406	-423	-829
		-2180	9582	7402	8750	1348

Source: EMSI Developer 2020.2 Datarun

2. Regional Management Cluster

Employment

The regional management cluster was composed of 24,215 jobs in 2020, which accounted for 2.8% of regional employment. This cluster saw 5.6% employment growth from 2010-2020, adding 1,286 jobs. The corporate, subsidiary, and regional managing offices industry group was the regional management cluster's only source of growth during this period. The two remaining industry groups in this cluster experienced decline from 2010-2020. Table 23A details employment change for the regional management cluster.

Table 23A: Employment Change, Management Cluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
551111	Offices of Bank Holding Companies	130	67	76	-54	-42%
551112	Offices of Other Holding Companies	784	235	171	-613	-78%
551114	Corporate, Subsidiary, and Regional Managing Offices	22,015	21,939	23,968	1,953	9%
	Total	22,928	22,242	24,215	1,286	5.6%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

The regional management cluster was most specialized in the corporate, subsidiary, and regional managing offices industry group in 2020. The offices of bank holding companies industry group was a more minor area of specialization. This cluster generated $3.68 billion in 2019, which accounted for 4.6% of the GRR's GRP for the same year. The corporate, subsidiary, and regional managing offices industry group supplied the vast majority of this cluster's GRP. Table 24A details LQ and GRP for the regional management cluster.

Table 24A: LQ & GRP, Management Cluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
551111	Offices of Bank Holding Companies	1.71	0.97	1.21	$6,763,888
551112	Offices of Other Holding Companies	2.49	0.67	0.46	$38,202,346
551114	Corporate, Subsidiary, and Regional Managing Offices	2.68	2.22	2.09	$3,639,322,199
				Total	$3,684,288,434

Source: EMSI Developer 2020.2 Datarun

Shift Share

Employment change in the regional management cluster was not competitive from 2010-2020, despite recent growth. This cluster underperformed expected job change by 7,702 jobs during this period, suggesting the regional management cluster is growing at a slower pace than the national management cluster. Table 25A details shift share values for the local management cluster.

Table 25A: Shift Share, Management Cluster, GRR, 2010-2020

NAICS	Description	Ind. Mix Effect	Nat'l Growth Effect	Expected Change	2010 - 2020 Change	Competitive Effect
551111	Offices of Bank Holding Companies	-47	25	-22	-54	-32
551112	Offices of Other Holding Companies	-8	150	142	-613	-755
551114	Corporate, Subsidiary, and Regional Managing Offices	4,646	4,223	8,869	1,953	-6,916
	Total	4,591	4,398	8,989	1,287	-7,702

Source: EMSI Developer 2020.2 Datarun

3. Regional Construction Cluster

Employment

The regional construction cluster was composed of 57,493 jobs across three unique subclusters in 2020. Employment in the regional construction cluster accounted for 6.6% of employment in the larger Region for the same year. Additionally, this cluster added 10,466 jobs from 2010-2020, marking 22.3% growth.

Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster

Approximately 14,929 workers were employed in businesses belonging to the Region's utility, power transmission, and other heavy or civil contractors subcluster in 2020. This accounted for 26% of the regional construction cluster's employment for the same year. The other specialty trade contractors industry group dominated the regional subcluster in terms of employment and job creation over the past decade. Additionally, the utility system construction industry group was the only industry group in this subcluster to experience employment decline form 2010-2020. Table 26A details employment change for the regional utility, power transmission, and other heavy or civil contractors subcluster.

Table 26A: Employment Change, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
2371	Utility System Construction	2,567	2,838	2,407	-160	-6%
2373	Highway, Street, and Bridge Construction	1,556	2,087	2,090	534	34%
2379	Other Heavy and Civil Engineering Construction	387	494	714	327	84%
2389	Other Specialty Trade Contractors	5,766	7,117	8,717	2,951	51%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	653	777	1,001	348	53%
	Total	10,929	13,313	14,929	4,000	37%

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

The regional residential and nonresidential building construction and contractors subcluster was the largest by employment in the Region's construction cluster. This subcluster saw 18% growth from 2010-2020, adding 5,919 jobs during this period. Only one industry group -land subdivision- saw employment decline over the past decade. The remainder saw employment growth ranging from 6-34% from 2010-2020. Table 26A details employment change for the regional residential and nonresidential building construction and contractors subcluster.

Table 26A: Employment Change, Residential and Nonresidential Building Construction and Contractors Subcluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
2361	Residential Building Construction	4,370	5,170	5,853	1,483	34%
2362	Nonresidential Building Construction	3,483	3,861	4,458	975	28%
2372	Land Subdivision	483	322	386	-97	-20%
2381	Foundation, Structure, and Building Exterior Contractors	4,968	4,966	5,204	236	5%
2382	Building Equipment Contractors	12,406	13,321	15,289	2,883	23%
2383	Building Finishing Contractors	7,268	7,096	7,707	439	6%
	Total	32,979	34,736	38,898	5,919	18%

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

The construction and finishing products manufacturing subcluster was the smallest in terms of employment within the regional construction cluster. Nevertheless, this subcluster experienced 17% employment growth (545 jobs) from 2010-2020. The other wood product manufacturing and architectural and structural metals manufacturing industry groups accounted for the largest share of employment in the regional Construction and Finishing Products Manufacturing Subcluster. Additionally, each industry group in this subcluster experienced at least 10% growth over the past decade. Table 27A details employment change for the regional construction and finishing products manufacturing subcluster.

Table 27A: Employment Change, Construction and Finishing Products Manufacturing Subcluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
3219	Other Wood Product Manufacturing	1,030	1,126	1,136	106	10%
3273	Cement and Concrete Product Manufacturing	693	833	876	183	26%
3323	Architectural and Structural Metals Manufacturing	882	935	1,064	182	21%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	516	514	590	74	14%
	Total	3,120	3,408	3,666	545	17%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

The regional construction cluster was the most specialized in the utility, power transmission, and other heavy or civil contractors subcluster in 2020. The regional construction cluster generated $4.69 billion in 2019, accounting for 5.8% of GRR's GRP for the same year.

Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster

The utility, power transmission, and other heavy or civil contractors subcluster was most specialized in the highway, street, and bridge construction and the other specialty trade contractors industry groups in 2020. Additionally the other specialty trade contractors industry group supplied the majority of this subcluster's GRP in 2019. Overall, the utility, power transmission, and other heavy or civil contractors subcluster accounted for the second largest portion of the regional construction cluster's GRP. Table 28A details LQ and GRP for the regional construction cluster.

Table 28A: LQ & GRP, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
2371	Utility System Construction	1.44	1.30	0.88	$277,161,079
2373	Highway, Street, and Bridge Construction	1.16	1.48	1.28	$167,776,510
2379	Other Heavy and Civil Engineering Construction	0.61	0.75	0.91	$56,509,662
2389	Other Specialty Trade Contractors	1.10	1.27	1.35	$617,582,890
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	0.74	0.86	0.88	$276,141,742

Total	$1,395,171,882

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

The building equipment contractors industry group was the greatest source of specialization in the regional residential and nonresidential building construction and contractors subcluster for 2020. This industry group also generated the majority of the larger subcluster's GRP in 2019. Additionally, the regional residential and nonresidential building construction and contractors subcluster accounted for the largest portion of the regional construction cluster's GRP in 2019. Table 29A details LQ and GRP for the regional residential and nonresidential building construction and contractors subcluster.

Table 29A: LQ & GRP, Residential and Nonresidential Building Construction and Contractors Subcluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
2361	Residential Building Construction	0.88	0.87	0.87	$417,590,529
2362	Nonresidential Building Construction	1.08	1.06	1.06	$489,076,827
2372	Land Subdivision	1.19	1.02	1.14	$27,570,178
2381	Foundation, Structure, and Building Exterior Contractors	1.10	1.00	0.89	$359,219,446
2382	Building Equipment Contractors	1.42	1.32	1.28	$1,235,693,481
2383	Building Finishing Contractors	1.11	1.03	0.98	$451,006,391
				Total	$2,980,156,852

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

The regional construction and finishing products manufacturing subcluster was not an area of particular specialization for the larger construction cluster. Only one industry group -cement and concrete product manufacturing- had an LQ value exceeding 1.0 in 2020. This subcluster also accounted for the smallest portion of the regional construction subclusters GRP in 2019. Table 30A details LQ and GRP for the regional construction and finishing products manufacturing subcluster.

Table 30A: Location Quotient, Construction and Finishing Products Manufacturing Subcluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
3219	Other Wood Product Manufacturing	1.05	1.06	0.95	$85,016,152
3273	Cement and Concrete Product Manufacturing	0.93	1.04	1.00	$102,020,308
3323	Architectural and Structural Metals Manufacturing	0.63	0.58	0.60	$94,457,959
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	0.49	0.45	0.50	$29,217,944
				Total	$310,712,363

Source: EMSI Developer 2020.2 Datarun

Shift Share

Employment change for the regional construction cluster was not competitive from 2010-2020; this cluster underperformed expected job change by 3,717 jobs during this period. The utility, power transmission, and other heavy or civil contractors subcluster, however, was competitive during this period, although not to the extent to offset underperformance in the other construction subclusters.

Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster

Employment growth for the regional utility, power transmission, and other heavy or civil contractors subcluster was competitive from 2010-2020, exceeding expected job change by 645 jobs during this period. Employment growth in the other specialty trade contractors industry group was this subcluster's greatest source of competitiveness. Table 31A details shift share values for the regional utility, power transmission, and other heavy or civil contractors subcluster.

Table 31A: Shift Share, Utility, Power Transmission, and other Heavy or Civil Contractors Subcluster, GRR, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
2371	Utility System Construction	492	916	1,408	-160	-1568
2373	Highway, Street, and Bridge Construction	298	45	344	534	190
2379	Other Heavy and Civil Engineering Construction	74	15	89	327	238
2389	Other Specialty Trade Contractors	1,106	219	1,325	2951	1626
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	125	64	189	348	159
	Total	2096	1260	3,356	4000	645

Source: EMSI Developer 2020.2 Datarun

Residential and Nonresidential Building Construction and Contractors Subcluster

Employment change for the regional residential and nonresidential building construction and contractors subcluster was not competitive between 2010-2020. This subcluster underperformed expected job change by 4,169 jobs during this period. Additionally, employment change in none of this subcluster's component industry groups was competitive over the past decade. Table 32A details shift share values for the regional residential and nonresidential building construction and contractors subcluster

Table 32A: Shift Share, Residential and Nonresidential Building Construction and Contractors Subcluster, GRR, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
2361	Residential Building Construction	838	735	1,574	1483	-91

2362	Nonresidential Building Construction	668	397	1,065	975	-91
2372	Land Subdivision	93	-170	-77	-97	-20
2381	Foundation, Structure, and Building Exterior Contractors	953	539	1,492	236	-1256
2382	Building Equipment Contractors	2,380	2230	4,610	2883	-1726
2383	Building Finishing Contractors	1,394	121	1,515	439	-1076
	Total	5487	3118	10,179	4436	-4169

Source: EMSI Developer 2020.2 Datarun

Construction and Finishing Products Manufacturing Subcluster

Employment change for the regional construction and finishing products manufacturing subcluster underperformed expected change by 102 jobs from 2010-2020. This indicates that this subcluster was not competitive during this period. Table 33A details shift share values for the regional construction and finishing products manufacturing subcluster.

Table 33A: Shift Share, Construction and Finishing Products Manufacturing Subcluster, GRR, 2010-2020

NAICS	Description	NGE	IME	Expected Change	2010 - 2020 Change	Competitive Effect
3219	Other Wood Product Manufacturing	198	24	222	106	-116
3273	Cement and Concrete Product Manufacturing	133	-7	126	183	57
3323	Architectural and Structural Metals Manufacturing	169	64	234	182	-51
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	99	-33	66	74	8
	Total	598	50	648	545	-102

Source: EMSI Developer 2020.2 Datarun

4. Regional Logistics Cluster

Employment

There were 46,912 workers employed in establishments belonging to the regional logistics cluster in 2020, which accounted for 5.5% of total regional employment. The warehousing and storage, management, scientific, and technical consulting services, and general freight trucking industry groups accounted for the largest portions of regional cluster employment during this year. Approximately 18,003 jobs were added across industry groups in this sector from 2010-2020, marking 16% growth. The warehousing and storage industry group led the regional logistics cluster in job creation during this period, adding 5,933 jobs over the past decade. Table 34A details employment change for the regional logistics cluster.

Table 34A: Employment Change, Logistics Cluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
4811	Scheduled Air Transportation	690	529	184	-506	-73%
4812	Nonscheduled Air Transportation	248	179	218	-30	-12%
4821	Rail Transportation	844	962	820	-24	-3%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	62	56	75	13	21%
4832	Inland Water Transportation	<10	<10	<10	-	-
4841	General Freight Trucking	5,224	5,895	7,524	2,300	44%
4842	Specialized Freight Trucking	1,896	2,354	2,412	516	27%
4851	Urban Transit Systems	669	547	620	-49	-7%
4855	Charter Bus Industry	88	92	79	-9	-10%
4859	Other Transit and Ground Passenger Transportation	259	576	2,036	1,777	686%
4861	Pipeline Transportation of Crude Oil	0	0	0	0	0%
4862	Pipeline Transportation of Natural Gas	68	119	197	129	190%
4869	Other Pipeline Transportation	33	52	37	4	12%
4881	Support Activities for Air Transportation	249	325	414	165	66%
4882	Support Activities for Rail Transportation	<10	12	47	-	-
4883	Support Activities for Water Transportation	43	57	69	26	60%
4884	Support Activities for Road Transportation	592	619	845	253	43%
4885	Freight Transportation Arrangement	424	593	854	430	101%
4889	Other Support Activities for Transportation	131	128	124	-7	-5%
4921	Couriers and Express Delivery Services	3,035	3,978	5,867	2,832	93%
4922	Local Messengers and Local Delivery	718	844	2,239	1,521	212%
4931	Warehousing and Storage	4,011	8,725	9,944	5,933	148%
5416	Management, Scientific, and Technical Consulting Services	7,461	8,852	10,562	3,101	42%
5619	Other Support Services	2,119	2,080	1,747	-372	-18%
	Total	28,864	37,574	46,912	18,003	16%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

The regional logistics cluster was most specialized in the urban and passenger transit, general and specialized freight transportation and arrangement, pipeline transportation, local delivery, and support activities for road transportation industry groups in 2020. Additionally, the regional logistics cluster generated $3.4 billion in 2019, which accounted for 4.2% of the GRR's GRP. Table 35A details LQ and GRP for the regional logistics cluster.

Table 35A: LQ & GRP, Logistics Cluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
4811	Scheduled Air Transportation	0.39	0.29	0.09	$41,397,189
4812	Nonscheduled Air Transportation	1.03	0.73	0.59	$73,272,503
4821	Rail Transportation	0.90	0.92	0.86	$153,016,060
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	0.35	0.29	0.38	$17,231,912
4832	Inland Water Transportation	0.03	0.02	0.03	$60,487
4841	General Freight Trucking	0.85	0.85	0.98	$519,446,593
4842	Specialized Freight Trucking	1.01	1.09	1.05	$167,406,435
4851	Urban Transit Systems	3.70	2.74	2.61	$33,327,447
4855	Charter Bus Industry	0.61	0.62	0.49	$3,324,269
4859	Other Transit and Ground Passenger Transportation	0.56	0.64	0.97	$41,974,161
4861	Pipeline Transportation of Crude Oil	0.00	0.00	0.00	$0
4862	Pipeline Transportation of Natural Gas	0.59	0.93	1.46	$144,347,321
4869	Other Pipeline Transportation	1.13	1.44	0.92	$29,665,950
4881	Support Activities for Air Transportation	0.35	0.38	0.38	$21,473,955
4882	Support Activities for Rail Transportation	0.08	0.07	0.27	$2,838,548
4883	Support Activities for Water Transportation	0.11	0.13	0.15	$5,480,314
4884	Support Activities for Road Transportation	1.26	1.04	1.20	$46,431,941
4885	Freight Transportation Arrangement	0.45	0.50	0.59	$71,819,356
4889	Other Support Activities for Transportation	1.02	0.78	0.65	$6,196,606
4921	Couriers and Express Delivery Services	1.16	1.29	1.25	$257,133,147
4922	Local Messengers and Local Delivery	1.10	1.23	1.55	$36,743,012
4931	Warehousing and Storage	1.31	2.18	1.43	$466,246,625
5416	Management, Scientific, and Technical Consulting Services	0.91	0.91	0.90	$881,017,640
5619	Other Support Services	1.20	1.10	0.84	$102,015,861
				Total	$3,121,867,333

Source: EMSI Developer 2020.2 Datarun

Shift Share

The regional logistics cluster surpassed expected job change for 2010-2020 by 1,976 jobs, indicating competitiveness. While employment in the regional warehousing and storage industry group more than doubled over the past decade, it was not the most competitive industry group in this cluster. Rather, the general freight trucking industry group led the regional cluster in competitiveness. Table 36A details shift share values for the regional logistics cluster.

Table 36A: Shift Share, Logistics Cluster, GRR, 2010-2020

NAICS	Description	IME	NGE	Expected Change	2010 - 2020 Change	Competitive Effect
4811	Scheduled Air Transportation	-21	132	111	-506	-618
4812	Nonscheduled Air Transportation	87	48	135	-30	-164
4821	Rail Transportation	-147	162	15	-24	-39
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	-4	12	8	13	6
4832	Inland Water Transportation	0	1	1	-	1
4841	General Freight Trucking	288	1,002	1,290	2,300	1,010
4842	Specialized Freight Trucking	75	364	439	516	76
4851	Urban Transit Systems	84	128	212	-49	-261
4855	Charter Bus Industry	-5	17	12	-9	-20
4859	Other Transit and Ground Passenger Transportation	874	50	924	1,777	854
4861	Pipeline Transportation of Crude Oil	0	0	0	0	0
4862	Pipeline Transportation of Natural Gas	-2	13	11	129	118
4869	Other Pipeline Transportation	5	6	11	4	-8
4881	Support Activities for Air Transportation	91	48	139	165	26
4882	Support Activities for Rail Transportation	4	2	6	-	33
4883	Support Activities for Water Transportation	-3	8	5	26	21
4884	Support Activities for Road Transportation	182	114	296	253	-43
4885	Freight Transportation Arrangement	142	81	223	430	207
4889	Other Support Activities for Transportation	40	25	65	-7	-72
4921	Couriers and Express Delivery Services	1,871	582	2,453	2,832	378
4922	Local Messengers and Local Delivery	735	138	873	1,521	648
4931	Warehousing and Storage	4,401	769	5,170	5,933	763

5416	Management, Scientific, and Technical Consulting Services	1,845	1,431	3,276	3,101	-176
5619	Other Support Services	-17	406	389	-372	-761
	Total	10,526	5,539	16,064	18,003	1,976

Source: EMSI Developer 2020.2 Datarun

5. Regional Health Care and Life Sciences Cluster

Employment

A combined 68,492 workers were employed in the regional health care and life sciences cluster in 2020, which accounted for 6.7% of total employment in the GRR. The general medical and surgical hospitals industry group accounted for the largest portion of regional cluster employment. This cluster saw milder growth from 2010-2020; 8,171 jobs were added, marking 2% growth. Table 37A details employment for the regional health care and life sciences cluster.

Table 37A: Employment Change, Healthcare & Life Sciences Cluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
3254	Pharmaceutical & Medicine Manufacturing	1,038	629	994	-44	-4%
3332	Industrial Machinery Manufacturing	538	478	496	-42	-8%
3345	Navigational, Measuring, Electromedical, & Control Instruments Manufacturing	118	137	141	23	19%
3391	Medical Equipment & Supplies Manufacturing	322	326	314	-8	-2%
4234	Professional & Commercial Equipment & Supplies Merchant Wholesalers	3,325	3,059	2,822	-503	-15%
4461	Health & Personal Care Stores	4,571	5,076	5,291	720	16%
5417	Scientific Research & Development Services	2,170	2,415	2,838	668	31%
5622	Waste Treatment & Disposal	563	605	356	-207	-37%
6214	Outpatient Care Centers	2,752	3,225	4,521	1,769	64%
6215	Medical & Diagnostic Laboratories	1,612	2,192	2,402	790	49%
6216	Home Health Care Services	5,769	6,316	6,749	980	17%
6219	Other Ambulatory Health Care Services	1,368	1,632	1,636	268	20%
6221	General Medical & Surgical Hospitals	20,808	21,410	22,722	1,914	9%
6222	Psychiatric & Substance Abuse Hospitals	1,025	830	985	-40	-4%

6223	Specialty -except Psychiatric & Substance Abuse Hospitals	974	976	746	-228	-23%
6231	Nursing Care Facilities - Skilled Nursing Facilities	4,626	4,772	4,840	214	5%
6232	Resident. Intellect. & Dev. Disability, Mental Health, & Substance Abuse Facilities	1,698	2,303	2,657	959	56%
6233	Cont. Care Retirement Communities & Assisted Living Facilities for Elderly	5,143	5,579	6,284	1,141	22%
6239	Other Residential Care Facilities	1,900	1,886	1,697	-203	-11%
	Total	60,320	63,844	68,492	8,171	2%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

Six industry groups in the regional health care and life sciences cluster had LQ values exceeding 1.0 in 2020. The regional cluster was more specialized in local service health care industries (hospitals and care facilities) and less specialized in traded sector health care industries, such as pharmaceutical medicine manufacturing and medical supplies manufacturing. The GRR's robust network of hospitals supplied the largest portion of the regional cluster's GRP in 2019, generating nearly $2 billion. Overall, the regional health care and life sciences cluster generated $5.54 billion in 2019, which accounted for 5.5% of the Region's GRP. Table 38A details LQ and GRP for the regional health care and life sciences cluster.

Table 38A: LQ & GRP, Healthcare & Life Sciences Cluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
3254	Pharmaceutical and Medicine Manufacturing	0.87	0.52	0.74	$335,518,468
3332	Industrial Machinery Manufacturing	1.21	0.94	0.90	$58,935,680
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	0.07	0.08	0.08	$28,339,397
3391	Medical Equipment and Supplies Manufacturing	0.24	0.24	0.21	$45,483,936
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	1.26	1.12	0.94	$584,992,077
4461	Health and Personal Care Stores	0.96	0.98	1.00	$261,016,874
5417	Scientific Research and Development Services	0.76	0.80	0.81	$444,780,290
5622	Waste Treatment and Disposal	1.35	1.46	0.82	$48,174,249
6214	Outpatient Care Centers	1.03	0.97	0.99	$417,778,020
6215	Medical and Diagnostic Laboratories	1.49	1.80	1.77	$237,123,708
6216	Home Health Care Services	0.93	0.83	0.76	$242,078,775
6219	Other Ambulatory Health Care Services	1.02	1.09	0.99	$110,035,307
6221	General Medical and Surgical Hospitals	1.13	1.12	1.11	$1,964,256,692

6222	Psychiatric and Substance Abuse Hospitals	2.39	1.77	1.74	$53,179,066
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	1.13	1.05	0.71	$58,897,433
6231	Nursing Care Facilities (Skilled Nursing Facilities)	0.65	0.68	0.71	$239,828,233
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	0.65	0.82	0.86	$88,433,229
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	1.55	1.45	1.41	$251,042,284
6239	Other Residential Care Facilities	2.60	2.59	2.26	$74,022,143
				Total	$5,543,915,861

Source: EMSI Developer 2020.2 Datarun

Shift Share

As mentioned above, the Region's heath care and life sciences cluster experienced milder growth over the past decade compared to other clusters. Shift share data suggest that this cluster was not competitive from 2010-2020; the regional health care and life sciences cluster underperformed expected job change by 3,848 jobs. Table 39A details shift share values for this cluster.

Table 39A: Shift Share, Healthcare & Life Sciences Cluster, GRR, 2010-2020

NAICS	Description	Ind. Mix Effect	Nat'l Growth Effect	Expected Change	2010 - 2020 Change	Competitive Effect
3254	Pharmaceutical & Medicine Manufacturing	-65	203	138	-44	-182
3332	Industrial Machinery Manufacturing	29	105	134	-42	-176
3345	Navigational, Measuring, Electromedical, & Control Instruments Manufacturing	-16	23	7	23	16
3391	Medical Equipment & Supplies Manufacturing	-31	63	32	-8	-40
4234	Professional & Commercial Equipment & Supplies Merchant Wholesalers	-168	651	483	-503	-986
4461	Health & Personal Care Stores	-375	895	520	720	199
5417	Scientific Research & Development Services	95	425	520	668	148
5622	Waste Treatment & Disposal	-84	110	26	-207	-234
6214	Outpatient Care Centers	1,442	539	1,981	1,769	-212
6215	Medical & Diagnostic Laboratories	103	316	419	790	371
6216	Home Health Care Services	1,402	1,129	2,531	980	-1,551

6219	Other Ambulatory Health Care Services	64	268	332	268	-64
6221	General Medical & Surgical Hospitals	-1,713	4,074	2,361	1,914	-446
6222	Psychiatric & Substance Abuse Hospitals	129	201	330	-40	-370
6223	Specialty -except Psychiatric & Substance Abuse Hospitals	24	191	215	-228	-442
6231	Nursing Care Facilities - Skilled Nursing Facilities	-1,089	906	-183	214	398
6232	Residential Intellectual & Developmental Disability, Mental Health, & Substance Abuse Facilities	2	332	334	959	625
6233	Continuing Care Retirement Communities & Assisted Living Facilities for the Elderly	768	1,007	1,775	1,141	-634
6239	Other Residential Care Facilities	-306	372	66	-203	-269
	Total	211	11,809	12,021	8,171	-3,848

Source: EMSI Developer 2020.2 Datarun

6. Regional Food and Beverage Cluster

Employment

The Region's food and beverage cluster was composed of 13,916 jobs in 2020, which accounted for 1.6% of the GRR's employment. This cluster saw 7% employment growth from 2010-2020, adding 2,499 jobs during this period. The beverage manufacturing industry group led the cluster in growth over the past decade. Alternatively, employment decline was limited to industry groups vested in animal production during this period. Table 40A details employment change for the regional food and beverage cluster.

Table 40A: Employment Change, Food & Beverage Cluster, GRR, 2010-2020

NAICS	Description	2010 Jobs	2015 Jobs	2020 Jobs	2010 - 2020 Change	2010 - 2020 % Change
1110	Crop Production	1,907	2,061	2,727	820	43%
1120	Animal Production	1,530	1,161	882	-648	-42%
1151	Support Activities for Crop Production	297	350	495	198	67%
1152	Support Activities for Animal Production	209	206	208	-1	0%
3111	Animal Food Manufacturing	28	84	58	30	107%
3112	Grain and Oilseed Milling	156	153	106	-50	-32%
3115	Dairy Product Manufacturing	<10	46	11	-	-
3116	Animal Slaughtering and Processing	919	1,027	1,028	109	12%

3118	Bakeries and Tortilla Manufacturing	1,002	1,043	1,184	182	18%
3119	Other Food Manufacturing	505	594	812	307	61%
3121	Beverage Manufacturing	237	630	1,285	1,048	442%
4244	Grocery and Related Product Merchant Wholesalers	3,016	3,533	3,466	450	15%
4245	Farm Product Raw Material Merchant Wholesalers	103	107	76	-27	-26%
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	943	1,402	1,581	81	68%
	Total	10,852	12,398	13,916	2,499	7%

Source: EMSI Developer 2020.2 Datarun

Location Quotient

The regional food and beverage cluster was the most specialized in the alcoholic beverage wholesale industry group, the grocery and related products wholesale industry group, and the beverage manufacturing industry group in 2020. Additionally, the GRR's food and beverage cluster accounted for 1.8% ($1.48 billion) of the Region's GRP in 2019. Table 41A details LQ and GRP for the regional food and beverage cluster.

Table 41A: LQ & GRP, Food & Beverage Cluster, GRR, 2010-2020

NAICS	Description	2010 LQ	2015 LQ	2020 LQ	2019 GRP
1110	Crop Production	0.30	0.33	0.44	$99,094,806
1120	Animal Production	0.31	0.24	0.18	$31,208,924
1151	Support Activities for Crop Production	0.14	0.15	0.19	$14,656,476
1152	Support Activities for Animal Production	0.50	0.52	0.43	$6,009,260
3111	Animal Food Manufacturing	0.12	0.33	0.20	$9,089,628
3112	Grain and Oilseed Milling	0.62	0.60	0.40	$32,983,287
3115	Dairy Product Manufacturing	0.01	0.08	0.02	$769,149
3116	Animal Slaughtering and Processing	0.44	0.49	0.45	$65,139,838
3118	Bakeries and Tortilla Manufacturing	0.80	0.75	0.78	$137,233,137
3119	Other Food Manufacturing	0.68	0.64	0.72	$167,117,993
3121	Beverage Manufacturing	0.31	0.65	0.98	$234,946,175
4244	Grocery and Related Product Merchant Wholesalers	0.95	1.03	0.97	$404,295,872
4245	Farm Product Raw Material Merchant Wholesalers	0.30	0.29	0.22	$13,733,205
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	1.31	1.64	1.72	$241,683,821
				Total	$1,457,961,572

Source: EMSI Developer 2020.2 Datarun

Shift Share

Employment growth in the regional food and beverage cluster from 2010-2020 surpassed expected job change by 1,568 jobs. This indicates competitiveness, which noteworthy in that the national cluster experienced decline during the same period. Rapid employment growth in the Region's beverage manufacturing industry group alongside more linear growth in the crop production industry group reinforced this cluster's competitiveness over the past decade. Table 42A details shift share values for the regional food and beverage cluster.

Table 42A: Shift Share, Food & Beverage Cluster, GRR, 2010-2020

NAICS	Description	IME	NGE	2010 - 2020 Change	Expected Change	Competitive Effect
1110	Crop Production	-368	366	820	-2	823
1120	Animal Production	-300	294	-648	-6	-642
1151	Support Activities for Crop Production	8	57	198	65	133
1152	Support Activities for Animal Production	-10	40	-1	30	-32
3111	Animal Food Manufacturing	3	5	30	8	21
3112	Grain and Oilseed Milling	-20	30	-50	10	-61
3115	Dairy Product Manufacturing	0	1	-	1	7
3116	Animal Slaughtering and Processing	-80	176	109	96	13
3118	Bakeries and Tortilla Manufacturing	17	192	182	209	-28
3119	Other Food Manufacturing	159	97	307	256	51
3121	Beverage Manufacturing	126	45	1,048	171	876
4244	Grocery and Related Product Merchant Wholesalers	-189	578	450	389	61
4245	Farm Product Raw Material Merchant Wholesalers	-22	20	-27	-2	-25
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	84	181	638	265	372
	Total	-589	2,082	3,056	1,490	1,568

Source: EMSI Developer 2020.2 Datarun