Compendium of Evaluation Criteria

The following table demonstrates where DHCD reviewers can find specific items relevant to each of the Evaluation Criteria in the final plan document.

Economic Growth and Diversification Plan Evaluations Criteria	
Criteria	Where compliance is documented in this plan:
Impact of the Plan on the Region	*35 points*
(1) The plan demonstrates that Regional Council members prioritized activities, consistent with the priorities of GO Virginia, that the region could undertake and would do one or more of the following; a) Expand economic opportunity b) Grow and diversify the economy c) Create and/or align worker training programs or other activities that develop, attract, or retain talent, with the education and skills needed by employers and potential employers in the region	The plan demonstrates that the Regional Council prioritized activities consistent with the priorities of GO Virginia in **the Executive Summary** and **Framework Initiatives.**
(2) The plan identifies existing or potential business activities, sectors, or clusters which can lead to sustainable, scalable, future growth in the region and includes: a) A discussion of process used to select those activities, sectors, or clusters b) Empirical data that was used to determine those activities, sectors, or clusters c) Identification of efforts to enhance access to higher paying jobs	The plan identifies existing or potential business activities, sectors, or clusters that can lead to future growth in the region. The process to select those activities, sectors and clusters is described in **the Executive Summary.** The empirical data can be found in **Appendix I - Data Deliverable** and **Appendix V - Targeted Industry Profiles.** The efforts to enhance access to higher paying jobs can be found in the **Framework Initiatives.**

(3) The plan prioritizes the identified activities, sectors, or clusters the Region may undertake to achieve its goals through activities in one or more of the following: a) Grow existing business b) Fill gaps in existing or emerging sector presence or support the development of existing clusters c) Scale up existing companies d) Encourage entrepreneurial activity that leads to job and business creation e) Commercialize development of research for public universities and public and private research facilities	The plan prioritizes the identified activities, sectors, or clusters the Region may undertake to achieve its goals. a) See "Grow existing business" in the **Framework Initiatives** and **Appendix V - Targeted Industry Profiles** b) See **Appendix V - Targeted Industry Profiles** c) See "Grow existing business" in the **Framework Initiatives** and **Appendix V - Targeted Industry Profiles** d) See "Startups/Innovation/Commercialization Opportunities" in the **Framework Initiatives** e) See "Startups/Innovation/Commercialization Opportunities" in the **Framework Initiatives**
(4) The plan identifies specific measurable performance metrics consistent with those established by the GO Virginia Board.	The plan identifies specific measurable performance metrics consistent with those established by the GO Virginia Board in **Performance Metrics.**
(5) The plan includes evidence of the rigor and methodology of the consultant studies.	The plan includes evidence of the rigor and methodology of the consultant studies in the **Executive Summary** and **Appendix I - Data Deliverable** and **Appendix V - Targeted Industry Profiles.**
(6) The plan includes a discussion of the challenges and gaps that will need to be addressed for the priorities to be accomplished.	The plan includes a discussion of the challenges and gaps that will need to be addressed for the priorities to be accomplished in **Appendix IV - Qualitative Interview Summary** and in the narrative explanations of the individual **Framework Initiatives.**

(7) The plan may include a discussion of sub-regions and how they will benefit from the overall regional priorities.	The plan includes a discussion of sub-regions in the **Framework Initiatives** (for example, see initiatives related to the northern sub-region versus the southern sub-region) and **Appendix I - Data Deliverable** (for example, county-by-county data sets on a number of topics as well as data aggregated on the planning district level.) See also **Appendix IV - Qualitative Interview Summary** for sub-regional-specific findings and priorities.
(8) The plan indicates that the Regional Council actively managed the staff and consultants involved in developing the plan and recommendations.	The plan indicates that the Regional Council actively managed the staff and consultants in the **Frameworks Initiatives.** See also **Appendix III – Stakeholder Engagement** which lists involvement by the Council as well as **IV - Qualitative Interview Summary** where individual Council members were interviewed. The Regional Council was also briefed at four separate presentations held in July and August.
(9) The plan may include a discussion of opportunities for intra-regional, intra-state, and interstate collaborations and partnerships.	The plan includes a discussion of opportunities in **Framework Initiatives.**
(10) The ability of the regional council to implement the recommendations of its plan.	The ability of the regional council to implement the recommendations is included in the **Framework Initiatives**. See particularly the "Other" categories of the initiatives in terms of implementation capacity.
Economic and Workforce Analysis	*25 Points*

(1) The plan Identifies workforce gaps in both the existing significant drivers of the economy as well as the prioritized opportunity areas and includes the following: a) Identification of existing efforts to develop, recruit, and retain higher paying jobs b) Assessment of workforce availability and gaps related to the opportunities and needs identified in the plan c) Plan demonstrates acknowledgement of the Virginia Workforce Board/Regional Workforce Investment Board gap analysis, or other similar analysis, as such other plans relate to the creation or retention of higher paying jobs. d) Plan identifies current efforts to address identified gaps to include: i. The skills/credentialing/experience/education required ii. Activities to import talent from outside Virginia, or to retain existing talent, to address gaps e) The plan includes a review of commuting patterns (both existing and potential) for the workforce to other regions/states, as well as in and out migration trends, and whether such activities affect the region's ability to create, attract, and/or retain high paying jobs.	The plan identifies workforce gaps in both the existing significant drivers of the economy as well as the prioritized opportunity areas in **Appendix I - Data Deliverable.** a) See "Occupational Analysis" section of the **Appendix I - Data Deliverable** b) See "Occupational Analysis" and "Business Workforce Survey Analysis" sections of the **Appendix I - Data Deliverable** c) See "Occupational Analysis" section of the **Appendix I - Data Deliverable** d) i. See "Occupational Analysis" section of the **Appendix I - Data Deliverable** ii. See "Occupational Analysis" section of the **Appendix I - Data Deliverable** e) See "Occupational Analysis" section of the **Appendix I - Data Deliverable**
Alignment	*20 Points*
(1) This plan demonstrates alignment with the goals of GO Virginia: a) Implementation will result in the creation of more, higher paying jobs (above median wage of region and/or sub region) b) Implementation will strengthen and diversify the region's economy and align with the priorities of the region as determined by the Regional Council c) Revenues are primarily attributable to out-of-state sources	This plan demonstrates alignment with the goals of GO Virginia in the **Executive Summary** and **Framework Initiatives** and **Performance Metrics.**

(2) This plan demonstrates consideration of opportunities to cooperate with state initiatives (where appropriate): a) Virginia Research Investment Committee (VRIC) b) Collaborative Jobs Act c) Economic, degree and credential provisions of The Virginia Plan for Higher Education, including the New Economy Workforce Credential Grant Program d) Alignment with other statewide and regional plans that may relate to the identified strategies and projects	This plan demonstrates consideration of opportunities to cooperate with state initiatives in the **Framework Initiatives** and **Performance Metrics.**
Development Process	*10 Points*
(1) The plan reflects a review and alignment of current and relevant existing local and regional strategic plans.	The plan reflects a review and alignment of current and relevant existing local and regional strategic plans in **Framework Initiatives** (see various specific initiatives). Local and regional strategic plans were also covered in interviews memorialized in **IV - Qualitative Interview Summary**.
(2) The plan demonstrates participation of Regional Council members in review and analysis of regional information including: a) Identification of critical issues of economic growth and diversification b) Prioritization of needs and opportunities c) Identification of opportunities for the commercialization of research d) Examine potential joint economic development activities. e) Assess the number of small and minority owned businesses, and promote their development in the region, if such activities lead to the creation of higher paying jobs.	The plan demonstrates participation of Regional Council members in review and analysis of regional information in the **Framework Initiatives** and **IV - Qualitative Interview Summary.**
(3) The plan includes a discussion of the stakeholder and public engagement process.	The plan includes a discussion of the stakeholder and public engagement process in **Appendix III Stakeholder Engagement** and **Appendix IV - Qualitative Interview Summary.**

(4) The plan identifies intraregional economic differences and addresses opportunities to benefit all parts of the region.	The plan identifies intraregional economic differences and addresses opportunities in the **Framework Initiatives, Appendix IV - Qualitative Interview Summary** and **Appendix I - Data Deliverable.**
(5) The plan outlines the engagement and involvement of the private sector (outside the regional council membership) in its development	The plan outlines the engagement and involvement of the private sector in the **Appendix III Stakeholder Engagement** and **Appendix IV - Qualitative Interview Summary.**
(6) The anticipated schedule for review and modifications to the plan based on new information or economic changes impacting the data or drivers of the region's economy.	The anticipated schedule for review and modifications to the plan is indicated in certain specific **Framework Initiatives** as well as in the **Performance Metrics.**
Budget/Strategy	*10 Points*
(1) The plan identifies potential sources of matching funds for grant requests (specific commitments and amounts are not required until applications are submitted for per capita and competitive applications.)	Potential sources of matching funds for grant requests are identified the **Framework Initiatives** and **Appendix IV - Qualitative Interview Summary** and are referenced in **Performance Metrics.**
(2) The plan discusses opportunities for efficiencies within the region that could provide potential resources to support plan implementation.	Opportunities for efficiencies within the region are identified in the **Framework Initiatives** and are referenced in **Performance Metrics.**
(3) The plan maximizes the focus on impact and reduces overhead and administrative expenses.	The plan discusses reducing overhead and administrative expenses in the **Framework Initiatives**. and are referenced in **Performance Metrics**.
(4) The plan identifies ways to ensure sustainability of the regional council for plan implementation and administration of the regional council for the time after state funding grants are exhausted	The plan identifies ways to ensure sustainability of the regional council for plan implementation in the **Framework Initiatives** and are referenced in **Performance Metrics**
(5) The plan identifies potential matching funds for the FY2018 capacity building funds (up to $250,000).	The plan identifies potential matching funds for the FY2018 capacity building funds in the **Executive Summary. (**See the subsection "Implementation and Funding" at the end.)

GO VIRGINIA REGION 8: ECONOMIC GROWTH AND DIVERSIFICATION PLAN

camoin associates
ECONOMIC DEVELOPMENT

In collaboration with:

THOMAS P. MILLER & ASSOCIATES

innovation policyworks

Acknowledgements

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GO Virginia Region 8 Council:

George Pace, *Chair*	Connie Loughhead
Chris Kyle, *Vice Chair*	John King
Mike Keyser	Keith May
Gwen Malone	John Downey
Mark Merrill	Kathlynn Brown
J.J. Smith	Jeff Stapel
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The report serves as a foundation for formulating the Economic Growth and Diversification Plan for Region 8 of the GO Virginia Initiative. The information provided herein will serve as a foundation for more in-depth planning and coordination to promote the growth of high-income jobs within the Commonwealth of Virginia.

The Project Team

The following consultant teams collaborated in assembling the data provided in this report:

Camoin Associates

Project Coordination; Economic Base Analysis

Thomas P. Miller & Associates

Occupational Analysis; Business Survey Administration

Innovation Policyworks

Innovation and Entrepreneurship Assessment

Table of Contents

Appendices

Executive Summary

Introduction

The Economic Growth and Diversification Plan is a guiding document that the Region 8 Council will use to:

1. Identify economic opportunities, needs, and challenges,
2. Establish priorities among identified opportunities, and
3. Outline needed enhancements where GO Virginia funds can support collaborative programs among at least two or more localities.

The plan is a pre-requisite for establishing regional priorities for the use of Go Virginia project funds.

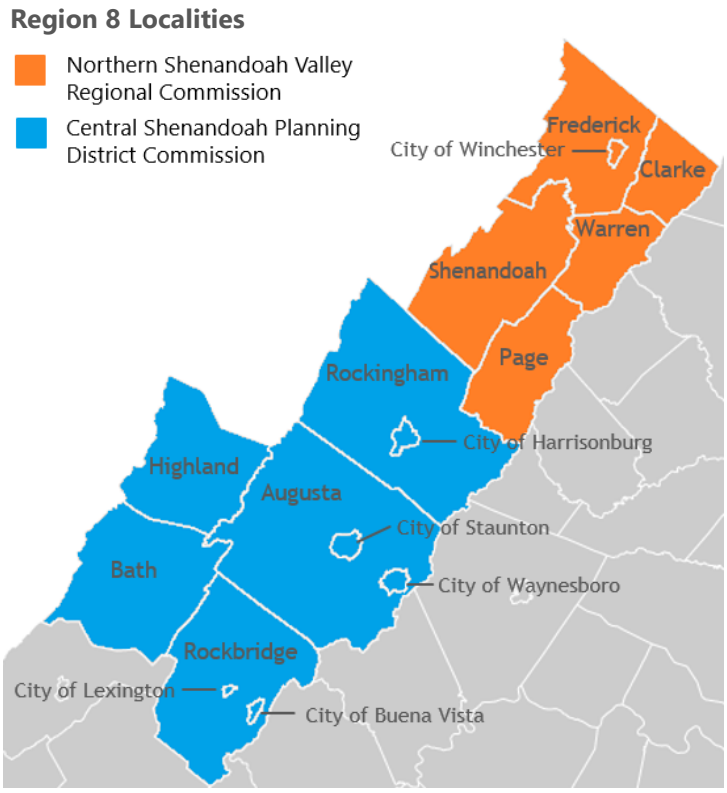
Based on extensive data collection and analysis, including an Economic Base Assessment, Innovation and Entrepreneurial Asset Inventory and Workforce Analysis (See Appendices I-V), five targeted industry sectors were identified for Region 8. These sectors will be the focus for creation of higher paying jobs for the region that will bring new investment, enhance the competitiveness of the region, and diversify the economy of the region, in turn spurring growth of Virginia's economy.

In addition, a set of framework initiatives was developed around four broad areas:

- Recruit and/or retain the talent needed in the region,
- Grow existing businesses, develop existing clusters, and scale-up small and mid-size companies,
- Establish start-ups from commercializing university-based research and supporting entrepreneurs, and
- Support potential joint economic development activities such as site development and training initiatives.

About Region 8

Region 8 spans the Shenandoah Valley of Virginia and is comprised of 16 cities and counties, shown in the map to the right.



Region 8 is home to two planning district organizations: the Central Shenandoah Planning District Commission (CSPDC) and the Northern Shenandoah Valley Regional Commission (NSVRC). The Central Shenandoah Planning District Commission is comprised of Rockingham County, City of Harrisonburg, Highland County, Augusta County, City of Staunton, City of Waynesboro, Bath County, Rockbridge County, City of Lexington, and City of Buena Vista. The Northern Shenandoah Valley Regional Commission is comprised of Frederick County, City of Winchester, Clarke County, Shenandoah County, Warren County and Page County.

The regional geography encompasses shining examples of American countryside in the Shenandoah National Park and George Washington & Jefferson National Forest, along with an abundance of historical properties. This area is also famed for its agricultural legacy and the industry continues to generate significant economic activity within the region.

As of 2017, Region 8 is home to a population of approximately 535,000 and 206,000 households. By 2022, the region is projected to add an additional 20,000 inhabitants and 8,000 households. Currently, the average household is made up of 2.5 individuals and the median age is 39 years.

About GO Virginia

GO VIRGINIA | VIRGINIA INITIATIVE FOR GROWTH & OPPORTUNITY IN EACH REGION

To enhance, reinforce, and complement its existing economic assets, the Commonwealth of Virginia introduced an effort to promote regional economic identity and cooperation. This effort, called the GO Virginia Initiative, is a collaboration designed to promote private-sector economic growth and diversification across the Commonwealth of Virginia through the creation of nine economic development regions to assess and target new investment and innovation in high-income and export-oriented industry sectors. The nine regions, established in the Spring of 2017, must assess current gaps in economic

development resources in both an intraregional and interregional capacity, and successfully put forth potential projects that can fill in these gaps with the aid of state funding.

The GO Virginia Initiative is an opportunity for economic regions around Virginia to develop a deeper understanding of their current capacities and find innovative solutions to leverage their existing strengths to promote economic development. As described by the Virginia Department of Housing and Community Development (DHCD), the initiative "supports a voluntary, incentive-based approach as the best way to encourage regional cooperation on private-sector growth. To fund state incentives, the coalition favors use of growth revenues, re-purposed dollars, and efficiency savings...GO Virginia proposes NO new taxes, mandates, layers of government, or changes in local authority."

Targeted Industries

The following industry sectors were selected based on quantitative and qualitative information, to be the future focus for economic development initiatives in Region 8. The targeted industries were compiled from related subsectors (a full list of those subsectors can be found in the Targeted Industry Appendix V). The sectors were chosen based on a wide list of criteria with a heavy emphasis on the following criteria outlined in the GO Virginia Initiative:

- Industries in the sector demonstrate strong current or projected employment growth.
- Industries in the sector have high earnings potential for workers.
- Industries in the sector are export-oriented.

The sectors chosen consist of industries that are already strong in Region 8, as they build upon assets including economic base, workforce, infrastructure, innovation, and entrepreneurship. Region 8's economy is already quite diversified, but needs to grow.

The five targeted industry sectors for Region 8 are:

- Financial and Business Services
- Health Care
- Information Technology/Communications
- Light Manufacturing
- Transportation and Logistics.

Summary jobs data is shown below for each of these sectors.

Targeted Industry Sectors as a Percentage of Region 8 Total Jobs				
Sector	2016 Sector Jobs	2026 Sector Jobs	2016 Percentage of Total Jobs	2026 Percentage of Total Jobs
Health Care	47,354	53,371	19.9%	20.4%
IT/Communications	5,066	6,533	2.1%	2.5%
Transportation and Logistics	13,017	15,246	5.5%	5.8%
Finance and Business Services	17,912	21,190	7.5%	8.1%
Light Manufacturing	19,974	19,325	8.4%	7.4%
Other Sectors	134,764	146,147	56.6%	55.8%

Source: EMSI

Each is profiled briefly below and described more fully in Appendix V.

Financial and Business Services

The Finance and Business Services sector represents industries that provide finance, insurance, real estate, accounting, and consulting services. The core subsectors for Region 8 are **Depository Credit Intermediation (NAICS 5221)**, **Computer Systems Design and Related Services (NAICS 5415),** and **Management, Scientific, and Technical Consulting Services (NAICS 5416)**.

Major Products and Services in Region 8:

- Printing and related services
- Insurance and wealth management
- Accounting and bookkeeping
- Real estate leasing
- Information and data processing
- Legal and consulting services
- Depository credit intermediation

As of 2016, 17,912 workers were employed by the Financial and Business Services industry sector in Region 8, spanning 2,108 establishments. Employment within this sector increased by 17% over the last decade, adding nearly 1,600 new jobs. Industries that are particularly concentrated within Region 8 include **Printing and Related Support Activities (NAICS 3231)** with a location quotient (LQ) of 4.20, **Insurance and Employee Benefit Funds (NAICS 3231)** with an LQ of 1.53, and **Depository Credit Intermediation (NAICS 5221)** with an LQ of 1.34. (Location Quotients measure the concentration of a given industry in a specific region relative to the United States. An LQ above 1.2 is considered significant.)

Regional job growth in the Finance and Business Services sector has historically outpaced that of the state and nation. Regional factors have propelled job growth at a greater rate than expected over the last decade, making this industry highly competitive. **Depository Credit Intermediation (NAICS 5221**) is projected to be the most competitive industry in Region 8 by 2026.

Health Care

The Health Care sector represents industries that provide health care and social assistance for individuals. Industries in this sector cooperate in the process to serve patients through health care providers, technology, and research. Establishments include hospitals, doctors' offices, nursing homes, surgery centers, laboratories, and medical research centers. The core subsector for Region 8 is **General Medical and Surgical Hospitals (NAICS 6221)**, which employs over 8,600 workers and is projected to add an additional 890 jobs over five years. This addition will make it the second most competitive industry in the Region by 2026. Other core subsectors include **Continuing Care Retirement Communities (NAICS 623311)** and **Nursing Care facilities (NAICS 623110)**.

Major Products and Services in Region 8:

- General health care
- Surgeries
- Assisted living
- Medical research
- Medical equipment and pharmaceuticals
- Dentistry

As of 2016, 47,352 workers were employed in the Health Care sector in Region 8. From 2011 to 2016, employment in the Health Care sector declined by 0.5%, a total of 222 jobs. Looking forward, Region 8 is projected to add over 3,500 Health Care jobs by 2021, for a 7% job growth from 2016 to 2021.

The Health Care sector plays a vital role in supporting the quality of life for residents in Region 8. As the population ages, an increased demand for health care services will require strategic planning by educational institutions and training providers to deliver an adequate number of health care workers who can perform a variety of medical specialties. The need is especially acute for nurses as the current workforce cohort continues to retire. Taking stock of existing retirement communities and assisted living facilities will also help localities understand how to retain individuals who want to age in place instead of leaving their community if they are not able to find sufficient care.

Information Technology/Communications

The Information Technology/Communications (ITC) sector represents industries involved in the development, manufacturing, and usage of IT and communications-related products and services. Establishments within this sector are primarily in research and development, electrical component manufacturing, or computer systems design. The core subsectors for Region 8 are **Software Publishers (NAICS 511210)**, **Computer Systems Design Services (NAICS 541512),** and **Security System Services (NAICS 561621).**

Major Products and Services in Region 8:

- Software design
- Computer systems design
- Engineering research and development
- Fiber optic cable
- Cybersecurity
- Data processing

Currently, the ITC sector in Region 8 employs over 5,000 employees in over 570 establishments. From 2011 to 2016, there has been a 9% growth in ITC jobs and a 11% growth in ITC establishments. Projections show an additional 922 ITC jobs by 2021, for a growth rate of 18% from 2016 to 2021. Regional growth in this sector has largely been driven by activity from the federal government, especially in the northern portion of Region 8. The region's proximity to Washington, DC presents opportunities to locate firms that are delivering products and services that are evolving to meet the changing demands of consumers and businesses. The ITC sector benefits from high demand across nearly every industry sector, as virtually every firm relies on some form of information technology, data hosting, or cybersecurity system.

Light Manufacturing

Light Manufacturing encompasses the range of processes in which materials are mechanically, physically, or chemically transformed into new products. Unlike heavy manufacturing, which is associated with continuous processes, light manufacturing is often associated with batches or isolated production runs. Light Manufacturing is less capital intensive than traditional manufacturing and is more oriented towards consumer-facing products. Establishments are mainly comprised of mills, plants, and factories.

Major Products and Services in Region 8:

- Plastics
- Medical devices and equipment
- Snack foods and chocolate
- Pharmaceuticals
- Textiles
- Electronic devices

In 2016, Region 8 was home to 419 Light Manufacturing establishments, which employed nearly 20,000 workers. Since 2011, the number of establishments and workers have decreased by 2% and 4% respectively. Despite this decline, manufacturing is still a significant source of employment for the region and provides above-average wages. While a decline in the number of employees needed in Light Manufacturing is being seen across the nation, Region 8 is competitively positioned to outperform similar

markets in this subsector. In general, the jobs that are in demand in this sector are higher skill, and therefore higher wage positions. So, while employment may continue to decrease on a national scale, Region 8 is posed to shed jobs at a rate slower than competitors, and the remaining jobs will be more likely to provide a living wage.

Manufacturing has a strong legacy in the Shenandoah Valley and throughout Region 8. While this industry continues to experience major upheavals from technological advancements and increased productivity levels, Region 8 has valuable assets on which it can capitalize to ensure that local operators have the resources to be successful. Subsectors in this industry are supported by ancillary infrastructure in the transportation and warehousing sector, helping to move manufactured goods throughout the region's major road networks, rail systems, and ports.

Transportation and Logistics

Major Products and Services in Region 8:

- Ground transportation of passengers and goods
- General freight trucking
- Warehousing and distribution of goods
- Commercial and passenger air service

The Transportation and Logistics sector represents industries that link producers and consumers through interconnected supply chains and an array of transportation modes. Logistics industries provide detailed coordination to increase efficiency in multi-modal transportation systems. Establishments in these industries use transportation equipment or transport-related facilities as a productive asset. Equipment varies based on mode of transportation, which includes air, rail, water, and road. Services within this sector primarily include transportation of passengers and goods, storing and warehousing products, and providing service and facilitating distribution to these establishments. The core subsectors for Region 8 include: **Charter Flights (NAICS 48121), General Warehousing and Storage (NAICS 493110),** and **General Freight Trucking, Long-Distance, Truckload (NAICS 484121)**, which have all shown significant growth within the past five years.

The Transportation and Logistics sector encompasses 614 establishments and employs just over 13,000 people in Region 8. In the five-year period from 2011 to 2016, Region 8 industries in this sector have grown by 23%, compared to a 17% growth at the national level. The region's transportation assets render it a prime location for companies moving goods throughout the country. From extensive interstate and state road networks to a regional airport and an inland port, capitalizing on assets throughout Region 8 localities will help improve overall connectivity.

Framework Initiatives

The Region 8 Economic Growth and Diversification Plan is not a typical strategic plan, but rather, a framework for the types of projects the Region 8 Council will consider pursuing applications for as part of GO Virginia's grant program. Initiatives that comprise the framework are divided into the following categories:

- Talent Development
- Growing Existing Businesses
- Startups/Innovation/Commercialization

- Sites
- Other Opportunities

Based on the quantitative and qualitative analysis of Region 8's economy, issues pertaining to each of the categories were identified, and framework initiatives proposed. Each category below highlights how Region 8 can leverage its assets to improve upon existing networks, while also pursuing new collaborations to support inter-jurisdictional collaborative programs that will lead to job creation, economic diversification and knowledge transfer.

The following opportunities are described in greater detail in the Framework Initiative section that follows.

I. Talent Development Opportunities

a. Encourage Earn and Learn Programs

Providing on-the-job and incumbent worker training and services can allow businesses to upskill current employees into difficult to fill middle-skill positions.

b. Expand Employability Skills Training

Employability training programs can help to prepare entry level candidates with the life and soft skills demanded by businesses and needed for candidates to succeed in the workplace.

c. Engage Businesses with Sector Partnerships

Sector partnerships can offer an opportunity to engage businesses with their peers, hear about collective industry needs, and offer collaborative solutions.

d. Increase K-12 Educator Engagement with Industry

Increasing the opportunities for K-12 teachers and staff to engage with local industry will help to change the culture around the local career opportunities available for students.

e. Increase Talent Attraction

Talent attraction efforts can help to expand the talent pool by bringing new people into the region from other states or countries.

II. Growing Existing Businesses Opportunities

a. Create a Public-Private Training Loan Pool

As an offshoot to the sector partnership initiative, Region 8 should help create a fund that employees and employers would use to fund training programs for incumbent workers.

b. Develop a Business Retention and Expansion Program

Communities within Region 8 should form a partnership to create and implement a formal business retention and expansion program.

c. Create Additional Regional Tourism Destination Sites

Region 8 should help in the creation of one or more tourism destination sites to draw in and retain more outside tourism spending dollars.

d. Deploy Broadband Partnerships

Communities can join together to help extend quality broadband to unserved and underserved areas by entering into public-private partnerships to solve infrastructure shortcomings.

e. Expand Marketing and Promotion

This initiative would support efforts to promote the region externally to potential residents and businesses as being a great place to live, work, play, and visit.

III. Startups/Innovation/Commercialization Opportunities

a. Increase Regional Research and Development Expenditures

By increasing R&D expenditures, it is likely that increased discovery, intellectual property, and spin-off companies could result.

b. Increase the Breadth and Depth of the Entrepreneurial Ecosystem

Supporting the development and operations of strong entrepreneurial assistance programs throughout the region will increase the success of startups and help entrepreneurs stay in the Shenandoah Valley as they grow.

c. Attract and Retain Entrepreneurial Companies as They Scale-Up

The scale-up stage offers the greatest opportunity for economic impact as early-stage companies transition from product development to production and market expansion.

IV. Site Opportunities

a. Site Readiness Investigation

Many sites in the region would benefit from some additional preliminary investigation work to determine levels of needed investment and timeline to readiness.

b. Enhance Visibility of Existing Sites

Existing sites need to be properly characterized and promoted at the state level and can benefit from a designation in the Commonwealth's Site Readiness Program.

c. Complete General Site Improvements: Northern Sub-region

Improvements can be made to business and industrial parks in the northern portion of the region to focus particularly on Northern Virginia expansions in the technology, communications, business services, and banking sectors.

d. Complete General Site Improvements: Southern Sub-region

Improvements can be made to business and industrial parks in the central and southern portion of the region to focus particularly on light manufacturing, food and beverage, and transportation and logistics growth.

e. Create Industrial Mega Site

This initiative would create a "Mega Site" to help attract a large new industrial prospect.

V. Other Opportunities

a. Identify Leadership for Plan Implementation

Shenandoah Valley Partnership (SVP) can provide leadership for the GO Virginia plan implementation by supporting communities with additional site readiness initiatives and coordination between regional stakeholders.

b. Develop Organizational Funding & Capacity Building Mechanisms for Plan Implementation

Develop a sustainable funding mechanism that will give SVP the financial resources needed to address emerging Region 8 challenges and opportunities and execute on the plan.

Implementation and Funding

The Economic Growth and Diversification Plan is a road map to help the Region 8 Council and their localities build resilient economies by leveraging existing assets, while also developing ambitious goals about possibilities for the future. A collaborative approach across the public and private sectors will be imperative to the successful implementation of this plan. The Framework Initiatives were developed with the understanding that the successful implementation of the initiatives will hinge on adequate organizational capacity and appropriate resources. The Region 8 Council recognizes that while state funds can be the catalyst to economic activity, additional funds will be required to realize the initiatives listed in this plan. Specific details on potential funding partners are listed throughout the Framework Initiatives and Performance Metrics sections. This plan will be reassessed on an annual basis to account for variations in factors driving the economy of Region 8.

Performance Metrics

Performance metrics were established to guide the successful progression of each framework initiative. The metrics provide concrete examples and timelines for how initiatives could advance in Region 8 with the aid of GO Virginia funds. While the metrics are defined to help establish benchmarks for the initiatives, it is anticipated that timelines and goals may change as new information or funding is acquired. The metrics will be documented in an Excel file that can be adjusted over time to reflect the changes in each initiative.

Framework Initiatives

Introduction

This section comprises the framework under which Region 8 will prioritize projects seeking GO Virginia funding assistance. Each category below highlights how Region 8 can leverage its assets to improve upon existing networks, while also pursuing new collaborations to support inter-jurisdictional collaborative programs that will lead to job creation, economic diversification, and knowledge transfer. The foundation for this framework is based on extensive stakeholder consultation, quantitative data collection, and feedback from the Region 8 Council.

Work Completed

The scope of work for this project was designed to collect a diverse range of information from a cross-section of stakeholders that represent the many facets of Region 8. The consultants of the Project Team focused their research efforts on identifying Region 8's competitive factors and exploring how to enhance opportunities for job growth in industries with high paying wages. Consideration was also given to building stronger industry clusters by actively supporting the resources, in terms of physical space and human capital, that will not only retain businesses in the region, but will elevate them towards a growth trajectory.

The following is a summary of the work that was completed as part of the Economic Growth and Diversification Plan. The Region 8 Council was actively engaged in providing feedback for individual deliverables and was consulted throughout the process to ensure the proposed framework aligns with and advances existing goals for Region 8.

- Review of existing planning and policy documents from within Region 8 localities
- Business/industry survey distributed across the region that garnered 156 responses
- Economic base analysis
- Workforce data analysis
- Innovation and entrepreneurial asset inventory
- Targeted industry determination and profiles
- Stakeholder interviews and focus groups
- Ongoing communication with Region 8 Council and four site visits

GO Virginia Framework Initiatives

The Framework outlined below was established based on the organizational and funding capacity within the Region 8 Council and its localities. While the initiatives are ambitious, the Project Team understands that the implementation phase is often where planning efforts can fall short. Therefore, each category offers potential partners for collaboration, presents cost estimates, and includes timelines for advancing the initiatives. Further details on measuring the success of the initiatives can be found in the Performance Metrics section.

The Framework is broken down into the following sections:

- **Talent Development** – A talented workforce is critical for employers and communities to achieve long term success and growth. Communities that struggle to attract and retain a highly skilled workforce will exhibit hindered growth. Talent development opportunities aim to attract, develop, and retain a productive workforce that aligns with the demands of the region's businesses.

- **Growing Existing Businesses** –Assessing the needs of current Region 8 business is instrumental in catalyzing regional growth. Opportunities in expanding existing businesses seek to further develop regional assets in order to encourage additional economic activity.
- **Startups/Innovation/Commercialization** – Research, innovation, and a business environment geared towards new business startups enables the region to stay on top of industry and economic changes. Opportunities in startups/innovation/commercialization focus on policies that support resources that are most crucial to building a strong entrepreneurial ecosystem.
- **Sites** – Site improvements coupled with new site development ensures the physical capacity necessary to accommodate business expansion and new industry.
- **Other Opportunities** – These opportunities seek to develop organizational capacity and funding mechanisms to ensure successful implementation of the framework initiatives.

I. Talent Development

a. Opportunity: Encourage Earn and Learn Programs

Providing on-the-job and incumbent worker training and services can allow businesses to upskill current employees into difficult to fill middle-skill positions.

Through focus groups and the regional business survey, employers indicated that it is relatively easy to find candidates to fill entry level positions. However, finding more experienced workers with specific technical skills is very difficult. The Shenandoah Valley Workforce Development Board had a grant that recently ended to provide on-the-job training resources to employers, so the resources available to support businesses in training new employees based on the needs of individual businesses have decreased.

Incumbent worker training programs help employers fill middle-skill positions by upskilling promising employees at lower levels of the company, promoting internal career pathways and career advancement for employees who have already proven to be hard workers and shown commitment. By opening up advancement opportunities, companies can retain high-quality workers who are outgrowing their current positions, but may still need a little bit of training to take the next step. The availability of these opportunities can also help companies in recruiting for entry-level positions, showing that if new employees put in their time and effort, there are opportunities for advancement.

Training can take the form of individual on-the-job training or customized courses for cohorts through local training providers such as:

- Blue Ridge Community College
- Lord Fairfax Community College
- Dabney S. Lancaster Community College
- Massanutten Technical Center
- Triplett Tech
- Valley Career and Technical Center

The Workforce Development Board does offer limited incumbent worker training, but this can be expanded and enhanced to reach additional employers. The Board can utilize its business services staff to connect with companies to determine where there is need, and education and training providers at all levels are key to ensuring the right training is available to meet those needs.

b. Opportunity: Expand Employability Skills Training

Employability training programs can help to prepare entry level candidates with the life and soft skills demanded by businesses and needed for candidates to succeed in the workplace.

Because of the low unemployment rate throughout the Region, there is a limited availability of talent. With the addition of demand for talent from the new Amazon and Navy Federal Credit Union, the burden will only be exacerbated, especially for warehousing and finance, respectively. The need to access alternative talent groups will become even more vital.

It is imperative that the Region focus talent development not only on technical skills but employability skills. While employers reported finding higher numbers of applicants for entry-level positions than higher skilled positions, they also reported that those applicants often do not have the soft skills necessary to be employed. An important source of talent can be found by accessing and leveraging additional populations (i.e. ex-offenders, individuals with disabilities, young adults, foreign born talent, etc.) Some of these individuals may need more training in both employability skills and technical skills either through traditional education or work based learning, but simply engaging them can lay the foundation for a sustainable workforce to support the growth and diversification of the regional economy.

Addressing these skills includes addressing issues of motivation, the value of work, and life skills, as well as setting expectations for the workplace. While these issues go beyond specific training and are dependent on individuals' experiences within schools or their homes, dedicated training programs can provide one avenue for jobseekers to understand and build these skills. A training program completion can indicate to employers that an applicant is motivated and committed to coming to work and learning how to be successful on the job. Knowing a candidate can learn and be trained provides business with a value-added workforce.

For this to be a valuable signal to employers, they must be involved in the creation of the training, specifically in identifying exactly what employability, or "soft", skills are needed in the work place. Ideally, this training would be created through a collaboration of community partners so that multiple organizations are involved in its implementation, providing the greatest number of jobseekers the opportunity to participate. Important partners to engage include the K-12 school system, community colleges, technical schools, the Workforce Development Board, and other community organizations, specifically those working with targeted populations.

c. Opportunity: Engage Businesses with Sector Partnerships

Sector partnerships can offer an opportunity to engage businesses with their peers, hear about collective industry needs, and offer collaborative solutions.

Supporting businesses in their talent development needs is critical to helping them grow and ultimately boost the regional economy. Sector partnerships provide an opportunity to hear from industry representatives about their common needs and create solutions that will benefit multiple employers. Sector partnerships can begin to identify industry-specific needs. For example, one concern that may arise is the impact of Amazon or Navy Federal Credit Union scaling up operations and the strain that will cause on the talent pool. By business and industry working collaboratively and with the support of public and private resources, partnerships can create customized solutions.

The Region should focus in on a couple key industries to start to ensure adequate attention is available to getting the partnerships up and running. Manufacturing and Health Care are logical candidates to be starting points because of the size of their presence in the region and their importance to the regional economy. Earlier this year, the Workforce Development Board completed a study on the manufacturing industry – *The Changing Manufacturing Workforce in the*

Shenandoah Valley – that provides a strong foundation for discussion among employers to take the next step in meeting the needs identified in the report.

Business representatives must drive the initiative in order to get buy-in from their peers and to ensure that the needs are coming directly from industry. One of the first steps to convening these sector partnerships should be to identify and recruit industry champions to lead the effort. They should be individuals who take personal interest and responsibility for the success of the partnership, understanding that the long-term success of their business is linked to broader community prosperity. The foundation of a sector partnership must be laid by industry representatives if the partnership is going to be effective and sustainable.

Though businesses should drive the agenda of a partnership, they must be supported and facilitated by a group of community partners who are willing to work together to create collaborative solutions in response to those business leaders. This includes the Workforce Development Board, education institutions of all levels, economic development, chambers of commerce, and other business and workforce development-related community organizations. These partners would act as the "staff" to the partnership to implement, support, and execute the partnership's agenda. As the partnership grows and becomes more self-sufficient, the need for community partner staff support could be replaced by actual sector partnership staff and the community partners would be free to foster the development of additional sectors.

d. Opportunity: Increase K-12 Educator Engagement with Industry

Increasing the opportunities for K-12 teachers and staff to engage with local industry will help to change the culture around the local career opportunities available for students.

Focus group and interview participants recognized the issue that most high school students still have the impression that they have to go to a 4-year institution after graduation to be successful. Many students, parents, and even teachers do not have a full understanding of the great career opportunities that are available and the education that is required to pursue them. They either do not realize that there are high-skilled, high-paying opportunities that require less than a four-year degree, or they have a false impression of the work environment (e.g. dark, dirty, unsafe manufacturing facilities rather than the highly technical and sophisticated processes of today). Educating students about local industries and future opportunities not only helps those who decide not to go to college, but it may also plant seeds in the minds of those students who choose to leave the area for education to want to come back for work once they complete their degrees. This is important for all industries, and can be an opportunity to highlight and recruit for each of the region's targeted industries.

Students need to see that there are multiple paths to success. After graduating, some may go to post-secondary education, some may go straight to work and may pursue further education later in their careers. All of these paths can equally lead to successful outcomes, and there is no one right way to pursue a career. Schools should celebrate post-graduation employment the same way they celebrate students getting into college.

Some of the high schools are creating opportunities to expose students to local industries. It is also critical to get the teachers and school staff who work with the students every day to be a part of the messaging in order to begin to change the culture around post-secondary education and careers. School personnel should participate in facility tours, job shadowing, educator externships, or other opportunities to be able to experience firsthand the demands of the industries that they can share with students.

These opportunities will be a partnership between K-12 schools and businesses, or other organizations who work with businesses, including the Workforce Development Board and local and regional economic development organizations and chambers of commerce.

e. Opportunity: Increase Talent Attraction

Talent attraction efforts can help to expand the talent pool by bringing new people into the region from other states or countries.

Because of the low unemployment rate within Region 8, the available talent pool is shrinking. Employers are recognizing that there is a limited amount of skilled talent available and are seeing fewer and fewer applicants for open positions. When the available talent pool is too small, employers are either forced to find their talent among those who are already employed with their competitors or to import talent from outside of the region.

To avoid poaching among employers, the region should focus on efforts to expand the talent pool through talent attraction. One target for attraction may be foreign-born talent. Community members indicated that the region is already an immigrant- and refugee-friendly area, and community organizations can maximize the talent within that population that is not currently utilized as well as create programs to support these individuals as the population grows, including ESL classes, employability skills training, career coaching to identify transferable skills, etc. This will help to create a pipeline for entry level workers, and because many of these individuals may have held skilled positions prior to their migration, they may also be a source for some higher-skilled talent with some help with licensing and certifications.

Region 8 can also focus on attracting middle-skill jobseekers based on the quality of life in the region. Quality of life was identified as both an asset and a challenge to talent attraction, but marketing the assets of the region, such as outdoor opportunities and small town living with proximity to larger metro areas, will speak to individuals who are seeking an active lifestyle in an area with quality job opportunities.

Regional economic development organizations or chambers of commerce are likely best positioned to lead talent attraction efforts. However, partners from across the talent development system must be engaged and supportive to ensure the Region has a common message and is attracting the appropriate talent.

II. Growing Existing Businesses

a. Opportunity: Create Public-Private Training Loan Pool

As an offshoot to the sector partnership initiative, Region 8 should help create a fund that employees and employers would use to fund training programs for incumbent workers.

Employers often hesitate to invest significant funds into employees who may then leave to work elsewhere. This loan pool would therefore be directed towards individual employees, who would borrow from the fund to pay for a specific training. At the same time, the employer would "sponsor" the employee by agreeing to pay the debt service on the loan as long as the employee continues his/her employment with the company. If the employee leaves, he/she would have to assume that debt service. Debt repayment would replenish the loan fund for the next recipient.

b. Opportunity: Develop Business Retention and Expansion Program

Communities within Region 8 should form a partnership to create and implement a formal business retention and expansion program.

Retaining and growing local businesses is the highest value economic development activity a community can undertake, for it is far easier to grow what you have than to attract a new prospect. Fortunately, the Shenandoah Valley appears to be a place where home grown businesses stick around and expand on a regular basis. The region can promote this trend by encouraging communities to come together and implement a formal BR&E program. This requires staff time to conduct periodic interviews with major employers to assess what is working and not working for them in the Region. Not only do these interviews identify potential expansion plans and concerns, they also serve as an early-warning system to industry sectors that are experiencing headwinds and may need assistance.

The cost of such a program would vary based on the size of the geography covered and the number of businesses that would be involved. However, if the BR&E program were limited to just the top employers, one to one-and-a-half FTEs could be sufficient, plus the cost of a one-time database setup to track visits and report findings.

c. Opportunity: Create Additional Regional Tourism Destination Sites

Region 8 should help in the creation of one or more tourism destination sites to draw in and retain more outside tourism spending dollars.

Tourism in an important industry for the region and brings in substantial outside dollars into the local economy. As new tourists are attracted, the entire region benefits from additional hotel, restaurant, entertainment and retail spending. There are several potential destination projects that, while located in a specific municipality, could serve the region as a whole. Such projects could include a new, large conference center, a satellite location of the Museum of National History, or a significant visitor's center focused on the Shenandoah Valley.

Several jurisdictions could join together to help co-fund one such destination project and may be able to leverage such funds to bring in private sector dollars. The public investment required will vary depending on the size and complexity but is assumed to be in excess of $1 million in most cases.

d. Opportunity: Deploy Broadband Partnerships

Communities can join together to help extend quality broadband to unserved and underserved areas by entering into public-private partnerships to solve infrastructure shortcomings.

Within Region 8, there are areas well served by high speed internet, particularly the more urbanized communities. However, some areas within Region 8 do not have access to quality broadband services. Since broadband is an essential element of infrastructure in the modern economy, this impedes business growth, talent attraction, and remote working opportunities as well as the ability to access education, training, and health care.

The region already has access to a "backbone" of fiber optics but is missing certain critical "middle-mile" and "last-mile" infrastructure that could tap into the backbone. Solving this issue is a difficult proposition for any one business or community to undertake because such connections are quite expensive and require a large customer base to amortize the upfront costs. In particular,

last-mile costs can be prohibitively expensive in less dense areas. This issue, however, could be solved through public-private partnerships that would help pay for certain parts of the network and allow multiple providers to offer services to customers.

e. Opportunity: Expand Marketing and Promotion

This initiative would support efforts to promote the region externally to potential residents and businesses as being a great place to live, work, play, and visit.

Region 8 offers a quality of life premium to its residents and businesses that differentiate it from more urbanized areas like Washington D.C., Baltimore and Northern Virginia (NOVA), which suffer from serious congestion and a high cost of living. Already, businesses and residents from NOVA are pushing into the northern areas of Region 8. The region also offers incredible recreational and tourism opportunities and attracts visitors from across the country. This brings in new dollars to the economy and grows jobs in the various hospitality sectors. Furthermore, the Shenandoah Valley already has a solid "brand" and name recognition. Therefore, further amplifying these qualities in existing and new markets will help to boost visitors.

The opportunity is for Region 8 to coordinate a marketing campaign to these two target markets, namely businesses/residents in NOVA and tourists from within and outside the state. On the former, Roanoke provides an interesting case study, as that region is heavily promoting its recreational amenities as a way to attract talent (particularly Millennials) entrepreneurs, and businesses. Arguably, Region 8 has as good or better natural resources, beauty and historic sites that could be leveraged in the same way.

The region could consider using a public relations marketing firm to design a logo, collateral material, and a marketing campaign that would place the brand in appropriate media channels.

III. Startups/Innovation/Commercialization

Innovation is important to Region 8 because it is a building block for economic growth. Economists believe that up to 80 percent of economic growth is rooted in new knowledge – innovation. Entrepreneurship is important because it is often the carrier for innovation; many new ideas come to the market through entrepreneurial firms.

For these reasons, innovation and entrepreneurship have a public benefit and are widely supported by the public sector. Best practice for the public support is generally in one of three forms:

- Support for research and development and access to markets, such as through translational research, proof of concept centers and building research capacity;
- Support for building and maintaining the entrepreneurial ecosystem; and
- Increasing access to capital.

Region 8's opportunities reflect two of these approaches.

a. Opportunity: Increase Regional Research and Development Expenditures

By increasing R&D expenditures, it is likely that increased discovery, intellectual property, and spin-off companies could result.

Region 8's academic and non-profit research organizations are constrained by their missions and their scale. Most are dedicated to teaching and award primarily undergraduate and master's degrees. Their missions do not include economic development. Scale is also a challenge, as the

largest research budget, $3.7 million at James Madison University (as of 2015), is roughly 1 percent of the budget of the Commonwealth's primary research institutions.

While converting any of these institutions into a research powerhouse seems unlikely, targeted expenditures could be focused on R&D related to sectors of strength in the region. Experience in other states (Georgia and the Georgia Research Alliance is an excellent example) shows that increased research investment leads to economic development outcomes when focused and sustained.

One approach is to start a Center of Excellence, using the public funds to recruit several mid-career faculty, and helping them apply for and win competitive federal R&D grants. This will lead to 1) a better educational experience for students and 2) increased opportunity for the discovery and protection of intellectual property that could lead to the formation of early-stage companies with roots in Region 8. Both will lead to higher-paying jobs in the region, and diversification of the economy. Funding for a center would be roughly $1 million a year for 3-5 years.

Currently the State Council of Higher Education of Virginia (SCHEV) is finalizing guidelines for the Virginia Research Investment Fund (VRIF). To qualify for this funding, academic institutions in Virginia should identify areas of research that leverage their current institutional expertise, the regional ecosystem and commercial potential.

The consultant team believes that cybersecurity is the best choice for Region 8, as James Madison University (JMU) already has significant faculty and educational programs in the field, the market for cybersecurity is growing rapidly and the region already has some firms in the ecosystem. A second choice, although less attractive, is agricultural-bio, based on some existing research expertise and the agricultural heritage of the region.

b. Opportunity: Increase the Breadth and Depth of Entrepreneurial Ecosystem

Supporting the development and operations of strong entrepreneurial assistance programs throughout the region will increase the success of startups and help entrepreneurs stay in the Shenandoah Valley as they grow.

Currently, Region 8's entrepreneurial ecosystem is strong with regard to student innovations at JMU, but thin and fragmented elsewhere in the region. It does not adequately support new businesses or help existing businesses to scale. Most programs are operated on limited budgets that constrain their capacity to assist entrepreneurs. Often managers of these programs lack the background to provide meaningful assistance to fast growing companies.

The goal of this opportunity is to provide grants and technical assistance to existing incubators, accelerators and co-working spaces in the region, and fund and assist the establishment of new ones. The funding would emphasize the sharing of personnel with targeted sector expertise (e.g., food and beverage manufacturing, cybersecurity), training events, networks, and access to capital among all the partners. The goal would be to have at least a co-working space (or better) within 45 minutes of everyone in the region, and an active schedule of learning opportunities and support for entrepreneurs and companies looking to expand and grow.

This opportunity should encompass all existing and new programs, as well as the Small Business Development Center (SBDC), JMU, Shenandoah Valley Innovation Council (SVIC) and economic development entities. It would be coordinated by a single intermediary organization, such as the SVIC. Approximate budget would be $500,000/year. Region 8 could potentially work with Go

Virginia Region 9 on this opportunity to expand its reach and acknowledge the existing overlaps in the ecosystems.

c. Opportunity: Attract and Retain Entrepreneurial Companies as They Scale-Up

The scale-up stage offers the greatest opportunity for economic impact as early-stage companies transition from product development to production and market expansion.

When startup and early stage companies move from ideation to product development and into production and market expansion, their needs change. Often, they need space for assembly or light manufacturing, back office operations, fulfilment or other non-research related activities. They are often facing new challenges in the expansion of their companies, unrelated to those they have faced as a startup. These companies may currently be located near major universities with high cost structures and/or in urban areas with restrictions on how much space is available.

Because of its expertise in light manufacturing, back office (IT) and logistics, Region 8 is well positioned to offer support to early stage companies from outside of the region, at the same time retaining local entrepreneurs. Support could take the form of technical assistance, e.g., mentoring; site availability at an appropriate scale (e.g., a manufacturing incubator or park with small- and mid-sized suites), capital, and connections (e.g., sector networks).

IV. Sites

a. Opportunity: Site Readiness Investigation

Many sites in the region would benefit from some additional preliminary investigation work to determine levels of needed investment and timeline to readiness.

The lack of available sites that are fully "shovel ready" is hampering economic development across the Region and was ranked as the second highest priority by local economic developers in a recent survey of the SVP membership. Furthermore, some sites even lack information on what would be necessary to bring the site to shovel-ready status, in terms of cost, feasibility and timeline.

The Region could address this issue by funding site investigations and characterizations on a regional basis with a GO Virginia match. These types of investigations would include Phase I ESA's as well as infrastructure engineering to determine probable cost to get appropriate services in place. There may be other work such as wetlands delineation and soil testing that would help characterize the site and would provide valuable information to prospects. SVP could provide in-kind services in matching existing sites to the most appropriate targeted industries based on industry-specific site requirements.

Such a program would need to be funded by local governments and private property owners in large part, with a match possible from GO Virginia. Each site would require between $10,000-$40,000 for basic investigation work. (Note: If that initial work indicates the need for more testing or engineering, the cost for that site could be much greater than the range provided.)

b. Opportunity: Enhance Visibility of Existing Sites

Existing sites need to be properly characterized and promoted at the state level and can benefit from a designation in the Commonwealth's Site Readiness Program.

After the Site Readiness Investigation initiative described above, the second step would be to submit the Region's premier sites to the Commonwealth's Site Readiness Program to be classified from Tier 1-Tier 5 based on readiness, raising their profile and enhancing transparency and marketability to site selectors.

A second aspect of this initiative would be to coordinate efforts across the Region to keep the state's database of sites (YesVirginia.org) current. A review of that database by the consultants revealed that some of the Region's sites are not listed at all and others are missing critical information. Not only will this data task help improve access to information, but can be used by the Region to raise visibility of what it has to offer to the Commonwealth's economic development community.

c. Opportunity: Complete General Site Improvements: Northern Sub-region

Improvements can be made to business and industrial parks in the northern portion of the region to focus particularly on Northern Virginia expansions in the technology, communications, business services, and banking sectors.

If a site's investigations and characterizations are complete, there will likely be a number of physical investments that will need to be made, potentially including improvements to roads, water/sewer, natural gas, electric and telecommunications infrastructure. Other major improvements could include site clearing and grading to make the site fully "pad-ready." In the northern portions of the Region, those kinds of improvements could be geared towards the targeted industries of IT/Communications (ex: Software design, Computer systems design, Engineering research and development, Cybersecurity and Data processing) and Business/Professional services (ex: Printing and related services, Insurance and wealth management, Accounting and bookkeeping, Information and data processing, Legal and consulting services, and Depository credit intermediation). This focus is in response to the development demand opportunities already present in the Region from Northern Virginia businesses looking to expand.

d. Opportunity: Complete General Site Improvements: Southern Sub-region

Improvements can be made to business and industrial parks in the central and southern portion of the region to focus particularly on light manufacturing, food and beverage, and transportation and logistics growth.

Likewise, physical improvements to sites in the southern sub-region can be focused on the most appropriate sectors, such as light manufacturing (ex: Plastics, Medical devices and equipment, Foods and beverage, Pharmaceuticals, Textiles, Electronic devices, Aerospace), as well as transportation and logistics.

e. Opportunity: Create Industrial Mega Site

This initiative would create a "Mega Site" to help attract a large new industrial prospect.

The Commonwealth of Virginia currently lacks "mega sites" at a high level of readiness. The term "mega site" does not have a precise definition, but typically encompasses at least 500 acres and often 1,000 or more acres, with a significant portion of those acres being both buildable and contiguous. The idea is that the mega site could form a future industrial "campus" for a major manufacturer or other end user.

There are only a small number of sites in the Region that could potentially become a mega site, including (but not limited to):

- The Blue Mountain site near the Shenandoah Valley Regional Airport that was under consideration at one point by Toyota. However, the site has shortcomings with water/sewer/gas that would require a significant investment as well as improvements to the I-81 interchange.
- Staunton Crossing with 300 acres, but it is constrained somewhat by existing buildings.
- The 512-acre Turkey Knob site, which requires a zoning change and certain transportation enhancements.

Because of the sheer size and potential impact of such an initiative, the Region could come together to pool resources for site improvements. This could also be matched by a tax-base sharing agreement so that all parties would benefit from both the jobs and the tax revenue. Improvements could easily run into the tens of millions of dollars depending on the extent of infrastructure investments required.

V. Other

a. Opportunity: Identify Leadership for Plan Implementation

Shenandoah Valley Partnership (SVP) can provide leadership for the GO Virginia plan implementation by supporting communities with additional site readiness initiatives and coordination between regional stakeholders.

The last recession had a significant impact on how many states and regions now deliver economic development services. Financial considerations forced states to regionalize their economic development efforts and investment decision making. This forced smaller local EDOs to relinquish programs, while conversely, regional EDOs have expanded their toolbox of programs and initiatives beyond lead generation and attraction. As a result, it is now common for multi-county regional organizations to provide leadership, funding and capacity in support of multi-pronged economic development initiatives across large geographic areas.

The GO Virginia program is designed to get regions to consider economic development initiatives in areas of innovation/startups, existing business expansion, workforce and site readiness. Until now, counties and communities within regions were handling their own efforts with regional EDOs primarily focused on marketing and attraction and workforce development being led by Workforce Development Boards. The eventual implementation of these broader economic development efforts within Region 8 will require leadership and additional capacity and funding. To ensure that the most effective management structure is in place, SVP is the logical organization to be charged with this responsibility. The organization already covers a majority of the geography, is considered the lead regional EDO by stakeholders and has the business and government network/relationships in place needed for continued collaboration and cooperation.

b. Opportunity: Develop Organizational Funding & Capacity Building for Plan Implementation

Develop a sustainable funding mechanism that will give SVP the financial resources needed to address emerging Region 8 challenges and opportunities and execute on the plan.

Like many of the Commonwealth's regional EDOs, the Shenandoah Valley Partnership does not currently have the capacity to comprehensively address the current and emerging challenges and opportunities identified in this GO Virginia framework. Based on research conducted by International Economic Development Council (IEDC), a growing number of economic development organizations now have formal multi-year funding campaigns designed to support a wider array of economic development challenges and initiatives. Where the public sector once provided the lion's share of financial resources for economic development organizational capacity, many EDOs are now primarily funded through a private-public mix. The SVP should explore the feasibility of developing a sustained funding campaign that would provide the financial resources for implementation of the GO Virginia Economic Growth & Diversification Plan, as well as provide new funding to leverage GO Virginia and other initiatives.

Implementation of Framework Initiatives

The Economic Growth and Diversification Plan is a road map to help the Region 8 Council and their localities build resilient economies by leveraging existing assets, while also developing ambitious goals about possibilities for the future. A collaborative approach across the public and private sector will be imperative to the successful implementation of this plan. Capitalizing on cross-jurisdictional efforts will help to maximize resources and allow initiatives to operate on a wider scale, as opposed to tackling tasks on a piecemeal basis. Each initiative was developed with potential partners in mind, along with opportunities to cooperate with existing state initiatives where appropriate, including the Virginia Research Investment Committee, Collaborative Jobs Act, The Virginia Plan for Higher Education, and other statewide programs. This plan will be reviewed on an annual basis to identify economic factors that may change the priorities of the framework initiatives. Additionally, the Performance Metrics document is intended to be used frequently and can be updated as necessary to accommodate priority shifts based on organizational or funding capacity.

Funding Mechanisms

Region 8 is proposing to use all $250,000 of its supplemental GO Virginia Funds for project work, as opposed to capacity building activities. Therefore, an appropriate source of matching funds will be identified when actual projects are proposed for funding. The Region 8 Council will seek a 1:1 match to partner with GO Virginia funds when moving forward in identifying viable projects based on the framework above. Matching funds will be derived from a variety of organizations, including public and private sector sources. Funds from localities, cross-jurisdictional groups, and other regional entities will be utilized as necessary. The Region 8 Council will also leverage GO Virginia grant funds with other regional stakeholders like the private foundations and non-profit charities that suit the programs or tasks proposed by the project.

Performance Metrics

Introduction

Performance metrics reflect the range of components that go into each framework initiative to ensure a project's successful completion. Establishing performance metrics at the outset of a project is essential for ensuring that all stakeholders maintain the same vision of a successful outcome. The performance metrics listed below will be used to assess Region 8's performance in achieving each framework initiative, each metric is not a definitive assessment but rather a representation of the types of specific milestones to measure success for projects undertaken with GO Virginia assistance.

Note: All timeline references provided below are from the date an individual project commences and not from the date this plan is approved.

I. Talent Development	
Framework Initiative	*Performance Metrics*
a. Encourage Earn and Learn Programs Providing on-the-job and incumbent worker training and services allows businesses to upskill current employees into difficult-to-fill middle skill positions.	■ Within the first six months: Create an inventory of Earn and Learn opportunities that business services representatives can easily reference with employers. ■ Within twelve months: Recruit at least 5 employers to host customized programs. ■ Within eighteen months: In partnership with education providers and selected businesses, develop at least five customized Earn and Learn opportunities

b. Expand Employability Skills Training Employability training programs can help to prepare entry level candidates with the life and soft skills demanded by businesses and needed for candidates to succeed in the workplace.	■ Within the first six months: Assess regional resources for employability skills training. ■ Within nine months: Convene employer focus group(s) to determine the employability skills needed. ■ Within eighteen months: Create a common employability skills training curriculum for implementation by community partners. ■ Thereafter: Train at least 100 individuals in a new program within the first year of implementation, incrementally increase each year. ■ Thereafter: Continue using annual business survey to measure employers' perceptions on the employability skills of applicants. Decrease the number of employers who find employability skills "Difficult" or "Very Difficult" to find in applicants each year.
c. Engage Businesses in Sector Partnerships Sector partnerships can offer an opportunity to engage businesses with their peers, hear about collective industry needs, and offer collaborative solutions.	■ Within the first three months: Identify and recruit industry champions in manufacturing and health care from each sub-region. ■ Within six months: Convene regional support partners to gain a common understanding of sector partnerships, outline roles and responsibilities, and plan for launches. ■ Within twelve months: Hold one industry convening each in the Manufacturing and Health Care industries. ■ Thereafter: Increase number of employers involved in partnerships each year by at least 5%.

d. Increase K-12 Educator Engagement with Industry Increasing the opportunities for K-12 teachers and staff to engage with local industry will help change culture around the local career opportunities available for students.	■ Within the first three months: Recruit a minimum of 10 employers to offer experiences for teachers and administrators. Thereafter: Add at least five new employers each year. ■ Within the first six months: Partner with at least five local high schools to offer opportunities to teachers and administrators. Thereafter: Add at least two new schools each year. ■ Within the first eighteen months: Recruit at least 20 teachers and administrators to participate in educator externships during.
e. Increase Talent Attraction Talent attraction efforts can help to expand the talent pool by bringing new people into the region from other states or countries.	■ Within the first three months: Identify the region's assets for coordinated marketing campaign. ■ Within six months: Identify target markets and appropriate channels for a marketing campaign. ■ Within five years: Labor force rate of increase has grown above the baseline rate by at least one percentage point. ■ Within five years: Net migration consistently positive.

II. Growing Existing Businesses

Framework Initiative	*Performance Metrics*
a. Create Public-Private Training Loan Pool As an offshoot to the sector partnership initiative, Region 8 should help create a fund that employees and employers would use to fund training programs for incumbent workers.	■ Within the first nine months: Form sector partnerships for at least three targeted industry sectors. ■ Within nine months: Use partnerships to identify joint training needs for each sector's employers. Engage a training provider to match those needs. ■ Within twelve months: Obtain commitments of at least $200,000 from partners in each sector for loan fund capital. ■ Thereafter: At least 50 employees per sector use the loan fund per year.

b. Develop a Business Retention and Expansion Program Communities within Region 8 should form a partnership to create and implement a formal business retention and expansion program.	■ Within the first twelve months: Select a targeted industry to focus on and chose which businesses will be served. Implement the program and use of a database to track the visits to businesses served by the program. ■ Within the twenty-four months: Complete at least two visits per year to all companies in the portfolio to identify potential expansion plans or identify early warning signs for relocation. ■ Within thirty-six months: Document job retention and incremental job creation of at least 1,000 jobs across all companies served.
c. Create Additional Regional Tourism Destination Sites Region 8 should help in the creation of one or more tourism destination sites to draw in and retain more outside tourism spending dollars.	■ Within the first three months: Develop a list of potential locations and projects. Select one or more projects for advancement. ■ Within eighteen months: Secure private sector commitments of sufficient funds and determine public sector "ask". ■ Within twenty-four months: Attain commitment of at least $1 million (in total) in public investment per project by participating jurisdictions to support implementation. ■ Within forty-eight months: One of more destination sites completed.

d. Deploy Broadband Partnerships Communities can join together to help extend quality broadband to unserved and underserved areas by entering into public-private partnerships to solve infrastructure shortcomings.	■ Within the first six months: Identify two or more municipalities that could collaborate to efficiently solve a broadband infrastructure issue. ■ Within twelve months: Establish a working relationship between those municipalities and get commitment from them to explore a potential partnership. ■ Within eighteen months: Complete a preliminary engineering report and probable cost estimate for such a joint investment. As necessary, identify a private partner to establish a public-private partnership (PPP). ■ Within three years of PPP establishment: no less than 50% of the households and businesses within the proposed service area has access to broadband.
e. Expand Marketing and Promotion This initiative would support efforts to promote the region externally to potential residents and businesses as being a great place to live, work, play, and visit.	■ Within the first six months: PR firm secured and marketing plan in place. ■ Within twenty-four months: Marketing plan implemented. ■ Within sixty months: Regional site expansions of at least 20 Northern Virginia businesses and 2,000 new households.

III. Startups/Innovation/Commercialization

Framework Initiative	*Performance Metrics*
a. Increase Regional Research and Development Expenditures By increasing R&D expenditures, it is likely that increased discovery, intellectual property, and spin-off companies could result.	■ Within three months: Identify research target. ■ Within twelve months: Work together to apply for VRIF or other funding. ■ Within eighteen months: Recruit faculty members. ■ Within thirty-six months: Win sufficient federal or other research grants to maintain program. ■ Within seven years: At least five patents and at least one spin-out company.

b. Increase the Breadth and Depth of Entrepreneurial Ecosystem Supporting the development and operations of strong entrepreneurial assistance programs throughout the region will increase the success of startups and help entrepreneurs stay in the Shenandoah Valley as they grow.	■ Within the first twelve months: Fund at least five entrepreneurial support programs in Region 8. ■ Within thirty-six months: Combined, the programs will serve 100 entrepreneurs a year and clients will create 1,000 jobs.
c. Attract and Retain Entrepreneurial Companies as They Scale-Up The scale-up stage offers the greatest opportunity for economic impact as early-stage companies transition from product development to production and market expansion.	■ Within twelve months: Support five scale-up clients. ■ Within three years: Ten scale-up clients. ■ Within eight years: Clients will create 2,500 jobs.

IV. Sites

Framework Initiative	*Performance Metrics*
a. Site Investigations for Readiness and Investments Many sites in the region would benefit from additional preliminary investigation work to determine levels of needed investment and timeline to readiness.	■ Within the first three months: Identify 5 priority sites that require additional site investigation. ■ Within six months: Of those priorities sites, identify the appropriate studies/test/preliminary assessments for each. ■ Within twenty-four months: All 5 sites have completed investigation work.
b. Enhance Visibility of Existing Sites Existing sites need to be properly characterized and promoted at the state level and can benefit from a designation in the Commonwealth's Site Readiness Program.	■ Within the first three months and thereafter: All site within Region 8 are on YesVirginia.org with updated information. ■ Within twenty-four months: Establish tier designation ranking of 5 priority sites.
c. Complete General Site Improvements: Northern Sub-region Improvements can be made to business and industrial parks in the northern portion of the region to focus particularly on Northern Virginia expansions in the technology, communications, business services, and banking sectors.	■ Within the first six months: Substantial site improvements are planned for at least three sites. ■ Within twenty-four months: Site improvements completed for three priority sites.

d. Complete General Site Improvements: Southern Sub-region Improvements can be made to business and industrial parks in the central and southern portion of the region to focus particularly on light manufacturing, food and beverage, and transportation and logistics growth.	■ Within the first six months: Substantial site improvements are planned for at least three sites. ■ Within twenty-four months: Site improvements completed for three priority sites.
e. Create Industrial Mega Site This initiative would create a "Mega Site" to help attract a large new industrial prospect.	■ Within the first twelve months: Most appropriate mega site selected. ■ Within twenty-four months: Engineering investigations completed. ■ Within thirty-six months: Infrastructure upgrades planned or in progress by 2020.

V. Other

Framework Initiative	*Performance Metrics*
a. Identify Leadership for Plan Implementation Shenandoah Valley Partnership (SVP) can provide leadership for the GO Virginia plan implementation by supporting communities with additional site readiness initiatives and coordination between regional stakeholders.	■ Within the first six months: New mandate approved by SVP board for the organization to take an active lead in site readiness initiatives. ■ Thereafter: SVP engaged in site readiness initiatives.
b. Develop Organizational Funding & Capacity Building for Plan Implementation Develop a sustainable funding mechanism that will give SVP the financial resources needed to address emerging Region 8 challenges and opportunities and execute on the plan.	■ Within the first eighteen months: New operating funds identified and secured to support SVP's expanded role. ■ Within twenty-four months: Capital campaign complete with funds in excess of $1 million.

Appendix I – Data Deliverable

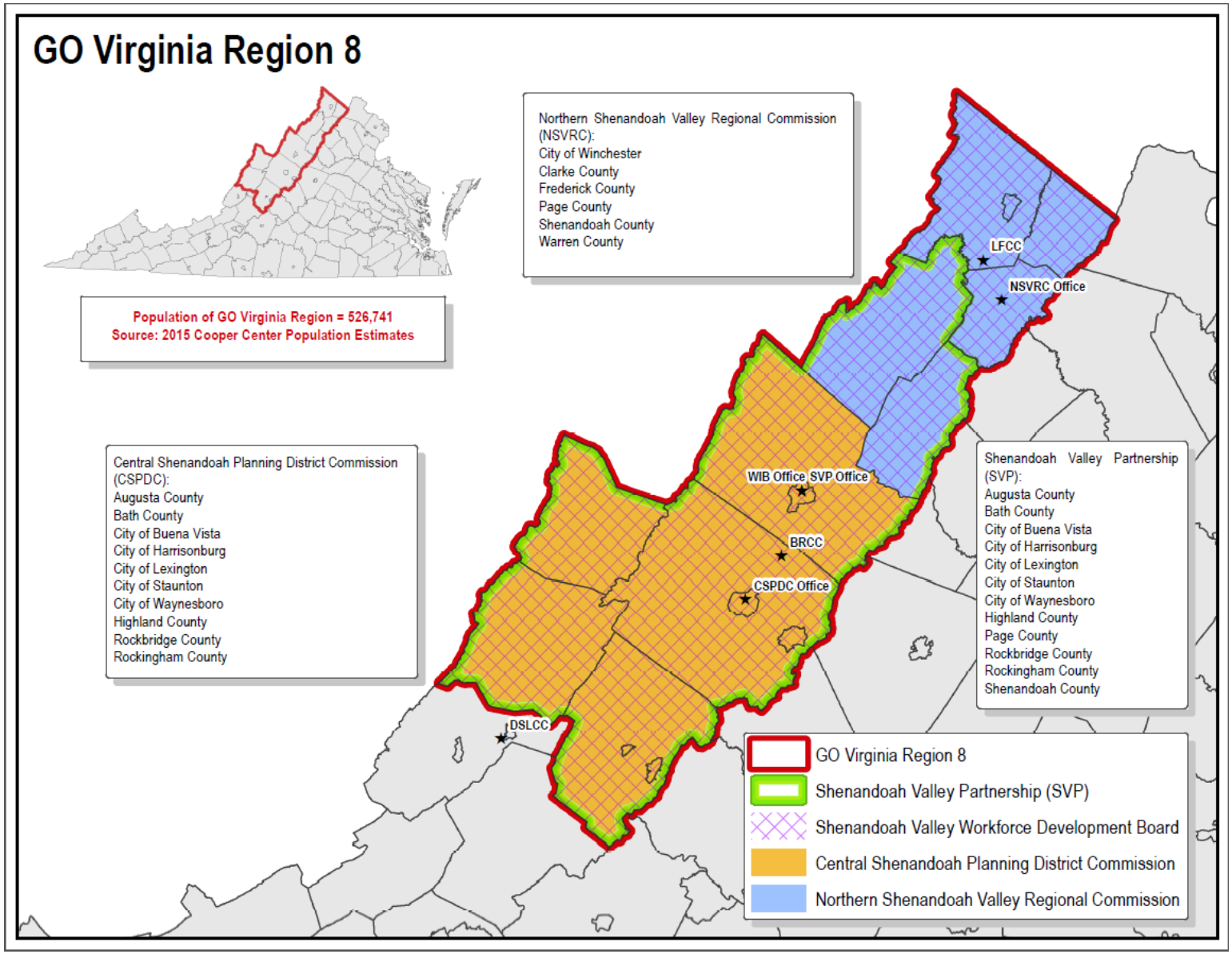
Table of Contents

Executive Summary

Prepared by:

THOMAS P. MILLER & ASSOCIATES

GO Virginia Region 8 Map



Economic Base Analysis Summary

The Economic Base Analysis will help inform our team's understanding of Region 8's competitive advantages, which will be crucial in determining targeted industries that suit the assets of the Region. The following analysis considers historical and projected data for the geographies of: Region 8, the Northern Shenandoah Valley Regional Commission, the Central Shenandoah Planning District Commission, as well as by individual locality, and national level data to evaluate local nuances in employment.

Between 2006 and 2016 the Region decreased by 1,196 jobs, a decline of 0.5%. The majority of counties within the Region declined in total jobs during that time period. However, this trend is expected to reverse, as the Region is projected to experience a job growth of 9%, adding approximately 22,000 jobs, over the course of 2016-2026. Currently, average earnings per job in Region 8 are approximately $47,000, falling short of average earnings at the national level, which total $62,000 per job.

Table 1: Regional Employment Overview

Regional Employment Overview							
Geography	2006 Jobs	2016 Jobs	2026 Jobs (Proj.)	2016 - 2016 Change	2016 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change
Region 8	239,283	238,087	259,774	(1,196)	(0.5%)	21,687	9%
Central Shenandoah Planning District Commission	139,710	138,610	150,973	(1,100)	(0.8%)	12,363	9%
Northern Shenandoah Valley Regional Commission	99,573	99,477	108,800	(96)	(0.1%)	9,323	9%

Source: EMSI

The top three industries by employment in the Region and both planning districts are Government (NAICS 90); Manufacturing (NAICS 31); and Health Care and Social Assistance (NAICS 62). Within the Region and both planning districts, these industries account for 41% of total 2016 jobs and are projected to continue to hold a similar share in the next ten years.[1]

In Region 8, Health Care and Social Assistance grew by 24%, adding nearly 6,000 jobs. This trend is projected to continue, as the industry is projected to add an additional 7,000 jobs by 2026. Currently, Individual and Family Services (NAICS 6241) is the most competitive industry in the Region. However, this industry is projected to be less competitive in the future and will be replaced by the much higher earning industry of General Medical and Surgical Hospitals (NAICS 6221) as one of the most competitive industries for the Region.

The Manufacturing sector (NAICS 31-33) declined by over 8,000 jobs across Region 8 between 2006-2016. These losses were greater than anticipated based on national and internal industry factors. However, this industry remains one of the top industries by employment and the most concentrated 2-digit industry. Within the Manufacturing sector there was an especially high concentration of Confectionery Manufacturing from Purchased Chocolate (NAICS 311352), Other Snack Food Manufacturing (NAICS 311919) and Nonwoven Fabric Mills (NAICS 313230).

Transportation and Warehousing is one of the highest growing industries, growing by 22% over the past decade in the Region compared to 11% at the national level. Specifically, Nonscheduled Air Transportation (NAICS 48121) and Pipeline Transportation of Natural Gas (NAICS 4862) have experienced extremely high growth of 2,700% and 485% respectively. Additionally, General Warehousing and Storage (NAICS 49311) increased by 29% adding nearly 1,000 jobs.

[1] Note that Government (NAICS 90) covers public sector administrative positions but also accounts for jobs at public sector health care facilities and public education institutions. Privately operated heath care facilities fall into the Health Care and Social Assistance (NAICS 62) industry.

Over the past ten years, the Finance and Insurance sector grew by 19%, or 888 jobs. Nearly all this growth has been concentrated in the counties that make up the Northern Shenandoah Valley Regional Commission. The Finance and Insurance sector is projected to continue to expand, adding an additional 1,385 jobs by 2026. The projected growth in this industry is concentrated in the subsector of Depository Credit Intermediation (NAICS 5221), which is projected to add over 1,000 jobs and become the most competitive industry in the Region by 2026. Average earnings in this specific industry are slightly over $56,000 per worker, well over the average earnings for the Region, which are approximately $47,000.

Information (NAICS 51) has experienced a decline from 2006 to 2016, but is projected to grow by 14% in the next ten years. Nationally, this industry is projected to increase at a lower rate of 5%. Software Publishers (NAICS 5112) is currently one of the top 5 most competitive industries in the Region; however, it is projected to lose its competitive edge by 2026.

Over 2006-2016, the most competitive industries in Region 8 were Depositary Credit Intermediation; Federal Government, Civilian; and Dairy Production Manufacturing, which have average earnings of $56,000, $107,000, and $85,000 respectively. The most competitive industries in Region 8 are projected to change by 2026. Depository Credit Intermediation is projected to continue to be the most competitive industry, followed by General Medical and Surgical Hospitals.

Table 2: Region 8 Most Competitive Industries, 2006 - 2016

Region 8 Most Competitive Industries, 2006 - 2016							
NAICS	Industry	Job Change	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect	2016 Earnings Per Worker
5221	Depository Credit Intermediation	1,090	(261)	107	(154)	1,243	$56,056
9011	Federal Government, Civilian	1,212	(49)	94	45	1,167	$106,711
3115	Dairy Product Manufacturing*	563	9	25	34	530	$65,312
5112	Software Publishers	535	13	1	14	521	$80,281
7223	Special Food Services	651	136	43	179	472	$19,259
4812	Nonscheduled Air Transportation	459	(2)	1	(1)	460	$80,882
5417	Scientific Research and Development Services	451	4	3	7	444	$82,837
6113	Colleges, Universities, and Professional Schools	1,154	608	159	767	387	$46,049

Source: EMSI, Virginia Employment Commission Quartley Census of Employment and Wages

** Note that earnings figures for Dairy Product Manufacturing were derived from multiple sources due to the difficulty of collecting agricultural data*

Occupational Analysis Summary

The Occupational Analysis will help Region 8 identify major demographic trends that are related to its workforce. It also includes an analysis of occupations in the region. Staffing patterns/requirements for the target industries are also included. The demographic and labor force data presented in this report is based off the "Shenandoah Valley Workforce Development Board's Local Development Area IV Plan for 2016-2020." Our findings support conclusions of this report regarding the demographic and labor force characteristics and we utilized many of the same data sources that were used in the original report. We also reviewed the "SVWDA State of the Workforce Report (2017)" which was completed by Magnum Economics and "The Changing Manufacturing Workforce in the Shenandoah Valley (2016 Update)" by Chmura.

This report builds off the thorough demographic analysis by analyzing the occupational mix of Region 8 as well as the two planning sub-regions that make up Region 8. Our work substantially expands on previous studies by providing the occupational mix and staffing patterns for the preliminary target industries that were discussed with the GO Virginia Region 8 subcommittee. Additional discussion surrounding the requirements and workforce availability in Region 8 based on industries that are growing quickly or otherwise have high potential to grow are also included in the following report. Our findings are summarized below:

Demographic and Labor Force Characteristics

- Frederick County is the largest in terms of population (81,340) and represents 16% of the region's total population. Rockingham and Augusta County represent the next biggest localities in terms of population, with 15% and 14% of the region's population residing in these counties. These three counties account for 45% of Region 8's population.
- The region is less diverse than Virginia. 15% of Region 8's population is non-white whereas 37% of Virginia's population is non-white. The locality with the largest non-white population was Winchester, VA.
- Most of the localities had median household incomes that were lower than the median household income for Virginia and the United States. Clarke and Frederick County were the only two localities whose median household income was higher than Virginia and the United States.
- The family poverty rate was higher in 5 localities and stood at 27% for Buena Vista, which was the highest rate of all the localities by approximately 15%.
- Lexington, VA had the highest educational attainment rate in terms of population with a Bachelor's Degree or higher at 44%. Page County had the lowest for both High School Graduates (77%) and those with Bachelor's Degrees or Higher (13%). Overall, educational attainment did not differ significantly with the State and National rates.
- Regarding commutation patterns, 144,967 people both live and work in Region 8, while 78,559 commute out of the Region for work. 50,393 workers come from outside to work in Region 8, resulting in a net outflow of 28,166 workers.

Occupational Analysis

- The top broad occupations for Region 8 by number of workers employed were: Office and Administrative Support Occupations (33,259); Sales and Related Occupations (24,716); Food Preparation and Serving Related Occupations (21,065); and Production Occupations (20,608). Food Preparation and Serving Occupations has grown the most over the last five years while Office and Administrative Support Occupations have the highest annual openings.
- The top occupations at the 5-Digit SOC level by number of workers employed were: Retail Salespersons (7,684); Cashiers (7,418); Combined Food Preparation and Serving Workers, Including Fast Food (6,173);

Office Clerks, General (5,597); and Heavy and Tractor-Trailer Truck Drivers (5,053). Median Hourly Earnings at this level range from $8.59 (Combined Food Preparation and Serving Workers, Including Fast Food) to $28.48 (Postsecondary Teachers). Cashiers had the most Annual Openings with 427.

Staffing Patterns[2]

- *Finance and Business Services* – There are six occupations that each account for over 3% of this cluster's workforce and these include: Accountants and Auditors (4.3%); Office Clerks, General (4.1%); Customer Service Representatives (4.0%); Printing Press Operators (3.7%); Insurance Sales Agents (3.2%); and Bookkeeping, Accounting and Auditing Clerks (3.1%). The only occupation of the six that requires a Bachelor's degree is Accountants and Auditors whereas the others require a high school diploma or equivalent or, in the case of Bookkeeping, Accounting and Auditing Clerks, some college.
- *Healthcare* – Registered Nurses are the largest occupation in this cluster and make up 7.2% of this cluster's regional workforce. Each of the top three occupations, Registered Nurses, Personal Care Aides, and Nursing Assistants, experienced growth over the last five years. Each is also projected to grow over the next five years, in total adding nearly 1,500 additional jobs.
- *Hospitality and Tourism* – Maids and Housekeeping Cleaners are the largest occupation in this cluster and represent 13.9% of the cluster's workforce. Other occupations that make up a significant portion of the workforce are Hotel, Motel and Resort Desk Clerks (8.8%); Waiters and Waitresses (4.9%); Fitness Trainers and Aerobics Instructors (4.2%) and Maintenance and Repair Workers, General (4.0%). All of these occupations have median hourly earnings of less than $20.00 and have minimal educational requirements.
- *Information Technology and Communications* – The occupations in this regional cluster have higher median hourly earnings compared to the other clusters. Of the six occupations that make up more than 3% of the workforce: Management Analysts (7.0%); Computer User Support Specialists (6.0%); Customer Service Representatives (4.7%); Software Developers, Applications (4.0%); Software Developers, Systems Software (3.3%): and Sales Representatives, Services, All Other (3.1%), only Customer Service Representatives have median hourly earnings that are less than $20.00/hr. This cluster also generally requires higher educational requirements for many of the entry level occupations.
- *Light Manufacturing* – The occupations that make up the largest percentage of this cluster are Team Assemblers (4.0%); First-Line Supervisors of Production and Operating Workers (3.3%); and Printing Press Operators (3.0%). The educational requirement for many of the occupations in this cluster is a high school diploma or equivalent. Although, some supervisory occupations, like General and Operations Managers, require a Bachelor's degree or higher.
- *Transportation/Distribution/Logistics* – Two occupations account for over 40% of this cluster's workforce. These include Heavy and Tractor-Trailer Truck Drivers (26.1%) and Laborers and Freight, Stock, and Material Movers, Hand (14.8%). These two occupations are expected to grow over the next five years with Heavy and Tractor-Trailer Truck Drivers expected to grow by 26%, adding 301 jobs, and Laborers and Freight, Stock, and Material Movers, Hand expected to grow by 15%, adding 192 jobs.

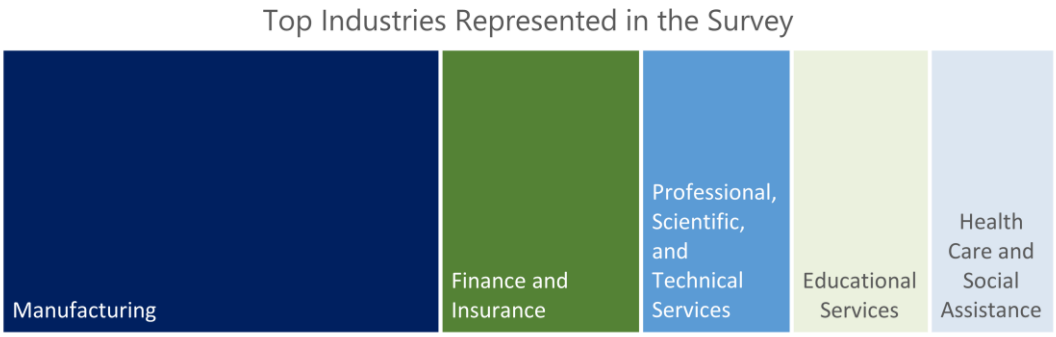
[2] Staffing patterns are listed by occupations defined by Standard Occupational Classification (SOC) code. It is important to note that occupations are often employed by multiple industries. Thus, there will overlap within the top occupations employed by the target industries.

Business Workforce Survey Analysis

The Business Workforce Survey analyzes the ten-county, six-city region regarding the workforce challenges and opportunities that exist. The survey was distributed to business leaders across the Go Virginia Region 8 area via email and presented questions that required the identification of employment numbers and projections; education and training needs; business expansion; as well as skills needs and gaps. In total, responses from individuals at 156 companies were analyzed as part of this study.

The industry sectors that had the highest participation rate in the survey were Manufacturing (22%); Finance and Insurance (10%); and Professional, Scientific, and Technical Services (8%),[3] Educational Services (7%), and Health Care and Social Assistance (6%).

Figure 1: Top Industries Represented in the Survey



Of the industries represented, the majority of the respondents indicated their companies have less than 100 employees (62.50%). Only 11% of respondents indicated they have more than 500 employees. Within these companies, a majority responded that they employ 0-9 full-time employees (29.41%). Only 4% of respondents indicated that they employ over 1,000 full-time employees. Additionally, when looking at revenue patterns of these industries, the majority (60.28%) of respondents indicated that less than 10% of the revenue from their Virginia-based operations comes from outside of the state of Virginia. Manufacturing was the industry that reported having more than 75% of revenue from their operations coming from outside of Virginia.

Continued growth is anticipated from these industries over the next ten years, additionally leading to projections of growth in hiring. Manufacturing anticipates an 88% chance of expansion; Finance and Insurance anticipate a 79% chance of expansion; Professional, Scientific, and Technical Services anticipate a 58% chance of expansion; Health Care and Social Assistance anticipate a 56% chance of expansion; and Educational Services anticipates a 30% chance of expansion.[4] In addition, respondents in the Manufacturing industry were looking to add employees at all four skill levels: professional skills, technical skills, and entry-level/support skills. As these industries plan to increase hiring over the next decade, it is important for the region to prepare the talent pool with the skills and training necessary to successfully fill these positions.

Companies noted that their greatest challenges in workforce and industry included the following:

[3] "Other" received 13 responses (8%)

[4] It is worth noting that Information Technology was the only industry with more than one survey respondent (3) that was anticipating 100% increased hiring due to growth.

Top Workforce Challenges Include:

- Hiring a qualified workforce (36%),
- Supplying desired salaries/benefits (16%),
- Employee retention (16%), and
- Employee recruitment (8%).

Top Industry Challenges Include:

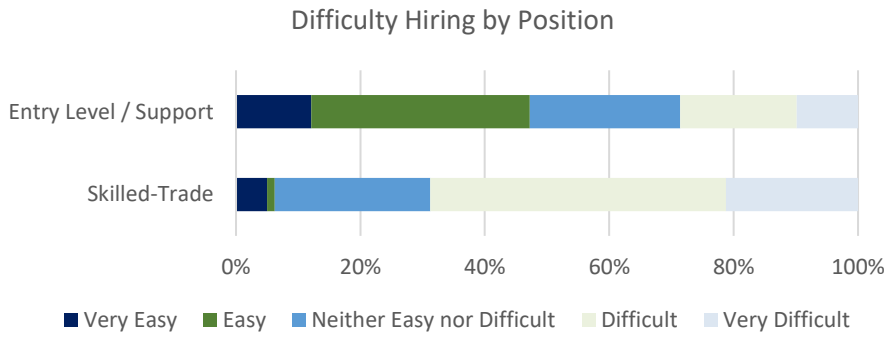
- Having a talented workforce (26%),
- Following government regulations/compliance (15%),
- Competition (9%), and
- Health care/benefits (8%).

In addition, business leaders were asked to identify the employability skills their companies faced when hiring. Of the top five difficult to hire skills, three were analytical skills such as problem solving (67%), critical thinking (62%), and decision-making (55%). Regarding soft skills, dependability (48%) and communication (42%) were two that employers identified were difficult to find when hiring.

Business leaders proposed strategies they felt would aid in overcoming the identified challenges. Top responses called for additional job training/workshops (16%), improvement to the local infrastructure (13%), and a push for a more concentrated effort towards attracting quality jobs and workers to Region 8 (10%). The Region 8 Council has the potential to achieve the most suggested solution by investing more in employment training workshops in collaboration with local businesses to prepare the future workforce.

Although a majority of businesses indicated their hiring patterns average 0-9 employees per year (63%), the most difficult type of position to fill is within skilled trades, with nearly 69% of companies indicating that hiring for these positions, is either difficult or very difficult. As businesses expressed difficulty in their hiring patterns, this became reflective of the tone in responses that the workforce is unqualified to fill positions.

Figure 2: Difficult Hiring by Position



However, only 29% of companies indicated that hiring for entry-level/support positions are either difficult or very difficult. It is worth noting, however, that all types of positions were reportedly filled on average between 1-6 months. The position that most frequently took more than a year to fill was professional (9%), which is concerning considering these positions typically require more analytical skills. Training for these position types should be geared toward ensuring the workforce is not only qualified and prepared, but also analytically centered.

Companies shared career advancement opportunities that they offer their employees to close the skill gap. These opportunities include paid conference attendance (66 respondents), classroom training (57 respondents), access to training or education programs (55 respondents), and tuition reimbursement (53 respondents). Respondents were asked to identify training programs they needed that were not available in the area. Responses included a Commercial Driver's License (CDL), behavioral developmental disability training, soldering training, refrigeration technicians, and forklift certification training. Although these programs were mentioned, many are in fact offered by institutions in the area, which indicates an opportunity for increasing employer awareness of training availability.

Innovation and Entrepreneurship Asset Inventory Summary

To support a targeted cluster, a region needs to have not only the businesses that form the core of economic activity, and the workforce to operate the businesses, but also the organizations that support the businesses. For clusters that rely on innovation for their competitive advantage, local sources of innovation are critical, because research shows that new ideas diffuse over a relatively short distance, often less than 50 miles. For clusters that are dynamic, with a balanced inventory of large and small, young and old firms, entrepreneurship is critical to provide diversity, a pathway for the commercialization of new ideas, and to foster creativity.

Our research into Region 8's innovation and entrepreneurship assets can be summarized in the following findings:

- Region 8 is dominated by small businesses, but the number of jobs created by small and/or young businesses has declined since 2000.
- The colleges and universities in the Region are focused on teaching and service rather than research, and have some very strong faculty in health, pharmacy, chemistry and biology.
- Lacking significant research activity and technology transfer and commercialization infrastructure, the colleges and universities are not contributing significantly to the startup community. However, James Madison University's technology transfer organization is active in the region in economic development. JMU has licensed five of its technologies, but with limited employment impact in Region 8.
- Patenting activity is relatively low and dominated by employees of large local manufacturers.

Job Creation by Young and Small Firms

Like many other places in Virginia, Region 8 is dominated by small businesses. Of the 20,462 establishments in the Region in 2015, 13.5% represent self-employed persons and 68.0% have 2-9 employees. Job creation by small firms in Region 8 has declined somewhat since 2000, with the steepest declines in Warren County. Bath and Clarke Counties bucked the trend and saw increased between 2000 and 2015.

In the service centers, job growth by young firms has been much higher than in the surrounding counties since 2000, but for almost all the locations, average job growth from young firms in 2015 is lower than in 2000 or in 2010. Young firms are contributing between 15% and 40% of the total employment growth in Region 8, depending upon the location.

Region 8 Colleges and Universities

Some of the colleges and universities in Region 8 include:

- American National University
- Blue Ridge Community College
- Bridgewater College
- Christendom College
- Eastern Mennonite University
- Dabney S. Lancaster Community College
- James Madison University
- Lord Fairfax Community College
- Mary Baldwin University
- Shenandoah University

- Southern Virginia University
- Virginia Military Institute
- Washington and Lee University

The first four are schools that largely award Baccalaureate and Masters degrees, with some STEM and health components. However, research is a secondary with little federal-funded (i.e. competitively awarded) activity. The colleges and universities do have some very strong faculty, especially in health and pharmacy, chemistry and biology, but without a strong technology transfer and commercialization focus, there is little startup activity related to these strengths.

However, Carnegie has recognized JMU as an "engaged university" (2014), which means that the university focuses on "engaged learning, civic engagement and community engagement." Significantly, JMU has named Dr. Yvonne Harris as the first Vice Provost for Research and Scholarship, and her department includes Technology Innovation and Economic Development to promote innovation, connect inventors and business commercialization, as well as protecting intellectual property.

Intellectual Property

Between January 1 and December 31, 2016, 130 patents were issued to inventors residing in Region 8. Of these, 22 included inventors who resided at a Frederick County address and 20 at a Winchester address. Waynesboro had 14, Augusta County had 11, with Harrisonburg, Staunton, and Warren County with 10 each.

Nearly 33% of the patents were assigned to companies with headquarters in Virginia, and 24.6% were assigned to companies in the same place as the inventor. The latter is often an artifact of an employment relationship. Indeed, the largest patenting entities in Region 8 are all major employers located in the area. Also, something interesting to note is that 10% of the patents are not assigned, this is usually an indication of an individual inventor working on their own time.

Equity and SBIRs

Only two Region 8 companies were awarded SBIRs or STTRs in 2016: Ryzing Technologies in Staunton and MicroHarmonics in Waynesboro. Both are single-person firms with government contracting backgrounds.

Region 8 companies raised at least $18,100,000 through 10 funding events since 2011. This likely understates the amount of equity raised, since numerous transaction details are not disclosed, nor are all angel deals included. The strongest year was 2015, with $10,250,000 raised. So far, in 2017, $1,450,000 has been raised.

Of these equity infusions, 73% were in companies related to agriculture, 25% in information technology, and 2% were aerospace. The IT companies were largely cloud and artificial intelligence. The agriculture percentage is due to an $8 million raise by Shenandoah Growers.

Region 8 equity transactions were relatively evenly distributed among stages of development, with 9% crowd funded, and 18% each in seed, venture and acquisition.

Seven of the 10 transactions were in Harrisonburg, reflecting the concentration of venture-funded companies throughout the city. The others were in Waynesboro, and Winchester.

Innovation Culture

Two measures that are often correlated with a supportive innovation culture in a place are diversity and creativity. Here we measure diversity by looking at age, race and origin. With the exception of the cities of Harrisonburg and Lexington with their large student populations, the localities in Region 8 have median ages between 37 and 50 years old. Also, except for Lexington, Region 8 is between 80% and 99.5% white, demonstrating little diversity.

Harrisonburg is 17.5% foreign-born, with Winchester following at 11.4%. The remaining counties of the Region span between 0.7% (Highland) and 5.7% (Frederick) in foreign-born population.

Economic Base Analysis

Prepared by:

Economic Base Analysis

As part of a larger economic development research planning process through the GO Virginia Initiative, Camoin Associates completed an Economic Base Analysis for the 16 county geography of Region 8. The data outlined below establishes an understanding of historic and projected employment trends, which will provide the foundation for identifying targeted industries for the Region.

This Economic Base Analysis is comprised of four related sections:

- **Industry and Employment Trends Analysis** – Details changes in industry employment over time
- **Location Quotient Analysis** – Lists industries that are particularly concentrated within the Region
- **Shift Share Analysis** – Examines the Region's competitiveness compared to the rest of the nation
- **Preliminary Industry Cluster Analysis** – Provides early estimations of potential target industry clusters

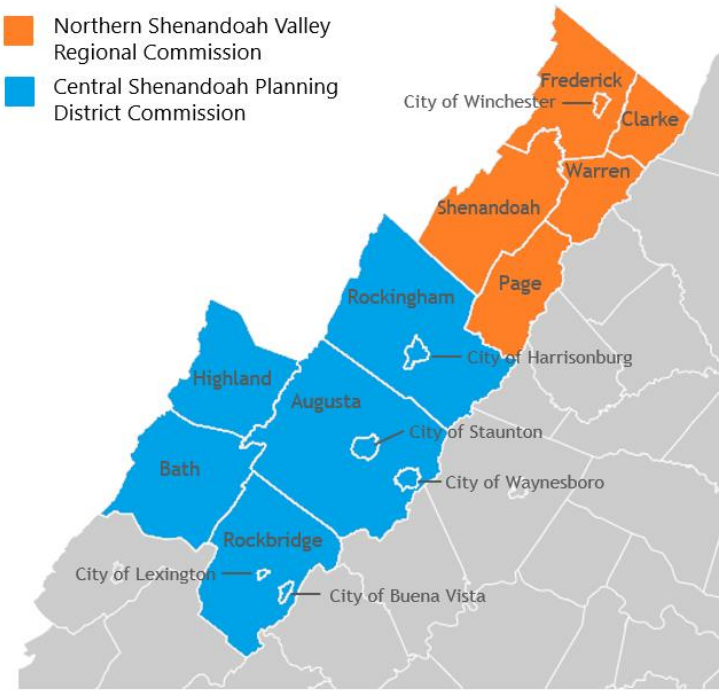
Primary Data Sources

Camoin Associates subscribes to Economic Modeling Specialists Intl. (EMSI), a proprietary data provider that aggregates economic data from approximately 90 sources, including the U.S. Census Bureau and the U.S. Departments of Health and Labor using specialized proprietary processes and models to estimate current statistics and predict future trends. EMSI industry data, in our experience, is more complete than most or perhaps all local data sources. Local data sources often miss significant employment counts by industry because data on sole proprietorships and contractual employment (i.e. 1099 contractor positions) is not included and certain employment counts are suppressed from BLS/BEA figures for confidentiality reasons when too few establishments exist within a single NAICS code. Visit www.economicmodeling.com for additional information.

Geographies Studied

Region 8 is located in the Shenandoah Valley region of Virginia and is comprised of 16 localities, listed in the map to the right. The Region is home to two planning districts: the Central Shenandoah Planning District Commission and the Northern Shenandoah Valley Regional Commission. The Central Shenandoah Planning District Commission (CDPDC), is comprised of Rockingham County, City of Harrisonburg, Highland County, Augusta County, City of Staunton, City of Waynesboro, Bath County, Rockbridge County, City of Lexington and City of Buena Vista. The Northern Shenandoah Valley Regional Commission (NSVRC) is comprised of Frederick County, City of Winchester, Clarke County, Shenandoah County, Warren County and Page County. In addition to examining the individual localities within Region 8, this report will examine the two planning districts. The United States will be used as a benchmark against which information about the Region can be compared.

Figure 3: Region 8 Localities



Industry and Employment Trends Analysis

The North American Classification Standard (NAICS) data will be used to evaluate Region 8 industries. NAICS is the standard maintained by the U.S. Census Bureau and is used by Federal agencies to classify business establishments. Under this standard, industries are organized into 2-digit through 6-digit levels. 2-digit codes show the highest aggregate NAICS code level representing broad categories such as "retail," whereas 6-digit industry codes present a finer level of detail like "fruit and vegetable markets." For this analysis, the 2-digit and 4-digit levels are utilized. These levels provide the balance of comprehensiveness and specificity needed to best understand the Region's industrial characteristics.

Industry Growth by Locality

Between 2006 and 2016, the Region lost 1,196 jobs, a decline of 0.5%. Most counties within the Region declined in total jobs during that time period. The City of Winchester experienced the most dramatic job decline, shedding 5,500 jobs, followed by the City of Staunton and Rockbridge County. However, Frederick and Rockingham experienced significant growth during that time, growing by approximately 7,700 and 2,300 jobs respectively. [5]

Table 3: Historical Change in Jobs by Region 8 Locality, 2006 - 2016

Historical Change in Jobs by Region 8 Counties, 2006 - 2016																	
NAICS	Industry Description	Augusta County	Bath County	Buena Vista City	Clarke County	Frederick County	Harrisonburg City	Highland County	Lexington City	Page County	Rockbridge County	Rockingham County	Shenandoah County	Staunton City	Warren County	Waynesboro City	Winchester City
11	Crop and Animal Production	31	(39)	Insf. Data	(9)	55	738	(46)	Insf. Data	69	(72)	365	(188)	Insf. Data	(20)	0	36
21	Mining, Quarrying, and Oil and Gas Extraction	(20)	0	0	(14)	(38)	(45)	Insf. Data	(21)	0	22	(52)	Insf. Data	Insf. Data	0	0	0
22	Utilities	(57)	(14)	(17)	0	45	0	0	0	Insf. Data	16	(3)	(6)	24	107	0	0
23	Construction	(662)	(73)	(23)	(224)	(1,177)	(280)	(32)	(98)	(345)	(177)	(1,265)	(369)	(225)	(636)	(490)	(580)
31	Manufacturing	(735)	(19)	98	(543)	418	(1,002)	3	(34)	(509)	(921)	(282)	(1,119)	83	26	(857)	(2,699)
42	Wholesale Trade	(8)	Insf. Data	22	36	(228)	(161)	Insf. Data	(57)	(10)	(8)	88	(34)	(39)	(46)	(90)	(103)
44	Retail Trade	123	(57)	(21)	(46)	1,524	(562)	(11)	(82)	(73)	30	(782)	(187)	(261)	118	243	(1,804)
48	Transportation and Warehousing	571	(17)	Insf. Data	(3)	1,266	(163)	4	38	24	(86)	1,511	142	(223)	(419)	(26)	(511)
51	Information	210	Insf. Data	Insf. Data	(6)	200	(429)	Insf. Data	(66)	1	6	72	(158)	(216)	(15)	140	(210)
52	Finance and Insurance	(24)	(3)	(11)	(19)	1,355	49	(1)	18	9	4	(48)	(66)	(44)	(47)	(28)	(256)
53	Real Estate and Rental and Leasing	20	(22)	(13)	(14)	(21)	73	Insf. Data	(1)	(9)	(26)	(47)	(66)	(35)	(61)	(92)	(136)
54	Professional, Scientific, and Technical Services	72	100	3	122	344	41	6	93	62	69	246	13	(62)	38	28	(72)
55	Management of Companies and Enterprises	(33)	Insf. Data	0	(25)	(143)	(4)	0	0	Insf. Data	(29)	80	81	101	(116)	(94)	526
56	Administrative and Support and Waste Management and Remediation Services	35	(15)	(25)	3	427	46	17	(12)	5	19	(360)	264	(29)	220	160	(602)
61	Educational Services	54	(27)	(166)	46	75	1,043	Insf. Data	486	3	43	(302)	22	(33)	94	13	(164)
62	Health Care and Social Assistance	750	62	8	53	1,014	(1,320)	15	(201)	84	321	2,759	427	458	505	(28)	690
71	Arts, Entertainment, and Recreation	3	3	Insf. Data	(42)	92	127	Insf. Data	(58)	169	(124)	(37)	65	0	(14)	(7)	(49)
72	Accommodation and Food Services	532	(135)	61	24	900	1,373	(45)	89	(51)	(205)	368	(129)	(422)	348	321	15
81	Other Services (except Public Administration)	169	(17)	(6)	(6)	191	(15)	(17)	32	6	87	113	10	(674)	(227)	50	(85)
90	Government	(434)	(14)	(87)	(58)	1,384	168	7	68	61	(246)	(120)	67	116	236	(39)	473
99	Unclassified Industry	33	30	Insf. Data	29	39	Insf. Data	Insf. Data	Insf. Data	Insf. Data	Insf. Data	Insf. Data	17	23	22	23	33
Total		635	(187)	(202)	(696)	7,719	(290)	(124)	200	(527)	(1,267)	2,335	(1,207)	(1,422)	114	(775)	(5,500)

Source: EMSI

[5] Note that industry data demonstrates persistent job losses in the cities in Region 8, and job gains into the surrounding counties. Further analysis appears to indicate that this may actually be jobs being reclassified by geography, as opposed to net losses or gains.

Historic and Projected Industry Employment Trends

The following tables break down 10-year historical and 10-year projected trends in employment within the region. Negative values are highlighted in red.

- Over the past ten years, the Region has lost 0.5% of total jobs. However, this trend is expected to reverse, as the Region is projected to experience a job growth of 9%, approximately 22,000 jobs, by 2026.
- Industries that experienced the greatest decline in jobs include: **Construction (NAICS 23); Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)**; and **Manufacturing (NAICS 31)**. Construction and Manufacturing are projected to continue to decline into 2026, although at a much slower rate than the previous decade.
- **Crop and Animal Production (NAICS 11)**; **Utilities (NAICS 22)**; and **Health Care and Social Assistance (NAICS 62)** jobs grew by 28%, 24% and 24%, respectively, accounting for approximately 6,600 new jobs from 2006 to 2016. These industries are projected to continue to grow into the next decade.
- Industries with the highest projected growth include**: Professional, Scientific, and Technical Services (NAICS 54)**; **Health Care and Social Assistance (NAICS 62)**; and **Finance and Insurance (NAICS 52)**. The Professional, Scientific, and Technical Services (NAICS 54) industry is projected to grow by 26%, adding over 2,000 jobs. Health Care and Social Assistance (NAICS 62) is projected to grow by 25%, adding over 7,000 jobs throughout the Region. Similarly, Finance and Insurance (NAICS 52) is projected to grow by 25%, adding nearly 1,400 jobs.
- **Transportation and Warehousing (NAICS 48)** added over 2,000 jobs from 2006 to 2016 and is projected to continue growing into 2026.
- Although **Information (NAICS 51)** experienced a decline from 2006 to 2016, it is projected to grow by 14% in the next ten years.

Table 4: Region 8 Historic Industry Employment Trends, 2-Digit NAICS

Region 8 Historic Industry Employment Trends, 2-Digit NAICS					
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change
11	Crop and Animal Production	3,333	4,254	921	28%
21	Mining, Quarrying, and Oil and Gas Extraction	420	293	(127)	(30%)
22	Utilities	471	582	111	24%
23	Construction	20,502	13,847	(6,655)	(32%)
31	Manufacturing	40,190	32,095	(8,095)	(20%)
42	Wholesale Trade	6,601	5,976	(625)	(9%)
44	Retail Trade	29,462	27,615	(1,847)	(6%)
48	Transportation and Warehousing	9,678	11,774	2,096	22%
51	Information	3,223	2,716	(507)	(16%)
52	Finance and Insurance	4,685	5,573	888	19%
53	Real Estate and Rental and Leasing	3,502	3,049	(453)	(13%)
54	Professional, Scientific, and Technical Services	6,743	7,846	1,103	16%
55	Management of Companies and Enterprises	2,263	2,607	344	15%
56	Administrative and Support and Waste Management and Remediation Services	9,000	9,152	152	2%
61	Educational Services	6,005	7,198	1,193	20%
62	Health Care and Social Assistance	23,085	28,680	5,595	24%
71	Arts, Entertainment, and Recreation	3,065	3,194	129	4%
72	Accommodation and Food Services	20,076	23,120	3,044	15%
81	Other Services (except Public Administration)	11,360	10,970	(390)	(3%)
90	Government	35,615	37,196	1,581	4%
99	Unclassified Industry	<10	350	Insf. Data	Insf. Data
Total		239,283	238,087	(1,196)	(0.5%)

Source: EMSI

Table 5: Region 8 Projected Industry Employment Trends, 2-Digit NAICS

Region 8 Projected Industry Employment Trends, 2-Digit NAICS					
NAICS	Description	2016 Jobs	2026 Jobs	2016 - 2026 Change	2016 - 2026 % Change
11	Crop and Animal Production	4,254	4,846	592	14%
21	Mining, Quarrying, and Oil and Gas Extraction	293	307	14	5%
22	Utilities	582	612	30	5%
23	Construction	13,847	13,630	(217)	(2%)
31	Manufacturing	32,095	31,165	(930)	(3%)
42	Wholesale Trade	5,976	6,667	691	12%
44	Retail Trade	27,615	28,563	948	3%
48	Transportation and Warehousing	11,774	13,476	1,702	14%
51	Information	2,716	3,087	371	14%
52	Finance and Insurance	5,573	6,958	1,385	25%
53	Real Estate and Rental and Leasing	3,049	3,363	314	10%
54	Professional, Scientific, and Technical Services	7,846	9,892	2,046	26%
55	Management of Companies and Enterprises	2,607	2,891	284	11%
56	Administrative and Support and Waste Management and Remediation Services	9,152	10,115	963	11%
61	Educational Services	7,198	8,683	1,485	21%
62	Health Care and Social Assistance	28,680	35,825	7,145	25%
71	Arts, Entertainment, and Recreation	3,194	3,564	370	12%
72	Accommodation and Food Services	23,120	25,233	2,113	9%
81	Other Services (except Public Administration)	10,970	11,645	1,420	4%
90	Government	37,196	38,616	1,420	4%
99	Unclassified Industry	350	633	283	81%
Total		238,087	259,774	21,687	9%

Source: EMSI

Historic and Projected Employment Trends Compared to the United States

The table below benchmarks historical industry activity in Region 8 to the United States. Industry sectors highlighted in green have grown or are projected to grow at a significantly faster rate (>10 percentage points) in Region 8 compared to the United Stated. Industry sectors highlighted in red have grown or are projected to grow at a significantly lower rate (<10 percentage points) in Region 8 compared to the nation.

- Over the last 10 years, employment within **Construction (NAICS 23)** fell by 32% within the Region, compared to a decline of 15% in the United States. Within the industry, **Residential Building Construction (NAICS 23611)** declined by over 1,700 jobs. **Site Preparation Contractors (NAICS 23891)** and **Commercial and Instructional Building Construction (NAICS 23622)** both experienced declines of greater than 800 jobs.
- **Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)** fell by 30% within the Region compared to 3% growth in the United States. The Region 8 decline is attributed to job losses in **Sand, Gravel, Clay and Ceramic and Refractory Minerals Mining and Quarrying (NAICS 21232)** and **Stone Mining and Quarrying (NAICS 21231)**.
- **Arts, Entertainment and Recreation (NAICS 71)** also showed significant decline in the Region relative to the United States, declining by 4% in Region 8 compared to a 16% growth at the national level. Major declines were in the **Promoters of Performing Arts, Sports and Similar Events with Facilities (NAICS 71131)** and **Theater Companies and Dinner Theaters (NAICS 71111)** subindustries.
- Since 2006, **Crop and Animal Production (NAICS 11)** expanded by 28% in Region 8, a much higher growth rate compared to the 1% growth at the national level. **Crop Production (NAICS 11100); Support Activities for Animal Production (NAICS 11521)** and **Support Activities for Crop Production (NAICS 11511)** added a total of 996 jobs.
- **Utilities (NAICS 22)** grew by 24% within the Region and a mere 2% at the national level. Within the Utilities industry, **Electric Power Transmission, Control and Distribution (NAICS 22112)** added 104 out of the 111 jobs from 2006 to 2016.
- **Transportation and Warehousing (NAICS 48)** expanded by 22% in the Region compared to 11% nationally. Specifically, **General Warehousing and Storage (NAICS 49311)** increased by nearly 1,000 jobs. **Nonscheduled Air Transportation (NAICS 48121)** and **General Freight Trucking, Long-Distance (NAICS 48412)** added 459 and 335 jobs respectively.
- **Finance and Insurance (NAICS 52)** declined by 4% on a national level but increased by 19% in Region 8. Major growth in this industry can be attributed to **Credit Unions (NAICS 52213),** which increased by 745%, adding nearly 1,500 jobs.

Table 6: Region 8 vs. United States Historic Industry Employment Trends, 2-Digit NAICS

Region 8 vs. United States Historic Industry Employment Trends, 2-Digit NAICS			
NAICS	Description	2006 - 2016 Region 8 Job Growth	2006 - 2016 United States Job Growth
11	Crop and Animal Production	28%	1%
21	Mining, Quarrying, and Oil and Gas Extraction	(30%)	3%
22	Utilities	24%	2%
23	Construction	(32%)	(15%)
31	Manufacturing	(20%)	(13%)
42	Wholesale Trade	(9%)	(1%)
44	Retail Trade	(6%)	2%
48	Transportation and Warehousing	22%	11%
51	Information	(16%)	(8%)
52	Finance and Insurance	19%	(4%)
53	Real Estate and Rental and Leasing	(13%)	(6%)
54	Professional, Scientific, and Technical Services	16%	17%
55	Management of Companies and Enterprises	15%	24%
56	Administrative and Support and Waste Management and Remediation Services	2%	7%
61	Educational Services	20%	24%
62	Health Care and Social Assistance	24%	25%
71	Arts, Entertainment, and Recreation	4%	16%
72	Accommodation and Food Services	15%	18%
81	Other Services (except Public Administration)	(3%)	3%
90	Government	4%	1%
99	Unclassified Industry	Insf. Data	17%
Total		0%	5%

Source: EMSI

Significant growth (>10 percentage points) compared to United States

Significant decline (<10 percentage points) compared to United States

Crop and Animal Production (NAICS 11) and Finance and Insurance (NAICS 52) are projected to continue significant growth in the Region compared to the nation. Other significant growth industries include Professional, Scientific, and Technical Services (NAICS 54); and Unclassified Industries (NAICS 99).

Table 7: Region 8 vs. United States Industry Employment Trends, 2-Digit NAICS

Region 8 vs. United States Projected Industry Employment Trends, 2-Digit NAICS			
NAICS	Description	2016 - 2026 Region 8 Job Growth	2016 - 2026 United States Job Growth
11	Crop and Animal Production	14%	3%
21	Mining, Quarrying, and Oil and Gas Extraction	5%	12%
22	Utilities	5%	1%
23	Construction	(2%)	10%
31	Manufacturing	(3%)	(0%)
42	Wholesale Trade	12%	9%
44	Retail Trade	3%	8%
48	Transportation and Warehousing	14%	9%
51	Information	14%	5%
52	Finance and Insurance	25%	9%
53	Real Estate and Rental and Leasing	10%	7%
54	Professional, Scientific, and Technical Services	26%	15%
55	Management of Companies and Enterprises	11%	9%
56	Administrative and Support and Waste Management and Remediation Services	11%	13%
61	Educational Services	21%	15%
62	Health Care and Social Assistance	25%	21%
71	Arts, Entertainment, and Recreation	12%	12%
72	Accommodation and Food Services	9%	11%
81	Other Services (except Public Administration)	4%	9%
90	Government	4%	5%
99	Unclassified Industry	81%	43%
Total		0%	5%

Source: EMSI

Significant growth (>10 percentage points) compared to United States

Significant decline (<10 percentage points) compared to United States

Largest Employment Industries

The table below lists 2-digit NAICS industries, sorted by descending job count in 2016.

Key Findings from this Analysis

- Region 8's largest industries by employment are **Government (NAICS 90)**; **Manufacturing (NAICS 31)**; and **Health Care and Social Assistance (NAICS 62)**. Note that Government (NAICS 90) covers public sector administrative positions but also includes jobs at public educational institutions, as well public health care facilities. Conversely, the Health Care and Social Assistance (NAICS 62) industry covers privately operated health care institutions.
- Combined, these industries constitute approximately 98,000 jobs, or 41% of the total jobs in the Region.
- Average earnings per job in these high employment industries range from mid $50k to low $60k, well over the average earnings for the Region 8, which reach $47,046.

Table 8: Region Top Industries by Job Count, 2-Digit NAICS

Region Top Industries by Job Count, 2-Digit NAICS			
NAICS	Description	2016 Jobs	Avg. Earnings Per Job
90	Government	37,196	$58,841
31	Manufacturing	32,095	$63,181
62	Health Care and Social Assistance	28,680	$55,497
44	Retail Trade	27,615	$30,314
72	Accommodation and Food Services	23,120	$19,223
23	Construction	13,847	$45,265
48	Transportation and Warehousing	11,774	$53,477
81	Other Services (except Public Administration)	10,970	$26,144
56	Administrative and Support and Waste Management and Remediation Services	9,152	$31,796
54	Professional, Scientific, and Technical Services	7,846	$59,478
61	Educational Services	7,198	$41,277
42	Wholesale Trade	5,976	$58,049
52	Finance and Insurance	5,573	$63,612
11	Crop and Animal Production	4,254	$29,554
71	Arts, Entertainment, and Recreation	3,194	$19,147
53	Real Estate and Rental and Leasing	3,049	$41,584
51	Information	2,716	$57,487
55	Management of Companies and Enterprises	2,607	$95,042
22	Utilities	582	$110,781
99	Unclassified Industry	350	$38,388
21	Mining, Quarrying, and Oil and Gas Extraction	293	$56,171
Total		238,087	$47,046

Source: EMSI

Top Employment by Planning District

The tables below list 2-digit NAICS industries sorted in descending order by job count in 2016 for both Planning Districts: Northern Shenandoah Valley Regional Commission (NSVRC) and Central Shenandoah Planning District Commission (CSPDC) Also included are each industry's percentage share of all jobs within the Region, as well as the average annual pay that workers in the industry command, compared to similar workers across the US.

- The top three industries by employment in both sub regions are **Government (NAICS 90)**; **Manufacturing (NAICS 31)**; and **Health Care and Social Assistance (NAICS 62)**. These industries account for 41% of total 2016 jobs for both sub regions.
- Average earnings per job are about equal in the Northern Shenandoah Valley Regional Commission and the US for the **Health Care and Social Assistance (NAICS 62)** industry, but lower for **Government (NAICS 90)** and **Manufacturing (NAICS 31)**.

Table 9: NSVRC Top 2-Digit NAICS Industries by Job Count

NSVRC Top 2-Digit NAICS Industries by Job Count							
NAICS	Description	2016 Jobs	% of All Jobs (2016)	2006 - 2016 Change	2006 - 2016 % Change	Avg. Earnings Per Job	Avg. Earnings Per Job (US)
90	Government	14,854	15%	2,164	17%	$63,084	$73,624
62	Health Care and Social Assistance	12,922	13%	2,771	27%	$57,961	$57,396
31	Manufacturing	12,770	13%	(4,428)	(26%)	$61,986	$80,355
44	Retail Trade	12,452	13%	(468)	(4%)	$31,536	$35,739
72	Accommodation and Food Services	8,581	9%	1,107	15%	$18,549	$23,224
23	Construction	5,789	6%	(3,331)	(37%)	$43,399	$60,879
81	Other Services (except Public Administration)	4,619	5%	(112)	(2%)	$27,264	$31,856
56	Administrative and Support and Waste Management and Remediation Services	4,577	5%	317	7%	$33,374	$42,514
48	Transportation and Warehousing	4,423	4%	499	13%	$51,093	$60,635
54	Professional, Scientific, and Technical Services	3,745	4%	507	16%	$63,993	$96,644
52	Finance and Insurance	3,218	3%	976	44%	$63,356	$115,377
61	Educational Services	2,705	3%	76	3%	$43,664	$47,603
42	Wholesale Trade	2,102	2%	(384)	(15%)	$61,558	$85,048
71	Arts, Entertainment, and Recreation	1,606	2%	218	16%	$21,070	$38,589
11	Crop and Animal Production	1,256	1%	(56)	(4%)	$28,998	$35,292
55	Management of Companies and Enterprises	1,242	1%	287	30%	$112,891	$135,201
53	Real Estate and Rental and Leasing	1,154	1%	(308)	(21%)	$43,048	$58,450
51	Information	925	1%	(188)	(17%)	$57,710	$113,098
22	Utilities	271	0%	159	142%	$112,204	$137,571
99	Unclassified Industry	144	0%	144	Insf. Data	$39,714	$59,105
21	Mining, Quarrying, and Oil and Gas Extraction	123	0%	(43)	(26%)	$60,349	$120,583
Total		99,477	100%	(96)	(0%)	$48,588	$62,349

Source: EMSI

Table 10: CSPDC Top 2-Digit NAICS Industries by Job Count

CSPDC Top 2-Digit NAICS Industries by Job Count							
NAICS	Description	2016 Jobs	% of All Jobs (2016)	2006 - 2016 Change	2006 - 2016 % Change	Avg. Earnings Per Job	Avg. Earnings Per Job (US)
90	Government	22,342	16%	(582)	(3%)	$56,021	$73,624
31	Manufacturing	19,324	14%	(3,667)	(16%)	$63,971	$80,355
62	Health Care and Social Assistance	15,758	11%	2,824	22%	$53,476	$57,396
44	Retail Trade	15,163	11%	(1,380)	(8%)	$29,310	$35,739
72	Accommodation and Food Services	14,539	10%	1,937	15%	$19,621	$23,224
23	Construction	8,058	6%	(3,324)	(29%)	$46,605	$60,879
48	Transportation and Warehousing	7,351	5%	1,597	28%	$54,912	$60,635
81	Other Services (except Public Administration)	6,351	5%	(279)	(4%)	$25,329	$31,856
56	Administrative and Support and Waste Management and Remediation Services	4,575	3%	(165)	(3%)	$30,217	$42,514
61	Educational Services	4,493	3%	1,118	33%	$39,841	$47,603
54	Professional, Scientific, and Technical Services	4,101	3%	596	17%	$55,355	$96,644
42	Wholesale Trade	3,875	3%	(239)	(6%)	$56,145	$85,048
11	Crop and Animal Production	2,997	2%	976	48%	$29,787	$35,292
52	Finance and Insurance	2,356	2%	(87)	(4%)	$63,962	$115,377
53	Real Estate and Rental and Leasing	1,895	1%	(145)	(7%)	$40,692	$58,450
51	Information	1,792	1%	(318)	(15%)	$57,373	$113,098
71	Arts, Entertainment, and Recreation	1,588	1%	(89)	(5%)	$17,202	$38,589
55	Management of Companies and Enterprises	1,365	1%	57	4%	$78,810	$135,201
22	Utilities	310	0%	(49)	(14%)	$109,539	$137,571
99	Unclassified Industry	206	0%	Insf. Data	Insf. Data	$37,458	$59,105
21	Mining, Quarrying, and Oil and Gas Extraction	170	0%	(83)	(33%)	$53,148	$120,583
Total		138,610	100%	(1,100)	(1%)	$45,939	$62,349

Source: EMSI

Top Employment Industries: 4-Digit NAICS

Location Quotient (LQ) analysis compares a specific geographic region to a larger reference area by quantifying the concentration of an industry, demographic group, or other variable compared to its concentration in the larger geography. In this section, concentration of employment by industry in Region 8 and its planning districts are compared to the nation to identify which industries are highly concentrated and, therefore, may have a competitive advantage within the Region.

LQ is calculated by dividing the percent of jobs within each industry locally by the percent of jobs in the same industry at the national level. For example, if the finance and insurance industry accounts for 2% of jobs in a community and at the national level this industry has 1% of the total jobs, the community has a LQ of 2.0 (0.02 ÷ 0.01 = 2). In this example, the local community employs twice as many individuals in the industry as expected based on national employment patterns. Typically, only values above 1.20 or below 0.80 are considered "significant" findings in LQ analysis. Industries with a high LQ and high employment numbers are assumed to produce more than what is needed locally (i.e. a surplus) and export their products and services.

The tables below show the top 30 4-digit NAICS industries in Region 8 and the planning districts by 2016 job count. Highlighted industries have location quotients greater than 2.00, indicating highly concentrated industries.

- The top five industries by employment in Region 8 have location quotients below 2.00, indicating that they are not highly concentrated compared to the US.
- **Restaurants and Other Eating Places (NAICS 7225**) is the top industry by number of jobs in all three geographies.
- In the Region, **Animal Slaughtering and Processing (NAICS 3116)**; **Warehousing and Storage (NAICS 4931)**; and **Plastics Product Manufacturing (NAICS 3261)** are the top 3 industries with high employment and LQs above 2.00.
- In the Northern Shenandoah Valley Regional Commission, **Plastics Product Manufacturing (NAICS 3261); Depository Credit Intermediation (NAICS 5221)**; and **Warehousing and Storage (NAICS 4931)**; are the top 3 industries with high employment and LQs above 2.00.
- Within the Central Shenandoah Planning District Commission, **Education and Hospitals (State Government) (NAICS 9026)**; **Animal Slaughtering and Processing (NAICS 3116)**; and **Traveler Accommodation (NAICS 7211)** industries are the top 3 industries by employment and have LQs above 2.00.

Table 11: Region 8 Top 30 Industries by Job Count, 4-Digit NAICS

Region 8 Top 30 Industries by Job Count, 4-Digit NAICS						
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 Location Quotient
7225	Restaurants and Other Eating Places	14,081	16,451	2,370	17%	1.06
9036	Education and Hospitals (Local Government)	14,032	14,002	(30)	(0%)	1.09
6221	General Medical and Surgical Hospitals	8,479	8,638	159	2%	1.25
9039	Local Government, Excluding Education and Hospitals	7,802	8,274	472	6%	0.98
9026	Education and Hospitals (State Government)	7,403	7,633	230	3%	1.69
3116	Animal Slaughtering and Processing	5,544	5,290	(254)	(5%)	7.10
4931	Warehousing and Storage	3,791	4,874	1,083	29%	3.59
4529	Other General Merchandise Stores	5,270	4,707	(563)	(11%)	1.65
7211	Traveler Accommodation	4,789	4,696	(93)	(2%)	1.66
6113	Colleges, Universities, and Professional Schools	3,468	4,622	1,154	33%	1.59
5617	Services to Buildings and Dwellings	4,155	4,449	294	7%	1.06
4451	Grocery Stores	3,645	4,386	741	20%	1.07
6211	Offices of Physicians	3,267	3,709	442	14%	0.95
3261	Plastics Product Manufacturing	4,916	3,629	(1,287)	(26%)	4.25
6241	Individual and Family Services	1,006	3,576	2,570	255%	1.00
2382	Building Equipment Contractors	4,372	3,526	(846)	(19%)	1.04
4841	General Freight Trucking	3,204	3,453	249	8%	1.92
5221	Depository Credit Intermediation	2,337	3,427	1,090	47%	1.34
9011	Federal Government, Civilian	2,048	3,260	1,212	59%	0.75
8131	Religious Organizations	3,776	3,203	(573)	(15%)	1.23
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	2,543	3,194	651	26%	2.37
3231	Printing and Related Support Activities	3,794	2,988	(806)	(21%)	4.22
5613	Employment Services	2,650	2,784	134	5%	0.52
4471	Gasoline Stations	3,170	2,744	(426)	(13%)	1.96
5511	Management of Companies and Enterprises	2,263	2,607	344	15%	0.78
2389	Other Specialty Trade Contractors	3,471	2,471	(1,000)	(29%)	1.65
9029	State Government, Excluding Education and Hospitals	2,703	2,347	(356)	(13%)	0.68
4441	Building Material and Supplies Dealers	2,537	2,331	(206)	(8%)	1.36
4411	Automobile Dealers	2,278	2,280	2	0%	1.16
2361	Residential Building Construction	3,926	2,200	(1,726)	(44%)	1.27

Source: EMSI

Table 12: NSVRC Top 30 Industries by Job Count, 4-Digit NAICS

NSVRC Top 30 Industries by Job Count, 4-Digit NAICS						
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 Location Quotient
7225	Restaurants and Other Eating Places	5,815	6,878	1,063	18%	1.06
9036	Education and Hospitals (Local Government)	6,141	6,637	496	8%	1.24
6221	General Medical and Surgical Hospitals	4,339	3,919	(420)	(10%)	1.36
9039	Local Government, Excluding Education and Hospitals	3,286	3,434	148	5%	0.97
3261	Plastics Product Manufacturing	3,595	2,894	(701)	(19%)	8.12
9011	Federal Government, Civilian	1,272	2,507	1,235	97%	1.39
5221	Depository Credit Intermediation	1,241	2,327	1,086	88%	2.18
4529	Other General Merchandise Stores	1,980	2,187	207	10%	1.84
5617	Services to Buildings and Dwellings	1,628	1,953	325	20%	1.12
6241	Individual and Family Services	413	1,922	1,509	365%	1.28
6211	Offices of Physicians	1,587	1,886	299	19%	1.16
4451	Grocery Stores	1,556	1,810	254	16%	1.05
4931	Warehousing and Storage	1,416	1,793	377	27%	3.16
5613	Employment Services	1,688	1,713	25	1%	0.76
3231	Printing and Related Support Activities	1,988	1,405	(583)	(29%)	4.75
2382	Building Equipment Contractors	1,774	1,293	(481)	(27%)	0.91
8131	Religious Organizations	1,270	1,291	21	2%	1.19
4471	Gasoline Stations	1,617	1,277	(340)	(21%)	2.18
5511	Management of Companies and Enterprises	955	1,242	287	30%	0.89
7211	Traveler Accommodation	1,321	1,226	(95)	(7%)	1.04
6113	Colleges, Universities, and Professional Schools	1,010	1,218	208	21%	1.00
6111	Elementary and Secondary Schools	1,355	1,176	(179)	(13%)	1.71
3116	Animal Slaughtering and Processing	831	1,112	281	34%	3.57
4841	General Freight Trucking	1,160	1,106	(54)	(5%)	1.47
2389	Other Specialty Trade Contractors	1,615	1,103	(512)	(32%)	1.76
4441	Building Material and Supplies Dealers	1,101	1,043	(58)	(5%)	1.46
4411	Automobile Dealers	954	1,039	85	9%	1.26
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	710	1,016	306	43%	1.81
2361	Residential Building Construction	1,728	1,007	(721)	(42%)	1.39
9026	Education and Hospitals (State Government)	676	977	301	45%	0.52

Source: EMSI

Table 13: CSPDC Top 30 Industries by Job Count, 4-Digit NAICS

CSPDC Top 30 Industries by Job Count, 4-Digit NAICS						
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 Location Quotient
7225	Restaurants and Other Eating Places	8,265	9,573	1,308	16%	1.06
9036	Education and Hospitals (Local Government)	7,892	7,365	(527)	(7%)	0.98
9026	Education and Hospitals (State Government)	6,727	6,656	(71)	(1%)	2.53
9039	Local Government, Excluding Education and Hospitals	4,516	4,840	324	7%	0.98
6221	General Medical and Surgical Hospitals	4,140	4,719	579	14%	1.17
3116	Animal Slaughtering and Processing	4,714	4,178	(536)	(11%)	9.63
7211	Traveler Accommodation	3,468	3,470	2	0%	2.11
6113	Colleges, Universities, and Professional Schools	2,458	3,404	946	38%	2.01
4931	Warehousing and Storage	2,375	3,081	706	30%	3.90
4451	Grocery Stores	2,089	2,576	487	23%	1.07
4529	Other General Merchandise Stores	3,291	2,520	(771)	(23%)	1.52
5617	Services to Buildings and Dwellings	2,527	2,496	(31)	(1%)	1.02
4841	General Freight Trucking	2,044	2,347	303	15%	2.24
2382	Building Equipment Contractors	2,598	2,233	(365)	(14%)	1.13
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	1,833	2,178	345	19%	2.78
8131	Religious Organizations	2,506	1,912	(594)	(24%)	1.26
6211	Offices of Physicians	1,680	1,823	143	9%	0.80
9029	State Government, Excluding Education and Hospitals	2,094	1,788	(306)	(15%)	0.89
6241	Individual and Family Services	593	1,654	1,061	179%	0.79
3231	Printing and Related Support Activities	1,806	1,583	(223)	(12%)	3.84
4471	Gasoline Stations	1,554	1,467	(87)	(6%)	1.80
2389	Other Specialty Trade Contractors	1,857	1,368	(489)	(26%)	1.57
5511	Management of Companies and Enterprises	1,308	1,365	57	4%	0.70
7223	Special Food Services	729	1,299	570	78%	1.89
4441	Building Material and Supplies Dealers	1,436	1,289	(147)	(10%)	1.29
1120	Animal Production and Aquaculture	1,090	1,255	165	15%	3.28
4411	Automobile Dealers	1,324	1,241	(83)	(6%)	1.08
2361	Residential Building Construction	2,198	1,193	(1,005)	(46%)	1.18
6231	Nursing Care Facilities (Skilled Nursing Facilities)	1,117	1,169	52	5%	0.81
5221	Depository Credit Intermediation	1,096	1,100	4	0%	0.74

Source: EMSI

Top Self-Employed Industries

The Region 8 industries with the highest number of 2016 self-employed workers are displayed in the table below. Highlighted industries have location quotients greater than 2.00, indicating concentrated industries.

- The top five industries with the highest number of self-employed workers have experienced a decline in workers since 2006.
- Only 2 of the top 20 self-employed industries have location quotients greater than 2.00. **Used Merchandise Stores (NAICS 4533)** is the only growing and concentrated self-employed industry.

Table 14: Region 8 Top Self Employed Industries by Job Count, 2006 - 2016

Region 8 Top Self Employed Industries by Job Count, 2006 - 2016						
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 Location Quotient
5617	Services to Buildings and Dwellings	1,207	1,124	(83)	(7%)	1.04
2383	Building Finishing Contractors	1,301	815	(486)	(37%)	1.28
1120	Animal Production and Aquaculture	994	792	(202)	(20%)	3.04
2361	Residential Building Construction	1,096	772	(324)	(30%)	1.29
2389	Other Specialty Trade Contractors	949	638	(311)	(33%)	1.24
8141	Private Households	538	593	55	10%	0.66
1110	Crop Production	420	586	166	40%	1.40
8121	Personal Care Services	664	581	(83)	(13%)	0.71
8111	Automotive Repair and Maintenance	429	452	23	5%	1.33
6244	Child Day Care Services	725	437	(288)	(40%)	0.84
5311	Lessors of Real Estate	378	419	41	11%	1.44
5416	Management, Scientific, and Technical Consulting Services	314	379	65	21%	0.85
2382	Building Equipment Contractors	435	344	(91)	(21%)	1.17
2381	Foundation, Structure, and Building Exterior Contractors	562	333	(229)	(41%)	1.27
7115	Independent Artists, Writers, and Performers	314	300	(14)	(4%)	0.83
4841	General Freight Trucking	458	287	(171)	(37%)	1.00
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	199	280	81	41%	1.13
6116	Other Schools and Instruction	227	262	35	15%	1.04
4533	Used Merchandise Stores	116	243	127	109%	3.65
7223	Special Food Services	181	190	9	5%	1.04
	Other Industries	5,285	5,154	(128)	(2%)	
	Total	16,791	14,983	(1,808)	(11%)	

Source: EMSI

Concentrated Industries: Location Quotient Analysis

The tables below show employment by 2-digit NAICS and the 4-digit NAICS codes with the highest LQs in the Region.

- **Manufacturing (NAICS 31)** was the sector with the highest concentration of jobs, with an LQ of 1.78. Within the Manufacturing sector there was an especially high concentration of **Confectionery Manufacturing from Purchased Chocolate (NAICS 311352)** (LQ = 19.80), **Other Snack Food Manufacturing (NAICS 311919)** (LQ = 16.05) and **Nonwoven Fabric Mills (NAICS 313230)** (LQ = 14.94). Several Manufacturing 4-digit NAICS industries are among the top 30 industries with the highest LQs.
- **Transportation and Warehousing (NAICS 48)** had an LQ of 1.45. The 4-digit NAICS **Nonscheduled Air Transportation (NAICS 4812)** stands out as having 2700% grow in the past 10 years, and currently has an LQ of 7.09. **Pipeline Transportation of Natural Gas (NAICS 4862)** also has a high growth rate of 485%.
- **Crop and Animal Production (NAICS 11)** had an LQ of 1.45. Within this industry, the 4-digit **Support Activities for Animal Production (NAICS 1152)** had the highest LQ at 8.65.
- Several industry sectors fall below the 0.80 LQ threshold indicating the area has fewer jobs in these sectors than expected. These industries include Arts, Entertainment, and Recreation (NAICS 71); Real Estate and Rental and Leasing (NAICS 53); Management of Companies and Enterprises (NAICS 55); Utilities (NAICS 22); Wholesale Trade (NAICS 42); Administration and Support and Waste Management and Remediation Services (NAICS 56); Information (NAICS 51); Finance and Insurance (NAICS 52); Professional, Scientific and Technical Services (NAICS 54); and Mining, Quarrying, and Oil and Gas Extraction (NAICS 21).

Table 15: Region 8 Employment Concentration, 2-Digit NAICS

Region 8 Employment Concentration, 2-Digit NAICS					
NAICS	Description	2016 Jobs	% of All Jobs	National Location Quotient	
31	Manufacturing	32,095	13.5%	1.70	
48	Transportation and Warehousing	11,774	4.9%	1.45	
11	Crop and Animal Production	4,254	1.8%	1.45	
61	Educational Services	7,198	3.0%	1.19	
72	Accommodation and Food Services	23,120	9.7%	1.14	
44	Retail Trade	27,615	11.6%	1.12	
23	Construction	13,847	5.8%	1.08	
90	Government	37,196	15.6%	1.02	
62	Health Care and Social Assistance	28,680	12.0%	0.96	
81	Other Services (except Public Administration)	10,970	4.6%	0.96	
99	Unclassified Industry	350	0.1%	0.81	
71	Arts, Entertainment, and Recreation	3,194	1.3%	0.79	
53	Real Estate and Rental and Leasing	3,049	1.3%	0.78	
55	Management of Companies and Enterprises	2,607	1.1%	0.78	
22	Utilities	582	0.2%	0.69	
42	Wholesale Trade	5,976	2.5%	0.66	
56	Administrative & Support & Waste Mgmt & Remediation Services	9,152	3.8%	0.62	
51	Information	2,716	1.1%	0.61	
52	Finance and Insurance	5,573	2.3%	0.60	
54	Professional, Scientific, and Technical Services	7,846	3.3%	0.52	
21	Mining, Quarrying, and Oil and Gas Extraction	293	0.1%	0.30	
Total		238,087	100.0%		

Source: EMSI

Table 16: Region 8 Top 30 4-Digit NAICS Industries by Location Quotient

Region 8 Top 30 4-Digit NAICS Industries by Location Quotient						
NAICS	Description	2016 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 Location Quotient	Avg. Earnings Per Job
1152	Support Activities for Animal Production	535	362	209%	8.65	$36,323
3113	Sugar and Confectionery Product Manufacturing	937	149	19%	8.49	$76,850
3274	Lime and Gypsum Product Manufacturing	181	(73)	(29%)	8.26	$85,172
3116	Animal Slaughtering and Processing	5,290	(254)	(5%)	7.10	$44,353
4812	Nonscheduled Air Transportation	476	459	2700%	7.09	$80,882
3141	Textile Furnishings Mills	517	(467)	(47%)	6.32	$41,772
3115	Dairy Product Manufacturing	1,101	563	105%	5.24	$85,264
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	1,013	82	9%	5.19	$76,378
3322	Cutlery and Handtool Manufacturing	244	(193)	(44%)	4.26	$63,750
3261	Plastics Product Manufacturing	3,629	(1,287)	(26%)	4.25	$72,136
3231	Printing and Related Support Activities	2,988	(806)	(21%)	4.22	$48,645
3119	Other Food Manufacturing	1,248	(194)	(13%)	4.03	$64,434
3211	Sawmills and Wood Preservation	547	2	0%	3.80	$52,662
3132	Fabric Mills	317	(254)	(44%)	3.73	$56,836
3111	Animal Food Manufacturing	323	102	46%	3.66	$54,811
4931	Warehousing and Storage	4,874	1,083	29%	3.59	$48,293
7212	RV (Recreational Vehicle) Parks and Recreational Camps	350	141	67%	3.56	$22,036
3255	Paint, Coating, and Adhesive Manufacturing	299	(113)	(27%)	3.23	$106,828
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	823	40	5%	3.19	$50,799
3219	Other Wood Product Manufacturing	1,093	(429)	(28%)	3.07	$42,305
1142	Hunting and Trapping	22	Insf. Data	Insf. Data	2.87	$25,366
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	390	(362)	(48%)	2.76	$94,318
4862	Pipeline Transportation of Natural Gas	117	97	485%	2.63	$83,122
3321	Forging and Stamping	383	(163)	(30%)	2.61	$58,772
3259	Other Chemical Product and Preparation Manufacturing	321	289	903%	2.60	$74,533
3273	Cement and Concrete Product Manufacturing	723	(625)	(46%)	2.52	$56,857
7121	Museums, Historical Sites, and Similar Institutions	615	15	3%	2.52	$30,478
3324	Boiler, Tank, and Shipping Container Manufacturing	351	58	20%	2.51	$80,635
1120	Animal Production and Aquaculture	1,575	(28)	(2%)	2.40	$29,013
3313	Alumina and Aluminum Production and Processing	212	(199)	(48%)	2.40	$57,222

Source: EMSI

Northern Shenandoah Valley Regional Commission

The table below shows employment by 2-digit NAICS for the Northern Shenandoah Valley Regional Commission ordered by location quotient (LQ).

- Similar to Region 8, **Manufacturing (NAICS 31)** was the sector with the highest concentration of jobs, with an LQ of 1.62.
- **Transportation and Warehousing (NAICS 48)** had an LQ of 1.30.
- **Retail Trade (NAICS 44)** had an LQ of 1.20.
- Several industry sectors fall below the 0.80 LQ threshold including: Utilities (NAICS 22); Administration and Support and Waste Management and Remediation Services (NAICS 56); Retail Estate and Rental and Leasing

(NAICS 53); Professional, Scientific and Technical Services (NAICS 54); Wholesale Trade (NAICS 42); Information (NAICS 51); and Mining, Quarrying, and Oil and Gas Extraction (NAICS 21).

NSVRC Employment Concentration, 2-Digit NAICS				
NAICS	Description	2016 Jobs	% of All Jobs	National Location Quotient
31	Manufacturing	12,770	12.8%	1.62
48	Transportation and Warehousing	4,423	4.4%	1.30
44	Retail Trade	12,452	12.5%	1.20
23	Construction	5,789	5.8%	1.08
61	Educational Services	2,705	2.7%	1.07
62	Health Care and Social Assistance	12,922	13.0%	1.04
11	Crop and Animal Production	1,256	1.3%	1.02
72	Accommodation and Food Services	8,581	8.6%	1.01
90	Government	14,854	14.9%	0.97
81	Other Services (except Public Administration)	4,619	4.6%	0.97
71	Arts, Entertainment, and Recreation	1,606	1.6%	0.95
55	Management of Companies and Enterprises	1,242	1.2%	0.89
52	Finance and Insurance	3,218	3.2%	0.83
99	Unclassified Industry	144	0.1%	0.80
22	Utilities	271	0.3%	0.77
56	Administrative & Support & Waste Mgmt & Remediation Services	4,577	4.6%	0.74
53	Real Estate and Rental and Leasing	1,154	1.2%	0.71
54	Professional, Scientific, and Technical Services	3,745	3.8%	0.59
42	Wholesale Trade	2,102	2.1%	0.56
51	Information	925	0.9%	0.50
21	Mining, Quarrying, and Oil and Gas Extraction	123	0.1%	0.30
Total		99,477	100.0%	

Source: EMSI

Central Shenandoah Planning District Commission

Employment concentration by 2-digit NAICS for the Central Shenandoah Planning District Commission ordered by location quotient (LQ) is listed in the table below.

- Similar to Region 8 and the Northern Shenandoah Valley Regional Commission, **Manufacturing (NAICS 31)** was the sector with the highest concentration of jobs, with an LQ of 1.76.
- **Crop and Animal Production (NAICS 11); Transportation and Warehousing (NAICS 48); Educational Services (NAICS 61); and Accommodation and Food Services (NAICS 72)** had relatively high LQ's of 1.75, 1.55, 1.27, and 1.23 respectively.
- Several industry sectors fall below the 0.80 LQ threshold including: Wholesale Trade (NAICS 42); Management of Companies and Enterprises (NAICS 55); Information (NAICS 51); Arts, Entertainment, and Recreation (NAICS 71); Utilities (NAICS 22); Administration and Support and Waste Management and Remediation Services (NAICS 56); Professional, Scientific, and Technical Services (NAICS 54); Finance and Insurance (NAICS 52); and Mining, Quarrying, and Oil and Gas Extraction (NAICS 21).

Table 17: CSPDC Employment Concentration, 2-Digit NAICS

CSPDC Employment Concentration, 2-Digit NAICS					
NAICS	Description	2016 Jobs	% of All Jobs	National Location Quotient	
31	Manufacturing	19,324	13.9%	1.76	
11	Crop and Animal Production	2,997	2.2%	1.75	
48	Transportation and Warehousing	7,351	5.3%	1.55	
61	Educational Services	4,493	3.2%	1.27	
72	Accommodation and Food Services	14,539	10.5%	1.23	
23	Construction	8,058	5.8%	1.08	
44	Retail Trade	15,163	10.9%	1.05	
90	Government	22,342	16.1%	1.05	
81	Other Services (except Public Administration)	6,351	4.6%	0.95	
62	Health Care and Social Assistance	15,758	11.4%	0.91	
53	Real Estate and Rental and Leasing	1,895	1.4%	0.83	
99	Unclassified Industry	206	0.1%	0.82	
42	Wholesale Trade	3,875	2.8%	0.73	
55	Management of Companies and Enterprises	1,365	1.0%	0.70	
51	Information	1,792	1.3%	0.69	
71	Arts, Entertainment, and Recreation	1,588	1.1%	0.67	
22	Utilities	310	0.2%	0.63	
56	Administrative & Support & Waste Mgmt & Remediation Services	4,575	3.3%	0.53	
54	Professional, Scientific, and Technical Services	4,101	3.0%	0.46	
52	Finance and Insurance	2,356	1.7%	0.44	
21	Mining, Quarrying, and Oil and Gas Extraction	170	0.1%	0.30	
Total		138,610	100.0%		

Source: EMSI

Competitive Analysis: Shift Share Analysis

Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages or disadvantages from growth that is attributable to overall national trends or national trends in that industry.

The shift share analysis helps to answer the question of "*Why is employment growing or declining in this local industry*?" To do this, shift share analysis splits regional job growth into three components: national change effect, industrial mix effect, and regional competitiveness effect. The following tables shows whether Region 8 and its two planning districts have a competitive advantage compared to the other geographies (past and projected). A shift share analysis is based on four factors, as defined by EMSI:

- **Industrial Mix Effect** – The industrial mix effect represents the share of regional industry growth explained by the growth of the specific industry at the national level. To arrive at this number, the national growth rate of the total economy is subtracted from the national growth rate of the specific industry, and this growth percentage is applied to the regional jobs in that industry.
- **National Growth Effect** – The national growth effect explains how much of the regional industry's growth is explained by the overall growth of the national economy. If the national economy is growing, you would generally expect to see some positive change in each industry in your local region.
- **Expected Change** – This is simply the rate of growth of the particular industry at the national level. Algebraically, the expected change is the sum of the industrial mix and the national growth.
- **Regional Competitive Effect** – The regional competitive effect explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry. Note that this effect can be positive even as regional employment in the industry declines. This would indicate that regional decline is less than the national decline.

Key Findings from this Analysis

- The shift share analysis shows that Region 8 **does not have a competitive advantage** relative to other parts of the nation in most industry sectors.
- If the Region's economy had mirrored national industry trends and overall national job growth, Region 8 would have added nearly 7,000 jobs between 2006 and 2016. Instead, it lost about 1,200 jobs. This difference, known as the Competitive Effect, is a result of the unique characteristics of the region that contributed to a job loss.
- There are a few industries that outperformed the rest of the nation, including: **Crop and Animal Production (NAICS 11); Utilities (NAICS 22); Transportation and Warehousing (NAICS 48); Finance and Insurance (NAICS 52); Government (NAICS 90);** and **Unclassified Industry (NAICS 99).**
- Of the industries that showed a positive Competitive Effect, **Transportation and Warehousing (NAICS 48)**; **Finance and Insurance (NAICS 52)**; and **Government (NAICS 90)** showed a significant positive Competitive Effect indicating that Region 8 has a unique competitive advantage in these industries at the 2-digit level.

Table 18: Region 8 Shift Share Analysis, 2-Digit NAICS

Region 8 Shift Share Analysis, 2-Digit NAICS									
NAICS	Description	2006 Jobs	2016 Jobs	2006 - 2016	2006 - 2016 %	Ind. Mix Effect	Nat'l Growth	Expected Change	Competitive Effect
11	Crop and Animal Production	3,333	4,254	921	28%	(134)	153	19	901
21	Mining, Quarrying, and Oil and Gas Extraction	420	293	(127)	(30%)	(7)	19	12	(139)
22	Utilities	471	582	111	24%	(10)	22	12	99
23	Construction	20,502	13,847	(6,655)	(32%)	(4,088)	941	(3,147)	(3,508)
31	Manufacturing	40,190	32,095	(8,095)	(20%)	(7,037)	1,844	(5,193)	(2,902)
42	Wholesale Trade	6,601	5,976	(625)	(9%)	(382)	303	(79)	(545)
44	Retail Trade	29,462	27,615	(1,847)	(6%)	(870)	1,352	482	(2,329)
48	Transportation and Warehousing	9,678	11,774	2,096	22%	629	444	1,073	1,022
51	Information	3,223	2,716	(507)	(16%)	(400)	148	(252)	(254)
52	Finance and Insurance	4,685	5,573	888	19%	(407)	215	(192)	1,080
53	Real Estate and Rental and Leasing	3,502	3,049	(453)	(13%)	(369)	161	(208)	(245)
54	Professional, Scientific, and Technical Services	6,743	7,846	1,103	16%	844	309	1,153	(50)
55	Management of Companies and Enterprises	2,263	2,607	344	15%	450	104	554	(210)
56	Administrative and Support and Waste Management and Remediation Services	9,000	9,152	152	2%	220	413	633	(482)
61	Educational Services	6,005	7,198	1,193	20%	1,183	276	1,459	(265)
62	Health Care and Social Assistance	23,085	28,680	5,595	24%	4,636	1,059	5,695	(100)
71	Arts, Entertainment, and Recreation	3,065	3,194	129	4%	341	141	482	(351)
72	Accommodation and Food Services	20,076	23,120	3,044	15%	2,776	921	3,697	(653)
81	Other Services (except Public Administration)	11,360	10,970	(390)	(3%)	(195)	521	326	(717)
90	Government	35,615	37,196	1,581	4%	(1,246)	1,634	388	1,194
99	Unclassified Industry	<10	350	Insf. Data	Insf. Data	1	0	1	344
Total		239,283	238,087	(1,196)	(0.5%)	(4,066)	10,981	6,915	(8,111)

Source: EMSI

Northern Shenandoah Valley Regional Commission and Central Shenandoah Planning District Commission Comparison

- Overall, Region 8 and its two planning districts underperformed during 2006 – 2016 compared to national employment trends.
- The Central Shenandoah Planning District Commission had the greatest underperformance with a Competitive Effect of -5,173 compared to the Northern Shenandoah Valley Regional Commission with a Competitive Effect of -2,938.

Table 19: Competitive Effect Comparison, 2-Digit NAICS

Competitive Effect Comparision, 2-Digit NAICS				
NAICS	Description	Region 8	NSVRC	CSPDC
		2006 - 2016	2006 - 2016	2006 - 2016
11	Crop and Animal Production	901	(64)	964
21	Mining, Quarrying, and Oil and Gas Extraction	(139)	(48)	(91)
22	Utilities	99	157	(58)
23	Construction	(3,508)	(1,931)	(1,577)
31	Manufacturing	(2,902)	(2,206)	(696)
42	Wholesale Trade	(545)	(355)	(190)
44	Retail Trade	(2,329)	(679)	(1,650)
48	Transportation and Warehousing	1,022	63	958
51	Information	(254)	(102)	(153)
52	Finance and Insurance	1,080	1,067	13
53	Real Estate and Rental and Leasing	(245)	(221)	(24)
54	Professional, Scientific, and Technical Services	(50)	(46)	(3)
55	Management of Companies and Enterprises	(210)	53	(263)
56	Administrative and Support and Waste Management and Remediation Services	(482)	17	(499)
61	Educational Services	(265)	(563)	298
62	Health Care and Social Assistance	(100)	267	(367)
71	Arts, Entertainment, and Recreation	(351)	1	(352)
72	Accommodation and Food Services	(653)	(270)	(383)
81	Other Services (except Public Administration)	(717)	(248)	(469)
90	Government	1,194	2,025	(831)
99	Unclassified Industry	344	144	200
Total		(8,111)	(2,938)	(5,173)

Source: EMSI

Most Competitive Industries

Industry data from 2006 to 2016 was examined to determine the most competitive industries in Region 8. During this time period, the most competitive industries in Region 8 are Depositary Credit Intermediation; Federal Government, Civilian; and Dairy Production Manufacturing, which have average earnings of $56,000, $107,000, and $85,000 respectively.

Table 20: Region 8 Most Competitive Industries, 2006 - 2016

Region 8 Most Competitive Industries, 2006 - 2016							
NAICS	Industry	Job Change	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect	2016 Earnings Per Worker
5221	Depository Credit Intermediation	1,090	(261)	107	(154)	1,243	$56,056
9011	Federal Government, Civilian	1,212	(49)	94	45	1,167	$106,711
3115	Dairy Product Manufacturing*	563	9	25	34	530	$65,312
5112	Software Publishers	535	13	1	14	521	$80,281
7223	Special Food Services	651	136	43	179	472	$19,259
4812	Nonscheduled Air Transportation	459	(2)	1	(1)	460	$80,882
5417	Scientific Research and Development Services	451	4	3	7	444	$82,837
6113	Colleges, Universities, and Professional Schools	1,154	608	159	767	387	$46,049

Source: EMSI, Virginia Employment Commission Quartley Census of Employment and Wages

** Note that earnings figures for Dairy Product Manufacturing were derived from multiple sources due to the difficulty of collecting agricultural data*

The most competitive industries in Region 8 are projected to change from 2016 to 2026. Depository Credit Intermediation is projected to continue to be the most competitive industry in the Region, followed by General Medical and Surgical Hospitals and Federal Government, Civilian.

Table 21: Region 8 Most Competitive Industries, 2016 - 2026

Region 8 Most Competitive Industries, 2016 - 2026							
NAICS	Industry	Job Change	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect	2016 Earnings Per Worker
5221	Depository Credit Intermediation	1,015	(272)	341	69	946	$56,056
6221	General Medical and Surgical Hospitals	1,456	(78)	859	781	675	$72,882
9011	Federal Government, Civilian	371	(552)	324	(228)	599	$106,711
6113	Colleges, Universities, and Professional Schools	1,288	321	460	781	507	$46,049
3222	Converted Paper Product Manufacturing	335	(113)	86	(27)	363	$63,970
7223	Special Food Services	512	6	159	165	347	$19,259
5417	Scientific Research and Development Services	396	3	51	54	343	$82,837
1152	Support Activities for Animal Production	341	(7)	53	46	294	$36,323
3231	Printing and Related Support Activities	(145)	(714)	297	(417)	272	$48,645
4841	General Freight Trucking	464	(142)	343	201	263	$59,152

Source: EMSI

Preliminary Cluster Identification

Industry clusters are groups of industries that are linked to common products, labor pools, technologies, supply chains and/or training needs. Identifying clusters is crucial in long term economic development planning, as benefits to one industry will generally impact other industries within the same cluster. The scale used, ranging from 0-100, is benchmarked only to industries within the Region, and *does not* take into consideration industry performance in any other geographies. Note that these industries are identified by EMSI based on a ranking of the characteristics listed below:

- **Earnings Potential** – The priority placed on ensuring that the industry provides high annual earnings per worker. Because high-paying jobs are considered a key priority for the GO Virginia Initiative, this metric is considered "Very Important" and assigned a multiplier of 4x.
- **Growth** - The priority placed on industries that have seen high job growth within the Region. This metric is considered "Important" and has been assigned a multiplier of 2x.
- **Regional Competitiveness** – The priority placed on industries whose job growth has exceeded industry job growth across the rest of the United States. This metric is considered "Important" and has been assigned a multiplier of 2x.
- **Regional Specialization** – The priority placed on the industry's concentration within the Region compared to the rest of the United States. Industries that are more concentrated within the Region are favored. Because encouraging specialized jobs is not a priority for the GO Virginia initiative, this metric is considered "Not Very Important" and has been assigned a multiplier of 1x.
- **Gross Regional Product** – The priority placed on the level of contribution an industry has on Gross Regional Product (GRP). Since the GO Virginia initiative is focused more on adding jobs without consideration of changes to GRP, this metric is considered "Not Very Important" and has been assigned a multiplier of 1x.

Region 8 Top Industry Clusters

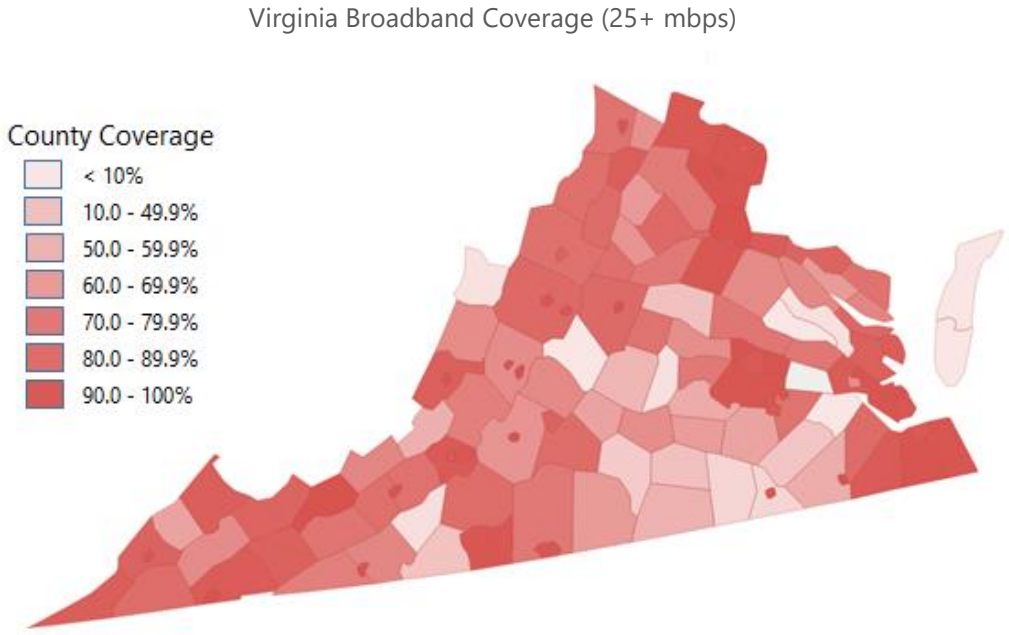
- The highest ranked cluster is **Biopharmaceuticals** with a score of 97 out of 100. Within the Biopharmaceutical cluster, the Medicinal and Botanical Manufacturing industry is responsible for 583 jobs. Average earnings for the Medicinal and Botanical Manufacturing industry are approximately $175,000.
- The **Electric Power Generation and Transmission** cluster was scored a 69 out of 100. The Electric Bulk Power Transmission and Control industry within the cluster employs 48 workers. Average earnings for this industry is $119,000.
- **Downstream Chemical Products** received a score of 66. Industries within the sector include: Paint and Coating Manufacturing; Surface Active Agent Manufacturing; and Polish and Other Sanitation Good Manufacturing employing 298, 36, and 18 workers respectively. Average earnings for these industries are $105,000.
- **Federal Government Services** scored a 64. Within the cluster, the Federal Government, Civilian, Excluding Postal Service; US Postal Services; and Federal Government, Military industries employ 2,499, 761, and 1,680 workers respectively. Federal Government, Civilian, Excluding Postal Service received a score of 91, which can be attributed to average industry earnings of $122,000.
- **Local Government Services** received a score of 64. The only industry included in this cluster is Local Government, Excluding Education and Hospitals, which employs 8,274 workers within the region and has average earnings of $59,000.

See Attachment B for a complete listing of clusters.

Broadband Availability

Adequate broadband infrastructure is a necessity for businesses to be able to compete locally, regionally and beyond. The state of Virginia has a broadband coverage of 89%. Approximately 15% of the state's population is classified as underserved, meaning they have access to less than 2 wired providers. Out of all the cities in Virginia, the Region 8 cities Winchester and Harrisonburg rank among the highest for broadband coverage with 87.2% and 90.5% coverage compared to Stafford with the highest coverage at 99.8%. Highland County ranks as one of the lowest coverages with a mere 17.7% having access to a minimum of 25 mbps.

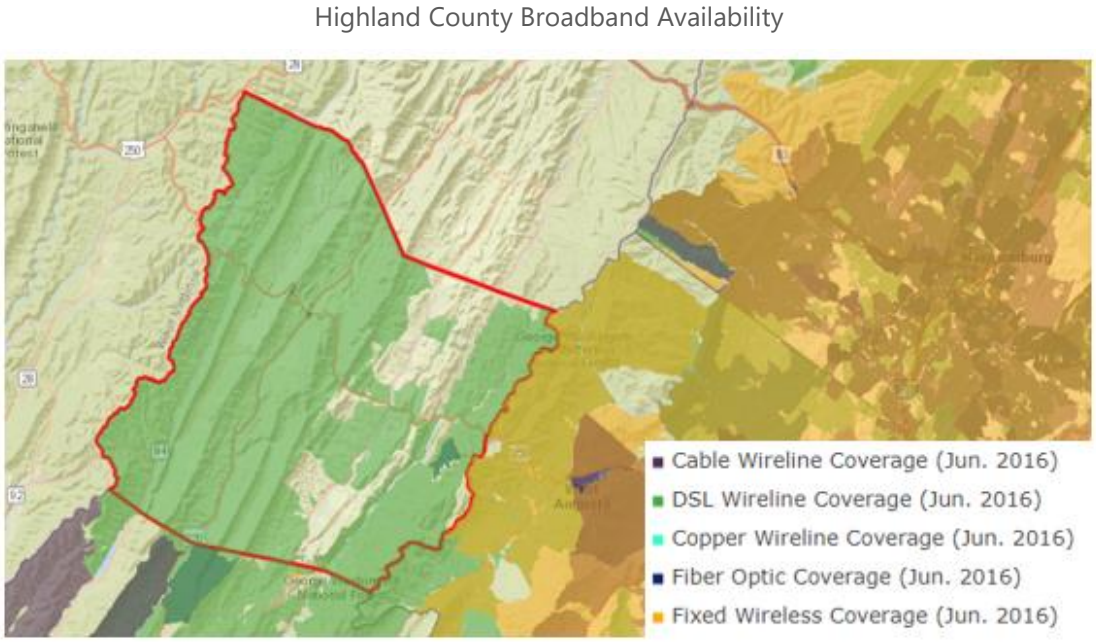
Figure 4: Virginia Broadband Coverage



Source: BroadbandNow

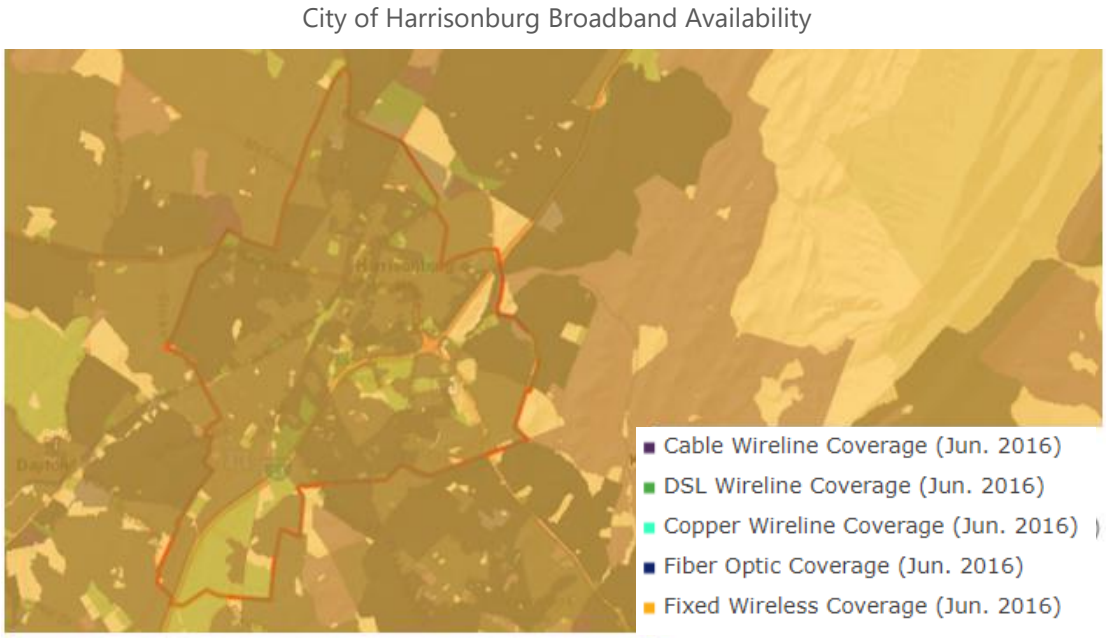
Currently, Highland County has access to only one broadband constituent, DSL. There is currently no access to cable wireline, copper wireline, fiber optic or fixed wireless. In addition to having limited broadband options, there are areas of the county that lack coverage entirely. In contrast, the City of Harrisonburg has full broadband coverage. The entire city has fixed wireless coverage, followed nearly complete DSL coverage and substantial cable wireline and fiber optic coverage. While some locations in Region 8 have stronger coverage, the speeds offered are still not adequate to be competitive. Most of the region has upload speeds less than 3 Mbps and download speeds of less than 25 mbps. The City of Staunton has the fastest upload and download speeds in the Region with upload speeds greater than 15 Mbps and download speeds greater than 50 Mbps.

Figure 5: Highland County Broadband Availability



Source: Center for Geospatial Information Technology

Figure 6: City of Harrisonburg Broadband Availability



Source: Center for Geospatial Information Technology

Attachment A: Locality Industry Trends

All industries highlighted in orange have a location quotient greater than 1.20.

Augusta County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	547	578	624	31	6%	46	8%	1.57
21	Mining, Quarrying, and Oil and Gas Extraction	47	27	38	(20)	(43%)	11	41%	0.22
22	Utilities	142	85	54	(57)	(40%)	(31)	(36%)	0.81
23	Construction	2,879	2,217	2,332	(662)	(23%)	115	5%	1.38
31	Manufacturing	6,363	5,628	5,810	(735)	(12%)	182	3%	2.38
42	Wholesale Trade	882	874	980	(8)	(1%)	106	12%	0.77
44	Retail Trade	2,093	2,216	2,490	123	6%	274	12%	0.72
48	Transportation and Warehousing	2,404	2,975	3,285	571	24%	310	10%	2.93
51	Information	90	300	417	210	233%	117	39%	0.54
52	Finance and Insurance	338	314	308	(24)	(7%)	(6)	(2%)	0.27
53	Real Estate and Rental and Leasing	267	287	358	20	7%	71	25%	0.59
54	Professional, Scientific, and Technical Services	558	630	752	72	13%	122	19%	0.33
55	Management of Companies and Enterprises	210	177	161	(33)	(16%)	(16)	(9%)	0.42
56	Administrative and Support and Waste Management and Remediation Services	1,134	1,169	1,229	35	3%	60	5%	0.63
61	Educational Services	147	201	289	54	37%	88	44%	0.27
62	Health Care and Social Assistance	3,286	4,036	4,734	750	23%	698	17%	1.08
71	Arts, Entertainment, and Recreation	178	181	192	3	2%	11	6%	0.36
72	Accommodation and Food Services	1,216	1,748	2,058	532	44%	310	18%	0.69
81	Other Services (except Public Administration)	974	1,143	1,313	169	17%	170	15%	0.80
90	Government	5,399	4,965	5,030	(434)	(8%)	65	1%	1.09
99	Unclassified Industry	0	33	58	33	Insf. Data	25	76%	0.62
Total		29,152	29,787	32,511	635	2%	2,724	9%	

Source: EMSI

Bath County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	65	26	24	(39)	(60%)	(2)	(8%)	0.81
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	114	100	108	(14)	(12%)	8	8%	10.98
23	Construction	226	153	150	(73)	(32%)	(3)	(2%)	1.11
31	Manufacturing	71	52	66	(19)	(27%)	14	27%	0.25
42	Wholesale Trade	<10	<10	14	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.09
44	Retail Trade	125	68	76	(57)	(46%)	8	12%	0.25
48	Transportation and Warehousing	32	15	14	(17)	(53%)	(1)	(7%)	0.17
51	Information	<10	40	59	Insf. Data	Insf. Data	19	48%	0.84
52	Finance and Insurance	16	13	17	(3)	(19%)	4	31%	0.13
53	Real Estate and Rental and Leasing	51	29	31	(22)	(43%)	2	7%	0.69
54	Professional, Scientific, and Technical Services	24	124	198	100	417%	74	60%	0.75
55	Management of Companies and Enterprises	<10	41	71	Insf. Data	Insf. Data	30	73%	1.14
56	Administrative and Support and Waste Management and Remediation Services	69	54	59	(15)	(22%)	5	9%	0.34
61	Educational Services	50	23	40	(27)	(54%)	17	74%	0.36
62	Health Care and Social Assistance	177	239	288	62	35%	49	21%	0.74
71	Arts, Entertainment, and Recreation	39	42	55	3	8%	13	31%	0.95
72	Accommodation and Food Services	1,129	994	1,078	(135)	(12%)	84	8%	4.53
81	Other Services (except Public Administration)	135	118	129	(17)	(13%)	11	9%	0.95
90	Government	418	404	401	(14)	(3%)	(3)	(1%)	1.02
99	Unclassified Industry	0	30	60	30	Insf. Data	30	100%	6.47
Total		2,762	2,575	2,937	(187)	(7%)	362	14%	

Source: EMSI

Buena Vista City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	<10	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.05
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	17	0	0	(17)	(100%)	0	0%	0.00
23	Construction	58	35	30	(23)	(40%)	(5)	(14%)	0.23
31	Manufacturing	756	854	1,232	98	13%	378	44%	3.86
42	Wholesale Trade	11	33	51	22	200%	18	55%	0.31
44	Retail Trade	204	183	205	(21)	(10%)	22	12%	0.63
48	Transportation and Warehousing	16	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.03
51	Information	28	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.09
52	Finance and Insurance	43	32	30	(11)	(26%)	(2)	(6%)	0.30
53	Real Estate and Rental and Leasing	24	11	15	(13)	(54%)	4	36%	0.24
54	Professional, Scientific, and Technical Services	27	30	33	3	11%	3	10%	0.17
55	Management of Companies and Enterprises	0	0	0	0	0%	0	0%	0.00
56	Administrative and Support and Waste Management and Remediation Services	246	221	327	(25)	(10%)	106	48%	1.27
61	Educational Services	412	246	253	(166)	(40%)	7	3%	3.46
62	Health Care and Social Assistance	424	432	408	8	2%	(24)	(6%)	1.24
71	Arts, Entertainment, and Recreation	<10	11	13	Insf. Data	Insf. Data	2	18%	0.23
72	Accommodation and Food Services	111	172	205	61	55%	33	19%	0.72
81	Other Services (except Public Administration)	97	91	99	(6)	(6%)	8	9%	0.68
90	Government	507	420	399	(87)	(17%)	(21)	(5%)	0.98
99	Unclassified Industry	0	<10	12	Insf. Data	Insf. Data	Insf. Data	Insf. Data	1.26
	Total	2,989	2,787	3,325	(202)	(7%)	538	19%	

Source: EMSI

Clarke County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	303	294	271	(9)	(3%)	(23)	(8%)	5.03
21	Mining, Quarrying, and Oil and Gas Extraction	25	11	<10	(14)	(56%)	Insf. Data	Insf. Data	0.57
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	654	430	387	(224)	(34%)	(43)	(10%)	1.69
31	Manufacturing	1,197	654	653	(543)	(45%)	(1)	(0%)	1.74
42	Wholesale Trade	123	159	240	36	29%	81	51%	0.88
44	Retail Trade	338	292	291	(46)	(14%)	(1)	(0%)	0.59
48	Transportation and Warehousing	52	49	65	(3)	(6%)	16	33%	0.30
51	Information	36	30	43	(6)	(17%)	13	43%	0.34
52	Finance and Insurance	122	103	103	(19)	(16%)	0	0%	0.56
53	Real Estate and Rental and Leasing	81	67	76	(14)	(17%)	9	13%	0.86
54	Professional, Scientific, and Technical Services	212	334	464	122	58%	130	39%	1.11
55	Management of Companies and Enterprises	92	67	43	(25)	(27%)	(24)	(36%)	1.01
56	Administrative and Support and Waste Management and Remediation Services	156	159	193	3	2%	34	21%	0.54
61	Educational Services	298	344	369	46	15%	25	7%	2.85
62	Health Care and Social Assistance	283	336	391	53	19%	55	16%	0.57
71	Arts, Entertainment, and Recreation	117	75	84	(42)	(36%)	9	12%	0.93
72	Accommodation and Food Services	188	212	240	24	13%	28	13%	0.53
81	Other Services (except Public Administration)	377	371	431	(6)	(2%)	60	16%	1.63
90	Government	776	718	715	(58)	(7%)	(3)	(0%)	0.99
99	Unclassified Industry	0	29	55	29	Insf. Data	26	90%	3.38
	Total	5,431	4,735	5,117	(696)	(13%)	382	8%	

Source: EMSI

Frederick County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	431	486	505	55	13%	19	4%	1.19
21	Mining, Quarrying, and Oil and Gas Extraction	141	103	96	(38)	(27%)	(7)	(7%)	0.75
22	Utilities	28	73	89	45	161%	16	22%	0.62
23	Construction	3,798	2,621	2,458	(1,177)	(31%)	(163)	(6%)	1.47
31	Manufacturing	4,872	5,290	5,977	418	9%	687	13%	2.01
42	Wholesale Trade	1,305	1,077	1,105	(228)	(17%)	28	3%	0.85
44	Retail Trade	2,152	3,676	4,585	1,524	71%	909	25%	1.07
48	Transportation and Warehousing	934	2,200	2,768	1,266	136%	568	26%	1.95
51	Information	125	325	415	200	160%	90	28%	0.53
52	Finance and Insurance	445	1,800	3,023	1,355	304%	1,223	68%	1.40
53	Real Estate and Rental and Leasing	292	271	292	(21)	(7%)	21	8%	0.50
54	Professional, Scientific, and Technical Services	806	1,150	1,406	344	43%	256	22%	0.54
55	Management of Companies and Enterprises	473	330	304	(143)	(30%)	(26)	(8%)	0.71
56	Administrative and Support and Waste Management and Remediation Services	1,290	1,717	2,239	427	33%	522	30%	0.83
61	Educational Services	156	231	330	75	48%	99	43%	0.27
62	Health Care and Social Assistance	1,089	2,103	2,817	1,014	93%	714	34%	0.51
71	Arts, Entertainment, and Recreation	337	429	537	92	27%	108	25%	0.76
72	Accommodation and Food Services	1,341	2,241	2,583	900	67%	342	15%	0.79
81	Other Services (except Public Administration)	1,164	1,355	1,556	191	16%	201	15%	0.85
90	Government	4,224	5,608	6,641	1,384	33%	1,033	18%	1.10
99	Unclassified Industry	0	39	68	39	Insf. Data	29	74%	0.64
	Total	25,404	33,123	39794	7,719	30%	6,671	20%	

Source: EMSI

Harrisonburg City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	65	803	1,227	738	1135%	424	53%	1.95
21	Mining, Quarrying, and Oil and Gas Extraction	80	35	18	(45)	(56%)	(17)	(49%)	0.26
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	1,483	1,203	1,335	(280)	(19%)	132	11%	0.67
31	Manufacturing	3,968	2,966	2,712	(1,002)	(25%)	(254)	(9%)	1.12
42	Wholesale Trade	1,441	1,280	1,381	(161)	(11%)	101	8%	1.01
44	Retail Trade	5,485	4,923	4,997	(562)	(10%)	74	2%	1.42
48	Transportation and Warehousing	565	402	338	(163)	(29%)	(64)	(16%)	0.35
51	Information	1,305	876	831	(429)	(33%)	(45)	(5%)	1.41
52	Finance and Insurance	868	917	1,009	49	6%	92	10%	0.71
53	Real Estate and Rental and Leasing	396	469	543	73	18%	74	16%	0.86
54	Professional, Scientific, and Technical Services	1,082	1,123	1,218	41	4%	95	8%	0.53
55	Management of Companies and Enterprises	99	95	92	(4)	(4%)	(3)	(3%)	0.20
56	Administrative and Support and Waste Management and Remediation Services	732	778	690	46	6%	(88)	(11%)	0.37
61	Educational Services	199	1,242	2,301	1,043	524%	1,059	85%	1.46
62	Health Care and Social Assistance	4,217	2,897	3,394	(1,320)	(31%)	497	17%	0.69
71	Arts, Entertainment, and Recreation	438	565	587	127	29%	22	4%	1.00
72	Accommodation and Food Services	3,489	4,862	5,515	1,373	39%	653	13%	1.71
81	Other Services (except Public Administration)	1,188	1,173	1,278	(15)	(1%)	105	9%	0.73
90	Government	6,483	6,651	6,655	168	3%	4	0%	1.30
99	Unclassified Industry	<10	39	69	Insf. Data	Insf. Data	30	77%	0.64
	Total	33,588	33,298	36,189	(290)	(1%)	2,891	9%	

Source: EMSI

Highland County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	84	38	20	(46)	(55%)	(18)	(47%)	4.75
21	Mining, Quarrying, and Oil and Gas Extraction	<10	0	0	Insf. Data	Insf. Data	0	0%	0.00
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	104	72	82	(32)	(31%)	10	14%	2.09
31	Manufacturing	34	37	52	3	9%	15	41%	0.73
42	Wholesale Trade	<10	12	21	Insf. Data	Insf. Data	9	75%	0.51
44	Retail Trade	53	42	46	(11)	(21%)	4	10%	0.63
48	Transportation and Warehousing	13	17	23	4	31%	6	35%	0.78
51	Information	48	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.52
52	Finance and Insurance	47	46	51	(1)	(2%)	5	11%	1.86
53	Real Estate and Rental and Leasing	<10	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.37
54	Professional, Scientific, and Technical Services	15	21	29	6	40%	8	38%	0.52
55	Management of Companies and Enterprises	0	0	0	0	0%	0	0%	0.00
56	Administrative and Support and Waste Management and Remediation Services	13	30	40	17	131%	10	33%	0.74
61	Educational Services	<10	12	20	Insf. Data	Insf. Data	8	67%	0.72
62	Health Care and Social Assistance	33	48	56	15	45%	8	17%	0.60
71	Arts, Entertainment, and Recreation	<10	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.24
72	Accommodation and Food Services	66	21	15	(45)	(68%)	(6)	(29%)	0.38
81	Other Services (except Public Administration)	66	49	46	(17)	(26%)	(3)	(6%)	1.58
90	Government	171	178	193	7	4%	15	8%	1.81
99	Unclassified Industry	0	<10	11	Insf. Data	Insf. Data	Insf. Data	Insf. Data	4.94
Total		766	642	715	(124)	(16%)	73	11%	

Source: EMSI

Lexington City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	<10	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.01
21	Mining, Quarrying, and Oil and Gas Extraction	21	0	0	(21)	(100%)	0	0%	0.00
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	169	71	73	(98)	(58%)	2	3%	0.24
31	Manufacturing	60	26	25	(34)	(57%)	(1)	(4%)	0.06
42	Wholesale Trade	91	34	26	(57)	(63%)	(8)	(24%)	0.16
44	Retail Trade	409	327	319	(82)	(20%)	(8)	(2%)	0.58
48	Transportation and Warehousing	25	63	104	38	152%	41	65%	0.34
51	Information	88	22	<10	(66)	(75%)	Insf. Data	Insf. Data	0.22
52	Finance and Insurance	126	144	162	18	14%	18	13%	0.68
53	Real Estate and Rental and Leasing	61	60	57	(1)	(2%)	(3)	(5%)	0.68
54	Professional, Scientific, and Technical Services	194	287	427	93	48%	140	49%	0.83
55	Management of Companies and Enterprises	0	0	0	0	0%	0	0%	0.00
56	Administrative and Support and Waste Management and Remediation Services	43	31	35	(12)	(28%)	4	13%	0.09
61	Educational Services	873	1,359	1,639	486	56%	280	21%	9.85
62	Health Care and Social Assistance	919	718	775	(201)	(22%)	57	8%	1.06
71	Arts, Entertainment, and Recreation	111	53	63	(58)	(52%)	10	19%	0.58
72	Accommodation and Food Services	653	742	823	89	14%	81	11%	1.61
81	Other Services (except Public Administration)	300	332	350	32	11%	18	5%	1.28
90	Government	1,072	1,140	1,033	68	6%	(107)	(9%)	1.37
99	Unclassified Industry	0	<10	10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.57
Total		5,216	5,416	5,931	200	4%	515	10%	

Source: EMSI

Page County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	76	145	191	69	91%	46	32%	1.83
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	<10	22	15	Insf. Data	Insf. Data	(7)	(32%)	0.95
23	Construction	789	444	368	(345)	(44%)	(76)	(17%)	1.29
31	Manufacturing	1,224	715	515	(509)	(42%)	(200)	(28%)	1.40
42	Wholesale Trade	60	50	81	(10)	(17%)	31	62%	0.20
44	Retail Trade	866	793	817	(73)	(8%)	24	3%	1.19
48	Transportation and Warehousing	116	140	172	24	21%	32	23%	0.64
51	Information	29	30	28	1	3%	(2)	(7%)	0.25
52	Finance and Insurance	141	150	173	9	6%	23	15%	0.60
53	Real Estate and Rental and Leasing	57	48	54	(9)	(16%)	6	13%	0.46
54	Professional, Scientific, and Technical Services	186	248	348	62	33%	100	40%	0.61
55	Management of Companies and Enterprises	38	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.01
56	Administrative and Support and Waste Management and Remediation Services	214	219	215	5	2%	(4)	(2%)	0.55
61	Educational Services	39	42	36	3	8%	(6)	(14%)	0.25
62	Health Care and Social Assistance	580	664	744	84	14%	80	12%	0.83
71	Arts, Entertainment, and Recreation	207	376	541	169	82%	165	44%	3.45
72	Accommodation and Food Services	688	637	623	(51)	(7%)	(14)	(2%)	1.17
81	Other Services (except Public Administration)	293	299	345	6	2%	46	15%	0.97
90	Government	1,330	1,391	1,469	61	5%	78	6%	1.41
99	Unclassified Industry	0	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.40
	Total	6,944	6,417	6,743	(527)	(8%)	326	5%	

Source: EMSI

Rockbridge County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	231	159	148	(72)	(31%)	(11)	(7%)	1.95
21	Mining, Quarrying, and Oil and Gas Extraction	24	46	64	22	92%	18	39%	1.69
22	Utilities	17	33	42	16	94%	9	27%	1.42
23	Construction	753	576	661	(177)	(24%)	85	15%	1.63
31	Manufacturing	1,892	971	683	(921)	(49%)	(288)	(30%)	1.86
42	Wholesale Trade	67	59	73	(8)	(12%)	14	24%	0.23
44	Retail Trade	1,145	1,175	1,307	30	3%	132	11%	1.72
48	Transportation and Warehousing	180	94	105	(86)	(48%)	11	12%	0.42
51	Information	33	39	46	6	18%	7	18%	0.32
52	Finance and Insurance	67	71	81	4	6%	10	14%	0.28
53	Real Estate and Rental and Leasing	75	49	49	(26)	(35%)	0	0%	0.45
54	Professional, Scientific, and Technical Services	113	182	239	69	61%	57	31%	0.43
55	Management of Companies and Enterprises	58	29	<10	(29)	(50%)	Insf. Data	Insf. Data	0.32
56	Administrative and Support and Waste Management and Remediation Services	156	175	193	19	12%	18	10%	0.43
61	Educational Services	30	73	110	43	143%	37	51%	0.43
62	Health Care and Social Assistance	183	504	871	321	175%	367	73%	0.61
71	Arts, Entertainment, and Recreation	340	216	169	(124)	(36%)	(47)	(22%)	1.93
72	Accommodation and Food Services	946	741	746	(205)	(22%)	5	1%	1.32
81	Other Services (except Public Administration)	290	377	458	87	30%	81	21%	1.19
90	Government	1,253	1,007	1,030	(246)	(20%)	23	2%	1.00
99	Unclassified Industry	0	<10	17	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.81
	Total	7,851	6,584	7,100	(1,267)	(16%)	516	8%	

Source: EMSI

Rockingham County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	1,020	1,385	1,545	365	36%	160	12%	3.22
21	Mining, Quarrying, and Oil and Gas Extraction	79	27	<10	(52)	(66%)	Insf. Data	Insf. Data	0.19
22	Utilities	35	32	25	(3)	(9%)	(7)	(22%)	0.26
23	Construction	4,155	2,890	2,725	(1,265)	(30%)	(165)	(6%)	1.54
31	Manufacturing	7,425	7,143	6,252	(282)	(4%)	(891)	(12%)	2.58
42	Wholesale Trade	1,030	1,118	1,255	88	9%	137	12%	0.84
44	Retail Trade	3,033	2,251	1,963	(782)	(26%)	(288)	(13%)	0.62
48	Transportation and Warehousing	1,929	3,440	4,350	1,511	78%	910	26%	2.89
51	Information	98	170	208	72	73%	38	22%	0.26
52	Finance and Insurance	323	275	294	(48)	(15%)	19	7%	0.20
53	Real Estate and Rental and Leasing	693	646	685	(47)	(7%)	39	6%	1.13
54	Professional, Scientific, and Technical Services	642	888	1,239	246	38%	351	40%	0.40
55	Management of Companies and Enterprises	138	218	232	80	58%	14	6%	0.44
56	Administrative and Support and Waste Management and Remediation Services	1,769	1,409	1,496	(360)	(20%)	87	6%	0.65
61	Educational Services	913	611	350	(302)	(33%)	(261)	(43%)	0.69
62	Health Care and Social Assistance	1,664	4,423	7,179	2,759	166%	2,756	62%	1.01
71	Arts, Entertainment, and Recreation	355	318	394	(37)	(10%)	76	24%	0.54
72	Accommodation and Food Services	2,220	2,588	2,980	368	17%	392	15%	0.87
81	Other Services (except Public Administration)	1,290	1,403	1,542	113	9%	139	10%	0.84
90	Government	3,711	3,591	3,605	(120)	(3%)	14	0%	0.67
99	Unclassified Industry	<10	30	52	Insf. Data	Insf. Data	22	73%	0.47
	Total	32,521	34,856	38,381	2,335	7%	3,525	10%	

Source: EMSI

Shenandoah County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	411	223	144	(188)	(46%)	(79)	(35%)	1.17
21	Mining, Quarrying, and Oil and Gas Extraction	0	<10	17	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.14
22	Utilities	75	69	63	(6)	(8%)	(6)	(9%)	1.26
23	Construction	1,380	1,011	976	(369)	(27%)	(35)	(3%)	1.22
31	Manufacturing	4,522	3,403	3,303	(1,119)	(25%)	(100)	(3%)	2.77
42	Wholesale Trade	341	307	382	(34)	(10%)	75	24%	0.52
44	Retail Trade	1,852	1,665	1,614	(187)	(10%)	(51)	(3%)	1.03
48	Transportation and Warehousing	452	594	758	142	31%	164	28%	1.12
51	Information	421	263	338	(158)	(38%)	75	29%	0.91
52	Finance and Insurance	346	280	251	(66)	(19%)	(29)	(10%)	0.47
53	Real Estate and Rental and Leasing	207	141	138	(66)	(32%)	(3)	(2%)	0.55
54	Professional, Scientific, and Technical Services	345	358	415	13	4%	57	16%	0.36
55	Management of Companies and Enterprises	109	190	233	81	74%	43	23%	0.87
56	Administrative and Support and Waste Management and Remediation Services	289	553	814	264	91%	261	47%	0.57
61	Educational Services	156	178	121	22	14%	(57)	(32%)	0.45
62	Health Care and Social Assistance	1,154	1,581	1,899	427	37%	318	20%	0.82
71	Arts, Entertainment, and Recreation	151	216	255	65	43%	39	18%	0.82
72	Accommodation and Food Services	1,500	1,371	1,262	(129)	(9%)	(109)	(8%)	1.04
81	Other Services (except Public Administration)	796	806	822	10	1%	16	2%	1.08
90	Government	2,173	2,240	2,332	67	3%	92	4%	0.94
99	Unclassified Industry	0	17	29	17	Insf. Data	12	71%	0.61
	Total	16,682	15,475	16,167	(1,207)	(7%)	692	4%	

Source: EMSI

Staunton City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	<10	<10	<10	Insf. Data	Insf. Data	Insf. Data	Insf. Data	0.04
21	Mining, Quarrying, and Oil and Gas Extraction	<10	35	62	Insf. Data	Insf. Data	27	77%	0.70
22	Utilities	36	60	57	24	67%	(3)	(5%)	1.37
23	Construction	540	315	317	(225)	(42%)	2	1%	0.48
31	Manufacturing	291	374	514	83	29%	140	37%	0.38
42	Wholesale Trade	316	277	255	(39)	(12%)	(22)	(8%)	0.59
44	Retail Trade	2,105	1,844	1,835	(261)	(12%)	(9)	0%	1.45
48	Transportation and Warehousing	389	166	116	(223)	(57%)	(50)	(30%)	0.40
51	Information	301	85	47	(216)	(72%)	(38)	(45%)	0.37
52	Finance and Insurance	361	317	320	(44)	(12%)	3	1%	0.67
53	Real Estate and Rental and Leasing	221	186	184	(35)	(16%)	(2)	(1%)	0.92
54	Professional, Scientific, and Technical Services	523	461	540	(62)	(12%)	79	17%	0.59
55	Management of Companies and Enterprises	239	340	348	101	42%	8	2%	1.97
56	Administrative and Support and Waste Management and Remediation Services	325	296	330	(29)	(9%)	34	11%	0.39
61	Educational Services	645	612	661	(33)	(5%)	49	8%	1.96
62	Health Care and Social Assistance	1,228	1,686	2,222	458	37%	536	32%	1.10
71	Arts, Entertainment, and Recreation	131	131	138	0	0%	7	5%	0.63
72	Accommodation and Food Services	1,625	1,203	989	(422)	(26%)	(214)	(18%)	1.15
81	Other Services (except Public Administration)	1,682	1,008	799	(674)	(40%)	(209)	(21%)	1.71
90	Government	2,725	2,841	2,691	116	4%	(150)	(5%)	1.51
99	Unclassified Industry	0	23	40	23	Insf. Data	17	74%	1.06
	Total	13,690	12,268	12,477	(1,422)	(10%)	209	2%	

Source: EMSI

Warren County									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	80	60	76	(20)	(25%)	16	27%	0.36
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	0	107	160	107	Insf. Data	53	50%	2.23
23	Construction	1,454	818	748	(636)	(44%)	(70)	(9%)	1.12
31	Manufacturing	1,039	1,065	1,178	26	3%	113	11%	0.99
42	Wholesale Trade	119	73	78	(46)	(39%)	5	7%	0.14
44	Retail Trade	1,533	1,651	1,703	118	8%	52	3%	1.17
48	Transportation and Warehousing	1,500	1,081	936	(419)	(28%)	(145)	(13%)	2.33
51	Information	104	89	106	(15)	(14%)	17	19%	0.35
52	Finance and Insurance	285	238	249	(47)	(16%)	11	5%	0.45
53	Real Estate and Rental and Leasing	171	110	116	(61)	(36%)	6	5%	0.49
54	Professional, Scientific, and Technical Services	365	403	456	38	10%	53	13%	0.46
55	Management of Companies and Enterprises	179	63	10	(116)	(65%)	(53)	(84%)	0.33
56	Administrative and Support and Waste Management and Remediation Services	668	888	1,089	220	33%	201	23%	1.05
61	Educational Services	675	769	950	94	14%	181	24%	2.22
62	Health Care and Social Assistance	1,151	1,656	2,020	505	44%	364	22%	0.97
71	Arts, Entertainment, and Recreation	278	264	235	(14)	(5%)	(29)	(11%)	1.14
72	Accommodation and Food Services	984	1,332	1,490	348	35%	158	12%	1.15
81	Other Services (except Public Administration)	1,037	810	787	(227)	(22%)	(23)	(3%)	1.24
90	Government	1,859	2,095	2,357	236	13%	262	13%	1.00
99	Unclassified Industry	0	22	38	22	Insf. Data	16	73%	0.87
	Total	13,481	13,595	14,782	114	1%	1,187	9%	

Source: EMSI

Waynesboro City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	0	0	0	0	0%	0	0%	0.00
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	1,015	525	600	(490)	(48%)	75	14%	0.94
31	Manufacturing	2,130	1,273	1,266	(857)	(40%)	(7)	(1%)	1.54
42	Wholesale Trade	269	179	252	(90)	(33%)	73	41%	0.45
44	Retail Trade	1,893	2,136	2,434	243	13%	298	14%	1.97
48	Transportation and Warehousing	201	175	162	(26)	(13%)	(13)	(7%)	0.49
51	Information	107	247	331	140	131%	84	34%	1.27
52	Finance and Insurance	254	226	228	(28)	(11%)	2	1%	0.56
53	Real Estate and Rental and Leasing	246	154	179	(92)	(37%)	25	16%	0.90
54	Professional, Scientific, and Technical Services	327	355	432	28	9%	77	22%	0.53
55	Management of Companies and Enterprises	559	465	400	(94)	(17%)	(65)	(14%)	3.18
56	Administrative and Support and Waste Management and Remediation Services	252	412	439	160	63%	27	7%	0.63
61	Educational Services	102	115	143	13	13%	28	24%	0.43
62	Health Care and Social Assistance	802	774	900	(28)	(3%)	126	16%	0.59
71	Arts, Entertainment, and Recreation	76	69	68	(7)	(9%)	(1)	(1%)	0.39
72	Accommodation and Food Services	1,146	1,467	1,675	321	28%	208	14%	1.66
81	Other Services (except Public Administration)	608	658	728	50	8%	70	11%	1.32
90	Government	1,185	1,146	1,125	(39)	(3%)	(21)	(2%)	0.72
99	Unclassified Industry	0	23	44	23	Insf. Data	21	91%	1.23
Total		11,174	10,399	11,406	(775)	(7%)	1,007	10%	

Source: EMSI

Winchester City									
NAICS	Description	2006 Jobs	2016 Jobs	2026 Jobs	2006 - 2016 Change	2006 - 2016 % Change	2016 - 2026 Change	2016 - 2026 % Change	2016 Location Quotient
11	Crop and Animal Production	12	48	59	36	300%	11	23%	0.15
21	Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0%	0	0%	0.00
22	Utilities	0	0	0	0	0%	0	0%	0.00
23	Construction	1,045	465	388	(580)	(56%)	(77)	(17%)	0.33
31	Manufacturing	4,343	1,644	926	(2,699)	(62%)	(718)	(44%)	0.79
42	Wholesale Trade	539	436	472	(103)	(19%)	36	8%	0.44
44	Retail Trade	6,179	4,375	3,878	(1,804)	(29%)	(497)	(11%)	1.61
48	Transportation and Warehousing	869	358	276	(511)	(59%)	(82)	(23%)	0.40
51	Information	399	189	203	(210)	(53%)	14	7%	0.39
52	Finance and Insurance	903	647	659	(256)	(28%)	12	2%	0.64
53	Real Estate and Rental and Leasing	654	518	582	(136)	(21%)	64	12%	1.21
54	Professional, Scientific, and Technical Services	1,324	1,252	1,697	(72)	(5%)	445	36%	0.75
55	Management of Companies and Enterprises	64	590	987	526	822%	397	67%	1.60
56	Administrative and Support and Waste Management and Remediation Services	1,643	1,041	727	(602)	(37%)	(314)	(30%)	0.64
61	Educational Services	1,304	1,140	1,070	(164)	(13%)	(70)	(6%)	1.71
62	Health Care and Social Assistance	5,893	6,583	7,128	690	12%	545	8%	2.01
71	Arts, Entertainment, and Recreation	297	248	230	(49)	(16%)	(18)	(7%)	0.56
72	Accommodation and Food Services	2,772	2,787	2,951	15	1%	164	6%	1.25
81	Other Services (except Public Administration)	1,063	978	964	(85)	(8%)	(14)	(1%)	0.78
90	Government	2,329	2,802	2,940	473	20%	138	5%	0.70
99	Unclassified Industry	0	33	60	33	Insf. Data	27	82%	0.70
Total		31,632	26,132	26,198	(5,500)	(17%)	66	0%	

Source: EMSI

Attachment B: Preliminary Industry Clusters

Biopharmaceuticals			
NAICS	Industry	Jobs	Score
325411	Medicinal and Botanical Manufacturing	583	97
Total		583	97

Source: EMSI

Electric Power Generation and Transmission			
NAICS	Industry	Jobs	Score
221121	Electric Bulk Power Transmission and Control	48	69
Total		48	69

Source: EMSI

Downstream Chemical Products			
NAICS	Industry	Jobs	Score
325510	Paint and Coating Manufacturing	298	67
325612	Polish and Other Sanitation Good Manufacturing	18	37
325613	Surface Active Agent Manufacturing	36	72
Total		352	66

Source: EMSI

Federal Government Services			
NAICS	Industry	Jobs	Score
901149	US Postal Service	761	42
901199	Federal Government, Civilian, Excluding Postal Service	2,499	91
901200	Federal Government, Military	1,680	34
Total		4,940	64

Source: EMSI

Local Government Services			
NAICS	Industry	Jobs	Score
903999	Local Government, Excluding Education and Hospitals	8,274	64
Total		8,274	64

Source: EMSI

Attachment C: Targeted Industry Employment Distribution

This information reflects updated conversations with the council regarding targeted industries.

Targeted Industry Sectors as a Percentage of Region 8 Total Jobs				
Sector	2016 Sector Jobs	2026 Sector Jobs	2016 Percentage of Total Jobs	2026 Percentage of Total Jobs
Health Care	47,354	53,371	19.9%	20.4%
IT/Communications	5,066	6,533	2.1%	2.5%
Transportation and Logistics	13,017	15,246	5.5%	5.8%
Finance and Business Services	17,912	21,190	7.5%	8.1%
Light Manufacturing	19,974	19,325	8.4%	7.4%
Other Sectors	134,764	146,147	56.6%	55.8%

Source: EMSI

Occupational Analysis

Prepared by:

Demographic and Labor Force Characteristics

Population

Frederick County is the largest locality in the region with 81,340 residents. The smallest locality in the Region is Highland County with 2,244 residents. The average population is 32,847 residents.

Figure 7: Population Demographics, 2015

2015 Total Population		
Locality	Total	% of Population
Augusta County	74,053	14%
Bath County	4,583	1%
Clarke County	14,299	3%
Frederick County	81,340	16%
Highland County	2,244	0%
Page County	23,843	5%
Rockbridge County	22,444	4%
Rockingham County	77,785	15%
Shenandoah County	42,724	8%
Warren County	38,841	7%
Buena Vista	6,666	1%
Harrisonburg	51,388	10%
Lexington	7,071	1%
Staunton	24,193	5%
Waynesboro	21,150	4%
Winchester	27,168	5%
SVWDA	**519,432**	**100%**

Source: U.S. Census Bureau, American Community Survey, 2015

Ethnicity

The largest race/ethnic group in the area is White with a population of 443,195. This is followed by Hispanic at 34,070, Blacks at 24,713, Other at 10,138, and Asian at 7,316. The region is significantly less diverse than the state: the non-white population of Region 8 is 15%, whereas the non-white population of Virginia is 37%.

Figure 8: Population by Race/Ethnicity, 2015

2015 SVWDA Population by Race and Ethnicity						
Locality	White	Black	Hispanic	Asian	Other	Total
Augusta County	67,951	2,939	1,749	430	984	74,053
Bath County	4,179	157	159	0	88	4,583
Clarke County	12,496	784	581	124	314	14,299
Frederick County	69,273	3,587	5,877	1,143	1,460	81,340
Highland County	2,233	0	0	0	11	2,244
Page County	22,569	381	426	123	344	23,843
Rockbridge County	20,927	637	337	157	386	22,444
Rockingham County	70,230	1,395	4,586	550	1,024	77,785
Shenandoah County	38,050	904	2,886	219	665	42,724
Warren County	33,831	1,530	1,509	401	1,210	38,481
Buena Vista	5,927	70	91	473	105	6,666
Harrisonburg	35,479	3,358	9,110	2,105	1,336	51,388
Lexington	5,331	761	273	486	220	7,071
Staunton	19,749	2,890	635	249	670	24,193
Waynesboro	16,526	2,496	1,421	204	503	21,150
Winchester	18,444	2,824	4,430	652	818	27,168
SVWDA	443,195	24,713	34,070	7,316	10,138	519,432
Virginia	5,237,848	1,560,316	709,156	489,610	478,873	8,256,630

Source: U.S. Census Bureau, American Community Survey, 2015

Figure 9: Population by Race and Ethnicity - Percentage

2015 SVWDA Population by Race and Ethnicity - Percentage						
Locality	White	Black	Hispanic	Asian	Other	Total
Augusta County	92%	4%	2%	1%	1%	100%
Bath County	91%	3%	3%	0%	2%	100%
Clarke County	87%	5%	4%	1%	2%	100%
Frederick County	85%	4%	7%	1%	2%	100%
Highland County	100%	0%	0%	0%	0%	100%
Page County	95%	2%	2%	1%	1%	100%
Rockbridge County	93%	3%	2%	1%	2%	100%
Rockingham County	90%	2%	6%	1%	1%	100%
Shenandoah County	89%	2%	7%	1%	2%	100%
Warren County	88%	4%	4%	1%	3%	100%
Buena Vista	89%	1%	1%	7%	2%	100%
Harrisonburg	69%	7%	18%	4%	3%	100%
Lexington	75%	11%	4%	7%	3%	100%
Staunton	82%	12%	3%	1%	3%	100%
Waynesboro	78%	12%	7%	1%	2%	100%
Winchester	68%	10%	16%	2%	3%	100%
SVWDA	85%	5%	7%	1%	2%	100%
Virginia	63%	19%	9%	6%	3%	100%

Source: U.S. Census Bureau, American Community Survey, 2015

Population by Age Cohort

SVWDA's age cohort composition is very similar to the state's. The largest age-group in the region and the state is '20-44'. Of the region's 519,432 residents, 163,689 are in the '20-44' cohort. The "oldest" county is Highland County with 34% of its population aged 65 or older. The "youngest" county is Lexington with 31% of its population under 19 years of age.

Figure 10: Population by Age Cohort, 2015

2015 SVWDA Population by Age					
Locality	0 to 19	20 to 44	45-64	65+	Total
Augusta County	16,598	21,327	22,577	13,551	74,053
Bath County	975	1,076	1,498	1,034	4,583
Clarke County	3,489	3,560	4,565	2,685	14,299
Frederick County	21,197	25,218	23,105	11,820	81,340
Highland County	348	353	780	763	2,244
Page County	5,412	6,768	7,054	4,609	23,843
Rockbridge County	4,432	5,759	6,989	5,264	22,444
Rockingham County	20,042	22,444	21,729	13,570	77,785
Shenandoah County	9,857	12,018	12,437	8,412	42,724
Warren County	9,820	11,727	11,510	5,424	38,841
Buena Vista	1,824	2,299	1,472	1,071	6,666
Harrisonburg	15,209	24,242	7,924	4,013	51,388
Lexington	2,157	3,311	781	822	7,071
Staunton	5,412	7,656	6,276	4,849	24,193
Waynesboro	5,297	6,801	5,266	3,786	21,150
Winchester	7,107	9,130	7,041	3,890	27,168
SVWDA	129,176	163,689	141,004	85,563	519,432
Virginia	2,098,628	2,840,713	2,215,628	1,101,661	8,256,630

Source: U.S. Census Bureau, American Community Survey, 2015

Table 5: Percent of Population by Age Cohort, 2015

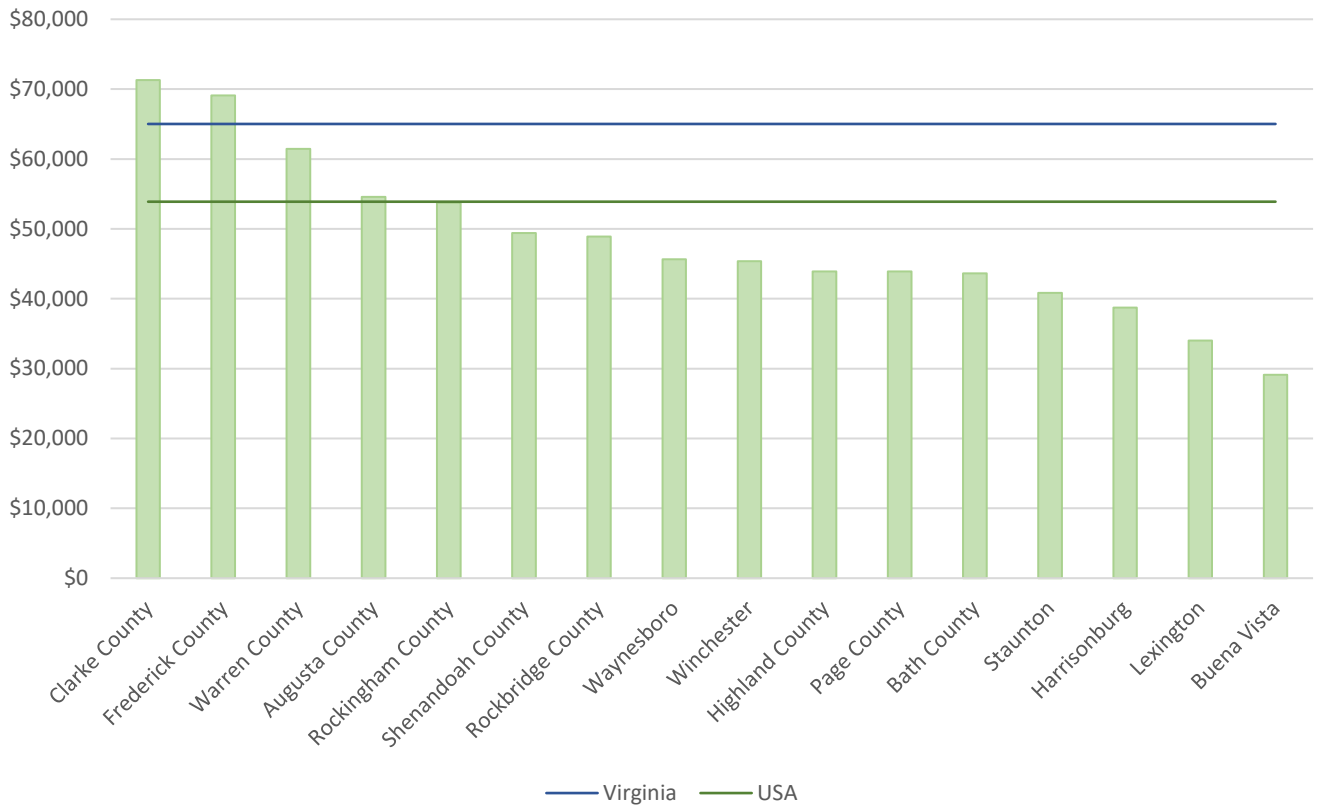
2015 SVWDA Population by Age - Percentage					
Locality	0 to 19	20 to 44	45 to 64	65+	Total
Augusta County	22%	29%	30%	18%	100%
Bath County	21%	23%	33%	23%	100%
Clarke County	24%	25%	32%	19%	100%
Frederick County	26%	31%	28%	15%	100%
Highland County	16%	16%	35%	34%	100%
Page County	23%	28%	30%	19%	100%
Rockbridge County	20%	26%	31%	23%	100%
Rockingham County	26%	29%	28%	17%	100%
Shenandoah County	23%	28%	29%	20%	100%
Warren County	26%	30%	30%	14%	100%
Buena Vista	27%	34%	22%	16%	100%
Harrisonburg	30%	47%	15%	8%	100%
Lexington	31%	47%	11%	12%	100%
Staunton	22%	32%	26%	20%	100%
Waynesboro	25%	32%	25%	18%	100%
Winchester	26%	34%	26%	14%	100%
SVWDA	25%	32%	27%	16%	100%
Virginia	25%	34%	27%	13%	100%

Source: U.S. Census Bureau, American Community Survey, 2015

Median Income

Median incomes range from a high of $71,295 in Clarke County to a low of $29,097 in Buena Vista. Only two counties (Clarke and Frederick) have a higher median income than Virginia's ($53,889) and only five counties have a higher median income than the United States' ($65,015). Eleven of the counties in the region have median incomes that are lower than both the state and national levels.

Figure 11: Median Income by County

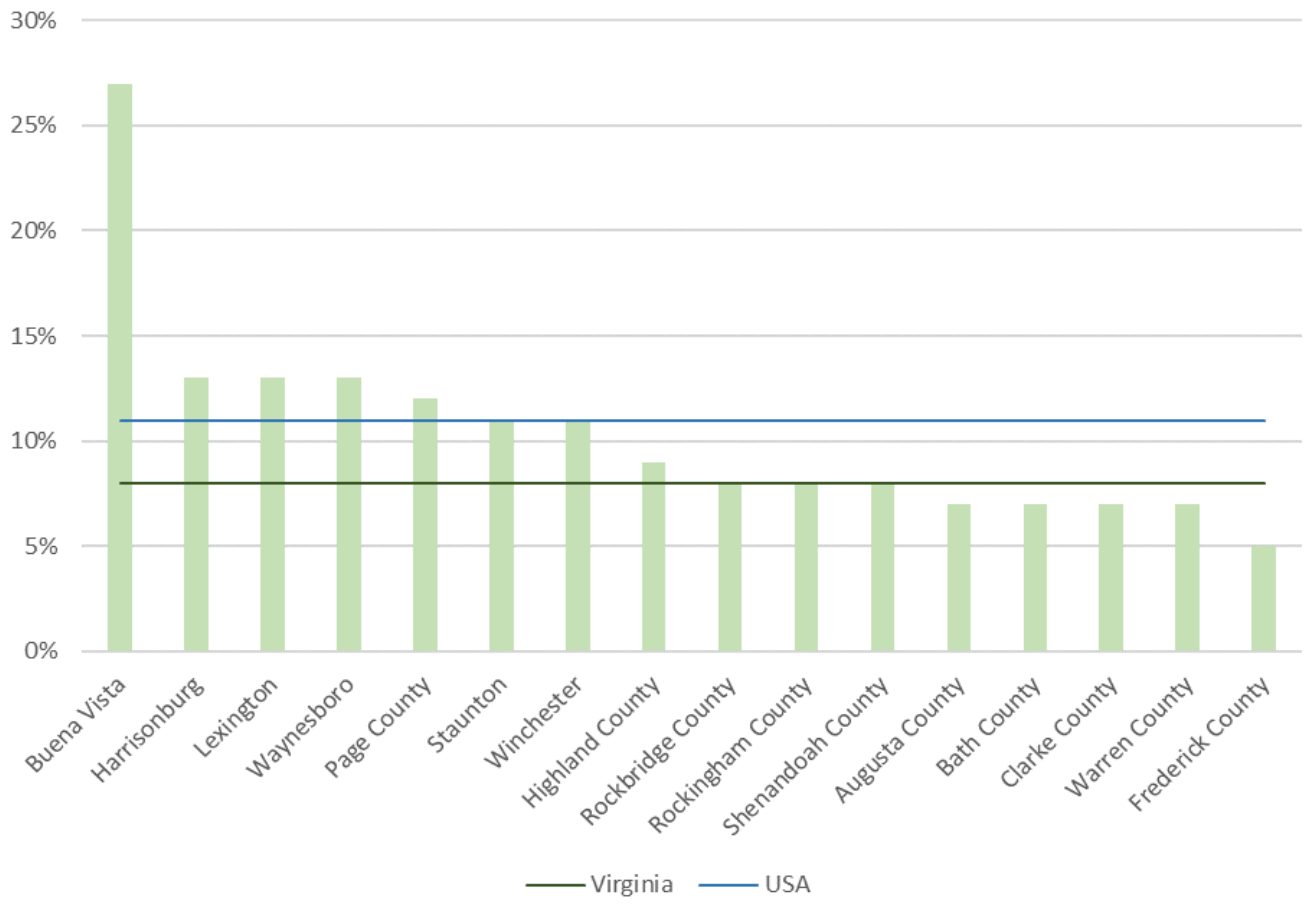


Source: U.S. Census Bureau, American Community Survey, 2015

Poverty Rate

This data shows the percentage of families in each county that live under the Federal poverty line. The Federal poverty line is set and dependent on the size of the family. Buena Vista has the highest poverty rate and exceeds the next highest by approximately 17%. Five of the counties have poverty rates that are higher than both the National and State levels (11.3% and 8.2% respectively). Two cities (Winchester and Staunton) have poverty rates that are extremely close to the United States' but are higher than Virginia's. Rockingham, Shenandoah and Rockbridge have poverty rates that are almost equal to the State's.

Figure 12: Poverty Rates by County

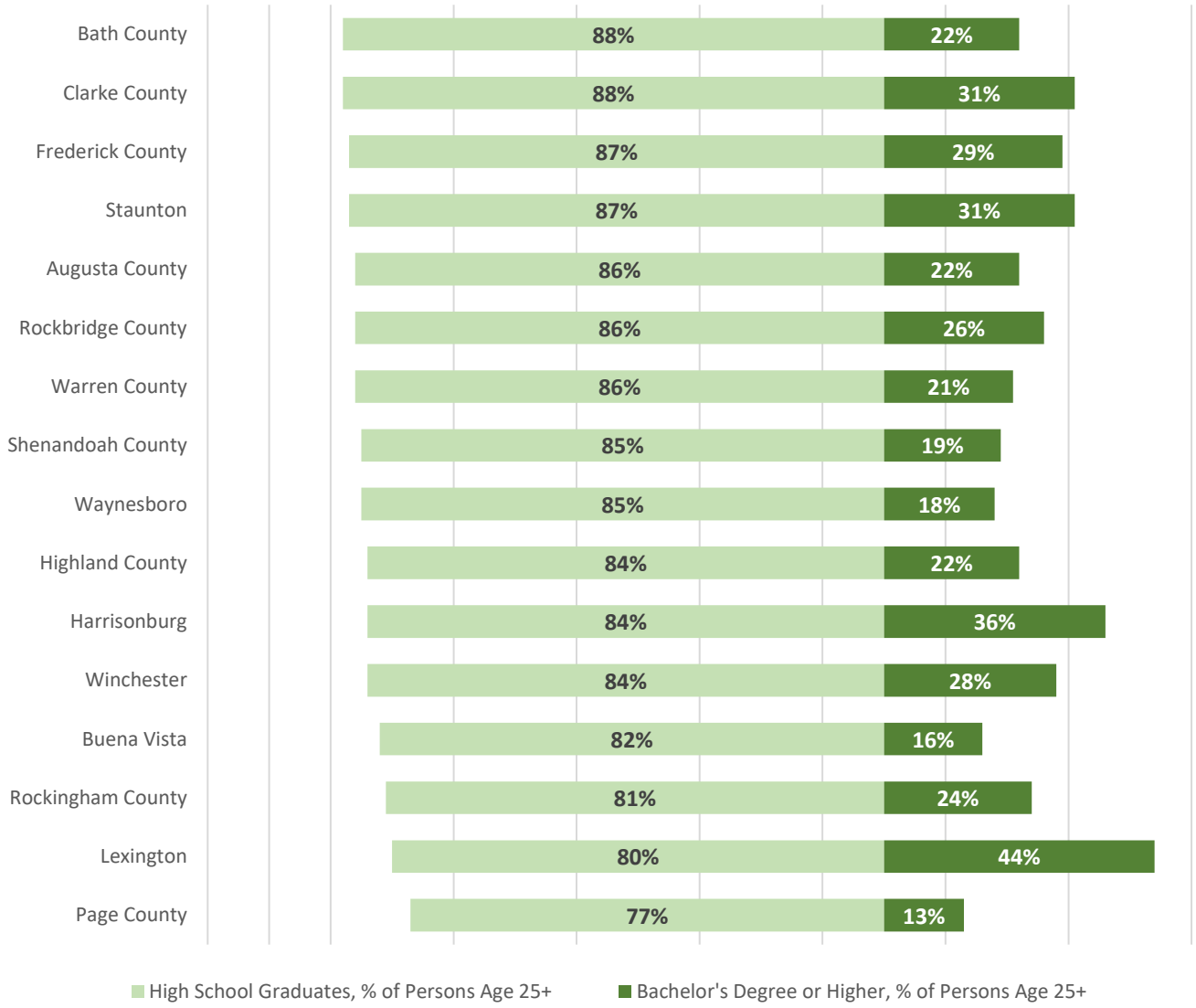


Source: U.S. Census Bureau, American Community Survey, 2015

Educational Attainment

Educational attainment provides a very strong indicator in assessing the nature of a region's workforce. The percentage of adults above the age of 25 who have completed high school ranges between 77% (Page County) to 88% (Bath County). The percentage of adults above the age of 25 who have completed a Bachelor's degree or higher ranges between 13% (Page County) to 44% (Lexington).

Figure 13: Educational Attainment

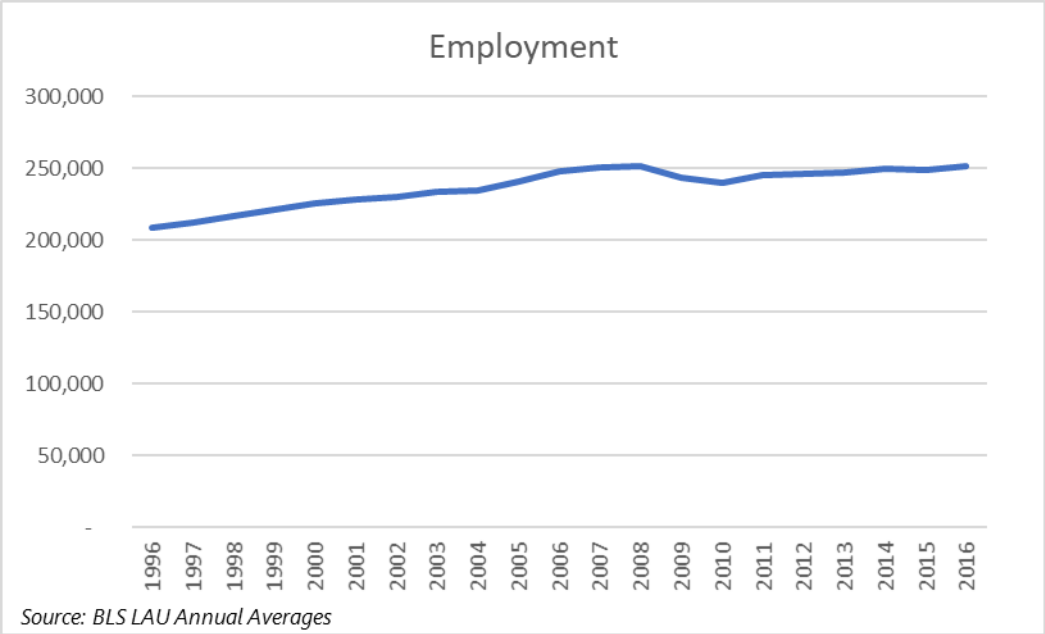


Source: U.S. Census Bureau, American Community Survey, 2015

Employment Trends, 1996-2016

Employment in Region 8 has grown steadily over the previous 20 years, rising from 208,344 in 1996 to 251,869 in 2016. There was a slight dip in employment between 2008-2010 due to the economic recession, but employment trends continued upward from 2010-2016. The region's labor force also increased from 217,382 in 1996 to 262,106 in 2016.

Figure 14: Twenty Year Regional Employment Trends

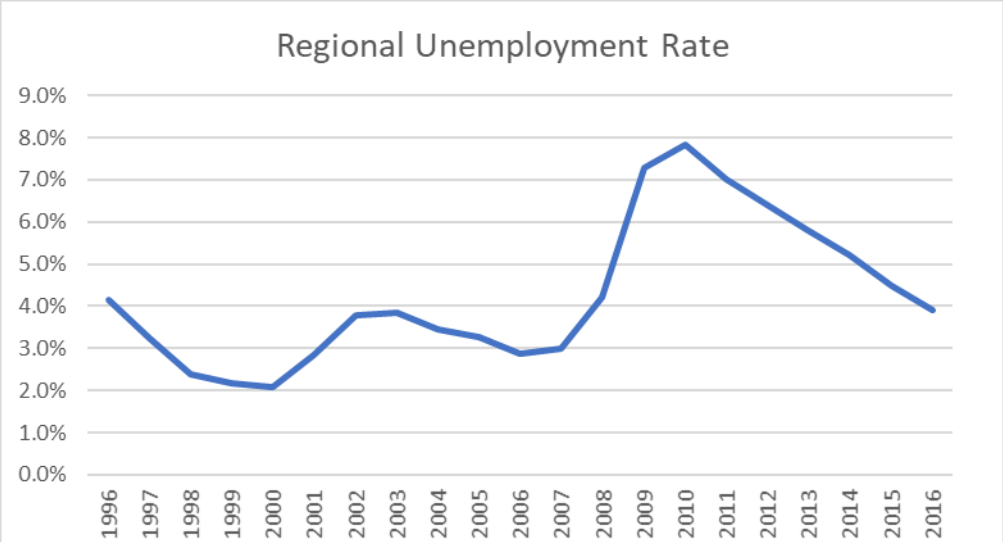


Source: BLS LAU Annual Averages

Unemployment Trends, 1996-2016

Unemployment has fluctuated during the last 20 years with peak unemployment in 2010 at 7.8% and trough unemployment at 2.1% in 2000. Unemployment is marked by the dramatic upturn during the 2009 Recession as the overall regional rate skyrocketed from approximately 3% to 7.8% in 2010.

Figure 15: Twenty Year Regional Unemployment Trends



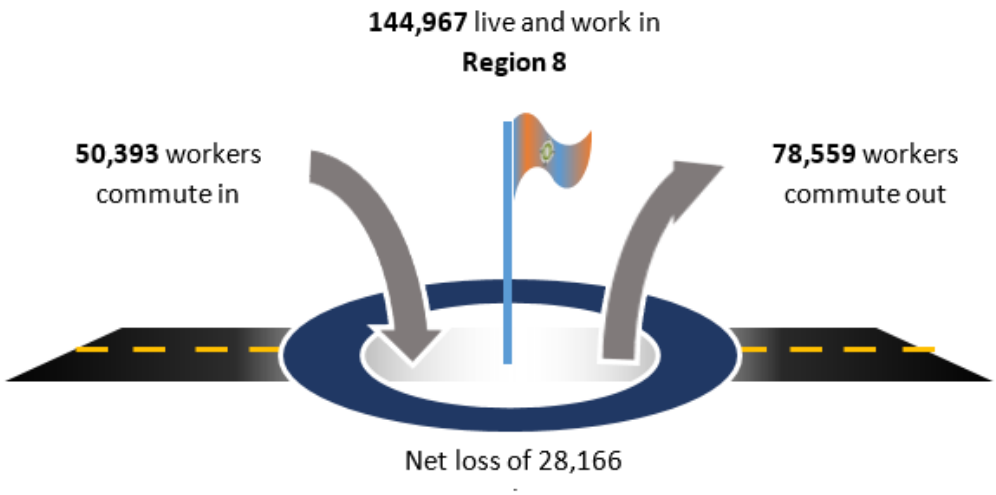
Source: BLS LAU Annual Averages

Commuting Patterns

Region 8

144,967 individuals both live and work in Region 8 while another 78,559 commute out of the Region for work. 50,393 workers come from outside to work in Region 8. The region has a net outflow of 28,166 workers. The top areas where Region 8 residents work are Harrisonburg city, VA (24,515); Rockingham County, VA (21,752); Augusta County, VA (18,137); Winchester city, VA (16,879); and Frederick County, VA (13,736).

Figure 16: Commuting Patterns for Region 8

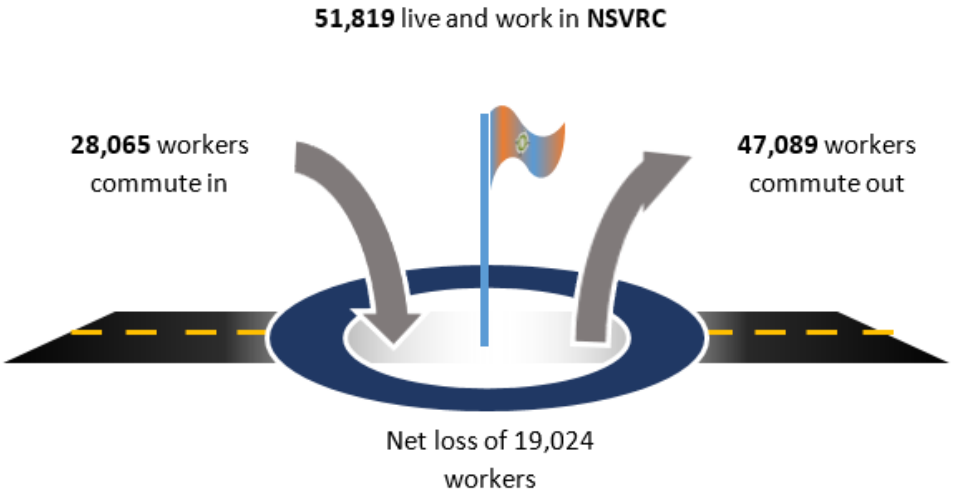


Source: US Census OnTheMap 2014

Northern Shenandoah Valley Regional Commission

The Northern Shenandoah Valley Regional Commission has 28,065 workers who commute in from outside of the region, while 47,089 workers who live in the region commute elsewhere for work. 51,819 workers both live and work in the region. This results in a net loss of 19,024 workers from the Region. The top localities where workers are employed are Winchester, VA (16,322); Frederick County, VA (13,115); Fairfax County, VA (8,784); Shenandoah County, VA (8,773); and Warren County, VA (7,892).

Figure 17: Commuting Patterns for Northern Shenandoah Valley Regional Commission

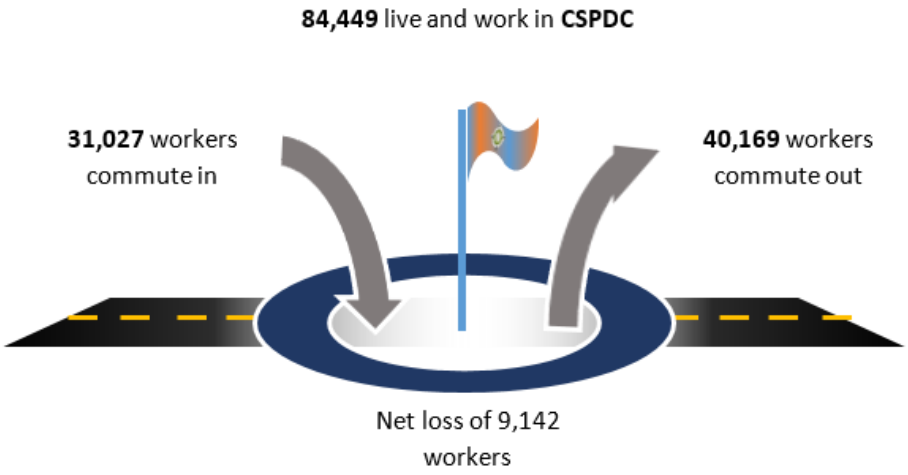


Source: US Census on the Map, 2014

Central Shenandoah Planning District Commission

The Central Shenandoah Planning District Commission has 31,027 workers who commute in to the region and 40,169 workers who commute outside of the region for work. 84,449 workers both live and work in this region which results in a net loss of 9,142 workers. The biggest destinations for the region's workers are Harrisonburg, VA (22,733); Rockingham County, VA (19,488); Augusta County, VA (17,808); Staunton City, VA (7,993); and Waynesboro, VA (6,685).

Figure 18: Commuting Patterns for Central Shenandoah Planning District Commission



Source: US Census on the Map, 2014

Occupational Analysis

Top Occupations 2-Digit SOC Codes

The largest occupation groups at the 2-Digit SOC level are: Office and Administrative Support Occupations (33,259); Sales and Related Occupations (24,716); Food Preparation and Serving Related Occupations (21,065); Production Occupations (20,608) and Transportation and Material Moving Occupations (20,560). Median Hourly Earnings range from $37.02 (Management Occupations to $9.68 (Food Preparation and Serving Related Occupations.

Figure 19: Current Occupational Mix, 2011-2016

Top Occupations 2-Digit SOC Codes					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Office and Administrative Support Occupations	33,259	1,711	1,467	0.93	$14.95
Sales and Related Occupations	24,716	360	1,276	1.03	$13.57
Food Preparation and Serving Related Occupations	21,065	1,746	1,343	1.06	$9.68
Production Occupations	20,608	(487)	1,140	1.46	$15.78
Transportation and Material Moving Occupations	20,560	1,743	1,151	1.32	$16.03
Education, Training, and Library Occupations	15,797	(324)	691	1.16	$21.68
Healthcare Practitioners and Technical Occupations	12,463	371	872	0.97	$31.71
Construction and Extraction Occupations	10,892	(140)	550	1.03	$16.52
Installation, Maintenance, and Repair Occupations	10,538	804	616	1.17	$19.01
Building and Grounds Cleaning and Maintenance Occupations	10,026	453	498	1.12	$10.94
Personal Care and Service Occupations	9,964	1,012	674	1.03	$10.26
Management Occupations	9,662	120	471	0.75	$37.02
Business and Financial Operations Occupations	8,121	760	451	0.68	$29.12
Healthcare Support Occupations	6,696	642	456	1.02	$12.86
Protective Service Occupations	4,454	79	251	0.84	$19.52
Computer and Mathematical Occupations	3,687	319	196	0.56	$32.01
Arts, Design, Entertainment, Sports, and Media Occupations	3,555	60	242	0.83	$17.41
Community and Social Service Occupations	3,547	158	214	0.92	$19.90
Farming, Fishing, and Forestry Occupations	2,258	357	206	1.24	$13.65
Architecture and Engineering Occupations	2,133	157	156	0.54	$32.02
Military occupations	1,680	70	69	0.56	$17.11
Life, Physical, and Social Science Occupations	1,305	51	96	0.68	$30.07
Legal Occupations	1,102	64	58	0.56	$33.39

Source: EMSI Q2, 2017 Dataset

Top Occupations 5-Digit SOC Codes

The top occupations in the region are: Retail Salespersons (7,684); Cashiers (7.418); Combined Food Preparation and Serving Workers, Including Fast Food (6,173); Office Clerks, General (5,597); and Heavy and Tractor-Trailer Truck Drivers (5,053). The Median Hourly Earnings for these occupations range from $18.62 (Heavy and Tractor-Trailer Truck Drivers) to $8.59 (Combined Food Preparation and Serving Workers, Including Fast Food.

Figure 20: Current Occupational Mix at 5-Digit SOC Level, 2011-2016

Top Occupations - 5-Digit SOC					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Retail Salespersons	7,684	133	388	1.07	$10.07
Cashiers	7,418	70	427	1.38	$8.86
Combined Food Preparation and Serving Workers, Including Fast Food	6,173	486	366	1.22	$8.59
Office Clerks, General	5,597	292	219	1.11	$13.21
Heavy and Tractor-Trailer Truck Drivers	5,053	457	240	1.75	$18.62
Laborers and Freight, Stock, and Material Movers, Hand	4,972	460	318	1.27	$13.17
Waiters and Waitresses	4,357	438	333	1.12	$9.25
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	4,279	191	181	1.10	$10.83
Stock Clerks and Order Fillers	4,158	224	194	1.40	$11.10
Registered Nurses	3,958	(12)	325	0.92	$25.11
Postsecondary Teachers	3,555	2	178	1.57	$28.48
Personal Care Aides	3,470	744	225	1.20	$8.82
Customer Service Representatives	3,296	388	202	0.81	$14.95
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	3,049	99	82	0.74	$15.14
Nursing Assistants	2,896	234	190	1.30	$11.78
Bookkeeping, Accounting, and Auditing Clerks	2,617	47	65	0.99	$16.79
Maids and Housekeeping Cleaners	2,603	85	139	1.14	$9.09
Maintenance and Repair Workers, General	2,579	161	116	1.17	$16.66
First-Line Supervisors of Retail Sales Workers	2,536	(10)	95	1.18	$17.26
Elementary School Teachers, Except Special Education	2,487	(123)	94	1.18	$23.75

Source: EMSI Q2 2017 Dataset

Growing Occupations 5-Digit SOC Codes, 2011-2016

In terms of growth over the last 5 years, the fastest growing occupations have been: Personal Care Aides (744); Combined Food Preparation and Serving Workers, Including Fast Food (486); Laborers and Freight, Stock, and Material Movers, Hand (460); Heavy and Tractor-Trailer Truck Drivers (457); and Waiters and Waitresses (438). The Median Hourly Earnings for these occupations range from $18.62 (Heavy and Tractor-Trailer Truck Drivers to $8.59 (Combined Food Preparation and Serving Workers, Including Fast Food).

Figure 21: Growing Occupations at 5-Digit SOC Level, 2011-2016

Top Growing Occupations 2011-2016 - 5-Digit SOC					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Personal Care Aides	3,470	744	225	1.20	$8.82
Combined Food Preparation and Serving Workers, Including Fast Food	6,173	486	366	1.22	$8.59
Laborers and Freight, Stock, and Material Movers, Hand	4,972	460	318	1.27	$13.17
Heavy and Tractor-Trailer Truck Drivers	5,053	457	240	1.75	$18.62
Waiters and Waitresses	4,357	438	333	1.12	$9.25
Customer Service Representatives	3,296	388	202	0.81	$14.95
Office Clerks, General	5,597	292	219	1.11	$13.21
Nursing Assistants	2,896	234	190	1.30	$11.78
Home Health Aides	1,305	232	93	0.89	$9.75
Stock Clerks and Order Fillers	4,158	224	194	1.40	$11.10
Farmworkers, Farm, Ranch, and Aquacultural Animals	402	211	63	3.00	$12.84
Industrial Truck and Tractor Operators	1,663	209	103	1.96	$14.90
First-Line Supervisors of Office and Administrative Support Workers	2,210	208	85	0.98	$23.05
Cooks, Restaurant	1,566	197	93	0.85	$10.35
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	4,279	191	181	1.10	$10.83
First-Line Supervisors of Food Preparation and Serving Workers	1,752	177	93	1.25	$14.51
Accountants and Auditors	1,520	163	94	0.72	$31.58
Landscaping and Groundskeeping Workers	2,308	162	133	1.19	$11.49
Maintenance and Repair Workers, General	2,579	161	116	1.17	$16.66
Industrial Machinery Mechanics	1,210	157	71	2.40	$21.78

Source: EMSI Q2 2017 Dataset

Growing Occupations 5-Digit SOC Codes, 2016-2021[6]

The occupations that are projected to grow the most throughout Region 8 over the next five years are: Personal Care Aides (560); Registered Nurses (528); Combined Food Preparation and Serving Workers, Including Fast Food (420); Heavy and Tractor-Trailer Truck Drivers (362); and Nursing Assistants (344). The demand for Healthcare occupations is expected to increase significantly with Personal Care Aides and Registered Nurses projected to grow the most but with Nursing Assistants and Home Health Aides also expected to grow significantly.

Figure 22: Projected Growing Occupations by 5-Digit SOC Codes, 2016-2021

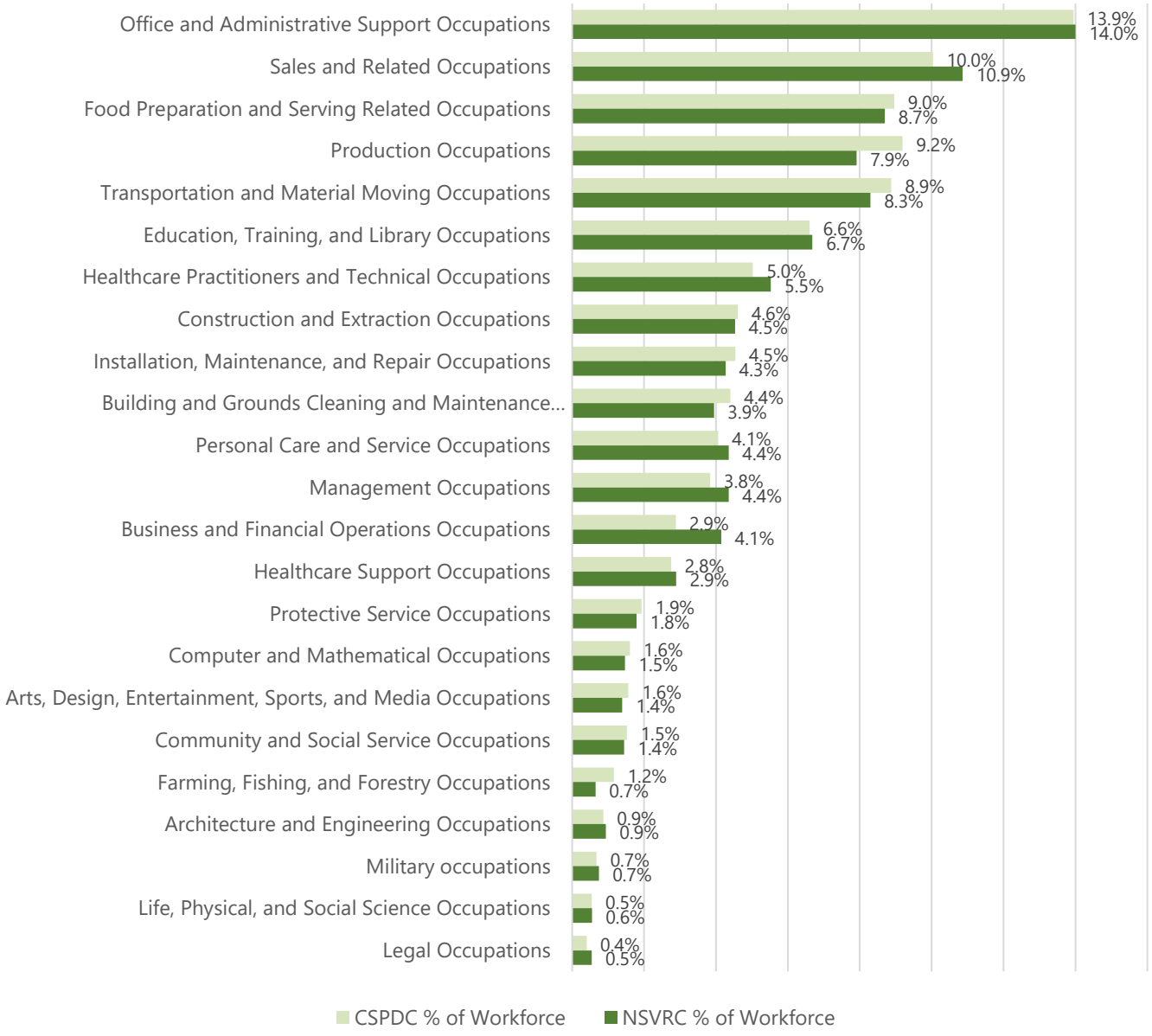
Occupations with Highest Projected Growth, 2016-2021				
Occupations	2016 Jobs	2016 - 2021 Change	Annual Openings	2016 LQ
Personal Care Aides	3,470	560	145	1.20
Registered Nurses	3,958	528	218	0.92
Combined Food Preparation and Serving Workers, Including Fast Food	6,173	420	301	1.22
Heavy and Tractor-Trailer Truck Drivers	5,053	362	177	1.75
Nursing Assistants	2,896	344	148	1.30
Laborers and Freight, Stock, and Material Movers, Hand	4,972	311	236	1.27
Customer Service Representatives	3,296	306	147	0.81
Retail Salespersons	7,684	280	353	1.07
Home Health Aides	1,305	256	84	0.89
Office Clerks, General	5,597	239	174	1.11
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	4,279	228	136	1.10
General and Operations Managers	2,210	207	101	0.66
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	3,049	206	78	0.74
Waiters and Waitresses	4,357	197	261	1.12
First-Line Supervisors of Office and Administrative Support Workers	2,210	193	74	0.98
Landscaping and Groundskeeping Workers	2,308	180	84	1.19
Postsecondary Teachers	3,555	171	119	1.57
Maintenance and Repair Workers, General	2,579	166	105	1.17
Maids and Housekeeping Cleaners	2,603	161	104	1.14
Cooks, Restaurant	1,566	155	76	0.85

Source: EMSI Q2 2017 Dataset

[6] Note that two recently announced projects, Amazon and Navy Federal are projected to bring 1,100 and 1,200 new jobs, respectively over the next four to five years. The projected employment data does not take these recent announcements into account. However, it is important that Region 8 be aware of the potential impact of new jobs that may be created within the Transportation, Trade, and Logistics and Finance and Business Services sectors.

Occupational Mix for the Northern Shenandoah Valley Regional Commission (NSVRC) and the Central Shenandoah Planning District Commission (CSPDC)

Figure 23: Occupational Mix for NSVRC vs. CSPDC



Source: EMSI Q2, 2017 Dataset

Top Occupations 2-Digit SOC Codes in CSPDC, 2011-2016

The top occupation fields were: Office and Administrative Support Occupations (19,330); Sales and Related Occupations (13,912); Production Occupations (12,736); Food Preparation and Serving Related Occupations (12,416); and Transportation and Material Moving Occupations (12,305). The Median Hourly Earnings for all occupational fields range from $33.40 (Management Occupations) to $9.84 (Food Preparation and Serving Related Occupations). The occupations that had the highest concentration were Production Occupations (1.55); Farming, Fishing, and Forestry Occupations (1.51); and Transportation and Material Moving Occupations (1.36).

Figure 24: Top Occupations in CSPDC by 2-Digit SOC, 2011 – 2016

Top Occupations - 2-Digit SOC (CSPDC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Office and Administrative Support Occupations	19,330	632	804	0.93	$14.51
Sales and Related Occupations	13,912	114	727	0.99	$13.58
Production Occupations	12,736	(457)	658	1.55	$15.32
Food Preparation and Serving Related Occupations	12,416	1,122	810	1.08	$9.84
Transportation and Material Moving Occupations	12,305	1,104	673	1.36	$16.45
Education, Training, and Library Occupations	9,148	(311)	403	1.16	$22.22
Healthcare Practitioners and Technical Occupations	6,967	359	614	0.93	$30.80
Construction and Extraction Occupations	6,386	(78)	318	1.04	$16.31
Installation, Maintenance, and Repair Occupations	6,292	470	347	1.20	$19.10
Building and Grounds Cleaning and Maintenance Occupations	6,103	286	293	1.17	$10.86
Personal Care and Service Occupations	5,633	264	357	1.00	$10.33
Management Occupations	5,327	62	252	0.71	$33.40
Business and Financial Operations Occupations	3,995	180	195	0.58	$26.52
Healthcare Support Occupations	3,817	401	287	1.00	$13.17
Protective Service Occupations	2,675	108	149	0.86	$18.37
Computer and Mathematical Occupations	2,227	98	112	0.58	$29.07
Arts, Design, Entertainment, Sports, and Media Occupations	2,168	43	152	0.87	$17.61
Community and Social Service Occupations	2,108	8	117	0.93	$19.91
Farming, Fishing, and Forestry Occupations	1,609	362	152	1.51	$13.77
Architecture and Engineering Occupations	1,198	63	86	0.52	$29.62
Military occupations	941	42	39	0.54	$17.62
Life, Physical, and Social Science Occupations	756	(25)	52	0.68	$29.81
Legal Occupations	559	(4)	28	0.49	$27.19

Source: EMSI 2017, Q2 Dataset

Top Occupations 5-Digit SOC Codes in CSPDC, 2011-2016

The top occupations in the region by total jobs are: Retail Salespersons (4,420); Cashiers (4,114); Office Clerks, General (3,603); Combined Food Preparation and Serving Workers, Including Fast Food (3,566); and Heavy and Tractor-Trailer Truck Drivers (3,168). The Median Hourly Earnings for these top occupations range from $18.60 (Heavy and Tractor-Trailer Truck Drivers) to $8.73 (Combined Food Preparation and Serving Workers, Including Fast Food). Although many of the top occupations are Sales and Food-Preparation related, occupations in the Transportation/Distribution/Logistics and Healthcare field also have a strong presence in the region.

Figure 25: Top Occupations in CSPDC by 5-Digit SOC, 2011 – 2016

Top Occupations - 5-Digit SOC (CSPDC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Retail Salespersons	4,420	32	226	1.06	$10.14
Cashiers	4,114	40	246	1.32	$9.09
Office Clerks, General	3,603	178	142	1.23	$13.03
Combined Food Preparation and Serving Workers, Including Fast Food	3,566	368	223	1.21	$8.73
Heavy and Tractor-Trailer Truck Drivers	3,168	272	139	1.88	$18.60
Postsecondary Teachers	2,771	(107)	137	2.10	$29.02
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2,757	115	110	1.22	$10.69
Laborers and Freight, Stock, and Material Movers, Hand	2,705	227	162	1.19	$14.46
Stock Clerks and Order Fillers	2,495	140	113	1.44	$11.28
Waiters and Waitresses	2,452	221	186	1.08	$9.54
Registered Nurses	2,222	93	250	0.88	$24.99
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,844	69	54	0.77	$14.79
Personal Care Aides	1,824	181	99	1.08	$8.78
Meat, Poultry, and Fish Cutters and Trimmers	1,712	(100)	60	12.14	$12.27
Nursing Assistants	1,644	214	128	1.26	$12.27
Maids and Housekeeping Cleaners	1,602	80	85	1.21	$9.17
Maintenance and Repair Workers, General	1,547	106	71	1.20	$16.96
Bookkeeping, Accounting, and Auditing Clerks	1,464	(4)	32	0.95	$16.57
First-Line Supervisors of Retail Sales Workers	1,360	(32)	52	1.08	$17.37
Customer Service Representatives	1,332	(13)	58	0.57	$13.92

Source: EMSI 2017, Q2 Dataset

Growing Occupations 5-Digit SOC Codes in CSPDC, 2011-2016

The five occupations that have experienced the largest growth over the last five years have been: Combined Food Preparation and Serving Workers, Including Fast Food (368); Heavy and Tractor-Trailer Truck Drivers (272); Laborers and Freight, Stock, and Material Movers, Hand (227); and Waiters and Waitresses (221). The Median Hourly Earnings for these top five occupations range from $18.60 (Heavy and Tractor-Trailer Truck Drivers) to $8.73 (Combined Food Preparation and Serving Workers, Including Fast Food). Aside from the top occupations, there has been significant growth in agriculture with Farmworkers, Farm, Ranch, and Aquacultural Animals adding 199 positions over the last five years and Farmworkers and Laborers, Crop, Nursery and Greenhouse adding 135. Additionally, Transportation-related occupations and Healthcare Occupations have also grown significantly.

Figure 26: Growing Occupations in CSPDC by 5-Digit SOC, 2011 – 2016

Growing Occupations - 5-Digit SOC (CSPDC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Combined Food Preparation and Serving Workers, Including Fast Food	3,566	368	223	1.21	$8.73
Heavy and Tractor-Trailer Truck Drivers	3,168	272	139	1.88	$18.60
Laborers and Freight, Stock, and Material Movers, Hand	2,705	227	162	1.19	$14.46
Waiters and Waitresses	2,452	221	186	1.08	$9.54
Nursing Assistants	1,644	214	128	1.26	$12.27
Farmworkers, Farm, Ranch, and Aquacultural Animals	312	199	53	4.01	$12.79
Personal Care Aides	1,824	181	99	1.08	$8.78
Office Clerks, General	3,603	178	142	1.23	$13.03
Stock Clerks and Order Fillers	2,495	140	113	1.44	$11.28
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	846	135	63	1.20	$12.59
First-Line Supervisors of Food Preparation and Serving Workers	1,060	124	59	1.29	$14.26
Industrial Truck and Tractor Operators	837	118	53	1.69	$14.70
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2,757	115	110	1.22	$10.69
Driver/Sales Workers	857	107	39	2.20	$11.87
Maintenance and Repair Workers, General	1,547	106	71	1.20	$16.96
Industrial Machinery Mechanics	810	105	44	2.76	$21.08
Home Health Aides	757	102	52	0.89	$9.47
Licensed Practical and Licensed Vocational Nurses	877	99	61	1.36	$19.26
Registered Nurses	2,222	93	250	0.88	$24.99
Security Guards	456	93	35	0.44	$15.35

Source: EMSI 2017, Q2 Dataset

Projected Growing Occupations 5-Digit SOC Codes in CSPDC, 2016-2021

The occupations that are projected to grow the most over the next five years are: Registered Nurses (511); Combined Food Preparation and Serving Workers (308); Nursing Assistants (269); Personal Care Aides (247); and Heavy and Tractor-Trailer Truck Drivers (231). The Median Hourly Earnings for these five occupations range from $8.73 (Combined Food Preparation and Serving Workers, Including Fast Food) to $24.99 (Registered Nurses). These projections indicate that the demand for Healthcare-related occupations will continue to increase with Registered Nurses, Nursing Assistants, Personal Care Aides, Home Health Aides, Licensed Practical and Licensed Vocational Nurses all expected to grow over the next five years. These projections also indicate that Transportation/ Logistics/Distribution related occupations will also increase in demand with Heavy and Tractor-Trailer, Truck Drivers; Laborers and Freight Stock, and Material Movers, Hands expected to grow significantly as well.

Figure 27: Projected Occupations in CSPDC by 5-Digit SOC, 2016 – 2021

Top Projected Occupations - 5-Digit SOC (CSPDC)					
Occupations	2016 Jobs	2016 - 2021 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Registered Nurses	2,222	511	164	0.88	$24.99
Combined Food Preparation and Serving Workers, Including Fast Food	3,566	308	189	1.21	$8.73
Nursing Assistants	1,644	269	96	1.26	$12.27
Personal Care Aides	1,824	247	67	1.08	$8.78
Heavy and Tractor-Trailer Truck Drivers	3,168	231	112	1.88	$18.60
Laborers and Freight, Stock, and Material Movers, Hand	2,705	169	120	1.19	$14.46
Retail Salespersons	4,420	146	195	1.06	$10.14
Home Health Aides	757	145	48	0.89	$9.47
Office Clerks, General	3,603	141	110	1.23	$13.03
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,844	132	50	0.77	$14.79
Maids and Housekeeping Cleaners	1,602	130	69	1.21	$9.17
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2,757	124	84	1.22	$10.69
Maintenance and Repair Workers, General	1,547	111	65	1.20	$16.96
General and Operations Managers	1,145	108	53	0.58	$36.69
Customer Service Representatives	1,332	107	56	0.57	$13.92
Farmworkers, Farm, Ranch, and Aquacultural Animals	312	102	30	4.01	$12.79
Waiters and Waitresses	2,452	94	146	1.08	$9.54
Landscaping and Groundskeeping Workers	1,237	91	43	1.09	$11.37
Licensed Practical and Licensed Vocational Nurses	877	89	45	1.36	$19.26
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	846	89	42	1.20	$12.59

Source: EMSI 2017, Q2 Dataset

Top Occupations 2-Digit SOC Codes in NSVRC, 2011-2016

Of all 2-Digit SOC Codes, the five largest are: Office and Administrative Support Occupations (13,929); Sales and Related Occupations (10,804); Food Preparation and Serving Related Occupations (8,649); Transportation and Material Moving Occupations (8,255); and Production Occupations (7,872). Of all the broad occupational categories, Office and Administrative Support Occupations have grown the most over the last five years with an increase of 1,079 positions in these occupation field. Construction and Extraction Occupations has declined the most with a decrease of 63 positions in this occupation field. The highest paying positions are Legal Occupations with Median Hourly Earnings of $39.96 and the lowest paying positions are Food Preparation and Serving Related Occupations with Median Hourly Earnings of $9.44.

The region has a comparatively high concentration of Production Occupations (LQ of 1.34), Transportation and Material Moving Occupations (1.27); and Education, Training, and Library Occupations (LQ of 1.17).

Figure 28: Top Occupations in NSVRC by 2-Digit SOC, 2011 – 2016

Top Occupations - 2-Digit SOC (NSVRC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Office and Administrative Support Occupations	13,929	1,079	663	0.93	$15.55
Sales and Related Occupations	10,804	246	549	1.08	$13.55
Food Preparation and Serving Related Occupations	8,649	624	533	1.04	$9.44
Transportation and Material Moving Occupations	8,255	639	478	1.27	$15.42
Production Occupations	7,872	(30)	482	1.34	$16.50
Education, Training, and Library Occupations	6,649	(12)	287	1.17	$20.91
Healthcare Practitioners and Technical Occupations	5,496	13	258	1.02	$32.86
Construction and Extraction Occupations	4,505	(63)	231	1.02	$16.83
Management Occupations	4,335	58	219	0.80	$41.43
Personal Care and Service Occupations	4,330	747	316	1.07	$10.17
Installation, Maintenance, and Repair Occupations	4,246	334	270	1.13	$18.89
Business and Financial Operations Occupations	4,125	580	256	0.83	$31.61
Building and Grounds Cleaning and Maintenance Occupations	3,924	168	205	1.05	$11.07
Healthcare Support Occupations	2,878	240	169	1.05	$12.45
Protective Service Occupations	1,779	(29)	101	0.80	$21.26
Computer and Mathematical Occupations	1,460	221	84	0.53	$36.63
Community and Social Service Occupations	1,439	150	96	0.89	$19.89
Arts, Design, Entertainment, Sports, and Media Occupations	1,387	17	90	0.78	$17.10
Architecture and Engineering Occupations	935	94	70	0.57	$35.16
Military occupations	738	27	30	0.59	$16.47
Farming, Fishing, and Forestry Occupations	649	(5)	54	0.85	$13.36
Life, Physical, and Social Science Occupations	549	75	43	0.69	$30.42
Legal Occupations	543	67	30	0.66	$39.96

Source: EMSI 2017, Q2 Dataset

Top Occupations 5-Digit SOC Codes in NSVRC, 2011-2016

The top five occupations in the NSVRC by total jobs are: Cashiers (3,305); Retail Salesperson (3,264); Combined Food Preparation and Serving Workers, Including Fast Food (2,608); Laborers and Freight, Stock, and Material Movers, Hand (2,267); and Office Clerks, General (1,994). Although the top occupations fall within the retail and food-service industry there is a significant occupational mix in the Transportation, Distribution and Logistics field as well as the Healthcare field.

Figure 29: Top Occupations in NSVRC by 5-Digit SOC, 2011 – 2016

Top Occupations - 5-Digit SOC (NSVRC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Cashiers	3,305	31	181	1.48	$8.59
Retail Salespersons	3,264	101	162	1.09	$9.97
Combined Food Preparation and Serving Workers, Including Fast Food	2,608	119	143	1.23	$8.40
Laborers and Freight, Stock, and Material Movers, Hand	2,267	233	156	1.39	$11.72
Office Clerks, General	1,994	114	78	0.95	$13.53
Customer Service Representatives	1,963	400	143	1.16	$15.64
Waiters and Waitresses	1,905	218	147	1.17	$8.86
Heavy and Tractor-Trailer Truck Drivers	1,885	185	101	1.56	$18.65
Registered Nurses	1,736	(105)	75	0.96	$25.27
Stock Clerks and Order Fillers	1,663	84	81	1.34	$10.82
Personal Care Aides	1,645	563	126	1.36	$8.88
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1,522	76	71	0.94	$11.08
Elementary School Teachers, Except Special Education	1,256	(50)	49	1.43	$25.15
Nursing Assistants	1,252	19	62	1.34	$11.14
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,205	31	29	0.70	$15.69
First-Line Supervisors of Retail Sales Workers	1,176	22	43	1.31	$17.14
Bookkeeping, Accounting, and Auditing Clerks	1,153	50	33	1.04	$17.08
Landscaping and Groundskeeping Workers	1,071	85	64	1.32	$11.62
General and Operations Managers	1,065	65	46	0.76	$48.19
First-Line Supervisors of Office and Administrative Support Workers	1,037	169	51	1.10	$24.26

Source: EMSI 2017, Q2 Dataset

Growing Occupations 5-Digit SOC Codes in NSVRC, 2011-2016

The occupations that have experienced the most growth, in terms of jobs, over the last five years have been: Personal Care Aides (563); Customer Service Representatives (400); Laborers and Freight, Stock, and Material Movers, Hand (233); Waiters and Waitresses (218); and Heavy and Tractor-Trailer Truck Drivers (185). The median hourly earnings for these five positions range from a high of $18.65 for Heavy and Tractor-Trailer Truck Drivers and a low of $8.88 for Personal Care Aides. There has been rapid growth in many business/professional services occupations including: Managers, All Other (76); Accountants and Auditors (102); Management Analysts (103) and Business Operations Specialists, All Other (104). There has also been a noted increase in low-skill Healthcare-related positions in this region with significant growth in Personal Care Aides (563) and Home Health Aides (129).

Figure 30: Growing Occupations in NSVRC by 5-Digit SOC, 2011 – 2016

Growing Occupations - 5-Digit SOC (NSVRC)					
Occupations	2016 Jobs	2011 - 2016 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Personal Care Aides	1,645	563	126	1.36	$8.88
Customer Service Representatives	1,963	400	143	1.16	$15.64
Laborers and Freight, Stock, and Material Movers, Hand	2,267	233	156	1.39	$11.72
Waiters and Waitresses	1,905	218	147	1.17	$8.86
Heavy and Tractor-Trailer Truck Drivers	1,885	185	101	1.56	$18.65
First-Line Supervisors of Office and Administrative Support Workers	1,037	169	51	1.10	$24.26
Home Health Aides	547	129	40	0.90	$10.17
Cooks, Restaurant	803	119	49	1.04	$9.41
Combined Food Preparation and Serving Workers, Including Fast Food	2,608	119	143	1.23	$8.40
Office Clerks, General	1,994	114	78	0.95	$13.53
Postsecondary Teachers	784	109	41	0.83	$26.47
Business Operations Specialists, All Other	630	104	32	1.02	$31.68
Management Analysts	515	103	33	1.01	$38.29
Accountants and Auditors	727	102	51	0.82	$32.95
Retail Salespersons	3,264	101	162	1.09	$9.97
Industrial Truck and Tractor Operators	827	92	50	2.33	$15.09
Landscaping and Groundskeeping Workers	1,071	85	64	1.32	$11.62
Stock Clerks and Order Fillers	1,663	84	81	1.34	$10.82
Managers, All Other	469	76	27	0.94	$31.36
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1,522	76	71	0.94	$11.08

Source: EMSI 2017, Q2 Dataset

Projected Growing Occupations 5-Digit SOC Codes in NSVRC, 2016-2021

The occupations that are projected to grow the most over the next five years are: Personal Care Aides (313); Customer Service Representatives (200); Laborers and Freight, Stock, and Material Movers, Hand (142); Retail Salespersons (134); and Heavy and Tractor-Trailer Truck Drivers (130). Although the top five for projected growth range between Median Hourly Earnings of $8.88 and $18.65 there are other high paying occupations that are projected to grow as well including: Management Analysts ($38.29); Accountants and Auditors ($32.95); Business Operations Specialists, All Others ($31.86); and General and Operations Managers ($48.19). The projections indicate that the NSVRC will have a demand for a wide-range of occupations ranging from high-skill/high pay to low-skill/low-pay.

Figure 31: Projected Occupations in NSVRC by 5-Digit SOC, 2016 – 2021

Projected Growing Occupations - 5-Digit SOC (NSVRC)					
Occupations	2016 Jobs	2016 - 2021 Change	Annual Openings	2016 LQ	Median Hourly Earnings
Personal Care Aides	1,645	313	77	1.36	$8.88
Customer Service Representatives	1,963	200	92	1.16	$15.64
Laborers and Freight, Stock, and Material Movers, Hand	2,267	142	116	1.39	$11.72
Retail Salespersons	3,264	134	158	1.09	$9.97
Heavy and Tractor-Trailer Truck Drivers	1,885	130	65	1.56	$18.65
Postsecondary Teachers	784	121	39	0.83	$26.47
First-Line Supervisors of Office and Administrative Support Wor	1,037	118	40	1.10	$24.26
Home Health Aides	547	112	36	0.90	$10.17
Tellers	393	111	43	1.23	$12.66
Combined Food Preparation and Serving Workers, Including Fa	2,608	111	112	1.23	$8.40
Janitors and Cleaners, Except Maids and Housekeeping Cleaner	1,522	103	53	0.94	$11.08
Waiters and Waitresses	1,905	102	115	1.17	$8.86
General and Operations Managers	1,065	99	48	0.76	$48.19
Office Clerks, General	1,994	99	64	0.95	$13.53
Landscaping and Groundskeeping Workers	1,071	89	40	1.32	$11.62
Cooks, Restaurant	803	87	40	1.04	$9.41
Business Operations Specialists, All Other	630	86	25	1.02	$31.68
Accountants and Auditors	727	78	36	0.82	$32.95
Management Analysts	515	76	23	1.01	$38.29
Secretaries and Administrative Assistants, Except Legal, Medical	1,205	74	28	0.70	$15.69

Source: EMSI 2017, Q2 Dataset

Target Industry Staffing Patterns

Finance and Business Services

When analyzing occupations[7], those that make up the largest percentage of this industry group are Customer Service Representatives (5.7%); Tellers (4.9%); Accountants and Auditors (3.7%); and Office Clerks, General (3.6%). The occupations that have grown the most over the last five years have been: Customer Service Representatives (264); First-Line Supervisors of Office and Administrative Support Workers (146); and Accountants and Auditors (138). The range for Median Hourly Earnings ranges from $11.91 (Veterinary Assistants and Laboratory Animal Caretakers) to $50.26 (Personal Financial Advisors). Most occupations in this industry field require, at a minimum, a high school diploma while the higher paying occupations generally require a Bachelor's Degree or higher.

Figure 32: Staffing Patterns for Finance and Business Services

Staffing Patterns for Finance and Business Services						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016	Median Hourly Earning	Typical Entry Education
Customer Service Representatives	1,019	264	126	5.7%	$14.95	High school diploma or equivalent
Tellers	873	26	88	4.9%	$13.25	High school diploma or equivalent
Accountants and Auditors	667	138	93	3.7%	$31.58	Bachelor's degree
Office Clerks, General	639	96	43	3.6%	$13.21	High school diploma or equivalent
First-Line Supervisors of Office and Administrative Support Workers	546	146	81	3.0%	$23.05	High school diploma or equivalent
Bookkeeping, Accounting, and Auditing Clerks	545	78	22	3.0%	$16.79	Some college, no degree
Printing Press Operators	530	(15)	(12)	3.0%	$17.12	High school diploma or equivalent
Insurance Sales Agents	466	(84)	(13)	2.6%	$21.45	High school diploma or equivalent
Management Analysts	390	96	74	2.2%	$36.79	Bachelor's degree
Lawyers	382	19	15	2.1%	$45.57	Doctoral or professional degree
Real Estate Sales Agents	358	12	29	2.0%	$18.20	High school diploma or equivalent
Maintenance and Repair Workers, General	321	65	40	1.8%	$16.66	High school diploma or equivalent
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	320	41	37	1.8%	$15.14	High school diploma or equivalent
General and Operations Managers	291	49	45	1.6%	$42.27	Bachelor's degree
Loan Officers	283	40	56	1.6%	$24.71	Bachelor's degree
Receptionists and Information Clerks	278	24	6	1.6%	$11.99	High school diploma or equivalent
Paralegals and Legal Assistants	243	14	11	1.4%	$19.24	Associate's degree
Graphic Designers	238	22	15	1.3%	$18.44	Bachelor's degree
Personal Financial Advisors	223	39	49	1.2%	$50.26	Bachelor's degree
Computer User Support Specialists	216	56	29	1.2%	$20.15	Some college, no degree
Sales Representatives, Services, All Other	211	44	41	1.2%	$21.98	High school diploma or equivalent
Veterinarians	208	31	16	1.2%	$39.70	Doctoral or professional degree
Software Developers, Applications	207	80	62	1.2%	$38.65	Bachelor's degree
Print Binding and Finishing Workers	199	(10)	(2)	1.1%	$15.83	High school diploma or equivalent
Veterinary Assistants and Laboratory Animal Caretakers	194	29	13	1.1%	$11.91	High school diploma or equivalent

Source: EMSI 2017, Q2 Dataset

[7] Staffing patterns are listed by occupations defined by Standard Occupational Classification (SOC) code. It is important to note that occupations are often employed by multiple industries. Thus, there will overlap within the top occupations employed by the target industries.

Healthcare

When analyzing occupations, those that make up the largest percentage of this industry group are Registered Nurses (7.2%); Personal Care Aides (6.1%); Nursing Assistants (5.3%); Elementary School Teachers, Except Special Education (4.2%); Postsecondary Teachers (3.9%); and Office Clerks, General (3.0%).[8] The occupations that are expected to grow the most are: Personal Care Aides (529); Registered Nurses (498); Nursing Assistants (329); Home Health Aides (250); and Licensed Practical and Licensed Vocational Nurses (120). The median hourly earnings range from $28.48 (Postsecondary Teachers) to $8.59 (Combined Food Preparation and Serving Workers, Including Fast Food). Most of the highest paying positions in this industry group require, at a minimum, a Postsecondary nondegree award or Bachelor's Degree.

Figure 33: Staffing Patterns for Healthcare

Staffing Patterns for Healthcare						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016)	Median Hourly Earnings	Typical Entry Education
Registered Nurses	3,655	466	498	7.2%	$25.11	Bachelor's degree
Personal Care Aides	3,112	1,233	529	6.1%	$8.82	No formal educational credential
Nursing Assistants	2,715	542	329	5.3%	$11.78	Postsecondary nondegree award
Elementary School Teachers, Except Special Education	2,155	(84)	37	4.2%	$23.75	Bachelor's degree
Postsecondary Teachers	1,978	(71)	20	3.9%	$28.48	Doctoral or professional degree
Office Clerks, General	1,521	25	51	3.0%	$13.21	High school diploma or equivalent
Secondary School Teachers, Except Special and Career/Technical Education	1,499	(65)	16	2.9%	$24.37	Bachelor's degree
Teacher Assistants	1,441	(41)	32	2.8%	$10.13	Some college, no degree
Home Health Aides	1,248	475	250	2.5%	$9.75	No formal educational credential
Licensed Practical and Licensed Vocational Nurses	1,245	229	120	2.4%	$19.03	Postsecondary nondegree award
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1,140	(9)	38	2.2%	$10.83	No formal educational credential
Substitute Teachers	1,139	(53)	13	2.2%	$11.46	Bachelor's degree
Middle School Teachers, Except Special and Career/Technical Education	1,004	(40)	15	2.0%	$23.72	Bachelor's degree
Receptionists and Information Clerks	967	177	106	1.9%	$11.99	High school diploma or equivalent
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	911	1	39	1.8%	$15.14	High school diploma or equivalent
Bus Drivers, School or Special Client	790	(40)	3	1.6%	$13.64	High school diploma or equivalent
Combined Food Preparation and Serving Workers, Including Fast Food	528	15	23	1.0%	$8.59	No formal educational credential
Medical Assistants	522	80	87	1.0%	$13.76	Postsecondary nondegree award

Source: EMSI 2017, Q2 Dataset

[8] The industry group created for Healthcare includes Education and Hospitals (State Government) (NAICS 9026) and Education and Hospitals (Local Government) (NAICS 9036) which account for healthcare employment in public hospitals; however, the staffing patterns for these industries also include non-healthcare occupations in public education institutions, such as Elementary School Teachers.

Hospitality and Tourism

When analyzing occupations, those that make up the largest percentage of this industry group are: Maids and Housekeeping Cleaners (13.9%); Hotel, Motel, and Resort Desk Clerks (8.8%); Waiters and Waitresses (4.9%); Fitness Trainers and Aerobics Instructors (4.2%); and Maintenance and Repair Workers, General (4.0%). The occupations that are projected to grow the most over the next five years are Maids and Housekeeping Cleaners (69); Hotel, Motel and Resort Desk Clerks (42); Fitness Trainers and Aerobics Instructors (37); Maintenance and Repair Workers, General (28); and Retail Salespersons (27). Compared to other industry groups, most of the key occupations in this group are low paying with a range of $23.05 (First-Line Supervisors of Office and Administrative Support Workers) to $8.86 (Cashiers). The majority of entry level occupations in this industry group require a High School Degree.

Figure 34: Staffing Patterns for Hospitality and Tourism

Staffing Patterns for Hospitality and Tourism						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016)	Median Hourly Earning	Typical Entry Education
Maids and Housekeeping Cleaners	1,213	26	69	13.9%	$9.09	No formal educational credential
Hotel, Motel, and Resort Desk Clerks	769	25	42	8.8%	$9.19	High school diploma or equivalent
Waiters and Waitresses	431	0	17	4.9%	$9.25	No formal educational credential
Fitness Trainers and Aerobics Instructors	368	68	37	4.2%	$17.35	High school diploma or equivalent
Maintenance and Repair Workers, General	348	15	28	4.0%	$16.66	High school diploma or equivalent
Retail Salespersons	307	25	27	3.5%	$10.07	No formal educational credential
Amusement and Recreation Attendants	258	20	27	2.9%	$8.95	No formal educational credential
Cashiers	200	11	12	2.3%	$8.86	No formal educational credential
Landscaping and Groundskeeping Workers	183	(4)	13	2.1%	$11.49	No formal educational credential
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	175	8	13	2.0%	$10.83	No formal educational credential
Cooks, Restaurant	159	2	9	1.8%	$10.35	No formal educational credential
Counter and Rental Clerks	159	18	12	1.8%	$12.61	No formal educational credential
Recreation Workers	146	22	20	1.7%	$11.01	High school diploma or equivalent
Tour Guides and Escorts	128	12	13	1.5%	$11.76	High school diploma or equivalent
Food Servers, Nonrestaurant	126	(4)	1	1.4%	$9.02	No formal educational credential
Coaches and Scouts	118	13	11	1.4%	$13.54	Bachelor's degree
First-Line Supervisors of Retail Sales Workers	116	5	6	1.3%	$17.26	High school diploma or equivalent
Bartenders	111	(2)	4	1.3%	$10.72	No formal educational credential
Office Clerks, General	110	4	8	1.3%	$13.21	High school diploma or equivalent
Nonfarm Animal Caretakers	108	4	8	1.2%	$9.32	High school diploma or equivalent
First-Line Supervisors of Office and Administrative Support Workers	101	2	7	1.1%	$23.05	High school diploma or equivalent
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	101	11	8	1.1%	$9.24	No formal educational credential
First-Line Supervisors of Housekeeping and Janitorial Workers	100	2	6	1.1%	$15.23	High school diploma or equivalent
First-Line Supervisors of Food Preparation and Serving Workers	99	2	5	1.1%	$14.51	High school diploma or equivalent
Customer Service Representatives	93	8	8	1.1%	$14.95	High school diploma or equivalent

Source: EMSI 2017, Q2 Dataset

Information Technology and Communications

When analyzing occupations, those that make up the largest percentage of this industry group are: Management Analysts (7.0%); Computer User Support Specialists (6.0%); Customer Service Representatives (4.7%); Software Developers, Applications (4.0%); Software Developers, Systems Software (3.3%). The occupations that are projected to grow the most over the next five years are Management Analysts (66); Software Developers, Applications (61); Computer User Support Specialists (43); Software Developers, System Software (31); and Market Research Analysts and Marketing Specialists (27). The median hourly earnings range from $42.87 (Software Developers, Systems Software) to $13.21 (Office Clerks, General). The entry-level education requirements vary from occupation to occupation but those that pay the highest require, at a minimum, a Bachelor's Degree.

Figure 35: Staffing Patterns for Information Technology and Communications

Staffing Patterns for Information Technology and Communications						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016)	Median Hourly Earnings	Typical Entry Education
Management Analysts	328	78	66	7.0%	$36.79	Bachelor's degree
Computer User Support Specialists	282	8	43	6.0%	$20.15	Some college, no degree
Customer Service Representatives	222	3	26	4.7%	$14.95	High school diploma or equivalent
Software Developers, Applications	189	36	61	4.0%	$38.65	Bachelor's degree
Software Developers, Systems Software	157	14	31	3.3%	$42.87	Bachelor's degree
Sales Representatives, Services, All Other	148	8	24	3.1%	$21.98	High school diploma or equivalent
Office Clerks, General	122	23	21	2.6%	$13.21	High school diploma or equivalent
Electrical and Electronic Equipment Assemblers	110	(29)	(8)	2.3%	$14.30	High school diploma or equivalent
Market Research Analysts and Marketing Specialists	106	17	27	2.3%	$21.15	Bachelor's degree
General and Operations Managers	95	10	24	2.0%	$42.27	Bachelor's degree
Computer Systems Analysts	90	7	27	1.9%	$37.21	Bachelor's degree
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific	85	(5)	12	1.8%	$23.40	High school diploma or equivalent
Bookkeeping, Accounting, and Auditing Clerks	70	6	7	1.5%	$16.79	Some college, no degree
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	69	15	16	1.5%	$15.14	High school diploma or equivalent
Computer Programmers	69	0	10	1.5%	$34.57	Bachelor's degree
Network and Computer Systems Administrators	68	4	13	1.5%	$34.18	Bachelor's degree
Accountants and Auditors	64	6	13	1.4%	$31.58	Bachelor's degree
Business Operations Specialists, All Other	61	14	17	1.3%	$30.16	Bachelor's degree
Managers, All Other	60	18	13	1.3%	$27.57	Bachelor's degree
Computer Network Support Specialists	58	2	6	1.2%	$27.82	Associate's degree
Telecommunications Line Installers and Repairers	56	(16)	(11)	1.2%	$27.03	High school diploma or equivalent
Inspectors, Testers, Sorters, Samplers, and Weighers	56	(5)	2	1.2%	$16.16	High school diploma or equivalent
First-Line Supervisors of Office and Administrative Support Workers	55	5	8	1.2%	$23.05	High school diploma or equivalent
Web Developers	53	13	13	1.1%	$25.57	Associate's degree
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Produ	51	(2)	13	1.1%	$41.00	Bachelor's degree

Source: EMSI 2017, Q2 Dataset

Light Manufacturing

When analyzing occupations, those that make up the largest percentage of this industry group are: Team Assemblers (4.0%); First-Line Supervisors of Production and Operating Workers (3.3%); Printing Press Operators (3.0%); Laborers and Freight, Stock, and Material Movers, Hand (2.9%); Inspectors, Testers, Sorters, Samplers, and Weighers (2.9%). The occupations that are projected to grow the most over the next five years are Team Assemblers (28); Industrial Machinery Mechanics (21); Woodworking, Machine Setters, Operators, and Tenders, Except Sawing (18); Welders, Cutters, Solderers and Brazers (16); and Machinists (11). The median hourly earnings for these jobs range from $42.27 (General and Operations Managers) to $9.86 (Sewing Machine Operators). Most of the occupations in this group require a High School diploma or equivalent.

Figure 36: Staffing Patterns for Light Manufacturing

Staffing Patterns for Light Manufacturing						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016)	Median Hourly Earning	Typical Entry Education
Team Assemblers	808	(91)	28	4.0%	$14.07	High school diploma or equivalent
First-Line Supervisors of Production and Operating Workers	662	(43)	0	3.3%	$26.48	High school diploma or equivalent
Printing Press Operators	589	(16)	(6)	3.0%	$17.12	High school diploma or equivalent
Laborers and Freight, Stock, and Material Movers, Hand	585	1	7	2.9%	$13.17	No formal educational credential
Inspectors, Testers, Sorters, Samplers, and Weighers	585	(40)	(32)	2.9%	$16.16	High school diploma or equivalent
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	562	5	4	2.8%	$23.40	High school diploma or equivalent
Packaging and Filling Machine Operators and Tenders	495	36	(6)	2.5%	$13.71	High school diploma or equivalent
Industrial Machinery Mechanics	464	56	21	2.3%	$21.78	High school diploma or equivalent
Heavy and Tractor-Trailer Truck Drivers	435	44	(5)	2.2%	$18.62	Postsecondary nondegree award
Customer Service Representatives	394	(6)	(3)	2.0%	$14.95	High school diploma or equivalent
Office Clerks, General	375	(16)	(15)	1.9%	$13.21	High school diploma or equivalent
Cabinetmakers and Bench Carpenters	353	(20)	(44)	1.8%	$15.26	High school diploma or equivalent
Packers and Packagers, Hand	348	(10)	(6)	1.7%	$13.79	No formal educational credential
General and Operations Managers	340	(23)	3	1.7%	$42.27	Bachelor's degree
Shipping, Receiving, and Traffic Clerks	337	(19)	(11)	1.7%	$14.44	High school diploma or equivalent
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	335	31	18	1.7%	$12.67	High school diploma or equivalent
Industrial Truck and Tractor Operators	333	13	4	1.7%	$14.90	No formal educational credential
Maintenance and Repair Workers, General	321	1	0	1.6%	$16.66	High school diploma or equivalent
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	306	(47)	(23)	1.5%	$17.67	High school diploma or equivalent
Sawing Machine Setters, Operators, and Tenders, Wood	289	38	8	1.4%	$12.33	High school diploma or equivalent
Sewing Machine Operators	287	(102)	(63)	1.4%	$9.86	No formal educational credential
Helpers--Production Workers	276	(33)	8	1.4%	$10.98	No formal educational credential
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	271	(44)	(35)	1.4%	$16.34	High school diploma or equivalent
Welders, Cutters, Solderers, and Brazers	267	(25)	16	1.3%	$20.24	High school diploma or equivalent
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	266	(30)	(39)	1.3%	$20.64	High school diploma or equivalent
Machine Feeders and Offbearers	259	4	(5)	1.3%	$16.99	No formal educational credential
Bookkeeping, Accounting, and Auditing Clerks	220	(19)	(15)	1.1%	$16.79	Some college, no degree
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	218	(9)	(28)	1.1%	$17.93	High school diploma or equivalent
Machinists	214	(41)	11	1.1%	$20.42	High school diploma or equivalent

Source: EMSI 2017, Q2 Dataset

Transportation/Distribution/Logistics

When analyzing occupations, those that make up the largest percentage of this industry group are: Heavy and Tractor Trailer Truck Drivers (26.1%); Laborers and Freight, Stock, and Material Movers, Hand (14.8%); Industrial Truck and Tractor Operators (5.7%); Stock Clerks and Order Fillers (4.0%); Light Truck or Delivery Services Drivers (3.8%). The occupations that are projected to grow the most are: Heavy and Tractor-Trailer Truck Drivers (301); Laborers and Freight, Stock, and Material Movers, Hand (192); Management Analysts (59); Industrial Truck and Tractor Operators (54); and Light Truck or Delivery Services Drivers (54). The median hourly earnings range from $42.27 (General and Operations Managers) to $11.10 (Stock Clerks and Order fillers). Most occupations require no formal education or a high school degree while the higher paying occupations generally require a Bachelor's Degree or higher.

Figure 37: Staffing Patterns for Transportation/Distribution/Logistics

Staffing Patterns for Transportation/Distribution/Logistics						
Occupations	2016 Jobs	2011-2016 Change	2016-2021 Change	% of Total Jobs in Industry Group (2016)	Median Hourly Earning	Typical Entry Education
Heavy and Tractor-Trailer Truck Drivers	3,392	310	301	26.1%	$18.62	Postsecondary nondegree award
Laborers and Freight, Stock, and Material Movers, Hand	1,931	402	192	14.8%	$13.17	No formal educational credential
Industrial Truck and Tractor Operators	743	162	54	5.7%	$14.90	No formal educational credential
Stock Clerks and Order Fillers	520	151	37	4.0%	$11.10	No formal educational credential
Light Truck or Delivery Services Drivers	496	84	54	3.8%	$13.05	High school diploma or equivalent
Management Analysts	295	74	59	2.3%	$36.79	Bachelor's degree
Packers and Packagers, Hand	286	35	26	2.2%	$13.79	No formal educational credential
Office Clerks, General	264	55	31	2.0%	$13.21	High school diploma or equivalent
Shipping, Receiving, and Traffic Clerks	236	62	22	1.8%	$14.44	High school diploma or equivalent
Customer Service Representatives	220	59	38	1.7%	$14.95	High school diploma or equivalent
Bus and Truck Mechanics and Diesel Engine Specialists	210	33	19	1.6%	$18.67	High school diploma or equivalent
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	207	32	19	1.6%	$26.24	High school diploma or equivalent
First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	173	32	14	1.3%	$24.49	High school diploma or equivalent
Dispatchers, Except Police, Fire, and Ambulance	164	22	21	1.3%	$17.39	High school diploma or equivalent
Machine Feeders and Offbearers	163	42	15	1.3%	$16.99	No formal educational credential
General and Operations Managers	146	27	25	1.1%	$42.27	Bachelor's degree

Source: EMSI 2017, Q2 Dataset

Business Workforce Survey Analysis

Prepared by:

Business Workforce Survey Analysis

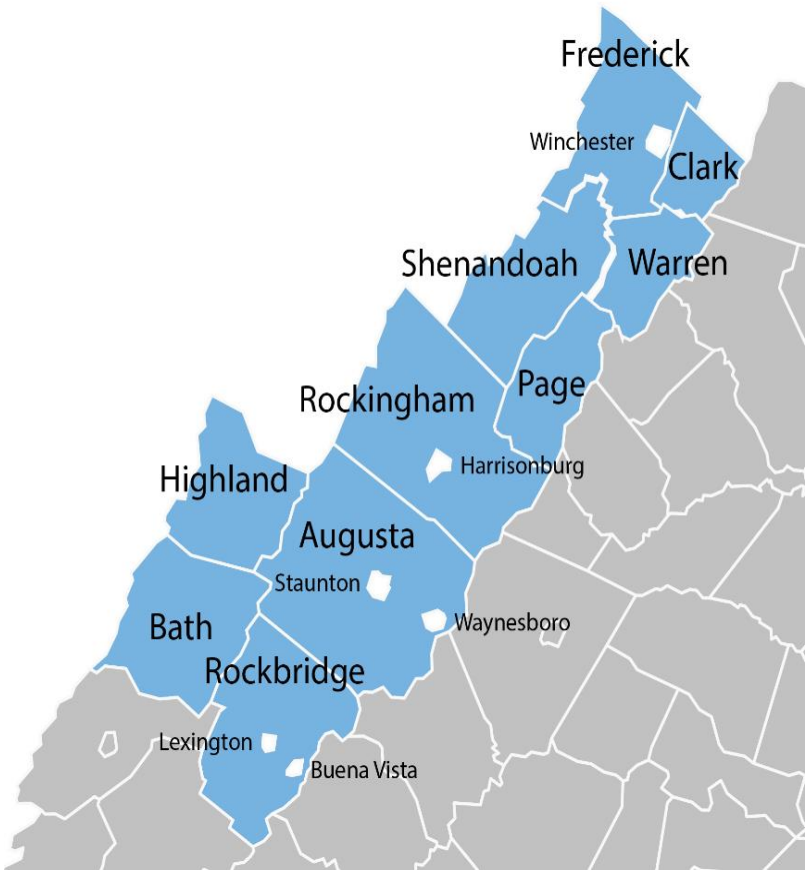
A survey was developed in partnership with the GO Virginia Region 8 Council to determine the workforce needs of businesses in the sixteen-locality region of Augusta, Bath, Clarke, Frederick, Highland, Page, Rockbridge, Rockingham, Shenandoah, and Warren Counties, and the Cities of Buena Vista, Harrisonburg, Lexington, Staunton, Waynesboro, and Winchester. The online survey was distributed via email, and was open from June 12, 2017 through July 11, 2017. The survey included questions about employment numbers and projections, skills needs and gaps, education and training needs, training challenges, and desired industry recognized credentials.

At the survey's close there was a total of 156 responses by various companies that were analyzed as part of this study. The companies represented by survey respondents are located in the following localities. For those who selected "Other", 6 (six) operate in other select counties, two (2) operate statewide, one (1) operates in North America, and one (1) is headquartered in the City of Harrisonburg and operates nationwide.

Table 22: Responses by County

Responses by County		
Counties	Responses	
Augusta County	53	33.97%
Rockingham County	53	33.97%
Shenandoah County	39	25.00%
City of Harrisonburg	38	24.36%
Frederick County	36	23.08%
City of Winchester	35	22.44%
Rockbridge County	25	16.03%
City of Staunton	25	16.03%
City of Waynesboro	25	16.03%
Clarke County	24	15.38%
Page County	23	14.74%
Warren County	21	13.46%
City of Lexington	17	10.90%
Highland County	14	8.97%
Bath County	12	7.69%
City of Buena Vista	11	7.05%
Other	10	6.41%

REGION 8 LOCALITIES



The survey respondents included companies within seventeen (17) listed industries in addition to the ability to identify as "Other". The respondents indicated they conduct business in the following industries:

Table 23: Respondents by Industry

Respondents by Industry	
Industry	Responses
Manufacturing	35
Finance and Insurance	16
Other	13
Professional, Scientific, and Technical Services	12
Educational Services	11
Health Care and Social Assistance	10
Construction	10
Transportation and Warehousing	8
Accommodation and Hospitality	8
Wholesale or Retail Trade	6
Government	6
Public Administration	5
Real Estate and Rental and Leasing	4
Agriculture, Forestry, Fishing, and Hunting	3
Information Technology	3
Arts Entertainment and Recreation	2
Mining, Quarrying, and Oil and Gas Extraction	2
Utilities	1
Administrative and Support and Waste Management	0

Of the 156 respondents, thirteen (13) respondents identified as "Other". These industries include Telecommunications, Broadcasting (2), Not-for-profit Services, Chamber of Commerce (2), Auto Dealership, Veterinary, Service Industry, Media, Business Association, Recruiting/Staffing, and Workforce Development.

Respondents self-identified the subsector in which their companies operate. The table below shows the break-down of responses by industry.

Table 24: Industry Subsectors

Industry Subsectors	
Industry	Subsector
Manufacturing	
Custom Metal Fabrication/ Aluminum	11
Electronics	1
Manufacturing	7
Food/Food Manufacturing/Agricultural Products	4
Industrial Refrigeration	1
Medical Devices	1
Concrete	2
Printing	2
Woodwork and Furniture	4
Finance and Insurance	
Banking	8
Customer Service	1
Financial Institution	1
Lending/Mortgages	2
Property & Casualty Insurance	3
Sales	1
Professional, Scientific, and Technical Services	
Accounting	1
Architect	1
Consulting	3
Development	1
Engineering and Surveying	1
Legal	3
Technology Commercialization	1
Video Production	1
Construction	
Commercial and Industrial	2

Construction Materials	3
Electrical Contractor	1
Mechanical	1
Metal Fabrication	1
Sign Design, Manufacturing, and Installation	1
Swimming Pools	1
Health Care and Social Assistance	
Behavioral health	1
Area Agency on Aging	2
Behavioral and Developmental Disability Services	1
Diagnostic Radiology	1
Disabilities	1
Mental Health, Substance Abuse and Developmental Disorders	1
Non-Profit/Service	2
Educational Services	
Community College/Higher Education	7
Electronics/Computer Aided Drafting	1
Library/Public	1
Accommodation and Hospitality	
Hotels	3
Restaurant	3
Sales and Catering	1
Tourism Promotion	1
Wholesale or Retail Trade	
Independent Bookstore	1
Warehousing/distribution	2
Health Food/Grocery	1
Agriculture/Horticulture	2
Transportation and Warehousing	
Aviation	1
Food Service	1

Third Party Logistics	2
Transportation Services	2
Government	
Economic Development	1
General Assembly	1
Healthcare/Mental Health Services	1
Legislature	1
Local Elected Official	1
Vocational Training	1
Public Administration	
Local Government Economic Development Organization (EDO)	1
Non-Profit/Community Advocate	2
Workforce Services	1
Real Estate and Rental and Leasing	
Brokerage and Development	1
Common Interest Community Management	1
Luxury Apartments	1
Agriculture, Forestry, Fishing, and Hunting	
Manufacturing	1
Poultry	1
Veterinary Technician	1
Arts Entertainment and Recreation	
Art Gallery and Commercial Photography	1
Photography and Videography	1
Information Technology	
IT consulting	2
Mining, Quarrying, and Oil and Gas Extraction	
Paper, Water Sanitation and Steel	1
Quarry	1
Utilities	
Electricity Distribution	1

Other (please specify)	
All Business Representation	1
Car Washes/Laundromats; Commercial/Residential Rentals; Private Investigation	1
Consulting and Education	1
Local Workforce Development Board	1
Small Animal Clinic	1
Staffing and Executive Placement	1
Television	4
Transportation / Retail	1

Existing Businesses in Region 8

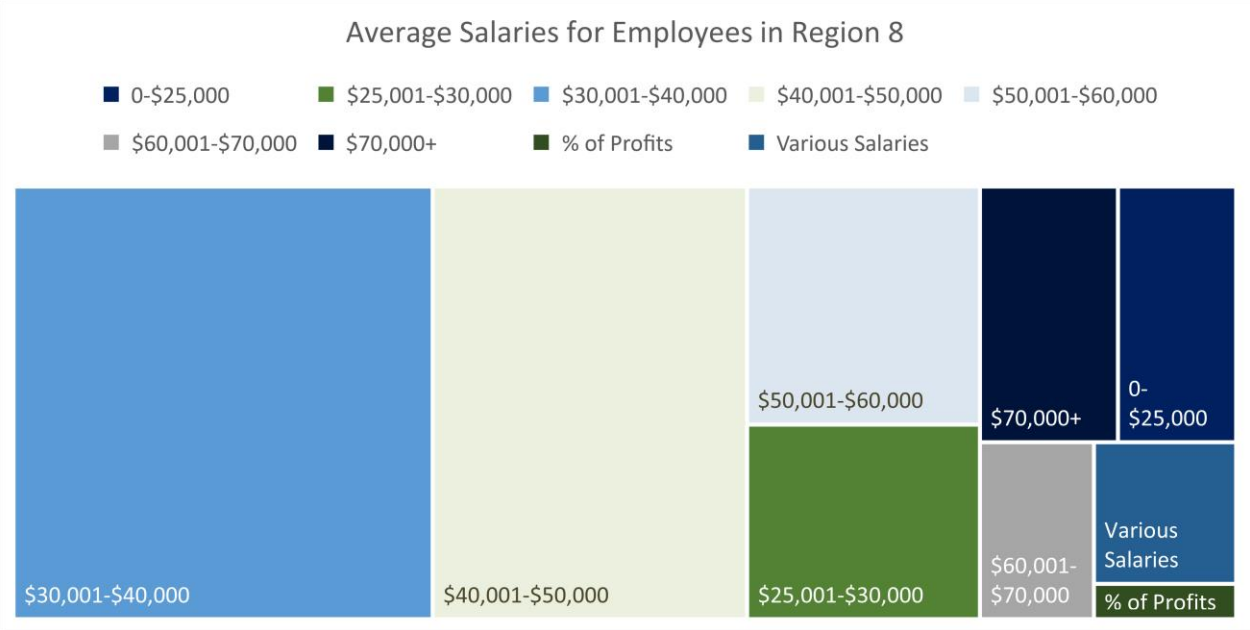
Years in Operation

Companies participating in the survey ranged from 1 year in business to 100+ years in business. On average, respondents have been in business for 42.3 years. The companies that have been in business the longest are in the Government industry (273 years), Finance and Insurance (168 years), and Mining, Quarrying, and Oil and Gas Extraction (150 years). Within the past ten years, the newest companies have been in Accommodation and Hospitality (6 new business within 9 years), Manufacturing (5 new businesses within 6 years), Professional, Scientific, and Technical Services (2 new business within 6 years), and Real Estate (2 new businesses within 6 years).

Salaries:

The most reported annual average salary for employees was within the $30,001-$40,000 range. The industries that reported paying their employees within this range most commonly were Manufacturing (9 companies), Finance and Insurance (4 companies), and Professional, Scientific, and Technical Services (4 companies). Industries that reported paying their employees lower wages, or the 0-$25,000 annual salary, were Wholesale/Retail Trade and Accommodation and Hospitality. In opposition, industries that reported paying their employees higher wages ($70,001+) were Transportation/Warehousing and Professional, Scientific, and Technical Services.

Table 25: Average Salaries for Employees in Region 8



Employment Size

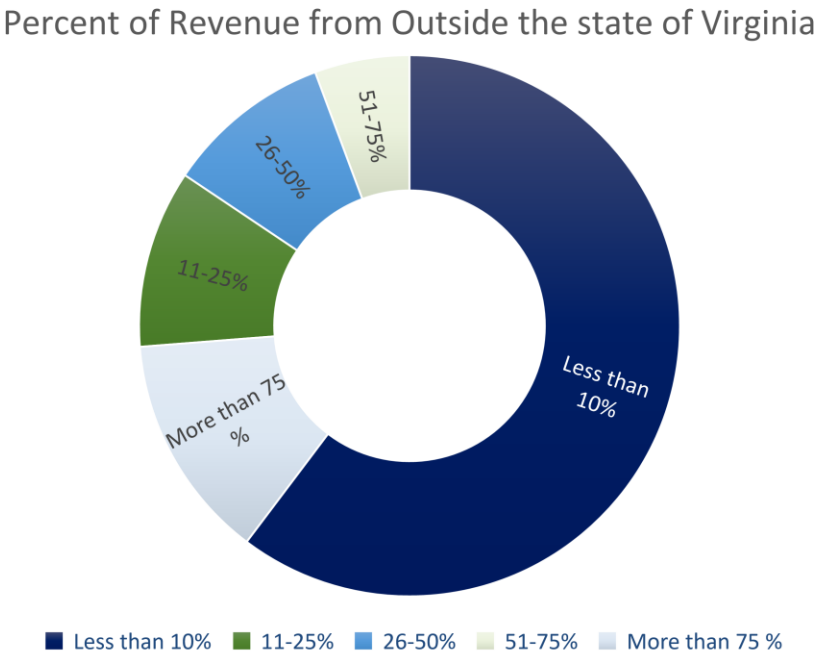
The Go Virginia Region 8 survey asked questions pertaining to employment size for indication of existing industry sizes. When looking at the survey data, a majority of the companies who responded have less than 100 employees (62.50%). While a majority of companies have smaller employment size, 26.32% of companies responded they have between 100 and 499 employees, and the remaining 11.18% have 500 employees or more.

Continuing looking at existing industry employees in Region 8, the survey asked companies to quantify their full-time employees. A majority of companies that responded employ 0-9 full-time employees (29.41%), 19.61% employ 10-49 full-time employees, 11.76% employ 50-99 full-time employees, 28.76% employ 100-499 full-time employees, 5.88% employ 500-999 full-time employees, and 4.58% employ 1,000+ full-time employees. When looking at industry trends, companies in the Manufacturing industry were most likely to report having more than 1,000+ full-time employees whereas companies that were most likely to report having 0-99 full-time employees were within Professional, Scientific, and Technical Services, Educational Services and Finance/Insurance.

Revenue from Outside Operations

A majority (60.28%) of respondents indicated that less than 10% of the revenue from their Virginia-based operations comes from outside of the state of Virginia. Finance and Insurance, Educational Services, and Professional, Scientific, and Technical Services were among the top industries that reported they have less than 10% of their revenue from out of state operations. Manufacturing was the most common industry to report having more than 75% of revenue from their Virginia-based operations coming from outside of Virginia.

Figure 38: Percent of Revenue from Outside the State of Virginia



Growth of Existing Region 8 Companies and Industries

Growth

The majority of the existing industry has plans for expanding locally or regionally. Excluding the "Other" category, 58% of the industries expressed that they were more than willing to expand locally/regionally. The industries that reported they were more likely to anticipate local and regional expansion are Information Technology (100%), Manufacturing (88%), and Transportation and Warehousing (88%). The table below represents the percentage of respondents within each industry that is anticipating local and regional growth.

Table 26: Percentage of Companies by Industry Anticipating Expansion Locally/Regionally

Percentage of Companies by Industry Anticipating Expansion Locally/Regionally	
Industry	Percentage
Information Technology	100%
Manufacturing	88%
Transportation and Warehousing	88%
Construction	80%
Finance and Insurance	79%
Agriculture, Forestry, Fishing, and Hunting	67%
Professional, Scientific, and Technical Services	58%
Accommodation and Hospitality	57%
Health Care and Social Assistance	56%
Arts Entertainment and Recreation	50%
Mining, Quarrying, and Oil and Gas Extraction	50%
Government	33%
Public Administration	33%
Real Estate and Rental and Leasing	33%
Educational Services	30%
Wholesale or Retail Trade	20%
Utilities	0%

Growth Timeline

As stated above, a majority (58%) of companies anticipate growth locally or regionally. Companies were asked when they believed their largest amount of growth in employees would occur. The largest amount of employee growth will be over the next 1-2 years, as indicated by company respondents, within Manufacturing (308 new employees across the Region 8 industry), Government (116 new employees across the Region 8 industry), and Construction (93

new employees across the Region 8 industry). All but two industries anticipate adding new employee's due to growth over the next 1-2 years. The two industries that do not anticipate adding new employees are Public Administration and Agriculture, Forestry, Fishing, and Hunting.

Growth continues for companies in the future. A majority of the responding companies are likely to add new employees over the next 3-5 years. The largest amount of growth reported in that timeframe is expected in Finance and Insurance (1,468 new employees across the Region 8 industry), Manufacturing (262 new employees across the region 8 industry), and Construction (226 new employees across the Region 8 industry). Over the next 5-10 years, the largest amount of growth is expected in Manufacturing (149 new employees across the Region 8 industry), Wholesale or Retail Trade (121 new employees across the Region 8 industry), and Construction (89 new employees across the Region 8 industry). It is worth noting that Manufacturing and Construction are among the top industries that anticipate adding new employees in each timeframe.

New Positions Due to Growth

Overall, respondents reported that the greatest percentage of available new jobs will be Entry Level Positions, followed by Professional and Skilled-Trade. The lowest reported percentage of new jobs will be Technical positions.

Table 27: Top 3 Industries Looking to Add Employees at Each Level

Top 3 Industries Looking to Add Employees at Each Level				
	Professional	Technical	Skilled Trade	Entry-Level/Support
1	Finance and Insurance	Manufacturing	Manufacturing	Manufacturing
2	Professional, Scientific, and Technical Services	Construction	Construction	Finance and Insurance
3	Manufacturing	Professional, Scientific, and Technical Services	Transportation and Warehousing	Professional, Scientific, and Technical Services

Challenges to the Current Workforce

Industry Challenges

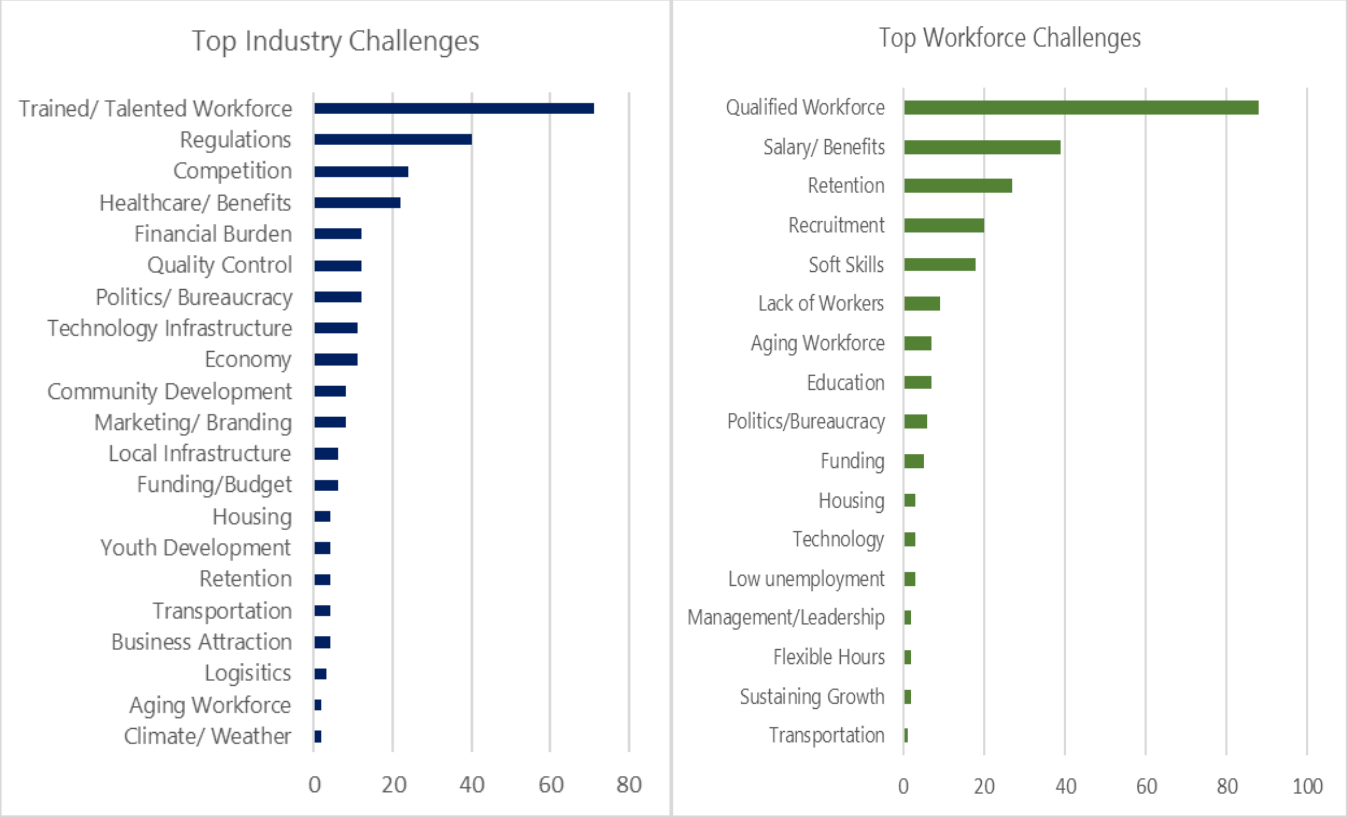
Companies across all industries reported experiencing a number of challenges to operating their businesses within the Region. The top three identified challenges were having a trained and adequate workforce (71), regulations (40), and competition (24). The top industries that reported challenges with regard to having a Trained and Adequate Workforce were Manufacturing, Construction, Educational Services, and Finance and Insurance. The top industries that reported challenges with Regulation were Manufacturing, Finance and Insurance, Transportation and Warehousing, and Construction. The top industries that reported competition as a challenge to operating their businesses were Manufacturing, Professional, Scientific, and Technical Services, and Finance and Insurance.

Workforce Challenges

Similarly, industries reported challenges in their workforce that affect operating their businesses throughout Region 8. The top three identified challenges within workforce needs were Qualified Workers (88 respondents), Salary, Benefits, and Healthcare (39 respondents), and Retention (27 respondents). The top industries that reported challenges regarding qualified workers were Manufacturing, Health Care and Social Assistance, and Construction.

The top industries that indicated that Salary, Benefits, and Healthcare were challenges in their workforce were Professional, Scientific, and Technical Services, Manufacturing, and Healthcare and Social Assistance. The top industries that reported challenges regarding retention were manufacturing, transportation and warehousing, and construction.

Figure 39: Top Industry and Workforce Challenges



Ways the Region 8 Council can Address Challenges

Companies reported various ways the Region 8 Council can aid them in addressing these challenges. The most popular method was to integrate new job training opportunities and workshops for both incoming and existing employees. The next two most common methods both aim to improve Region 8 through infrastructure and creating an attractive community. These methods are reflective of the top industry and workforce challenges. Additional funding streams and regional networking were also methods identified that the Region 8 Council can aid in addressing challenges.

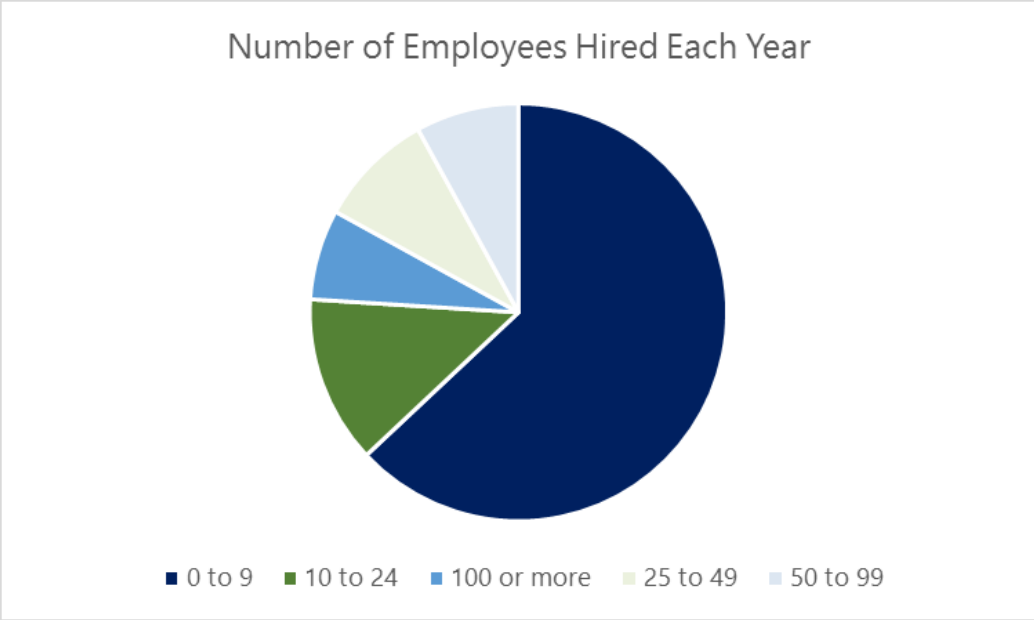
Figure 40: Ways Region 8 Council can Address Challenges

Employee Recruitment

Hiring Patterns

63% of companies who responded to the survey reported they hired, on average, 0-9 employees per year. Additionally, 13% of companies reported they hired 10-24 employees per year, 9% reported they hire 25-49 employees per year, 8% reported they hire 50-99 employees per year, and 7% reported they hired 100+ employees per year.

Figure 41: Number of Employees Hired Each Year



Recruiting Patterns

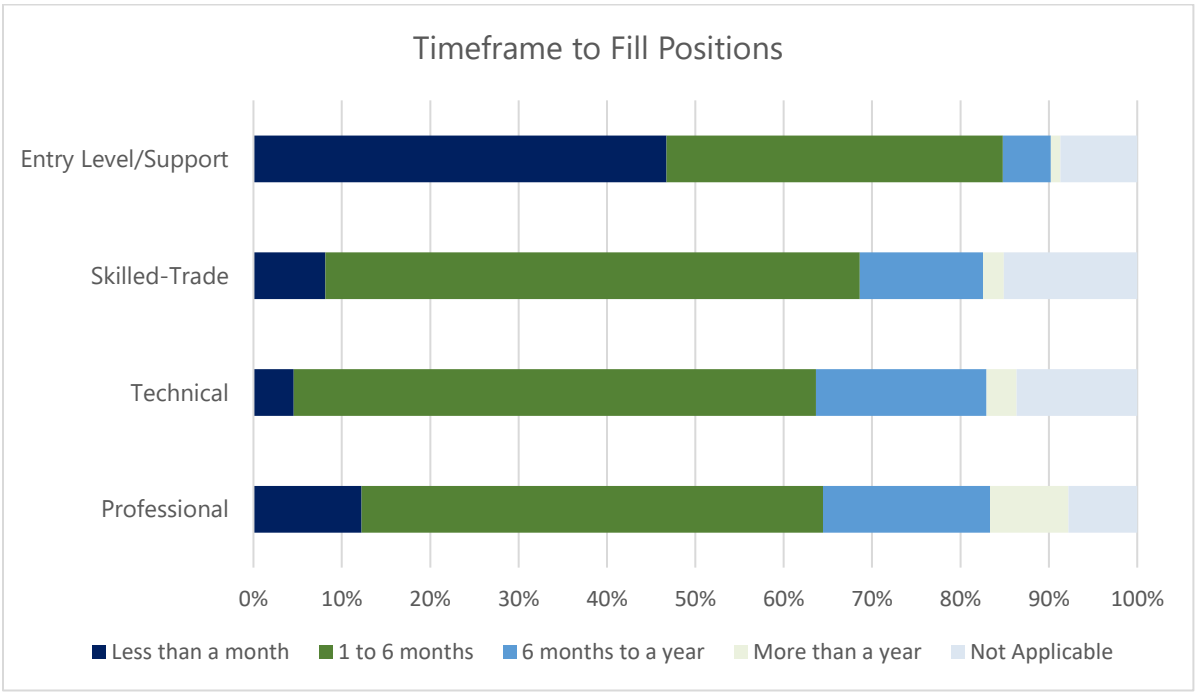
Survey results illustrate that most companies utilize online job postings (e.g., company website, online state employment portal, Indeed.com, etc.) and Employee Referrals equally for their recruitment needs. Popular recruitment resources are followed by utilizing educational institutions and the workforce system (e.g., career and job fairs).

Figure 42: Employee Recruitment Resources

Timeframe for Filling Positions

The most common timeframe for filling all position types is between 1 to 6 months. Respondents indicated an easier time filling entry-level/support positions, with nearly 50% of those being filled in less than a month.

Figure 43: Timeframe to Fill Positions

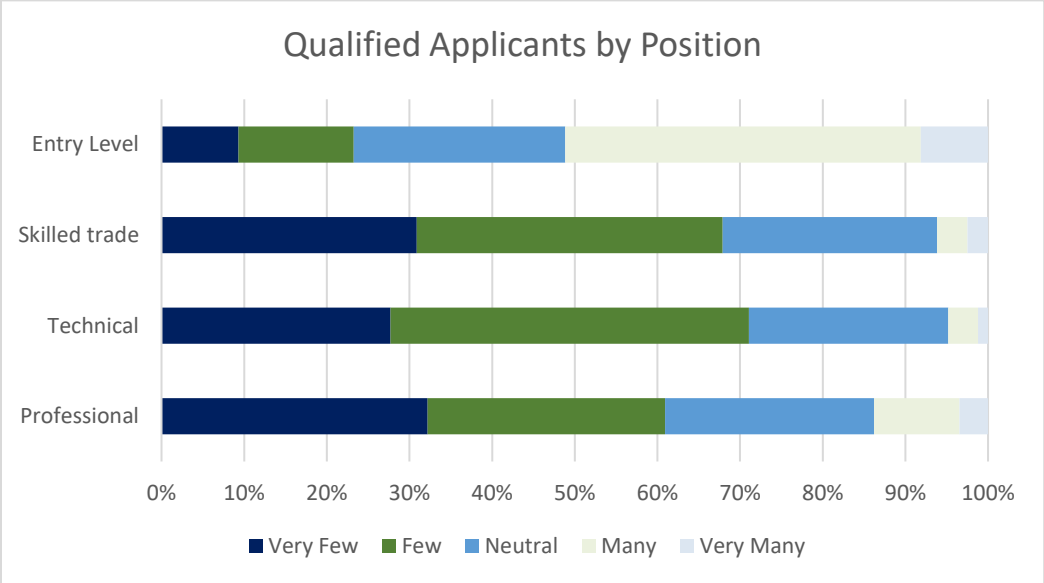


Hiring Difficulties

Companies reported that the greatest difficulty with hiring employees is at the skilled-trade level with 68.75% of companies indicating that hiring for these positions is either difficult or very difficult. On the other hand, 47.25% of companies report that there is ease in filling positions at the entry level/support positions.

The top industries that reported having difficulty finding applicants for skilled-trade positions were Manufacturing, Construction, Transportation/Warehousing, and Health Care and Social Assistance. Educational Services, Manufacturing, and Professional, Scientific, and Technical Services reported having the most ease when hiring entry-level/support positions.

Figure 44: Qualified Applicants by Position



Companies were asked to rate the qualification level of applicants for each type of job. This scale ranged from "Very Few to "Very Many." Nearly 71% of respondents indicated they had "Very Few" to "Few" qualified applicants for technical positions, 67.90% of respondents indicated that they had "Very Few" to "Few" applicants for skilled trade positions, and 60.91% of respondents indicated that they had "Very Few" to "Few" applicants for professional positions. In opposition, 51.16% of respondents indicated that they had "Very Many" to "Many" qualified applicants for entry level/ support positions.

The top industries that reported they had "Very Few" to "Few" applicants applying to technical positions were Manufacturing, Construction, and Educational Services. The top industries that reported they had "Very Few" to "Few" applicants applying to skilled trade positions were Manufacturing, Accommodation and Hospitality, Construction, Health Care and Social Assistance, and Transportation/Warehousing. The top industries that reported they had "Very Few" to "Few" applicants applying to professional positions were manufacturing, construction, and professional, scientific, and technical services. In opposition, the top industries that reported they had "Very Many" to "Many" qualified applicants applying to entry level/support positions were Manufacturing, Educational Services, and Transportation/Warehousing.

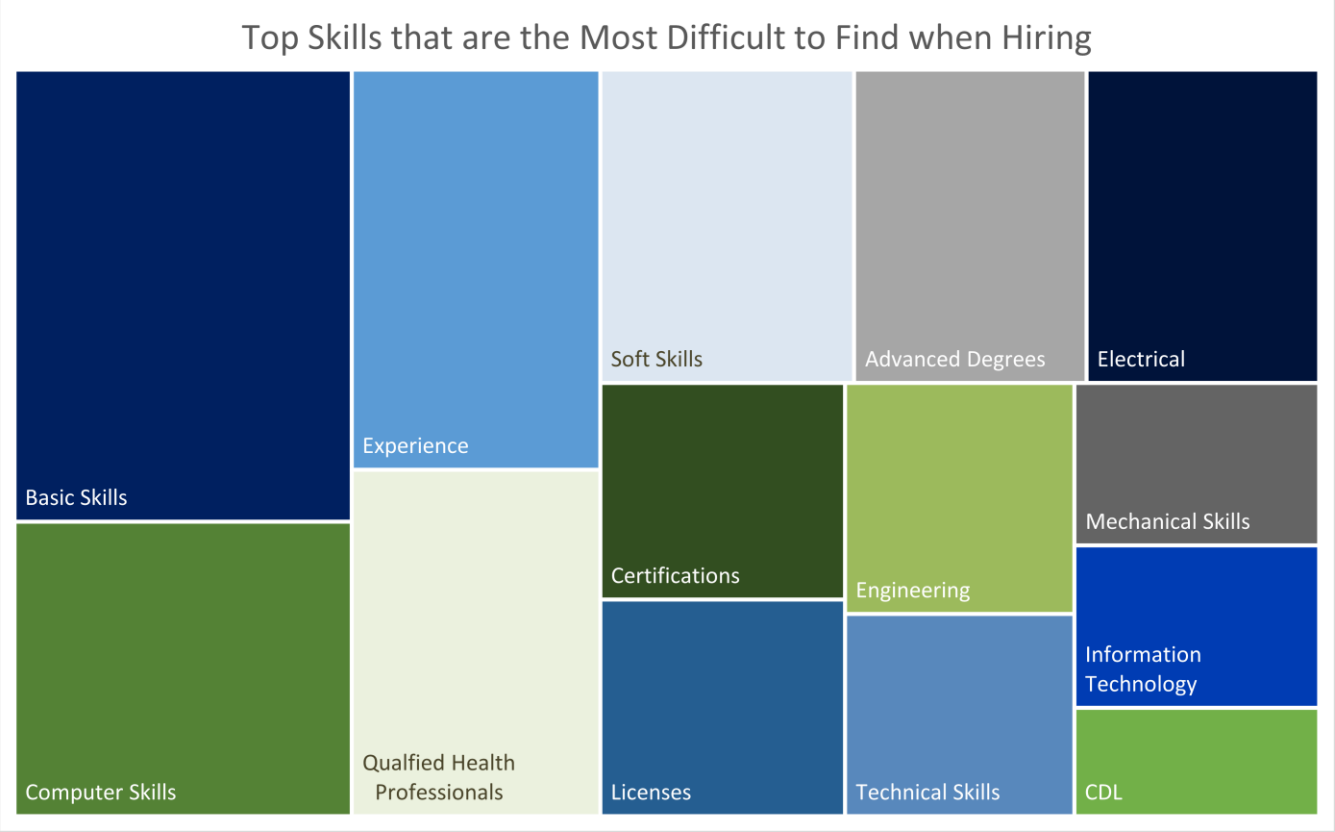
Nearly 60% of respondents (58.94%) reported that the individuals in the applicant pool in their area do not have the necessary skills to be hired, while just 16.84% felt that individuals in the applicant pool do have the necessary skills. In addition, 57.89% of companies reported that they do not agree that individuals in the area who have the skills

necessary are available to hire. This is compared to the 12.64% of companies who reported that they do agree that they the individuals who have the needed skills are available to hire. The survey also revealed that while companies are seeking to fill positions, 63.54% of respondents indicated that the applicant pool in the area is not large enough to meet that demand.

Top Credentials that are Most Difficult to Find

The top five technical/occupational skills or credentials that companies reported most difficult to find when hiring were basic skills, computer skills, experience, qualified health professionals and soft skills. The hierarchy chart below reflects all the responses and their reoccurrence in the results (the larger the colored box, the more frequent the response).[9]

Figure 45: Top Skills that are the Most Difficult to Find when Hiring

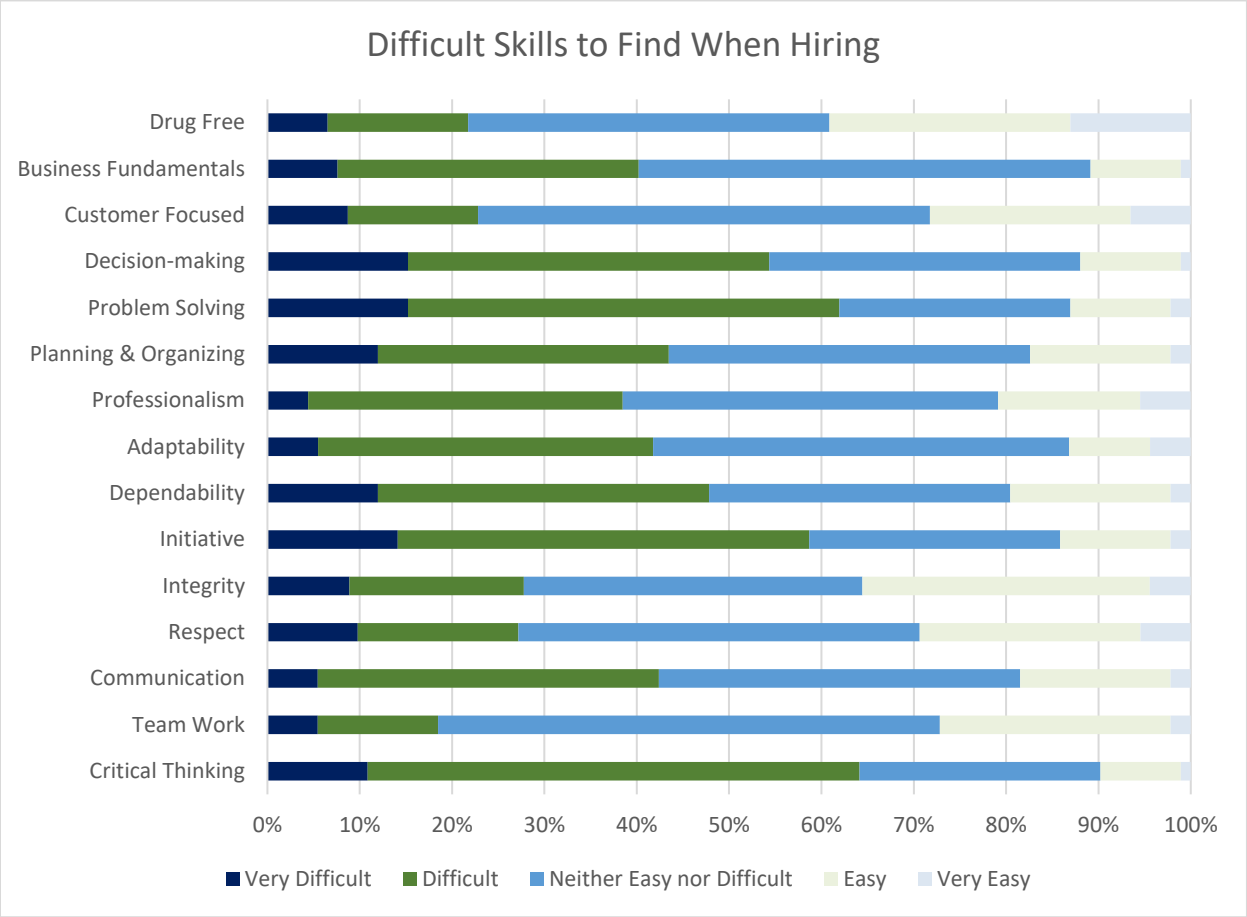


[9] Responses that were not repeated/mentioned once were not including in this analysis.

Employability Skills

Necessary job skills are often unique to a specific field or business type, so this survey focused on general employability skills that are applicable across company type. The most difficult employability skills to find in applicants were critical thinking skills, problem solving skills, and the ability to take initiative. Conversely, the least difficult employability skills to find when hiring were soft skills such as drug-free, integrity, and customer-focused capabilities.

Figure 46: Difficult Skills to Find When Hiring

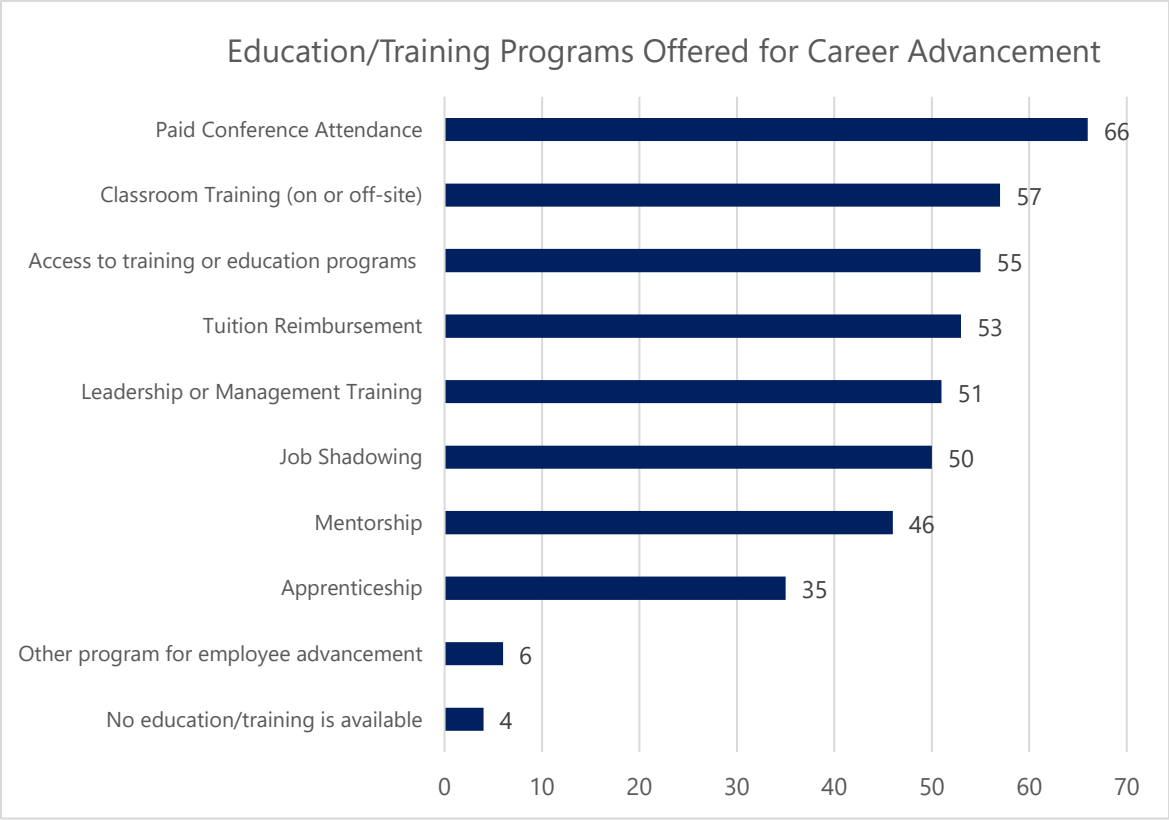


Employee Training

Nearly all companies offer some type of education or training program for employee advancement with the most frequented selection being paid conference attendance (70.21%).

One (1) from Manufacturing, one (1) from Professional, Scientific, and Technical services, one (1) from the Service Industry, and one (1) from Public Administration do not offer any type of education/training program for career advancement. For those who selected other, responses included internships (1), providing industry certification programs (1), on-the-job training (1), and tuition reimbursement (1).

Figure 47: Education/Training Programs Offered for Career Advancement



When asked to indicate education and training programs that are needed but not offered in the area, companies varied in responses. Many of the responses were industry specific such as:

- Basic Business Skills (Professional dress)
- Customer Service (2 responses)
- Behavioral and Developmental Disability Technical Training Programs
- Commercial Driver's License
- Certified Med Techs
- Registered Behavior Technician
- Hospitality Training (preferably completed in High School)

- Reach Truck Forklift Training Program
- Ammonia Refrigeration Training and Refrigeration Tech
- Apprenticeship Programs for Manufacturing

One respondent indicated that there is a disconnect between youth and the available jobs in the Shenandoah Valley. This respondent continued to share that college is not always an option for everyone and there is a stigma surrounding trade schools, which begins (being taught) in the classrooms of K-12 schools. One additional notable response indicated that:

"Listing specific training programs will not help us, we need certain capability built into a broad spectrum of education rather than certain courses. Sometimes our needs are specific to certain programming languages and frameworks that would make little sense for a community college or university to offer - the landscape changes too quickly to spend, say, two years training. Generally speaking, emphasis on choosing a computing technology, learning it and applying it quickly is far more important than teaching a particular language once a student knows the most common. Learning to make these decisions needs to be stressed from high school onward. We prefer full-time staff that can make solid, timely decisions to implement a new business idea and get it in front of customers quickly, while working in small teams. The local universities are doing a much better job of preparing their graduates for this recently, in business, computer science and engineering curricula. On each level of our companies, preference is given to candidates that can think on their feet and adapt quickly. Those that are superstars in certain languages might be needed temporarily to accomplish a short-term goal, but the visionary thinkers/doers are the ones that get hired."

Innovation and Entrepreneurship Asset Inventory

Prepared by:

Innovation and Entrepreneurship Asset Inventory

Starting in the post-World War II era, economists started undertaking research about how knowledge affected economic growth.[10] By the 1980s, many recognized that new knowledge was as important to economic growth as labor and capital,[11] leading countries and states to consider science- and technology-based strategies to promote further economic development. These strategies have evolved over the years, but generally include a focus on five elements of an innovation-based economy:

- Sources of innovation, such as universities, federal labs and non-profit research entities;
- Companies—entrepreneurial, small and large—that can bring new ideas to the market;
- Skilled knowledge workers with expertise in science, technology, engineering and math disciplines;
- Infrastructure that supports these entities, such as high-speed broadband connections, intellectual property protection, and equity capital markets; and
- Community, the connective tissue that links these elements into an ecosystem.

This inventory looks at innovation and entrepreneurship assets in Region 8 because these are drivers of economic growth. A region with strong innovation will be more competitive and grow faster than those without. And regions with entrepreneurial cultures and tightly integrated ecosystems will be more diverse economically, and less susceptible to economic changes.

Region 8's innovation and entrepreneurial assets are relatively thin, and mostly aspirational. While the region is dominated by small business, their job creation has slowed, as has job creation from young firms. The local colleges and universities are primarily producing baccalaureate and master degrees and have little federal research. The colleges and universities do have some very strong faculty, especially in health and pharmacy, chemistry and biology, but without a strong technology transfer and commercialization focus, there is little startup activity related to these strengths. Indeed, the relatively low number of patents have been awarded to employees of large local manufacturers. Lastly, the culture is not very creative or diverse, except for in Harrisonburg and Winchester.

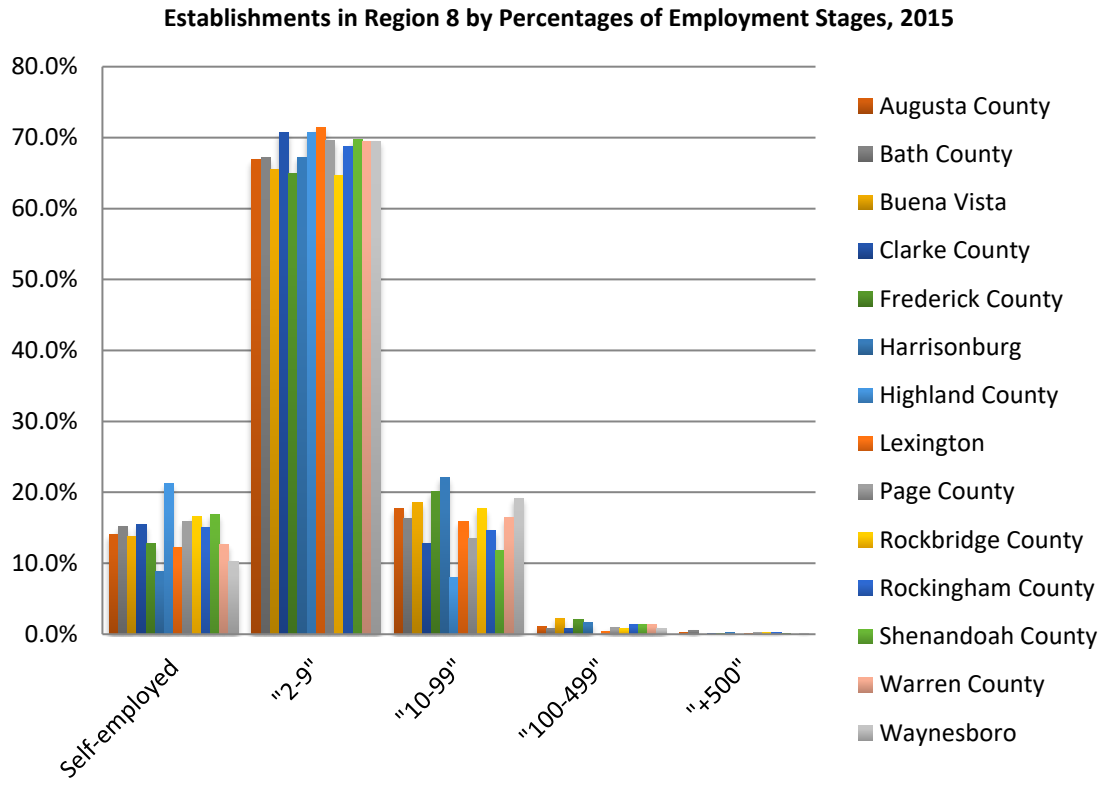
Small Business and Entrepreneurship

Job creation comes primarily from young companies and those in scale-up stages that are expanding from startup mode to revenue creation and production. This is in contrast to older firms whose employment trends have been declining for some time. A major reason for this phenomenon is that it is easier for younger firms to innovate and stay relevant in their markets. This section of the report looks at both small and young firms in Region 8.

Like many other places in Virginia, Region 8 is dominated by small businesses. Of the 20,462 establishments in the Region in 2015, 13.5% represent self-employed persons and 68.0% have 2-9 employees. Among the different counties in the Region, these percentages vary, with Harrisonburg having the lowest level of self-employment at 8.9% and the highest level of employment in the 10-99 -person firm category at 22.0%. In contrast, Highland County has a self-employment of 21.3% and only 8% in the 10-99 -person establishment category.

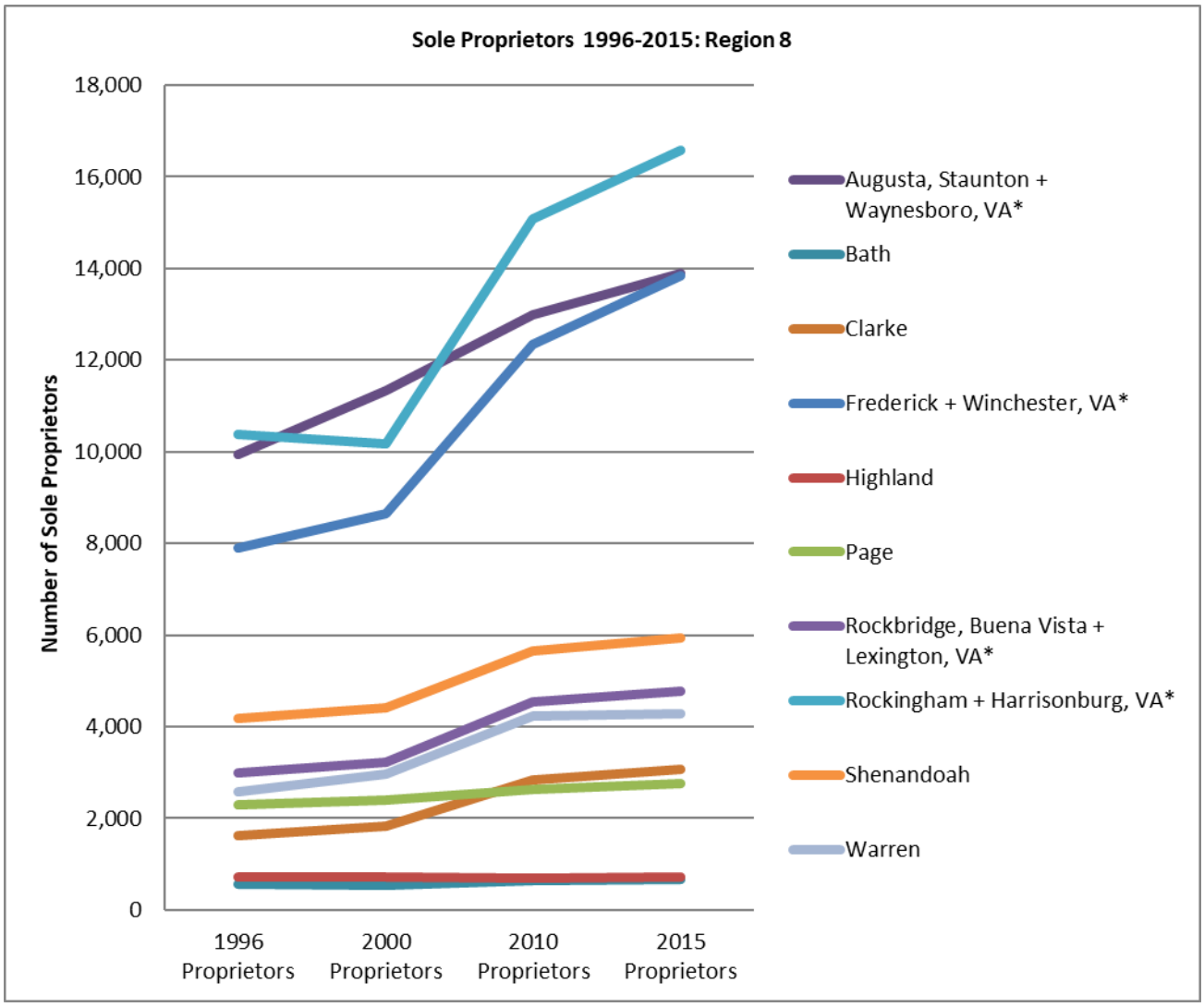
[10] Solow, Robert W. 1956. "A Contribution to the Theory of Growth." *The Quarterly Journal of Economics*.70 (1): 65-94.
[11] Romer, Paul. 1986. "Increasing Returns and Long-Run Growth."94 (5): 1001-1037.

Figure 48: Establishments in Region 8 by Percentages of Employment Stages, 2015



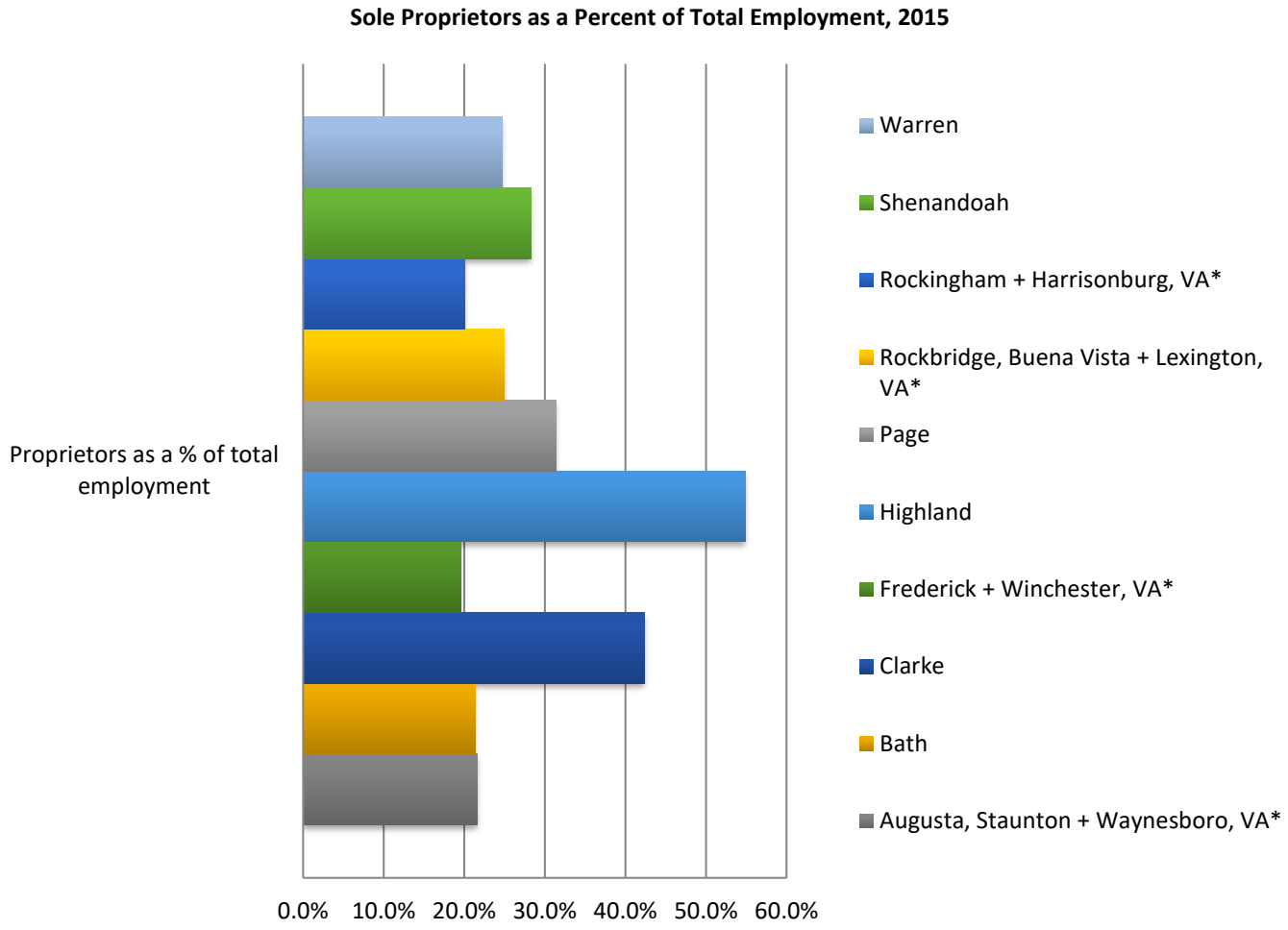
Source: Youreconomy.org. Data for Staunton and Winchester not available.

Figure 49: Sole Proprietors 1996 – 2015: Region 8



Source: US Census Bureau, LEHD, QWI

Figure 50: Sole Proprietors as a Percent of Total Employment, 2015

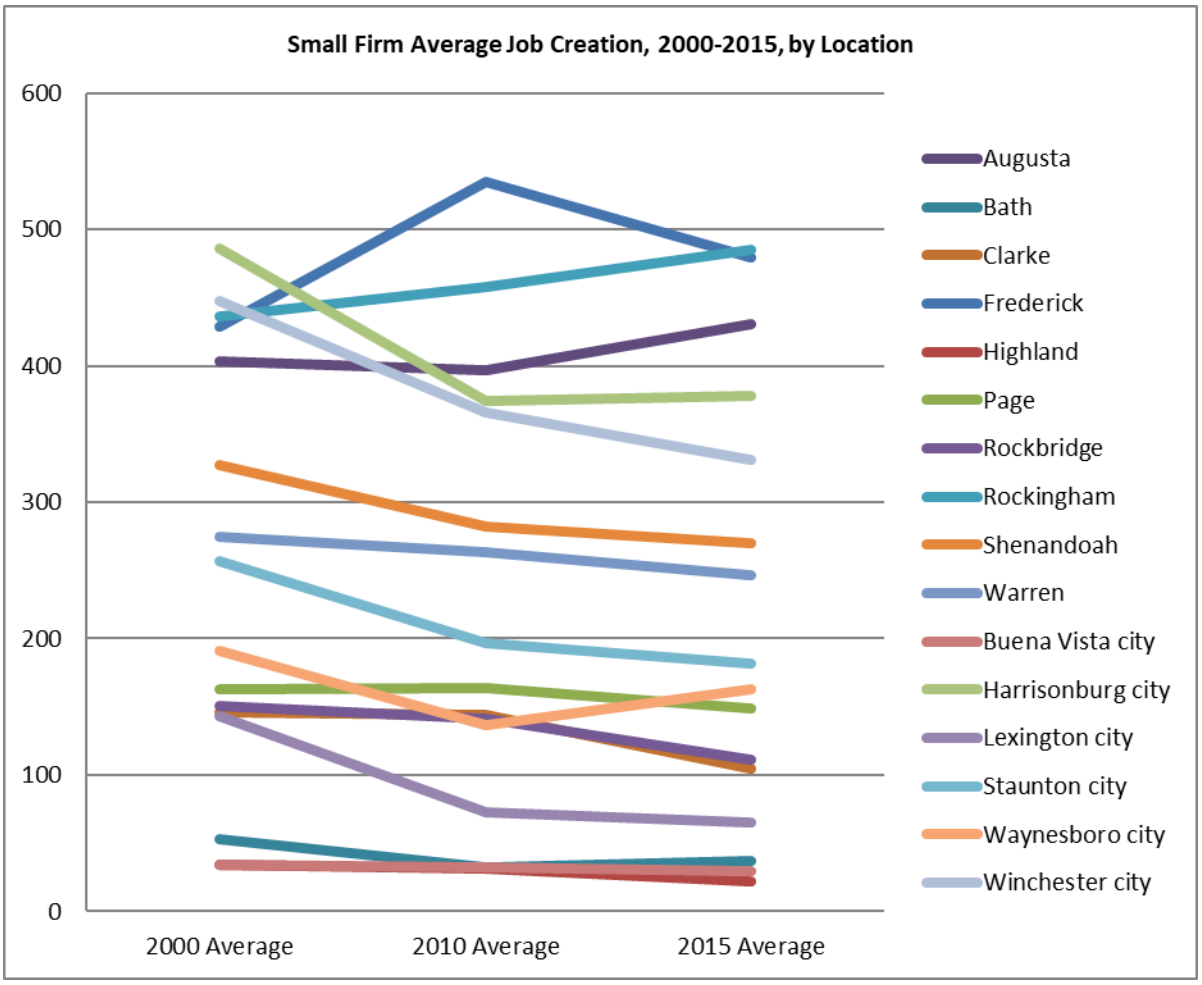


Source: US Census Bureau, LEHD, QWI

The number of sole proprietors has grown quickly in the areas including Harrisonburg, Waynesboro, Staunton and Winchester. However, Highland and Clarke Counties have the highest percentage of sole proprietors.

Job creation by small firms in Region 8 has declined somewhat since 2000, with the steepest declines in Warren County. Bath and Clarke Counties bucked the trend and saw an increase in jobs between 2000 and 2015.

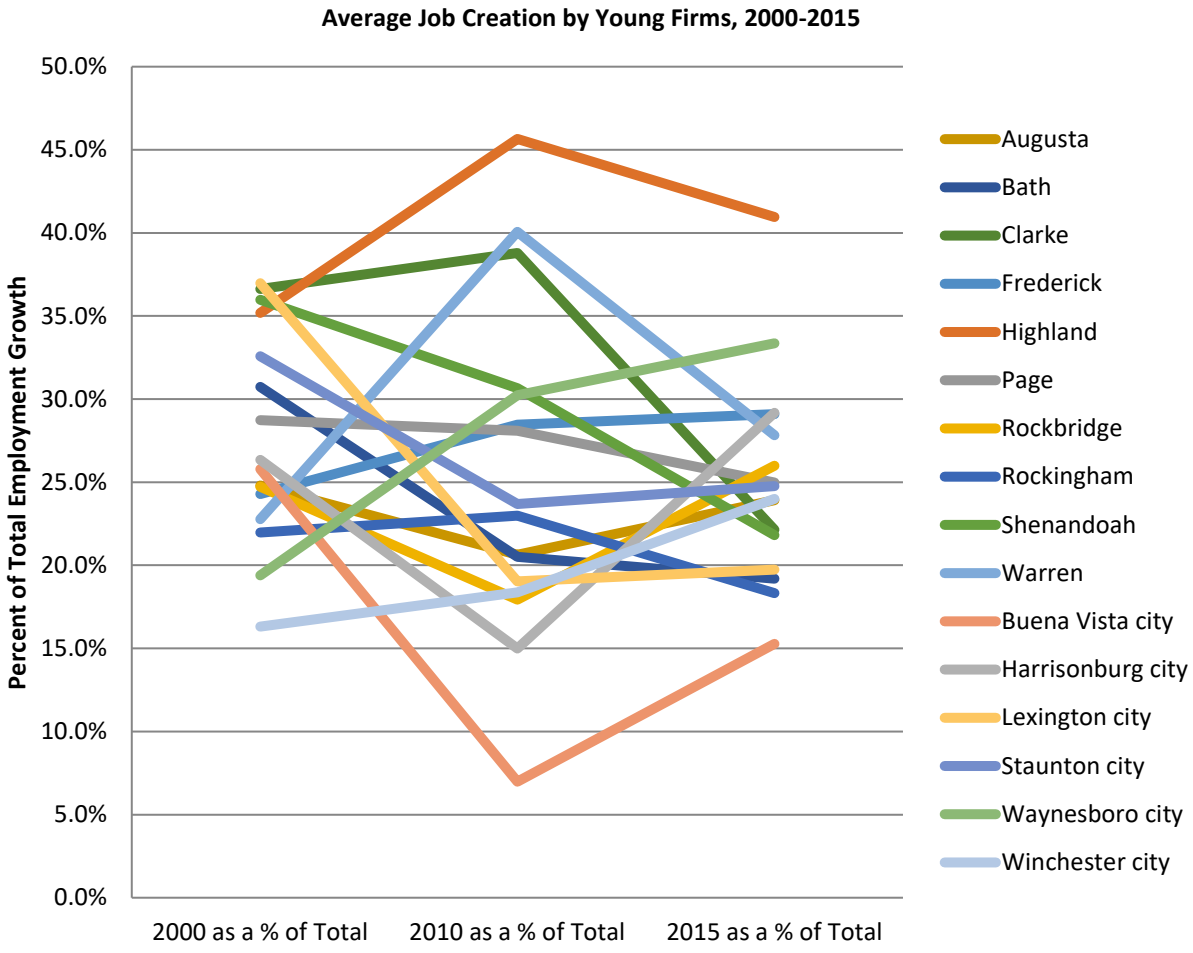
Figure 51: Small Firm Average Job Creation, 2000 - 2015, by Location



Source: US Census Bureau, LEHD, QWI

Since economic growth is often associated with young firms (less than five years old), rather than small firms per se, we looked at job growth by young firms as a percentage of total growth in each locality. In the service centers, job growth by young firms has been much higher than in the surrounding localities since 2000, but for almost all of the locations, average job growth from young firms in 2015 is lower than in 2000 or in 2010. Young firms are contributing between 15 and 40% of the total employment growth in Region 8, depending upon the location.

Figure 52: Average Job Creation by Young Firms, 2000 - 2015



Source: US Census Bureau, LEHD, QWI

Sources of Innovation

This section of the report looks at sources of innovation – where do new ideas come from in the region? This is important because most innovation stays localized; it is commercialized within 50 miles of where it was created, and often even closer than that.

The Importance of Knowledge to Economic Growth

In the past fifty years, economists have identified the role of new knowledge in economic growth. Two Nobel Prize-winning economists are credited with first identifying the role of knowledge. Nobel Prize in Economics winner Robert Solow observed that there was a variable other than capital, labor and land involved in economic growth, and Kenneth Arrow, another Nobel Prize winner, articulated that the variable was new knowledge.

New knowledge spills over from its source (such as a university or corporate research laboratory) to regional firms, and by extension, to the regional economy. University research, in particular, is important to stimulating innovation and economic growth in its host community. And, the extent to which knowledge is important to an industry will impact its location decisions with respect to sources of innovation including university research and development.

Why Universities Matter

Empirically, regions with universities grow faster than those without, and in smaller places where the agglomeration effects are not as strong, the university's role is even more important. Universities "heavily influence the ability of regions to attract and retain technology-intensive firms, to provide the regional labor force with modern knowledge skills, and to respond flexibly to.... economic circumstances."[12]

What is Innovation?

Innovation is when new or improved ideas, products, services, technologies, or processes create more market demand or cutting-edge solutions to economic, social, and environmental challenges.

As there are many types of innovations—market, social, civic, and place innovations—this definition focuses on innovations derived from a subset of industries that benefit from co-location and proximity and where firms and workers interact and collaborate. These industries include:

High-value, research-oriented sectors such as applied sciences—from life and material sciences to energy technology to nanotechnology

The burgeoning "app economy" and tech start-up community

Highly creative fields such as industrial design, graphic arts, media, architecture, and a growing hybrid
of industries that merge tech with creative and applied design fields

Highly specialized, small batch manufacturing in advanced manufacturing industries, advanced textile production, and small artisan-oriented manufacturing

Other industries organically locating in these areas and are benefiting from interaction and collaboration. Each city should look for other industries during their own analysis—cities could be ahead of the research.

Source: Brookings Institute

University research spurs the creation of new firms and thus affects regional employment. Research partnerships with universities expand and complement the absorptive capacity of the firms, increasing their innovation and competitiveness.

For regions to be competitive,

"The key event is the creation of an entrepreneurial university, whether from an existing academic base or a new foundation, which takes initiatives together with government and industry to create a support structure for firm formation and regional growth."[13]

The entrepreneurial university is characterized by a focus on industry-partnerships, technology transfer of research discoveries to interested and capable industry partners, including startups, support for entrepreneurs, whether students, faculty, or community-based, and support for the ecosystem, often in the form of research parks, incubators, and other capital-intensive infrastructure.

University spin-offs are an important part of the picture since they provide innovative products, new jobs, induce corporate investment in university R&D and have highly localized impacts. Eighty percent of spin-offs operate in the same state as their host institution. However, technology transfer efforts such as these are most effective if they are located within a strong innovation ecosystem and when university reward systems are aligned with desired outcomes.

There is also rising interest in entrepreneurship among students. Increasingly, campuses are involved with supporting entrepreneurs, including student-led companies as well as those from the community. Universities that support entrepreneurs and new businesses, including those generated both on and off campus, also support a flexible and creative workforce, and can significantly leverage economic revitalization. Indeed, students with entrepreneurial

[12] Drucker, J. and H.A. Goldstein. 2007. "Assessing the regional economic development impacts of universities: a review of current approaches." *International Regional Science Review.* 30(1): 20-46.

[13] Etzkowitz, H. and M. Klofsten. 2005. "The innovating region: towards a theory of knowledge-based regional development." *R&D Management*. 35(3): 243-255.

skills and knowledge are themselves a valuable output of any university.

The role of a university in its community seems to have changed along with many other institutions in our society. The ivory tower image of a university with a sole focus on teaching and research has given way to an understanding that universities are important place-based assets that can help a region be competitive in a knowledge-based economy. The linear science-push model has given way to a more nuanced and complex understanding of entwined interests among universities, industry and government, and a new contract has arisen, one that suggests than in return for public funds, universities must address their "users" – society and the economy – and be more accountable.

University Roles in Economic Development

It is helpful to place this discussion in a larger context, that is, what is the function of the university? Goldstein, Maier and Luger's[14] construct of eight different functions is useful as it lays out all the possible ways that universities can impact their surrounding communities and regions. The eight functions are:

1. Creation of knowledge
2. Human-capital creation
3. Transfer of existing know-how
4. Technological innovation
5. Capital investment
6. Regional leadership
7. Knowledge infrastructure production
8. Influence on regional milieu[15]

Region 8 Colleges and Universities

Some of the colleges and universities in Region 8 include:

- American National University
- Blue Ridge Community College
- Bridgewater College
- Christendom College

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[14] Goldstein, H.A., G. Maier and M.I. Luger. 1995. "The university as an instrument for economic and business development: U.S. and European comparison," in D.D. Dill and B. Sporn (eds), *Emerging Patterns of Social Demand on University Reform: Through a Glass Darkly*. Elmsford, NY: Pergamon.

[15] The *creation of knowledge* and the *creation of human capital* (that is, the teaching of students and training of scholars) refer to the traditional roles of teaching and research that characterized the US university in the early 20th century. The *transfer of existing know-how* refers to the cooperative extension model where universities take on the role of training and educating local and regional businesses and entities. *Technological innovation*, on the other hand, refers to the protection and dissemination of new knowledge into the market so that it becomes an innovation, usually embodied in intellectual property policies and technology transfer offices at universities. *Capital investment* refers to the impact of new construction and other long-term investment on the local community. *Regional leadership* refers to the role that university officials and faculty can play in providing direction and resources to the community, while *knowledge infrastructure production* specifically refers to the idea that knowledge "spills over" into the local community. Lastly, *influence on regional milieu* refers to the ability of universities to contribute to the cultural amenities of an area through its arts, sports, and entertainment activities, as well as the agglomeration of highly educated people in one place.

- Eastern Mennonite University
- Dabney S. Lancaster Community College
- James Madison University
- Lord Fairfax Community College
- Mary Baldwin University
- Shenandoah University
- Southern Virginia University
- Virginia Military Institute
- Washington and Lee University

Below, we profile the four most significant four-year institutions.

James Madison University

James Madison University (JMU) is classified by the Carnegie Foundation as a "Master's College and University." This reflects the level of research being conducted and degrees granted. In 2015-16, JMU awarded 4534 bachelor degrees, 752 masters and 28 doctorates. The doctoral programs are primarily related to nursing and psychology, although there is a doctorate in computer science and one in strategic leadership.

Carnegie has also recognized JMU as an "engaged university" (2014) which means that the university focuses on "engaged learning, civic engagement and community engagement." Significantly, JMU has named Dr. Yvonne Harris as the first Vice Provost for Research and Scholarship, and her department includes Technology Innovation and Economic Development to promote innovation, connect inventors and business commercialization, as well as protecting intellectual property.

Five significant research centers at JMU include:

- Center for International Stabilization and Recovery
- Institute for Energy and Environmental Research
- Institute for Infrastructure and Information Assurance[16]
- Institute for National Security Analysis
- Virginia Clean Cities

Although JMU is the most prominent university in Region 8, it does not receive significant amounts of federal R&D funds. It ranks 350 out of 1005 colleges and universities by the National Science Foundation for total federal obligations and 427th for total research and development expenditures.

Table 28: Virginia Universities Ranking and Expenditure

National Ranking Based on 2015 R&D expenditures	University	2015 R&D Expenditures in thousands of dollars
44	Virginia Tech	$504,282
62	University of Virginia	$373,218

[16] JMU carries this research center on its website, yet also asserts that it has not been funded or active for a number of years.

97	Virginia Commonwealth University	$218,925
142	George Mason University	$106,410
169	Old Dominion University	$65,092
173	William and Mary School of Marine Sciences	$61,554
290	Hampton University	$14,895
348	Virginia State University	$7,808
384	Norfolk State	$5,348
427	James Madison University	$3,712
448	University of Richmond	$3,069
639	Washington & Lee	$432

Source: National Science Foundation, http://www.ncsesdata.nsf.gov

Shenandoah University

Shenandoah University is a Carnegie "Doctoral University –Moderate Research Activity" and in 2015-16 awarded 469 bachelor degrees, 296 masters and 99 doctorates. In addition, they awarded 160 professional degrees that same year (business administration). STEMH (science, technology, engineering, math and health) degrees accounted for 607 of these. The school is known for its nursing, pharmacy and other health-related programs. As part of its last five-year plan (2008-2013), Shenandoah added a new BBA in Entrepreneurship.

Virginia Military Institute

Virginia Military Institute (VMI) is a Carnegie "Baccalaureate College: Arts and Science Focus" school, and awarded 374 bachelor's degrees in 2015-16. Of these, 162 were STEMH related. Civil engineering is a popular degree for VMI, as is computer science and electrical and computer engineering.

Washington and Lee University

Washington and Lee University (W&L) is also a Carnegie "Baccalaureate College: Arts and Science Focus" school, 470 students graduated with bachelor's degrees in 2015-16, as well as 93 with professional degrees (law). Of these, 125 were STEMH related.

Citation Analysis

One way to understand the academic strengths of the Region 8 colleges and universities is to look at the researchers and professors there. In academia, the value of one's research is measured by the number of peer-reviewed publications completed since this is a competitive process that ensures the validity and strength of the work. In addition, the citations that a published paper receives are also important; the more that other researchers cite your work, the more important to the field of study it is assumed to be. The h-index is an author-level metric that measures a person's research output and its citation impact.

A related measure is called the RG Score. RG stands for ResearchGate, a "LinkedIn" type of tool for researchers where papers are shared. The RG Score takes a person's research and turns it into a source of reputation. It is based on research in the person's ResearchGate profile and how other researchers interact with it.

We compiled a list of all researchers at one of the Region 8 colleges and universities with a RG of 20 or higher, and included a few with scores in the high 19s as well. There are a total of 34 researchers at four colleges and universities on this list. The distribution is shown below.

Table 29: Region 8 Colleges and University Research Gate Scoring

	# of faculty with RG>19	Average H-index	Average RG Score
JMU	15	20	31.27
Shenandoah	5	16	26.78
W&L	9	14	24.03
VMI	5	14	24.63

The top 10 researchers by h-index are shown below:

Table 30: Top 20 Researchers by h-index

Name	School	Department	h-index	Items	Citations	RG Score
Ludlow, C	JMU	Communications Science and Disorders	47	175	7342	41.89
DeGraff, BA	JMU	Chemistry (retired?)	37	107	4425	38.4
Ford, TW	Shenandoah	Health Professions (since left)	34	199	3993	39.15
Harris, RN	JMU	Biology	31	162	3101	36.56
Hurd, LE	W&L	Biology	28	76	2483	33.45
Jones, T	VMI	Chemistry	28	99	2154	36.96
Gilje, JW	JMU	Chemistry	24	147	1763	39.37
Maslen, E	JMU	Integrated Science and Technology (retired)	22	107	1995	29.77
Gray, L	JMU	Communications Science and Disorders	21	93	1505	34.8
Zhang, Y	JMU	Chemistry	21	38	3321	31.68

The top 10 by RG score are shown here. The list is the same as above with one exception.

Table 31: Top 10 Researchers by RG Score

Name	School	Department	h-index	Items	Citations	RG Score
Ludlow, C	JMU	Communications Science and Disorders	47	175	7342	41.89
Gilje, JW	JMU	Chemistry	24	147	1763	39.37
Ford, TW	Shenandoah	Health Professions (since left)	34	199	3993	39.15
DeGraff, BA	JMU	Chemistry (retired?)	37	107	4425	38.4
Jones, T	VMI	Chemistry	28	99	2154	36.96
Harris, RN	JMU	Biology	31	162	3101	36.56
Baber, AE	JMU	Chemistry	19	42	1369	34.95
Gray, L	JMU	Communications Science and Disorders	21	93	1505	34.8
Hurd, LE	W&L	Biology	28	76	2483	33.45
Zhang, Y	JMU	Chemistry	21	38	3321	31.68

This analysis illustrates the potential impact that the Region's colleges and universities could have with their strengths in health and pharmacy, chemistry and biology. Note the lack of highly ranked researchers in computer science.

SBIR/STTR

The Small Business Innovation Research (SBIR) program and its companion, the Small Business Technology Transfer Program (STTR), are two federal set-aside programs by which agencies that perform intermural research are required to award a small portion of their research awards to small businesses (generally less than 500 employees). With the STTR, the small business must be teamed with a university. Companies that win SBIRs and STTRs are generally research organizations or start-ups, since there is no matching requirement, and the awards are grants that do not have to be paid back. They are awarded competitively based on the quality of the science and on the potential for the technology to be commercialized and support the agency's mission.

These grants and contracts are awarded on a competitive basis for applied research, and are a way for early stage businesses to gain funding for science and technology-based research and development that may lead to commercialization. The grants and contracts have no equity implications, so they are widely considered as an excellent source of early stage funding. Sources of equity, such as venture capitalists, look for SBIR/STTR funded companies to invest in because their technology has been vetted competitively.

In 2016, Virginia companies were awarded 245 grants and contracts under the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. The SBIR/STTR program is highly competitive, and companies whose researchers are skilled in writing grant applications are often at an advantage.

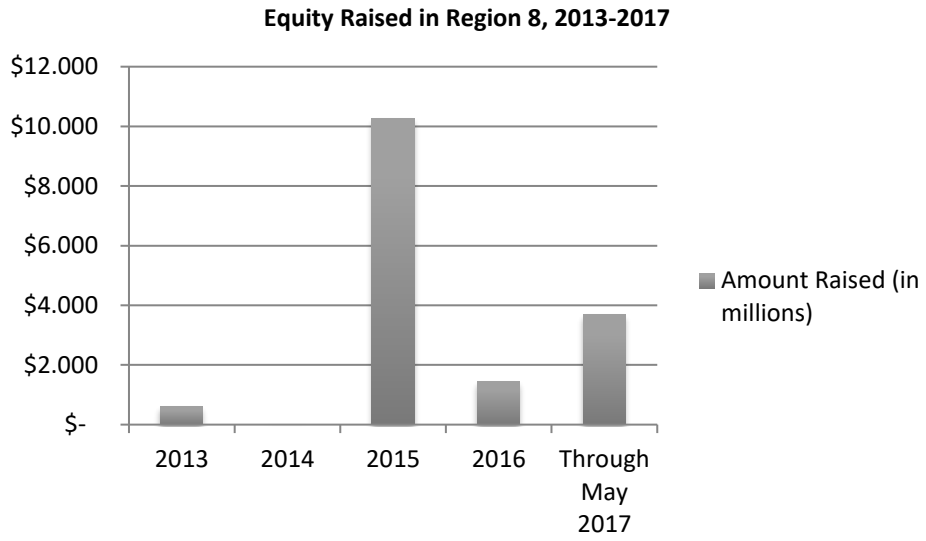
Only two Region 8 companies were awarded SBIRs or STTRs in 2016: Ryzing Technologies in Staunton and MicroHarmonics in Waynesboro. MicroHarmonics is a single-person consulting firm specializing in millimeter wave and sub-millimeter wave components and systems. Ryzing is also a single-person government contractor with expertise in textiles.

Equity Raised

Venture capital, including in this case seed funding and angel investors, is a source of equity financing used by rapidly growing companies to accelerate their growth. While not all innovative companies succeed in getting venture capital, or want to dilute their ownership by obtaining outside capital, the presence of venture capital denotes a company that outside investors find to be attractive, usually because of its technology, potential markets and management team.

Region 8 companies raised at least $18,100,000 through 10 funding events since 2011. This likely understates the amount of equity raised, since numerous transaction details are not disclosed, nor are all angel deals included. 2015 was the strongest year with $10,250,000 raised. $1,450,000 has been raised so far in 2017.

Figure 53: Equity Raised in Region 8, 2013 - 2017



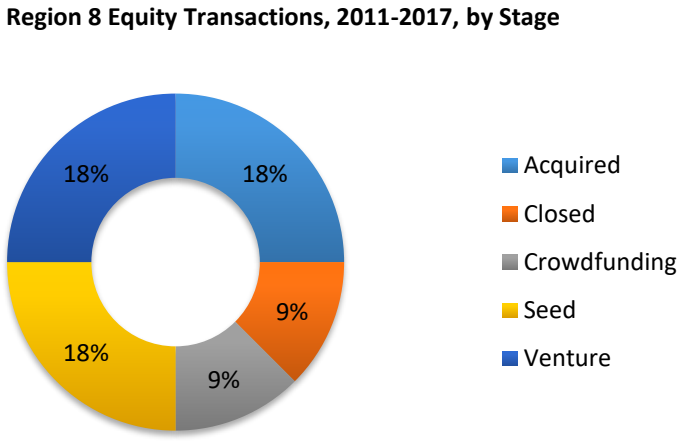
Source: crunchbase.com

Of these equity infusions, 73% were in companies related to agriculture, 25% in information technology, and 2% were aerospace. The IT companies were largely cloud and artificial intelligence. The agriculture percentage is due to an $8 million raise by Shenandoah Growers.

Region 8 equity transactions were relatively evenly distributed among stages of development, with 9% crowd funded, and 18% each in seed, venture and acquisition.

Seven of the 10 transactions were in Harrisonburg, reflecting the concentration of venture-funded companies throughout the county. The others were in Waynesboro, and Winchester.

Figure 54: Region 8 Equity Transactions, 2011 - 2017, by Stage:



Source: crunchbase.com.

Patents Awarded

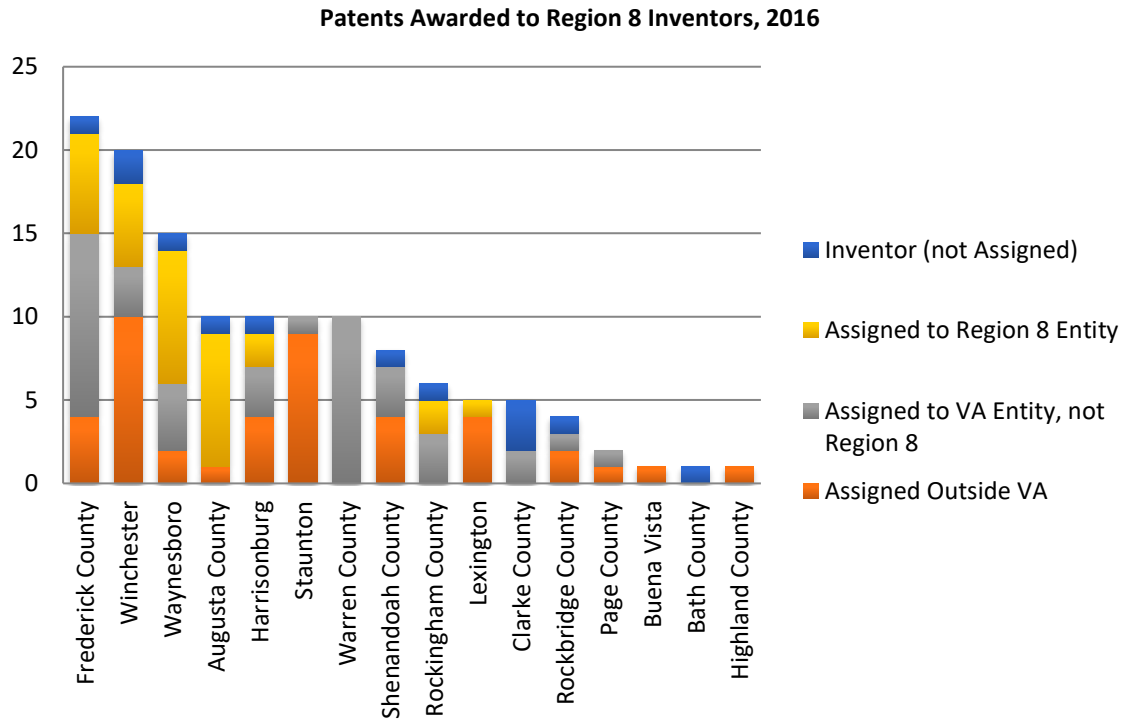
The U.S. Patent and Trade Office (USPTO) lists inventors by their home addresses and requires patent applications to list the individual inventors. If, as a result of their employment relationship, a patent is actually owned by an inventor's employer, the usual practice is to assign the patent to the employer. This is most often a company or university, or several entities, if the patent lists several inventors.

It is important to note that patent analysis is only one indicator of knowledge production, as some new knowledge is protected by trade secrets, trademarks, or not at all. We also note that not all patents are innovations, because they are not brought to market. However, patents are commonly used as a proxy for the invention of new knowledge, as any patent must be unique, non-obvious and new.

Between January 1 and December 31, 2016, 130 patents were issued to inventors residing in Region 8. Of these, 22 included inventors who resided at a Frederick County address and 20 at a Winchester address. Waynesboro had 14, Augusta County 11 with Harrisonburg, Staunton, and Warren County with 10 each.

Nearly 33 percent of the patents were assigned to companies with headquarters in Virginia, and 24.6% were assigned to companies in the same place as the inventor. The latter is often an artifact of an employment relationship. Indeed, the largest patenting entities in Region 8 are all major employers located in the area. Also interesting is that 10% of the patents are not assigned, usually an indication of an individual inventor working on their own time.

Figure 55: Patents Awarded to Region 8 Inventors, 2016



Source: US Patent and Trademark Office, www.uspto.gov

Table 32: Top Region 8 Patenting Entities

Top Region 8 Patenting Entities

Company Name	Location	Number of Patents in 2016	Sector
Rubbermaid	Winchester	4	Consumer Products, Manufacturing
Virginia Panel Corporation	Waynesboro	4	Telecomm, Manufacturing
Evolve Manufacturing	Winchester	2	Contract manufacturing
Power Monitors	Mount Crawford	2	Electronics manufacturing
Torey Plastics	Front Royal	1	Plastics and film manufacturing
MELNOR	Winchester	1	Lawn and gardening products, manufacturing
Attochron	Lexington	1	Lasers, teamed with VMI
SRI	Harrisonburg	1	Research and development
Comsonics	Harrisonburg	1	Telecomm, electronics manufacturing

Source: US Patent and Trademark Office, www.uspto.gov.

Note that no patents were discovered for any of the colleges or universities in 2016. However, James Madison University has a total of nine patents issued to it or its commercialization partner, James Madison Innovations. Relative to its overall R&D activity, this number is "respectable," according to a Milken Institute report on the effectiveness of university technology transfer operations.[17]

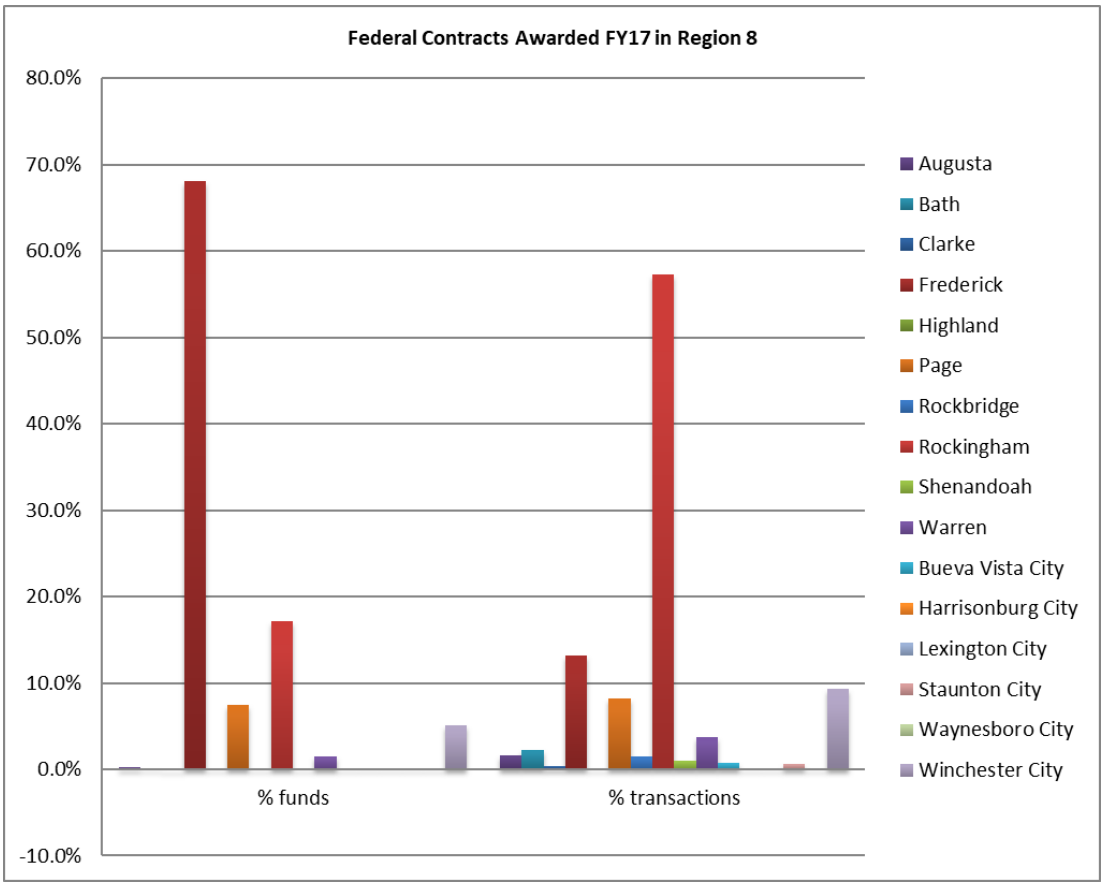
Federal Locations and Contracts

Due to the proximity to Washington, DC and the federal government, Virginia and Region 8 are home to many firms that have federal contracts. This is significant for innovation when those contracts are for research and development, product development, or help a firm become established and grow.

In FY2017, firms in Region 8 were awarded $11,520,126 in federal contracts. Frederick County led the region both in percentage of the total value of the contracts and in the number of transactions, followed by Rockingham County and Page County.

[17] DeVos, R. 2017. Concept to Commercialization: The Best Universities for Technology Transfer. http://assets1c.milkeninstitute.org/assets/Publication/ResearchReport/PDF/Concept2Commercialization-MR19-WEB.pdf. JMU is not included in this list, however it's results would place it around 190th in the ranking.

Figure 56: Federal Contracts Awarded FY17 in Region 8

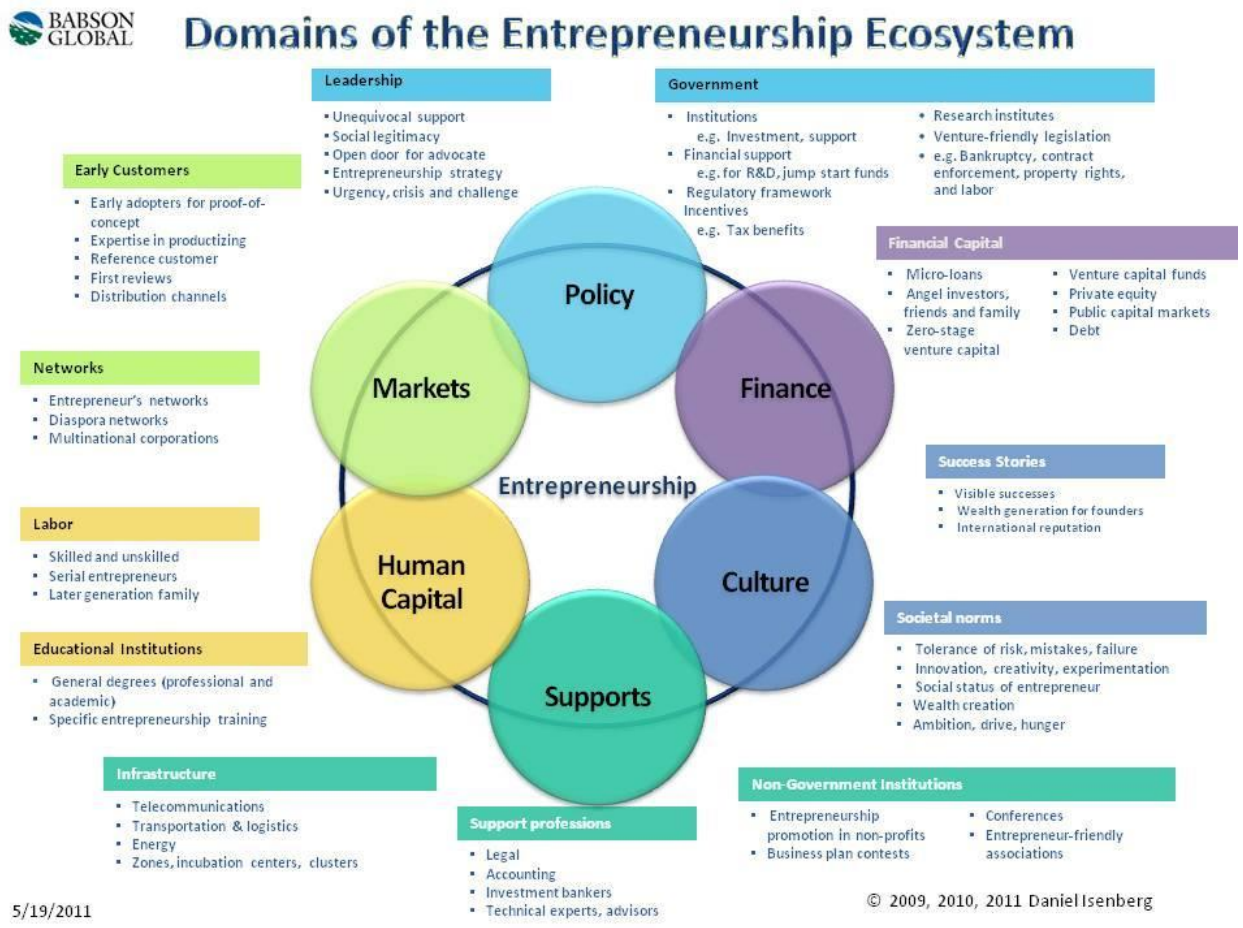


Source: usaspending.gov.

Entrepreneurial Ecosystem

An entrepreneurial ecosystem is the set of activities, linkages and interactions that support entrepreneurs in a region, and helps grow new companies. The density and completeness of the ecosystem are related to increased success among its entrepreneurs; missing pieces of the ecosystem can slow or derail entrepreneurial activities. This is particularly difficult in more rural regions where the lack of critical mass can make it even more difficult to start and grow companies than it is in regions with more resources.

This image, created by Daniel Isenberg, founder of the Babson College Entrepreneurial Ecosystem Project, shows the elements of an entrepreneurial ecosystem.



This illustrates why rural regions are at a disadvantage. Because of lower populations and density, local markets (for early adoption of new products and services), networks and labor can be less available in a rural area than in a larger metropolitan setting. Some infrastructure and other support services may be less available, and the culture may be less tolerant of risks. Capital may be less available, and local policy structures may not be supportive.

Region 8 has made steps to counteract these challenges, however progress is uneven. In Harrisonburg, some parts of the ecosystem are more robust, while the ecosystem is less developed in the other Region 8 localities.

James Madison University is contributing by training undergraduates and graduate students in entrepreneurship. The Center for Entrepreneurship supports student entrepreneurs and is hosting its first summer cohort this year. In addition the 4VA program and its X-Labs makerspace are allowing JMU students to experience and experiment with new technologies such as drones. In addition, Washington and Lee has a new Center for Entrepreneurship.

The infrastructure in Region 8 is limited, with some broadband and even cell service lacking in the more remote regions. And support structures, such as lawyers, accountants, and mentors, are limited in the region, compared to other parts of Virginia.

Infrastructure specific to entrepreneurs, on the other hand, is fragmented. While X-Labs and the Center for Entrepreneurship programming is available for students, a single co-working space in downtown Harrisonburg is full. An Innovation Hub is planned in Staunton and will likely include the existing makerspace. Lexington's co-working space, StartHere, is not fully utilized. The Highland Center's newly renovated home in Monterey supports local food-based businesses with two commercial kitchens and walk-in freezers.

Non-governmental institutions, such as the Shenandoah Valley Innovation Council, exist, and are focused on the technology sector in general. Sources of capital are relatively strong for a region of this size. Shenandoah Valley Angel Investors has invested over $3 million in nine ventures, and is actively working to increase the number and quality of entrepreneurial enterprises in the Region. The Staunton Creative Community Fund, is a source of primarily debt capital to area businesses.

As documented elsewhere in this report, JMU, Shenandoah College, VMI and Washington and Lee are themselves not as strong a piece of the local ecosystem as they might be if they were research universities. As a result, there are limited examples of successful spin-off companies, although JMU in particular is working to change this. On the other hand, the diversity and creativity supported by a "college town" is also part of the supportive culture of this area and extends to Harrisonburg, Staunton and Lexington.

Definitions:

Incubator: a facility that offers startup companies office/laboratory/manufacturing space, as well as technical assistance, access to capital, training, and events. Typically has screening for admission, regular progress milestones and graduation criteria.

Accelerator: a time-limited program, e.g. 12 weeks or 3 months, often provided for cohorts of companies, that provides technical assistance, mentors, advisors, coaches, training, with an event at the conclusion. Most accelerators offer grants or equity, either throughout the program, or as a prize at the end.

Co-working Space: a place where multiple individuals and companies share office space, often with broadband access, kitchens, conference rooms and other shared facilities. Most successful co-working spaces also provide space for community events and training programs to increase crosstalk and collaboration.

Makerspace: a place equipped with a variety of machines used to make things, often including machining, wood working, 3D printing, and the like, shared by members of the community for a fee.

Small Business: a company with a small number of employees. For the Small Business Administration, this can be less than 500 employees. In most communities, this means less than 50 employees, and often less than 10.

Entrepreneur: a founder of a company with a novel idea that intends to grow the company.

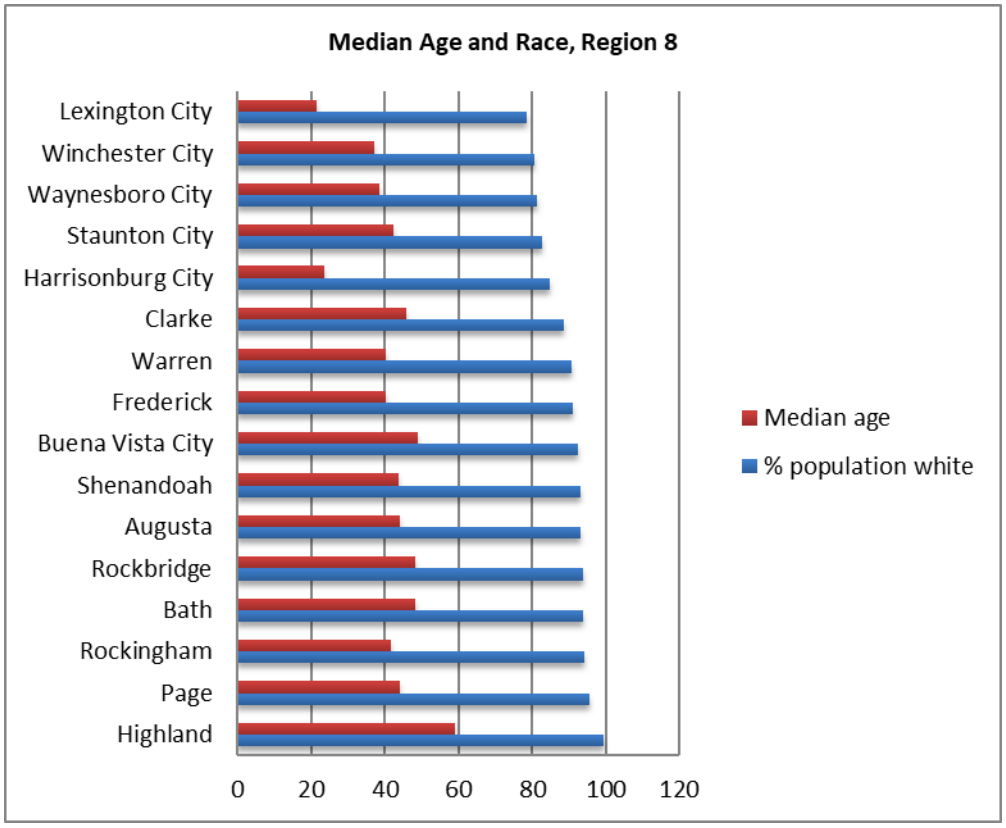
Throughout the Region, there are also Small Business Development Centers (SBDCs), although they are part of several distinct organizations because of the way SBDCs are run in Virginia. Each is staffed differently, and supports a large geographic area.

Innovation Culture

The culture of a place (or an organization) has been shown to directly impact the likelihood that creative and innovative ideas will emerge. Two measures that are often correlated with a supportive innovation culture in a place are diversity and creativity.

Here we measure diversity by looking at age, race and origin. With the exception of the cities of Harrisonburg and Lexington with their large student populations, the localities in Region 8 have median ages between 37 and 50 years old. Also, with the exception of Lexington, Region 8 is between 80 and 99.5% white, demonstrating little diversity. The number of foreign-born is highest in Rockingham, Frederick and Harrisonburg at 3979, 4452 and 8557 respectively. As a percent, however, Harrisonburg is 17.5% foreign-born, with Winchester following at 11.4%. The rest of the Region is between 0.7% (Highland) and 5.7% (Frederick).

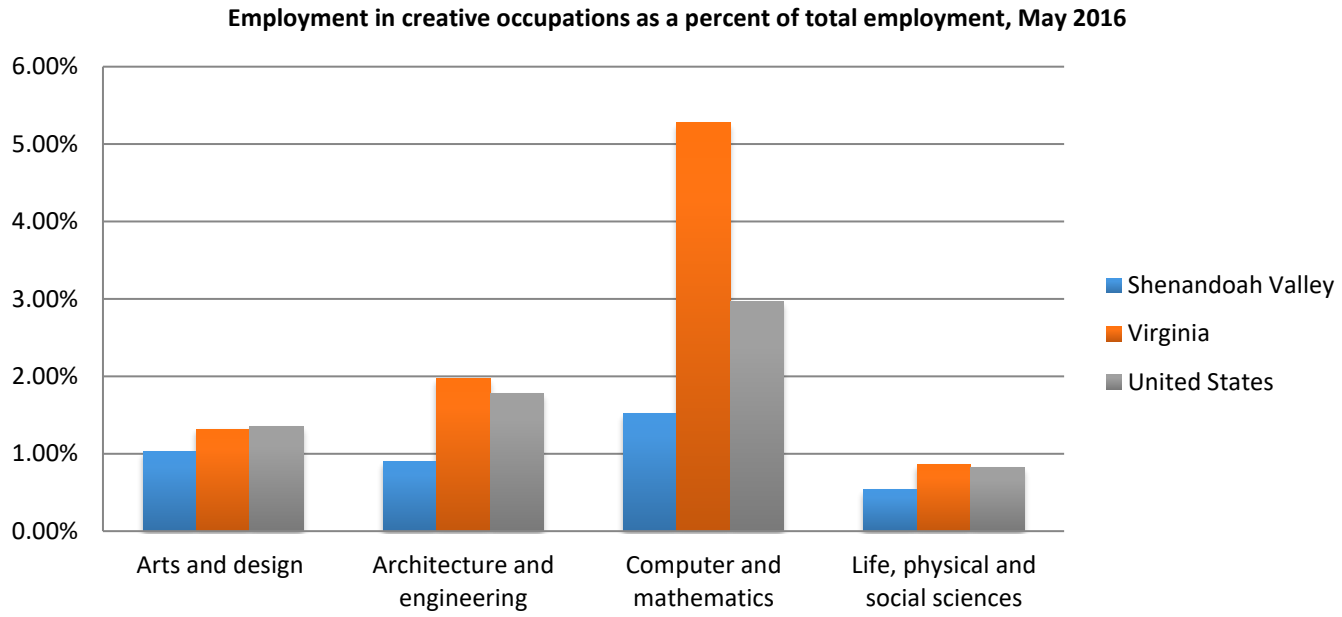
Figure 57: Median Age and Race, Region 8



Source: US Census, American Factfinder, 2015 American Community Survey

On the other hand, employment in creative occupations is relatively low in the area served by the Shenandoah Valley Workforce Development Board. Employment in this region for Arts and design, Life, physical and social sciences, and Computer and mathematics occupations is lower than both Virginia and the US.

Figure 58: Employment in Creative Occupations



Source: Occupational Employment and Wage Rates (OES), May 2016, http://data.virginialmi.com

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ECONOMIC DEVELOPMENT

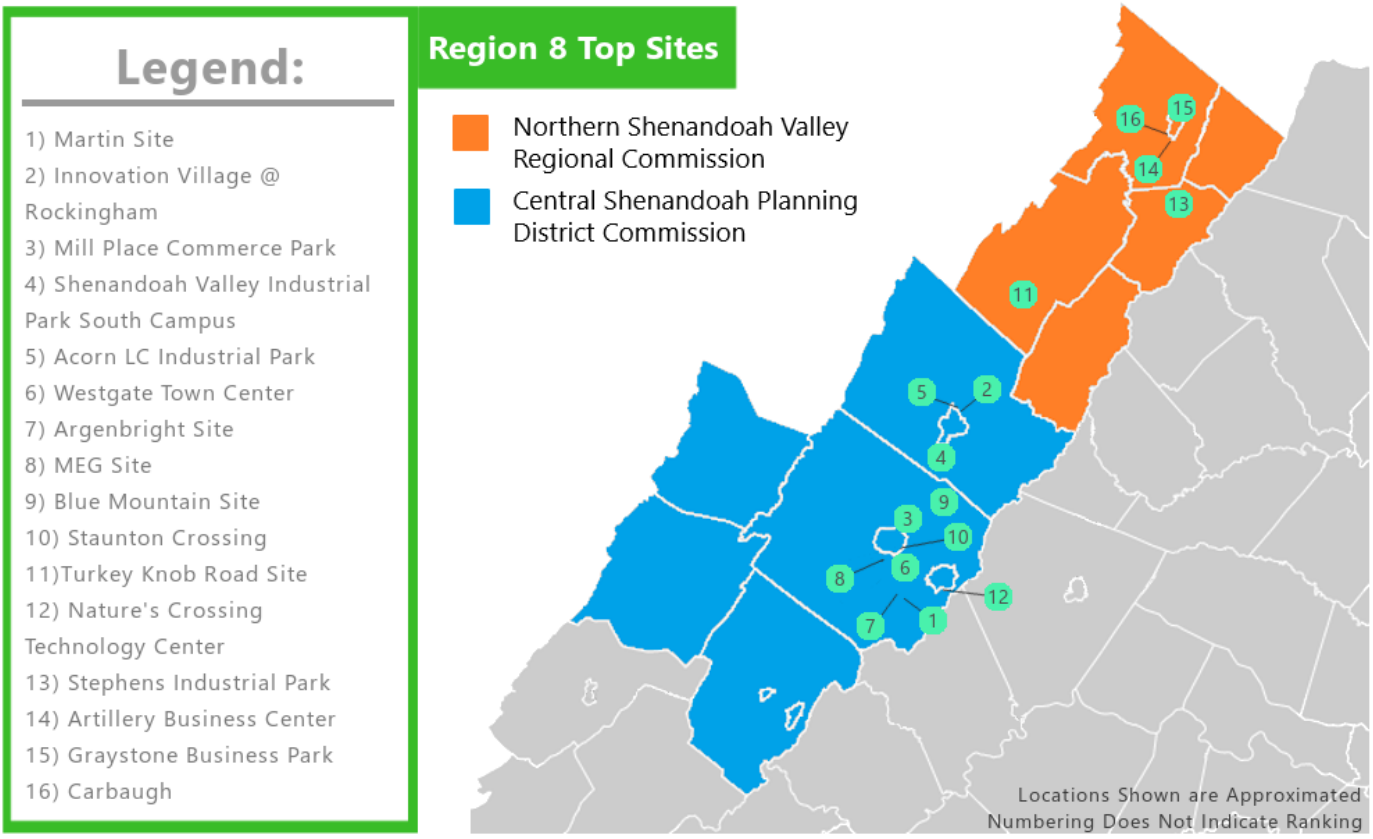
Appendix II - Top Selected Sites

Top Site Information

Below are sites identified as important for fostering economic development opportunities in Region 8.

Legend:

1) Martin Site
2) Innovation Village @ Rockingham
3) Mill Place Commerce Park
4) Shenandoah Valley Industrial Park South Campus
5) Acorn LC Industrial Park
6) Westgate Town Center
7) Argenbright Site
8) MEG Site
9) Blue Mountain Site
10) Staunton Crossing
11)Turkey Knob Road Site
12) Nature's Crossing Technology Center
13) Stephens Industrial Park
14) Artillery Business Center
15) Graystone Business Park
16) Carbaugh

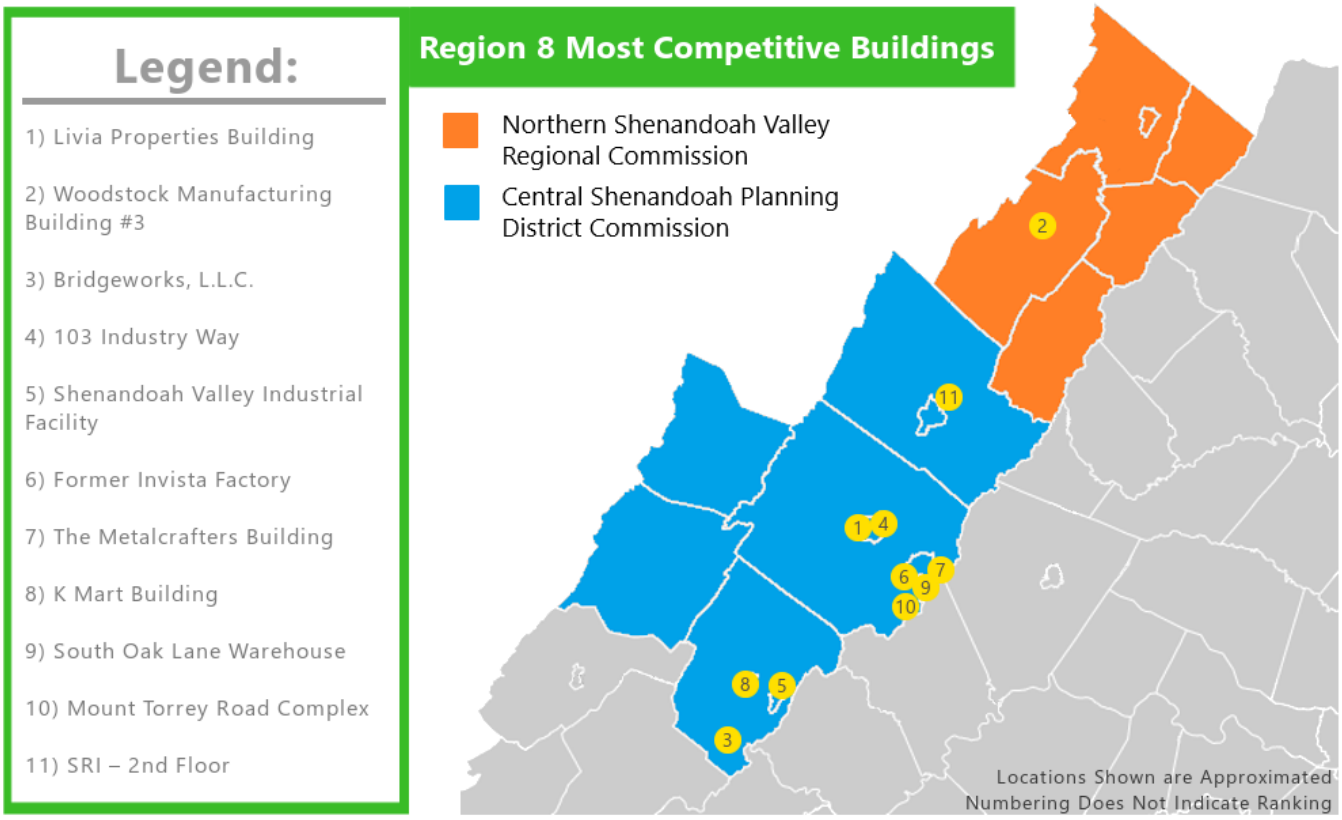


Region 8 Top Site Information							
Property Name	County	Acreage	Sewer On Site	Water On Site	Natural Gas On Site	Distance to Highway	Rail Access
Martin Site	Augusta	800	Yes	Yes	Yes	4	Yes
Innovation Village @ Rockingham	Rockingham	365	Yes	Yes	Yes	2	No
Mill Place Commerce Park	Augusta	400	Yes	Yes	Yes	1	No
Shenandoah Valley Industrial Park South Campus	Rockingham	245	Yes	Yes	No	2	Yes
Acorn LC Industrial Park	Harrisonburg	84	Yes	No	No	4	No
Westgate Town Center	Augusta	105	Yes	Yes	No	1	No
Argenbright Site	Augusta	90	No	No	No	4	No
MEG Site	Augusta	258	Yes	Yes	No	0	No
Innovation Village @ Rockingham	Rockingham	365	Yes	Yes	Yes	2	No
Blue Mountain Site	Augusta	530	No	No	No	1.5	Yes
Staunton Crossing	Staunton	295	Yes	Yes	Yes	0.1	Yes
Turkey Knob Road Site	Shenandoah	648	No	No	Yes	2	Yes
Nature's Crossing Technology Center	Waynesboro	170	No	Yes	No	0.3	Yes
Stephens Industrial Park	Warren	54	Yes	Yes	Yes	3	Yes

Source: Shenandoah Valley Partnership

Top Building Information

Below is building information for properties deemed as potential economic development opportunities in Region 8.



Region 8 Top Building Information							
Property Name	County	Total Space	Sewer On Site	Water On Site	Natural Gas On Site	Distance to Highway	Rail Access
Livia Properties Building	Staunton	120,000	Yes	Yes	No	3.5	Yes
Woodstock Manufacturing Building 3	Shenandoah	116,000	No	No	No	3	No
Bridgeworks, L.L.C.	Rockbridge	40,400	Yes	Yes	Yes	5	No
103 Industry Way	Staunton	27,075	Yes	Yes	Yes	1.6	No
Shenandoah Valley Industrial Facility	Buena Vista	173,055	Yes	Yes	Yes	5	No
Former Invista Facility	Waynesboro	69,300	No	Yes	No	2	No
The Metalcrafters Building	Waynesboro	164,000	Yes	Yes	Yes	2	No
K Mart Building	Rockbridge	56,500	Yes	Yes	Yes	3	No
South Oak Lane Warehouse	Augusta	322,198	No	Yes	No	1.2	Yes
Mount Torrey Road Complex	Augusta	104,000	No	Yes	No	2	No
SRI Building 2nd Floor	Harrisonburg	est. 14,500	Yes	Yes	Yes	0	No

Source: Shenandoah Valley Partnership

Appendix III – Stakeholder Engagement List

Region 8 Stakeholder Interview List	
Individual	Affiliation
Alan Dahl	Real estate investor
Alison Denbigh	Independent business owner
Amanda Glover	Augusta County, ED Director
Ashton Harrison	Bath County, County Administrator
Becky Nucilli	Shentel
Betsy Lee	StartHere Lexington
Betty Mitchell	The Higland Center
Bill Frazier	Frazier Associates
Bobbi Strother	Thermo Fisher
Bobby Berkstresser	White's Travel Center
Bonnie Riedesel	Central Shenandoah PDC
Bradley Polk	Shenandoah County, Dir. of Community Development
Brandon Davis	Northen Shenandoah Valley Regional Comission
Brian Brown	Shenandoah Valley Workforce Development Board
Carrie Chenery	Shenandoah Valley Partnership
Chiedo	Chiedo Labs
Chris Kyle	Shentel
Chris Thompson	InterChange Co.
Christina Cain	Staunton Creative Community Fund
Christina Phillips	Whitewave Foods
Courtland Robinson	Business Development Director SVP
Debbie Melvin	Virginia Economic Development Partnership
Debby Hopkins	Shenandoah Valley Workforce Development Board
Diane Yearian	JMU Human Resources
Dilton Gibbs	Kraft Heinz
Doug Stanley	Warren Co Administrator
EG&D Subcommittee	
Elizabeth McCarty	Central Shenandoah PDC
Frank Tamberrino	Harrisonburg Chamber of Commerce
George Anas	Rockingham County, ED Director
George Pace	GOVA Chair
Gerard Eldering	Blue Vigil
Greg Campbell	Shenandoah Valley Regional Airport
Greg Hitchin	City of Waynesboro, ED Director
Heather Kovaly	Thermo Fisher
Jeanian Clark	Lord Fairfax Community College
Jeff Stapel	Shickel Corp/SVWDB Chair
Jen Weaver	Shenandoah Valley Partnership
Jennifer McDonald	Front Royal/Warren Co EDA
JJ Smith	Valley Proteins
Jo Lee Loveland Link	Volvox, Inc. (SB)
Joan Hollen	Shenandoah Valley Workforce Development Board
Joanie Eiland	Elk Trucking, Inc.
John Downey	BRCC/GoVA, SVWDB

John Link	Volvox, Inc. (SB)
Judith Trumbo	Virginia Mennonite Retirement Community
Julie Suijk	Valley Health
Karen Bowman	SV Tech Council
Kathlynn Brown	SRI International
Keith Robinson	InterChange Co.
Larry Kroggle	Daikin Applied Technologies
Len Capelli	Clarke County ED Director
Lisa Seekford	Riddleberger Brothers
Martin Lightsey	Cadence
Mary Ann Gilmer	Goodwill Industries of the Valley
Nick Swayne	James Madison University
Nicky Swayne	SV Tech Council, Center for Entrepreneurship
Patrick Barker	Frederick County, ED Director
Patrick McGouwm	Center for Entrepreneurship
Paul Vitagliano	ThermoFisher Scientific
Peirce Macgill	City of Harrisonburg, Asst. ED Director
Robin Sullenberger	Highland County
Sally Michaels	Frederick County, Existing Business Coordinator
Sandy Rinker	Massanutten Technical Center
Sharon Johnson	Shenandoah Valley Workforce Development Board
Skylar Mouris	Shenandoah Valley Partnership Intern
Spencer Suter	Rockbridge County Administrator
Steve Gerome	Ball Corp.
Susan Brooks	Navy Federal
Tom Sheets	Blue Ridge Lumber

Appendix IV – Qualitative Interview Summary

Table of Contents

Talent Development

- Economy is reaching full employment, not a lot of slack labor, no available skilled labor in particular.
    - Huge projected nursing shortage, issue of lack of clinical rotations, this could lead to a multi-region solution.
    - Amazon will pull another 1,000 logistics workers out of the pool, exacerbating the problem for existing employers. Same with Navy Federal Credit Union.
    - Truck drivers in short supply, welders and train maintenance.
    - Industrial machine mechanics are starting to see wage inflation.
    - Signing bonuses are prevalent.
    - Region is starting to lose prospects due to this issue.
- Workforce is the #1 issue sited by local economic developers.
    - Need "work and learn" opportunities for high schoolers.
- JMU has 20,000 and is highly selective. However, JMU and other students leave the area upon graduation.
- There is a strong work ethic.
    - Entry level applicants are relatively plentiful; drug issue is present but not huge.
    - Training is the issue more than available workers.
- Strong supply of labor coming from West Virginia.
- Opportunity: pool funds from an industry sector with GOVA, create a revolving loan fund for training individuals.
    - Individual is lender, but sponsor (employer) agrees to pay debt service on training loan as long as person remains an employee. Repayment funds future loans. Individual is on the hook if they exit.
- The region has a very low unemployment rate, creating a very small available talent pool. It is necessary for employers to look outside of the traditional view of the talent pool to additional populations such as individuals with disabilities and foreign-born talent.
- The low unemployment, but continued demand, creates the opportunity for many workers to hop between jobs even for just a small raise or small changes in working conditions.
- While one of the strengths of the Region was said to be its beauty and quality of life, this also makes it difficult to attract workers, especially from the younger generation who are looking for more amenities that are found in more populated areas. Attraction is also difficult due to low wages compared to other surrounding areas.
- The manufacturing industry is a strong core of the regional economy, and employers are expecting to hire at all levels in the coming years. There will continue to be a great demand for talent in this industry, and the talent pool must be cultivated to fulfill that need.
- One of the Region's biggest strengths is its educational community, with a variety of institutions at all levels available for technical and post-secondary education. Employers were very complimentary of the responsiveness, particularly of the community colleges – Blue Ridge Community College, Lord Fairfax Community College, and Dabney Lancaster Community College – and the technical centers – Massanutten Technical Center, Triplett Tech, and Valley Career and Technical Center – in meeting their training needs.
    - Altogether, 50,000 students, representing an enormous potential talent pool. How do we capture them before they decide to leave?
- The Shenandoah Valley Workforce Development Board has been active in pursuing additional resources that have led to OJT and Apprenticeship programs. The strength of the Board and its Staff is an asset to the region.

- Many employees throughout the Region hold higher educational attainment than would typically be required by their positions. As the available labor pool was larger in recent years, employers were able to pick these more highly educated individuals, which has been a contributing factor to an issue with underemployment in the Region.
- One characteristic of the younger generation of workers is that most don't expect to stay at a job for more than 3-5 years. Understanding this trend, some employers have begun to adapt their practices so that they can still effectively hire and work with this population. There may be opportunities to educate other employers on how to adapt to this trend.
- There are several significant hiring events that will take place in the near future with two very large companies locating in the region needing more than 1,000 workers. This will have a significant effect on the current workforce and will require a collaboration of partners across the workforce system to meet this need without burdening current employers.
- It is important to get high school students to understand the opportunities available in the local economy and what facilities and jobs in local industries really look like. Targeting teachers and guidance counselors is a key part of reaching students and has a more lasting effect on getting the messaging into the schools. Young students must see that there are multiple paths to success after high school, not just a four-year degree.
- Employers are trying to prepare for the effect of retirements. Many businesses in the region have many long-term committed employees, so they are worried not only with filling the positions, but filling them with individuals who have the same good attitude and commitment.
    - Particularly acute for the manufacturing and construction sectors.

Growing Existing Businesses

- Hard to recruit new businesses, but local businesses are not leaving, they like it here and can make money.
- NOVA drives up cost of labor because they offer premium salaries. However, in the balance of the Region, wages are a selling point.
- While there is heavier traffic on I-81, still one of the biggest assets the Region has that ties it together and provides opportunities. No tolls, higher speeds, less congestion and more affordable land/labor than I-95.
- In the north, warehousing and logistics is big and there is major spillover from NOVA.
    - Amazon warehouse, Navy Federal, IT Tech at Avtex, etc.
- In the south, tourism is big and growing; residential growth from Charlottesville spillover.
    - Opportunities for conference center, tourism destination center, retirement-focused developments. "Race Track" proposal.
    - Satellite location of the Museum of Natural History ($10mm, state request of $6.5mm).
- Opportunity: export initiatives based on the very strong agriculture production of the Region.
- Opportunity: airport and aerospace-related projects, aviation maintenance.
    - From Courtland "[…] prime real estate for an aerospace related project. Note, SHD's hanger space is currently at capacity. The Airport's adequate runway length for larger aircraft, rural and discreet surroundings, low to moderate enplanement counts, and positioning on the eastern seaboard makes it a prime location for developing and testing aeronautical technology. Aviation Maintenance Technology training programs offered by Blue Ridge Community College have and can continue to support jobs in this sector. Employers like Dynamic Aviation and Leidos have contracts all over the world but choose to operate in the Shenandoah Valley, offering great salaries and advancement opportunities in this field."

- Industry associations are non-existent or not strong.
- Manufacturing opportunities:
    - Mega site for auto related,
    - Craft beverage, and
    - Pharma manufacturing plant.

Startups/Innovation/Commercialization

- Region 8 has made steps to counteract these challenges, however progress is uneven. In Harrisonburg, some parts of the ecosystem are more robust, while the ecosystem is less developed in the other Region 8 localities.
- James Madison University is contributing by training undergraduates and graduate students in entrepreneurship. The Center for Entrepreneurship supports student entrepreneurs and is hosting its first summer cohort this year. In addition, the 4VA program and its X-Labs makerspace are allowing JMU students to experience and experiment with new technologies such as drones. JMU also has a cyber security program that could tie into the spillover from NOVA.
- The infrastructure in Region 8 is limited, with some broadband and even cell service lacking in the more remote regions. And support structures, such as lawyers, accountants, and mentors, are limited in the region, compared to other parts of Virginia.
- Infrastructure specific to entrepreneurs, on the other hand, is fragmented. While X-Labs and the Center for Entrepreneurship programming is available for students, a single co-working space in downtown Harrisonburg is full. An Innovation Hub is planned in Staunton and will likely include the existing makerspace. Lexington's co-working space, StartHere, is not fully utilized. The Highland Center's newly renovated home in Monterey supports local food-based businesses with two commercial kitchens and walk-in freezers.
- Non-governmental institutions, such as the Shenandoah Valley Innovation Coalition, exist, and are focused on the technology sector in general.
- Sources of capital are relatively strong for a region of this size.
- JMU, Shenandoah College, VMI and Washington and Lee are themselves not as strong a piece of the local ecosystem as they might be if they were research universities. SRI, another research entity, also has limited production of intellectual property that can be commercialized. As a result, there are limited examples of successful spin-off companies, although JMU in particular is working to change this.
    - Ag-bio research institute? Avian flu, infection control, food sciences and food tech?
    - How do we best capitalize on SRI's powerhouse status in Silicon Valley?
- The diversity and creativity supported by a "college town" is also part of the supportive culture of this area and extends to Harrisonburg, Staunton and Lexington.
- There is an opportunity to pull over from NOVA the innovation assets lacking in the Region, such as in the cybersecurity field.

Sites

- Site are not ready – there is a lack of product.
    - Lack of sites is the #2 issue cited by local economic developers.
    - Sites are not prospect ready or marketable, multiple issues with infrastructure.
    - Regulatory burden can be at play as well.
    - Money is an issue, aversion to pre-investing.

    - Supply constraint is clearly hampering growth.
- Under the state's classification system, we have lots of Tier 1 and Tier 2 sites, a few Tier 3 and no Tier 4 or 5.
- One "Dream" would be a Regional industrial site like the Blue Mountain Site, which is 500 acres near the airport, Tier 2, needs water tank and upgrade to WW plant and 6 miles of gas line to pull in gas. Turkey Knob – part of the site received a Tier 4 designation (100 acres of 600, some of which is encumbered by solar farm).
- Warren County sites:
    - Jett property, needs $25mm bridge to get to 522-acre site.
    - Happy Creek, 660 acres, new interchange on 66 needed, plan to get gas to site.
    - $12-14 mm for grade-separated crossing to eliminate backups.
    - Siting a smaller (500MW) gas powered plant (recent one 1,600MW).
    - $25mm to do Crooked Run site.
    - Stevens industrial park, 54 acres, 26 with gas, water, sewer and rail.
    - Data center, IT Federal plus one could work, but would need $3.5 mm to get to five data centers (dual feed and capacity)
- Waynesboro sites:
    - Longer term project to build out two parks, city owns them off I-64.
    - From Greg: "$14 mm VDOT to connect industrial parks, main artery through industrial park, 2023, City is doing water/infrastructure 170 acres with industrial park with gas and rail. 2x 40-acre rail sites plus additional site. Will open 50 acres of old industrial. Exit 94 and 96. Nature's Crossing Technology Center (the new one – 170 acres of farm), Waynesboro Commerce and industry park. Interstate frontage – prime office. City is throwing in $10 million for purchasing, water/sewer. 1.2 mm SF of space fully built in the 170 acres. Part is wetlands, that is where nature park comes in, flood plan."
- There is access to plentiful water supplies with the aquifer and river waters. Some users can tap in directly and bypass municipal systems.

Other

- Broadband and cell coverage is an issue for portions of the region.
- Staunton Foundation has seed money.
- Airport is a real asset. From Courtland: "Approximately a quarter of all projects that come across our desk demand, proximity to an airport with corporate amenities and commercial service. Moreover, there are several large and medium size employers that base their corporate planes at SHD year-round. The service provided by SHD is just as much a business retention asset as it is an attraction tool, but to me there's more opportunity there than meets the eye."
- Region is family friendly, but not great for 20-30-year old's, Millennials are lacking here.
- K-12 education system not seen as a quality asset, business executives typically send kids to private school or live in Charlottesville.
- While one region, stakeholders indicated that there are some natural sub-regions that exist within Region 8, most commonly dividing it into North, Central, and South regions.
- There is a strong collaborative spirit within the region that is a great foundation for collaborative efforts. Employers and community partners all indicated that there are good relationships in place with various entities and that organizations are always willing to partner on initiatives.

- While data shows that the region is relatively homogenous when looked at as a whole, there is a large amount of diversity in several areas, including Harrisonburg and Winchester. There are nearly 60 different languages spoken at Harrisonburg High School. There are many refugees hosted in the region, due in large part to the presence of the church and its mission focus.
- Economic base is already fairly diversified – decreasing reliance on manufacturing and construction, growing medical, financial and logistics. Tourism and outdoor recreation assets are strong, including historic site attractions.

Appendix V – Targeted Industry Profiles

Table of Contents

Finance and Business Services

Region 8 Industry Profile

Overview:

The Finance and Business Services sector represents industries that provide finance, insurance, real estate, accounting, and consulting services. The core subsectors for Region 8 are Depository Credit Intermediation (NAICS 5221), Computer Systems Design and Related Services (NAICS 5415) and Management, Scientific, and Technical Consulting Services (NAICS 5416). A detailed listing of the industries included in the sector is provided at the end of this profile.

Major Products and Services in Region 8:

- Printing and related services
- Insurance and wealth management
- Accounting and bookkeeping
- Real estate leasing
- Information and data processing
- Legal and consulting services
- Depository credit intermediation

Sector Significance in Region 8

Regional job growth in the Finance and Business Services sector has historically outpaced that of the state and nation. Regional factors have propelled job growth at a greater rate than expected over the last decade, making this industry highly competitive. Depository Credit Intermediation (NAICS 5221) is projected to be the most competitive industry in Region 8 by 2026.

Industry Trends

Finance and Business Services establishments increased by 2.7% in Region 8, adding 56 new firms. This growth falls short of state and national growth at 10.6% and 9.3% respectively. The 2,108 Finance and Business Services establishments in Region 8 account for 3.6% of all Finance and Business Services businesses in Virginia.

Industry Establishments				
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change
Region 8	2,052	2,108	56	2.7%
Virginia	53,223	58,874	5,651	10.6%
United States	1,738,025	1,899,958	161,933	9.3%

Source: EMSI

While Region 8's establishment growth lagged behind state and national figures, job growth was comparatively strong. Over the past five years, Finance and Business Services jobs have increased by 17.0% in the Region, compared to 7.0% in the state and 10.0% in the nation. Looking forward for the next five years, all studied regions are expected to grow at a slower rate with Region 8 still leading job growth.

Projections indicate that Region 8 will add 2,012 jobs between 2016-2021, expanding the sector by just over 11%.

Historical Change in Jobs					
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change	Regional Competitive Effect
Region 8	15,315	17,912	2,597	17.0%	1,561
Virginia	583,925	623,791	39,866	7.0%	
United States	16,411,761	18,131,870	1,720,109	10.0%	

Source: EMSI

Projected Change in Jobs					
Location	2016	2021	2016 - 2021 Change	2016 - 2021 % Change	Regional Competitive Effect
Region 8	17,912	19,924	2,012	11.2%	1,342
Virginia	623,791	667,235	43,444	7.0%	
United States	18,131,870	19,431,070	1,299,200	7.0%	

Source: EMSI

Regional Competitive Effect[i]: As shown by a regional competitive effect of 1,561, job growth in Finance and Business services over the past five years exceeded expectations based on national trends. A positive regional competitive effect indicated that regional factors contributed to additional job gain over this period. Over the next five years, regional factors will produce job growth at a slightly lesser rate, while still adding an additional 1,342 jobs to Region 8.

Concentration[ii]: When examining a given industry, a location quotient (LQ) greater than 1 denotes that a given industry is more concentrated in a specified area than across the entire United States. Of the 22 4-digit industries included in the Finance and Business Services industry sector, three currently have location quotients (LQs) that are higher than 1.2, which denotes significant concentration of an industry within a region. These industries are Printing and Related Support Activities (NAICS 3231, LQ of 4.20), Insurance and Employee Benefit Funds (NAICS 3231, LQ of 1.53), and Depository Credit Intermediation (NAICS 5221, LQ of 1.34).

Occupations in Finance and Business Services

Top Occupations Replacement Demand[iii]

The following table includes the top five occupations identified to staff the Finance and Business Services sector within Region 8. However, the occupation data below is for the entire state of Virginia and, also, crosses over multiple industries. Nevertheless, it gives a good indication of the overall trends within these occupations. Over the next five years, while the top five occupations are projected to collectively add several thousand new jobs, the majority of job demand will come from replacement jobs. Since the number of jobs for Tellers is projected to decline, all available openings will come from replacement jobs.

Replacement Demand for Top Finance and Business Services Occupations (Virginia)							
Occupations	Employed in Industry Group 2016	Change (2016 - 2021)	2016 - 2021 Openings	Annual Openings	2016 - 2021 Replacement Jobs	Annual Replacement Jobs	% Replacement Jobs
Accountants and Auditors	45,191	3,868	10,145	2,029	6,277	1,255	61.9%
First-Line Supervisors of Office and Administrative Support Workers	44,180	2,680	6,116	1,223	3,436	687	56.2%
Tellers	11,715	(481)	2,248	450	2,248	450	100.0%
Customer Service Representatives	63,205	6,271	14,428	2,886	8,157	1,631	56.5%
Office Clerks, General	96,585	3,845	14,476	2,895	10,631	2,126	73.4%

Source: EMSI Q2 2017 Dataset

Job Postings and Required Skills

The following includes job posting data for Region 8 between April and June 2017 for the top occupations required to staff companies within the Finance and Business Services industry. The top occupations with job postings include Customer Service Representatives; Secretaries and Administrative Assistants, Except Legal, Medical, and Executive; and Maintenance and Repair Workers, General. Of these, there appears to be challenges in hiring Customer Service Representatives; Sales Representatives, Services, All Other; First-Line Supervisors of Office and Administrative Support Workers; Insurance Sales Agents; Personal Financial Advisors; Tellers; and Software Developers, Applications. This indicates that there is likely more demand than supply for these occupations. On the other hand, there were more Office Clerks, General and Bookkeeping, Accounting, and Auditing Clerks hired than there were job postings, which may indicate that companies are not relying directly on traditional job postings to hire.

The Relevance Score indicates the frequency at which a skill appeared on job postings for the selected occupations relative to all job postings within the region. A positive score indicates a greater frequency. Based on job postings during the same period, the most relevant hard skills required include Typing; Marketing Planning; and Long-Term Care Insurance. Relevant soft skills include Listening and Leading.

Finance and Business Services Job Postings vs. Hires, April 2017 - June 2017		
Occupation	Avg Monthly Postings	Avg Monthly Hires
Customer Service Representatives	237	159
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	135	146
Maintenance and Repair Workers, General	133	137
Sales Representatives, Services, All Other	121	56
General and Operations Managers	115	115
First-Line Supervisors of Office and Administrative Support Workers	114	98
Insurance Sales Agents	66	14
Accountants and Auditors	52	68
Computer User Support Specialists	49	42
Personal Financial Advisors	49	6
Tellers	40	22
Software Developers, Applications	25	18
Office Clerks, General	21	295
Receptionists and Information Clerks	18	88
Management Analysts	16	26
Loan Officers	14	10
Bookkeeping, Accounting, and Auditing Clerks	12	130
Printing Press Operators	7	13
Print Binding and Finishing Workers	6	4
Real Estate Sales Agents	4	18
Paralegals and Legal Assistants	3	10
Veterinarians	2	10
Lawyers	2	15
Veterinary Assistants and Laboratory Animal Caretakers	2	11
Graphic Designers	0	10

Source: EMSI Q2 2017 Dataset

Finance and Businesses Services Job Postings Hard Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Typing	1.27	354
Marketing Planning	0.62	140
Long-Term Care Insurance	0.55	131
Sales	0.49	1,348
Financial Industry Regulatory Authorities	0.46	134
Brand Awareness	0.40	130
Customer Service	0.36	1,157
Administration	0.36	670
Wireless Communications	0.35	80
Finance	0.31	794
Positioning	0.28	129
Securities (Finance)	0.27	132
Marketing Strategies	0.23	135
Management	0.19	1,318
Long-Term Care	0.18	148
Client Rapport	0.17	185
Insurance Sales	0.17	95
Financial Services	0.16	223
Preventive Maintenance	0.15	92
Retailing	0.15	757
Repairing (Computer Systems)	0.14	274
HVAC	0.13	104
Retirement Plans	0.13	132
Warranty	0.12	102
Investments	0.11	143
Operations	0.11	633
Accounting	0.11	262
Marketing	0.11	437

Source: EMSI Q2 2017 Dataset

Finance and Business Services Job Postings Soft Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Listening	0.02	111
Leading	0.02	205

Source: EMSI Q2 2017 Dataset

Supply Chain: Demand, Purchases and Sales

Demand

Demand for a given industry or industry sector is calculated based on the estimated national demand from all industries and consumers. Industry wages, taxes, and other value added payments are indirectly part of the demand through the production of the supplying industry. The total demand by consumers and other industries in Region 8 for goods and services produced by Finance and Business Services is $1.7 billion. Slightly over 22% of this demand was met by Finance and Business Services within the Region, equivalent to roughly $387 million worth of goods and services. The other 78% of the demand was satisfied by imports from outside the Region.[1]

Demand in Region 8 for Goods Produced by Finance and Business Services				
Demand Met in Region 8	% Demand Met in Region 8	Demand Met by Domestic Imports	% Demand Met by Domestic Imports	Total Demand in Region 8
$ 387,423,002	22.2%	$ 1,354,408,007	77.8%	$ 1,741,831,009

Source: EMSI

Purchases

The top industries from which Finance and Business Services in Region 8 purchased the greatest amount of goods is displayed in the table below. Over $79 million in goods and services were purchased from Commercial Banking (NAICS 522110); approximately 5% of these purchased came from within the Region while 95% were imported. This represents the highest percentage of purchases imported from outside the Region. A similar amount of goods and material was purchased from Temporary Help Services (NAICS 561320). The majority of the $75 million in purchases in this category were also imported.

The highest percentage of purchases made within Region 8 was in Officers of Real Estate Agents and Brokers (NAICS 531210) where 52% of the purchases came from within the Region. In contrast, purchases made from Commercial Banking (NAICS 522110); Temporary Help Services (NAICS 561320); Insurance Agencies and Brokerages (NAICS 52410); Lessors of Residential Buildings and Dwellings (NAICS 531110); Corporate, Subsidiary, and Regional Managing Offices (NAICS 551114); and Janitorial Services (NAICS 561720) were primarily imported from outside the Region. Less than 20% of goods purchased in these sectors came from Region 8.

[1] This data only includes demand with respect to industries and consumers within the United States.

Top 10 Industries by Purchases Made by Region 8 Finance and Business Services in 2016						
NAICS	Purchases from	In-Region Purchases	% In-Region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
522110	Commercial Banking	$3,864,866	4.9%	$75,265,818	95.1%	$79,130,684
561320	Temporary Help Services	$4,024,014	5.4%	$70,789,239	94.6%	$74,813,253
524210	Insurance Agencies and Brokerages	$3,273,766	5.5%	$56,686,164	94.5%	$59,959,930
523930	Investment Advice	$14,872,814	26.9%	$40,389,654	73.1%	$55,262,468
531110	Lessors of Residential Buildings and Dwellings	$3,296,499	6.4%	$48,146,180	93.6%	$51,442,679
551114	Corporate, Subsidiary, and Regional Managing Offices	$2,445,402	5.2%	$44,976,541	94.8%	$47,421,942
531210	Offices of Real Estate Agents and Brokers	$22,081,103	51.8%	$20,541,257	48.2%	$42,622,360
561720	Janitorial Services	$4,767,423	12.5%	$33,459,400	87.5%	$38,226,823
561730	Landscaping Services	$9,459,979	26.6%	$26,067,270	73.4%	$35,527,249
523920	Portfolio Management	$8,511,304	25.1%	$25,434,595	74.9%	$33,945,898

Source: EMSI

Sales[2]

In Region 8, the largest buyer of products and services from the Finance and Business Services sector was General Medical and Surgical Hospitals (NAICS 622110), totaling $49 million. Sales to this industry, along with four other major buyers, decreased from 2015 to 2016. The biggest decrease in sales occurred in Lessors of Residential Buildings and Dwellings (NAICS 531110), where sales decreased by $3.7 million. Conversely, the largest increase of sales occurred in the Federal Government (NAICS 901199) sector, increasing by $3.6 million.

Top 10 Industries for Sales Made by Region 8 Finance and Business Services				
NAICS	Sales to	Total In-Region Sales 2015	Total In-Region Sales 2016	Change in Sales 2015 - 2016
622110	General Medical and Surgical Hospitals	$51,232,919	$49,117,487	($2,115,432)
551114	Corporate, Subsidiary, and Regional Managing Offices	$26,564,606	$28,392,163	$1,827,557
901199	Federal Government, Civilian, Excluding Postal Service	$22,915,882	$26,503,035	$3,587,153
522110	Commercial Banking	$17,902,729	$19,637,627	$1,734,898
813110	Religious Organizations	$19,373,324	$17,421,764	($1,951,560)
621111	Offices of Physicians (except Mental Health Specialists)	$19,331,621	$16,388,145	($2,943,477)
522130	Credit Unions	$10,556,905	$13,318,126	$2,761,221
531110	Lessors of Residential Buildings and Dwellings	$14,370,244	$10,703,124	($3,667,121)
611310	Colleges, Universities, and Professional Schools	$13,713,371	$10,668,561	($3,044,811)
525990	Other Financial Vehicles	$10,079,956	$10,415,117	$335,160

Source: EMSI

[2] Industry sales are calculated using the sum of the dollar value for all goods and services that other industries purchased from a given industry or industry sector. This calculation a) uses historical data instead of estimates, and b) does not include consumer spending; the total in-region sales for an industry or industry sector will often be lower than estimated in-region demand.

Factors Driving Investment and Competitiveness

The Finance and Business Services industry grows in tandem with the US economy. Finance and Business Services are reliant on the growth and success of the industries to which it caters. Increasing corporate profitability and business expenditures results in higher demand for these services.

Overall, the barriers to entry in the Finance and Business Services industry are generally low due to low regulation and minimal startup costs. Mergers are common in this industry for firms to offer end-to -end business solutions. As a result, service lines are not mutually exclusive and are often used in conjunction with another industry service. For example, management consulting, accounting and IT consulting will be used throughout a firm's advisement to execution process.

Depository Credit Intermediation

Increased membership and interest rates are anticipated to increase Credit Unions (NAICS 52213) industry revenue at an annualized rate of 1.7% through 2022. Credit unions compete with other depository credit intermediaries and non-depository credit intermediaries on price, product offerings and quality of services. Credit Unions benefit from two main perceptions: (1) a common bond among members and (2) that they are a low or no fee institution.

IBISWorld projects that the Credit Union industry will face consolidation at a rate of 1.1% over the next five years. Credit Unions that can survive the mergers and acquisitions will face increased demand and need to expand branch networks to satisfy these demands. Credit unions can increase their competitive edge through addition of branches, ATMs and cooperative agreements for greater access to their customers. While banking services are still the primary service line for these businesses, maintaining secure databases to protect customer information is also becoming a significant consideration. Expanding firms will need to consider cybersecurity systems that adequately cover their existing customers and can further handle more traffic as customer volume increases.

Computer Systems Design and Related Services

Computer Systems Design and Related Services (NAICS 54151) companies are typically small, nonemployee or independent contractors. Company consolidations allow companies to remain competitive through technology and services shifts. Currently, shifts towards cloud computing and data analysis has resulted in increased demand for services as companies begin to replace older technology. Industry revenues are projected to grow at an annualized rate of 2.4% over the next five years into 2021. Online financial services are expected to rise at an annualized rate of 8.7%, further increasing Computer Systems Design and Related Services demand and revenue.

Low barriers to entry coupled with increasing revenues will encourage new companies to enter the industry, increasing competition. A suitable network connection, like fiber-optic broadband access, is a key piece of infrastructure needed for startups in this field. For companies to retain a competitive edge they need to focus on reputation and customer base. These factors are extremely valuable in obtaining new work, especially for IT consultants in Computer Systems Design and Related Services, which acquire the majority of their work from referrals and recommendations from previous clients.

Management, Scientific, and Technical Consulting Services

Demand in Management Consulting Services (NAICS 54161) stems from a variety of different sectors including financial institutions, professional firms, and healthcare companies requiring staff realignment. Management Consulting Services operators thrive both in times of rising and declining corporate profit. Rising corporate profits attract Management Consulting Services to determine expansions, restructures or mergers. When corporate profits decline firms use Management Consulting Services to determine restructures to operations to remain competitive during difficult market conditions. Companies within the Management Consulting Services sector are highly competitive. Competition is primarily based on quality of insights provided, but there is also large emphasis on cost.

Key External Drivers

National trends suggest that the overall health of the Finance and Business Services sector is impacted greatly by:

- **Corporate profit** – Corporate profit measures the health of the entire economy, rather than one specific industry. As corporate profit increases the number of businesses that can afford Finance and Business Services increases. Corporate profit is anticipated to increase at an annualized rate of 1.7% over the next five years, presenting a potential opportunity for the industry.
- **Government consumption and investment** - Government agencies attribute a significant proportion to industry revenue. Government consumption and investment is projected to increase, favoring the Finance and Business Services industry.
- **Private investment in computers and software** - An increase in investment specifically in computers and software increases the likelihood of businesses using management consultants and other Finance and Business Services industries. Aggregate private investment, including private investment in computers and software, is projected to rise at an annualized rate of 3.8% through 2022, presenting an opportunity for the industry.
- **Aggregate household debt** – Aggregate household debt includes all debt that consumers hold, including credit cards, mortgages, personal loans, car loans and other debt. As aggregate household debt increased interest revenue increases specially for the for Depository Credit Intermediation industry. High aggregate household debt is indicative of consumer confidence and has a strong influence on private consumption. Aggregate household debt is expected to increase, representing a potential opportunity for the industry,

Success Factors

For Finance and Business Services firms to continue to operate successfully, they will need to:

- Establish a reputation for strong and in-depth knowledge of the product or service being offered
- Provide additional business and financial services to raise revenue
- Exercise effective cost control methods
- Recruit and maintain a highly skilled and well trained workforce
- Access niche markets through specialized skills or services
- Develop a strong network of contacts, referrals, and other industry players

Factors Driving Location

The Southeast region of the United States holds the largest share of Finance and Business Services industry activity. States in the Southeast have the benefit of being located near a large number of states, densely populated areas and are located near key downstream markets. Virginia is home to 3.2% of all Credit Union (NAICS 52213) establishments, 3.7% of Management Consulting Services (NAICS 54161) establishments and 6.7% of Computer Systems Design and Related Services (NAICS 54151).

The physical space needed for firms in this sector ranges widely depending on their size, service lines and equipment or software requirements. In the neighboring Northern Virginia real estate market, the business services sector accounts for 39% of office market leasing activity.[3] With 17% of the area's nearly 193 billion rentable square feet (RSF) vacant, and an additional 4.4 million RSF under construction, the office market in Northern Virginia is saturated. The vacancy rates indicate that supply is outpacing demand, but the lease rates increased 50 basis points from year end 2015 to an average of $30.67 per square foot.[4] Due to this inventory surplus and an unbalanced market, it will be challenging for Region 8 localities to compete in the office space market.

Overview of Finance and Business Services Companies in Region 8

A diverse range of finance and business services firms exist throughout Region 8. A selection of these firms are listed below:

- Navy Federal Credit Union
- R R Donnelley
- World Color
- Creekside Insurance Advisors, Inc.
- LD&B Insurance and Financial Services
- PBMares
- Summit Community Bank
- DuPont Credit Union

[3] Northern Virginia is comprised of Arlington, Clarke, Culpeper, Fairfax, Fauquier, Frederick, King George, Loudoun, Prince William County, Spotsylvania, Stafford, and Warren, and the independent cities of Alexandria, Falls Church, Fairfax, Fredericksburg, Manassas and Manassas Park Counties.
[4] Real Estate Outlook Northern Virginia Office Market Q4 2016, Transwestern

[i] The Regional Competitive Effect is part of a Shift Share Analysis. Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages from growth that can be attributed to national employment trends or overall industry trends. Shift Share indicators help to answer the question "Why is employment growing or declining in this industry?" The **regional competitive effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry.

[ii] Location Quotient (LQ) analysis determines how concentrated a particular industry, demographic group, or other variable is compared to a larger geography. Concentration is a measure of local and regional strength when assessing economic growth potential. LQ is calculated by comparing the variable at a regional and national level. For example, if breweries account for 0.16% of all jobs in the Region but only 0.015% of all national jobs, then the LQ for breweries in that region would be 10.67 (0.16/0.015), demonstrating that breweries are 10 times more concentrated in that region than the national average.

[iii] Replacement Demand utilizes the difference between the number of jobs that are expected to be added to the regional economy between the period of 2016 and 2021 and the number of jobs that will have openings due to normal turnover in the workforce such as retirement, death, and changing careers. Occupations with high figures for replacement demand compared to expected job growth may point to an occupation with low wages, or it may indicate a large number of upcoming retirements due to an aging workforce.

4-Digit NAICS Industries Included in the Finance and Business Services Sector

Finance and Business Services	
NAICS	Description
5415	Computer Systems Design and Related Services
5416	Management, Scientific, and Technical Consulting Services
5419	Other Professional, Scientific, and Technical Services
5411	Legal Services
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
5413	Architectural, Engineering, and Related Services
5313	Activities Related to Real Estate
5242	Agencies, Brokerages, and Other Insurance Related Activities
5311	Lessors of Real Estate
5239	Other Financial Investment Activities
5241	Insurance Carriers
5418	Advertising, Public Relations, and Related Services
5182	Data Processing, Hosting, and Related Services
3231	Printing and Related Support Activities
5414	Specialized Design Services
5221	Depository Credit Intermediation
5222	Nondepository Credit Intermediation
5231	Securities and Commodity Contracts Intermediation and Brokerage
5191	Other Information Services
5223	Activities Related to Credit Intermediation
5259	Other Investment Pools and Funds
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
5251	Insurance and Employee Benefit Funds

Health Care

Region 8 Industry Profile

Overview:

The Health Care sector represents industries that provide health care and social assistance for individuals. Industries in this sector cooperate in the process to serve patients through health care providers, technology and research. Establishments include hospitals, doctors' offices, nursing homes, surgery centers, laboratories, and medical research centers. The core subsector for Region 8 is General Medical and Surgical Hospitals (NAICS 6221), which employs over 8,600 workers and is projected to add an additional 1,500 workers over the next ten years. This addition will make it the second most competitive industry in the Region by 2026. Other core subsectors include Continuing Care Retirement Communities (NAICS 623311) and Nursing Care facilities (NAICS 623110). A detailed listing of the 4-digit NAICS industries included in the sector are provided at the end of this profile.

Major Products and Services in Region 8:

- General healthcare
- Surgeries
- Assisted living
- Medical research
- Medical equipment and pharmaceuticals
- Dentistry

Sector Significance in Region 8

The Health Care sector plays a vital role in supporting quality of life for residents in Region 8. As the population ages throughout Region 8 localities, an increased demand for hospital services will require strategic planning by educational institutions and training providers to deliver an adequate number of health care workers who can perform a variety of medical specialties. The need is especially acute for nurses as the current workforce cohort continues to retire. Taking stock of existing retirement communities and assisted living facilities will also help localities understand how to retain individuals who want to age in place instead of leaving their community if they are not able to find sufficient care.

Industry Trends

The number of establishments increased by 7.2% in Region 8 between 2011 and 2016. This growth slightly exceeds national growth of 6.3% but falls short of the 12.6% state-level growth. The 1,205 Health Care establishments in Region 8 account for 6.0% of all Health Care businesses in the state.

Industry Establishments				
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change
Region 8	1,124	1,205	81	7.2%
Virginia	17,877	20,125	2,248	12.6%
United States	854,503	908,032	53,529	6.3%

Source: EMSI

While Region 8 has experienced growth in establishments, total jobs have declined by 0.5% (a loss of 222) over the past five years. During the same period, Virginia and the nation both experienced a 5.0% growth in Health Care jobs. Looking forward, all study regions are expected to grow at a faster rate in the five years leading up to 2021. Region 8 anticipates a 7.0% job growth, adding over 3,500 jobs.

Historical Change in Jobs					
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change	Regional Competitive Effect
Region 8	47,576	47,354	(222)	(0.5%)	(2,454)
Virginia	685,739	719,066	33,327	5.0%	
United States	27,423,313	28,859,776	1,436,463	5.0%	

Source: EMSI

Projected Change in Jobs					
Location	2016	2021	2016 - 2021 Change	2016 - 2021 % Change	Regional Competitive Effect
Region 8	47,354	50,894	3,540	7.0%	(292)
Virginia	719,066	783,196	64,130	9.0%	
United States	28,859,776	31,422,969	2,563,193	9.0%	

Source: EMSI

Regional Competitive Effect[i]: As shown by a regional competitive effect of –2,454, job growth in Health Care in Region 8 over the last five years failed to meet expectations based on national trends. This indicates that local factors within the Region contributed to job loss over this period. While the Region is anticipated to expand their Health Care industry by 7% 2016-2021, the job gains are projected to fall short of job expectations based on national and sector factors.

Concentration[ii]: When examining a given industry, a location quotient (LQ) greater than 1 denotes that a given industry is more concentrated in a specified area than across the entire United States. Of the 20 selected 4-digit industries included in the Health Care industry sector, 6 currently have location quotients (LQs) that are higher than 1.2, which denotes significant concentration of an industry within a region. These industries are:

- Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly (NAICS 6233, LQ of 2.37),

- Death Care Services (NAICS 8122, LQ of 1.78),
- Education and Hospitals (State Government) (NAICS 9026, LQ of 1.69),
- Consumer Goods Rental (NAICS 5322, LQ of 1.36),
- General Medical and Surgical Hospitals (NAICS 6221, LQ of 1.25), and
- Medical Equipment and Supplies Manufacturing (NAICS 3391, LQ of 1.20).

Occupations in Health Care

Top Occupations Replacement Demand[iii]

The chart below indicates the top five occupations[1] required to staff companies within the Health Care industry for Region 8, however, the data is provided for the state of Virginia. While the top five occupations are projected to experience healthy growth, particularly for Personal Care Aides and Registered Nurses, just over half of the openings over the next five years among these occupations will be replacement jobs, due in large part to the aging population and upcoming retirements. Office Clerks, General and Registered Nurses, in particular, will have high replacement demand.

Replacement Demand for Top Healthcare Occupations (Virginia)							
Occupations	Employed in Industry Group 2016	Change (2016 - 2021)	2016 - 2021 Openings	Annual Openings	2016 - 2021 Replacement Jobs	Annual Replacement Jobs	% Replacement Jobs
Registered Nurses	66,681	6,606	14,836	2,967	8,230	1,646	55.5%
Home Health Aides	13,470	3,951	5,679	1,136	1,728	346	30.4%
Nursing Assistants	37,792	3,912	8,383	1,677	4,471	894	53.3%
Personal Care Aides	52,388	8,956	11,255	2,251	2,298	460	20.4%
Office Clerks, General	96,585	3,845	14,476	2,895	10,631	2,126	73.4%

Source: EMSI Q2 2017 Dataset

[1] Of the Health Care and related support occupations in the staffing pattern. The industry group created for Healthcare includes Education and Hospitals (State Government) (NAICS 9026) and Education and Hospitals (Local Government) (NAICS 9036) which account for healthcare employment in public hospitals; however, the staffing patterns for these industries also include non-healthcare occupations in public education institutions, such as Elementary School Teachers.

Job Postings and Required Skills

The following table includes job posting data for Region 8 between April and June 2017 for the top occupations required to staff companies within the Health Care industry.[2] The top occupations by job postings include Registered Nurses and Combined Food Preparation and Service Workers, Including Fast Food. Of these, there appears to be challenges in hiring Registered Nurses. This indicates that there may be more demand than supply for this occupation. On the other hand, there were far more Combined Food Preparation and Service Workers, Including Fast Food; Janitors and Cleaners, Except Maids and Housekeeping Cleaners; Nursing Assistants; Personal Care Aides; Home Health Aides; Office Clerks, General; and Receptionists and Information Clerks hired than there were postings, which may indicate that companies are not relying directly on traditional job postings to hire.

The Relevance Score noted on the next page indicates the frequency at which a skill appeared on job postings for the selected occupations relative to all job postings within the region. A positive score indicates a greater frequency. Based on job postings during the same period, the most relevant hard skills required include Kidney Transportation; Nursing; Kidneys; and Basic Life Support. Relevant soft skills include: Mental Health; Critical Thinking; Listening; Cleanliness; and Coordinating.

Healthcare Job Postings vs. Hires, April 2017 - Jun 2017		
Occupation	Avg Monthly Postings	Avg Monthly Hires
Registered Nurses	673	117
Combined Food Preparation and Serving Workers, Including Fast Food	256	649
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	133	164
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	110	305
Nursing Assistants	72	156
Personal Care Aides	63	236
Licensed Practical and Licensed Vocational Nurses	61	68
Medical Assistants	32	20
Home Health Aides	29	64
Office Clerks, General	21	275
Receptionists and Information Clerks	20	86

Source: EMSI Q2 2017 Dataset

[2] Of the Health Care and related support-occupations in the staffing pattern. The industry group created for Healthcare includes Education and Hospitals (State Government) (NAICS 9026) and Education and Hospitals (Local Government) (NAICS 9036) which account for healthcare employment in public hospitals; however, the staffing patterns for these industries also include non-healthcare occupations in public education institutions, such as Elementary School Teachers.

Healthcare Job Postings Hard Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Kidney Transplantation	4.30	126
Nursing	2.30	2,134
Kidneys	1.48	118
Basic Life Support	1.15	827
American Homecoming Act	0.94	290
Nursing Care	0.73	348
Typing	0.63	408
Personal Care	0.57	279
Acute Care	0.45	409
Health Care	0.42	1,404
Health Facilities	0.36	333
Medicaid	0.34	222
Rehabilitations	0.34	450
Intensive Care	0.30	227
Hospitalization	0.27	912
Life Support	0.27	207
Caregiving	0.26	192
Advanced Cardiovascular Life Support (ACLS)	0.26	374
Intensive Care Unit	0.26	306
Long-Term Care	0.25	277
Case Management	0.25	217
Behavioral Health	0.24	208
Cleaning	0.23	869
Orthopedic Surgery	0.20	226
Restaurant Operation	0.20	768

Source: EMSI Q2 2017 Dataset

Healthcare Job Postings Soft Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Mental Health	0.10	200
Critical Thinking	0.04	138
Listening	0.02	191
Cleanliness	0.01	148
Coordinating	0.01	202

Source: EMSI Q2 2017 Dataset

Supply Chain: Demand, Purchases and Sales

Demand

Demand for a given industry or industry sector is calculated based on the estimated national demand from all industries and consumers. Industry wages, taxes, and other value added payments are indirectly part of the demand through the production of the supplying industry. The total demand by consumers and other industries in Region 8 for goods produced by Health Care is $1.4 billion. Nearly 39% of this demand was met by Health Care within the Region, equivalent to $561 million worth of goods. The other 61% of demand was satisfied by imports from outside the Region.[3]

Demand in Region 8 for Goods Produced by Health Care				
Demand Met in Region 8	% Demand Met in Region 8	Demand Met by Domestic Imports	% Demand Met by Domestic Imports	Total Demand in Region 8
$ 561,064,651	38.9%	$ 881,708,250	61.1%	$ 1,442,772,902

Source: EMSI

Purchases

The top industries from which the Health Care sector in Region 8 purchased the greatest amount of goods is displayed in the table below. Health Care purchased $71.9 million worth of goods and materials from Corporate, Subsidiary, and Regional Managing Offices (NAICS 551114), approximately 39% of these purchases came from within the Region while 61% were imported. The Health Care sector also purchased $50.7 million worth of goods and materials from Lessors of Residential Buildings and Dwellings (NAICS 53110). This represents the highest percentage of purchases made within Region 8, with 82% of these purchases made within the Region. Similarly, the industry made just under 82% of $31.2 million in purchases from Lessors of Nonresidential Buildings (NAICS 531120) within Region 8.

Top 10 Industries by Purchases Made by Region 8 Health Care in 2016						
NAICS	Purchases from	In-Region Purchases	% In-Region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
551114	Corporate, Subsidiary, and Regional Managing Offices	$27,930,208	38.8%	$43,974,619	61.2%	$71,904,827
531110	Lessors of Residential Buildings and Dwellings	$41,573,846	82.0%	$9,123,463	18.0%	$50,697,309
524126	Direct Property and Casualty Insurance Carriers	$6,358,497	13.7%	$40,009,750	86.3%	$46,368,247
531210	Offices of Real Estate Agents and Brokers	$24,057,541	58.1%	$17,325,943	41.9%	$41,383,483
561320	Temporary Help Services	$17,001,781	47.8%	$18,539,200	52.2%	$35,540,981
524114	Direct Health and Medical Insurance Carriers	$3,275,753	9.5%	$31,212,802	90.5%	$34,488,555
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)	$25,576,874	81.9%	$5,650,987	18.1%	$31,227,860
541110	Offices of Lawyers	$12,905,422	41.6%	$18,143,439	58.4%	$31,048,860
524113	Direct Life Insurance Carriers	$2,700,549	9.7%	$25,097,491	90.3%	$27,798,040
531390	Other Activities Related to Real Estate	$14,373,853	56.6%	$11,043,807	43.4%	$25,417,660

Source: EMSI

[3] This data only includes demand with respect to industries and consumers within the United States.

Sales[4]

Health Care establishments in Region 8 primarily sold their products and services to government-related sectors. The industry's largest buyer was Local Government, Excluding Education and Hospitals (NAICS 903999), followed by State Government, Excluding Education and Hospitals (NAICS 902999), with sales of $563.7 million and $76.1 million respectively. Sales within half of the top 10 industries decreased from 2015 to 2016. The biggest decrease in sales occurred in the State Government sector, where sales decreased by $2.6 million. Conversely, the largest increase of sales occurred in the Local Government sector, where sales increased by $11.4 million.

Top 10 Industries for Sales Made by Region 8 Health Care

NAICS	Sales to	Total In-Region Sales 2015	Total In-Region Sales 2016	Change in Sales 2015 - 2016
903999	Local Government, Excluding Education and Hospitals	$552,258,659	$563,706,880	$11,448,221
902999	State Government, Excluding Education and Hospitals	$78,718,276	$76,090,273	($2,628,003)
622110	General Medical and Surgical Hospitals	$12,054,504	$12,406,942	$352,438
902622	Hospitals (State Government)	$3,870,301	$4,000,424	$130,123
621111	Offices of Physicians (except Mental Health Specialists)	$4,173,704	$3,803,950	($369,754)
901199	Federal Government, Civilian, Excluding Postal Service	$2,588,094	$2,830,130	$242,036
238220	Plumbing, Heating, and Air-Conditioning Contractors	$1,425,322	$1,558,707	$133,385
621210	Offices of Dentists	$1,266,382	$1,194,736	($71,646)
484121	General Freight Trucking, Long-Distance, Truckload	$885,124	$878,779	($6,345)
621493	Freestanding Ambulatory Surgical and Emergency Centers	$894,503	$870,968	($23,535)

Source: EMSI

Factors Driving Investment and Competitiveness

Health Care is a diverse sector that has far-reaching implications in community and economic development. Demand and revenue are expected to increase most notably due in part to an aging population. Personal disposable income is also anticipated to rise, making private health care and nursing care services more attainable. New technologies will further expand the services within the Health Care sector leading to increased efficiency. This in turn may reduce patients' length of stay resulting in less frequent hospital visits and in turn, altering operators' revenue. To increase competitiveness and profitability, establishments may seek to consolidate to achieve economies of scale.

[4] Industry sales are calculated using the sum of the dollar value for all goods and services that other industries purchased from a given industry or industry sector. This calculation a) uses historical data instead of estimates, and b) does not include consumer spending; the total in-region sales for an industry or industry sector will often be lower than estimated in-region demand.

Shifts in the Health Care delivery system are not only felt within the industry itself, but also on-the-ground in communities, even down to local real estate. Communities are transitioning from traditional hospitals to smaller primary care facilities such as urgent care or outpatient care facilities to offer more reasonable rates, shorter wait times and more convenient locations to patients. Outpatient facilities, where patients typically are not admitted overnight, are an increasing source of primary care by US health care professionals, growing both in number of establishments and services offered. These smaller community centers are occupying medical office building space at an increasing rate, as well as taking over locations of former big-box stores like Barnes and Noble. This "retailization of health care" has forced real estate professional including planners, managers and developers to collaborate with hospital executives to understand how to build comprehensive networks of health services, while being cognizant of the potential policy changes in the future.

While there is a positive economic outlook for this sector, there remains an element of uncertainty due to shifts in government funding and health care reform at the federal level. Changes in regulations can greatly impact the quality of health services, cost, and how funding is allocated.

Overall the barriers to entry in the Health Care industry are generally high due to regulatory requirements and workforce experience. Some Health Care industries, such as Retirement Communities, have low barriers to entry but are changes are anticipated due to regulations, financing and increasing health care standards.

General Medical and Surgical Hospitals

General Medical and Surgical Hospitals (NAICS 622110) compete based on quality of care, services, skilled personnel and convenience. Hospitals located near large population centers, such as cities, have a competitive advantage in the number of people it will attract. Quality of care is closely tied to skilled workforce. Facilities with a high quality of care are more likely to receive referrals from current patients.

Specialty hospitals and surgery centers are projected to increase, posing a threat to the General Medical and Surgical Hospitals sector. Profitability in General Medical and Surgical Hospital industry will be hindered by federal and state budget cuts to health care. Consolidation in this industry helps operators reduce costs and remain competitive.

Continuing Care Retirement Communities

Continuing Care Retirement Communities (NAICS 623311) are projected to experience strong growth in the next five years, with revenue growth of $81.3 billion. This growth is greatly attributed to a growing economy and aging population combined with favorable health care reform. Health care reform such as the Patient Protection and Affordable Care enable senior citizens to receive care in their communities rather than being admitted to a hospital or nursing home.

There is a common perception of retirement and assisted living communities being a last resort. To combat this, facilities will need to adjust services and facilities. Changes include more home-like designs and enhanced socialization areas to encourage life as usual.

Nursing Care Facilities

The Nursing Care Facilities (NAICS 623110) industry has reached the mature stage of its life, meaning drastic development in this sector is not expected. The growth in the aging population will increase demand for industry services and boost industry revenue. However, demand for Nursing Care Facilities will be mitigated by health care legislature favoring at-home services and advancements in medical treatments and procedures.

Nursing Care Facilities face internal competition primarily based on customer service and location. Marketing to local physicians and hospitals can enable an establishment to have a competitive edge over neighboring facilities.

Key External Drivers

The overall stability of the Health Care sector is impacted by the follow indicators:

- **Per Capita Disposable Income** – The majority of industry revenue is generated from private sources, including out-of-pocket spending. As disposable income increases consumers are more likely to purchase goods, increasing the demand for Health Care services. Per capita disposable income is projected to continue to increase over the next five years.
- **Federal Funding for Medicare and Medicaid** - Much of the Health Care industry relies on reimbursement from government programs such as Medicare and Medicaid. This in turn affects demand and prices of Health Care goods and services. Increased government funding will increase revenue in the industry. Funding for Medicare and Medicaid is expected to increase over the next five years.
- **Number of Adults 65 and Older** - Health Care spending per capita is 3 to 5 times higher in people over the age of 65 compared to people under the age of 65. An increase in the number of elderly will increase demand in the Health Care sector. The number of people over the age of 65 is expected to steadily increase.
- **Number of People with Private Health Insurance** – Individuals with health insurance coverage tend to utilize health care services more frequently. As the number of people who are covered rises, demand and spending will increase within the health care industry. The number of people with private health insurance is projected to increase slowly at a rate of 0.5% from 2017 to 2022.

Success Factors

For Health Care establishments to operate successfully in the industry, they will need to:

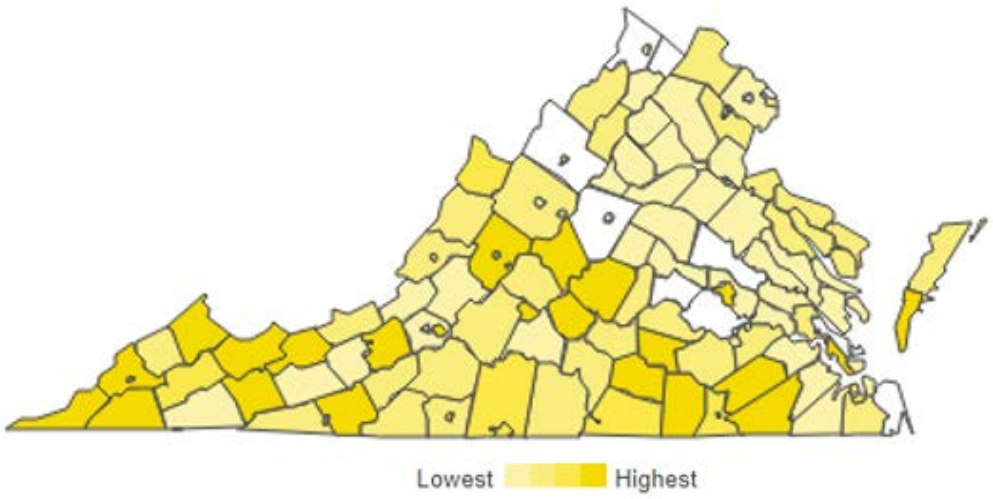
- Attract and retain a workforce that is appropriately skilled for the right position
- Proximity to key markets such as being located near a highly-populated area and in close proximity to other health care services providers
- Recognize economies of scale and the cost savings and other efficiencies of larger facilities
- Understand government policies and their implications
- Create a reputation for procedural expertise and good patient outcomes

Factors Driving Location

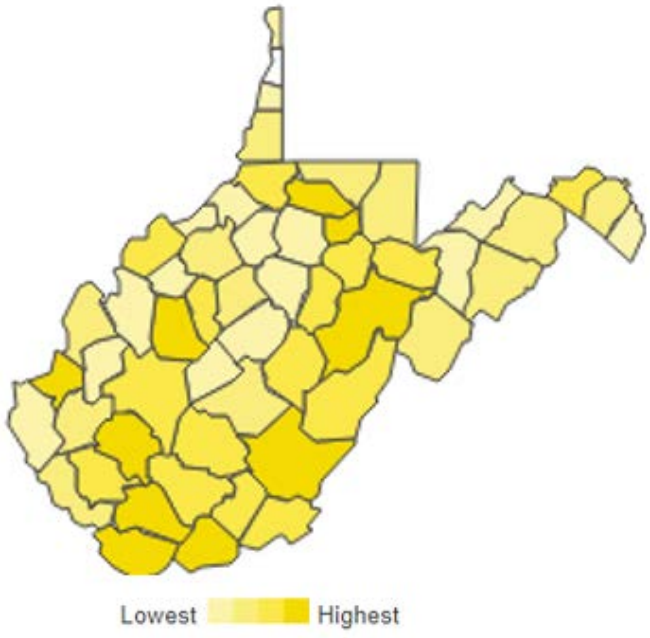
The Southeast region of the United States holds the largest share of industry activity and population. Hospitals in this region outpace the population due to the prevalence of health problems such as obesity as well as a disproportionately high number of senior citizens.

Examining Medically Underserved Areas (MUAs) can help determine which locations need health care resources. The map below displays Virginia's shortage of primary care health professionals, with white representing the lowest amount of shortage and dark yellow indicating the highest shortage. Within Region 8 many counties are classified as underserved, meaning there is a lack of access to primary care services. MUAs are determined based on four primary variables: low ratio of primary care physician per population, high infant mortality rate, high percentage of population below the poverty level and high percentage of population age 65 or over. Region 8 counties with the greatest shortage of primary health care professionals are Rockbridge and Highland Counties. Conversely Frederick, Clarke and Rockingham currently do not appear to have a shortage of primary care physicians. In addition to medically underserved areas of Region 8, neighboring counties of West Virginia are also highly underserved. West Virginia patients often travel to counties within Region 8 to receive health care from establishments with more resources. Government funding, programs and strategies are employed in these MUAs to attract physicians to underserved areas.

Virginia Primary Care Health Professional Shortage Areas



West Virginia Primary Care Health Professional Shortage Areas



Source: Health Resources and Services Administration

Virginia is home to a number of key research, testing, and medical laboratories as well as pharmaceutical and medical device companies. Virginia's universities, federal labs and research entities provide opportunities for co-location and cooperative relationships.

Overview of Health Care Companies in Region 8

Many Health Care companies exist throughout Region 8, covering hospitals, retirement communities, nursing facilities and other institutions. Many of these facilities are not only crucial for providing services for patients, but also for training future health care professionals. A selection of these firms is listed below:

- Augusta Medical Center
- Winchester Medical Center
- Sentara RMH Medical Center
- James Madison University's University Health Center
- Shenandoah Valley Westminster-Canterbury
- Virginia Mennonite Retirement Community
- Sunnyside Retirement Community
- Harrisonburg Rockingham County Free Clinic
- CareFree Home Health & Companions Inc.
- FirstLight HomeCare of Northwest Virginia

[i] The Regional Competitive Effect is part of a Shift Share Analysis. Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages from growth that can be attributed to national employment trends or overall industry trends. Shift Share indicators help to answer the question "Why is employment growing or declining in this industry?" The **regional competitive effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry.

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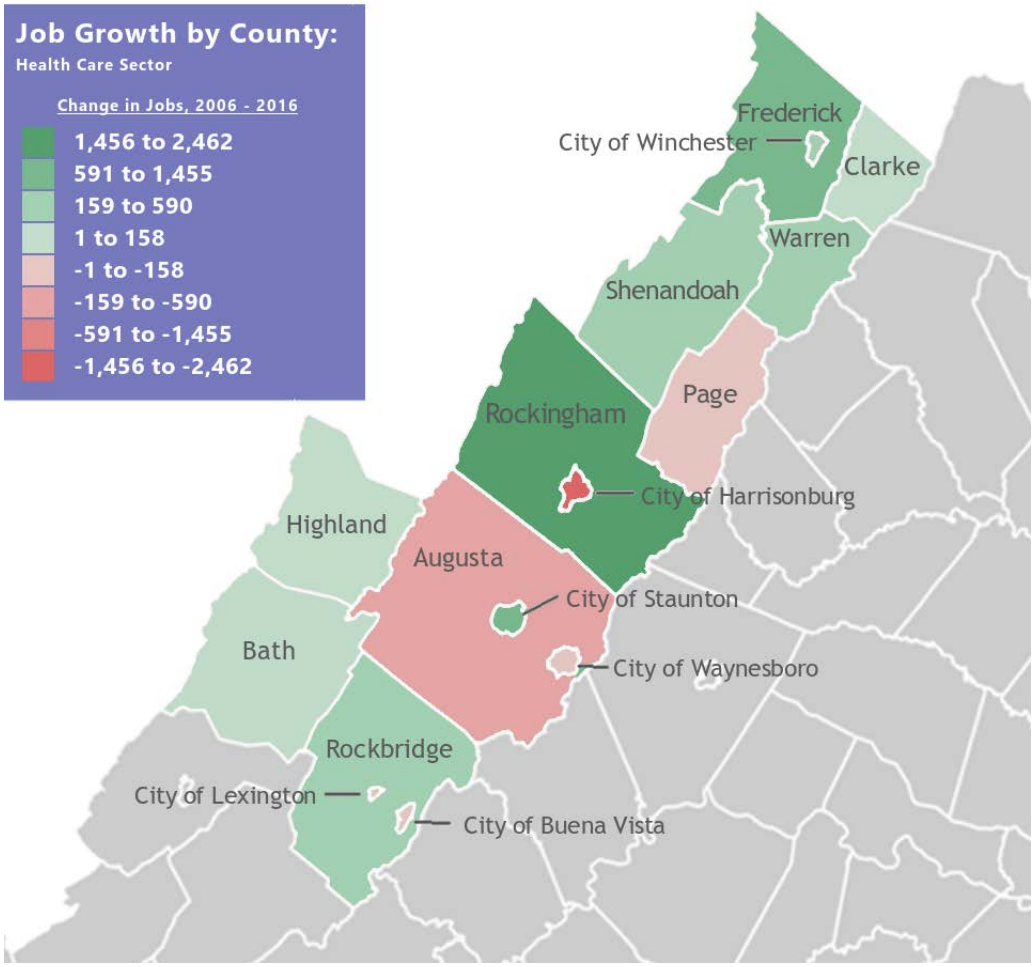
4-Digit NAICS Industries Included in the Health Care Sector

Health Care	
NAICS	Description
3391	Medical Equipment and Supplies Manufacturing
4461	Health and Personal Care Stores
5322	Consumer Good Rental
6211	Office of Physicians
6212	Offices of Dentists
6213	Offices of Other Health practitioners
6214	Outpatient Care Centers
6215	Medical and Diagnostic Laboratories
6216	Home Health Care Services
6219	Other Ambulatory Health Care Services
6221	General Medical and Surgical Hospitals
6222	Psychiatric and Substance Abuse Hospitals
6223	Specialty (except Psychiatric and Substances Abuse) Hospitals
6231	Nursing Care Facilities (Skilled Nursing Facilities)
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly
6239	Other Residential Care Facilities
6241	Individual and Family Services
8122	Death Care Services
9026	Education and Hospitals (State Government)
9036	Education and Hospitals (Local Government)

Health Care Job Growth by County, 2006 - 2016



Information Technology/Communications

Region 8 Industry Profile

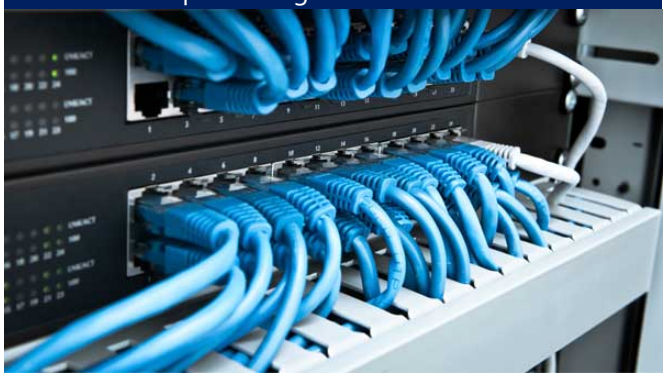
Overview:

The Information Technology/Communications (ITC) sector represents industries involved in the development, manufacturing, and usage of IT and communications-related products and services. Establishments within this sector are primarily in research and development, electrical component manufacturing, or computer systems design. The core subsectors for Region 8 are Software Publishers (NAICS 511210), Computer Systems Design Services (NAICS 541512), and Security System Services (NAICS 561621).

A full list of all 4-digit NAICS industries within this sector can be found at the end of this profile. It should be noted that because of the cross-compatibility of many industries within each targeted sector, some industries may belong to multiple categories.

Major Products and Services in Region 8:

- Software design
- Computer systems design
- Engineering research and development
- Fiber optic cable
- Cybersecurity
- Data processing



Sector Significance in Region 8

Region 8's proximity to the nation's Cyber Capital, Washington, DC, presents opportunities to locate firms that are delivering products and services that are evolving to meet the changing demands of consumers and businesses. The ITC sector benefits from high demand across nearly every industry sector, as virtually every firm relies on some form of information technology, data hosting, or cybersecurity system. Regional growth in this sector has largely been driven by activity from the federal government, especially in the northern portion of Region 8. While the sector has been strong in recent years, there remains a vulnerability to a reduction in federal spending that needs to be addressed to create a more stable environment for firms in this sector.

Industry Trends

ITC establishments in Region 8 increased by 10.7% between 2011 and 2016, adding 55 firms. This growth lags behind Virginia's growth rate of 15.5%, and national growth, which reached 16.2%. The 570 IT/Communications establishments in Region 8 account for 2.0% of all ITC businesses in the state.

Industry Establishments				
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change
Region 8	515	570	55	10.7%
Virginia	24,567	28,371	3,804	15.5%
United States	626,634	728,315	101,681	16.2%

Source: EMSI

Over the past five years, Region 8 jobs in ITC grew by 8.5%, or nearly 400 jobs. This outpaced Virginia's growth rate in the same period, but did not match ITC growth across the entire country, which expanded by 13%. Looking forward to 2016-2021, Region 8 is projected to surpass both national and state growth in terms of overall sector growth rate. Region 8 is projected to gain over 900 jobs, expand the industry by 18.2%.

Historical Change in Jobs					
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change	Regional Competitive Effect
Region 8	4,668	5,066	398	8.5%	(171)
Virginia	361,675	374,037	12,362	3.0%	
United States	7,960,486	8,976,663	1,016,177	13.0%	

Source: EMSI

Projected Change in Jobs					
Location	2016	2021	2016 - 2021 Change	2016 - 2021 % Change	Regional Competitive Effect
Region 8	5,066	5,988	922	18.2%	467
Virginia	374,037	394,081	20,044	5.0%	
United States	8,976,663	9,707,565	730,902	8.1%	

Source: EMSI

Regional Competitive Effect[i]: A regional competitive effect of -171 demonstrates that job growth in the ITC sector over the last five years failed to meet expectations based on national trends. This indicates that factors within Region 8 contributed to net job losses over that period. Conversely, regional factors will play a favorable role in job growth figures over the next five years, as an additional 467 jobs are expected to be added to Region 8 based on the sector's Regional Competitive Effect over 2016-2021.

Concentration[ii]: When examining a given industry, a location quotient (LQ) greater than 1 denotes that a given industry is more concentrated in a specified area than across the entire United States. Within the ITC industry sector there are 16 selected 4-digit NAICS industry codes; currently only one industry in Region 8 has an LQ higher than 1.2, which denotes significant concentration of an industry within a region. This industry is Other Telecommunications (NAICS 5179) with an LQ of 1.57. Expanding into the 6-digit NAICS level there are 4 industries with significant concentration including Electronic Connector

Manufacturing (NAICS 334417) with an LQ of 5.44, Telecommunications Resellers (NAICS 517911) with an LQ of 2.23, Printing Machinery and Equipment Manufacturing (NAICS 333244) with an LQ of 1.56, and Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals (NAICS 334515) with an LQ of 1.50.

Occupations in Information Technology/Communications

Top Occupations Replacement Demand[iii]

The chart below indicates the top five occupations required to staff companies within the ITC industry sector. The data below reflects occupation totals for the State of Virginia and demonstrates replacement demand, which quantifies the number of positions that will be unfilled due to individuals in the workforce that retire, die or pursue a career change. While the top five occupations are projected to experience healthy growth, especially Customer Service Representatives, a large number of openings over the next five years will be due to replacement demand from the aging population, which will bring upcoming retirements. While replacement demand is high, the majority of annual openings over the next five years for Software Developers, Applications and Computer Service Representatives will be due to new jobs. The availability of a skilled workforce is the overwhelming issue in this sector, and to be competitive, Region 8 will need to focus on workforce availability.

Replacement Demand for Top Information Technology and Communications Occupations (Virginia)							
Occupations	Employed in Industry Group 2016	Change (2016 - 2021)	2016 - 2021 Openings	Annual Openings	2016 - 2021 Replacement Jobs	Annual Replacement Jobs	% Replacement Jobs
Management Analysts	52,999	2,470	6,233	1,247	3,762	752	60.4%
Software Developers, Applications	37,116	3,046	5,806	1,161	2,759	552	47.5%
Software Developers, Systems Software	27,457	1,417	3,428	686	2,011	402	58.7%
Computer User Support Specialists	22,948	1,956	3,494	699	1,537	307	44.0%
Customer Service Representatives	63,205	6,271	14,428	2,886	8,157	1,631	56.5%

Source: EMSI Q2 2017 Dataset

Job Postings and Required Skills

The table below includes job posting data for Region 8 between April and June 2017 for the top occupations required to staff companies within the ITC industry sector. The top occupation is Customer Service Representatives with 237 average monthly postings. Based on the number of job postings vs. hires, there appears to be high demand for Customer Service Representatives; Sales Representatives, Services, All Other; Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products; Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products; Network and Computer Systems Administrators; and Computer Systems Analysts. There are far more hires than postings for Office Clerks, General and Bookkeeping, Accounting, and Auditing Clerks, which may indicate that employers are using other methods to find workers.

The relevance score noted in the second table indicates the frequency at which a particular skill appeared in job postings for the selected occupations relative to all job postings within the region. Based on job postings during the same period, the most relevant hard skills required include: Wireless Networks;

Typing; Wireless Communications; and Sales. The top soft skills include: Leading; Creativity; and Coordinating.

Information Technology and Communications Job Postings Hard Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Wireless Networks	2.15	102
Typing	1.22	349
Wireless Communications	0.68	123
Sales	0.67	1,515
Analysis Of Variance	0.64	80
Customer Service	0.46	1,262
Administration	0.45	734
Account Management	0.21	141
Management	0.21	1,363
Selling Techniques	0.20	495
Operations	0.18	737
Cold Calling	0.17	149
Business To Business	0.15	126
Retailing	0.13	736
Marketing	0.11	440
Investments	0.10	142
Accounting	0.10	253
Stocks (Inventory)	0.10	76
Finance	0.09	537
Retail Management	0.09	88
Installations (Computer Systems)	0.08	86
Clerical Works	0.08	116
Warranty	0.07	78
Demos	0.07	99
Networking	0.07	165
Information Systems	0.07	92
Service-Orientation	0.07	85

Source: EMSI Q2 2017 Dataset

Information Technology and Communications Job Postings Soft Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Leading	0.04	254
Creativity	0.03	78
Coordinating	0.02	132

Source: EMSI Q2 2017 Dataset

Supply Chain: Demand, Purchases and Sales

Demand

Demand for a given industry or industry sector is calculated based on the estimated national demand from all industries and consumers. Industry wages, taxes, and other value-added payments are indirectly part of the demand through the production of the supplying industry. The total demand by consumers and other industries in Region 8 for goods produced by the ITC sector is $418 million. Nearly 36% of this demand was met by ITC companies within the Region, totaling $150 million worth of goods. The other 64% of demand was satisfied by imports from other states.[1]

Demand in Region 8 for Goods Produced by IT/Communications				
Demand Met in Region 8	% Demand Met in Region 8	Demand Met by Domestic Imports	% Demand Met by Domestic Imports	Total Demand in Region 8
$ 149,972,180	35.9%	$ 268,313,978	64.1%	$ 418,286,159

Source: EMSI

Purchases

The top industries from which Region 8 ITC firms purchased the greatest quantity of goods is displayed in the table below. The ITC sector purchased $45 million worth of goods and materials from Wired Telecommunications Carriers (NAICS 517110). Approximately 58% of these purchases came from within the Region while the remaining 42% were imported. The ITC sector also purchased $29 million worth of goods and materials from Software Publishers (NAICS 511210). 27% of these purchases came from within the Region, while 73% were imported.

The highest percentage of purchases made within Region 8 were from Wired Telecommunications Carriers (NAICS 517110) and Commercial Banking (NAICS 522110), both with approximately 58% of purchases coming from within the Region. In contrast, purchases made from Cable and Other Subscription Programming (NAICS 515210) were entirely imported from other states. Additionally, purchases made from Motion Picture and Video Production (NAICS 512110) were mainly imported from outside the Region, with a mere 3% purchased from within the Region.

[1] This data only includes demand with respect to industries and consumers within the United States.

Top 10 Industries by Purchases Made by Region 8 IT/Communications in 2016						
NAICS	Purchases from	In-Region Purchases	% In-Region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
517110	Wired Telecommunications Carriers	$26,144,098	57.8%	$19,080,789	42.2%	$45,224,887
511210	Software Publishers	$7,949,811	27.0%	$21,486,715	73.0%	$29,436,526
512110	Motion Picture and Video Production	$492,003	3.0%	$15,711,068	97.0%	$16,203,071
551114	Corporate, Subsidiary, and Regional Managing Offices	$4,646,718	35.3%	$8,522,363	64.7%	$13,169,081
515210	Cable and Other Subscription Programming	$0	0.0%	$10,827,132	100.0%	$10,827,132
561320	Temporary Help Services	$4,887,408	48.1%	$5,272,586	51.9%	$10,159,994
541110	Offices of Lawyers	$4,056,396	40.6%	$5,931,243	59.4%	$9,987,639
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	$2,160,044	24.0%	$6,856,436	76.0%	$9,016,481
541611	Administrative Management and General Management Consulting Services	$2,645,692	32.0%	$5,616,878	68.0%	$8,262,570
522110	Commercial Banking	$4,313,162	57.7%	$3,159,505	42.3%	$7,472,667

Source: EMSI

Sales[2]

Calculation of industry sales is based on all goods and services that other industries purchased from a given industry sector. The total in-region sales for an industry or industry sector will often be lower than estimated in-region demand due to the calculation being based on historical data instead of estimates and not including consumer spending. The largest buyer of the ITC sector in Region 8 was the Federal Government (NAICS 901199) followed by Wired Telecommunications Carriers (NAICS 517110), with sales of $32 million and $21 million respectively. Sales within the top industries increased from 2015 to 2016, except for Software Publishers (NAICS 511210). Sales in Software Publishers decreased by $3.7 million. Conversely the largest increase of sales occurred in the Federal Government sector, where sales increased by $3.8 million.

[2] Industry sales are calculated using the sum of the dollar value for all goods and services that other industries purchased from a given industry or industry sector. This calculation a) uses historical data instead of estimates, and b) does not include consumer spending; the total in-region sales for an industry or industry sector will often be lower than estimated in-region demand.

Top 10 Industries for Sales Made by Region 8 IT/Communications				
NAICS	Sales to	Total In-Region Sales 2015	Total In-Region Sales 2016	Change in Sales 2015 - 2016
901199	Federal Government, Civilian, Excluding Postal Service	$28,081,396	$31,894,651	$3,813,255
517110	Wired Telecommunications Carriers	$20,383,019	$20,655,955	$272,937
622110	General Medical and Surgical Hospitals	$18,280,968	$19,601,950	$1,320,982
551114	Corporate, Subsidiary, and Regional Managing Offices	$13,375,557	$14,233,005	$857,448
511210	Software Publishers	$13,534,195	$9,832,240	($3,701,955)
621111	Offices of Physicians (except Mental Health Specialists)	$8,016,578	$8,266,279	$249,701
903999	Local Government, Excluding Education and Hospitals	$6,741,514	$7,103,046	$361,532
902999	State Government, Excluding Education and Hospitals	$5,886,880	$5,948,104	$61,224
901200	Federal Government, Military	$4,931,213	$5,505,640	$574,427
517911	Telecommunications Resellers	$4,509,609	$5,342,828	$833,219

Source: EMSI

Factors Driving Investment and Competitiveness

As the economy strengthens, corporate profit will continue to rise and encourage investment in the ITC sector to improve operational efficiency. Shifting technology usage coupled with technological advancements will boost service offerings and further demand for the ITC market. Additionally, crucial downstream markets such as the business and finance sector are projected to grow, further aiding in the growth of the IT/Communications sector.

Over the past decade more than $11.3 billion has been invested into Virginia's ITC sector. [3] Key companies such as Microsoft and Carfax have invested millions towards expanding data centers and headquarters. In addition to significant investment, Virginia also offers tax exemptions to specifically jump start IT companies. Computer equipment bought or leased before June of 2022 is exempt from Retail Sales and Use tax contingent on the equipment being used in Virginia, at least $150 million is invested in capital, and the assurance that the equipment's use generates a minimum of 50 new high-paying jobs.[4]

Several colleges and universities in Virginia have placed emphasis on preparing an IT workforce by offering degree and non-degree programs. In 2016, over 5,000 degrees were awarded in IT and related programs. [5] Specific to Region 8, James Madison University offers certificates, degrees and advanced degrees in areas such as Information Security, Computer Science, and Secure Computer and Database Systems.

[3] YesVirginia.org
[4] Miller, R (2009). "Virginia Passes Data Center Tax Incentives" Data Center Knowledge. Website: http://www.datacenterknowledge.com/archives/2009/05/13/virginia-passes-data-center-tax-incentives/
[5] YesVirginia.org

Overall, the ITC sector is highly competitive. Companies compete based on technical expertise, quality of service, and availability of value-added services, while price is a less important factor. Technological advancement presents a threat to existing technology, meaning companies must invest in research and development to stay on the cutting edge. Consolidations are common within the IT sector, allowing companies to expand their service base and gain a competitive advantage.

Companies entering ITC industries face low barriers to entry. Low startup costs coupled with few local and state regulations creates an environment conducive to new firms. New establishments primarily rely on a knowledge base on the IT field and a functioning IT system.

Software Publishers

The Software Publishers (NAICS 511210) industry has grown as businesses and consumers invest in software, computers and video games. Predictive analytics, artificial intelligence, and increasing prevalence of software in day-to-day activities coupled with increased downstream markets will enable the Software Publishers sector to grow at an annualized rate of 2.7%, increasing revenue by $248.3 billion over the next five years to 2022.

Large companies such as Microsoft, IBM, Apple, Oracle, and SAP hold roughly 30% in collective market share, the other 70% of the market being represented by approximately 6,700 businesses. Mergers and acquisitions are common in the Software Publishers industry; as large software publishers establish specialties in growing niches by acquiring smaller companies. Niche software development includes online payment processing, biometric scanning, online surveys, e-trading, web creation, and motion capture. Operators are transitioning from traditional physical software to a software-as-service (SaaS) model which has allowed companies to stabilize cash flow. In SaaS, customers subscribe for a license to use software from a remote server, allowing for constant updates which are imperative for securing devices from emerging threats.

Availability of a trained workforce is a major factor driving this industry. Outsourcing coding to low-wage countries like India or China is common, especially for startup companies who do not have the coding knowledge or budget for an in-house programmer.

Computer Systems Design Services

The Computer System Design and Related Services industry is projected to grow at an annualized rate of 2.4% to $424 billion by 2021. This growth is mainly attributed to shifting technology trends, which will continue to boost the demand for new services and technology. Additionally, growth in the major downstream market of finance and insurance will further stimulate the Computer Systems Design Services industry.

This industry faces relatively low regulations and startup costs, making it easy for new firms to enter the market. As a result, the majority of the market share is comprised of small companies, non-employers or independent contractors. Reputation and customer base are crucial for companies to remain competitive, especially for IT consultants in Computer Systems Design and Related Services which acquire the majority of their work from referrals and recommendations from previous clients.

Cybersecurity Security System Services

Virginia is home to several Federal agencies which primarily focus on cybersecurity, including the U.S. Army Cyber Command, U.S. Department of Defense, and U.S. Department of Homeland Security's National Cyber Security and Communications Integration. Thirty-six Virginia companies appear on the Cybersecurity 500 list, which lists the world's hottest and most innovative cybersecurity companies.[6]

Security software defends against viruses, malware, and other threats that could result in the loss of valuable data. Security Software has experienced 5.9% growth since 2012 and is project to continue growing by 5.0% per year until 2022.[7] The largest segment on this industry is enterprise security, followed by consumer security and mobile security.

One of the biggest limitations to the growth the cybersecurity subsector is the availability of an appropriately trained workforce. To accommodate this need, Virginia has 18 universities offering cybersecurity-related degree programs. Eleven of these schools have been recognized by the U.S. Government by earning the Centers of Academic Excellence in Cyber Defense of Information Assurance designation from the National Security Agency. [8] James Madison University is a major training asset in Region 8, offering training specific to cybersecurity in the form of degree and non-degree programs.

Key External Drivers

The overall health of the ITC industry sector primarily relies on the status economy as a whole, especially business growth and investment. As a result, external drivers for the industry are as follows:

- **Corporate profit** – Corporate profit is the measurement of profits earned across the entire economy, not just one specific industry. As corporate profit rises more businesses will be able to afford and demand software, cybersecurity, consulting services, system analysts and other ITC services. Corporate profit is expected to rise into 2022, representing a potential opportunity for the ITC sector.
- **Number of businesses** – Demand for ITC services is consistent with growth in the overall number of businesses. The number of businesses is expected to grow at a low rate, which represents a probable threat to the ITC sector.
- **Aggregate private investment** – Aggregate private investment is the total amount firms and households spend. This includes spending towards physical structure, equipment, and software. As businesses invest in software and other equipment they are more likely to require other ITC services. Private investment in computers and software generates demand for implementation assistance and technical support. Both aggregate private investment and specifically private investment in computers and software are expected to rise throughout the next five years.
- **Demand from finance and insurance** – Finance and insurance companies are one of the largest markets for the ITC sector. Specifically, for Computer Systems Design Services (NAICS 541512), finance and insurance represents nearly 20% of industry revenue. These companies require vast

[6] YesVirginia.org
[7] IBISWorld. 2016. Industry Report 51121f, Security Software Publishing in the US.
[8] YesVirginia.org

computing for the execution of trades and rely on IT firms to determine methods of storage and protection. As finance and insurance companies expand, the demand for information technology services increases. Demand from financial and insurance markets is expected to increase over the next five years, representing a potential opportunity for the sector.

- **Government consumption and investment –** Federal and state governments comprise a significant proportion of demand for the ITC sector. Virginia's proximity to the national capital, will allow Region 8's ITC sector to reap rewards of federal spending and consumption.
  Many federal contracting companies are headquartered in Virginia. These companies already seek out professions in the IT field. Federal spending specific to cybersecurity is increasing.
  Government consumption and investment is projected to increase, presenting an opportunity for the ITC sector.

Success Factors

For ITC establishments to continue successfully in the industry, they will need to:

- Be able to compete on price and service offerings,
- Attract and retain a workforce with suitable skills specific positons in each subsector,
- Offer a variety of services to retain customers,
- Increase accessibility to consumers,
- Develop specialized skills and services to access niche markets,
- Develop a symbiotic relationship with another industry, and
- Establish strong relationships with high quality subcontractors to ensure that high-quality, timely and cost-efficient output can be guaranteed.

Factors Driving Location

The ITC sector has the advantage of being able to operate remotely to reach their target market. Establishment locations are dependent on a skilled workforce and reliable broadband.[9]

Software Publishers, Computer Systems Design Services and Cybersecurity follow similar patterns in national business establishment presence and distribution. The Southeast region of the United States leads in population resulting in a high demand of goods and services from the ITC sector. In all categories except for Computer Systems Design Services, the West leads in industry establishments directly followed by the Southeast. For Computer System Design Services, the Southeast contains the largest number of IT consulting firms, followed by the West.

Virginia currently holds 6.7% of the nation's IT consulting firms, 3.7% of the Security System Service firms, and 2.8% of Software Publishing firms. In 2014, Virginia was ranked number one for information technology jobs.[10] Meaning, Virginia had the highest concentration of IT workers in non-IT industries, indicating that the economy is technology-driven. This high ranking is primarily attributed to high concentration of knowledgeable workers with a high percentage of them working for the federal

[9] Diment, D (2016). "IBISWorld Industry Report 51821 Data Processing & Hosting Services in the US". IBISWorld
[10] Information Technology and Innovation Foundation, The 2014 State New Economy Index.

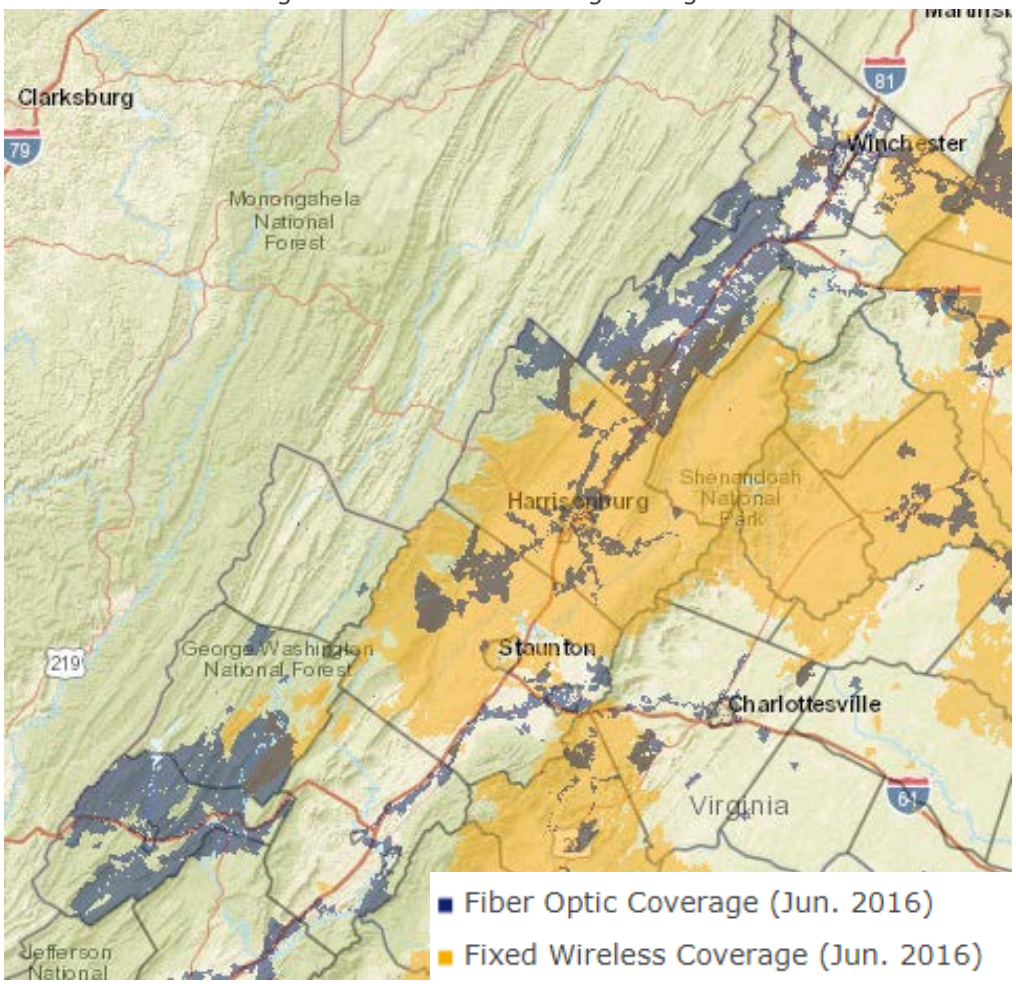
government or related contractors. Virginia is home to leading ITC companies including Amazon, CoStar, HP Enterprise Services, and IBM. Region 8 has not captured a substantial portion of this investment, however Amazon recently announced that they would be opening an e-commerce warehouse and distribution facility in Frederick County, which capitalizes on the region's transportation and logistics assets.

Broadband Availability

Businesses and individuals depend on broadband to connect and collaborate with the global marketplace. Adequate broadband infrastructure is a necessity for businesses to compete locally, regionally and globally. A business utilizing broadband can capitalize on reaching a larger range of customers, saving time through increased speeds and faster processing of sales. Currently, approximately 15% of Virginia's population is classified as underserved, meaning they have access to less than two wired providers.

Adequate broadband is intermittent throughout Region 8. The map below shows that the central area of Region 8 is served well by fixed wireless and the northern part of the Region has sporadic fiber optic coverage. Highland County has almost no fiber optic or fixed wireless coverage.

Figure 1: Broadband Coverage in Region 8



Source: Center for Geospatial Information Technology

Overview of Information Technology/Communications Companies in Region 8

- Dynamic Aviation
- Rosetta Stone
- Serco
- Axon Connected
- PPI Time Zero
- Approved Colleges
- The Chiedo Companies
- SHENTEL
- Gulfstream Aerospace Corp
- GEODIS
- Anthem Data Center
- Blue Vigil
- RainCrow

[i] The Regional Competitive Effect is part of a Shift Share Analysis. Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages from growth that can be attributed to national employment trends or overall industry trends. Shift Share indicators help to answer the question "Why is employment growing or declining in this industry?" The **regional competitive effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry.

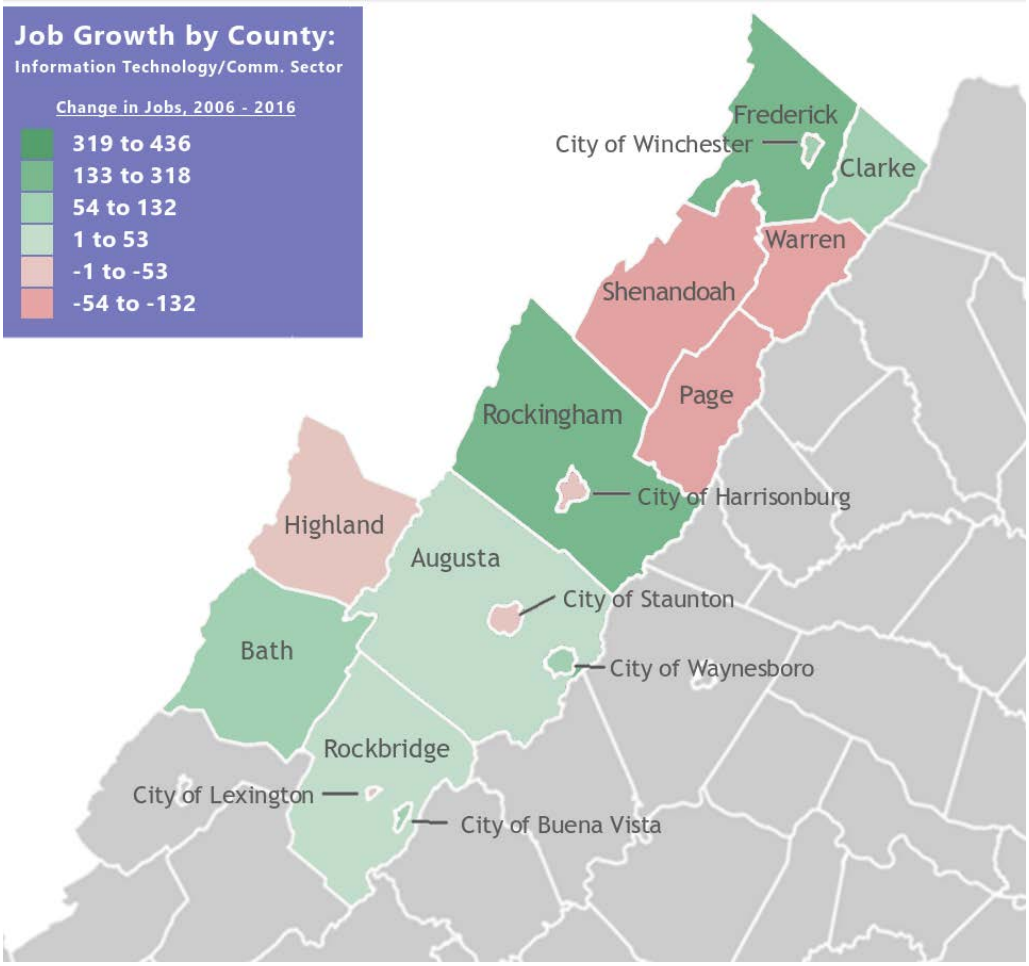
[ii] Location Quotient (LQ) analysis determines how concentrated a particular industry, demographic group, or other variable is compared to a larger geography. Concentration is a measure of local and regional strength when assessing economic growth potential. LQ is calculated by comparing the variable at a regional and national level. For example, if breweries account for 0.16% of all jobs in the Region but only 0.015% of all national jobs, then the LQ for breweries in that region would be 10.67 (0.16/0.015), demonstrating that breweries are 10 times more concentrated in that region than the national average.

[iii] Replacement Demand utilizes the difference between the number of jobs that are expected to be added to the regional economy between the period of 2016 and 2021 and the number of jobs that will have openings due to normal turnover in the workforce such as retirement, death, and changing careers. Occupations with high figures for replacement demand compared to expected job growth may point to an occupation with low wages, or it may indicate a large number of upcoming retirements due to an aging workforce.

4-Digit NAICS Industries Included in the Information Technology/Communications Sector

Information Technology/Communications	
NAICS	Description
5415	Computer Systems Design and Related Services
5416	Management, Scientific, and Technical Consulting Services
5417	Scientific Research and Development Services
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
5171	Wired Telecommunications Carriers
5182	Data Processing, Hosting, and Related Services
3344	Semiconductor and Other Electronic Component Manufacturing
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers
5112	Software Publishers
3359	Other Electrical Equipment and Component Manufacturing
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers
3332	Industrial Machinery Manufacturing
3353	Electrical Equipment Manufacturing
5179	Other Telecommunications
3341	Computer and Peripheral Equipment Manufacturing
561621	Security Systems Services (except Locksmiths)
511210	Software Publishers
334118	Other Computer Peripheral Equipment Manufacturing
541512	Computer Systems Design Services

Information Technology/Communications Job Growth by County, 2006 - 2016



Light Manufacturing

Region 8 Industry Profile

Overview:

Light Manufacturing encompasses the range of processes in which materials are mechanically, physically, or chemically transformed into new products. Unlike heavy or advanced manufacturing which is associated with continuous processing and assembly, light manufacturing is often associated with batches or isolated production runs. Light Manufacturing is less capital intensive than traditional manufacturing and is more oriented towards consumer-facing products. Establishments are mainly comprised of mills, plants, and factories. Primary manufacturing activities in Virginia consist largely of food production.[1] Region 8's core light manufacturing subsectors include: Plastic Product Manufacturing (NAICS 326150), Medical Equipment and Supplies Manufacturing (NAICS 33911), and Food Manufacturing Comprised of Snack Food Production (NAICS 31191) and Chocolate and Confectionery Manufacturing (NAICS 31135). A detailed listing of the industries included in the sector are provided at the end of this profile.

Major Products and Services in Region 8:

- Plastics
- Medical devices and equipment
- Snack foods and chocolate
- Pharmacueticals
- Textiles
- Electronic devices

Sector Significance in Region 8

Manufacturing has a strong legacy in the Shenandoah Valley and throughout Region 8. While this industry continues to experience major upheaval from technological advancements and increased productivity levels, Region 8 has valuable assets on which it can capitalize to ensure that local operators have the resources to be successful in their fields. Subsectors in this industry are supported by ancillary infrastructure in the transportation and warehousing sector, helping to move manufactured goods throughout the region's major road networks, rail systems, and ports.

Industry Trends

In 2016, there were 419 Light Manufacturing establishments in Region 8, accounting for 8.4% of all businesses in Virginia for this sector. The number of Light Manufacturing establishments decreased by 2.1% in Region 8 for the 2011 to 2016 period. Conversely, Virginia observed an increase of 1.6%. Nationally, the number of establishments decreased by -0.1%.

[1] Bureau of Labor Statistics, Manufacturing 31-33

Industry Establishments				
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change
Region 8	428	419	(9)	(2.1%)
Virginia	4,930	5,010	80	1.6%
United States	253,377	253,195	(182)	(0.1%)

Source: EMSI

In Region 8, Light Manufacturing lost 731 jobs over the last five years, decreasing the size of the industry by 4.0%. Growth in Virginia and the United States exceeded that of Region 8, as the state saw a job expansion of 1.0% and 5.0%, respectively. In the upcoming five years reaching 2021, the industry is expected to see further decline of another 282 jobs in Region 8, rendering the net job loss in the decade 2011-2021, 1,013 jobs. In the next five years, the state's overall job growth is expected to increase to 2.9%, while the nation's job growth in Light Manufacturing is expected to slow to 0.2%.

Historical Change in Jobs					
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change	Regional Competitive Effect
Region 8	20,705	19,974	(731)	(4.0%)	(2,107)
Virginia	161,557	163,157	1,600	1.0%	
United States	8,083,969	8,490,595	406,626	5.0%	

Source: EMSI

Projected Change in Jobs					
Location	2016	2021	2016 - 2021 Change	2016 - 2021 % Change	Regional Competitive Effect
Region 8	19,974	19,692	(282)	(1.4%)	(137)
Virginia	163,157	167,862	4,705	2.9%	
United States	8,490,595	8,510,142	19,547	0.2%	

Source: EMSI

Regional Competitive Effect[i]: As shown by a regional competitive effect of -2,107, job growth in Light Manufacturing in Region 8 over the last five years fell short of expectations based on national trends. This indicates that regional factors in Region 8 contributed to the loss in jobs over this period. The job losses in this sector reflect challenging times for manufacturing subsectors not just for the region, but for the state and country. However, Region 8 has a strong legacy in a range of manufacturing disciplines and can strategically capitalize on institutional knowledge to continue to innovate and respond to market trends. Looking towards the next five years, regional factors will allow for loss at a slower rate, but will not reach a positive net gain.

Concentration[ii]**:** When examining a given industry, a location quotient (LQ) greater than 1 denotes that a given industry is more concentrated in a specified area than across the entire United States. Of the 45 4-digit industries included in the Light Manufacturing industry sector, 19 currently have location quotients (LQs) that are higher than 1.2, which denotes significant concentration of an industry within a region. These industries are:

- Sugar and Confectionery Product Manufacturing (NAICS 3113, LQ of 8.49),
- Textile Furnishing Mills (NAICS 3141, LQ of 6.32),
- Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (NAICS 3334, LQ of 5.19),
- Cutlery and Hand tool Manufacturing (NAICS 3322, LQ of 4.26),
- Plastics Product Manufacturing (NAICS 3261, LQ of 4.25),
- Printing and Related Support Activities (NAICS 3231, LQ of 4.22),
- Sawmills and Wood Preservation (NAICS 3211, LQ of 3.80),
- Animal Food Manufacturing (NAICS 3111, LQ of 3.66),
- Other Wood Product Manufacturing (NAICS 3219, LQ of 3.07),
- Other Chemical Product and Preparation Manufacturing (NAICS 3259, LQ of 2.60),
- Cement and Concrete Product Manufacturing (NAICS 3273, LQ of 2.52), Converted Paper Product Manufacturing (NAICS 3222, LQ of 2.13),
- Beverage Manufacturing (NAICS 3121, LQ of 2.12),
- Other Furniture Related Product Manufacturing (NAICS 3379, LQ of 2.08),
- Pharmaceutical and Medicine Manufacturing (NAICS 3254, LQ of 1.84),
- Architectural and Structural Metals Manufacturing (NAICS 3323, LQ of 1.45),
- Cut and Sew Apparel Manufacturing (NAICS 3152, LQ of 1.28),
- Medical Equipment and Supplies Manufacturing (NAICS 3391, LQ of 1.20), and
- Architectural and Structural Metals Manufacturing (NAICS 3371, LQ of 1.20).

Occupations in Light Manufacturing

Top Occupations Replacement Demand[iii]

The chart below indicates the top five occupations required to staff companies within the Light Manufacturing industry. The data below reflects occupation totals for the State of Virginia and demonstrates replacement demand, which quantifies the number of positions that will be unfilled due to individuals in the workforce that retire, die or pursue a career change. Of the top five occupations, Laborers and Freight, Stock, and Material Movers, Hand is projected add the most jobs through 2021. The aging population within the region will likely bring upcoming retirements within these occupations. All of the top occupations have replacement demand greater than 60% over the next five years. Leading the way is Printing Press Operators, with replacement demand just over 97%.

Replacement Demand for Top Light Manufacturing Occupations (Virginia)							
Occupations	Employed in Industry Group 2016	Change (2016 - 2021)	2016 - 2021 Openings	Annual Openings	2016 - 2021 Replacement Jobs	Annual Replacement Jobs	% Replacement Jobs
First-Line Supervisors of Production and Operating Workers	13,134	422	1,481	296	1,057	211	71.3%
Team Assemblers	16,974	1,119	3,007	601	1,887	377	62.8%
Printing Press Operators	4,529	(324)	338	68	329	66	97.1%
Inspectors, Testers, Sorters, Samplers, and Weighers	9,067	516	1,690	338	1,173	235	69.4%
Laborers and Freight, Stock, and Material Movers, Hand	51,214	3,538	11,430	2,286	7,891	1,578	69.0%

Source: EMSI Q2 2017 Dataset

Job Postings and Required Skills

The table below includes job posting data for Region 8 between April and June 2017 for the top occupations required to staff companies within the Light Manufacturing industry. The top occupation, by far, is Heavy and Tractor-Trailer Truck Drivers, with over 4,427 average monthly postings. Other top occupations include Customer Service Representatives and Maintenance and Repair Workers, General. Of the top postings, demand is highest for Heavy and Tractor-Trailer Truck Drivers; Customer Service Representatives; Sales Representatives, Wholesale and Manufacturing, except Technical and Scientific Products; and First-Line Supervisors of Production and Operating Workers. However, there are several occupations that average more hires than postings. These include Industrial Truck and Tractor Operators; Office Clerks, General; and Bookkeeping, Accounting, and Auditing Clerks. Employers hiring these occupations may be using other methods besides online job postings to find workers.

The Relevance Score noted on the next page indicates the frequency at which a skill appeared on job postings for the selected occupations relative to all job postings within the region. A positive score indicates a greater frequency. Based on job postings during the same period, the most relevant hard skills required include Cargos; Road Transport; Wheels; and Driving. The top soft skills include: Scheduling (Project Management); Leading; Leadership; and Learning.

Light Manufacturing Job Postings vs. Hires, April 2017 - June 2017		
Occupation	Avg Monthly Postings	Avg Monthly Hires
Heavy and Tractor-Trailer Truck Drivers	4,427	253
Customer Service Representatives	237	159
Maintenance and Repair Workers, General	133	137
Laborers and Freight, Stock, and Material Movers, Hand	116	353
General and Operations Managers	115	115
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	115	67
First-Line Supervisors of Production and Operating Workers	102	38
Industrial Truck and Tractor Operators	68	87
Helpers--Production Workers	29	35
Office Clerks, General	21	295
Shipping, Receiving, and Traffic Clerks	20	48
Industrial Machinery Mechanics	18	37
Inspectors, Testers, Sorters, Samplers, and Weighers	18	46
Packaging and Filling Machine Operators and Tenders	17	64
Bookkeeping, Accounting, and Auditing Clerks	12	130
Machinists	10	10
Printing Press Operators	7	13
Team Assemblers	6	62
Packers and Packagers, Hand	6	86
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	5	7
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	3	8
Machine Feeders and Offbearers	2	21
Welders, Cutters, Solderers, and Brazers	2	23
Sawing Machine Setters, Operators, and Tenders, Wood	1	14
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1	16
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0	9
Sewing Machine Operators	0	7
Cabinetmakers and Bench Carpenters	0	16
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	0	18

Source: EMSI Q2 2017 Dataset

Light Manufacturing Job Postings Hard Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Cargos	0.59	3,435
Road Transport	0.54	2,470
Wheels	0.48	1,070
Driving	0.43	3,582
Hazardous Materials	0.26	1,755
Leasing (Contract Law)	0.18	1,132
Health Insurance	0.18	1,597
Cleaning	0.14	2,035
Life Insurance	0.14	1,928
Recruitment	0.09	3,406
Dispatching	0.08	376
Defensive Driving	0.07	359
Purchasing	0.07	941
Vision Insurance	0.07	373
Satellites	0.07	336
Permits	0.07	461
Television	0.06	369
Disability Insurance	0.04	393
Insurance	0.03	2,449
Trailers	0.03	353
Information Technology	0.03	721
Forklift Truck	0.02	338
Distribution (Business)	0.02	752
Networking	0.02	501
Unloading	0.02	444
Warehousing	0.01	545
Materials	0.01	441

Source: EMSI Q2 2017 Dataset

Light Manufacturing Job Postings Soft Skills, April 2017- June 2017	
Skill	Postings with Skill
Scheduling (Project Management)	1,141
Leading	492
Leadership	246
Learning	202

Source: EMSI Q2 2017 Dataset

Supply Chain: Demand, Purchases and Sales

Demand

Demand for a given industry or industry sector is calculated based on the estimated national demand from all industries and consumers. Industry wages, taxes, and other value added payments are indirectly part of the demand through the production of the supplying industry. The total demand by consumers and other industries in Region 8 for goods produced by Light Manufacturing was $3.6 billion. Approximately 25% of this demand was met by Light Manufacturing in Region 8, equivalent to roughly $880 million. The other 75% of demand was satisfied by imports from outside the Region.[2]

Demand in Region 8 for Goods Produced by Light Manufacturing				
Demand Met in Region 8	% Demand Met in Region 8	Demand Met by Domestic Imports	% Demand Met by Domestic Imports	Total Demand in Region 8
$ 880,115,591	24.7%	$ 2,677,920,860	75.3%	$ 3,558,036,451

Source: EMSI

Purchases

The table below shows the industries from which the Light Manufacturing sector in Region 8 purchased the greatest amounts of goods. Light Manufacturing purchased $318.4 million worth of goods and materials from Corporate, Subsidiary, and Regional Managing Offices (NAICS 551141) in 2016. Slightly over 20% of these purchases were sourced from within Region 8, while the other 80% were imported from other locations. The industry made significant purchases in Plastics Material and Resin Manufacturing (NAICS 325211) and Crop Production (NAICS 111000) sectors, at $252 million and $117 million respectively.

Top 10 Industries by Purchases Made by Region 8 Light Manufacturing in 2016						
NAICS	Purchases from	In-Region Purchases	% In-Region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
551114	Corporate, Subsidiary, and Regional Managing Offices	$64,134,279	20.1%	$254,236,871	79.9%	$318,371,150
325211	Plastics Material and Resin Manufacturing	$22,919,063	9.1%	$229,474,313	90.9%	$252,393,376
111000	Crop Production	$10,857,253	9.3%	$105,940,814	90.7%	$116,798,066
425120	Wholesale Trade Agents and Brokers	$1,643,931	2.3%	$69,089,378	97.7%	$70,733,309
322130	Paperboard Mills	$443,367	0.8%	$57,582,754	99.2%	$58,026,121
325411	Medicinal and Botanical Manufacturing	$48,784,325	91.0%	$4,798,249	9.0%	$53,582,574
325199	All Other Basic Organic Chemical Manufacturing	$0	0.0%	$53,244,964	100.0%	$53,244,964
322121	Paper (except Newsprint) Mills	$1,343,627	2.6%	$49,410,812	97.4%	$50,754,439
322211	Corrugated and Solid Fiber Box Manufacturing	$23,531,259	46.5%	$27,037,644	53.5%	$50,568,903
331110	Iron and Steel Mills and Ferroalloy Manufacturing	$0	0.0%	$49,180,537	100.0%	$49,180,537

Source: EMSI

The highest percentage of purchases made within Region 8 was in Medicinal and Botanical Manufacturing (NAICS 325411), where 91% of the $53.6 million was purchased within Region 8. In contrast, purchases made from Plastics Material and Resin Manufacturing (NAICS 325211), Crop Production (NAICS 111000), Wholesale Trade Agents and Brokers (NAICS 425120), Paperboard Mills

[2] This data only includes demand with respect to industries and consumers within the United States.

(NAICS 322130), All Other Basic Organic Chemical Manufacturing (NAICS 325199), Paper (except Newsprint) Mills (NAICS 322121), and Iron and Steel Mills and Ferroalloy Manufacturing (NAICS 331110) were mainly imported from outside regions. Less than 10% of goods purchased in these sectors came from Region 8.

Sales[3]

Industry sales are calculated using the sum of all goods and services that other industries purchased from a given industry sector. For Region 8, Light Manufacturing sector' largest buyers were Animal Production and Aquaculture (NAICS 112000), Medical and Botanical Manufacturing (NAICS 325411) and Other Snack Food Manufacturing (NAICS 311919) with $57.6 million, $44.4 million and $40.6 million in sales respectively. Sales within the majority of the top purchasing sectors increased in the 2015 to 2016 period, except for All Other Plastics and Product Manufacturing (NAICS 326199), Poultry Processing (NAICS 311615), and Breweries (NAICS 312120). All Other Plastics and Product Manufacturing saw the biggest decline with sales decreasing by $4.9 million. The biggest sales shift occurred in Medical and Botanical Manufacturing, where sales increased by $6.5 million from 2015 to 2016.

Top 10 Industries for Sales Made by Region 8 Light Manufacturing

NAICS	Sales to	Total In-Region Sales 2015	Total In-Region Sales 2016	Change in Sales 2015 - 2016
112000	Animal Production and Aquaculture	$51,837,830	$57,648,532	$5,810,702
325411	Medicinal and Botanical Manufacturing	$37,865,188	$44,395,131	$6,529,943
311919	Other Snack Food Manufacturing	$36,817,277	$40,625,276	$3,807,999
311352	Confectionery Manufacturing from Purchased Chocolate	$33,835,115	$37,260,827	$3,425,712
326199	All Other Plastics Product Manufacturing	$38,701,968	$33,770,974	($4,930,994)
336390	Other Motor Vehicle Parts Manufacturing	$28,332,940	$28,445,360	$112,421
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	$23,593,539	$27,727,990	$4,134,451
311615	Poultry Processing	$17,853,654	$17,297,663	($555,990)
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing	$17,077,611	$17,178,231	$100,620
312120	Breweries	$15,787,891	$15,338,704	($449,187)

Source: EMSI

Factors Driving Investment and Competitiveness

Nationally, revenue in this industry is growing as companies improve and innovate upon existing products. As a result, new companies are rapidly entering the market. Companies that cannot compete leave the market or consolidate to achieve a level of economic stability. Across the Light Manufacturing

[3] Industry sales are calculated using the sum of the dollar value for all goods and services that other industries purchased from a given industry or industry sector. This calculation a) uses historical data instead of estimates, and b) does not include consumer spending; the total in-region sales for an industry or industry sector will often be lower than estimated in-region demand.

industry, automation has been replacing the need for human labor, reducing labor costs and allowing businesses to remain competitive.

Companies entering the Light Manufacturing industry face moderate barriers to entry. Patents, research, capital costs and government regulation can act as a barrier to entry. Major brands with brand loyalty can make it difficult for new operators to compete.

Plastic Product Manufacturing

The majority of operators in this subsector are small- to medium-sized firms. Nearly 88% of all operators employ fewer than 100 workers. Low industry concentration coupled with few input suppliers encourages new operators to enter the market and compete. Plastic Product Manufacturing requires significant financial investment for research and plant equipment, which may deter smaller businesses from entering the market. The industry also faces competition from abroad, which is a constant consideration for US manufacturers.

Medical Equipment and Supplies

Technical innovation, quality and competitive pricing are the primary factors affecting competition in the Medical Equipment and Supplies Manufacturing industry. Sales are primarily driven by the introduction of new products, and therefore research and development is key to companies remaining competitive. Additionally, specialization enables small companies to find a niche market where they can corner the market. As the government and healthcare environment changes, operators will have to explore cost cutting measures in order to accommodate anticipated price concessions. Cost cutting measures include consolidating, pursing lower-cost input materials, outsourcing industry services, and investing in automation.

Food Manufacturing

Competition within Food Manufacturing primarily depends on product price, quality, and level of differentiation. Brands with a reputation for high quality goods command a premium price. However, consumers are price sensitive and may be tempted to switch brands to find more affordable options when the price of the goods increases. The ability to secure premiere shelf space in retailers gives brands a competitive advantage. Yet, more informal methods of marketing and distributing goods have created opportunities for smaller producers.

Nearly half of the Snack Food Production (NAICS 31191) market is large producers, leaving plenty of market share for smaller, more specialized producers. Technology advances such as automation of mixing and baking processes have improved production efficiencies. The industry is expected to continue to introduce new technologies as consumer preferences continue to evolve.

Chocolate is a widely-accepted product, meaning the industry is unlikely to experience a surge in demand. As a result, the number of new Chocolate and Confectionery Manufacturing (NAICS 31135) businesses is projected to increase slowly into 2021. Changing consumer tastes and health trends will push companies to produce healthier varieties. Additionally, there has been a push towards exotic ingredients as a result chocolate imports pose a threat to the domestic companies.

The rural landscape and presence of agriculture in Region 8 caters to the trends towards agritourism. Virginia law states that agritourism is "any activity carried out on a farm or ranch that allows members of the general public, for recreational, entertainment, or educational purposes, to view or enjoy rural activities, including farming, wineries, ranching, historical, cultural, harvest-your-own activities, or natural activities and attractions." [4] Agritourism promotes visitation to farms and can boost sales of value-added products, while enabling farmers to educate visitors on their supply chain and production.

Key External Drivers

For businesses in the Light Manufacturing sector, success, wages and employment growth vary across the industry. However, there is a common correlation between high-skill, low-volume manufacturing and higher wagers. Additionally, Light Manufacturing companies that have entered the market with innovative products have been able to capitalize on shifting tastes. Placing newer products at higher price points has contributed to higher revenue and expanded profit margins. Additional external drivers for the industry include:

- **Demand for related product manufacturing** – The single greatest external driver in the performance of light manufacturing industries is demand for their corresponding product. For example, if health care utilization increases then demand for medical equipment and supplies will subsequently increase. Additionally, as print media companies face lower subscriptions, demand for paper products will drop.
- **Research and development expenditure** – Industry growth is dependent on research and development (R&D) to increase efficiency, reduce costs and develop advanced products. Projections expect an increase in R&D expenditures across numerous light manufacturing industries The Region may capitalize on these expenditures to stay at the cutting edge.
- **Trade-weighted index** - The trade-weighted index (TWI) is a measure of the US dollar against currencies of U.S. trading partners. Exports will decline when the dollar appreciates, because US exports become more expensive to foreign purchasers. The trade-weighted index is projected to be flat.
- **Demand for medical services** – Specific to Medical Equipment and Supplies Manufacturing, demand for medical services has a direct effect on industry revenue. When demand for medical services rise, so will the stock of medical equipment and supplies. A multitude of factors impact the demand for medical services including the number of adults as aged 65 and older, number of physician visits, and number of individuals with private health insurance. All of these factors are projected to rise, presenting an opportunity for the Medical Equipment and Supplies Manufacturing (NAICS 33911) industry.
- **Cost of primary inputs** – These input prices have a large effect on industry success. As the price of sugar, corn, cocoa, etc. prices increase, establishments in the respective food manufacturing industries must either raise prices or absorb costs. Businesses with strong brand loyalty will benefit from increased input costs. Specifically, for Snack Food Production (NAICS 31191) and

[4] Code of Virginia § 3.2-6400

Chocolate and Confectionery Manufacturing (NAICS 31135), primary inputs such as corn, sugar and cocoa are anticipated to decrease.

- **Healthy eating index** – Specific to food manufacturing, this index portrays how closely the average person obeys the USDA's recommended diet guidelines. An increase in the HEI means that health consciousness is increasing, which will have a negative effect on industry sales for Snack Food Production (NAICS 31191) and Chocolate and Confectionery Manufacturing (NAICS 31135). The index is expected to continue rising at a slow rate, which poses a threat to those industries.

Success Factors

For Light Manufacturing operators to continue successfully in the industry, they will need to:

- Be able to adapt to changes in consumer preferences and operating environment
- Have the ability to pass on cost increases, e.g. commodity price increases
- Establish product differentiation
- Utilize economies of scale to reduce effects of high costs of production
- Put in place long-term contracts with suppliers to minimize instability of supply costs
- Understand local regulations and strategically negotiate with regulators
- Ensure quality and safety of products
- Establish an aggressive marketing strategy for increased brand awareness
- Match the needs of the employers with an adequately skilled workforce

Factors Driving Location

Industries in the Light Manufacturing sector often choose their location based on sources of import inputs, major distribution centers, and necessary infrastructure. Additionally, they rely on adequate supply of specialized workers who are knowledgeable in manufacturing processes.

There are several factors that drive Light Manufacturing to Virginia. Virginia's central location and robust transportation systems allow goods to reach a vast network of customers. Training programs and college curricula have catered to creating a workforce educated in industrial processes. Additionally, research and development facilities throughout the state support the manufacturing sector through areas such as supply chain design, automation, materials research and applied coating solutions.

Plastic Product Manufacturing

The location of Plastic Product Manufacturing establishments is based on proximity to major markets and population centers. The Southeast region of the nation holds the highest percentage of all industry establishments with 28%. Virginia is home to 1.5% of all Plastic Product Manufacturing establishments in the United States. Many raw materials associated with Plastic Product Manufacturing come from overseas, making seaports a major asset.

Medical Equipment and Supplies

Medical Equipment and Supplies Manufacturing (NAICS 33911) establishments are largely influenced by population size and age distribution. Medical Equipment and Supplies Manufacturing companies benefit from proximity to downstream customers and upstream suppliers, making transportation a vital component. These facilities thrive in a community that has a business environment focused in medical research and production. Virginia is currently home to 1.6% of all Medical Equipment and Supplies Manufacturing companies.

Food Manufacturing

Snack Food and Chocolate and Confectionery establishments often choose their location based on sources of important inputs such as wheat, corn, and sugar. Businesses in both sectors concentrate near big city markets or areas with large populations for easy serviceability. Virginia is one of the four largest contributors to Snack Food production in the Southeast region, which is home to 15% of establishments.

Overview of Light Manufacturing Companies in Region 8

A diverse range of manufacturing firms exist throughout Region 8, covering food processing, packaging, plastics manufacturing and metal fabrication companies. A selection of these firms are listed below:

- Cargill Turkey Products
- Hershey Foods of Virginia
- MillerCoors Shenandoah Brewery
- Perdue
- Valley Milk Products
- Graham Packing
- Graphic Packing International
- WestRock
- Pactiv, Grottoes Plastics Plant
- Miller Metal Fabricators
- Merck
- Berry Plastics
- Virginia Industrial Plastics
- ComSonics Inc.
- Virginia Panel Corporation
- George's Chicken
- Pilgrim's Pride
- Virginia Growers Poultry
- Shenandoah Valley Organic
- Shenandoah Growers
- Packaging Corporation of America
- Rubbermaid
- Andros Food

- National Fruit Company
- Kraft Foods
- Whitewave
- Rt. 11 Potato Chips
- Mckee Foods
- Cadence

[i] The Regional Competitive Effect is part of a Shift Share Analysis. Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages from growth that can be attributed to national employment trends or overall industry trends. Shift Share indicators help to answer the question "Why is employment growing or declining in this industry?" The **regional competitive effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry.

[ii] Location Quotient (LQ) analysis determines how concentrated a particular industry, demographic group, or other variable is compared to a larger geography. Concentration is a measure of local and regional strength when assessing economic growth potential. LQ is calculated by comparing the variable at a regional and national level. For example, if breweries account for 0.16% of all jobs in the Region but only 0.015% of all national jobs, then the LQ for breweries in that region would be 10.67 (0.16/0.015), demonstrating that breweries are 10 times more concentrated in that region than the national average.

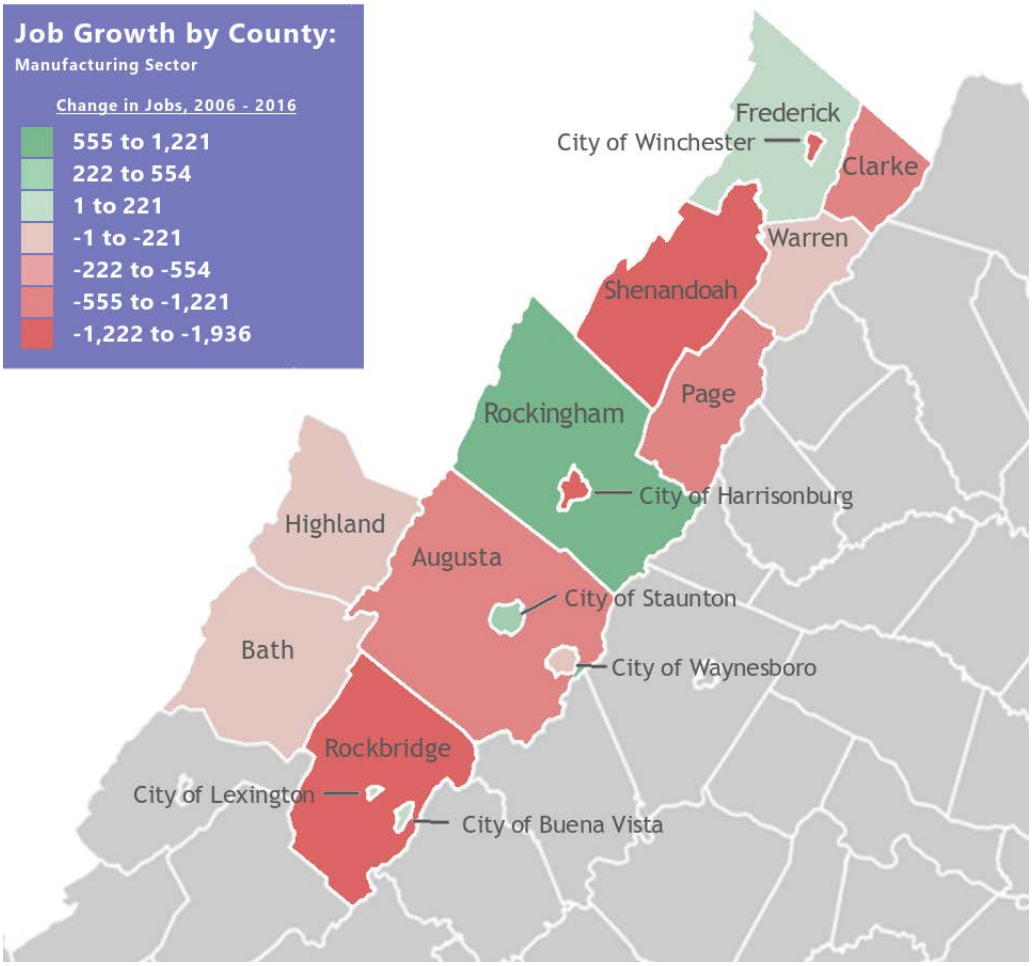
[iii] Replacement Demand utilizes the difference between the number of jobs that are expected to be added to the regional economy between the period of 2016 and 2021 and the number of jobs that will have openings due to normal turnover in the workforce such as retirement, death, and changing careers. Occupations with high figures for replacement demand compared to expected job growth may point to an occupation with low wages, or it may indicate a large number of upcoming retirements due to an aging workforce.

4-Digit NAICS Industries Included in the Light Manufacturing Sector

Light Manufacturing	
NAICS	Description
3121	Beverage Manufacturing
3261	Plastics Product Manufacturing
3345	Navigational, Measuring, Electro medical, and Control Instruments Manufacturing
3211	Sawmills and Wood Preservation
3219	Other Wood Product Manufacturing
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing
3364	Aerospace Product and Parts Manufacturing
3231	Printing and Related Support Activities
3344	Semiconductor and Other Electronic Component Manufacturing
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
3391	Medical Equipment and Supplies Manufacturing
3399	Other Miscellaneous Manufacturing
3273	Cement and Concrete Product Manufacturing
3359	Other Electrical Equipment and Component Manufacturing
3363	Motor Vehicle Parts Manufacturing
3222	Converted Paper Product Manufacturing
3322	Cutlery and Hand tool Manufacturing
3332	Industrial Machinery Manufacturing
3372	Office Furniture (including Fixtures) Manufacturing
3259	Other Chemical Product and Preparation Manufacturing
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
3369	Other Transportation Equipment Manufacturing
3323	Architectural and Structural Metals Manufacturing
3315	Foundries
3329	Other Fabricated Metal Product Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
3254	Pharmaceutical and Medicine Manufacturing
3133	Textile and Fabric Finishing and Fabric Coating Mills
3353	Electrical Equipment Manufacturing
3331	Agriculture, Construction, and Mining Machinery Manufacturing
3379	Other Furniture Related Product Manufacturing

3341	Computer and Peripheral Equipment Manufacturing
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing
3152	Cut and Sew Apparel Manufacturing
3312	Steel Product Manufacturing from Purchased Steel
3271	Clay Product and Refractory Manufacturing
3112	Grain and Oilseed Milling
3141	Textile Furnishings Mills
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
3366	Ship and Boat Building
3113	Sugar and Confectionery Product Manufacturing
3272	Glass and Glass Product Manufacturing
3149	Other Textile Product Mills
3111	Animal Food Manufacturing
3221	Pulp, Paper, and Paperboard Mills

Light Manufacturing Job Growth by County, 2006 - 2016



Transportation and Logistics

Region 8 Industry Profile

Overview:

Major Products and Services in Region 8:

- Transporting passengers and goods
- National post office and courier establishments
- Warehousing and sorting goods

The Transportation and Logistics sector represents industries that link producers and consumers through interconnected supply chains and an array of transportation modes. Logistics industries provide detailed coordination to increase efficiency in multi-modal transportation systems. Establishments in these industries use transportation equipment or transport-related facilities as a productive asset. Equipment varies based on mode of transportation which includes air, rail, water, and road. Services within this sector primarily include transportation of passengers and goods, storing and warehousing products, and providing service and facilitating distribution to these establishments. The core subsectors for Region 8 include: Charter Flights (NAICS 48121), General Warehousing and Storage (NAICS 493110), General Freight Trucking, Long-Distance, Truckload (NAICS 484121), which have all shown significant growth within the past five years. A detailed listing of the industries included in the sector are provided at the end of this profile.

Sector Significance in Region 8

The Transportation and Logistics sector encompasses 614 establishments and employs just over 13,000 people in Region 8. In the last five years, Region 8 industries in this sector have grown by 23%, compared to a 17% growth at the national level. The region's transportation assets render it a prime location for companies moving goods throughout the country. From extensive road networks to a regional airport that has the potential to integrate more uses on site, capitalizing on assets throughout Region 8 localities will help improve overall connectivity.

Industry Trends

The number of establishments increased by 5.5% in Region 8. This growth falls short of growth at the state and national level. The 614 Transportation and Logistics establishments in Region 8 account for 4.4% of all industry businesses in the state.

Industry Establishments				
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change
Region 8	582	614	32	5.5%
Virginia	12,686	13,988	1,302	10.3%
United States	445,131	504,223	59,092	13.3%

Source: EMSI

Job growth in the Region surpassed both the state and nation. Across Region 8 2,426 jobs were added over the last five years, increasing the size of the industry by nearly 23%. In that same period Virginia added nearly 20,000 jobs, increasing total jobs by 10.5%. The nation experienced a growth of 17.0%. In the next five years, all study regions are expected to grow at a lesser rate than the previous five years.

Historical Change in Jobs					
Location	2011	2016	2011 - 2016 Change	2011 - 2016 % Change	Regional Competitive Effect
Region 8	10,591	13,017	2,426	22.9%	184
Virginia	191,071	211,043	19,972	10.5%	
United States	5,927,942	6,937,216	1,009,274	17.0%	

Source: EMSI

Projected Change in Jobs					
Location	2016	2021	2016 - 2021 Change	2016 - 2021 % Change	Regional Competitive Effect
Region 8	13,017	14,555	1,538	11.8%	475
Virginia	211,043	227,391	16,348	7.7%	
United States	6,937,216	7,546,502	609,286	8.8%	

Source: EMSI

Regional Competitive Effect[i]: As shown by a regional competitive effect of 184, job growth in Transportation and Logistics in Region 8 over the last five years exceeded expectations based on national trends. This indicates that regional factors contributed to the job creation over this period. Looking towards the next five years, regional factors will bolster this sector's competitiveness and contribute to 475 more jobs than would be expected based on national and industry trends.

Concentration[ii]: When examining a given industry, a location quotient (LQ) greater than 1 denotes that a given industry is more concentrated in a specified area than across the entire United States. Of the 23 4-digit industries included in the Transportation and Logistics industry sector, 7 currently have location quotients (LQs) that are higher than 1.2, which denotes significant concentration of an industry within a region. These industries are Nonscheduled Air Transportation (NAICS 4812, LQ of 7.08), Warehousing and Storage (NAICS 4931, LQ of 3.58), Pipeline Transportation of Natural Gas (NAICS 4862, LQ of 2.62), Support Activities for Road Transportation (NAICS 4884, LQ of 2.01), Charter Bus Industry (NAICS 4855,

LQ of 1.94), General Freight Trucking (NAICS 4841, LQ of 1.90), and Specialized Freight Trucking (NAICS 4842, LQ of 1.22).

Occupations in Transportation and Logistics

Top Occupations Replacement Demand[iii]

The chart below indicates the top five occupations required to staff companies within the Transportation and Logistics sector in Region 8. The data below reflects occupation totals for the State of Virginia and demonstrates replacement demand, which quantifies the number of positions that will be unfilled due to individuals in the workforce that retire, die or pursue a career change. All occupations are projected to add jobs through 2021, with Laborers and Freight Stock, and Material Movers, Hand leading the way with over 3,500 new jobs. While job growth is strong, over the next five years over 60% of annual openings will come from replacement workers as current workers retire.

Replacement Demand for Top Transportation and Logistics Occupations (Virginia)							
Occupations	Employed in Industry Group 2016	Change (2016 - 2021)	2016 - 2021 Openings	Annual Openings	2016 - 2021 Replacement Jobs	Annual Replacement Jobs	% Replacement Jobs
Stock Clerks and Order Fillers	56,169	2,824	11,962	2,392	9,138	1,828	76.4%
Heavy and Tractor-Trailer Truck Drivers	41,844	1,983	5,932	1,186	3,645	729	61.4%
Light Truck or Delivery Services Drivers	21,447	1,072	2,943	589	1,871	374	63.6%
Industrial Truck and Tractor Operators	13,171	819	2,516	503	1,695	339	67.4%
Laborers and Freight, Stock, and Material Movers, Hand	51,214	3,538	11,430	2,286	7,891	1,578	69.0%

Source: EMSI Q2 2017 Dataset

Job Postings and Required Skills

The table below includes job posting data for Region 8 between April and June 2017 for the top occupations required to staff companies within the Transportation and Logistics industry. The top occupation, by far, is Heavy and Tractor-Trailer Truck Drivers, with over 4,400 average monthly postings. Other top occupations include Stock Clerks and Order Fillers; and Customer Service Representatives. For these top occupations, especially Heavy and Tractor-Trailer Truck Drivers, there is greater demand than supply. In fact, there continues to be significant demand for Heavy and Tractor-Trailer Truck Drivers. However, for a few occupations there have been a greater number of hires vs. job postings. These include Laborers and Freight, Stock, and Material Movers, Hand; and Office Clerks, General. Employers may be using other methods to hire workers in these occupations.

Based on job postings during the same period, the most relevant hard skills required include Cargos; Road Transport; Wheels; and Driving. The Relevance Score noted in the second table indicates the frequency at which a particular skill appeared on job postings for the selected occupations relative to all job postings within the region. A positive score indicates a greater frequency.

The top soft skills include: Scheduling (Project Management); Leading; Leadership; and Learning.

Transportation and Logistics Job Postings vs. Hires, April 2017 - June 2017		
Occupation	Avg Monthly Postings	Avg Monthly Hires
Heavy and Tractor-Trailer Truck Drivers	4,427	253
Stock Clerks and Order Fillers	423	231
Customer Service Representatives	237	159
Light Truck or Delivery Services Drivers	150	78
Laborers and Freight, Stock, and Material Movers, Hand	116	353
General and Operations Managers	115	115
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	79	21
Industrial Truck and Tractor Operators	68	87
Bus and Truck Mechanics and Diesel Engine Specialists	58	32
Office Clerks, General	21	295
Shipping, Receiving, and Traffic Clerks	20	48
Management Analysts	16	26
Packers and Packagers, Hand	6	86
First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	3	19
Dispatchers, Except Police, Fire, and Ambulance	2	18
Machine Feeders and Offbearers	2	21

Source: EMSI Q2 2017 Dataset

Transportation and Logistics Job Postings Hard Skills, April 2017- June 2017		
Skill	Relevance Score	Postings with Skill
Cargos	0.57	3,526
Road Transport	0.50	2,503
Wheels	0.44	1,074
Driving	0.42	3,702
Hazardous Materials	0.25	1,822
Leasing (Contract Law)	0.16	1,135
Health Insurance	0.16	1,582
Life Insurance	0.13	1,975
Cleaning	0.13	2,074
Warehousing	0.08	967
Defensive Driving	0.08	393
Recruitment	0.08	3,417
Dispatching	0.08	391
Palletizing	0.07	470
Steering	0.07	350
Purchasing	0.07	961
Forklift Truck	0.06	503
Vision Insurance	0.06	373
Permits	0.06	461
Television	0.05	370
Unloading	0.05	640
Disability Insurance	0.03	374
Trailers	0.03	362
Insurance	0.03	2,504
Distribution (Business)	0.03	809
Information Technology	0.03	737
Materials	0.02	519
Networking	0.02	498
Lifting	0.01	1,024

Source: EMSI Q2 2017 Dataset

Transportation and Logistics Job Postings Soft Skills, April 2017- June 2017	
Skill	Postings with Skill
Scheduling (Project Management)	1,323
Leading	510
Leadership	305
Learning	241

Source: EMSI Q2 2017 Dataset

Supply Chain: Demand, Purchases and Sales

Demand

Demand for a given industry or industry sector is calculated based on the estimated national demand from all industries and consumers. Industry wages, taxes, and other value added payments are indirectly part of the demand through the production of the supplying industry. The total demand by consumers and other industries in Region 8 for goods produced by Transportation and Logistics is $900.4 million. Nearly 29% of this demand was met by Transportation and Logistics within the Region, $259.9 million worth of goods. The other 71% of demand was satisfied by imports from other states.[1]

Demand in Region 8 for Goods Produced by Transportation and Logistics				
Demand Met in Region 8	% Demand Met in Region 8	Demand Met by Domestic Imports	% Demand Met by Domestic Imports	Total Demand in Region 8
$ 259,766,717	28.9%	$ 640,630,967	71.1%	$ 900,397,684

Source: EMSI

Purchases

The table below shows the industries from which the Transportation and Logistics sector in Region 8 purchased the greatest amounts of goods. Transportation and Logistics purchased $117 million worth of goods and materials from Petroleum Refineries (NAICS 324110) in 2016, all of which were imported. Following Petroleum Refineries, the Transportation and Logistics sector also purchased $60 million worth of goods and services from Couriers and Express Delivery Services (NAICS 492110). Over half of these purchases were made within Region 8, while the other 47% were imported from other states.

General Warehousing and Storage (NAICS 493110) had the highest sourcing from within Region 8, where 74% of the $35 million in purchases was made within Region. Similarly, the industry made 71% of $22 million in purchases from Lessors of Residential Buildings and Dwellings (NAICS 531110) within Region 8. In contrast, purchases made from Freight Transportation Arrangement (NAICS 488510) and Corporate, Subsidiary, and Regional Managing Offices (NAICS 55114) were mainly imported from outside the Region. Less than 20% of goods purchased in these sectors came from Region 8.

[1] This data only includes demand with respect to industries and consumers within the United States.

Top 10 Industries by Purchases Made by Region 8 Transportation and Logistics in 2016						
NAICS	Purchases from	In-Region Purchases	% In-Region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
324110	Petroleum Refineries	$0	0.0%	$116,753,512	100.0%	$116,753,512
492110	Couriers and Express Delivery Services	$31,366,982	52.7%	$28,191,265	47.3%	$59,558,247
493110	General Warehousing and Storage	$26,205,482	74.1%	$9,162,707	25.9%	$35,368,189
488510	Freight Transportation Arrangement	$3,514,758	13.4%	$22,661,489	86.6%	$26,176,248
531110	Lessors of Residential Buildings and Dwellings	$15,557,034	70.7%	$6,444,541	29.3%	$22,001,575
551114	Corporate, Subsidiary, and Regional Managing Offices	$4,245,187	19.7%	$17,274,739	80.3%	$21,519,926
901149	US Postal Service	$11,302,050	54.2%	$9,556,702	45.8%	$20,858,752
531210	Offices of Real Estate Agents and Brokers	$7,977,012	45.3%	$9,619,766	54.7%	$17,596,779
561320	Temporary Help Services	$4,756,467	31.7%	$10,253,804	68.3%	$15,010,271
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)	$8,553,459	63.9%	$4,840,792	36.1%	$13,394,251

Source: EMSI

Sales[2]

Transportation and Logistics establishments in Region 8 primarily sold their products and services to General Freight Trucking, Long-Distance, Truckload (NAICS 484121); Poultry Processing (NAICS 311615); and General Warehousing and Storage (NAICS 493110). The industry's largest buyer was General Freight Trucking with nearly $29 million in sales in Region 8 in 2016, up $2.6 million since 2015. Sales within all the top purchasing sectors increased in the period 2015-2016. The biggest shift in sales occurred in the General Warehousing and Storage sector, where sales increased by $3.4 million from 2015 to 2016.

Top 10 Industries for Sales Made by Region 8 Transportation and Logistics				
NAICS	Sales to	Total In-Region Sales 2015	Total In-Region Sales 2016	Change in Sales 2015 - 2016
484121	General Freight Trucking, Long-Distance, Truckload	$26,049,316	$28,687,662	$2,638,346
311615	Poultry Processing	$24,329,713	$25,263,769	$934,057
493110	General Warehousing and Storage	$19,362,806	$22,735,278	$3,372,472
622110	General Medical and Surgical Hospitals	$17,133,278	$18,520,417	$1,387,138
452910	Warehouse Clubs and Supercenters	$16,295,593	$16,657,585	$361,993
311511	Fluid Milk Manufacturing	$11,837,555	$12,738,559	$901,004
484122	General Freight Trucking, Long-Distance, Less Than Truckload	$8,059,726	$8,734,473	$674,747
112000	Animal Production and Aquaculture	$7,672,809	$8,109,833	$437,024
551114	Corporate, Subsidiary, and Regional Managing Offices	$7,738,470	$8,029,731	$291,261
445110	Supermarkets and Other Grocery (except Convenience) Stores	$7,123,006	$7,620,495	$497,489

Source: EMSI

Factors Driving Investment and Competitiveness

Nationally, the Transportation and Logistics sector grows consistently with general economic activity. Despite establishment proliferation, large integrated companies continue to gain greater market share.

[2] Industry sales are calculated using the sum of the dollar value for all goods and services that other industries purchased from a given industry or industry sector. This calculation a) uses historical data instead of estimates, and b) does not include consumer spending; the total in-region sales for an industry or industry sector will often be lower than estimated in-region demand.

Services within the industry have been altered to cater to changing consumer demand. Technological developments have slowed due to diminishing returns, and are mainly focused on efficiency rather than new services. Investment and industry growth is contingent on rising demand and integrated logistics. Key downstream markets such as manufacturers have widely accepted Transportation and Logistics services, and will continue to rely on them thus ensuring future demand. This sector is highly competitive and expected to remain so in the upcoming years.

Interstate 81 (I-81) is a major transportation asset in Region 8. It is classified as one of the most important highways on the East Coast and is essential to Virginia's economy. This interstate caters to a high volume of truck traffic with connections to I-64, I-66, and I-77. The growth of the Transportation and Logistics sector within Region 8 is directly aligned with the management of vehicle capacity on I-81. Increased truck traffic will continue to place stress on local infrastructure and appropriate measures to maintain quality infrastructure will be necessary to ensure that routes remain passable.

The quality of general infrastructure for Transportation and Logistics has a significant influence on the ability to engage in trade and travel. Transportation infrastructure includes the quality of roads, bridges, railways, ports etc. Deteriorating infrastructure has a negative impact resulting in longer travel times, increased wear on vehicles, and lowered accessibility. High-quality infrastructure has a positive effect on economic growth by increasing access to livelihood, decreasing travel time and lowering transportation costs.

Overall barriers to entry in the Transportation and Logistics industry are low. In the more labor-intense subsectors there is generally little capital, experience or expertise needed to enter the industry. Basic warehousing and freight trucking requires initial capital investment and employment of workers to handle basic functions. Barriers to entry are expected to rise as industries within Transportation and Logistics increasingly outsource supply chain logistics, add more value-added services, and increase the basic requirements that new entrants must meet to be competitive. There are some subindustries with high barriers to entry due to regulations that must be met to ensure staff and customer safety.

Charter Flights

Competition within Charter Flights (NAICS 48121) relies on operators' ability to capitalize on flexibility, luxury and convenience. Flights than can fly into small, local airports have a competitive advantage over large carriers that may be restricted due to a higher passenger threshold needed to run specific routes.

Rising fuel prices will threaten industry profitability over the next five years. In addition to fuel prices, maintenance and aircraft upgrades will need to be sustained to maintain profitability. Newer aircrafts are associated with attracting customers and yielding more in return. In contrast, some operators opt for older aircrafts that are retired from mainline carriers. While these aircrafts are less expensive, they require more capital in maintenance and repair, which could make this option less competitive. The success of the industry is also reliant on the availability of airline pilots and individuals that can service a variety of air crafts.

Public Storage and Warehousing

Growth in e-commerce will place additional space and labor requirements on the Public Storage and Warehousing industry especially by businesses without their own facilities, which will place a higher demand on third party warehousing. Nationally, e-commerce sales are projected to grow at an annualized rate of 7.8% into 2022. These national trends have already had ramifications in Region 8, as Amazon recently announced that they are opening an e-commerce warehouse and distribution facility in Frederick County.

The success of General Warehousing and Storage (NAICS 493110) is based on price, location and service offerings. The addition of value-added services have helped operators remain competitive. Vertical integration through clients operating their own warehouses poses a threat to the industry. This is already true for large companies such as Walmart, General Motors, and Amazon. Additionally, the need for warehousing facilities may shift as improved logistics coordination reduces lead times in supply and demand chains.

General Freight Trucking

The General Freight Trucking, Long-Distance, Truckload (NAICS 484121) industry has fluctuated in the past due to consolidations. Demand for General Freight Trucking has increased as the US manufacturing sector offshores more work. Trucking companies have coupled with shipping companies to move goods from ports to consumption and manufacturing centers. Additionally, operations have expanded to include door to door transactions.

Wages in this industry are dependent on the supply of truck drivers. Currently, there is a shortage of truck drivers, which has placed stress on the industry and resulted in increased wages as a percentage of total revenue. While operators mitigate this existing workforce challenge, the landscape for this field is anticipated to shift as technological advancements towards self-driving trucks emerge from technology firms. Firms developing the software for autonomous trucks aim to provide increased coordination, increasing fuel efficiency and improved safety conditions. The uptake of this technology is still in the initial phases and the full ramifications on the industry are challenging to quantify. If the technology for self-driving trucks continues to proliferate, the sector's workforce requirements will shift, as technicians to repair and maintain the software inside trucks will prove more valuable than drivers.

While technological changes involving self-driving trucks are still underway, federal regulations surrounding General Freight Trucking have recently been amended in an effort to improve highway safety. Regulations limit the length of time a driver can be on duty to 14 hours per day and further enforce required breaks. Drivers who surpass the maximum distance allowed within the specified time frame can receive speeding violations. These regulations, while in place to protect the safety of drivers and those on the road, can reduce the quantity of shipments and involve reconfiguring supply chains.

Key External Drivers

Economic growth and increased downstream demand provides an environment conducive to revenue expansion in this industry. The overall health of the Transportation and Logistics sector primarily relies on

the status of the manufacturing and retail industries. As a result, the Transportation and Logistics sector is impacted greatly by:

- **Price of Fuel** – Transportation is sensitive to fluctuations in fuel prices. Fuel accounts for a significant proportion of operating costs and a decrease in fuel costs can increase profit margins. Diesel and crude oil prices are expected to increase, increasing pressures on the industry. Additionally, natural gas prices are expected to increase,
- **Per Capita Disposable Income** – Disposable income drives consumer demand, as disposable income increases consumers are more likely to purchase goods increasing the demand for Transportation and Logistics services. Per capita disposable income is projected to continue to increase over the next five years.
- **Industrial Production Index** – A high industrial production index reflects a healthy manufacturing sector. Growth in manufacturing output increases demand for transportation specifically, long-distance freight trucking. Industrial production index is projected to grow slightly over the next five years.
- **Freight Transportation Services Index** – This index is a measure of the annual output of the United States transportation sector. Increased shipping demand results in a rise in demand for warehousing. Freight Transportation Services are anticipated to show nominal growth over the next five years.

Success Factors

For Transportation and Logistics operators to continue successfully in their industries, they will need to:

- Understand clients' needs, maintain research of market, and quickly adopt new technology
- Tighten financial control over costs and revenue as well as effective cost management
- Attract and retain workforce that is appropriately skilled for the right position
- Create a reputation for consistently and high standards to retain customers
- Incorporate long term sales contracts

Factors Driving Location

A determining factor in locational decision-making for the Transportation and Logistics sector is proximity to areas of high market and population density, specifically pertaining to manufacturing and retail, as well as access to major transportation and distribution hubs. Approximately, 43% of the United States population and nearly 200,000 manufacturing establishments are within a 24-hour drive time of Virginia.[3] Proximity to large ports, interstates, rail lines, and transfer opportunities provides easy access for the warehousing and storage of goods. Virginia is home to six major in-state highways, two major freight rail lines, several marine ports, and regional airports, all of which have contributed to Transportation and Logistics growth.

[3] YesVirginia.Org

Region 8 is home to the Virginia Inland Port in Front Royal, VA. The Virginia Inland Port brings goods from the Port of Virginia closer to inland markets and consolidates local cargo for export. From this port, goods travel to major areas including Washington D.C, New York, and Pennsylvania. Major companies such as Home Depot, Kohl's, and Red Bull have capitalized on the Virginia Inland Portland and nearby assets by opening distribution centers in Front Royal. Region 8 is also home to the Shenandoah Valley Regional Airport in Weyers Cave, 15 miles outside of the City of Harrisonburg.

Overview of Transportation and Logistics Companies in Region 8

A selection of Transportation and Logistics companies are listed below:

- Norfolk Southern Corporation
- CSX Corporation
- Shenandoah Valley Railroad
- Buckingham Branch Railroad
- Shenandoah Valley Regional Airport
- Virginia Inland Port
- Interchange Corporation
- Winchester Regional Airport
- Warehousing/distribution facilities for a number of retailers including Wal-Mart, Best Buy, Target, Marhsalls, Americold, and Amazon

[i] The Regional Competitive Effect is part of a Shift Share Analysis. Shift Share Analysis distinguishes an industry's employment growth in a specific area that is attributable to local competitive advantages from growth that can be attributed to national employment trends or overall industry trends. Shift Share indicators help to answer the question "Why is employment growing or declining in this industry?" The **regional competitive effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses, because the growth cannot be explained by national trends in that industry or the economy as whole. This effect is calculated by taking the total regional growth of the given industry and subtracting the national growth for that same industry.

[ii] Location Quotient (LQ) analysis determines how concentrated a particular industry, demographic group, or other variable is compared to a larger geography. Concentration is a measure of local and regional strength when assessing economic growth potential. LQ is calculated by comparing the variable at a regional and national level. For example, if breweries account for 0.16% of all jobs in the Region but only 0.015% of all national jobs, then the LQ for breweries in that region would be 10.67 (0.16/0.015), demonstrating that breweries are 10 times more concentrated in that region than the national average.

[iii] Replacement Demand utilizes the difference between the number of jobs that are expected to be added to the regional economy between the period of 2016 and 2021 and the number of jobs that will have openings due to normal turnover in the workforce such as retirement, death, and changing careers. Occupations with high figures for replacement demand compared to expected job growth may point to an occupation with low wages, or it may indicate a large number of upcoming retirements due to an aging workforce.

4-Digit NAICS industries Included in the Transportation and Logistics Sector

Transportation and Logistics	
NAICS	Description
4811	Scheduled air transportation
4812	Non-scheduled air transportation
4821	Rail Transportation
4831	Deep Sea, Coastal, and Great Lakes Transportation
4832	Inland Water Transportation
4841	Great Freight Trucking
4842	Specialized Freight Trucking
4855	Charter Bus Industry
4859	Other Transit and Ground Passenger Transportation
4861	Pipeline Transportation of Crude Oil
4862	Pipeline Transportation of Natural Gas
4869	Other Pipeline Transportation
4881	Support Activates for Rail Transportation
4882	Support Activities for Rail Transportation
4883	Support Activities for Water Transportation
4884	Support Activities for Road Transportation
4885	Freight Transportation Arrangement
4889	Other Support Activities for Transportation
4921	Couriers and Express Delivery Services
4931	Warehousing and Storage
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing
5416	Management, Scientific, and Technical Consulting Services
5619	Other Support Services

Transportation and Logistics Job Growth by County, 2006 - 2016