

```
class(x: Int, y: Int) {  
    self.x = x  
    self.y = y  
}  
  
/// Returns the surrounding points in range of  
/// the current one  
func points(inRange range: Int = 1) -> [Point] {  
    var results = [Point]()  
  
    let lowerBoundOfXRange = x - range  
    let upperBoundOfXRange = x + range  
  
    let lowerBoundOfYRange = y - range  
    let upperBoundOfYRange = y + range  
  
    for xCoordinate in lowerBoundOfXRange...upperBoundOfXRange {  
        for yCoordinate in lowerBoundOfYRange...upperBoundOfYRange {  
            let coordinatePoint = Point(x: xCoordinate, y: yCoordinate)  
            results.append(coordinatePoint)  
        }  
    }  
    return results  
}
```

2020 Middle Tennessee Workforce Study



Northern Middle Tennessee Local
Workforce Development Board



Table of Contents

Message from the Northern Middle Tennessee Local Workforce Development Board	3
Introduction	3
The Good	4
The Bad	5
The Ugly	5
The Study Area	6
Industry Cluster Analysis	7
Occupational Needs Assessment	8
Occupational Supply Gaps	20
Occupational Skills Gaps	21
Talent Location	22
Disruption and Automation	25
Best Practice Workforce Profiles	30
Apprenti	31
Tractor Supply Co. and Nashville State	33
Nashville Career Readiness Partnership - Construction Program	35
Nissan and TCAT-Murfreesboro	37
Student Survey	39
Barriers To Work	40
Conclusion	42
Tactical Recommendations	42

Message from the Northern Middle Tennessee Workforce Board

The Northern Middle Tennessee Workforce Board embraces the Tennessee Department of Labor and Workforce Development's vision of being the nation's premier workforce system and strives to be the most effective local workforce area in the state. To accomplish this task, the Board must have access to relevant labor market information and analysis and must respond with a strategic blueprint to effectively deploy the resources offered through the Workforce Innovation and Opportunity Act (WIOA).

The current economic conditions require targeted investments to rebuild our vibrant economy in response to both local natural disasters and the global pandemic, events which have combined to wreak havoc with our region's well-known hospitality and tourism sectors while simultaneously sidelining our strong manufacturing sector. The Northern Middle Tennessee Workforce Board's (NMTWB) support of this study, as well as its long-standing partnership with the Nashville Area Chamber of Commerce, strengthens our commitment to build innovative workforce initiatives with an emphasis on incorporating career pathways for our future workforce. The Board remains focused on funding and supporting upskilling opportunities for the unemployed and underemployed individuals through the American Job Center system.

As we adjust to the evolving dynamics facing our stakeholders, we are reminded the NMTWB must be agile and responsive to employers' needs by implementing multiple strategies that incorporate supports for a more diverse and inclusive labor force that is highly skilled and prepared for change. The Northern Middle Tennessee Workforce Board intends to utilize the information provided within the report to serve as a catalyst for economic growth and prosperity across Middle Tennessee.

Marla W. Rye

Executive Director
Northern Middle Tennessee Local Workforce
Development Board

INTRODUCTION

To adjust to impending structural shifts in our workforce, the U.S. will need a significant investment in, and modernization of, our active labor market policies to reflect the realities and needs of both workers and businesses.

– Katie Spiker, National Skills Coalition

While 2020 brought severe tornadoes, storms, a global pandemic and economic downturn, the year also brought to the forefront the interdependence and reliance all economic and workforce development organizations have on one another. Despite the obstacles presented by 2020, data in this report highlights strengths and opportunities that exist as part of the economic and labor force landscape in Middle Tennessee. By gaining a greater understanding of this data, we begin to map out the means to ensure every person in our region has the opportunity, support, and resources to connect to a career in a high-wage, high-demand pathway.

Researchers of this study are grateful to the Northern Middle Tennessee Workforce Board (NMTWB) for their foresight in underwriting this study. Their support was critical in the undertaking of this study of the 17-county Nashville and Clarksville Metropolitan Statistical Areas.

Identifying career pathways of opportunity and connecting workers across the population to training, credentials, and degrees creates opportunity for families to prosper in Middle Tennessee. This report lays the groundwork for collaboration among policy makers, educators, talent and economic development professionals, employers and researchers.



THE GOOD

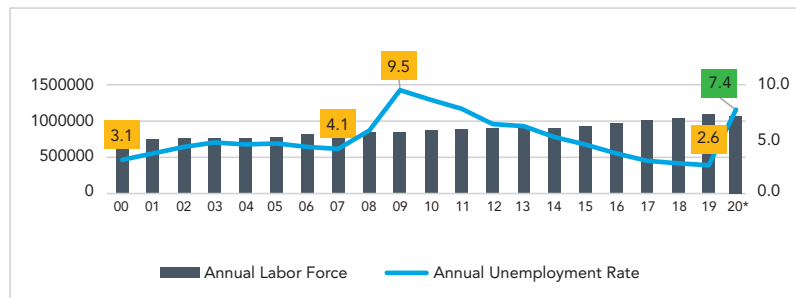
In 2007 and again in 2010, the Center for Regional Economic Competitiveness (CREC) completed studies of labor market opportunities for the Nashville area. During this period, the annual unemployment rate went from a low of 5.2% in the Clarksville Metropolitan Statistical Area (MSA) to a height of 10.3%, while the Nashville MSA reached a peak of 9.5% from a low of 4.1%.¹ These studies guided regional economic and workforce development efforts, and educational investments, for several years. In 2015, The Research Center of the Nashville Area Chamber of Commerce (Chamber) conducted an updated study that provided data and analysis of industry and occupational sectors driving the region's jobs growth and prosperity offering insights into Nashville's demand for workforce supply and identifying skills gaps that posed challenges for future industry growth and development.

In 2019, unemployment in the Nashville MSA was trending towards historic lows with some counties

dipping below 2.0%, while the nearby Clarksville MSA hovered near 4.0%.² The economy was at full employment, meaning no workers who are able and willing are involuntarily unemployed.

Meanwhile, the economy (as measured in terms of Gross Domestic Product [GDP]) for both regions continued to grow at a compound annual rate of 3.5% (Clarksville MSA) and 6.1% (Nashville MSA) with jobs for all industries growing at a rate of approximately 3.3% per year.³ The tight labor market, coupled with extraordinary economic growth, did not seem inclined to slow down. This elevated workforce to the region's top issue, driving policy makers to consider what was needed to develop the talent base, recruit new workforce to the region, and increase workforce participation among Middle Tennesseans through training programs and workforce initiatives. Understanding labor force participation and who remains on the sidelines means consideration of innovations in outreach, training, recruitment practices, and public and private sector policies. Alignment of these systems supports equitable participation in the prosperity of the region.

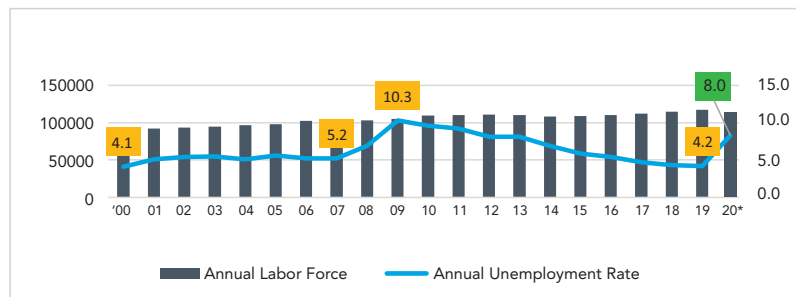
Figure 1. Labor Force & Unemployment by Year - Nashville MSA



*Preliminary Estimate

Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

Figure 2. Labor Force & Unemployment by Year - Clarksville MSA



*Preliminary Estimate

Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

¹ Bureau of Labor Statistics, Local Area Unemployment Statistics

² Ibid

³ U.S. Bureau of Economic Analysis

THE BAD

Despite notable levels of labor force growth and historically low unemployment in 2019, labor force participation rates had not returned to their pre-recessionary levels. The lackluster performance of labor force participation begged the question, “In an economy boasting full employment, who is not fully participating and why not?” Employment participation disparities could partially be explained by diminishing civilian population trends and deficiencies in skills, but other exclusionary factors also keep some residents from fully participating in the high growth economy. As evidenced by widening income disparities, lack of access to housing, healthcare and education for some populations, macrolevel indicators of growth do not always translate into microlevel participation in prosperity.⁴

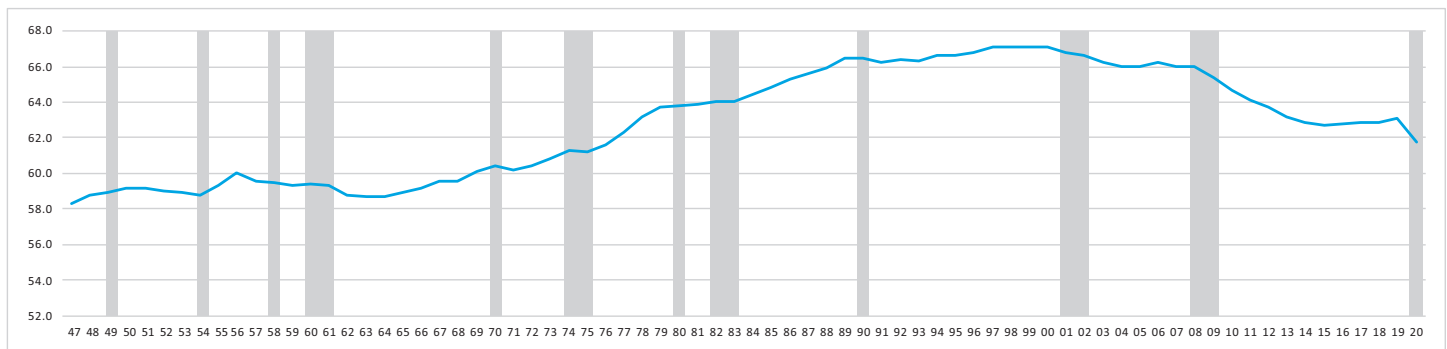
THE UGLY

The optimism and historical economic growth of the post-2010 recession in both the Nashville and Clarksville MSAs (economic region) came to an abrupt halt in early

2020 just as this study was nearing completion. As 2019 came to a close, the World Health Organization began to warn of a potential outbreak of the COVID-19 virus. By early 2020, COVID-19 was a global pandemic with significant supply and demand-side economic impacts. In mid-March, the State of Tennessee and the economic region began to feel these impacts as businesses closed normal operations and workers were temporarily furloughed or permanently laid off. By May, nearly 400,000 workers across the state were laid off by their employers. While this number decreased slightly by the end of the month (to approximately 360,000), a surge of cases in early summer and more than 170,000 cases statewide as of early September have tempered plans to return to pre-COVID level economic activity.⁵

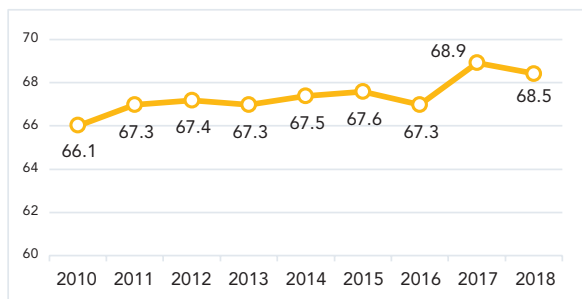
According to the Tennessee Department of Labor and Workforce Development, the post-COVID landscape has averaged about 312,575 weekly unemployment claims for the eight-week period beginning March 22, 2020 through May 30, 2020. Despite the spike in COVID-19 cases, the number of weekly unemployment claims decreased to an average of approximately 280,000 weekly unemployment claims through August 1, 2020.⁶

Figure 3. U.S. Labor Force Participation Rate, 1947-2020



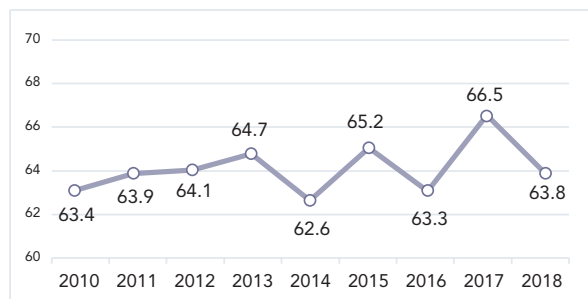
Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics, Current Population Survey; Bureau of Economic Analysis

Figure 4. Labor Force Participation - Nashville MSA



Source: U.S. Bureau of Labor Statistics

Figure 5. Labor Force Participation - Clarksville MSA



Source: U.S. Bureau of Labor Statistics

⁴ U.S. Bureau of Labor Analysis, Sycamore Institute TN, U.S. Census Bureau, ACS 1 yr. Estimates
⁵ Tennessee Department of Health

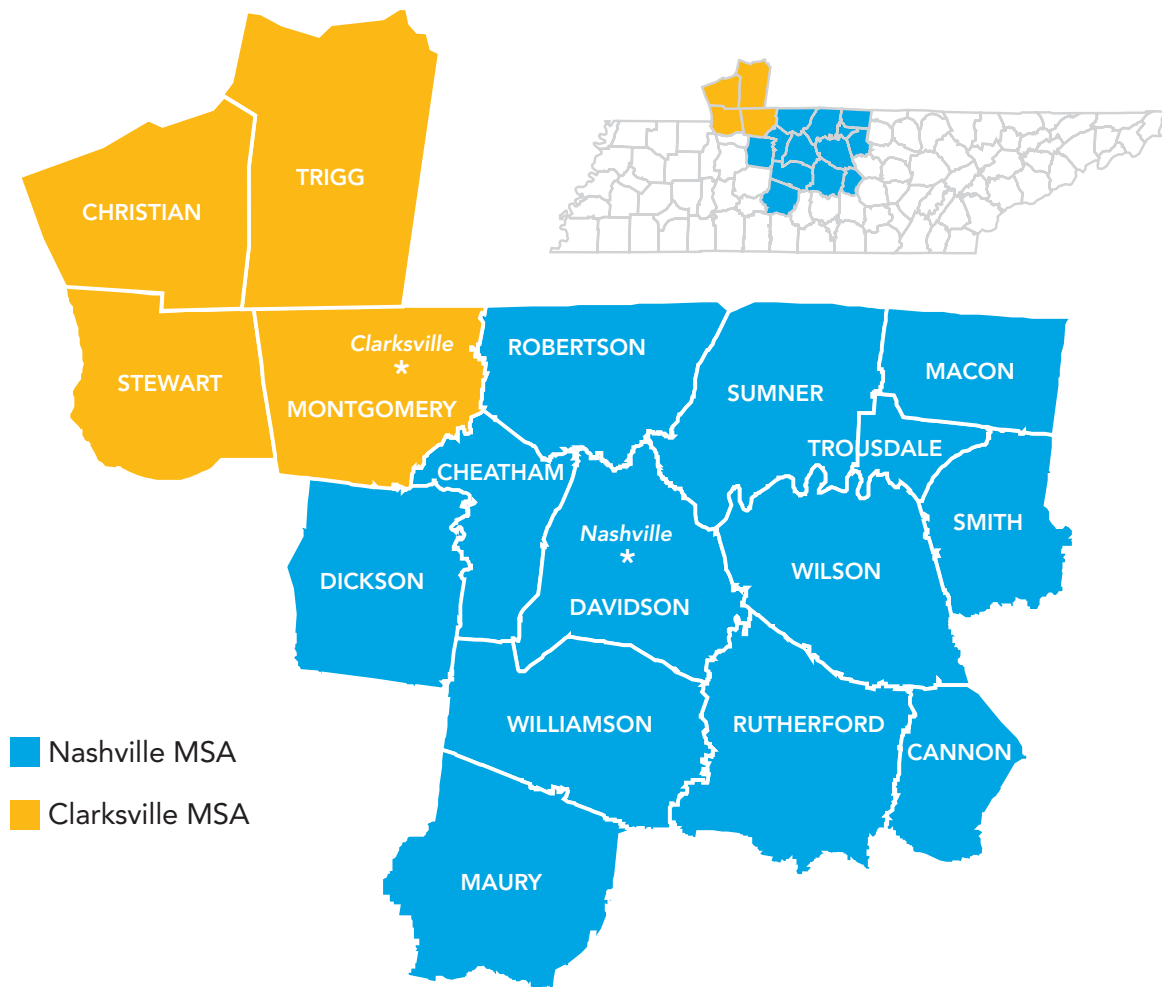
⁶ Tennessee Department of Labor and Workforce Development, The Research Center - NACC

THE STUDY AREA

The Nashville-Clarksville joint metro region is a combination of the Nashville MSA's 13-county region, the Clarksville MSA's four-county region spanning both Tennessee and Kentucky. Metropolitan statistical areas are geographic entities with a core urban area of a population of 50,000 or more, delineated by the U.S. Office of Management and Budget (OMB). The

Nashville MSA is comprised of 13 counties, all in the state of Tennessee: Cannon, Cheatham, Davidson, Dickson, Macon, Maury, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson and Wilson. The Clarksville MSA is comprised of four counties: Montgomery and Stewart in Tennessee, Christian and Trigg in Kentucky. The joint metro region is centrally located within the United States, and the state of Tennessee shares a border with eight states providing connectivity to the southeast region and beyond.⁷

Figure 6. The Nashville-Clarksville Joint Metro Region



⁷ U.S. Department of Commerce, Office of Management and Budget

INDUSTRY CLUSTER ANALYSIS

An industry cluster analysis for the economic region determines the collective regional strength arising from grouped industry specializations. Industry clusters are groups of related or linked businesses functioning interdependently creating a competitive hub for linked industries sharing common markets, occupational skills and technologies within a given region. Clusters are important to the economic landscape because of shared links and access to specialized suppliers, skilled workers, proximity to competitors and base of industry knowledge.

Traded and local clusters were determined by utilizing data from the US Cluster Mapping Project (the collaborative result of research from Harvard Business School, MIT Sloan and Temple Fox School of Business) coupled with location quotient data from the Chamber Research Center's purchased third party labor market databases. Traded clusters are the industry groups (e.g., manufacturers or transportation and logistics providers) providing goods or services beyond the geographic boundaries of the region bringing in capital from outside the region. Traded clusters are most likely to benefit from having a strong globally cooperative business climate. They typically account for about 33% of a region's employment while providing 50% of wages and well over 90% of a region's research and development and innovation. Local clusters are those industries (e.g., hospitals and educational institutions) providing goods and services to a limited service geography.

Research initially identified fifteen traded clusters for the

economic region. Following further data releases and updates, the clusters assessment revealed ten traded clusters, two localized clusters and four opportunity clusters (shown below). Opportunity clusters represent industries not currently within our economic landscape but for which we have a strong concentration of workers and suppliers.⁸

To demonstrate the inter-relatedness of clusters and industries - automotive and advanced manufacturing are two of the largest clusters in the region, both of which caused the metals and plastics manufacturing industries to grow. These four industries have spurred the growth of the transportation, distribution and logistics industry. While downstream, chemical manufacturing has also grown in the region; the advent and increase of advanced manufacturing has spurred growth in this cluster and presents opportunities for further growth. The presence of both industrial and occupational specializations in these clusters lends itself well to create a medical device manufacturing cluster in Middle Tennessee that could rival the Memphis region. This also gives rise to opportunities for industries engaged in production technology. The complementary nature of the occupations and skills that make up these industries, both in the economic region and among our peer communities, allow policymakers and business leaders to consider workforce development efforts that ensure secondary operations for industries. These secondary operations would allow industries to retool or shift their operations to complementary operations that allow them to respond to market disruptions, recessions, or events such as war or global pandemics that alter or disrupt supply lines.⁹

Figure 7. Regional Target Clusters



⁸ U.S. Cluster Mapping, EMSI, JobsEQ, The Research Center-NACC

⁹ Ibid

The economic region also continues to perform well in business services. Davidson and Williamson Counties have seen increases in business services involving the management of companies or headquarters. Additionally, insurance and captive insurance firms (companies that manage risk for other companies or their own subsidiaries) have seen significant growth, thanks in part to a strong push by the State of Tennessee to tailor a regulatory framework more conducive to the growth and recruitment of captive firms.¹⁰ The increase of the local health-related cluster has also underpinned the growth in insurance related industries. Between these business clusters and the insurance industries, the opportunity exists to develop a highly specialized information technology cluster.

OCCUPATIONAL NEEDS ASSESSMENT

From these clusters, the study determined the top five occupations per major employment and wage growth cluster for which the economic region has high employment (occupational) specialization or a location quotient (LQ) above 1.0. Regional specializations refer to the concentration of workers with a given occupational skill indexed to the national average. This determines the location quotient for that geography compared to similar geographics (county to county, MSA to MSA, city to city). A location quotient of 1.0 represents the national average while numbers above 1.0 represent higher than average concentrations and numbers below 1.0 represent lower than average concentrations.

The study also identified if the target cluster had occupations for which the economic region has low specialization (LQ below 1.0). Since industries are dependent on these key occupations, those with a low concentration (LQ) of skilled workers present the logical area of focus for the creation or promotion of workforce development programs to increase the pipeline of skilled workers to those target occupations. These recommendations are tempered against 5-year and 10-year occupational gaps analysis.¹¹ The study includes an

occupational analysis report for each of the selected subset of occupations in order to assess supply and demand, demographic composition and the makeup of these occupations by level of training required and the training pipeline. Each of these occupations received an automation value that will allow us to assess their potential risk of technological disruption, as well as opportunities to upskill to meet future technological needs. A COVID-19 risk index which indicates the level of vulnerability of occupations resulting from COVID-19 impacts on industries is also integrated into the occupational matrix.

The study next layers in wage data to determine whether the occupation provides a “good,” “promising,” or “other” job using the Brookings Institute’s methodology on Opportunity Jobs. The economic region’s target sectors are a source of “good” and “promising” jobs. Good jobs, as defined by the Brookings Institution, offer “stable employment, middle-class wages and benefits” for workers without a bachelor’s degree. Promising jobs are entry-level positions for workers without a bachelor’s degree “from which most workers can reach a good job within 10 years.”¹² High-skill jobs are good or promising jobs for workers with a bachelor’s degree. All other jobs that do not fit these categories are classified as “other jobs” by the Brookings Institution.¹³ A good or promising job typically pays above the regional median wage, which in the Clarksville MSA is \$16.11 and is \$18.37 for the Nashville MSA. For the combined economic region, the median wage is \$18.27. In Middle Tennessee, certificate and degree-requiring occupations which fall into the “good” and “promising” jobs category are also the least vulnerable to the impact of COVID-19.¹⁴ These include professional and technical jobs associated with corporate operations, information technology, community services and health care. The occupations requiring the lowest level of training and education are least likely to fall into the “good” or “promising” jobs category and are also the most vulnerable to COVID-19 and to economic recessions. These jobs are often associated with food service, accommodations, retail and customer service. During COVID-19, we also see that production occupations are vulnerable. As the pandemic’s negative production effects decrease, this vulnerability will reverse.

¹⁰ Tennessee Department of Commerce and Insurance, The Research Center - NACC

¹¹ Due to COVID-19 and its drastic alteration of our workforce landscape, we weighted 3-year and 5-year gaps against sector level unemployment as part of our selection process

¹² The Brookings Institution

¹³ Ibid

¹⁴ McKinsey & Company, JobsEq

AUTOMOTIVE CLUSTER

According to the Bureau of Labor Statistics (BLS), this cluster has 104 businesses and employs 30,921 people in the economic region. Jobs in automotive experienced 18.1% growth in the region between 2014 and 2019, nearly two times the national growth rate of 11.3%. Industry employment

growth is projected to increase by 8.3% compared to national growth levels of 5.4%. Occupational concentration or an LQ of 1.47 indicates a workforce availability 47% above other MSAs. Combined with 13% overall job growth for these specific occupations it is clear the talent pool for these workers is increasing.

Figure 8. Automotive Industry Cluster Location Quotient and Growth Chart

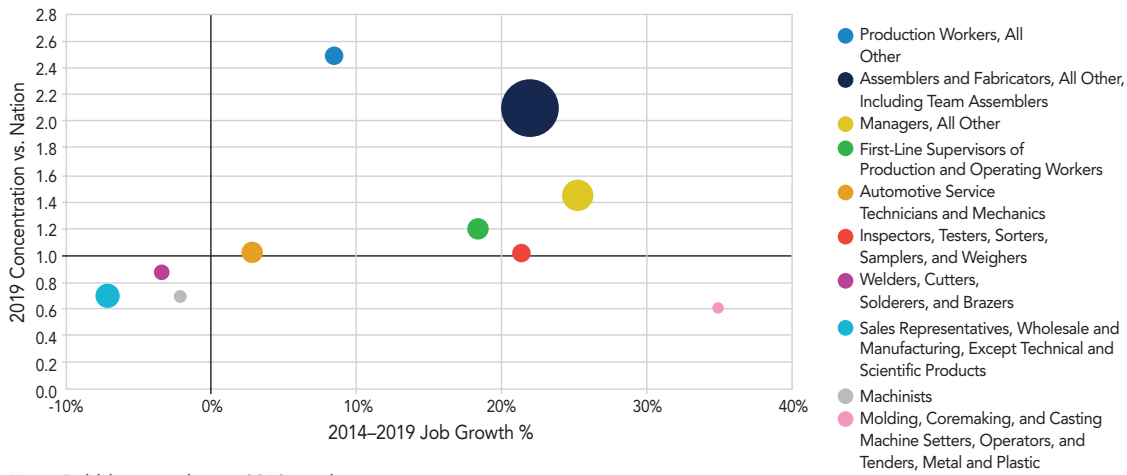


Figure 9. Automotive Industry Cluster Occupational Table

SOC	Key Occupation	LQ	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.50	4,481	4,861	5,193	\$12.73	\$13.37
51-2098	Assemblers and Fabricators, All Other, Including Team Assemblers	2.10	17,532	21,381	22,361	\$17.30	\$18.28
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
51-1011	First-Line Supervisors of Production and Operating Workers	1.20	4,858	5,752	6,169	\$27.52	\$28.86
49-3023	Automotive Service Technicians and Mechanics	1.02	5,762	5,927	6,273	\$18.10	\$19.81
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.01	3,590	4,359	4,356	\$17.11	\$18.93
51-4121	Welders, Cutters, Solderers, and Brazers	0.87	2,877	2,779	2,952	\$18.79	\$19.28
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.70	8,140	7,556	8,108	\$23.94	\$30.92
51-4041	Machinists	0.69	2,096	2,051	2,188	\$19.54	\$20.61
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.61	556	750	796	\$16.95	\$18.51
	Total	1.47	57,822	65,347	69,137		\$23.48

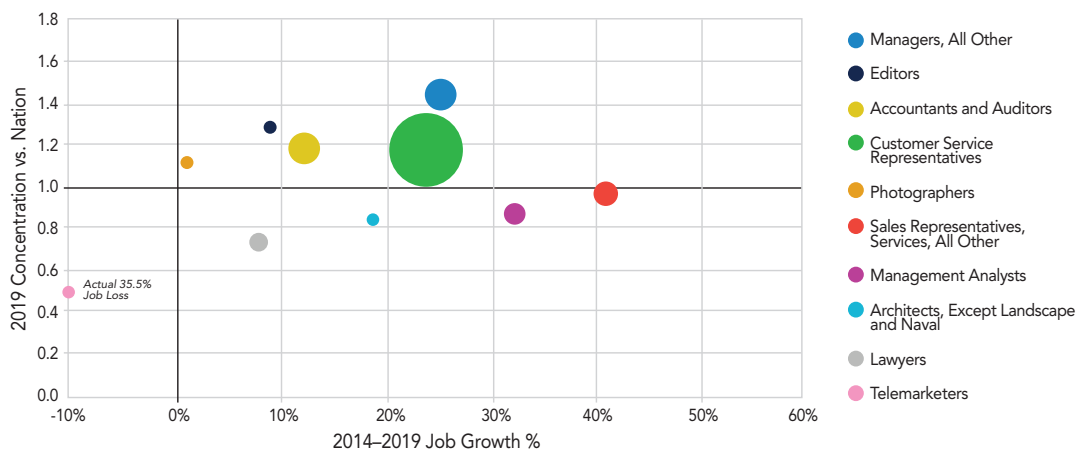
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

BUSINESS SERVICES CLUSTER

According to the BLS, this cluster has 9,007 businesses and employs approximately 150,717 people in the economic region. Business-related jobs in this cluster experienced 26.5% growth in the region between 2014 and 2019, over two times the national growth rate of 10.6%. Occupational concentration or an LQ of 0.99 indicates a

workforce availability just below the national average. Combined with 21.4% overall job growth for these specific occupations, the talent pool for these workers continues to grow in the region and presents an opportunity for additional job growth. While the administrative services segment of this cluster has been impacted significantly, high skilled business and finance occupations have been able to navigate COVID-19 related jobs losses much more successfully than other sectors and industries.

Figure 10. Business Services Industry Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 11. Business Services Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
27-3041	Editors	1.27	1,137	1,236	1,275	\$22.47	\$27.37
13-2011	Accountants and Auditors	1.18	11,312	12,767	14,379	\$30.62	\$34.29
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
27-4021	Photographers	1.16	1,160	1,180	1,217	\$16.96	\$28.88
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
13-1111	Management Analysts	0.87	4,440	5,854	6,902	\$36.30	\$45.55
17-1011	Architects, Except Landscape and Naval	0.85	720	855	918	\$34.33	\$39.20
23-1011	Lawyers	0.76	4,372	4,731	5,111	\$46.63	\$61.73
41-9041	Telemarketers	0.45	886	571	612	\$15.11	\$15.83
	Total	0.99	58,398	70,899	77,774		\$30.53

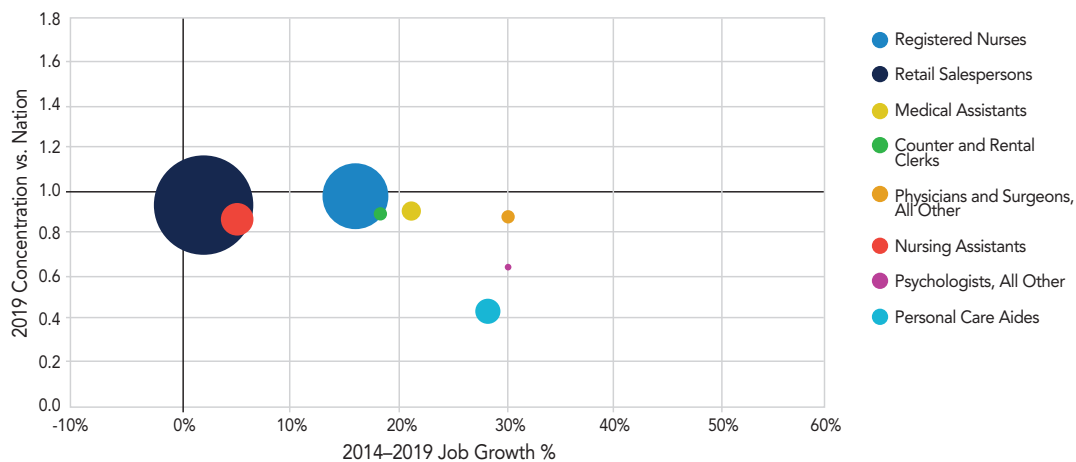
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

HEALTHCARE (NONTRADED) CLUSTER

The healthcare industry encompasses approximately 4,942 establishments and employs approximately 141,139 people in the economic region, according to the BLS. Health care related jobs in this cluster experienced 11.3% growth in the region between

2014 and 2019, over 1.3 times the national growth rate of 8.7%. Occupational concentration or an LQ of 0.87 indicates a workforce availability below the national average. Despite this, the top occupations in this cluster have seen an overall job growth of 10.2% which indicates the talent pool for these workers continues to grow in the region. The concentration of these occupations presents an opportunity for workforce development.

Figure 12. Healthcare Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.

Source: EMSI

Figure 13. Healthcare Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
29-1141	Registered Nurses	0.98	19,208	22,307	25,261	\$30.62	\$31.22
41-2031	Retail Salespersons	0.93	30,764	31,426	33,393	\$11.45	\$14.84
31-9092	Medical Assistants	0.89	3,958	4,790	5,721	\$16.07	\$16.87
41-2021	Counter and Rental Clerks	0.88	2,441	2,893	3,380	\$11.65	\$13.88
29-1069	Physicians and Surgeons, All Other	0.87	2,178	2,830	3,184	\$107.05	\$114.86
31-1014	Nursing Assistants	0.84	8,929	9,437	10,281	\$13.45	\$13.71
19-3039	Psychologists, All Other	0.65	211	276	306	\$45.89	\$54.10
39-9021	Personal Care Aides	0.43	6,352	8,165	9,681	\$10.05	\$10.79
	Total	0.87	89,600	98,705	108,717		\$22.80

Note: Highlighted are the key occupations that have a concentration lower than 1.

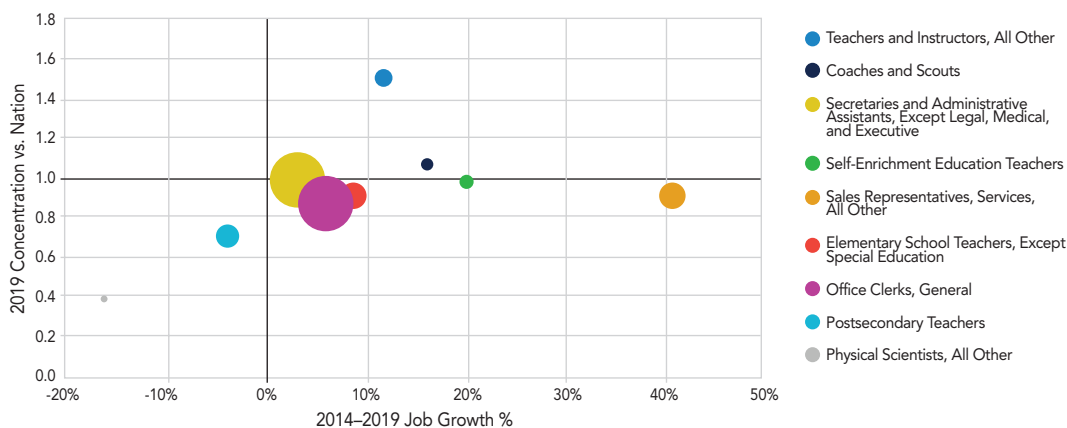
Source: EMSI

EDUCATION AND KNOWLEDGE (SEMI-TRADED) CLUSTER

According to the BLS, educational and knowledge industries encompass approximately 890 establishments and employ approximately 32,045 people in the economic region. Education-related jobs in this cluster experienced 11.2% growth in the region between 2014 and 2019, over 1.2 times

the national growth rate of 9.4%. Occupational concentration or an LQ of 1.04 indicates a workforce availability above the national average. The top occupations in this cluster have seen an overall job growth of 10.2% which indicates the talent pool for these workers continues to grow in the region. The concentration of these occupations presents an opportunity for workforce development.

Figure 14. Education and Knowledge Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 15. Education and Knowledge Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
25-3097	Teachers and Instructors, All Other	1.51	4,237	4,723	5,075	\$20.19	\$23.87
27-2022	Coaches and Scouts	1.07	1,902	2,224	2,476	\$16.76	\$24.94
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1.05	19,708	20,326	20,814	\$16.99	\$17.65
25-3021	Self-Enrichment Education Teachers	0.97	2,463	2,946	3,314	\$18.56	\$24.95
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
25-2021	Elementary School Teachers, Except Special Education	0.93	9,052	9,844	10,576	\$25.56	\$26.32
43-9061	Office Clerks, General	0.88	21,082	22,492	23,749	\$16.59	\$17.94
25-1099	Postsecondary Teachers	0.69	8,139	7,748	8,017	\$31.46	\$37.78
19-2099	Physical Scientists, All Other	0.39	85	71	77	\$32.10	\$47.48
	Total	1.04	77,625	83,838	88,992		\$24.15

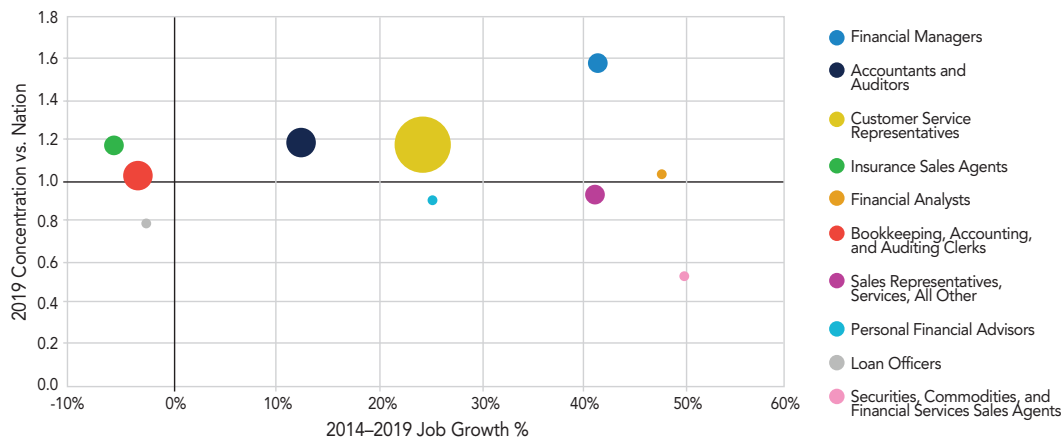
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

FINANCE AND INSURANCE SERVICES CLUSTER

Finance and insurance industries encompass approximately 4,264 establishments, according to the BLS, and employ approximately 58,523 people in the economic region. Jobs in this cluster experienced 12.8% growth in the region between

2014 and 2019, over 1.5 times the national growth rate of 8.2%. Occupational concentration or an LQ of 1.01 indicates a workforce availability very slightly above the national average. The top occupations in this cluster have seen an overall job growth of 20.5% which indicates the talent pool for these workers continues to grow in the region. The concentration of these occupations presents an opportunity for workforce development.

Figure 16. Finance and Insurance Services Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 17. Finance and Insurance Services Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-3031	Financial Managers	1.58	5,483	7,757	8,924	\$51.30	\$59.51
13-2011	Accountants and Auditors	1.18	11,312	12,767	14,379	\$30.62	\$34.29
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
41-3021	Insurance Sales Agents	1.15	6,973	7,303	7,817	\$22.03	\$30.85
13-2051	Financial Analysts	1.05	1,725	2,550	2,920	\$34.34	\$37.68
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1.01	12,215	12,990	13,898	\$19.62	\$20.85
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
13-2052	Personal Financial Advisors	0.88	1,344	1,683	1,969	\$34.35	\$50.83
13-2072	Loan Officers	0.77	1,660	1,770	1,968	\$28.16	\$33.37
41-3031	Securities, Commodities, and Financial Services Sales Agents	0.54	1,213	1,817	2,101	\$27.37	\$39.70
	Total	1.01	68,368	82,413	90,593		\$29.08

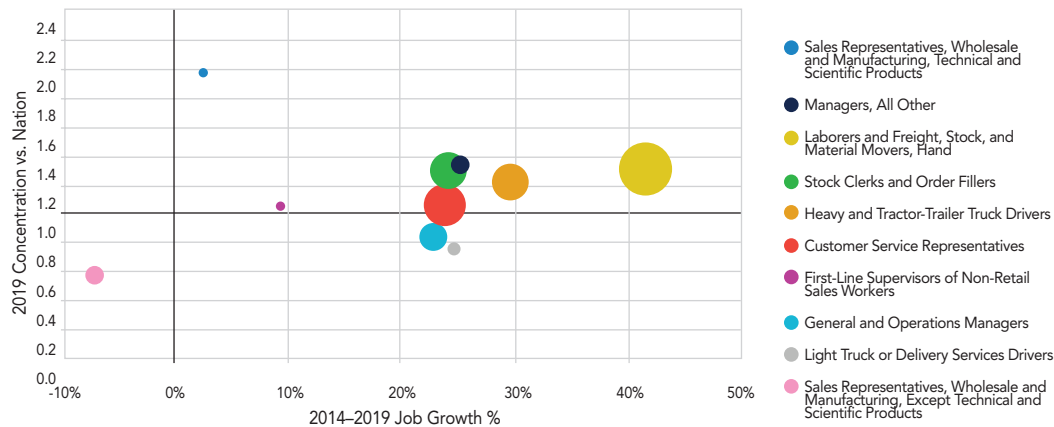
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

DISTRIBUTION AND ELECTRONIC COMMERCE CLUSTER

According to the BLS, distribution and electronic commerce industries encompass approximately 4,594 establishments and employ approximately 67,400 people in the economic region. Jobs in this cluster experienced 21.5% growth in the region

between 2014 and 2019, three times the national growth rate of 7.4%. Occupational concentration or an LQ of 1.10 indicates a workforce availability 10% above the national average. The top occupations in this cluster have seen an overall job growth of 24.8% which indicates the talent pool for these workers continues to grow in the region. The concentration of these occupations presents an opportunity for workforce development.

Figure 18. Distribution and Electronic Commerce Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 19. Distribution and Electronic Commerce Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2.08	5,217	5,357	5,636	\$29.83	\$40.55
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
43-5081	Stock Clerks and Order Fillers	1.41	17,536	21,787	23,586	\$12.10	\$12.76
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.34	16,290	21,148	24,155	\$21.44	\$22.89
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
41-1012	First-Line Supervisors of Non-Retail Sales Workers	1.17	2,863	3,131	3,344	\$33.28	\$40.62
11-1021	General and Operations Managers	0.97	14,122	17,373	19,489	\$44.87	\$56.05
53-3033	Light Truck or Delivery Services Drivers	0.88	5,330	6,655	7,630	\$16.12	\$17.78
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.70	8,140	7,556	8,108	\$23.94	\$30.92
	Total	1.10	120,931	150,943	166,623		\$24.56

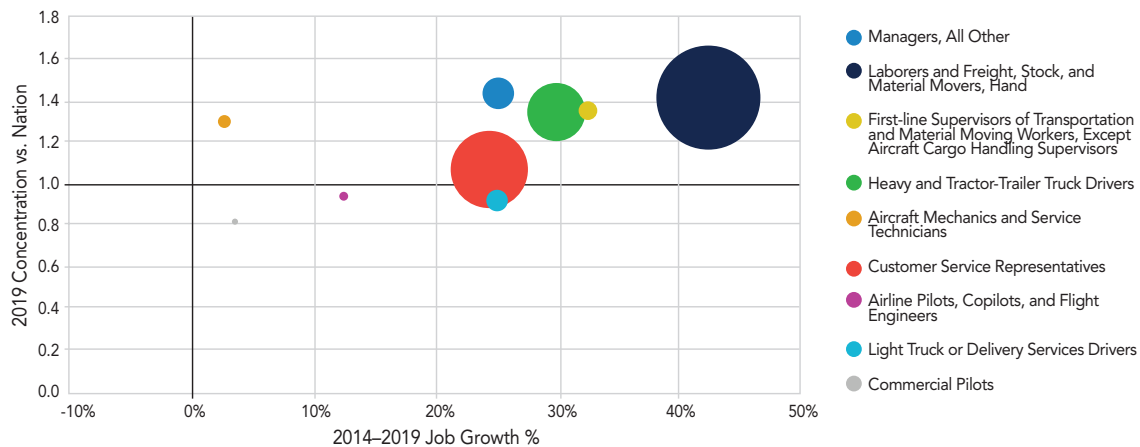
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

TRANSPORTATION AND LOGISTICS CLUSTER

The transportation and logistics cluster encompasses approximately 1,105 companies, according to the BLS, and employs approximately 29,747 people in the economic region. Jobs in this cluster experienced 24.1% growth in the

region between 2014 and 2019, over 2.4 times the national growth rate of 10.1%. Occupational concentration or an LQ of 1.28 indicates a workforce availability 28% above the national average. The top occupations in this cluster have seen an overall job growth of 30%, which indicates the talent pool for these workers continues to grow significantly in the region.

Figure 20. Transportation and Logistics Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 21. Transportation and Logistics Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	1.38	3,339	4,427	5,029	\$24.41	\$25.86
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.34	16,290	21,148	24,155	\$21.44	\$22.89
49-3011	Aircraft Mechanics and Service Technicians	1.32	1,876	1,938	1,939	\$24.23	\$27.26
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
53-2011	Airline Pilots, Copilots, and Flight Engineers	0.95	800	903	952	\$57.53	\$55.41
53-3033	Light Truck or Delivery Services Drivers	0.88	5,330	6,655	7,630	\$16.12	\$17.78
53-2012	Commercial Pilots	0.81	328	343	355	\$41.76	\$44.02
	Total	1.28	80,016	104,026	115,424		\$20.49

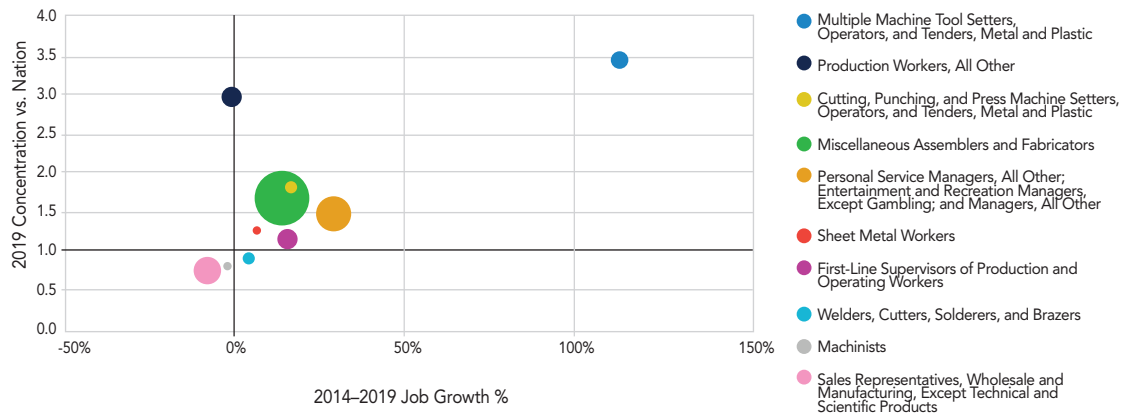
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

METALS MANUFACTURING CLUSTER

According to the BLS, this cluster has 328 businesses and employs 10,607 people in the economic region. Jobs in metals manufacturing experienced 13.7% growth in the region between

2014 and 2019, over 8.5 times the national growth rate of 1.6%. Industry growth is projected to increase by 4.7% compared to national growth levels of 2%. Key occupational concentration or an LQ of 1.49 indicates a workforce availability 49% above other MSAs. Combine with 13.7% overall job growth for these specific occupations and it is clear the talent pool for these workers is increasing.

Figure 22. Metals Manufacturing Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.
Source: EMSI

Figure 23. Metals Manufacturing Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	3.45	1,827	3,911	4,110	\$16.79	\$17.87
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.80	2,267	2,636	2,681	\$17.09	\$17.58
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
47-2211	Sheet Metal Workers	1.26	1,258	1,344	1,478	\$22.27	\$22.28
51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
	Total	1.49	52,979	60,241	64,078		\$23.87

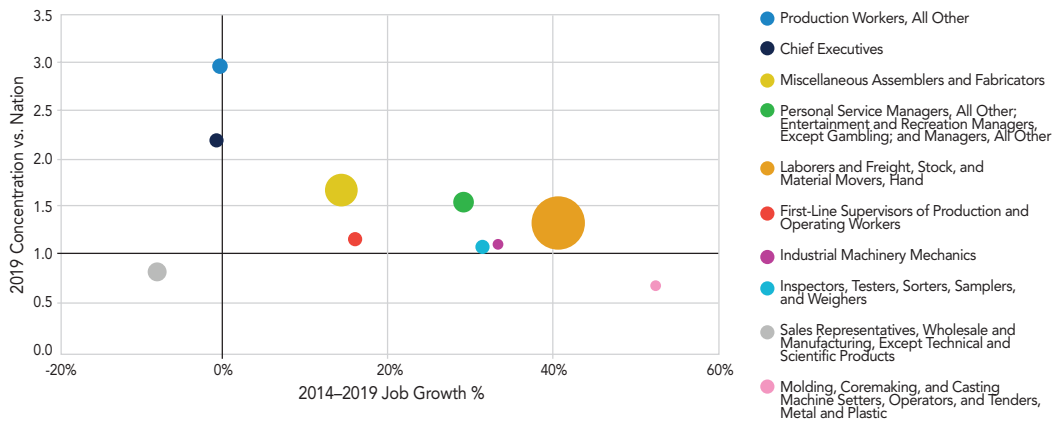
Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

PLASTICS AND RUBBER MANUFACTURING CLUSTER

The plastics and rubber manufacturing cluster has 94 businesses and employs 5,188 people in the economic region, according to the BLS. Jobs in plastics manufacturing experienced 25.7% growth in the region between 2014 and 2019, over three

times the national growth rate of 8.6%. Industry growth is projected to increase by 6.4% compared to national growth levels of 1.4%. Key occupational concentration or an LQ of 1.38 indicates a workforce availability 38% above other MSAs. Combine with 20.4% overall job growth for these specific occupations and clearly the talent pool for these workers is increasing.

Figure 24. Plastics and Rubber Manufacturing Industry Cluster Location Quotient and Growth Chart



Note: Bubble size indicates 2019 employment size.

Source: EMSI

Figure 25. Plastics and Rubber Manufacturing Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings (\$)	Average Hourly Earnings (\$)
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
11-1011	Chief Executives	2.19	4,496	4,471	4,529	\$71.08	\$82.04
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.28	20,764	29,138	33,198	\$14.29	\$14.81
51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
49-9041	Industrial Machinery Mechanics	1.07	2,418	3,201	3,481	\$24.13	\$25.34
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.05	3,597	4,690	4,705	\$17.45	\$19.38
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.70	592	900	946	\$16.65	\$17.95
	Total	1.38	74,207	89,380	96,952		\$24.26

Note: Highlighted are the key occupations that have a concentration lower than 1.

Source: EMSI

OTHER ADVANCED MANUFACTURING/PRODUCTION TECHNOLOGY CLUSTER

According to the BLS, this cluster which includes machinery manufacturing has 943 businesses and employs 17,309 people in the economic region. Jobs in advanced manufacturing and production technology experienced 17.1% growth in the region

between 2014 and 2019, 2.3 times the national growth rate of 7.7%. Industry growth is projected to increase by 6.5% in Middle Tennessee compared to national growth levels of 3.2%. Key occupational concentration or an LQ of 1.27 indicates a workforce availability 27% above other MSAs. An expected 12.7% overall job growth for these specific occupations demonstrates that the talent pool for these workers is increasing and presents an opportunity for workforce development.

Figure 26. Advanced Manufacturing Industry Cluster Location Quotient and Growth Chart

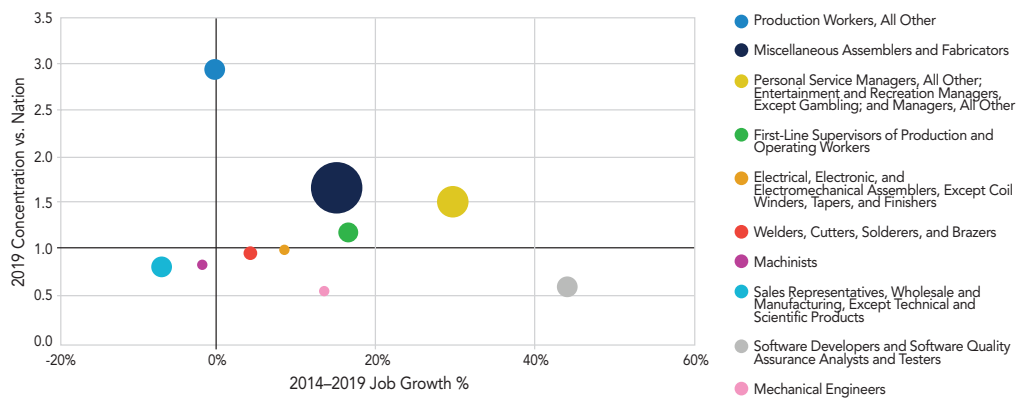


Figure 27. Advanced Manufacturing Industry Cluster Occupational Table

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	0.95	1,915	2,097	2,195	\$16.54	\$17.75
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	0.58	4,393	6,344	7,951	\$45.74	\$46.13
17-2141	Mechanical Engineers	0.52	1,059	1,211	1,382	\$40.27	\$44.15
	Total	1.27	54,995	62,003	67,337		\$27.02

Note: Highlighted are the key occupations that have a concentration lower than 1.
Source: EMSI

DEFICIT OCCUPATIONS FOR TARGET CLUSTERS

Among the top occupations for the target clusters, there are several occupations with location quotients below the national average of 1.0. Following is the list of top occupations for each target cluster having lower concentration or supply than required. These represent the second tier of

occupations targeted for workforce development within the economic region. Only those occupations where wages are above the regional median wage which typically offer benefits are included in this target occupation group as these represent “good” or “promising” jobs. Recall the regional median wage in the Clarksville MSA is \$16.11 and is \$18.37 for the Nashville MSA. For the combined economic region, the median wage is \$18.27.

Figure 28. Occupations With Below Average Concentrations, Above Median Wages

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-1021	General and Operations Managers	0.97	14,122	17,373	19,489	\$44.87	\$56.05
13-1111	Management Analysts	0.87	4,440	5,854	6,902	\$36.30	\$45.55
13-2052	Personal Financial Advisors	0.88	1,344	1,683	1,969	\$34.35	\$50.83
13-2072	Loan Officers	0.77	1,660	1,770	1,968	\$28.16	\$33.37
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	0.58	4,393	6,344	7,951	\$45.74	\$46.13
17-1011	Architects, Except Landscape and Naval	0.85	720	855	918	\$34.33	\$39.20
17-2141	Mechanical Engineers	0.52	1,059	1,211	1,382	\$40.27	\$44.15
17-2112	Industrial Engineers	0.74	1,258	1,630	1,907	\$39.09	\$41.27
19-3039	Psychologists, All Other	0.65	211	276	306	\$45.89	\$54.10
23-1011	Lawyers	0.76	4,372	4,731	5,111	\$46.63	\$61.73
25-1099	Postsecondary Teachers	0.69	8,139	7,748	8,017	\$31.46	\$37.78
25-2021	Elementary School Teachers, Except Special Education	0.93	9,052	9,844	10,576	\$25.56	\$26.32
25-3021	Self-Enrichment Education Teachers	0.97	2,463	2,946	3,314	\$18.56	\$24.95
29-1069	Physicians and Surgeons, All Other	0.87	2,178	2,830	3,184	\$107.05	\$114.86
29-1141	Registered Nurses	0.98	19,208	22,307	25,261	\$30.62	\$31.22
41-3031	Securities, Commodities, and Financial Services Sales Agents	0.54	1,213	1,817	2,101	\$27.37	\$39.70
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
43-5052	Postal Service Mail Carriers	0.84	1,741	2,074	2,011	\$24.39	\$24.80
43-9061	Office Clerks, General	0.88	21,082	22,492	23,749	\$16.59	\$17.94
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.61	556	750	796	\$16.95	\$18.51
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
51-9011	Chemical Equipment Operators and Tenders	0.22	105	143	183	\$19.92	\$20.39
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.53	481	504	570	\$16.35	\$17.87
51-9081	Dental Laboratory Technicians	0.30	83	86	109	\$18.65	\$21.76
51-9082	Medical Appliance Technicians	0.69	51	80	96	\$16.23	\$16.80
51-9083	Ophthalmic Laboratory Technicians	0.25	68	58	80	\$16.54	\$17.76
53-2011	Airline Pilots, Copilots, and Flight Engineers	0.95	800	903	952	\$57.53	\$55.41
53-2012	Commercial Pilots	0.81	328	343	355	\$41.76	\$44.02

Source: EMSI and JobsEQ

OCCUPATIONAL SUPPLY GAPS

The economic region faces projected employment gaps for several occupations including top occupations for target clusters with lower than average concentrations. This chart highlights these occupations at the three-digit SOC level for the economic region. Occupations where wages are below the regional median typically do not offer benefits and are not resistant to economic shifts and recessions. It should be noted that the top four occupational categories with annual supply

shortages above 300 also are the most resistant occupations to the effects of COVID-19 related employment loss and recessionary impacts. Construction, while having cyclical periods of growth, is often the most susceptible to changes in market conditions, supply impacts and recession. Additionally, many construction occupations do not pay above the regional median wage. The study does not exclude this occupational subset because it encompasses some high-skill and high wage occupations such as electricians and plumbers of which the economic region has seen a growing shortage.

Figure 29. Potential Average Annual Occupation Gaps over 5 Years in Nashville & Clarksville MSAs

SOC	Occupation	Annual Supply Gap	Pre-COVID-19 Employment 2020Q1	Annual Growth Demand	Annual Sep Demand	Total Annual Demand	Projected Employment 2030	Accumulated Supply 2025	Accumulated Demand 2025	Average Wages
29-0000	Healthcare Practitioners and Technical	(1,005)	72,538	1,592	6,627	8,218	88,456	15,682	20,709	\$75,400
11-0000	Management	(763)	81,427	1,617	9,747	11,364	97,596	24,580	28,396	\$102,500
13-0000	Business and Financial Operations	(428)	65,650	1,334	8,755	10,089	78,991	22,783	24,921	\$66,400
15-0000	Computer and Mathematical	(314)	28,175	746	2,854	3,600	35,632	7,909	9,479	\$77,600
47-0000	Construction and Extraction	(179)	47,579	1,039	7,449	8,488	57,967	18,938	19,834	\$44,100
49-0000	Installation, Maintenance, and Repair	(175)	45,086	739	6,298	7,036	52,475	16,479	17,352	\$46,200
25-0000	Educational Instruction and Library	(153)	55,765	908	7,712	8,619	64,840	19,105	19,870	\$50,700
17-0000	Architecture and Engineering	(136)	14,870	281	1,682	1,963	17,681	4,262	4,943	\$74,400
21-0000	Community and Social Service	(79)	18,317	406	2,867	3,274	22,379	7,490	7,884	\$45,900
31-0000	Healthcare Support	(75)	40,044	1,238	8,026	9,264	52,424	18,721	19,097	\$30,300
19-0000	Life, Physical, and Social Science	(53)	7,078	141	876	1,017	8,490	2,330	2,595	\$63,500
23-0000	Legal	(50)	8,042	154	804	958	9,585	2,113	2,362	\$98,500
27-0000	Arts, Design, Entertainment, Sports, and Media	(32)	25,590	361	4,135	4,496	29,203	9,541	9,703	\$55,400

Source: JobsEQ

OCCUPATIONAL SKILLS GAPS (CERTIFICATION DEFICITS)

The region currently has a gap in certifications in several skills evidenced by the following table.

This study only considers those certification annual gaps that have an annual supply cap above 15, align with the occupational gaps for the region as well as with target clusters, have wages above the regional median wage and are high employment growth occupations.

Figure 30. Skill Gaps: Nashville & Clarksville MSA (Certifications)

Sector	Skill	Candidates #	Openings #	Gap #
Healthcare	Registered Nurse (RN)	998	1,185	-187
	Certified Nursing Assistant (CNA)	760	927	-167
	Licensed Practical Nurse (LPN)	503	607	-104
	Medical Assistant Certification (MA)	237	253	-16
	Nationally Certified Medical Assistant (NCMA)	17	89	-72
	National Phlebotomy Association Certified Phlebotomist	58	115	-57
	Registered Health Information Technician (RHIT)	26	51	-25
	Certified Rehabilitation Counselor (CRC)	26	79	-53
	Certified Coding Specialist (CCS)	23	52	-29
	Certified Patient Care Technician/Associate/Nurse Technician (CPCT or CPCA or CNT)	10	53	-43
	Technologist in Cytogenetics (CG)	8	28	-20
	Chemotherapy Certification	3	29	-26
Transportation, Distribution, Logistics	Class A Commercial Driver's License (CDL-A)	690	946	-256
	Commercial Driver's License (CDL)	543	676	-133
Finance	Series 63	38	85	-48
Information Technology	Certified Information Systems Security Professional (CISSP)	48	66	-18
	Certified Professional Coder (CPC)	41	58	-16
	Cisco Certified Internetwork Expert (CCIE)	10	24	-15
Miscellaneous	OSHA 10	92	113	-21
	Automobile Technician: Engine Repair (Test A1)	3	22	-19

Source: JobsEQ

TALENT LOCATION

The following maps highlight where talent lives and works for each of the major occupation groups experiencing industry demand and occupational gaps. Understanding the geographic worker commuting patterns by occupational skill set allows targeted economic and workforce development efforts.

Figure 31. Commuting Patterns - Management Occupations

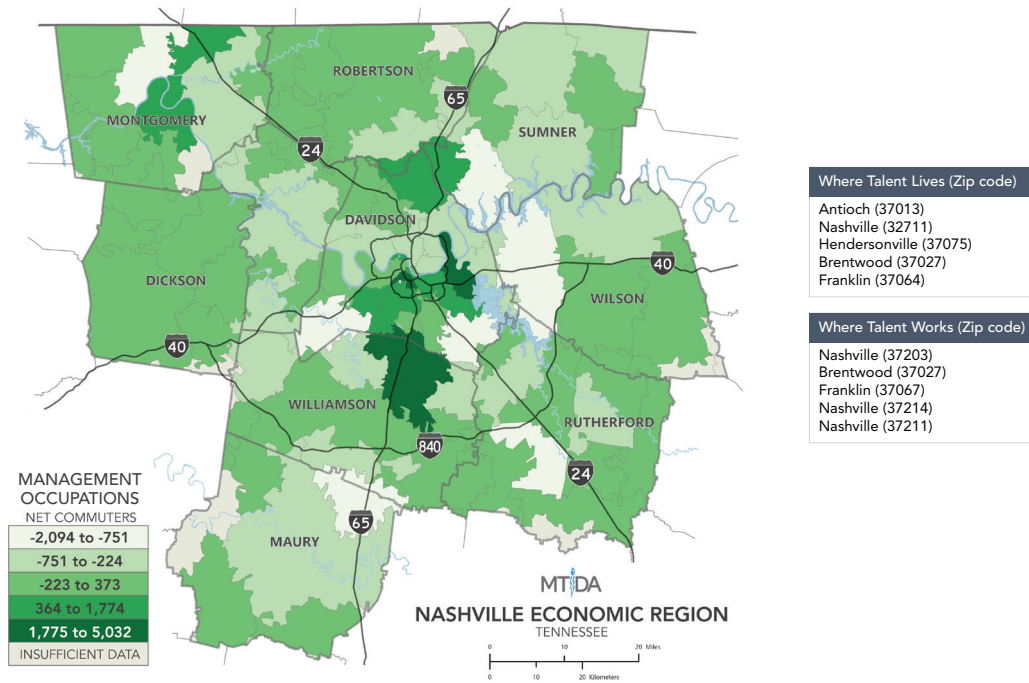


Figure 32. Commuting Patterns - Business & Financial Occupations

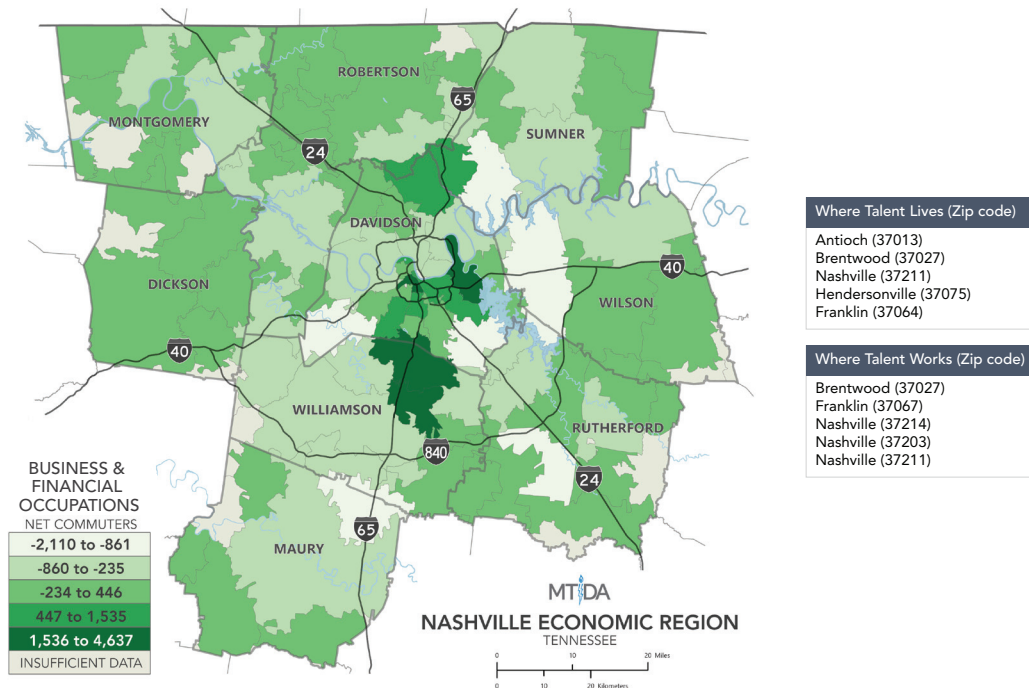


Figure 33. Commuting Patterns - Healthcare Occupations

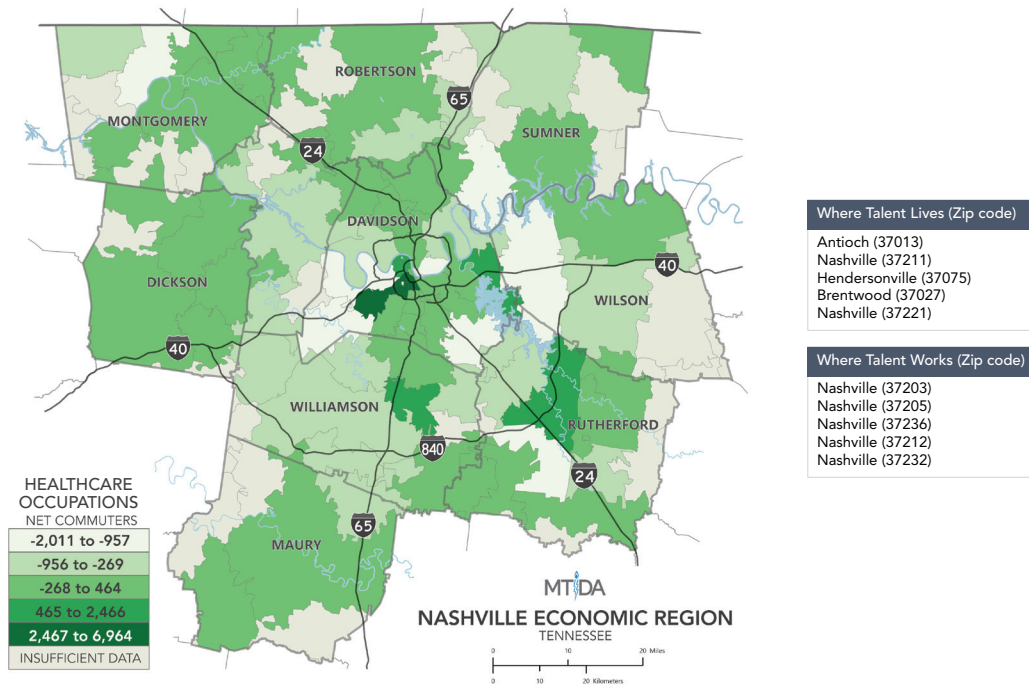


Figure 34. Commuting Patterns - Computer & Mathematical Occupations

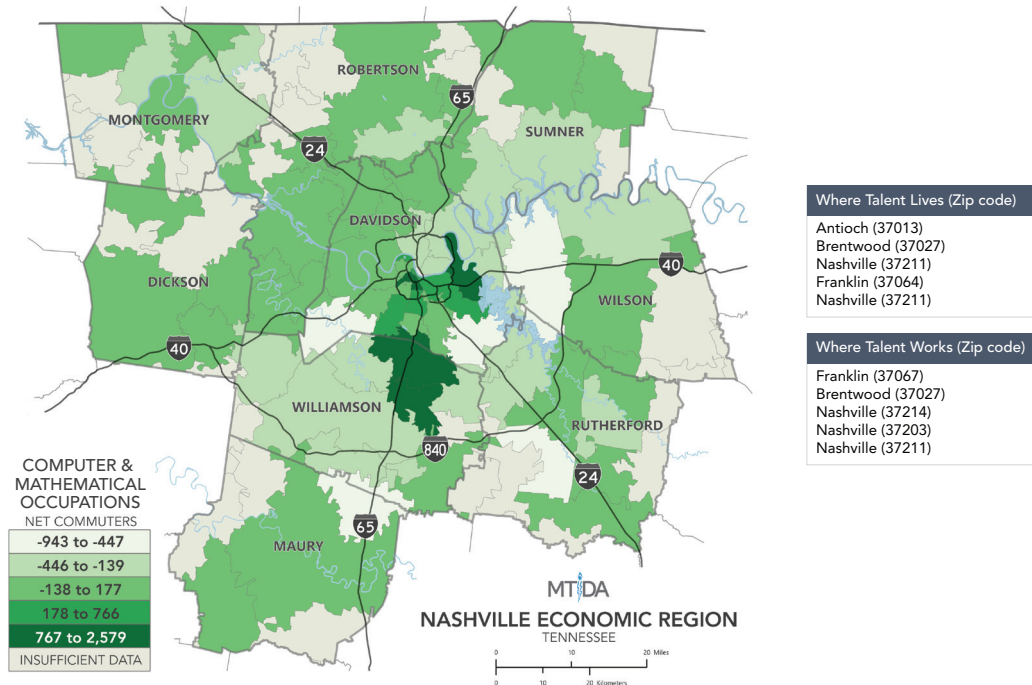
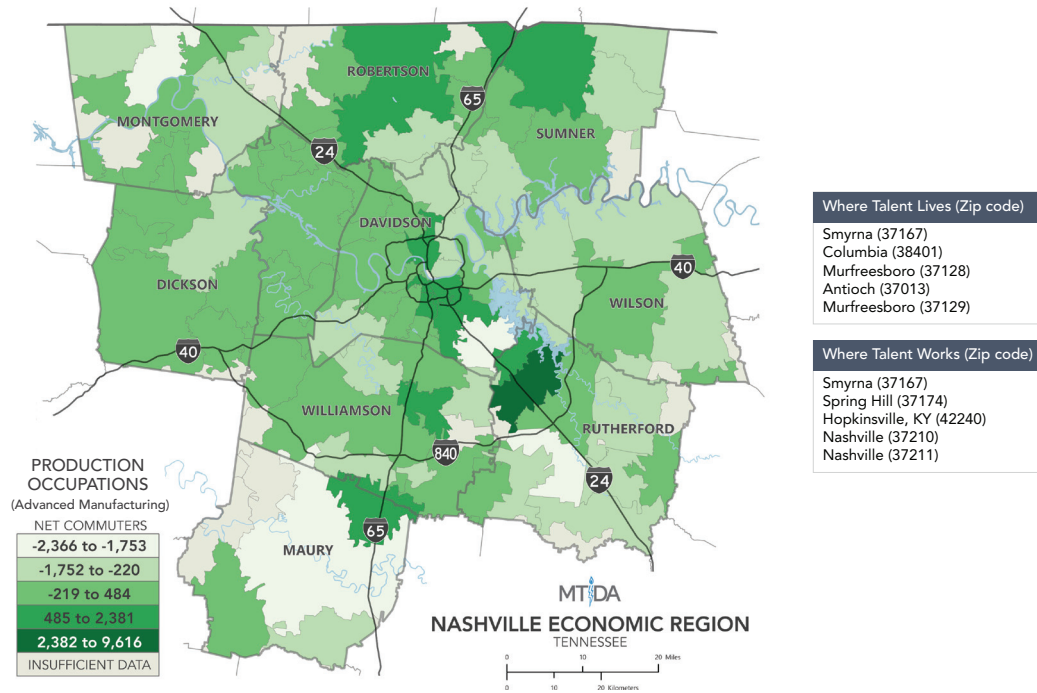
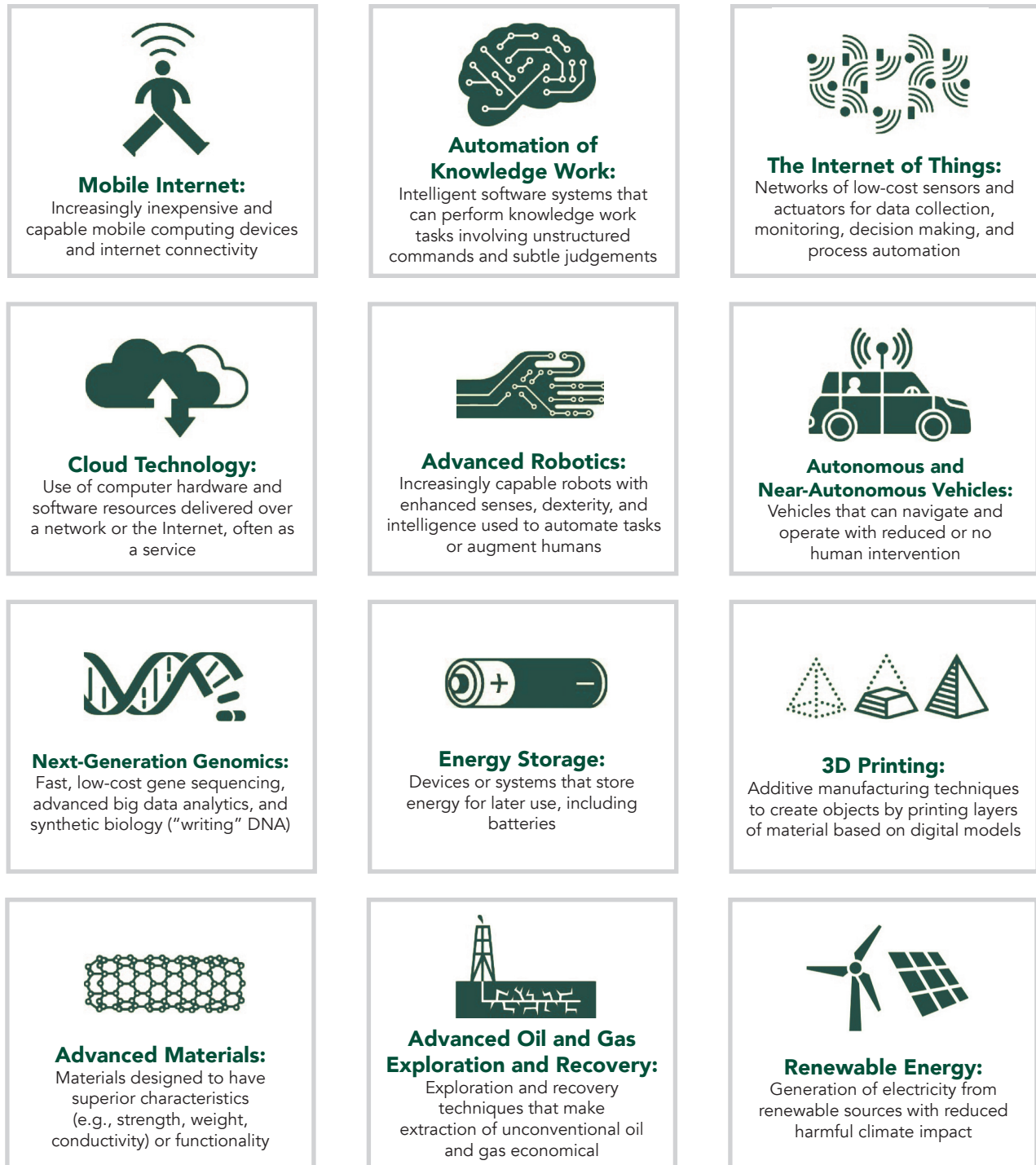


Figure 35. Commuting Patterns - Production Occupations



DISRUPTION AND AUTOMATION

In addition to the occupational supply gaps, this study looks at automation and disruptive technologies. Disruptive technologies are those that can change the ways people live and work. In 2013, the McKinsey Global Institute released a report on twelve potentially economically disruptive technologies listed in the accompanying graphic.



Source: McKinsey Global Institute analysis

Most of these technologies have the potential to influence the world of work and deeply impact various industries, but for the purposes of this report the focus is on replacement of human work or tasks by technology – specifically, automation of knowledge work and advanced robotics.

Physical task automation has been occurring for hundreds of years. Any evolution in work processes because of technological innovation falls into this category. This is a well-researched and well understood phenomenon, especially when compared to the automation of knowledge work. However, dimensioned understanding of what this has and can develop into is emerging. When referring to physical tasks, the term most often used is “automation” while automation of knowledge work is often referred to as “artificial intelligence.” Both categories contain numerous technologies in various stages of development and adoption. Adoption of automation and AI has to do with how developed technologies are, while adoption rates have to do with cost, return on investment and sometimes considerations of job elimination. A January 2019 paper released by the Brookings Institution states that almost no occupation will be unaffected by the adoption of currently available technologies.¹⁵ According to the Brookings Institution’s assessment of all currently classified occupations in the Nashville MSA, 25% face high exposure to automation, 36% face medium exposure and 39% face low exposure. While this number may seem daunting, historically automation of both physical and knowledge work does not always mean loss of jobs, but it does always mean redirection of labor and workforce.¹⁶

Current technology could fill workforce shortages in the region, and where there is displacement, the challenge will be meeting this transition intentionally. Employers can assess their readiness; policymakers can think and plan proactively about the wellbeing of workers in high risk industries and occupations. Workforce development efforts can target skill areas that are not only less automatable, but also potentially more rewarding for workers.

Occupation

Most research on occupational automation looks at the task content of occupations. This field is dominated by academics, workforce, policy and economic development-focused organizations. This research is purposed to give direction to workforce development and policy leaders to prepare for ambiguous patterns. Research by Frey and Osborne out of Oxford in 2013 took the first swing at an assessment of all occupations and almost all indexes that exist today have factored in this research. Researchers used workforce experts, machine learning and O*Net data to create automation probabilities.

Each work activity has a certain importance and occupational task share allocated to it and the EMSI index factors in time spent both on low-risk and high-risk work. Imposing a “high risk” threshold of 100 means that the occupational task content has the potential to be automated at or above the average rate for all occupations. The following was found to be true:

5-digit SOC codes aggregated to the 2-digit level show what share of these high-level occupational groups are at high-risk. The automation index is the same across the Nashville and Clarksville MSAs.

Figure 36. Occupational Groups Automation Risk-Share

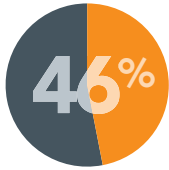
2-Digit SOC	Description	% of Occupation Group that is at or above the average automation risk
11	Management Occupations	3.0
13	Business and Financial Operations Occupations	3.3
15	Computer and Mathematical Occupations	0
17	Architecture and Engineering Occupations	8.6
19	Life, Physical, and Social Science Occupations	7.0
21	Community and Social Service Occupations	0
23	Legal Occupations	0
25	Education, Training, and Library Occupations	3.7
27	Arts, Design, Entertainment, Sports, and Media Occupations	14.6
29	Healthcare Practitioners and Technical Occupations	3.3
31	Healthcare Support Occupations	29.4
33	Protective Service Occupations	22.7
35	Food Preparation and Serving Related Occupations	94.4
37	Building and Grounds Cleaning and Maintenance Occupations	100
39	Personal Care and Service Occupations	54.8
41	Sales and Related Occupations	31.8
43	Office and Administrative Support Occupations	37.5
45	Farming, Fishing, and Forestry Occupations	86.7
47	Construction and Extraction Occupations	98.3
49	Installation, Maintenance, and Repair Occupations	94.2
51	Production Occupations	97.2
53	Transportation and Material Moving Occupations	62.7

Source: EMSI

¹⁵ https://www.brookings.edu/wp-content/uploads/2019/01/2019_01_BrookingsMetro_Automation-AI_Report_Muro-Maxim-Whiton-FINAL-version.pdf

¹⁶ https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Returning to the more granular, 5-digit SOC codes the following was found to be true:



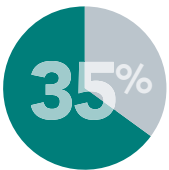
356 OUT OF **772** ASSESSED OCCUPATIONS WERE FOUND TO HAVE AN **AUTOMATION RISK ABOVE AVERAGE**. THIS IS ABOUT **46%**.



OF THE **356** OCCUPATIONS ABOVE AVERAGE RISK,
26.7% REQUIRE **NO FORMAL EDUCATIONAL CREDENTIAL**;
62.4% REQUIRE ONLY A **HIGH SCHOOL DIPLOMA OR EQUIVALENT**;
1% REQUIRE SOME **COLLEGE BUT NO DEGREE**;
21% REQUIRE SOME **POSTSECONDARY NONDEGREE AWARD**;
2.2% REQUIRE AN **ASSOCIATE DEGREE**;
NONE REQUIRE A **BACHELOR'S DEGREE**;
1% REQUIRE A **MASTER'S DEGREE**;
 AND **NONE** REQUIRE A **DOCTORAL OR PROFESSIONAL DEGREE**.

These are largely entry level positions.

In the Nashville MSA:



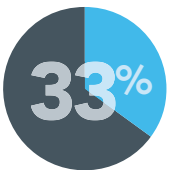
124 OF **356**, OR **35%**, ABOVE AVERAGE RISK OCCUPATIONS IN THE AREA HAVE A **LOCATION QUOTIENT GREATER THAN 1**. THIS MEANS THAT THESE OCCUPATIONS ARE **CONCENTRATED IN THE REGION AT A HIGHER RATE** RELATIVE TO THE NATIONAL AVERAGE.

THESE ABOVE AVERAGE RISK OCCUPATIONS REPRESENT **\$7,336,401** IN **TOTAL EARNINGS PER HOUR** OR **\$15,259,714,735 ANNUALLY**.



CONSIDERING PROJECTED GROWTH BY EMSI, **BY 2023** THIS WOULD REPRESENT **\$8,240,018** IN **TOTAL EARNINGS PER HOUR** OR **\$17,139,238,150 ANNUALLY**. THIS IS WITH THE ASSUMPTION OF STAGNANT WAGES AS THE BUREAU OF LABOR STATISTICS DOES NOT PROJECT OCCUPATIONAL WAGES.

In the Clarksville MSA:



116 OF **356**, OR **33%**, ABOVE AVERAGE RISK OCCUPATIONS IN THE AREA HAVE A **LOCATION QUOTIENT GREATER THAN 1**. THIS MEANS THAT THESE OCCUPATIONS ARE **CONCENTRATED IN THE REGION AT A HIGHER RATE** RELATIVE TO THE NATIONAL AVERAGE.

THESE ABOVE AVERAGE RISK OCCUPATIONS REPRESENT **\$788,480** IN **TOTAL EARNINGS PER HOUR** OR **\$1,640,040,004 ANNUALLY**.



CONSIDERING PROJECTED GROWTH BY EMSI, **BY 2023** THIS WOULD REPRESENT **\$836,276** IN **TOTAL EARNINGS PER HOUR** OR **\$1,739,454,896 ANNUALLY**. THIS IS WITH THE ASSUMPTION OF STAGNANT WAGES AS THE BUREAU OF LABOR STATISTICS DOES NOT PROJECT OCCUPATIONAL WAGES.

Trends

Many occupations that are above average risk for automation are low wage, low entry barrier occupations.

Using data from the US Census, one can see that there are disparities in educational attainment and earnings along racial and ethnic lines.

Figure 37. Educational Attainment by Race and Ethnicity — Nashville MSA

	Black or African American	Asian	Two or More Races	Hispanic or Latino	White
Less than High School	11.9%	15.0%	6.9%	36.0%	9.2%
High School Diploma or Equivalent	28.2%	17.7%	21.6%	30.2%	27.3%
Some college, no degree	24.9%	8.1%	26.4%	12.6%	20.0%
Associate's degree	8.0%	5.4%	6.0%	4.3%	7.2%
Bachelor's degree	16.6%	29.0%	26.7%	12.0%	24.1%
Graduate or professional degree	10.4%	24.8%	12.4%	4.9%	12.5%

Source: American Community Survey 2016-2018 1-Year Estimates, 3-Year Weighted Average

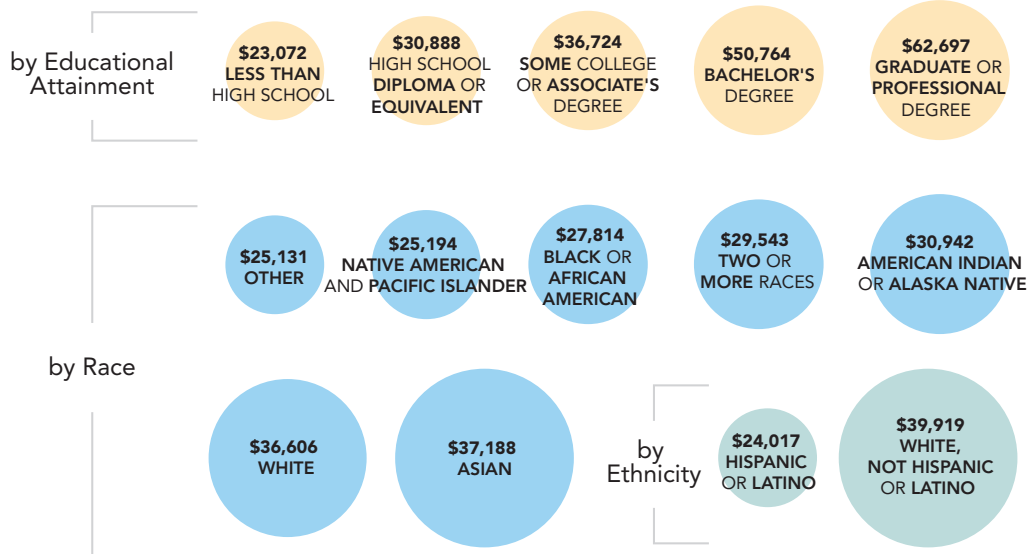
Figure 38. Educational Attainment by Race and Ethnicity — Clarksville MSA

	Black or African American	Hispanic or Latino	White
Less than High School	11.7%	13.9%	8.3%
High School Diploma or Equivalent	27.8%	20.2%	29.3%
Some college, no degree	28.3%	31.1%	27.0%
Associate's degree	11.2%	12.1%	9.7%
Bachelor's degree	13.8%	15.5%	16.8%
Graduate or professional degree	7.2%	7.0%	8.9%

Source: American Community Survey 2016-2018 1-Year Estimates, 3-Year Weighted Average

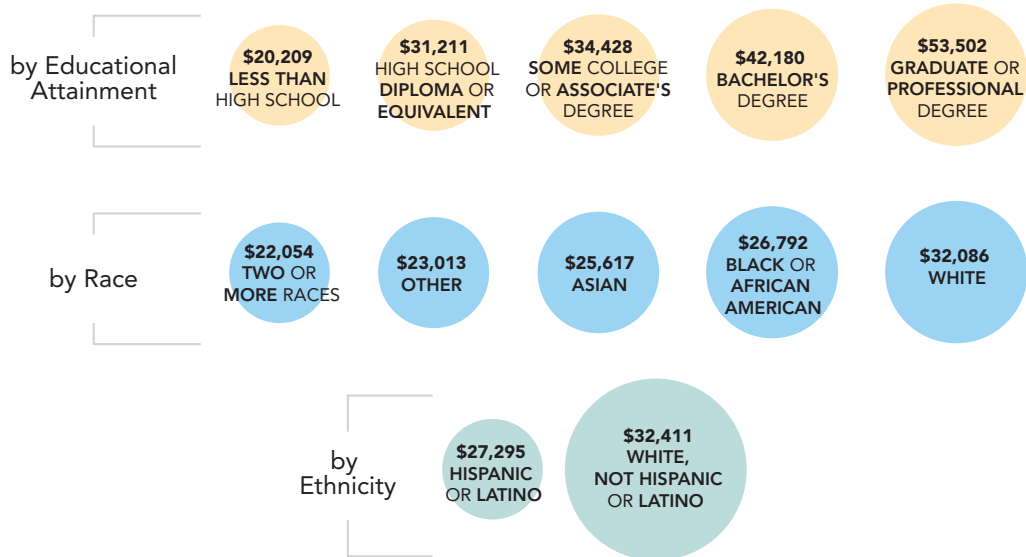
This can be taken a step further to look at median earnings by educational attainment, race, and ethnicity:

Figure 39. Median Earnings by Educational Attainment, Race and Ethnicity — Nashville MSA



Source: American Community Survey 2014–2018 5-Year Estimates

Figure 40. Median Earnings by Educational Attainment, Race and Ethnicity — Clarksville MSA



Source: American Community Survey 2014–2018 5-Year Estimates

Patterns in Artificial Intelligence

Research points to the potential of artificial intelligence to disrupt higher wage occupations. The Brookings Institution has released work on this.¹⁷ In fact, this

report states that “AI is a very different technology than earlier types of automation and is going to most affect a very different part of the workforce... because even less is known about AI than other types of automation, it appears much more ambiguous and confined in its impacts, at least for now.”

¹⁷ https://www.brookings.edu/wp-content/uploads/2019/11/2019.11.20_BrookingsMetro_What-jobs-are-affected-by-AI_Report_Muro-Whiton-Maxim.pdf

A background image of a Nashville street scene with various buildings and signs, including a large 'BOOTS' sign on the left and a 'CASH' sign in the center. A semi-transparent dark blue overlay covers the entire image, with white text and lines. In the top left corner, there are several thin, white, curved lines.

Automation and Artificial Intelligence in Nashville Area Chamber Member Organizations

BEST PRACTICE WORKFORCE PROFILES

Featured on the following pages are short profiles on some best practice workforce pipeline programs in Nashville and the surrounding region. All the programs featured highlight unique partnerships in diverse industries and innovative solutions to connecting Middle Tennessee talent to promising jobs. Interviews were conducted with representatives from each of the programs and when applicable site visits were made to see the programs in action.



The path, the plan, your career in tech.

The Need The Greater Nashville Technology Council serves as the leading voice and advocate for Middle Tennessee's \$7.5 billion information technology ecosystem and the over 50,000 technology professionals who design, implement and safeguard the technology that powers the region. They are in place to strengthen and advance the technology sector in Middle Tennessee by bringing together key stakeholders to create opportunity and growth. Through various focus groups and conversations facilitated by the Tech Council with technology employers in the region it became apparent that there was a growing need for an accelerated technology boot camp of sorts to fit the region's growing need for high-quality tech talent. However, once students were trained there was still a learning curve when it came to employment readiness. Thus, the Greater Nashville Technology Council sought to create an apprenticeship program that combined classroom training alongside work-based learning in partnership with major employers in the region. Ultimately, this created a direct pipeline for those people seeking to enter tech careers to fill the high-need tech jobs of employers in the region.

The Program Apprenti is the first technology-focused apprenticeship program in Tennessee and is unlike other traditional internships or job training options. Apprenti combines paid on-the-job training and education with placement in high skilled, salary-competitive occupations. The Greater Nashville Technology Council works with companies in the tech industry to identify mid-tier jobs ready to be filled by highly competent people, regardless of their educational background. The Greater Nashville Technology Council has been intentional in actively recruiting women, minorities and veterans, groups that are typically underrepresented in tech jobs. Everyone is eligible and encouraged to apply. The Apprenti program currently is a pipeline towards careers in these fields: network security, software development, web development and system administration.

What They Do The program begins when interested applicants take an online assessment. The assessment is used to assess aptitude for a tech career as the typical applicant is someone who has had some professional experience but is looking to move into the tech field. These test results are then screened by the Apprenti team at the Greater Nashville Technology Council, headed up by Chief of Staff Sandi Hoff. Once the cohort has been selected the apprentices go through the employer selection process, and it is important to note that this happens prior to any of the technology classes and training. Students then interview and receive a job offer from one of the partner employers. This is followed by the classroom training portion of the program through a partnership with Vol State Community College and the Nashville Software School. The Network Security and System Administration training lasts 14 weeks, while Software and Web Development students receive six months of classroom training. After classroom training the apprentices move into the final stage of the official program which is 12 months of on-the-job training with their pre-selected employer.

During the on-the-job training portion, the apprentices start with being paid 60% of market rate and after six months move to a market rate salary.

How They Did It The Greater Nashville Technology Council was able to spearhead the Apprenti program through corporate partnerships and sponsorships, as well as partnering with the Nashville Software School and Vol State Community College to complete the classroom portion. They also applied for and received a state-funding grant. From there the program evolved and continues to evolve as their first cohort of 15 apprentices moves into being full-time employees. The second cohort began at the start of 2020.

Models and Spin-Offs

While the initial spark for the creation of Apprenti came out of conversations between the Tech Council and regional employers with tech functions, the Tech Council was fortunate enough to identify a model with a partner in Seattle around the same time. The Washington Technology Association has a similar program that had recently launched, and the Greater Nashville Technology Council was able to collaborate with them to help build out the Apprenti program here in Middle Tennessee. There are now 12 similar Apprenti programs around the country from Seattle, Washington, to Cincinnati, Ohio, to the state of Louisiana.

Benefits

Sandi Hoff described how a big goal for the Tech Council in creating this program was to change the conversation around hiring tech talent. Within the tech community in Middle Tennessee there is a lot of talk about how employers were struggling to find talent to fit their needs. Apprenti, while not the only solution, is an important piece in building out more options and pathways to connect people interested in the tech industry to training and then good jobs. The Tech Council is in a unique position. In addition to having strong relationships within the corporate tech community, they are also able to weigh heavily what makes sense for employers in hiring tech talent and what needs they may have in an apprenticeship program as well. In the end, Apprenti can bridge those people looking to break into the tech industry with state-of-the-art training as well as provide them with jobs while filling in the manpower strain that tech companies in the area are feeling.

Sources: <https://apprenticareers.org/locations/tennessee/>; <https://technologycouncil.com/apprentitn/>;
Interview with Sandi Hoff, Chief of Staff, Greater Nashville Technology Council



The Need It all started when Rob Tudor, now director of IT Partnerships at Nashville State Community College, left his IT job at Tractor Supply Company in the spring of 2018 to come to Nashville State. Around the end of that same year Rob started having serious conversations with directors at Tractor Supply and Nashville State about how the two could build a working public-private partnership. Rob wanted to find a way to get his graduating IT students funneled into Tractor Supply's present and growing need for IT talent. It was in these meetings that the two entities sought to find a way to bring Tractor Supply's internship work to the students at Nashville State and have the resources and work space at the school, since eliminating transportation barriers for the future student workers was a big priority. It was from here that the Tractor Supply Learn and Earn Internship Program on the campus of Nashville State came to fruition.

The Partnership The Tractor Supply Learn and Earn Program on Nashville State Community College's campus is a semester long internship for Nashville State students located on the school's campus but providing real tech solutions to Tractor Supply and their retail stores across the country. The program launched in the summer of 2019 with a cohort of 5 student interns. The program is unique in that it provides students the opportunity to work and be paid in an internship for a reputable company while continuing to be on campus and take classes towards their degrees. The students have then been able to provide extremely valuable networking and programming work to meet Tractor Supply's IT needs.

What They Do The timeline for the students to complete the body of work laid out by Tractor Supply coincides with Nashville State's school semesters. The students first apply to the program as you would to any internship, and then move through an interview process with Tractor Supply. The pilot program and the subsequent cohorts have all ended up having between four and five students. The project focus of the pilot program was networking with the subsequent two cohorts focusing more on programming with a focus in automation. After the students have been selected, they have a one week orientation with the Tractor Supply supervisors in their workspace on campus, which typically follows with a six week training course to prepare students for the work they will focus on completing for the rest of the semester. Students also can do a day in the life at Tractor Supply's corporate offices in Brentwood, Tennessee. Here they have the chance to meet with company leadership and present the work they are doing back at Nashville State. In the most recent cohort, students also had the chance to experience a day in the life at a Tractor Supply retail store and see firsthand what the IT support systems they are building look like in action. At the end of the semester, some students continue to work for Tractor Supply if their schedule allows, while others return to taking full course loads, but with new invaluable work experience and knowledge.

How They Did It To initially build out the program, Nashville State made a capital investment in building an on-campus working space for the students and their Tractor Supply supervisor. The funding was sought and approved by the school's president and Tennessee Board of Regents. From here Nashville State converted an old classroom into a mini IT office space complete with cubicles and co-working spaces, with specific IT cabling and enhanced WIFI capabilities. Tractor Supply then brought in all the necessary technology (laptops, monitors, etc.) for the interns to carry out their work. From there Tractor Supply planned and laid out the body of work for the students to finish in their 15-week semester with a presentation at the end to demonstrate the results of their assigned projects.

Models

There were not any existing models that informed the work of Nashville State and Tractor Supply.

Benefits

The benefits for the students of Nashville State are that students can work on campus while continuing to earn their degrees. The program addresses transportation barriers for work and school. Students gain hands-on technical knowledge from Tractor Supply supervisors and corporate real-world experience through special program days on site at Tractor Supply offices and retail stores. Finally, students can receive a Capstone credit for their internship, something that is necessary for graduation.

Source: Interview with Rob Tudor, Director of IT Partnerships at Nashville State Community College

Nashville Career Readiness Partnership — Construction Program

The Need Nashville's construction industry is booming because of Nashville's decade-long status as a top destination in which to visit, live and work. A challenge has been for the city to connect companies that are hiring in the construction industry to qualified job candidates. Davidson County residents are eager for jobs to go to local candidates, and in order to hire local talent for construction, employers need to be able to readily find and hire qualified candidates. The Nashville Construction Readiness Partnership was started to address this challenge. In its first year, it provided residents with necessary training in addition to connecting qualified candidates with potential employers (and vice versa). There was also special care taken in providing jobs and career pathways to Davidson County's low-and middle-income residents that otherwise would have been inaccessible.

The Partnership At the start of the Construction Readiness Partnership in 2017, the mayor of Nashville at the time, Megan Berry, wanted to focus the training resources in Promise Zones. Promise Zones are high poverty communities where the federal government partners with local leaders to increase economic activity, improve educational opportunities, leverage private investment, reduce violent crime, enhance public health and address other priorities identified by the community.

The mayor's office put out an RFP asking for community organizations to bid on hosting training programs. The two community organizations that were then chosen were Goodwill, which allowed them to scale an existing construction program to reach more people, and Project Return, an organization that helps people returning to the community after incarceration. Now both Goodwill and Project Return are receiving funding from the mayor's office to provide construction training, as well as being connected with construction employers to make the pathway to a job even more seamless. These community partners have allowed for enhanced program awareness, especially amongst lower income and unemployed residents, while also allowing for the mayor's office to assist area employers with filling their workforce needs.

What They Do Goodwill and Project Return put on the actual construction training. At each of these agencies, candidates receive a six-week hands-on training. Goodwill also offers a stipend for people while in the training. Candidates all graduate with an industry recognized NCCER (National Center for Construction and Education Research) credential, as well as receive training in important soft skills applicable to any job. Goodwill has also had the opportunity to partner with the Tennessee Valley Authority and received a grant from Green Jobs to provide an additional weatherization credential for people going through the program.

How They Did It Construction employers are invited to engage with the training providers and attend graduations where they have access to interested job candidates. The Nashville Career Advancement Center is the Metro Nashville Agency operating in partnership with the employers, community agencies, training providers and Nashville's job seekers to connect through the Nashville Career Readiness Partnership, and are a central point of contact for employers looking to fill job positions. This central point of contact has been imperative in making the pathway to employment as easy as possible for both those being trained and employers.

Benefits and Spin-offs

After the first two years of the Construction Readiness Partnership over 200 Davidson County residents had been successfully enrolled in construction training programs. Of that group 90% have successfully landed jobs. For the second year of the Public Investment Plan, the "C" in the name was changed from construction to career to broaden the program's reach to additional high-need industries in Davidson County: Hospitality and Healthcare. The benefit of what is now the "Career Readiness Partnership" is that it bridges the gap between skilled workers and companies with open positions. This benefits those looking for skills training to find a job or, like the people that Project Return's construction training serves, those looking to find a job after incarceration. This also benefits employers in the region as well as the various low- and middle-income communities where trainings are located. This partnership truly helps create job pathways that could otherwise be inaccessible.

Source: <https://www.nashville.gov/Metro-Action-Commission/Nashville-Career-Advancement-Center/Nashville-Career-Readiness-Partnership.aspx>, Interview with Tanya Evrenson, Director of Adult Strategy at the Nashville Career Advancement Center; <https://www.hudexchange.info/programs/promise-zones/promise-zonesoverview/>



The Need Dan Caldwell, Senior Manager of Learning Pathways at Nissan North America, describes a trend that was present in the early 2000s towards four-year colleges and universities as the primary viable path after high school. This trend took hold and created a workforce gap, a lack of workers with trade or technical skills like industrial maintenance and machining. In 2015 these middle-skill jobs accounted for 53% of the U.S. labor market, but only 43% of the country's workers held the skills to fill these jobs. This directly affected the Middle Tennessee region, placing a strain on the highest-producing manufacturing plant for Nissan North America in Smyrna. In 2012 Nissan went through a large expansion, releasing five new or updated model cars as well as adding a new afternoon production shift. To meet their need Nissan had to make more mid-career hires, further creating a strain in the middle-skill market as many of their suppliers in the area also relied on middle-skilled workers.

To bridge this skills gap the public-private partnership between the Tennessee College of Applied Technology of Murfreesboro and Nissan North America was born.

The Partnership In January of 2017, TCAT-Murfreesboro and Nissan North America began accepting its first students at the newly constructed Smyrna Campus and Nissan Training Center. The technical training center is shared by the college and Nissan, highlighting a public-private partnership between Nissan and the College System of Tennessee to create educational opportunities that are closely aligned to current workforce needs in the region. The campus offers programs to prepare students and Nissan employees for careers in advanced manufacturing and related fields, training and upskilling them in those high demand middle skills.

What They Do The education and training facility houses both public TCAT students as well as current employees from the Nissan Smyrna Plant. On the TCAT side, students can take classes in fields such as Automotive Technology, Collision Repair Technology, Industrial Electrical Maintenance/Mechatronics, Machine Tool Technology and Welding Technology. Current Nissan workers as well as the TCAT students learn valuable skills that can be directly applied in Nissan's facilities or with other employees in the Middle Tennessee region.

How They Did It The governor at the time, Bill Haslam, proposed the joint-use training facility in his 2013 State of the State address and the Tennessee General Assembly approved a \$35.4 million appropriation in the 2013- 2014 state budget. Nissan is paying \$1.9 million through a lease agreement. The

balance of the funding for the state-of-the-art training equipment came through internal Tennessee Board of Regents funding, grants from state and federal agencies and donations from Nissan and its vendors.

Models

At the onset of the project, Nissan looked at the public-private partnerships already in place between Toyota and Bluegrass Community and Technical College in Kentucky as well as between Eastman Chemical and Northeast State in Kingsport, Tennessee. These served as jumping off points to create a public-private technical education partnership unlike any other in the state of Tennessee.

Benefits

Caldwell described the benefits of the public-private partnership as five-fold. First, the students win. They get to take classes at a state-of-the-art training facility and use top of the line equipment.

Second, TCAT wins. In addition to Nissan's initial capital investment to open the facility, they also secured \$1.5 million in state-of-the-art equipment contributed by 20 separate Nissan vendors, which technical schools are usually on long waiting lists to receive.

Third, Nissan wins. As a private corporation Nissan is not able to accept donated equipment, but the TCAT is. Thus, Nissan is only able through this partnership to use this equipment for their own continuing education efforts for their employees.

Fourth, the vendors win. Down the road when these TCAT graduates are purchasers for whatever company they work for they will think back on these vendors they are familiar with and will likely choose their products.

Finally, the community wins. The state-of-the-art training facility also houses a large conference space and is open to the public to use. For example, the Junior Achievement STEM summit has been hosted at the training facility the past two years.

While the facility is home to Nissan's programs for its employees and potential employees, the TCAT Smyrna campus is open to any student interested in careers in its course offerings. Through the Tennessee Promise Program, students who graduate from high school in 2015 or later may attend tuition-free.

This facility highlights Nissan's and the State of Tennessee's investment in developing and maintaining a highly skilled workforce in Middle Tennessee.

Sources: Interview with Dan Caldwell, Nissan/Tennessee Board of Regents Press Release (March 31, 2017), Smyrna Campus and Nissan Training Center homepage (<https://tcatmurfreesboro.edu/businessindustry/smyrna-campus-and-nissan-training-center>)

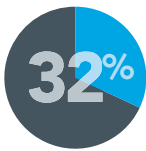
STUDENT SURVEY

In March and April 2020, the Chamber asked students across the Nashville and Clarksville MSAs a series of questions about employment status, school experience, goals, and expectations faced balancing a schedule as an adult student before and during the beginning of the Metro Nashville-Davidson County and then State

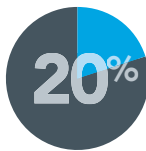
of Tennessee COVID-19 shutdowns. This survey had approximately 400 respondents. Distribution partners included Nashville State Community College, Columbia State Community College, Volunteer State Community College, and various TCAT locations (Tennessee College of Applied Technology) across the MSAs.

Find below a collection of high-level results:

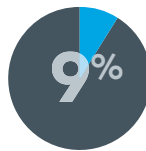
THE **TOP THREE FIELDS OF STUDY** REPRESENTED BY **SURVEY RESPONDENTS** CORRESPOND TO PREVIOUSLY IDENTIFIED FOCUS SECTORS FOR THE REGION.



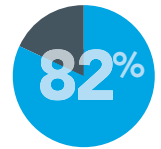
Health
Science



Business Management,
Administration or Finance

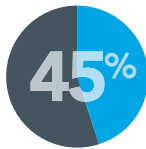


Information
Technology

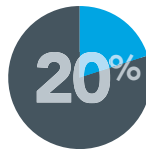


82% OF RESPONDENTS WITH A JOB INDICATED THEY ARE PAID HOURLY AND 57% OF HOURLY EMPLOYEES INDICATED THEY MAKE LESS THAN \$15 PER HOUR.

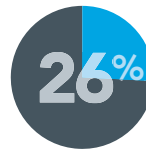
EDUCATIONAL PURSUITS OF SURVEY RESPONDENTS:



Two-year
Associate Degree

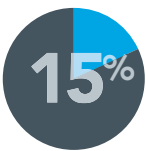


Certificate

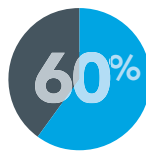


Bachelor's
Degree

12% OF RESPONDENTS INDICATED THAT TRANSPORTATION MAKES THEIR SCHEDULES DIFFICULT AND THE PRIMARY ISSUE HERE WAS COMMUTE TIME.



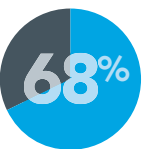
15% OF RESPONDENTS INDICATED THAT THEY DO NOT HAVE HEALTH INSURANCE.



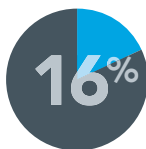
60% OF RESPONDENTS INDICATED THEY PLAN ON REMAINING IN THE NASHVILLE REGION AFTER GRADUATION.

15% OF RESPONDENTS INDICATED THAT CHILDCARE MAKES THEIR SCHEDULES DIFFICULT AND THE PRIMARY ISSUE HERE WAS COST.

EMPLOYMENT STATUS OF SURVEY RESPONDENTS:

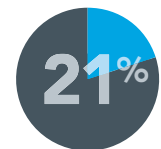


Employed



Multiple
Employers

OF RESPONDENTS THAT INDICATED THEY HAVE MORE THAN ONE JOB, 77% REPORTED THAT THIS IS BECAUSE OF COST OF LIVING.



21% OF RESPONDENTS PARTICIPATE IN WORK-BASED LEARNING (APPRENTICESHIPS, OR STRUCTURED LEARNING AT A WORKPLACE) AND 81% OF THESE RESPONDENTS INDICATED THAT THIS IS THROUGH THEIR SCHOOL.

BARRIERS TO WORK

Each of the next three topics could be standalone studies, addressing how barriers like childcare, transportation and housing impact workers in the region. As evidenced by the student survey, these topics are part of the equation when discussing the regional workforce and how workers can access training, education and good jobs. Additionally, each of these three topics has significance both seen outside of and through the lens of COVID-19.

Childcare

Access to childcare has been a topic of much discussion and concern in recent years at a national level as well as a local level. The issues with childcare mainly revolve around access, cost and quality of care. It is important to look at the way childcare affects the workforce and thus the Middle Tennessee regional economy. Ultimately, high-quality, affordable childcare for all is good for families, communities and the economy.

It helps the economy when women work, research shows¹⁸, and it is often beneficial for their families as well, especially when half of Tennessee families depend on a female breadwinner.¹⁹ Evidence also demonstrates that when there's high quality, affordable and readily accessible childcare, more women work. According to Think Tennessee's State of our State: Women in the Workforce report, there is a 13-percentage point gap in labor force participation between men and women in the state of Tennessee.²⁰ Expanding access also better allows families to realize their full economic potential as well foster economic growth and prosperity.

One initiative currently supporting and growing Nashville's early childhood education system is the Blueprint for Early Childhood Success. While the Blueprint's focus is grounded in creating a citywide framework for literacy, it is recognized that without early intervention to meet critical milestones this goal cannot be achieved. Thus, a roadmap was also created to strengthen preschools and early learning opportunities. While the roadmap has made great strides to chart a

path forward to strengthen Nashville's early childhood education network, there is still much more work to be done, especially when it comes to surrounding counties and creating better opportunities for the early childhood education workforce.

There are three major economic benefits of high-quality, affordable childcare. The first is a more productive workforce. This is especially true today as many have had to pivot to work from home due to COVID-19. Parents that have access to reliable and affordable childcare can be more productive and less absent at work. Secondly, childcare supports the direct and indirect jobs of many, such as early education workers and student parents. Finally, childcare means better earnings for workers and higher labor force participation. Childcare centers provide vital infrastructure to allow parents to hold jobs outside of their homes, which often means a higher salary and a clearer pathway to promotions and pay raises.

Housing and Transportation

Housing and transportation are critical to Middle Tennessee's quality of life. The Chamber's Research Center considered both issues as they relate to workforce, including the impact of COVID-19 on efforts to improve housing and transportation quality and access.

A common housing metric is cost burden. A household or individual is considered cost burdened if they spend 30 percent or more of their take-home pay on housing. Data from the economic region shows disparities when broken out by race, ethnicity, ownership status and educational attainment.

This housing and transportation data represents a period before COVID-19's impact on Middle Tennessee. More households have become cost burdened as individuals have lost employment, been furloughed or experienced reduced income. As eviction moratoriums end, the effects of the economic downturn will become more severe. While cost burden related to housing has been negatively impacted by COVID-19, Middle Tennesseans who commute to work are experiencing far less traffic on the roads than is typical. In 2018 in the Nashville MSA, approximately 20 percent of daily commuters

¹⁸ The National Bureau of Economic Research, *Changing Business Cycles: The Role of Women's Employment*, March 2019

¹⁹ A Better Balance, *State of our State: Women in the Workforce*, 2019

²⁰ Science Magazine, *Early Childhood Investments Substantially Boost Adult Health*, March 2014

experienced a commute of over 45 minutes.

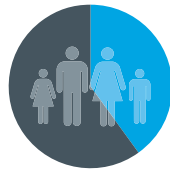
Over the last five years, remote working has been on the rise, particularly in the Nashville MSA, increasing from approximately 4 percent to 6 percent of the labor

force. With the sudden impact of COVID-19, many organizations have been forced to suddenly turn to remote work and are now finetuning their remote work policies with indications that remote working will become an ever-increasing trend for years to come.

ACCORDING TO THE **2019 VITAL SIGNS SURVEY**, IN THE **JOINT METRO REGION** APPROXIMATELY **60% OF BLACK OR AFRICAN AMERICAN HOUSEHOLDS ARE COST BURDENED** COMPARED TO APPROXIMATELY **40% OF WHITE HOUSEHOLDS.**



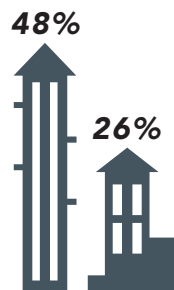
SIMILARLY, APPROXIMATELY **60% OF HISPANIC OR LATINO HOUSEHOLDS ARE COST BURDENED** COMPARED TO APPROXIMATELY **40% OF WHITE HOUSEHOLDS THAT ARE NOT HISPANIC OR LATINO.**



IN THE NASHVILLE MSA, APPROXIMATELY **40% OF ALL HOUSEHOLDS ARE COST BURDENED.**

THIS IS SEEN DISPROPORTIONATELY IN **RENTERS.**

ACROSS THE JOINT METRO REGION



48% OF RENTER-OCCUPIED HOUSEHOLDS ARE COST BURDENED.



26% OF OWNER-OCCUPIED HOUSEHOLDS WITH A MORTGAGE ARE COST BURDENED.



IN THE **CLARKSVILLE MSA**, APPROXIMATELY **37% OF ALL HOUSEHOLDS ARE COST BURDENED.**

CONCLUSION

The data regarding key occupations required by our target industries and the skills and occupation gaps that exist currently, point to five key occupational groups for workforce development efforts. These focus areas are healthcare practitioners and technical occupations, computer and mathematical occupations, business and financial occupations, management occupations and production occupations for advanced manufacturing. Workforce efforts should focus heavily on the healthcare, business services, information technology, and advanced manufacturing sectors in terms of these occupations.

The projected deficits in skilled workforce will continue to broaden over the next five years, exasperated by the economic conditions created by COVID-19, instability in global economies, attrition due to an aging labor force and disruption from technology. Preparing students and retooling and upskilling adult workers can ensure these critical target sectors are well supplied with the qualified workforce necessary to grow and sustain competitiveness. At the same time, talent development can help ensure that more residents can compete for good and promising jobs and benefit from growing prosperity in the region.

This study is intended to inform and serve differing

stakeholders, from workforce and economic development professionals to industry decision makers, and from policy makers to regional leadership, with economic data that translates into concrete and intentional recommendations. The recommendations below include empirically-based practices to align industry needs with workforce development programs in the region.

TACTICAL RECOMMENDATIONS

Workforce Development Professionals

- Use workforce shortage data and assessments of skills, aptitudes and education to upskill the current workforce.
- Use assessments of workforce shortage data, skills and education required to develop upskilled workforce in preparation for automation and other technologies to best position workers for resilience. Determine the skill tiers of workers in the target occupational areas.
- Provide support to existing industries through partnerships with economic development organizations to assess the digital readiness of workers. Determine the skill tiers of workers in the target industries:



DO NOT KNOW HOW TO USE **ANY FORM OF TECHNOLOGY** (I.E. CELL PHONES, COMPUTERS, EMAIL, ETC.) AT **HOME OR WORK**.



BASIC KNOWLEDGE OF **CELL PHONES, COMPUTER HARDWARE, MACHINERY** AND **BASIC SOFTWARE, INTERNET, AND WORK-RELATED MACHINES**; LIMITED USE AT HOME AND WORK.



COMFORTABLE KNOWLEDGE AND USE OF **BASELINE TECHNOLOGY, MACHINERY** AND **SOFTWARE**; USE AT HOME AND WORK AS PART OF THEIR REGULAR **DAILY PERSONAL OR OCCUPATIONAL ROUTINE**.



ADVANCED KNOWLEDGE AND USE OF TECHNOLOGY, MACHINERY AND SOFTWARE UTILIZED BOTH **PERSONALLY AND AS PART OF THEIR WORK** (INCLUSIVE OF INDUSTRIAL MACHINE TECHNOLOGY). **LIMITED ABILITY TO PROGRAM AND/OR CODE** TO ACCOMPLISH TASKS.



EXPERT LEVEL KNOWLEDGE AND USE OF TECHNOLOGY, MACHINERY AND SOFTWARE; **ABLE TO PROGRAM OR CODE**.

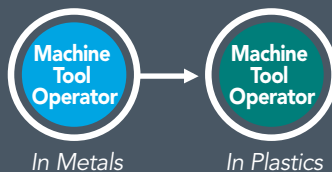
- Focus areas:

- Healthcare occupations: nursing (with pathways from CNA/Tech to LPN, RN, BSN & NP), therapists (i.e. respiratory, physical, occupational), and lab technicians.
 - Information Technology: (hardware/network setup, network systems security, software coding, informatics and data science).
 - Business/Corporate Services: (management, analysts—financial and business informatics, accounting and auditing, paralegal/legal administrative [for the next 48 months there will be surplus of legal administrative staff]).
 - A niche opportunity also exists to facilitate the development of advanced software developers, data scientists, statisticians, mathematicians and actuaries by creating pathways from high school to terminal degree and professional certification through incremental micro-credentials.
- Develop stackable, micro-credentials aligned to target industries and occupations.
 - Consider both horizontal and vertical stacking.

VERTICAL STACKING



HORIZONTAL STACKING



- Develop secondary skills pathway inclusive of both complementary skills and upskilling.
 - Target entry-level workforce to bring them to middle skill in both their industry and complementary industries; prepare them to upskill for automation.
- Focus training on occupations that provide opportunity jobs wherein individuals with less than a bachelor's degree can make at least the regional median wage and have benefits.
 - Develop a plan to identify and address barriers to employment that are often also barriers to education and workforce development.

Economic Development Professionals

- Target Advanced Manufacturing [with attention to Production Technology & Medical Device Manufacturing], Healthcare Industries, Business Services and Information Technology sectors when targeting employers to relocate to the region.
- Use out-commuter data to strategize on what industry would fit the skillsets of workers in counties that currently have high rates of the labor force commuting out for work.
- Provide support to existing industries to increase targeted use of automation, AI and production technology as means to limit disruption and increase emergency preparedness.
- Provide support to existing industries to increase awareness of complementary supply services that offer the development of secondary operations (for example a metals manufacturing supplier for automotive could consider a secondary line of supply to other industries requiring metal fabrication such as a medical device manufacturer).
- Provide support to existing industries in assessing the digital readiness of workers. Determine the skill tiers of workers in the target industries (see example of Base Zero through Base Four skill tiers above).

Employers

- Proactively incorporate plans to upskill or reskill the current workforce to meet the needs of a changing economy.
- Engage and partner with workforce and economic development professionals to facilitate the development of systemic programming.
- As automation of tasks becomes more commonplace, employers must develop plans for upskilling and/or reskilling their present workforce with skills and short-term, stackable educational training opportunities that will
 - ensure continuity of business productivity and services, and
 - enable progression of skills and employment stability for their workforce.

Employers, Workforce & Economic Development Professionals, and Regional Leaders

- Understanding how technology affects an organization and the region is key in planning around its effects. Towards this goal, employers, workforce and economic development professionals and regional leaders must establish an understanding of current technology infiltration in the workforce.
- Develop resilient infrastructure that ensures alignment between employers and the region's training providers and education institutions.

Ultimately, while data informs, partnerships transform. Creating a workforce development plan that includes many partners with the common interest of strengthening workers and workplaces is important in creating organizational strategies that lead to systemic change.



nashvillechamber.com