



# Northern Kentucky Labor Shed Identification & Target Industry Analysis

January 2022



# Executive Summary



# Executive Summary

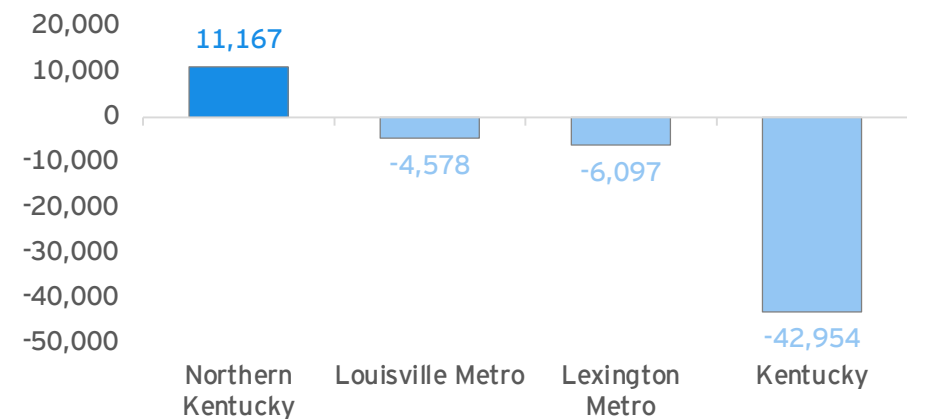
The economic momentum currently enjoyed by Northern Kentucky has no peer within the state. Historically, employment growth within Kentucky has been led by the state's two largest metropolitan areas—Louisville and Lexington. The pandemic, however, has disrupted both regional economies. As a result, the Northern Kentucky metro has emerged as the state's leading job engine.

Between 2015 and 2020, collective job losses in the Louisville and Lexington metros exceeded 10,000. Jobs losses within the state weren't confined to its urban cores. All told, there were 40,000 fewer workers employed by Kentucky companies in 2020 compared to 2015.

Against this backdrop, the resiliency of the Northern Kentucky economy is extraordinary. Total employment in Boone, Campbell, and Kenton counties rose by more than 11,000 between 2015 and 2020. Job gains covered a variety of areas, including arts, culture, and recreation, construction, health care, transportation and warehousing, and professional services.

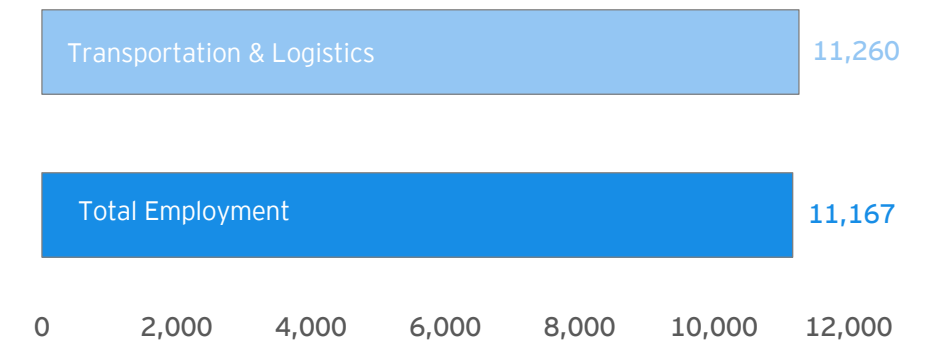
The remarkable performance of the Northern Kentucky economy reflects the region's growing stature as a leading transportation and logistics hub. Anchored by Amazon Air and its \$1.5 billion investment in the Cincinnati/Northern Kentucky International Airport, as well as DHL's North American super-hub, Northern Kentucky has become a logistics mecca. Between 2015 and 2020, the region's Transportation & Logistics cluster was responsible for creating more than 11,200 jobs. Due to employment losses in other clusters, this figure actually exceeded overall net job gains in Northern Kentucky during this period.

Employment growth, 2015 - 2020



Source: EMSI

Northern Kentucky employment growth, 2015 - 2020



Source: EMSI

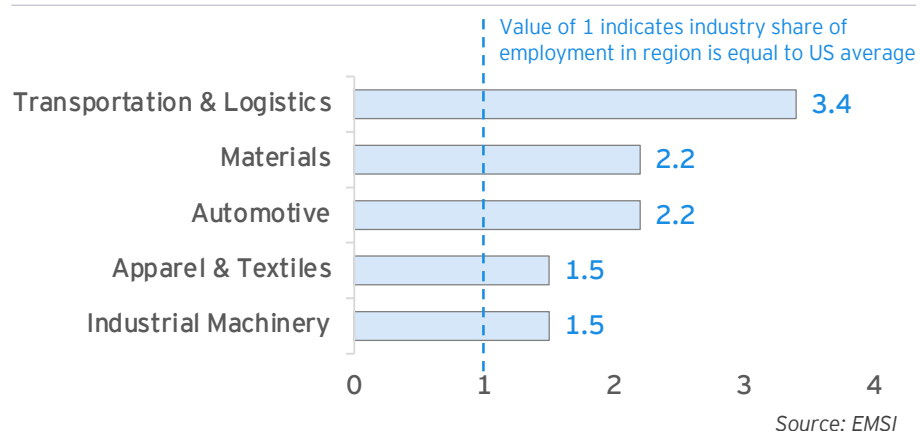
## Executive Summary, *continued*

Thanks in part to the phenomenal pace of recent employment growth, Transportation & Logistics is now the most concentrated industry cluster in Northern Kentucky by a significant margin. In 2019, on a per capita basis, the region was home to more than three times as many Transportation & Logistics jobs relative to the US average. Although Northern Kentucky's prowess as a logistics hub is perhaps the most widely heralded aspect of the local economy, it is far from the region's only strength.

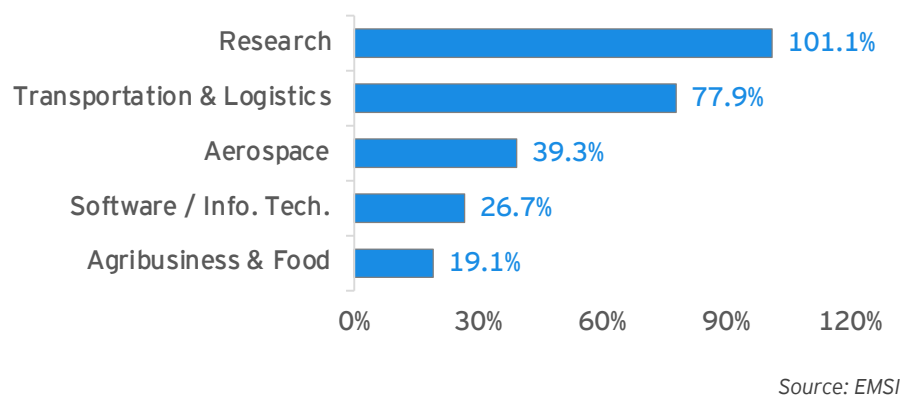
Though Northern Kentucky is increasingly known as a place for *moving* things, it is also a leading destination for *making* things. Outside of Transportation & Logistics, the most concentrated clusters in the region are all related to manufacturing. On a per capita basis, Northern Kentucky is home to twice as many Materials and Automotive manufacturing jobs relative to the national average. The region also has a relatively high share of jobs in production-oriented sectors such as Industrial Machinery and Apparel & Textiles. In both clusters, Northern Kentucky employment is approximately 50% greater than the US average.

While the Transportation & Logistics sector is responsible for the lion's share of employment growth within Northern Kentucky in recent years, several other clusters have also experienced impressive job gains. Northern Kentucky Research employment, which encompasses scientific research as well as consulting services, doubled between 2014 and 2019. Though the Research cluster remains relatively small, it has grown at a faster pace than the transportation and logistics sector. During this same period, regional employment in Software/Information Technology rose by nearly 40%. Other sectors that have posted especially strong employment growth within Northern Kentucky in recent years include Aerospace and Agribusiness & Food.

Location quotient of Northern Kentucky's five most relatively concentrated industry clusters, 2019



Northern Kentucky's five fastest growing industry clusters, 2014 - 2019





# Executive Summary, *continued*

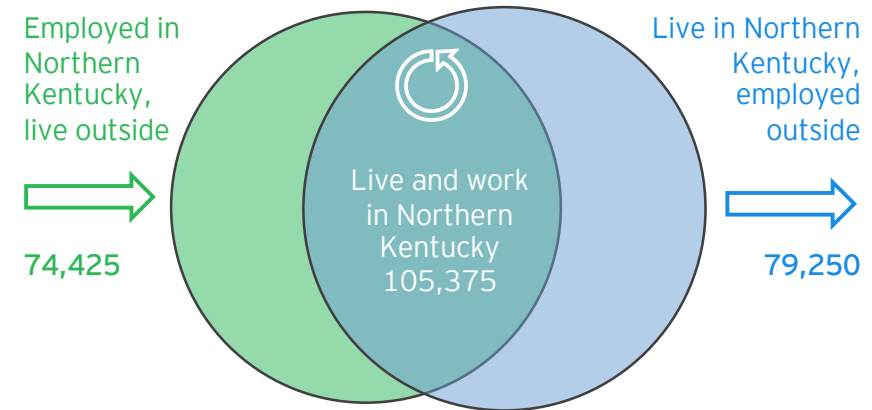
Northern Kentucky has been able to propel strong employment growth across a variety of industry clusters in part due to the region's geographically dynamic workforce. While approximately 105,000 individuals live and work within Northern Kentucky, the region is also a significant exporter of talent. Approximately 43% of all employed Northern Kentucky residents, for example, work outside of the three-county region.

Northern Kentucky is also highly dependent on outside workers to support local companies—more than 40% of individuals employed in the region reside elsewhere. Northern Kentucky's labor shed encompasses many communities in relative proximity to major transportation corridors throughout the Cincinnati metropolitan area. As the region boasts three interstates, this represents a substantial population. In 2019, Northern Kentucky's labor shed was home to more than 1.4 million residents—nearly four times the population of Northern Kentucky itself.

In general, Northern Kentucky tends to export workers employed in industries featuring higher-wages and advanced educational requirements. The three industries with the largest net outflow of Northern Kentucky resident-workers, for example, include Health Care and Social Assistance, Professionals and Technical Services, and Management. Conversely, the region tends to import workers in industries with more limited skills requirements. Northern Kentucky is especially dependent on external labor to support Transportation and Warehousing operations. On a net basis, local Transportation and Warehousing companies import more than 7,000 workers from outside jurisdictions.

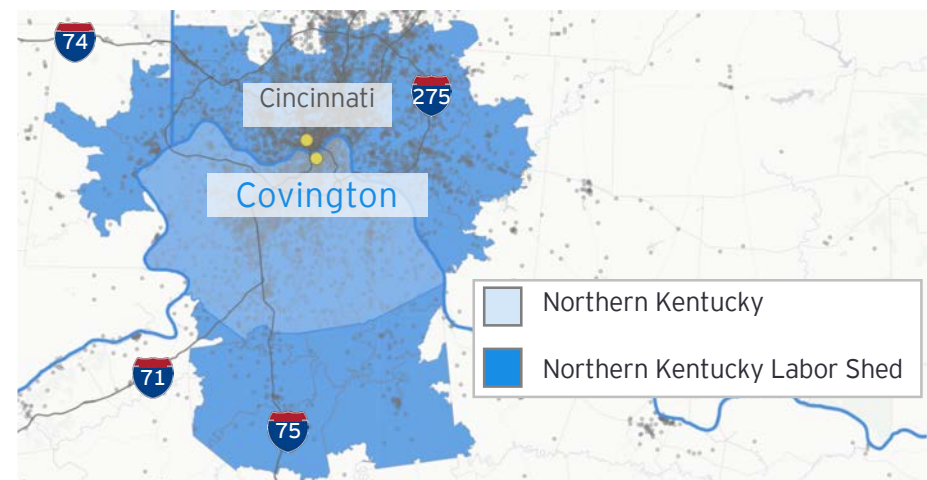
A similar dynamic characterizes the flow of workers by occupations. On a net basis, Northern Kentucky exports Engineering, Computer, and Financial talent while importing Logistics, Back Office, and Hospitality workers.

Northern Kentucky workforce inflow/outflow dynamics, 2018



Source: US Census Bureau

Northern Kentucky labor shed



# Executive Summary, *continued*

The dynamism and diversity of Northern Kentucky's workforce—combined with regional assets such as the airport, the Ports of Cincinnati and Northern Kentucky, and multiple local institutions of higher learning—are all likely to help the region thrive in the face of rapidly evolving economic, technological, demographic, and geographic macrorends and industry disruptions.

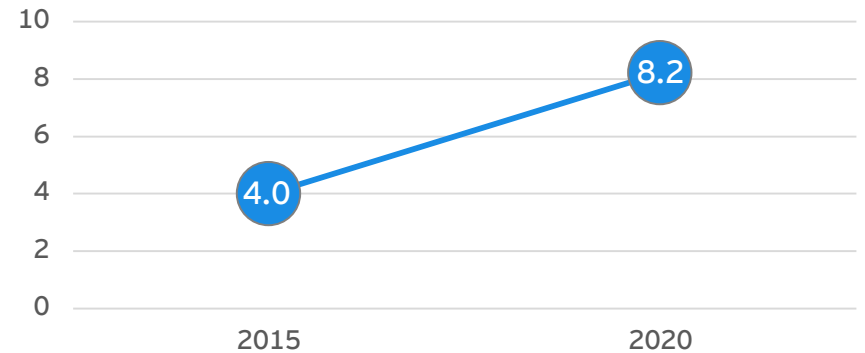
**Economic** - The migration of retail dollars online sharply accelerated during the pandemic. Few regions in the US have experienced more investment as a result of the growth of online shopping than Northern Kentucky. Between 2015 and 2020, the volume of air cargo traffic in the region doubled and shows no signs of slowing.

**Demographic** - With 10,000 Baby Boomers turning 65 every day, spending on healthcare and related fields continues to rise. Thanks to unique academic programs such as the Health Informatics program at Northern Kentucky University, the region is cultivating the talent necessary to take advantage of emerging opportunities in areas such as healthcare and biotechnology. Notably, regional production of IT talent (which includes Informatics) is increasing at a faster pace than the growth of air cargo shipments in the region.

**Technological** - With carmakers increasingly focused on electric vehicle development, the industry is on the cusp of a historic transformation. Currently, there are more than a dozen auto plants located within 200 miles of Northern Kentucky. Collectively, these facilities represent approximately 3.7 million in vehicle manufacturing capacity. Ford's recent announcement of a \$5.8 billion investment in two battery production facilities within the state places Northern Kentucky at the heart of domestic automobile production.

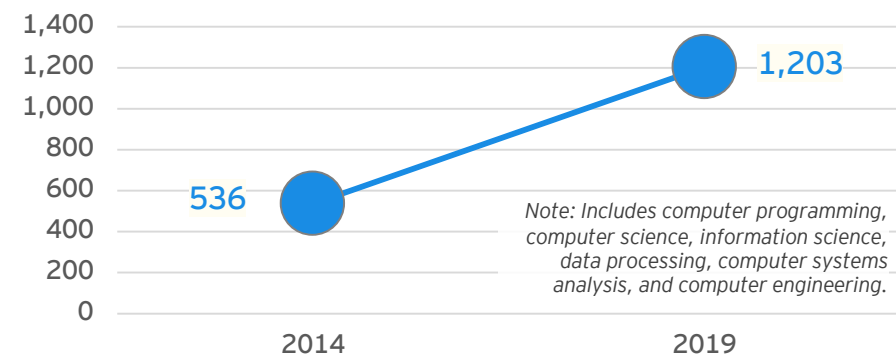
**Geographic** - Northern Kentucky combines a talented workforce with one of the lowest costs of living among major metropolitan regions. In an era in which a growing number of workers can commute to work from anywhere, few regions provide more value to workers and employers alike than Northern Kentucky.

Cargo landed weight at Cincinnati/Northern Kentucky International Airport (billions of pounds)



Source: Federal Aviation Administration

Information Technology degrees awarded annually - University of Cincinnati, Northern Kentucky University, and Miami University



Note: Includes computer programming, computer science, information science, data processing, computer systems analysis, and computer engineering.

Source: National Science Foundation

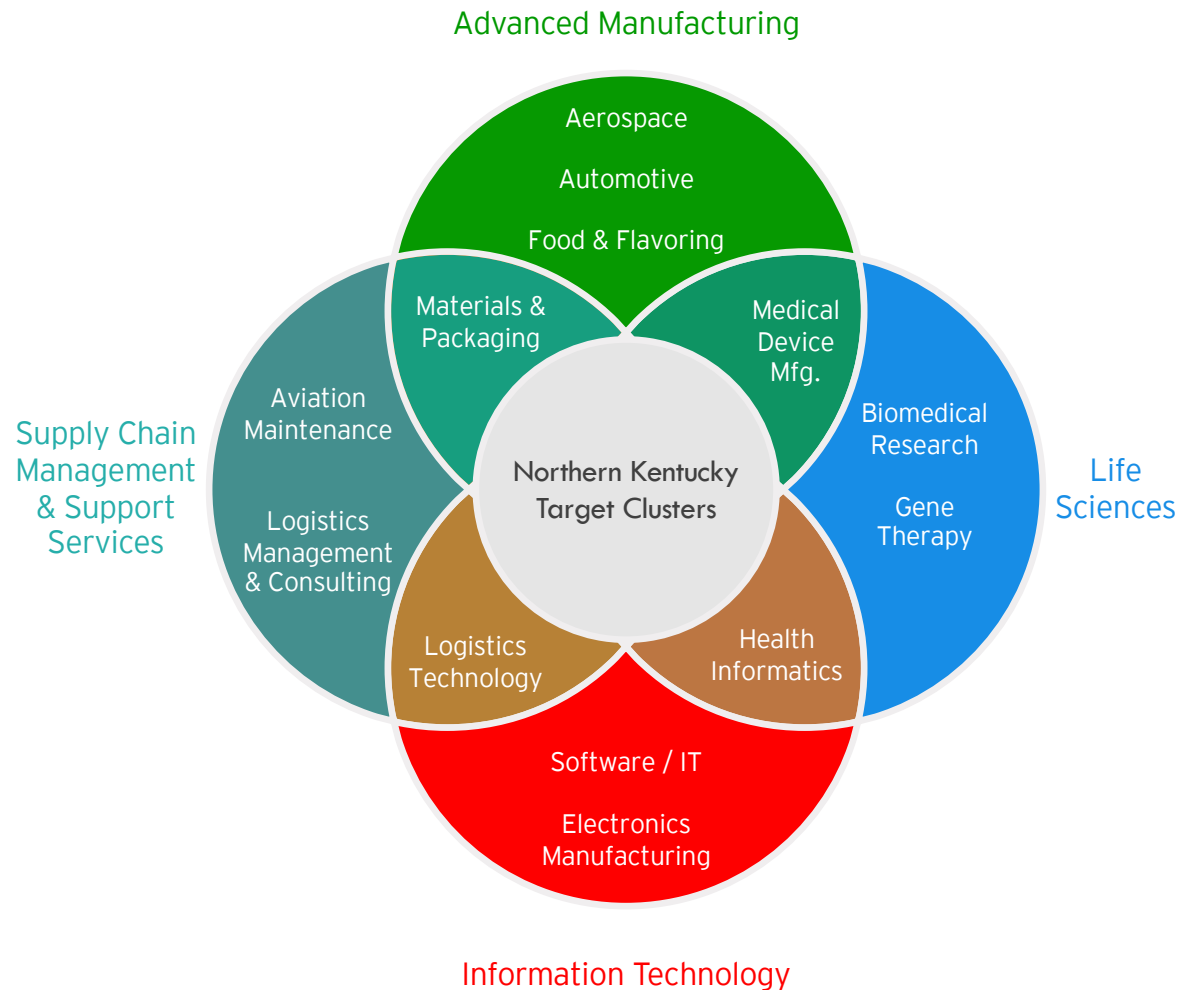
# Executive Summary, *continued*

Against the preceding backdrop of megatrends and industry disruptors—as well as individual industry growth trajectories and the region’s existing industrial composition—four target clusters are recommended for future economic development efforts in Northern Kentucky—Advanced Manufacturing, Life Sciences, Information Technology, and Supply Chain Management & Support Services. As shown in the accompanying graphic, each target contains several niche clusters.

While each cluster has its own unique characteristics, the clusters also share several notable traits. Perhaps most strikingly, recent employment gains in all four target clusters have not only outperformed the region as a whole, but also the national average for these industries. Despite the pandemic and its lingering economic impact, all recommended target clusters are also projected to post employment gains in Northern Kentucky in the years ahead.

In addition to strong employment growth performance, the target clusters also create high-wage opportunities for local workers. The average annual wage for each of these clusters exceeds the regional average by at least \$10,000. As reflected by the comparatively high wages commanded by workers in these clusters, growth in areas such as Life Sciences and Information Technology will create new job opportunities for homegrown talent that might otherwise commute out of the region for employment.

Recommended target clusters



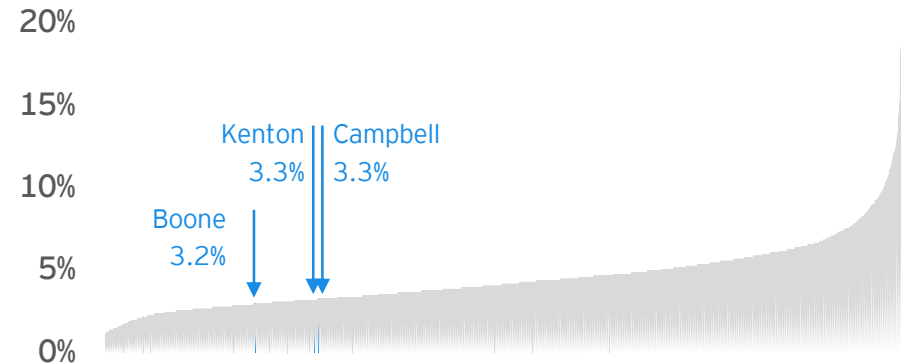
## Executive summary, *continued*

The four target clusters collectively provide Northern Kentucky with a pathway to promote a balanced economic development agenda. The diversity of these clusters will help the regional economy from becoming too dependent on any one industry. The target clusters also encompass companies of varying sizes, creating opportunities for startups and global conglomerates alike.

Given their varied needs, it is important that Northern Kentucky adopt a holistic approach in supporting the growth of recommended target clusters. In particular, the rapid rise of the logistics and distribution industry threatens to constrain the availability of labor and land available to other sectors. Already, the three counties that comprise the Northern Kentucky region feature some of the lowest unemployment rates in the country. Additionally, in recent years the logistics and distribution industry has consumed a sizable share of the region's available industrial real estate. If niche clusters such as Automotive Manufacturing and Aerospace are to thrive in Northern Kentucky in the decades ahead, it is also critical to ensure that development (and redevelopment) activity doesn't preclude their growth.

As these issues demonstrate, however, many of the most pressing economic development topics in Northern Kentucky in the years ahead are likely to be the consequences of the region's current positive momentum. In a world that has experienced extraordinary economic tumult during the pandemic, managing success is an enviable position for any region to occupy. Ultimately, successfully addressing these challenges will not only enrich Northern Kentucky but also help sustain a statewide economic recovery. If the past 24 months is any example, the economic health of the commonwealth is increasingly dependent on the vibrancy of Northern Kentucky.

Unemployment rate for all US counties, August 2021



Source: Bureau of Labor Statistics



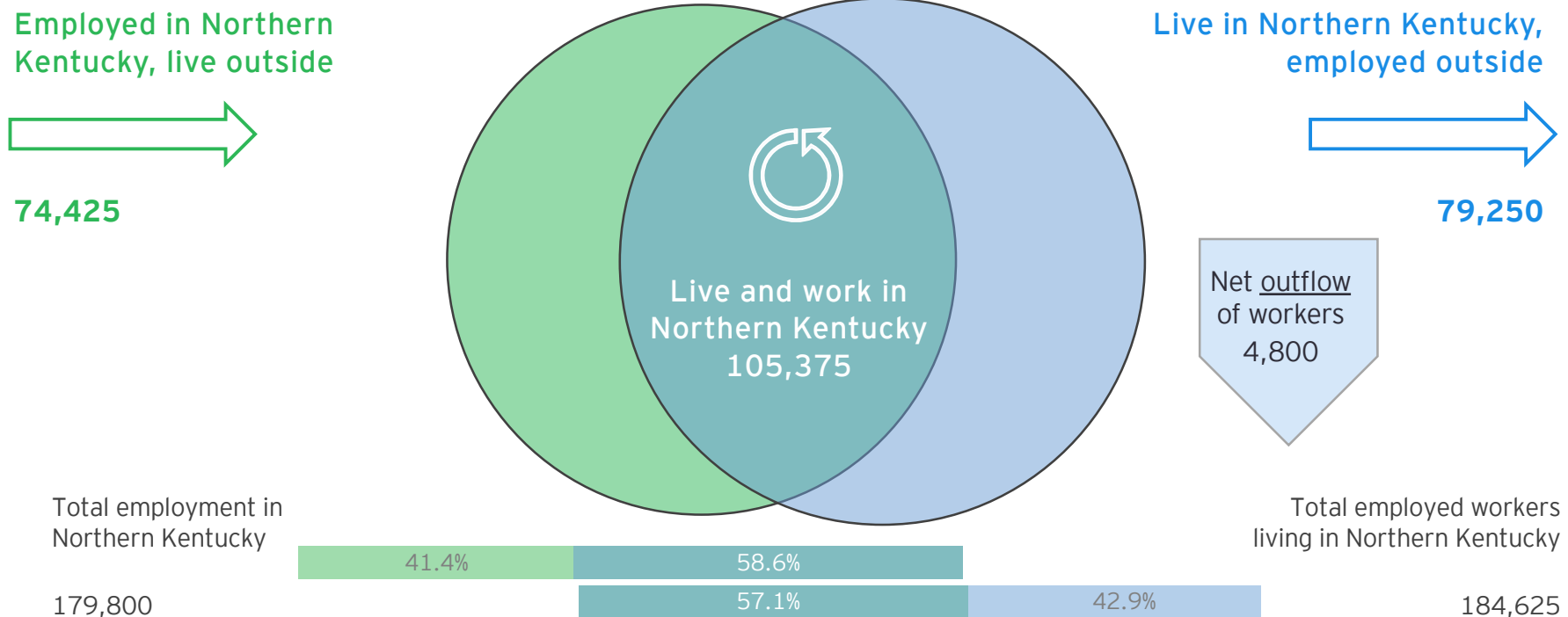
# Labor Shed Identification & Demographic Scan



# Northern Kentucky resident and worker flows

While Northern Kentucky both exports and imports significant levels of talent, there remains a substantial overlap between those who live in the region and those who work within the community. Of the nearly 185,000 employed individuals residing in Northern Kentucky, nearly 60% are employed outside of the three-county region. At the same time, more than 40% of workers employed in Northern Kentucky live elsewhere.

Northern Kentucky (Boone, Campbell, and Kenton counties) workforce inflow/outflow dynamics, 2018

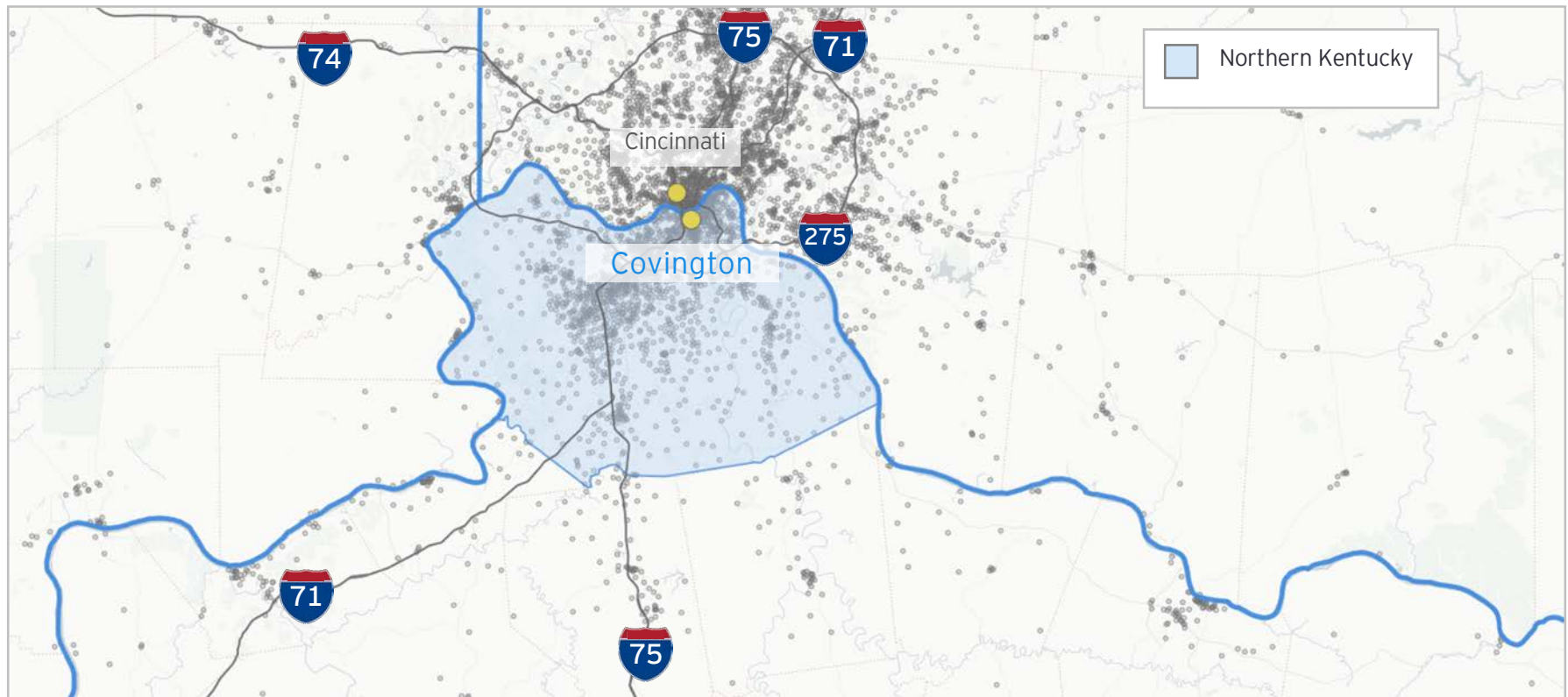


Source: US Census Bureau

# Northern Kentucky worker origin

More than 40% of all individuals working in Northern Kentucky live outside of the three-county region. These outsiders largely commute from adjacent areas of Kentucky, Ohio, and Indiana. On a net basis, however, Northern Kentucky exports approximately 4,800 workers to neighboring jurisdictions. Assuming these workers were instead employed within either Boone, Campbell, or Kenton counties and earning the regional average wage (\$55,000), this exodus of talent represents more than \$265 million in unrealized payroll.

Northern Kentucky worker origin, 2018



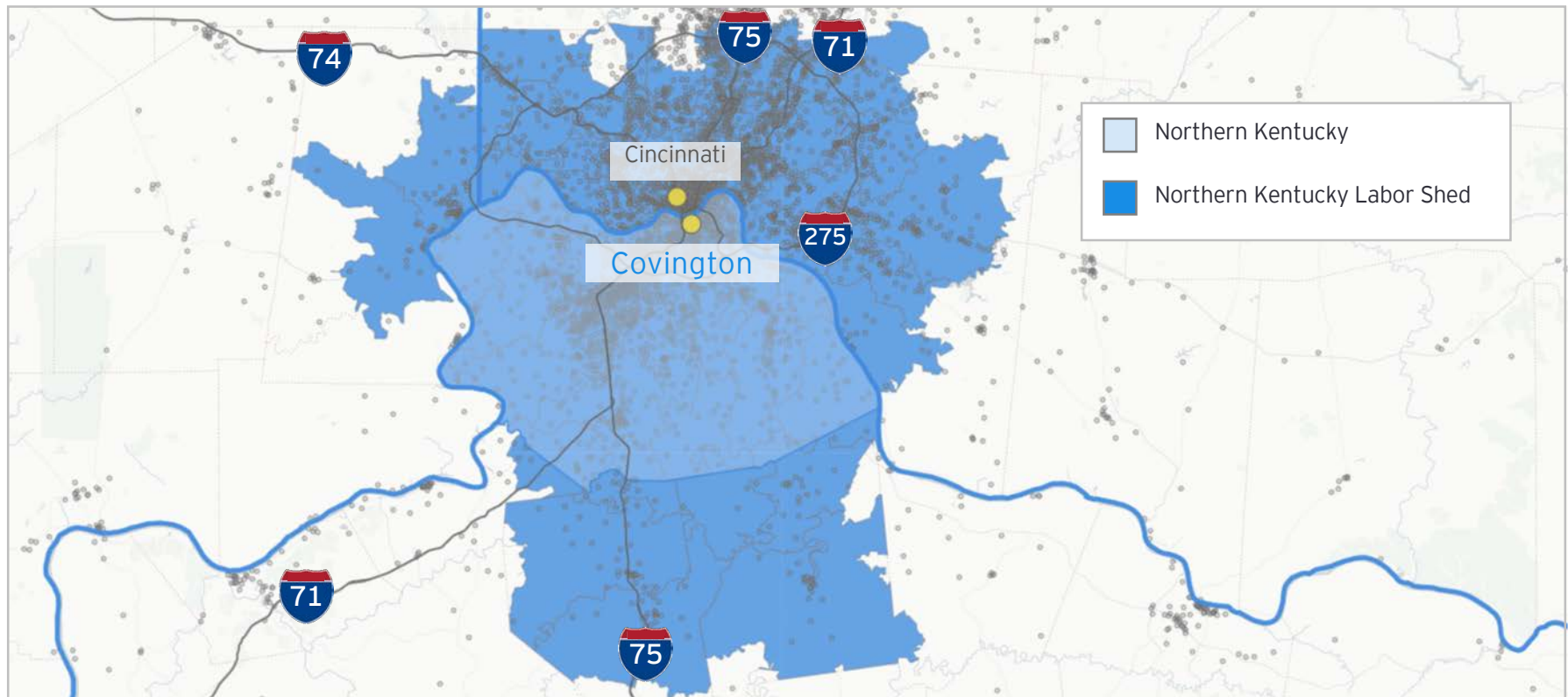
Source: US Census Bureau



# Northern Kentucky labor shed

Northern Kentucky's labor shed largely follows the contours of the broader region's transportation corridors. To the south, workers commute into Northern Kentucky from jurisdictions located in relative proximity to Interstate 75 in Grant and Pendleton counties. Northern Kentucky also attracts workers located alongside Interstate 275 to the west and east of Cincinnati.

Northern Kentucky labor shed



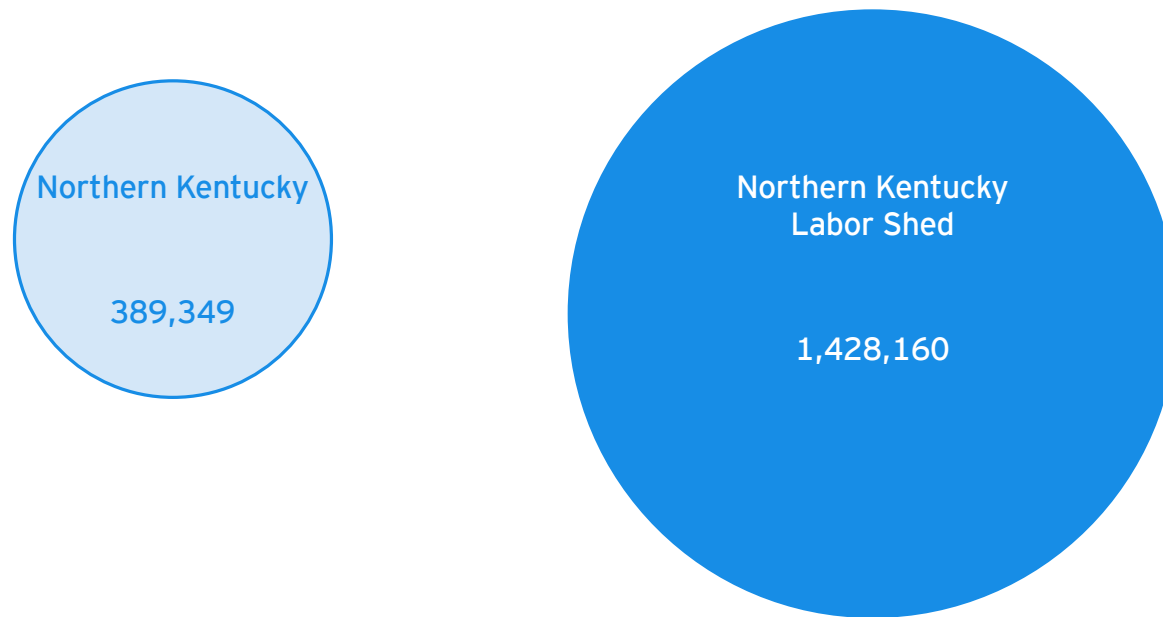
Source: US Census Bureau

# Population

The three counties in Northern Kentucky are home to approximately 390,000 residents. Notably, the region's labor shed is home to a substantially larger population. With more than 1.4 million residents, Northern Kentucky's labor shed is nearly four times the population of Northern Kentucky itself.

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Population, 2019



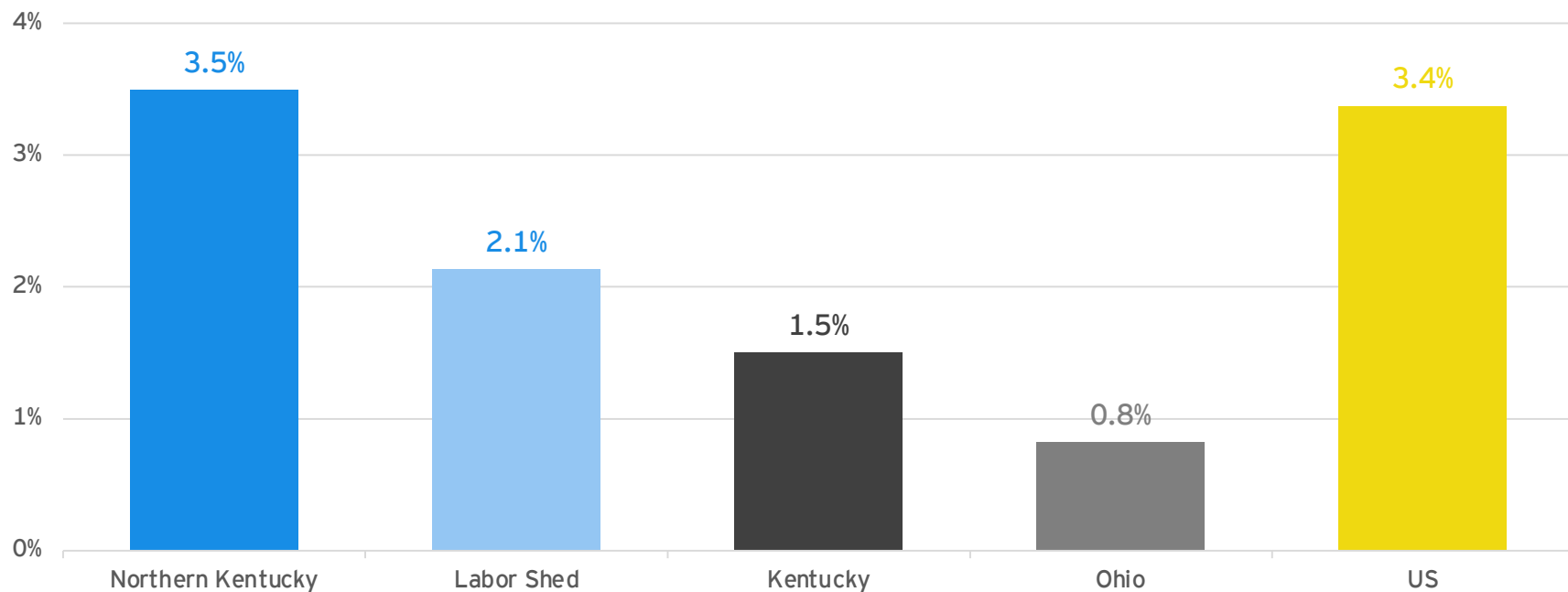
Source: US Census Bureau



# Population Growth

Northern Kentucky is the only examined area where population growth exceeds the national average. Although the population residing in Northern Kentucky's labor shed is growing at a faster clip than either the Kentucky or Ohio averages, these gains trail both the rates of Northern Kentucky and the US as a whole.

Population growth, 2014 - 2019

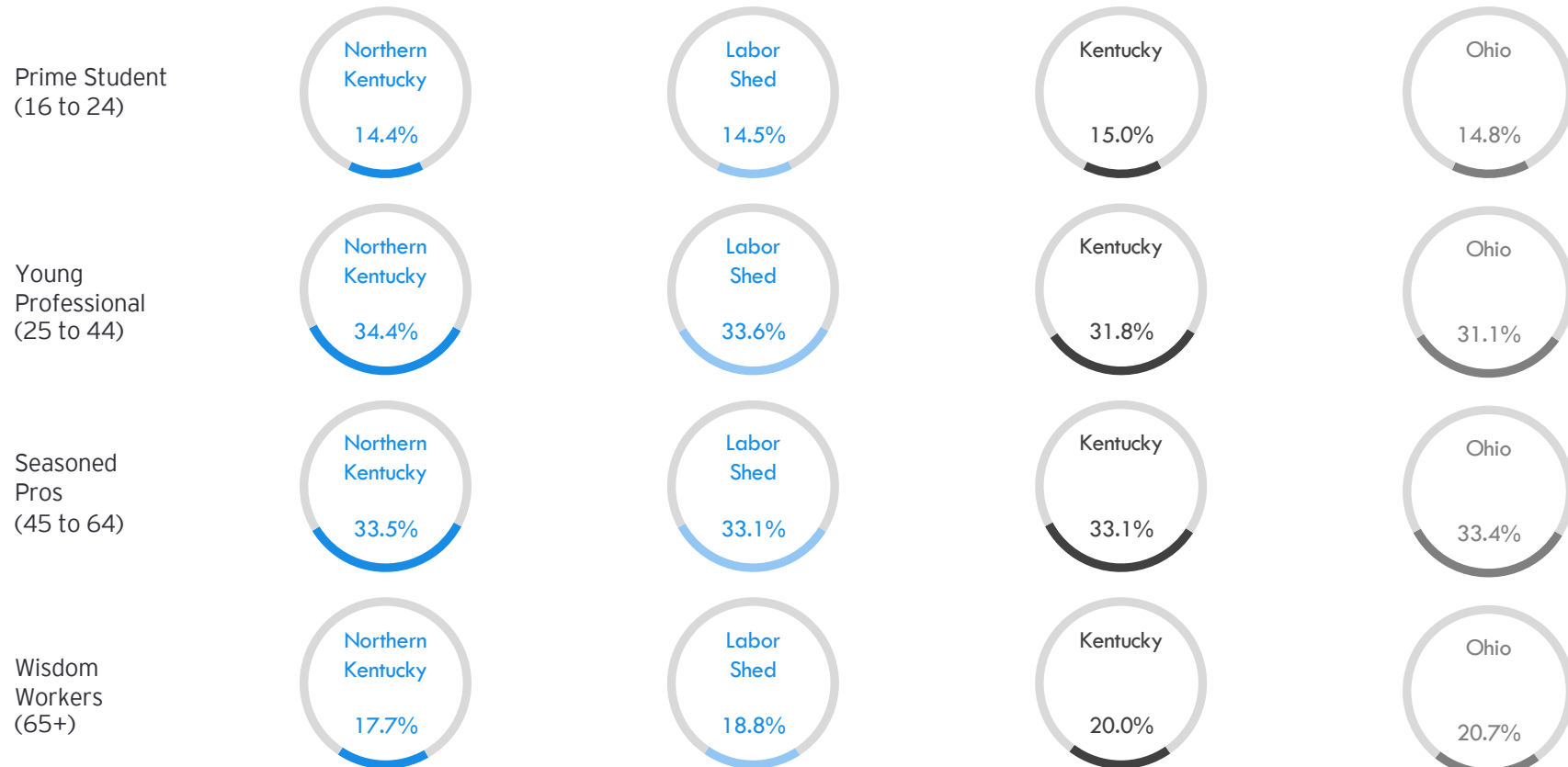


Source: US Census Bureau

# Labor Force by Age

There are limited differences in the age composition of Northern Kentucky's population and the broader labor shed. On the whole, Northern Kentucky is home to a slightly younger population relative to the labor shed. Nearly 49% of Northern Kentucky resident worker population are between the ages of 16 and 44. The figure for Northern Kentucky's labor shed is 48%. Conversely, individuals aged 45 and older represent a small proportion of Northern Kentucky's workforce relative to the broader labor shed.

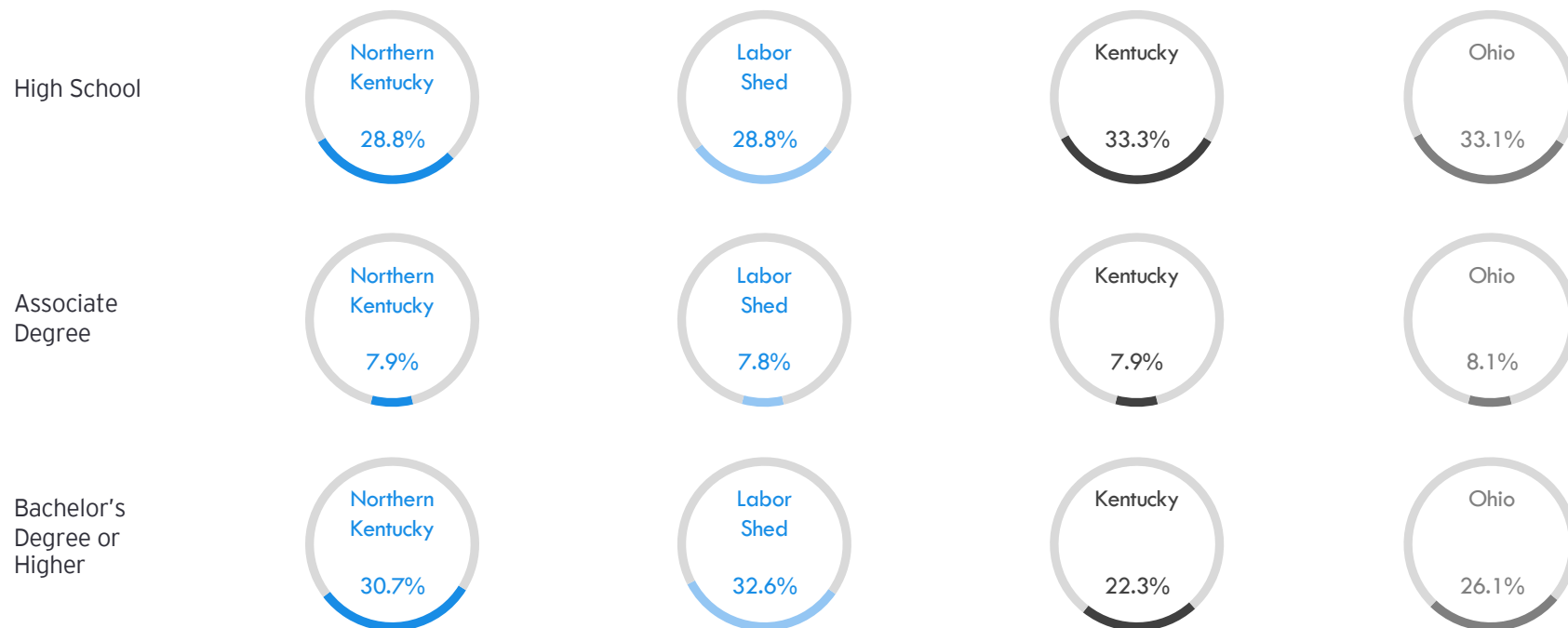
Labor Force by Age (Among Residents Ages 16 years of age and older), 2019



# Labor Force by Educational Attainment

Workers living in Northern Kentucky have significantly higher levels of educational attainment than either the Kentucky or Ohio statewide averages. Nearly 31% of workers residing in Northern Kentucky possess a bachelor's degree or higher level of educational attainment; the figure for Kentucky and Ohio is 22% and 26%, respectively. At nearly 33%, educational attainment at the bachelor's degree and above level in the broader labor shed is even higher. Approximately 8% of Northern Kentucky resident workers possess an associate degree. This figure is nearly identical to the Kentucky, Ohio, and labor shed averages.

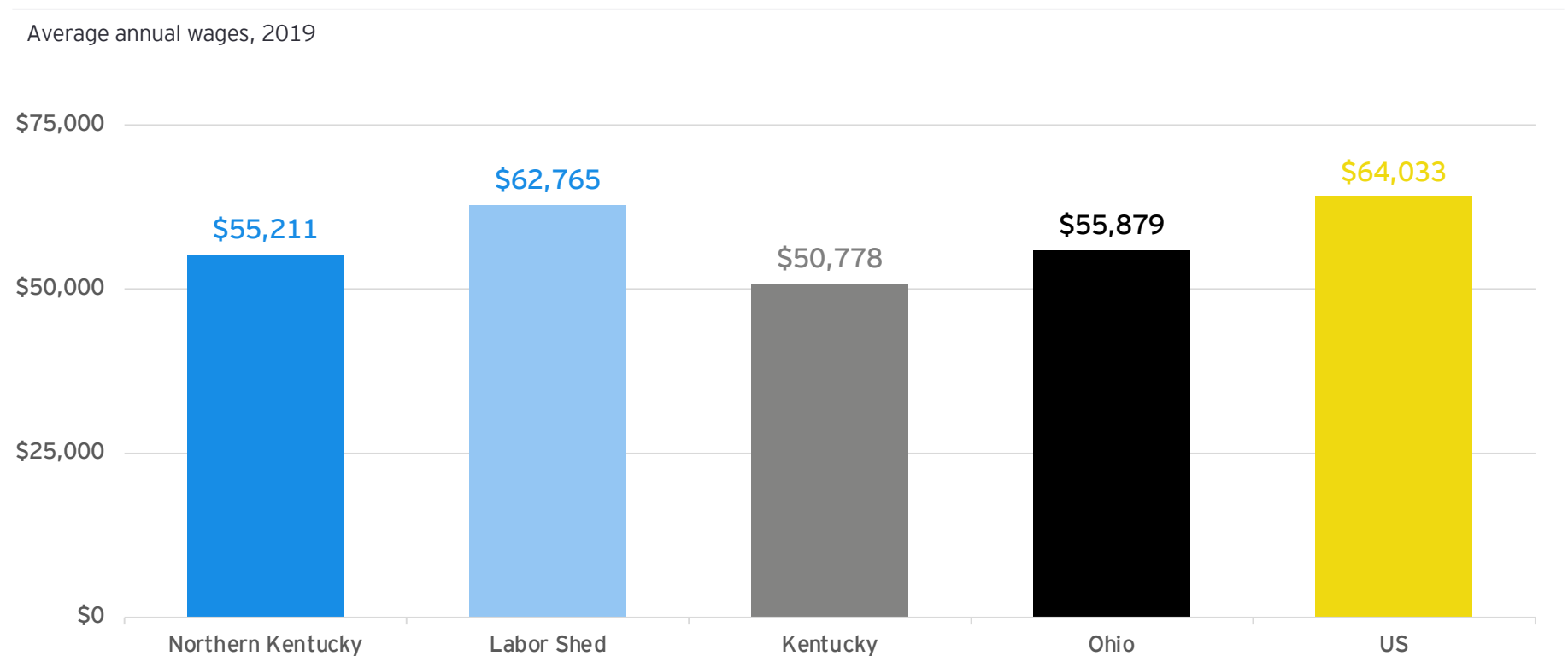
Educational Attainment Level (Among Residents Ages 18 years of age and older), 2019



Source: US Census Bureau

# Average Annual Wages

In 2019, the average wage for workers in Northern Kentucky was approximately \$55,000 annually. Average wages in Northern Kentucky are slightly less than the average of the broader labor shed (\$62,765), though this figure is skewed by high-wage employment within downtown Cincinnati. Average wages in Northern Kentucky exceed the statewide figure but remain less than the national average.



Source: EMSI

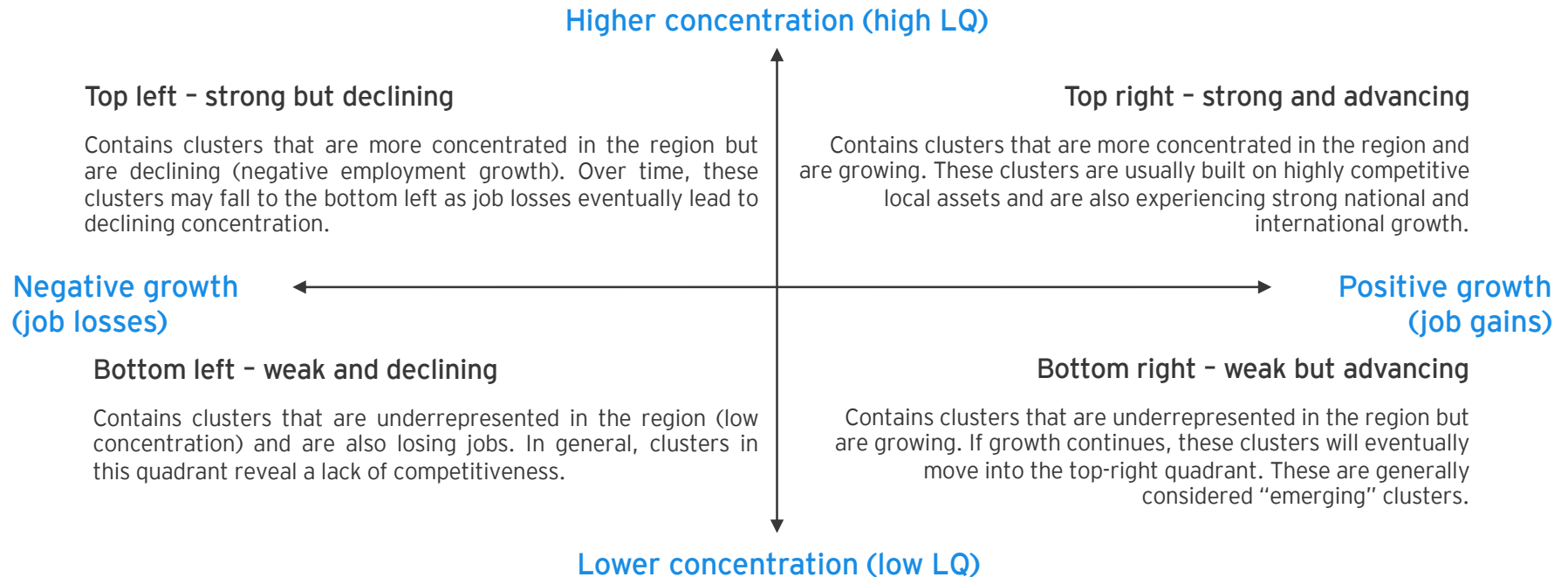
# 3 Industry and occupational cluster analysis





# Industry cluster analysis

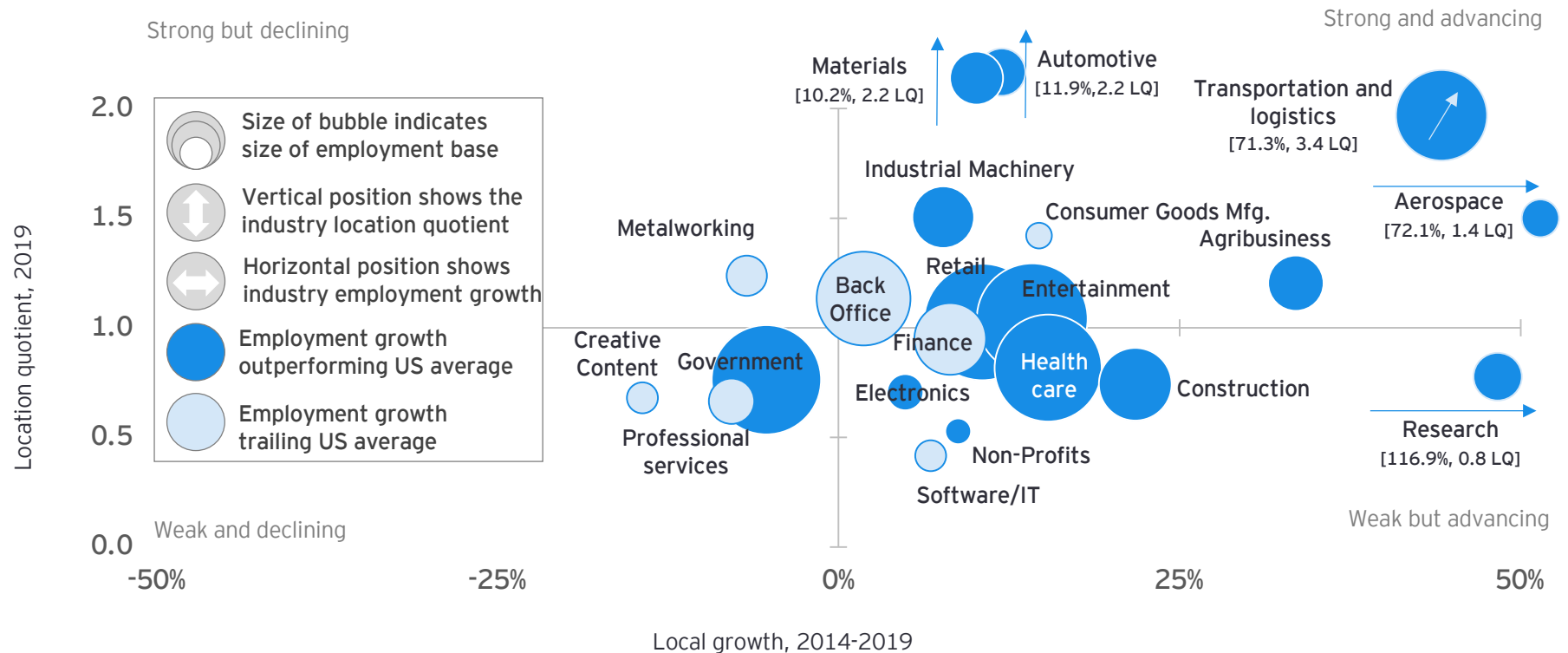
The chart on the following page combines location quotients (LQs), growth and relative size to illustrate a snapshot of Northern Kentucky's industry cluster performance. The analysis provides a more granular view of employment dynamics than traditional federal definitions (as seen in the preceding section). The horizontal axis displays employment growth of each cluster from 2014 through 2019. The vertical axis shows the LQ. An LQ is the ratio of local share of industry employment relative to the national share of industry employment. For example, an LQ greater than 1 indicates that local industry employment is greater than the US average. The size of each bubble indicates the number of local jobs in the cluster. Clusters can generally be grouped into four categories, as described in the map below.



# Industry composition

Between 2014 and 2019, a majority of industry clusters in Northern Kentucky posted employment growth. The rise of Transportation & Logistics in Northern Kentucky during this period is especially noteworthy. On a net basis, Northern Kentucky employment increased by approximately 23,500 between 2014 and 2019. Transportation & Logistics alone accounted for more than 40% of these jobs.

Northern Kentucky industry cluster analysis



Source: EMSI (only clusters with more than 950 jobs are shown).

# Industry composition, continued

Although recent employment growth in Northern Kentucky has been disproportionately fueled by **Transportation & Logistics**, the region's economy boasts several other notable strengths. **Transportation & Logistics** is the most relatively concentrated cluster in the region and has created the most jobs of any cluster on an absolute basis. Two smaller clusters, however, have enjoyed greater rates of growth. This includes **Research** (employment growth of more than 100% between 2014 and 2019) and **Biomedical** (85% growth). The **Aerospace** cluster, where employment increased by more than 70% between 2014 and 2019, has also enjoyed especially strong gains within Northern Kentucky.

Northern Kentucky industry cluster performance

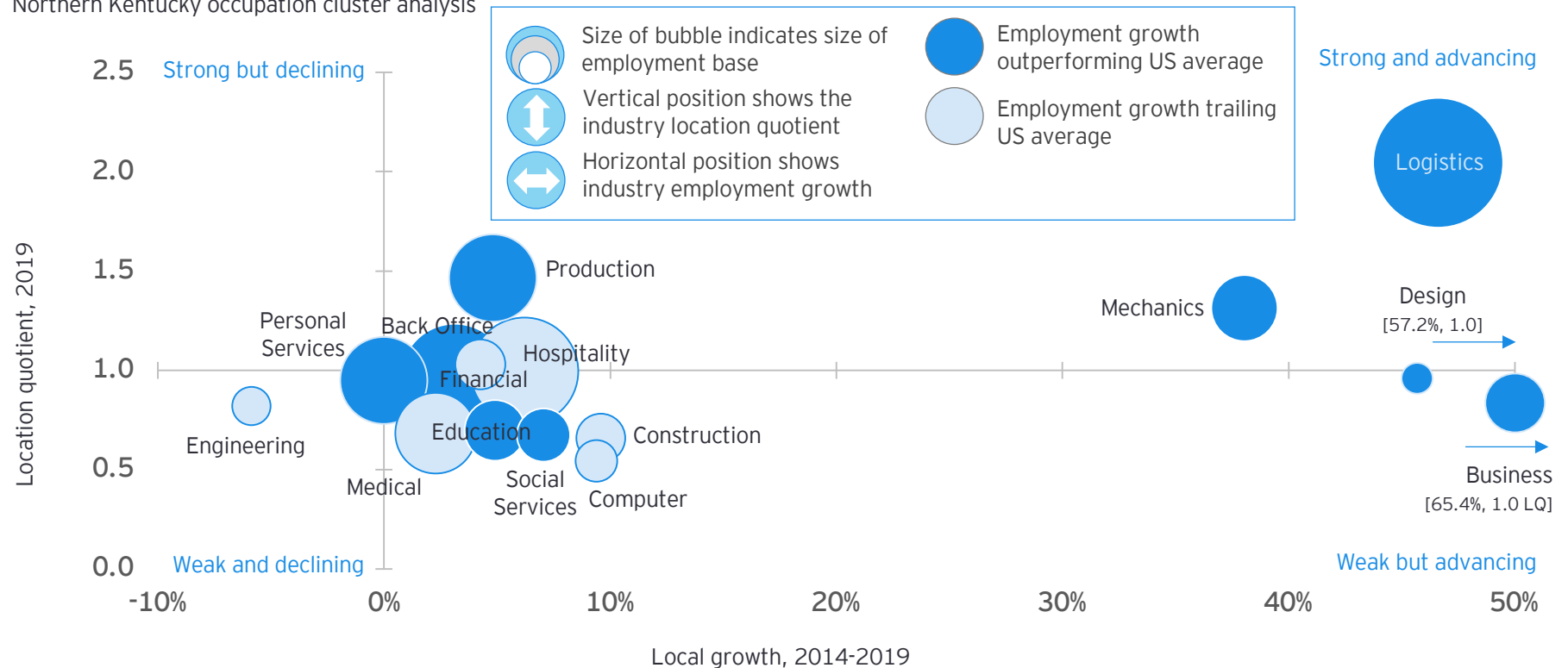
Cluster	Employment (2019)	Employment growth (2014-2019)	Location quotient (2019)	Cluster	Employment (2019)	Employment growth (2014-2019)	Location quotient (2019)
Aerospace	996	72.1%	1.4	Government	22,155	-6.4%	0.8
Agribusiness & Food	5,067	19.1%	1.2	Healthcare	21,258	6.4%	0.8
Apparel & Textiles	871	-3.5%	1.3	Higher Education	571	-14.1%	0.3
Automotive	4,062	0.0%	2.2	Industrial Machinery	6,361	1.2%	1.5
Back Office	16,348	3.1%	1.1	Materials	5,437	3.4%	2.2
Biomedical	558	84.8%	0.5	Metalworking	3,060	-16.7%	1.2
Construction	9,858	17.5%	0.7	Non-Profits	965	-20.8%	0.5
Consumer Goods Mfg.	1,265	10.8%	1.4	Professional Services	3,876	-10.0%	0.7
Creative Content	1,829	-18.4%	0.7	Research	2,449	101.1%	0.8
Education	642	3.3%	0.3	Retail	25,165	-1.9%	1.0
Electronics	2,045	-14.6%	0.7	Software / Info. Tech.	1,815	26.7%	0.4
Energy	666	-4.5%	0.4	Telecom Services	686	-4.8%	0.7
Entertainment	22,760	-5.3%	1.0	Transportation & Logistics	22,678	77.9%	3.2
Finance	9,583	3.0%	0.9	<b>TOTAL</b>	<b>193,750</b>	<b>13.8%</b>	
Furniture	404	46.4%	0.6				

Source: EMSI

# Occupation composition

Between 2014 and 2019, virtually every major occupational cluster in Northern Kentucky posted employment gains. The fastest growing occupational clusters in Northern Kentucky include Business, Design, and Logistics. The number of Northern Kentucky workers employed in each of these clusters increased by at least 45% between 2014 and 2019. Most other occupational clusters in the region posted comparatively modest employment gains during this period.

Northern Kentucky occupation cluster analysis



Source: EMSI (only clusters with more than 1,000 jobs are shown).

# Occupation composition

Notably, employment in virtually every occupational cluster within Northern Kentucky has experienced growth in recent years. Especially fast-growing occupational clusters include **Business**, **Design**, **Logistics**, and **Mechanics**. Employment in all four clusters increased by more than 35% between 2014 and 2019. The most concentrated occupational clusters in Northern Kentucky largely support the region's logistics and manufacturing industries. This includes **Logistics** employment, which is twice as concentrated in Northern Kentucky relative to the US average, as well as **Production** workers (50% more concentrated in Northern Kentucky) and **Mechanics** (30% more concentrated within the region).

## Northern Kentucky occupation cluster performance

Cluster	Employment (2019)	Employment growth (2014-2019)	Location quotient (2019)	Cluster	Employment (2019)	Employment growth (2014-2019)	Location quotient (2019)
Agriculture	273	13.2%	0.2	Legal	806	-2.1%	0.5
Architecture	200	23.1%	0.8	Logistics	37,835	46.6%	2.0
Back Office	26,090	3.1%	1.0	Math	124	15.0%	0.5
Business	6,896	61.4%	0.9	Mechanics	9,892	38.1%	1.3
Communications	231	9.7%	0.3	Medical	14,673	2.3%	0.7
Computer	3,954	9.4%	0.5	Performance	250	-55.5%	0.3
Construction	5,417	9.6%	0.7	Personal Services	17,051	0.0%	0.9
Design	1,197	57.2%	1.0	Plant Operators	593	231.1%	1.1
Education	8,337	4.9%	0.7	Political	178	88.9%	1.0
Engineering	3,361	-5.9%	0.8	Production	17,196	4.8%	1.5
Financial	5,670	4.3%	1.0	Sales & Marketing	944	22.7%	0.7
Geology	304	199.2%	0.9	Social Service	6,426	7.1%	0.7
Hospitality	25,960	6.2%	1.0	TOTAL	193,750	13.8%	

Sources: EMSI



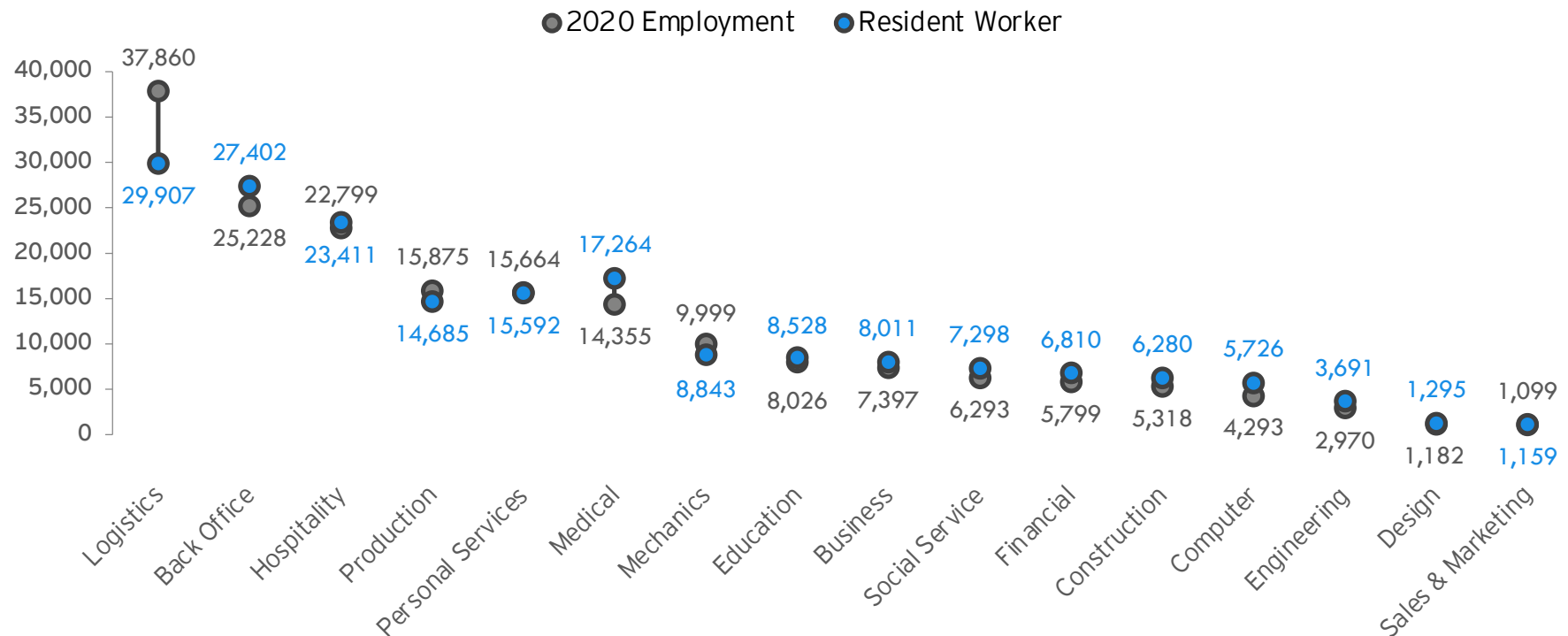
# 4 Talent flow analysis



# Occupation composition by worker origin

As highlighted earlier, Northern Kentucky is both an exporter and importer of talent. For occupations such as Logistics, Mechanics, and Production, Northern Kentucky has more jobs than residents employed in these fields. As such, the region relies on outside labor to fill some of these positions. In other occupations, Northern Kentucky is home to more talent than available employment opportunities. Examples include Computer, Engineering, Medical, and Financial occupations. As a result of the jobs-to-talent imbalance, many of these residents must commute outside of Northern Kentucky for employment.

Northern Kentucky employment versus resident workers

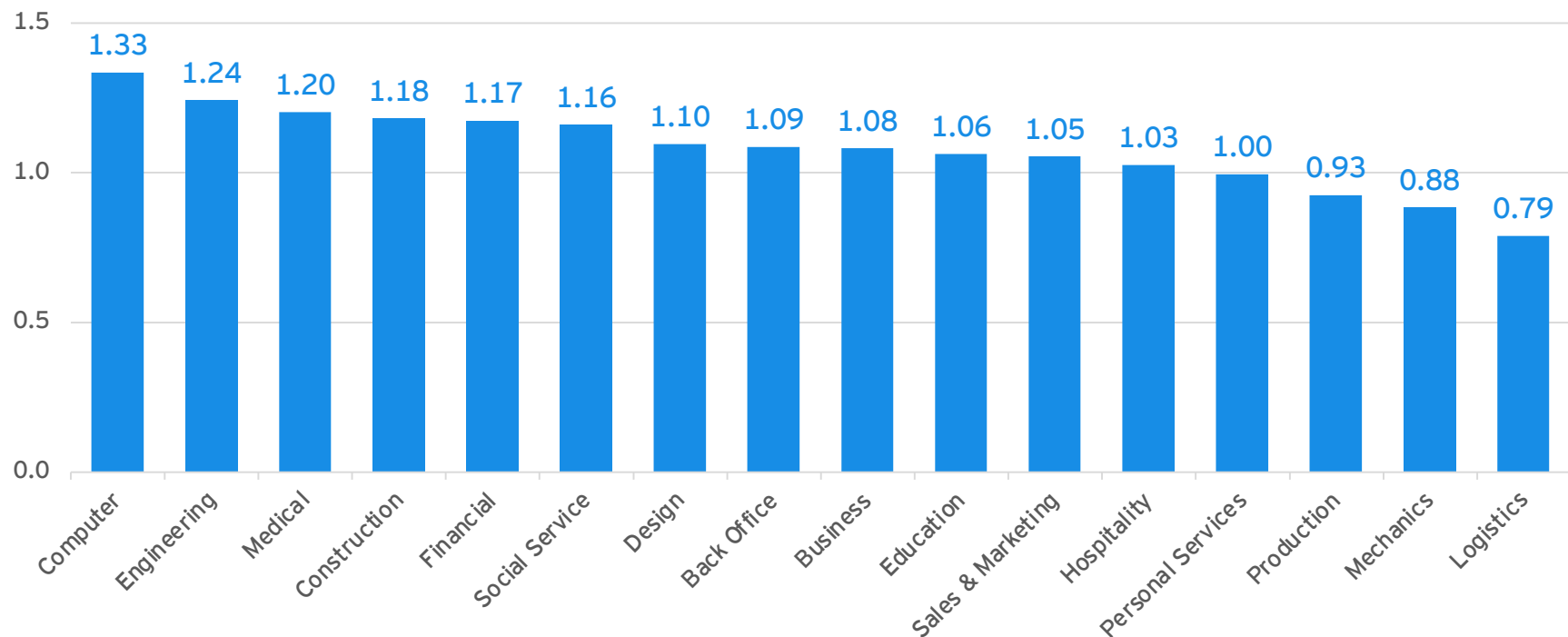


Source: EMSI (only occupations with at least 750 workers shown)

# Occupation composition, continued

The ratio of employment to resident workers by occupation can provide additional insights into Northern Kentucky's labor dynamics. Values of less than 1 reflect occupations for which the region is a net importer of talent. Values that exceed 1 indicate occupations for which Northern Kentucky is a net exporter of talent. For example, there are approximately 30% more Northern Kentucky residents working in Computer occupations compared to the total number of Computer jobs within the region. On a proportional basis, occupations exporting the greatest levels of talent in Northern Kentucky's labor include Engineering, Medical, and Financial positions.

Northern Kentucky ratio of resident workers to employment, 2019

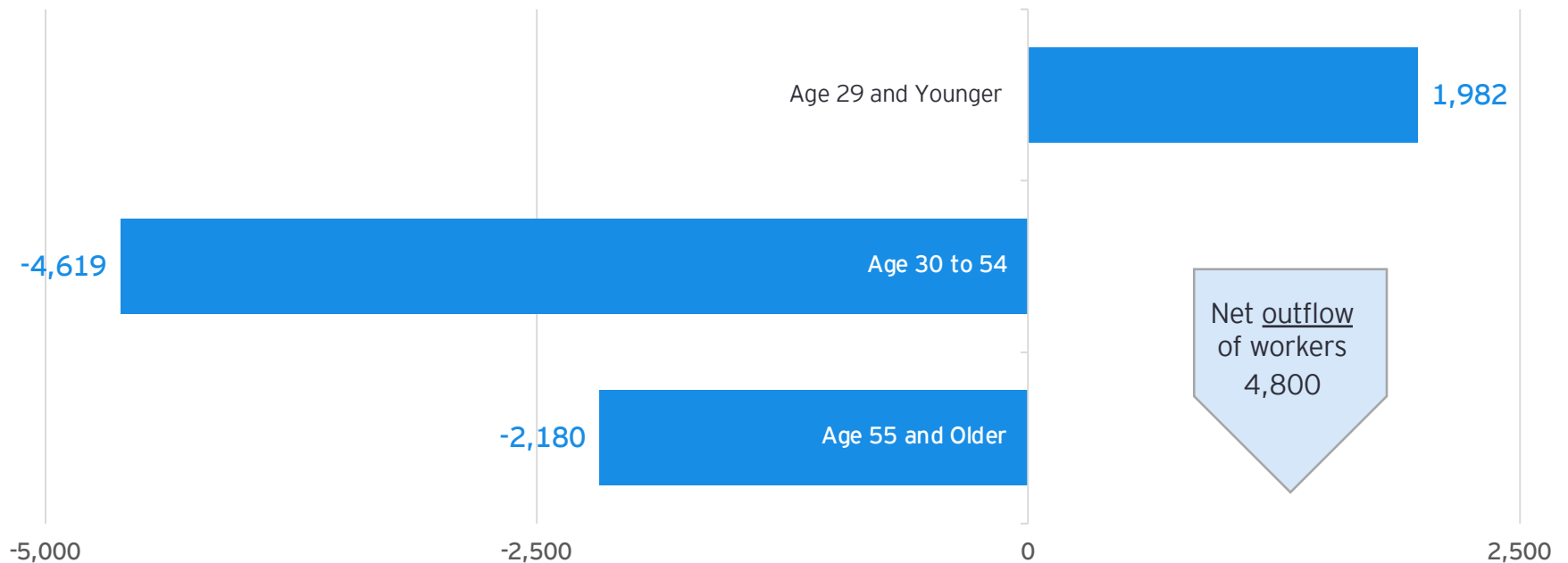


Source: EMSI

# Net inflow of workers by age

Northern Kentucky tends to import younger workers and export older workers. In 2018, for example, there were nearly 2,000 more workers aged 29 and younger employed in Northern Kentucky compared to the number of employed residents aged 29 and younger residing in the region. Conversely, Northern Kentucky exports thousands of workers aged 30 years and older.

Net inflow of workers into Northern Kentucky by age, 2018

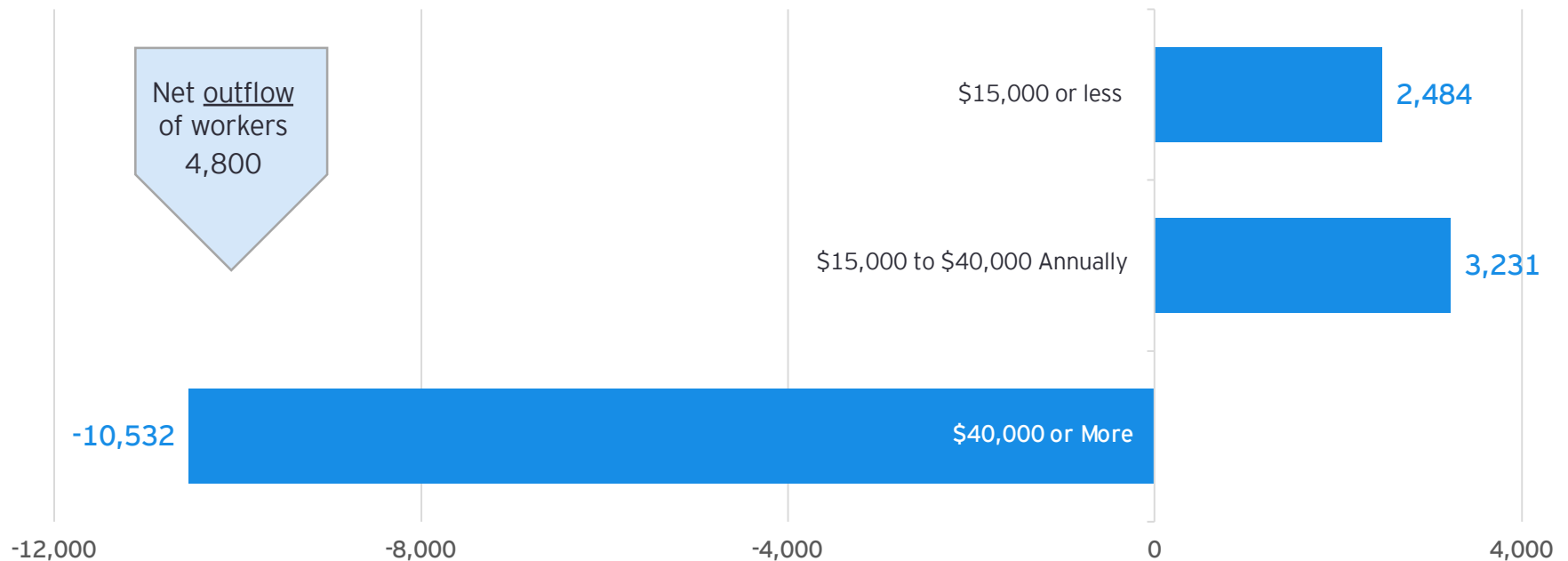


Source: US Census Bureau

# Net inflow of workers by earnings

Given the labor flows into and out of Northern Kentucky by age, it is perhaps unsurprising that the region tends to export higher earners. On a net basis, Northern Kentucky is an importer of workers making \$40,000 or less annually at their primary job. Conversely, on a net basis, Northern Kentucky is a net exporter of workers making \$40,000 or more per year. Specifically, Northern Kentucky is home to approximately 10,500 more employed residents earning at least \$40,000 annually compared to the number of individuals working in the region whose earnings exceed this threshold.

Net inflow of workers into Northern Kentucky by earnings, 2018



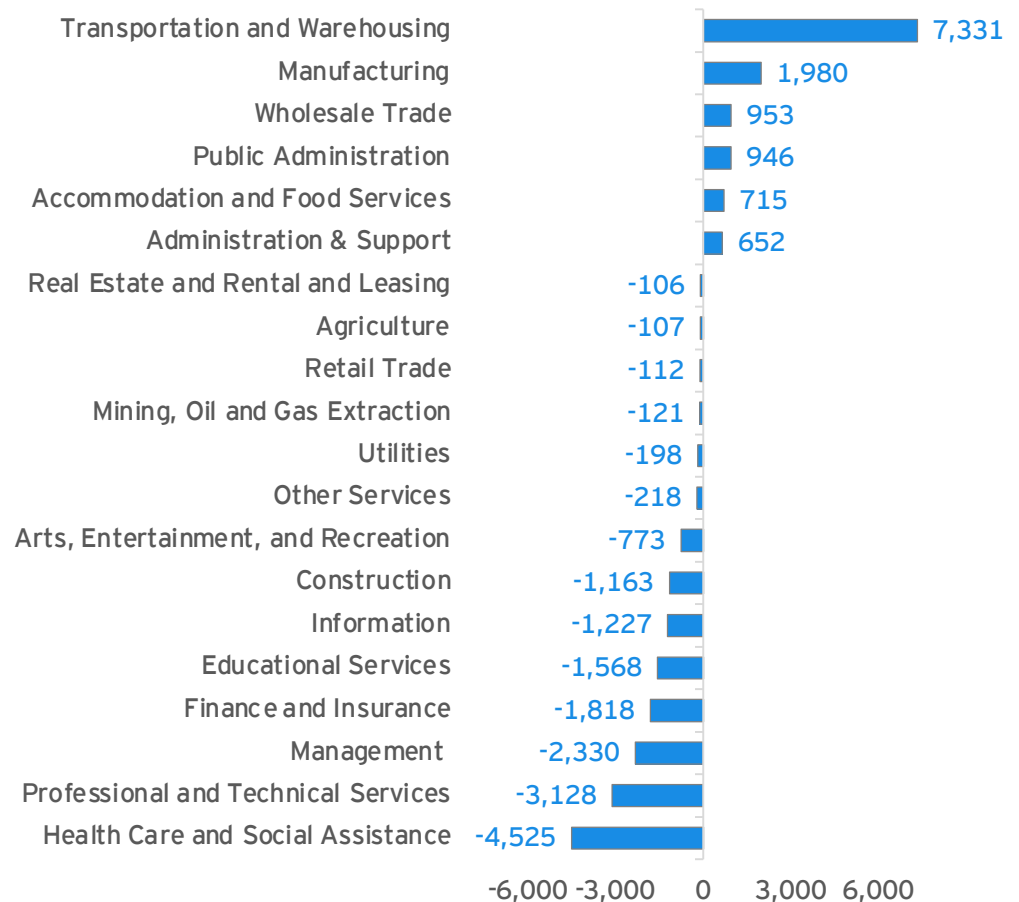
Source: US Census Bureau

# Net inflow of workers by industry

The net flow of workers into and out of Northern Kentucky varies widely by industry. The region tends to import workers in industries characterized by limited educational attainment requirements. This includes Transportation and Warehousing, Manufacturing, and Accommodation and Food Services. Northern Kentucky is especially dependent on imported talent to support its Transportation and Warehousing sector.

In other sectors, however, Northern Kentucky exports a significant level of talent. In general, these industries tend to feature higher-paying positions with advanced educational requirement. For example, Northern Kentucky is home to 4,525 more workers employed in the Health Care and Social Assistance industry compared to the total number of Health Care and Social Assistance jobs located within in the region. Other major industries in which Northern Kentucky is an exporter of talent includes Professional Services, Management, Finance, and Information.

Net inflow of workers into Northern Kentucky by industry composition, 2018



Source: US Census Bureau



# 5 Target Industry Selection

A close-up photograph of a female scientist in a laboratory setting. She is wearing a white lab coat, a blue surgical mask, and clear safety goggles. Her hair is tied back. She is holding a test tube with a yellow liquid in her right hand, and another test tube with a yellow liquid is visible in her left hand. The background is slightly blurred, showing other laboratory equipment and a purple container. The overall tone is professional and scientific.

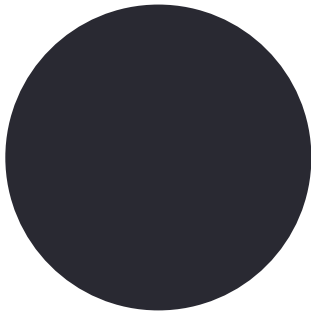
# Cluster evaluation and selection

Target cluster selection is an iterative process that integrates quantitative and qualitative information. Through a combination of data analysis and local insights, target clusters and supporting niche sectors are identified and tailored to each community's needs and opportunities.

Target cluster selection is driven by four primary questions that serve as filters in the selection process:

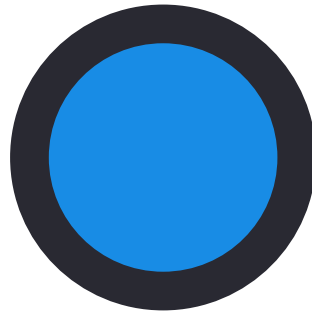
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## Target selection process



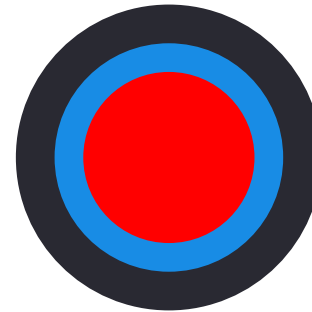
1. What is the regional and national growth trajectory of the cluster?

*Examining growth trends helps understand if the target cluster will continue to grow and create opportunities throughout Northern Kentucky.*



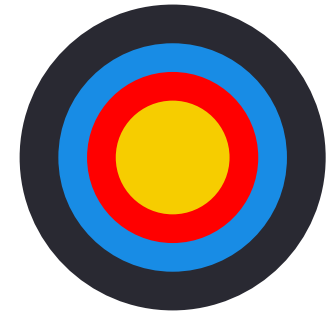
2. What clusters have an existing local/regional presence?

*Clusters with an existing concentration in the region reflect local competitive strengths and present some of the best opportunities for expansion, recruitment, and startup growth.*



3. Which clusters are best positioned to leverage the region's assets in the face of industry change?

*The ability of regional assets to support cluster ecosystems and expanded activity is a critical factor in the cluster selection process.*



4. Which clusters align with the region's aspirations?

*Cluster strategies can only be successful if they reflect local goals and values.*

# National economic overview

In the immediate years before the pandemic, much of the country's employment gains were propelled by just four industry clusters—Healthcare, Transportation & Logistics, Entertainment, and Construction. Between 2014 and 2019, these four clusters were responsible for nearly 60% of all US employment growth. The gains of both Healthcare and Transportation & Logistics proved especially impressive. Collectively, these two clusters accounted for more than 3.2 million new jobs between 2014 and 2019. The two other leading sources of job growth between 2014 and 2019—Entertainment and Construction—were both locally serving clusters ultimately dependent on gains in other sectors. Other notable sources of employment growth during this period include Software/IT, Back Office, Finance, Research and Professional Services.

Many manufacturing sectors also experienced employment growth prior to the pandemic. In absolute terms, employment gains have been largely driven by Agribusiness & Food, Automotive, and Industrial Machinery. Collectively, these clusters contributed to nearly half of all manufacturing job gains between 2014 and 2019. Other sources of manufacturing employment growth includes Aerospace, Materials, and Consumer Goods.

## Potential target industries

Aerospace	Agribusiness & Food	Apparel & Textiles	Automotive	Back Office	Biomedical
Construction	Consumer Goods Mfg.	Creative Content	Education	Electronics	Energy
Entertainment	Finance	Furniture Mfg.	Government	Healthcare	Higher Education
Industrial Machinery	Materials	Metalworking	Mining & Logging	Non-Profits	Professional Services
Research	Retail	Shipbuilding	Software/IT	Telecom Services	Transportation & Logistics
Growing nationally, export oriented, location agnostic			Declining nationally or locally serving or location specific		

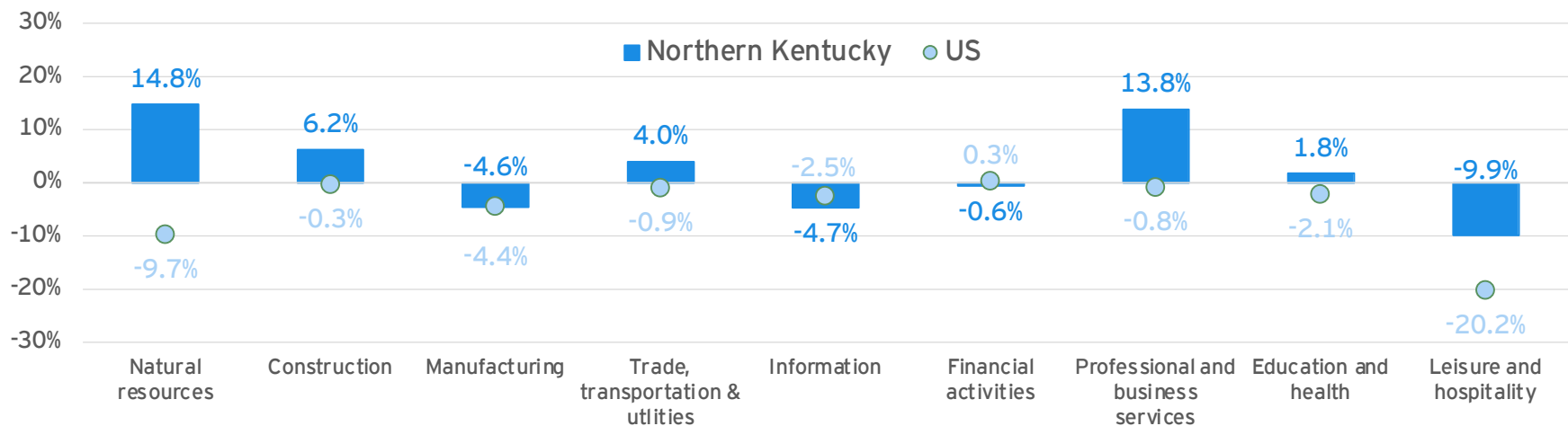
# National economic overview, continued

The global pandemic resulted in an unprecedented disruption to the US economy. Within the first six months of 2020, millions of American workers lost their jobs. The national unemployment rate soared to nearly 15%. The most severe depths of the economic downturn, however, proved relatively short-lived. The National Bureau for Economic Research—the official arbiter of recessions—ultimately determined that the 2020 recession was the shortest on record.

Given the dramatic ups and downs of the past two years, the following analysis largely explores employment trends among individual clusters between 2014 and 2019. While this longer-term examination emphasizes trends that are likely to shape our economy for years to come, the immediate havoc wrecked upon the national and global economy cannot be ignored.

In general, employment in Northern Kentucky has proven more resilient during the pandemic relative to the national economy. Between March 2019 and March 2021, total private employment in the US declined by 4%. In contrast, Northern Kentucky experienced private sector employment gains during this period (though regional employment remains below 2020 levels). Regionally, just **three major employment areas experienced notable employment losses—manufacturing, information, and leisure and hospitality**. Private manufacturing employment in Northern Kentucky remains approximately 4% less than 2019 levels. Private leisure and hospitality in the region is 10% less than pre-pandemic levels.

Private-sector employment change, March 2019 - March 2021



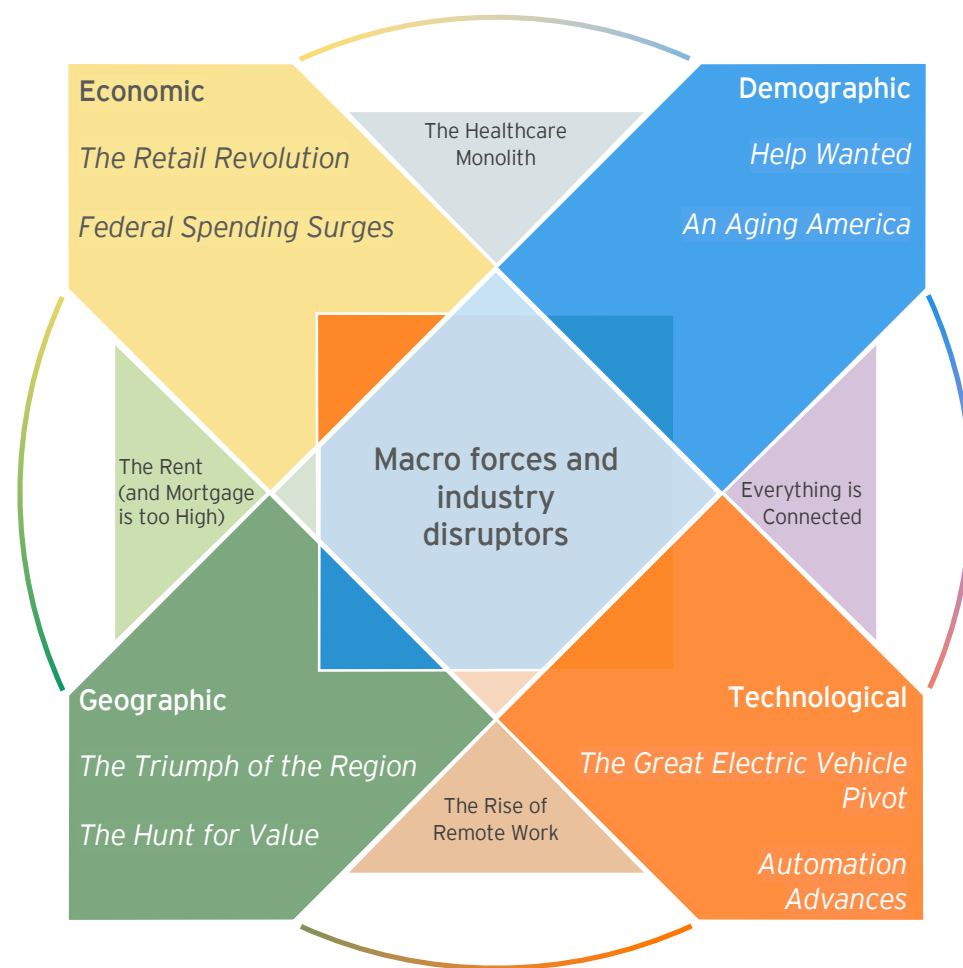
Source: Bureau of Labor Statistics

# Macro forces and industry disruptors

As disruptive as the pandemic has been, in many ways it simply accelerated pre-existing trends. This dynamic underscores the power and importance of macro forces and industry disruptors. In the years ahead, the ability of communities to support specific target industries will be determined in large part by these same macro forces and industry disruptors. The aging of the US population, for example, will help create new opportunities in the life sciences and other aligned sectors that support human health. Realizing the potential of these possibilities, however, will require nuanced retention and recruitment strategies that align elements such as talent production, workforce development, and infrastructure investment with industry need. As this example demonstrates, the local response to macro forces and industry disruptors will be critical in advancing economic vibrancy.

Of the twelve macro forces and industry disruptors, eight are grouped into one of four categories—economic, demographic, technological, geographic. While these four categories represent the primary drivers of change, they are also deeply intertwined with one another. The rise of remote work for example, represents the convergence of technological innovation as well as a fundamental disruption to the geographic nature of work. In an acknowledgement that entirely new dynamics often lie at the junction of disruptors, we also include profiles on four “convergence” forces.

Ultimately, the macro forces and disruptors examined in the following pages pose significant risks for both individual companies as well as entire industries. At the same time, however, rapidly evolving competitive environments will create entirely new markets. Communities that can help firms navigate these macro forces and industry disruptors will be best-positioned to thrive in the years ahead.



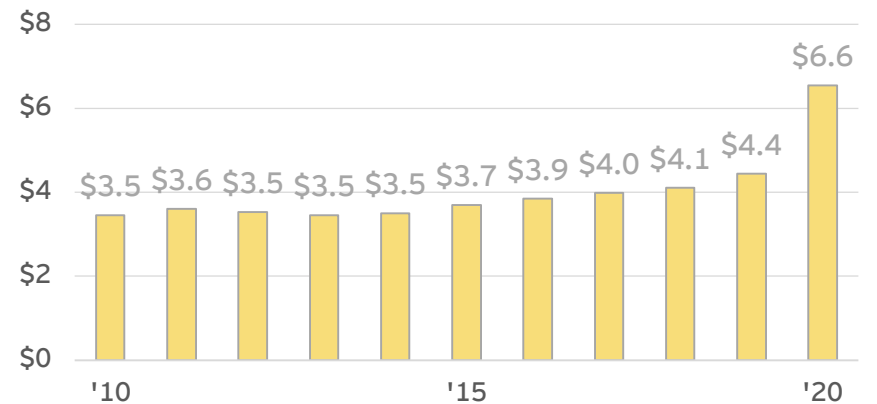
# Macro forces and industry disruptors - Economic

## ECONOMIC

*Federal Spending Surges* - The global health pandemic spurred a massive increase in federal spending. Elevated levels of federal spending are likely to be sustained in the years ahead as current US political leadership looks to boost investment in a host of areas. The recently passed infrastructure bill, for example, encompasses \$1.2 trillion in spending on roadways, bridges, and internet access. Other proposed programs, including the US Innovation and Competition Act, may provide billions of dollars in new funding for technologies critical to national security including semiconductor manufacturing and artificial intelligence. If they become reality, these initiatives promise to serve as engines of local job growth for years to come.

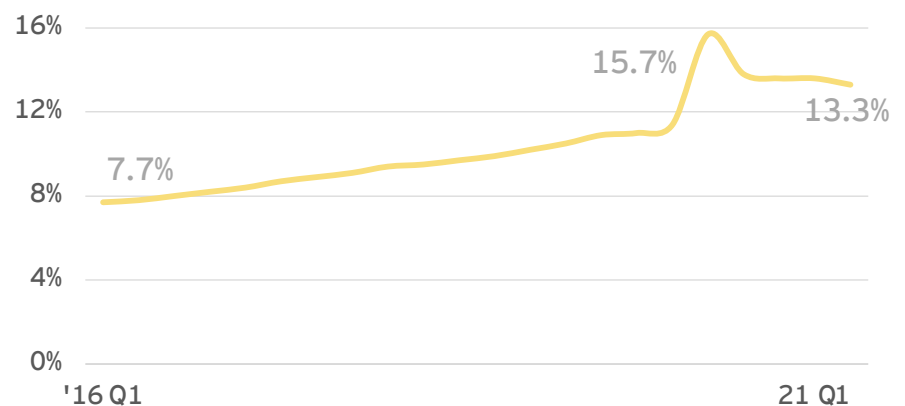
*The Retail Revolution* - While online shopping has steadily increased during the past decade, e-commerce activity sharply accelerated at the onset of the pandemic. Despite strong growth, however, there remains significant room for additional gains—more than 85% of all retail sales still occur at physical locations. The continued migration of retail dollars to online platforms is likely to require sustained spending on supporting infrastructure such as fulfillment centers and air cargo facilities. At the same time, much of the country's existing retail infrastructure such as the traditional shopping center may no longer be viable. Repurposing old enclosed malls, for example, is likely to become a more frequent topic of local redevelopment activities.

US federal government outlays (in trillions)



Source: White House

Online sales as share of total retail sales



Source: US Census Bureau

# Macro forces and industry disruptors - Demographic

## DEMOGRAPHIC

*Help Wanted* - During the initial months of COVID-19, US employers shed millions of jobs as consumer demand collapsed in the face of a rapidly spreading pandemic. By 2021, however, the surplus of labor had been replaced by a dearth of talent. As the economy has gradually reopened, the availability of workers has emerged as a significant obstacle for many employers. During the summer of 2021, for example, there were a record 10 million job openings in the US. Despite hopes that worker shortages would lessen as school resumed, daycare became more widely available/dependable and enhanced unemployment benefits ended, labor availability continues to be a challenge.

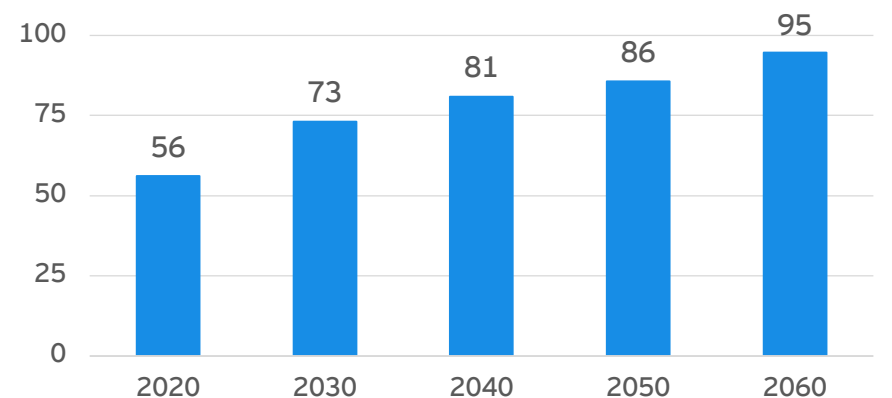
Monthly job openings (in millions, seasonally adjusted)



Source: Bureau of Labor Statistics

*An Aging America* - More than 10,000 Baby Boomers turn 65 every day, a dynamic that reflects the overall aging of the US population. This 'silver tsunami' will have two substantial impacts on the US workforce in coming years. Perhaps most visibly, a rapidly aging population will contribute to continued growth in the healthcare industry and other sectors that disproportionately serve the elderly (see the *Healthcare Monolith* for more details). At the same time, other industries such as manufacturing that are characterized by a relatively older workforce are likely to experience a significant exodus of workers in the decades ahead. Both dynamics have significant implications for future workforce development efforts.

Projections of US population age 65 and older (in millions)



Source: US Census Bureau



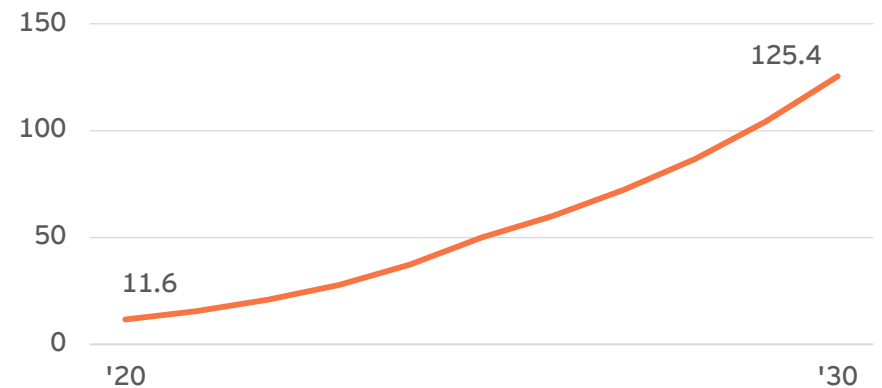
# Macro forces and industry disruptors - Technological

## TECHNOLOGICAL

*The Great Electric Vehicle Pivot* - A century after Henry Ford revolutionized personal transportation with the introduction of the assembly line, the automobile industry is on the verge of another seismic change—electrification. While electric vehicles currently represent just a tiny fraction of automobiles sold each year, this figure is expected to rise substantially in the coming decade. As a result, automakers are racing to pivot from the internal combustion engine to electric drivetrains. The transition has enormous implications for the automobile supply chain and the communities that support these suppliers. Electric vehicles, for example, have far fewer parts than traditional automobiles. At the same time, increased demand for batteries and other electric motor technologies may help offset these declines. Helping local automotive suppliers transition to these new technologies is likely to emerge as a pressing task for many communities in the coming years.

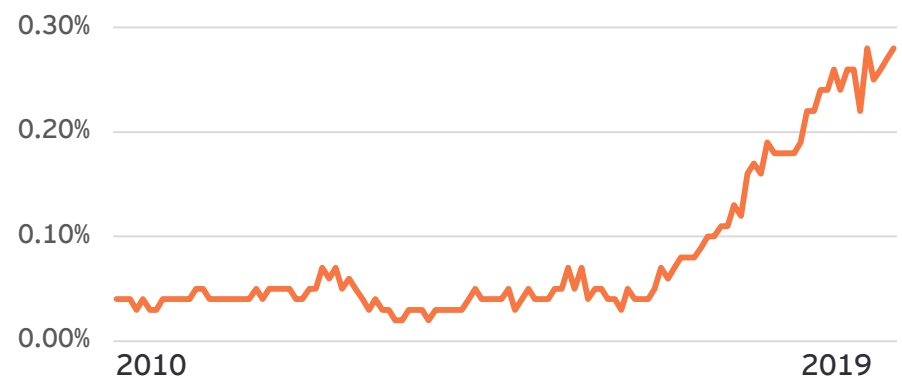
*Automation Advances* - Technologies that automate functions currently performed by workers promise to fundamentally transform the labor market. In professions such as accounting and other business services, advanced digital processes such as artificial intelligence and machine learning may increasingly displace human labor. In other industries such as logistics and distribution, increasingly sophisticated robotics may take the place of existing workers. Already, Amazon utilizes approximately 350,000 robots in its existing fulfillment centers globally. At the same time, automation is also contributing to growth in aligned occupations. According to projections by the Bureau of Labor Statistics, for example, statisticians and data scientists will be among the 10 fastest growing jobs through the end of the decade.

Projected electric vehicle production (millions of units)



Source: International Energy Agency

AI Job Postings as Share of Total Online Job Postings



Source: Stanford Artificial Intelligence Index, Burning Glass

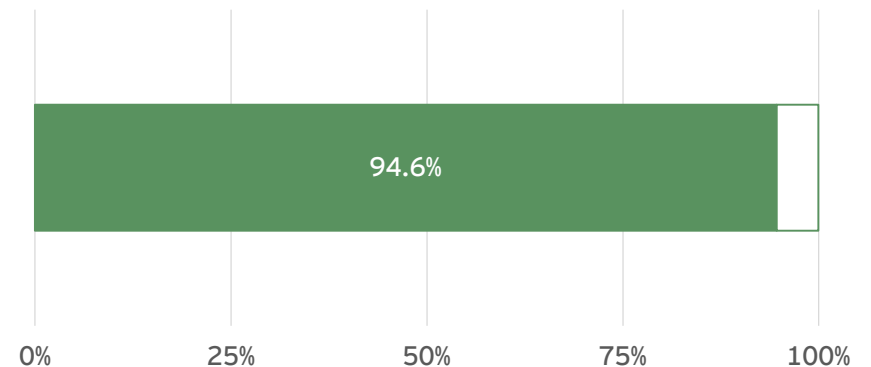
# Macro forces and industry disruptors - Geographic

## GEOGRAPHIIC

*The Triumph of the Region* - During much of the 20th century, one of the dominant themes of US economic development was the convergence of prosperity. Broadly speaking, American dynamism was fueled by both urban industrial centers and rural agricultural-based communities. In recent decades, however, virtually all domestic employment growth and population growth have been captured by metropolitan areas. Although these regions are typically anchored by a traditional urban core, growth is often propelled by outlying suburban communities. In the most dynamic metropolitan areas, individual communities collaborate to promote their collective strengths while also coordinating policy development to ensure that regional issues such as transportation are effectively managed.

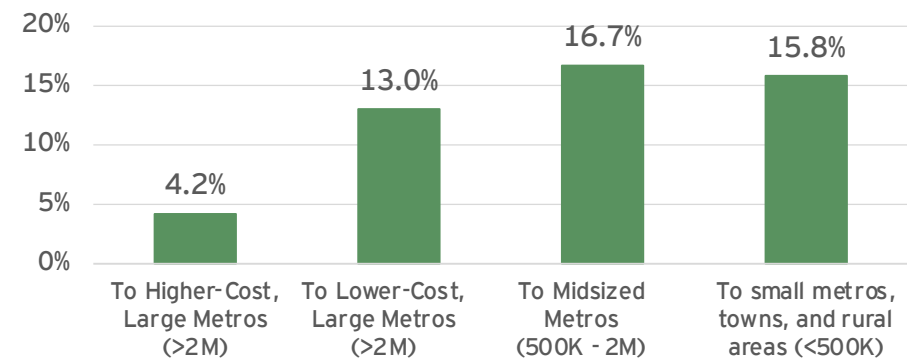
*The Hunt for Value* - Although metropolitan areas have largely outperformed rural areas in recent years, a select number of regions have enjoyed especially strong employment gains. Regional success in places such as Austin and Denver, however, has fueled escalating housing costs and increasingly congested roadways. Despite these issues, however, these regions remained attractive due to the abundance of economic opportunity they offered current and prospective residents. The pandemic—and the dramatic rise in telecommuting it helped unleash—may have permanently changed this equation. Migration from high-cost, large metropolitan areas to smaller and lower-cost locales, for example, increased significantly during the first year of the pandemic. While it remains to be seen if this trend proves permanent, the dominance of “rock star” metros is no longer assured.

Metropolitan employment growth as percentage of US total, 2004 - 2019



Source: EMSI

Estimated change in migration from high-cost, large metros during pandemic (2020 Q2 - 2021 Q2)



Source: Federal Reserve Bank of New York

# Macro forces and industry disruptors - Convergence

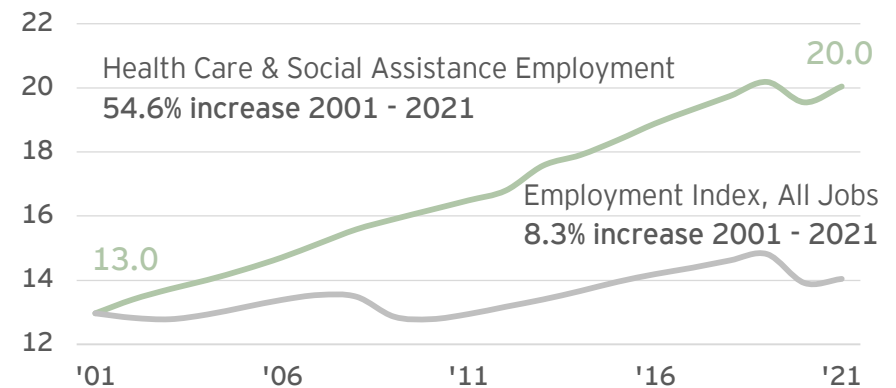
## ECONOMIC X DEMOGRAPHIC

*The Healthcare Monolith* - Pandemic aside, the Health Care industry is seemingly immune to the dynamics of the broader economy. During boom times, health care employment rises. During downturns, the healthcare industry keeps adding jobs. With the average lifespan of Americans continuing to rise, significant increases in health care employment are virtually assured in the years ahead. The need for support services for a growing elderly population will fuel demand in specific health care occupations. An increased elderly population, for example, will require more nurse practitioners, personal care aides, and physician assistants. Already, the federal government projects that healthcare professions will represent 6 of the 10 fastest growing during the next decade.

## DEMOGRAPHIC X TECHNOLOGICAL

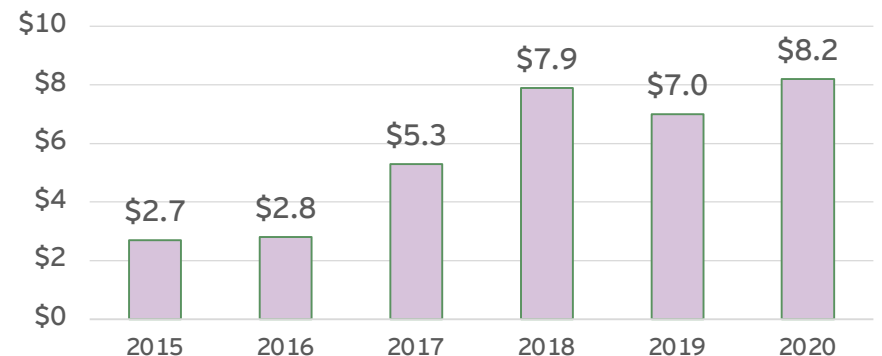
*Everything Is Connected* - Historically, talk of automation has often focused on the risk of worker displacement. The pandemic and resulting labor shortages, however, highlight that the two-way nature of the relationship between automation and workers. With talent scarce, employers are increasingly embracing automation technologies. Mass deployment of these systems is also helping fuel the emergence of an increasingly powerful Internet of Things (IoT) ecosystem in which many devices are connected via the internet. In an era in which nearly any activity can be measured, advances in predictive analytics, competencies in aligned areas such as machine learning, artificial intelligence, and cybersecurity will be increasingly necessary to help us make sense of the data generated by our environment and securely store it. IoT technologies are also likely to become increasingly vital to a host of industries from manufacturing to logistics. Mass deployment of autonomous vehicles, for example, is likely to require that cars communicate with one another as well as the built environment.

US employment growth (in millions)



Source: Bureau of Labor Statistics

Internet of things venture capital funding (in billions)



Source: Pitchbook

# Macro forces and industry disruptors - Convergence

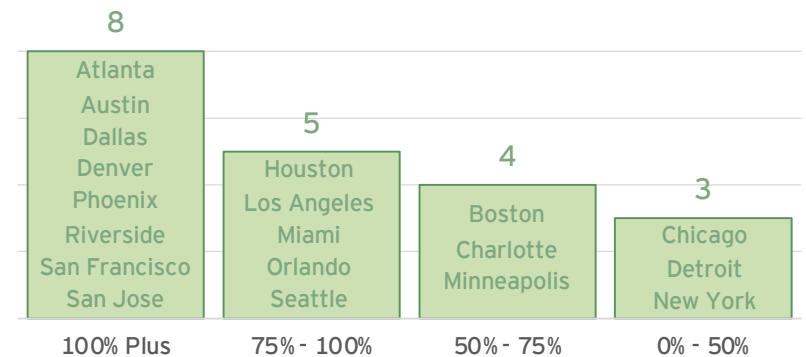
## GEOGRAPHIC X ECONOMIC

*The Rent (and Mortgage) is Too Darn High* - In the decade prior to the pandemic, 20 metropolitan areas accounted for half of all employment gains nationally. Such concentrated job growth produced a sharp rise in home prices in many of these regions. While locales such as San Francisco and San Jose have long wrestled with issues around housing affordability, the issue now impacts many traditionally affordable regions. In Denver, for example, median home values jumped by more than 150% during the past decade. Meanwhile, average annual wages in the region rose by less than 50%. As a result of these twin dynamics, a growing number of prospective home buyers risk being permanently priced out of the market.

## TECHNOLOGICAL X GEOGRAPHIC

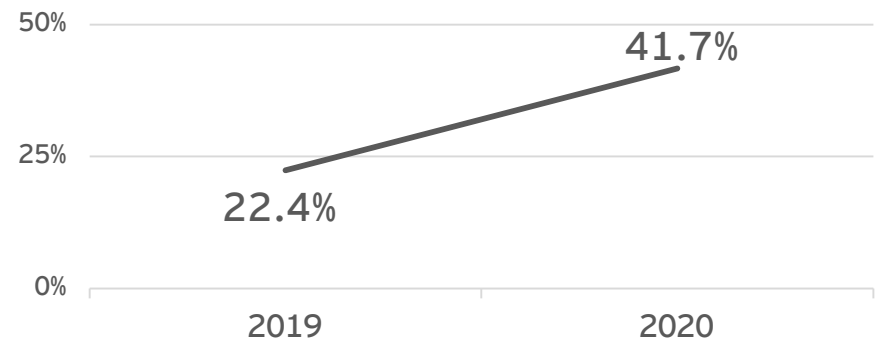
*The Rise of Remote Work* - The COVID pandemic produced a massive increase in the proportion of Americans telecommuting to their place of employment. Though it remains to be seen how durable this shift might be, remote work is almost certain to be a much more common behavior than it was prior to the pandemic. The rise of remote work has substantial implications for communities throughout the country. For the past 20 years, the proportion of Americans who moved in any given year has steadily fallen. If a growing number of workers have the option of living anywhere, this trend may finally reverse itself. As highlighted earlier, there is already some evidence that this dynamic has benefited rural, more affordable locales. At the same time, the prospect of reduced demand for office space represents a significant threat to the economic vibrancy and fiscal health of more urban locations.

Change in median home value from 2009 to 2020  
among 20 metros with greatest job growth from 2009 to 2019



Source: EMSI, National Association of Realtors

Percentage of employed persons who work at home on an average day  
(averages for May to December)



Source: Bureau of Labor Statistics

# Cluster evaluation and selection

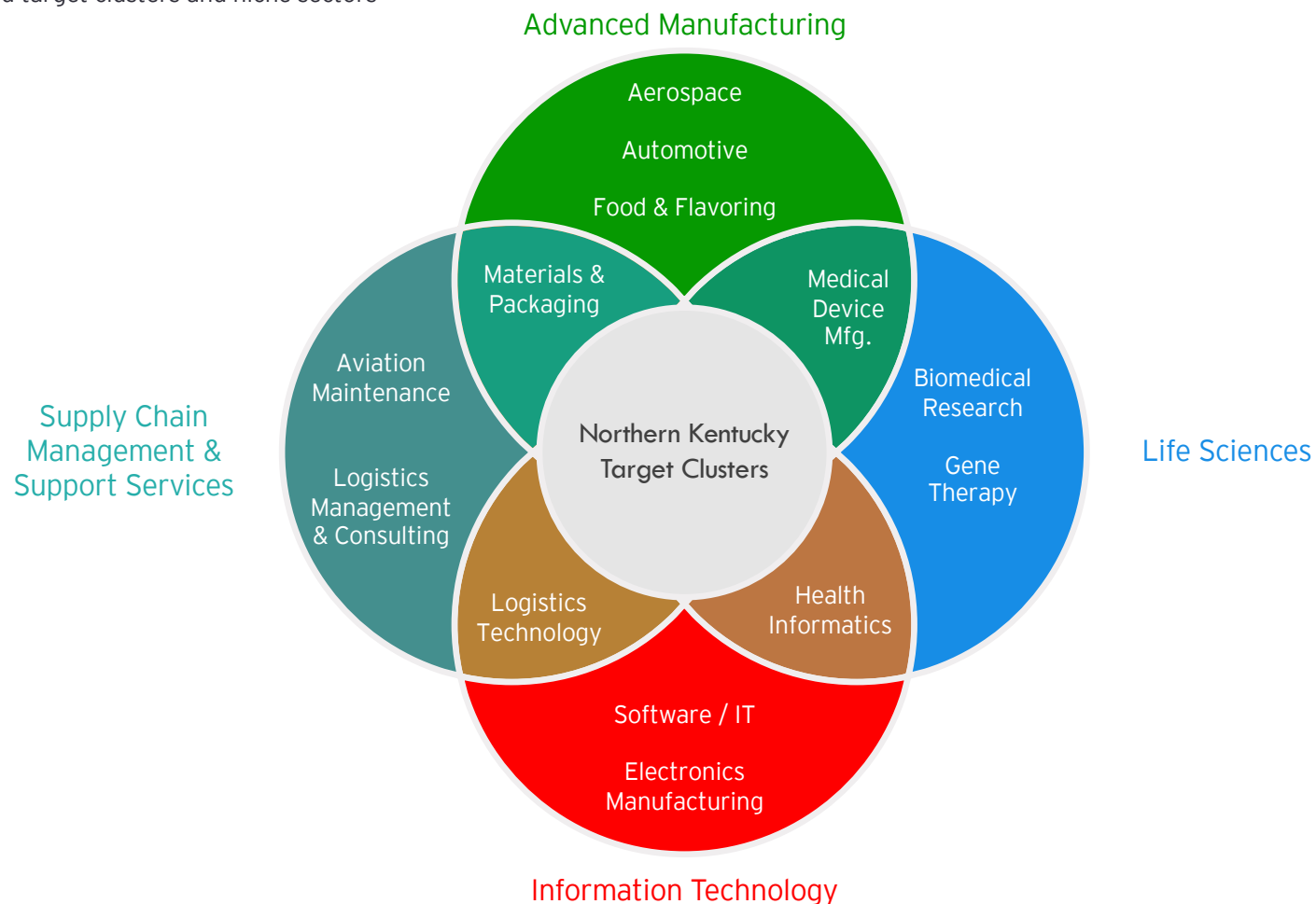
Following the review and selection process outlined in this report, the following four target clusters are recommended for future economic development efforts in Northern Kentucky—Advanced Manufacturing, Life Sciences, Information Technology, and Supply Chain Management & Support Services. Also, all four target industries not only experienced steady employment gains in the five years prior to the pandemic, but regional employment growth outpaced the national average. The selected target industries are also characterized by relatively high wages. Many of these industries also tend to employ workers in occupations for which the region is currently exporting talent to neighboring jurisdictions.



# Niche target clusters

Each target contains several niche clusters. At the same time, multiple target clusters share overlapping competencies and competitive assets. As a result, individual niche sectors may lie at the intersection of broader target clusters. Medical device manufacturing, for example, leverages the region's production prowess with its emerging life sciences strengths.

Recommended target clusters and niche sectors





# 6 Target Cluster Profiles



# Advanced Manufacturing

## About the industry

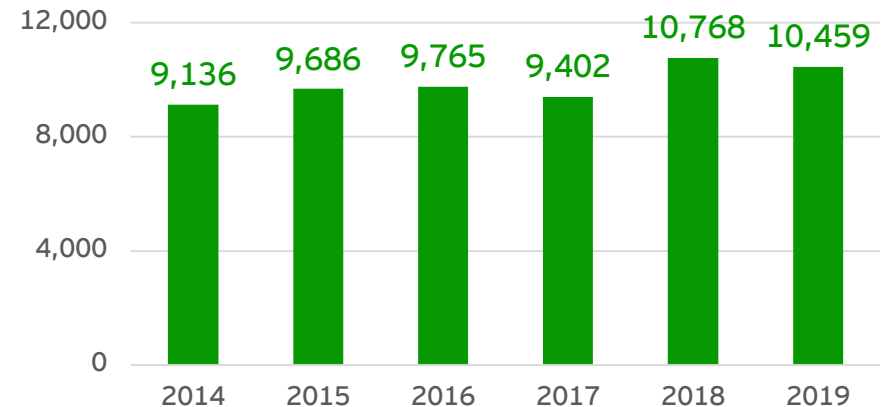
Advanced Manufacturing involves the transformation of raw materials into components and finished products. Advanced Manufacturing is among the most heavily recruited industrial sectors thanks to its capital-intensive nature and its ability to support high-wage employment opportunities. As a result, large-scale Advanced Manufacturing projects often command substantial incentive packages when exploring new locations.

Incentives alone, however, are not typically sufficient to secure Advanced Manufacturing operations. Many facilities have substantial site infrastructure and labor requirements. Access to abundant, competitively priced labor is critical. Proximity to infrastructure such as interstates, seaport, cargo airports, and/or rail lines are also important in connecting Advanced Manufacturing firms to customers, suppliers, and raw materials. Other important considerations include access to reliable and affordable energy supplies and the capacity of water and wastewater systems.

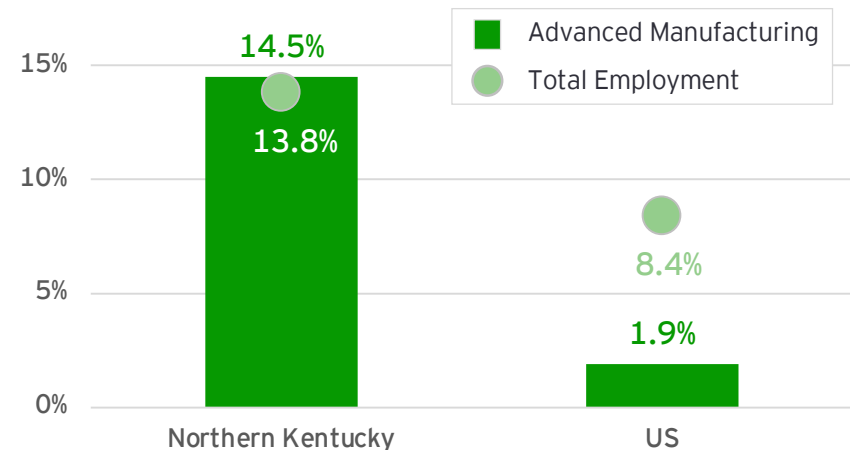
## Employment trends

The Advanced Manufacturing cluster employs approximately 3.4 million workers. Although employment growth has trailed the US average during the past five years, the industry's national performance obscures the gains enjoyed by many individual communities. In Northern Kentucky, for example, between 2014 and 2019 Advanced Manufacturing's employment growth rate exceed the regional average.

Northern Kentucky Advanced Manufacturing employment growth, 2014 - 2019



Employment growth, 2014 - 2019



Sources: EMSI

# Advanced Manufacturing, *continued*

## Industry Disruptors

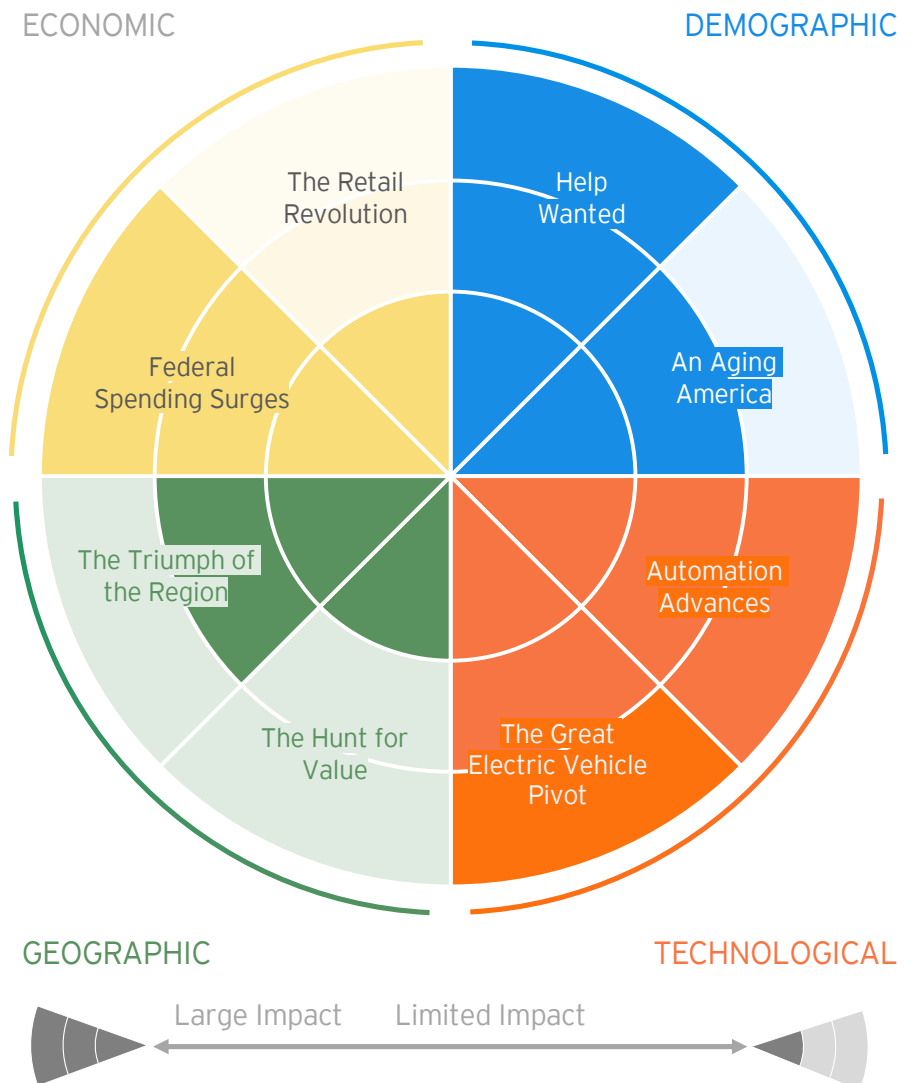
*Economic* - Increased federal spending is likely to boost the fortunes of the domestic manufacturing sector. Proposed investments in infrastructure, for example, represent massive expenditures on everything from transportation equipment to industrial machinery.

*Demographic* - While many manufacturers have long struggled with labor shortages, the situation has worsened in the wake of the pandemic. According to estimates published by the Bureau of Labor Statistics, there were more than 900,000 Manufacturing job openings in July 2021, a 20-year high. With more than a quarter of all manufacturing workers in the US age 55 and older, the industry's talent shortage may become even more pronounced in the years ahead.

*Technological* - Advanced Manufacturing will also be transformed by the changing nature of transportation. The ascent of electric vehicles, for example, will create new opportunities in areas such as battery development. In September 2021, for example, Ford announced it would be constructing a \$5.8 billion battery manufacturing campus in Glendale, Kentucky, south of Elizabethtown.

*Geographic* - Domestic manufacturing operations continue to cluster in cost-competitive metropolitan areas that combine a skilled workforce with unique infrastructure assets such as airports, interstate highways, and ports. As a result, many rural areas increasingly find it difficult to recruit and retain manufacturing facilities.

Disruptors impact on Advanced Manufacturing



# Advanced Manufacturing, *continued*

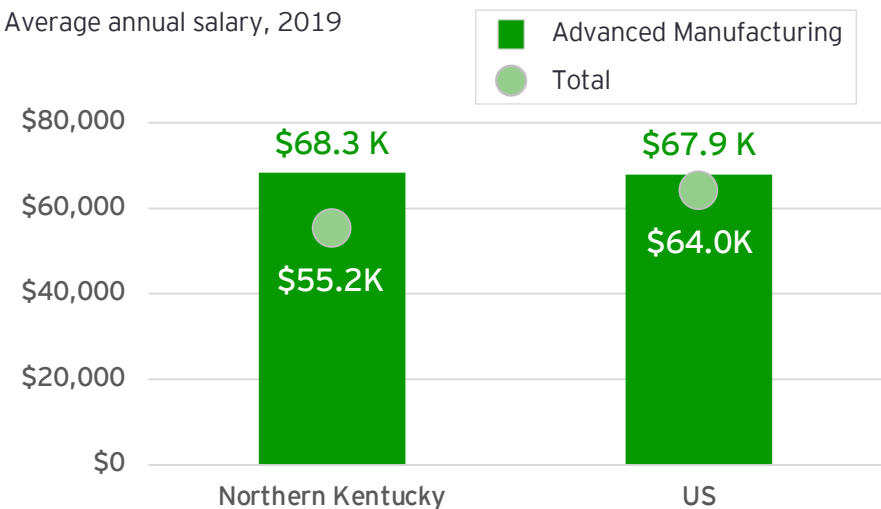
## Niche Sectors

**Aerospace** - Aerospace encompasses the development and manufacture of aircraft, engines, parts, missiles, and space vehicles. Growth in both civilian and defense markets has helped Aerospace sustain strong employment growth during the past two decades. Although the pandemic contributed to a sharp decline in passenger air traffic in 2020, the sector is expected to rebound in the years ahead. Increased civilian aviation activity is likely to be further complemented by sustained military spending as well as growth within the emerging realm of private space exploration.

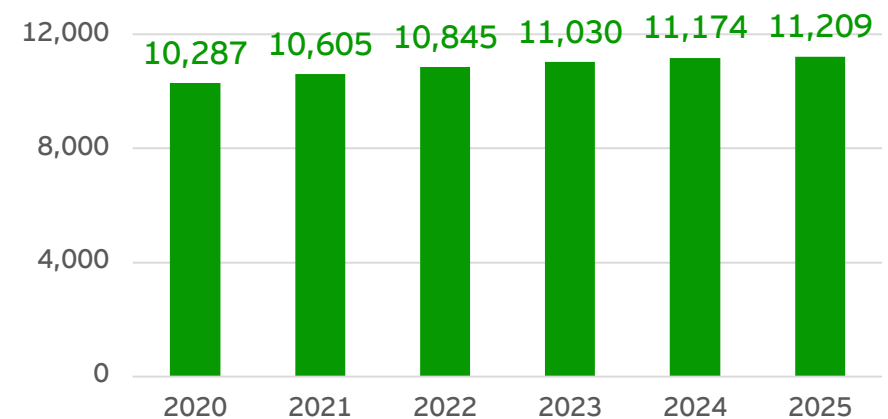
**Automotive** - The Automotive cluster involves the production and fabrication of entire automobiles as well as the development of individual components. After a period of employment growth that largely reflected steady sales growth, the pandemic unleashed unprecedented volatility throughout the industry. According to data from the U.S. Bureau of Economic Analysis, monthly sales fell to a 40-year low in April 2020. By April 2021, monthly sales hit a 15-year high. Since then, the rise of the Delta variant and supply chain disruptions have helped fuel a steady decline in sales. While supply chain issues may limit immediate growth opportunities, industry employment is expected to rise over the long-term as a result of pent-up consumer demand and as well as increased investments in electric and autonomous vehicles.

**Food & Flavoring** - The Food & Flavoring cluster encompasses the production and processing of agricultural and related products, as well as the development of new products for both the human and animal markets. Industry growth often reflects evolving consumer tastes (such as the embrace of “functional” foods that provide benefits beyond nutrition) as well as technological innovation (the rise of plant-based meat alternatives).

Average annual salary, 2019



Northern Kentucky Advanced Manufacturing projected employment growth, 2020 - 2025



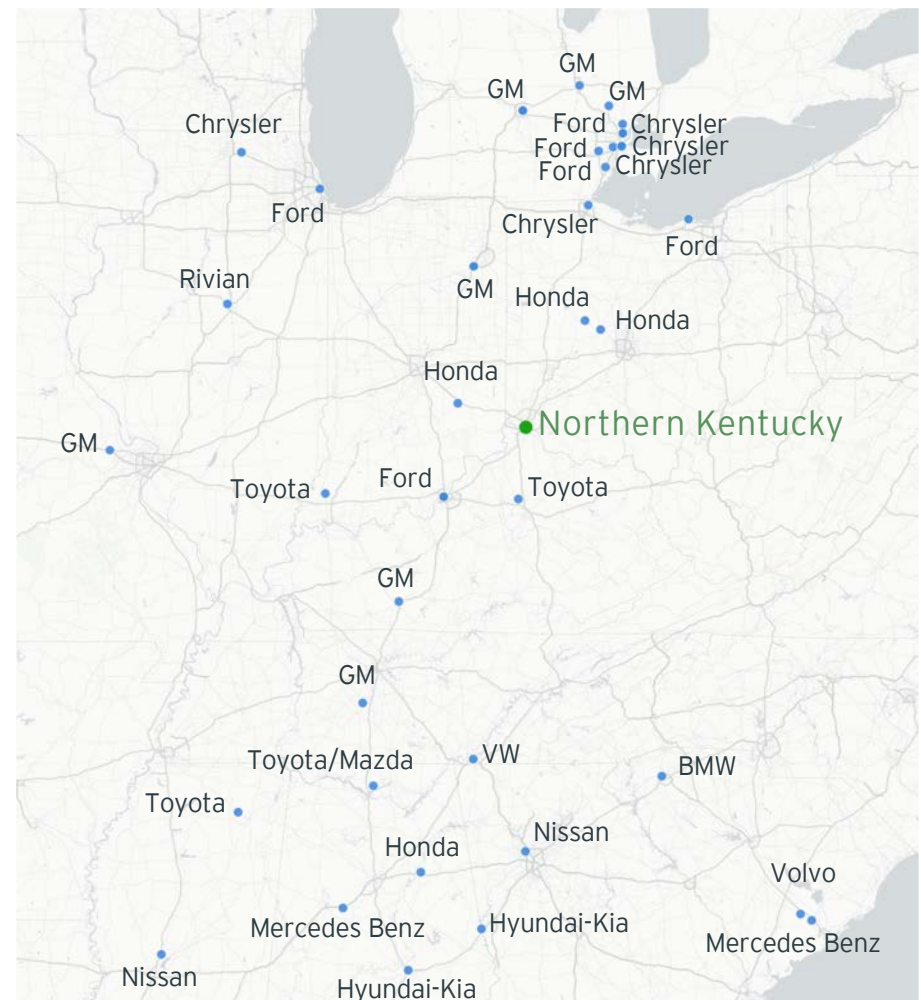
Sources: EMSI

# Advanced Manufacturing, *continued*

## Regional Strengths

- Northern Kentucky has a long tradition of supporting Advanced Manufacturing operations. The region is home to a disproportionately large share of manufacturing employment. On a per capita basis, for example, Northern Kentucky has a relatively large number of workers employed in Automotive, Materials, Industrial Machinery, Agribusiness, and Aerospace manufacturing. Additionally, Northern Kentucky's labor shed provides local employers with thousands of additional manufacturing workers.
- Historically, Advanced Manufacturing employment in Northern Kentucky has outperformed the nation as a whole. Between 2014 and 2019, for example, Northern Kentucky employment in Automotive, Materials, Industrial Machinery, Agribusiness, and Aerospace all increased at a faster clip than the the national average. Collectively, Advanced Manufacturing employment growth in Northern Kentucky increased 70% greater than the pace of national gains during this period.
- Northern Kentucky is increasingly located in the geographic center of the domestic automotive industry. Toyota's plant in Georgetown, is less than 75 miles from Northern Kentucky. Additionally, Northern Kentucky is located less than 150 miles from Ford's recently announced \$5.8 billion battery production facility in Glendale.
- Anchored by local firms such as ADM Flavors as well as companies such as Givaudan Flavors and MANE located across the river, Northern Kentucky and the broader region are home to one of the world's most extensive Food & Flavoring clusters.

US automotive assembly plants east of the Mississippi River



Source: EY



# Life Sciences

## About the Industry

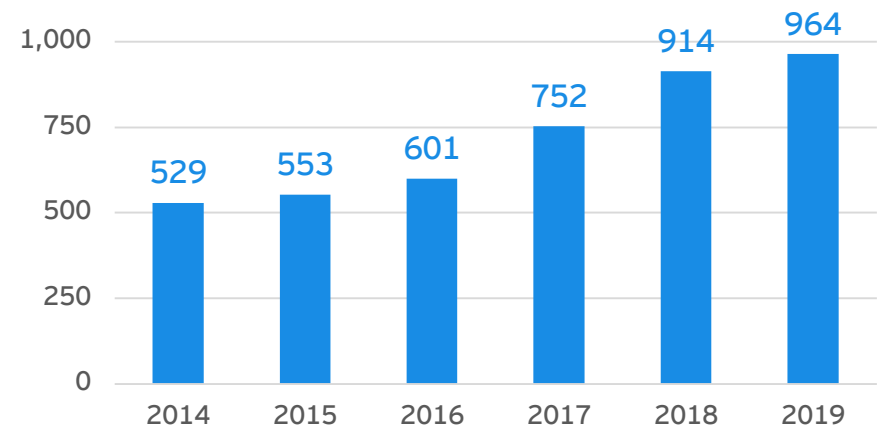
The Life Sciences cluster involves the protection and enhancement of human health. It encompasses a variety of individual sectors, including pharmaceuticals development and production, medical device manufacturing, medical and diagnostic laboratories, and scientific research.

Given the cutting-edge nature of scientific functions such as drug development and clinical trials, growth in the Life Sciences sector is largely fueled by innovation. As a result, the industry typically concentrates in communities rich in research resources. This might include locales with either a large university and/or an extensive hospital network. As many Life Sciences occupations require extensive training and education, talent availability is also critical. The presence of a university can help ensure that local Life Sciences firms have access to the talent they need to thrive.

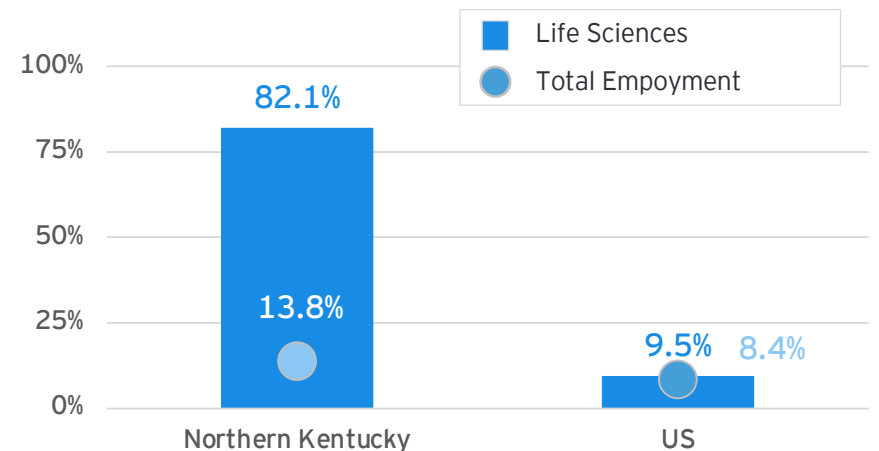
## Employment trends

The Life Sciences sector employs approximately 1.7 million workers in the US. This figure does not include workers employed in more traditional health care service roles such as doctors and nurses. In the five years preceding the pandemic, total Life Sciences employment growth has slightly outpaced the national average. In Northern Kentucky, however, the modestly sized cluster has grown substantially. In 2014, the local Life Sciences sector employed slightly more than 500 Northern Kentucky workers. Thanks to growth in areas such as research and development, pharmaceutical development, and medical laboratories, this figure approached 1,000 in 2019.

Northern Kentucky Life Sciences employment growth, 2014 - 2019



Employment growth, 2014 - 2019



Sources: EMSI



# Life Sciences, *continued*

## Industry Disruptors

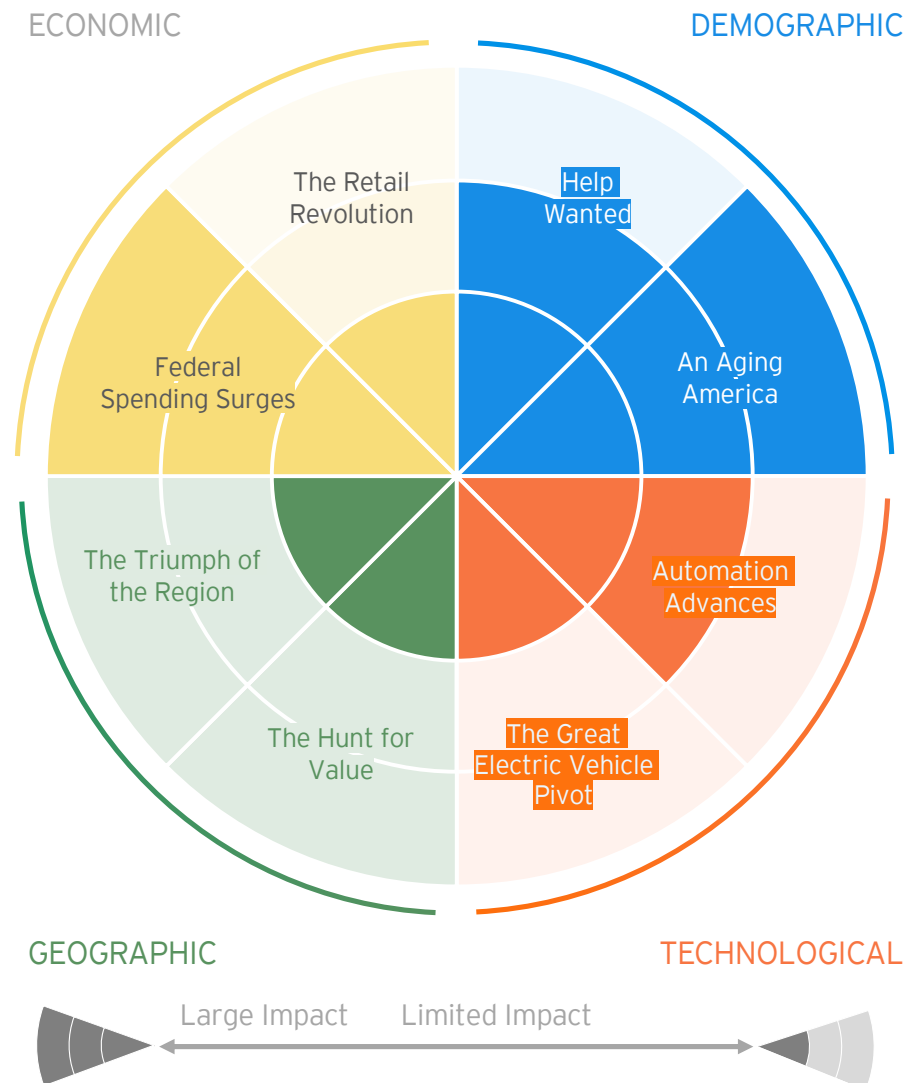
*Economic* - As the government plays a pivotal role in funding Life Sciences research and development, increased federal spending could be a boon for the industry. The Biden administration, for example, has called for a 20% boost in funding for the National Institutes of Health and as well as the National Science Foundation.

*Demographic* - The aging of the American population will contribute to increased demand for Life Sciences products and services for years to come. Talent availability, already an issue prior to the pandemic, will also continue to be a pressing issue for many Life Sciences firms.

*Technological* - A recent study published by the Journal of the American Medical Association put the price tag of developing a new FDA-approved drug at close to \$1 billion. This cost includes expenditures on failed drug development efforts. In recent years, however, there is growing hope that advances in artificial intelligence may help substantially reduce the time and expense of drug discovery by helping researchers more quickly identify promising biological agents.

*Geographic* - Historically, the Life Sciences industry has been disproportionately concentrated in regions such as Boston, Philadelphia, and San Francisco that feature a combination of established industry players, large research universities, and abundant venture capital. Due to the fixed nature of much of this innovation infrastructure, the geography of the Life Sciences sector is less likely to be vulnerable to disruption than other industries.

Disruptors impact on Life Sciences



# Life Sciences, *continued*

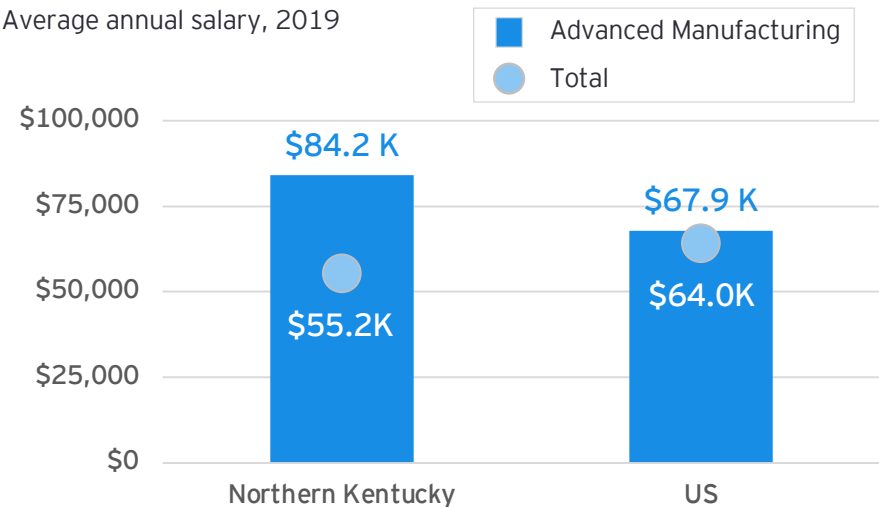
## Niche Sectors

**Biomedical Research** - Biomedical research involves the exploration of biological processes to help prevent, diagnose, and treat disease. Biomedical Research has traditionally leveraged advances in life and physical sciences. In recent years, however, computational sciences have assumed a growing role in the sector. Specific functions include diagnostic and medical laboratories as well the design and management of clinical trials. Thanks to its vital role in advancing healthcare innovation, Biomedical Research spending continues to rise.

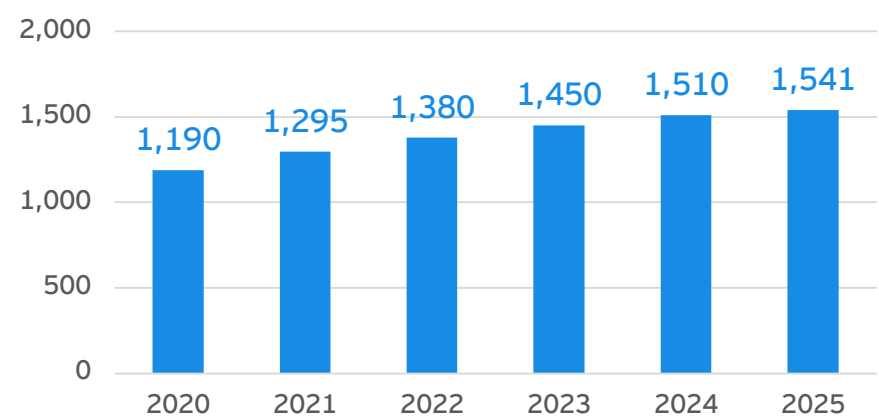
**Gene and Cell Therapy** - Gene therapy is an emerging field that involves the modification of genetic material to treat disease. Currently, the relatively few FDA-approved gene therapy treatments available to patients include several diseases relating to blood disorders and degenerative disorders of the eye and muscles. In the years ahead, however, gene therapy is expected to help treat a growing number of conditions, especially those that are considered rare. Clinical trials will be a critical component in the evolution of gene therapy from an emerging field to a mature technology.

**Medical Device Manufacturing** - Medical Device Manufacturing includes the production of products with surgical, dental and vision applications as well as the development of prescription and over-the-counter products that prevent or treat illnesses. In recent decades, Medical Device Manufacturing has become increasingly dependent on a global supply chain. The difficulty in securing medical equipment during the pandemic, however, underscored the shortcomings of this approach. As a result, Medical Device Manufacturing may benefit from a growing emphasis on domestic production.

Average annual salary, 2019



Northern Kentucky Life Sciences projected employment growth, 2020 - 2025



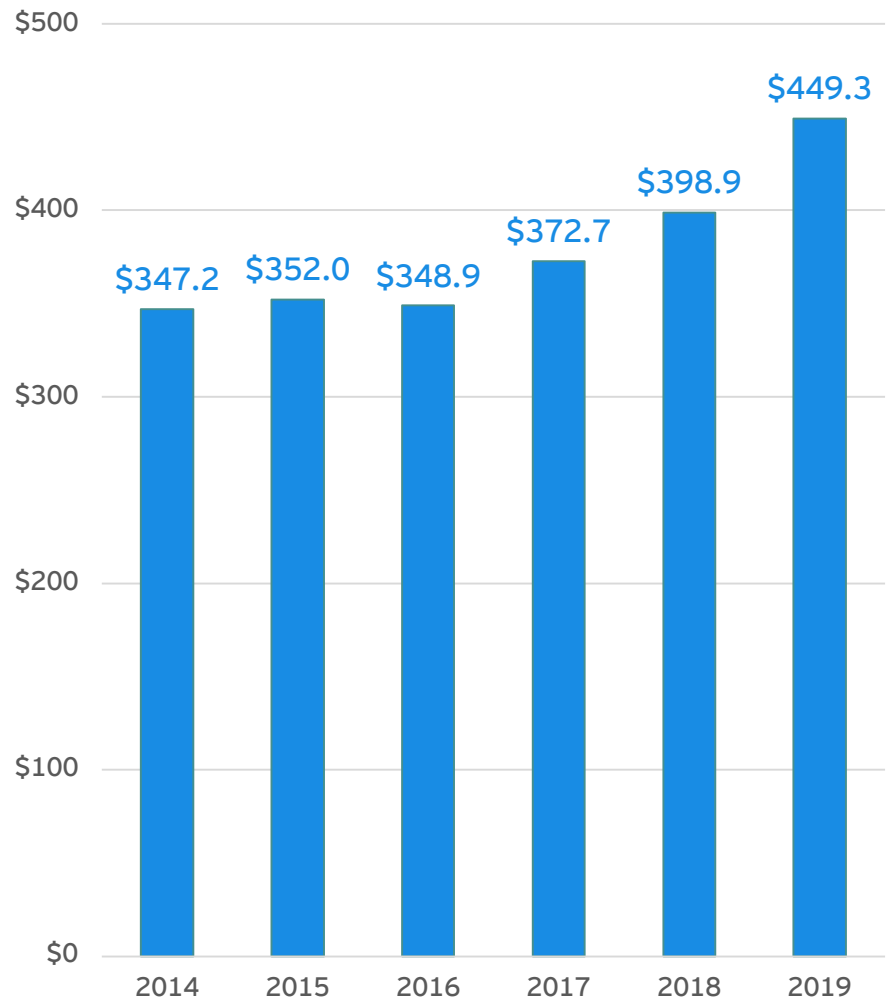
Sources: EMSI

# Life Sciences, *continued*

## Regional Strengths

- Buoyed by a wealth of talent, increased R&D activity throughout the broader region, and several strategically located companies, in recent years Northern Kentucky's Life Sciences cluster has performed exceptionally well. Between 2014 and 2019, regional Life Sciences employment increased at nearly nine times the rate of growth nationally.
- Northern Kentucky has a surplus of approximately 3,000 Healthcare workers. Though currently employed outside of Northern Kentucky, this pool of talent provides local Life Sciences companies with "flex" labor capacity.
- Research and development funding in the region has surged in recent years. Total life sciences R&D activity at the University of Cincinnati, Northern Kentucky University, and Miami University rose by approximately \$100 million between 2014 and 2019. Currently, these three universities collectively manage nearly a half billion dollars annually in life sciences R&D funding.
- In addition to serving as hubs of innovation, regional universities are also important producers of Life Sciences talent. In 2019, the University of Cincinnati, Northern Kentucky University, and Miami University collectively awarded 3,800 health professional degrees. This includes Northern Kentucky University's Health Informatics program.
- Northern Kentucky boasts a wide range of Life Sciences and aligned companies, including CTI (clinical trials and testing), Carl Zeiss Vision and Thermo Fischer Scientific (medical device manufacturing), and Bexion and Gravity Diagnostics (medical research). The region is also served by multiple healthcare systems.

Academic life sciences research and development expenditures (in millions) - University of Cincinnati, Northern Kentucky University, and Miami University



Source: National Science Foundation

# Supply Chain Management & Support Services

## About the Industry

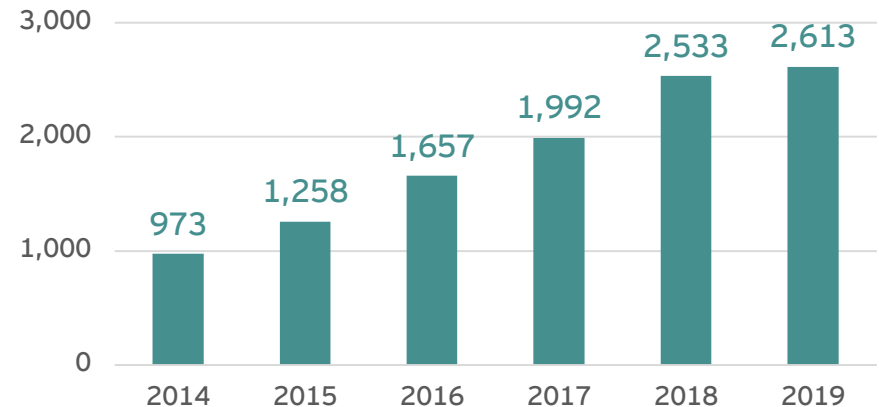
Supply Chain Management & Support Services facilitates the transport of goods via rail, road, water, and air. Crucially, the sector does not encompass fulfillment centers and other traditional warehousing operations. Instead, Supply Chain Management & Support Services typically involve higher-value functions such as providing operating advice to companies on how to improve their logistical efficiency or increase the resiliency of their supply chains. Due to the central role the Cincinnati/Northern Kentucky International Airport plays in the region's logistics and distribution industry, the cluster includes Aviation Maintenance operations.

The rise of sprawling supply chains and growth of e-commerce have helped make Supply Chain Management & Support Services an increasingly vital link in the global economy. Companies typically cluster within a broader logistics and distribution ecosystem tied to a strategically significant infrastructure. Supply Chain Management & Support Services, for example, is typically concentrated around major port and air cargo facilities

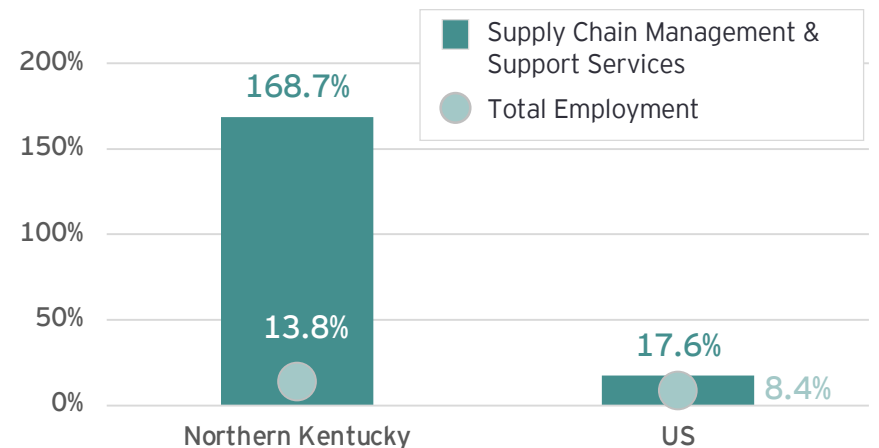
## Employment Trends

In recent years, Supply Chain Management & Support Services employment has experienced phenomenal growth at both the national and regional level. Within the US, Supply Chain Management & Support Services employment increased at twice the pace of overall job growth between 2014 and 2019. During this same period, Supply Chain Management & Support Services employment in Northern Kentucky has exceeded the national rate of growth by a factor of nearly ten.

Northern Kentucky Supply Chain Management & Support Services employment growth, 2014 - 2019



Employment growth, 2014 - 2019



# Supply Chain Management & Support Services, *continued*

## Industry Disruptors

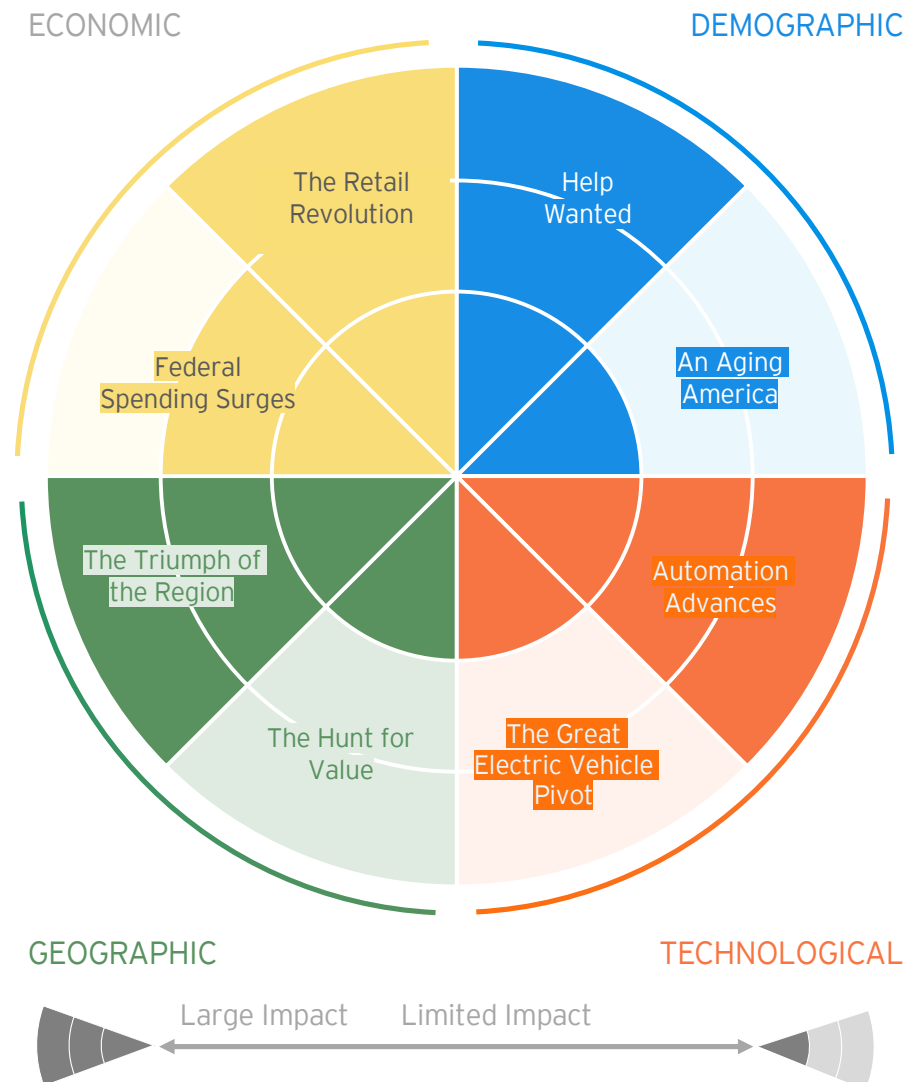
*Economic* - Perhaps no industry has benefitted more from the retail revolution than Supply Chain Management & Support Services. In recent years, retailers have rushed to build out their online fulfillment capabilities as they adopt an omnichannel distribution approach that leverages both digital platforms and physical stores. Supply Chain Management & Support Services are a critical component of this strategy. In the years ahead, the industry is likely to benefit from the continued growth of online shopping as well as new investment in supply chains as firms look to boost resiliency.

*Demographic* - Unlike many other industries, Supply Chain Management & Support Services doesn't face a rapidly aging workforce. Still, securing talent has long proven difficult due to the industry's rapid growth in recent years. Recruiting and attracting workers has only become more difficult during the pandemic.

*Technological* - Historically, the broader distribution and logistics sector has been characterized by limited technological innovation and comparatively minimal levels of capital investment. Instead, labor costs typically represent the bulk of operating expenses. As a result, increased automation could have a substantial impact on industry employment. While Supply Chain Management & Support Services workers would likely prove largely insulated from this trend due to the higher skill nature of the work, other warehousing and fulfillment laborers may prove more vulnerable to displacement.

*Geographic* - The growth of the Supply Chain Management & Support Services largely reflects the growing concentration of Americans residing in metropolitan regions. Employment tends to be especially pronounced in regions rich in specialized infrastructure (ports, airports, etc.) and blessed with a strategically important location (proximity to major population centers).

Disruptors impact on Supply Chain Management & Support Services



# Supply Chain Management & Support Services, *continued*

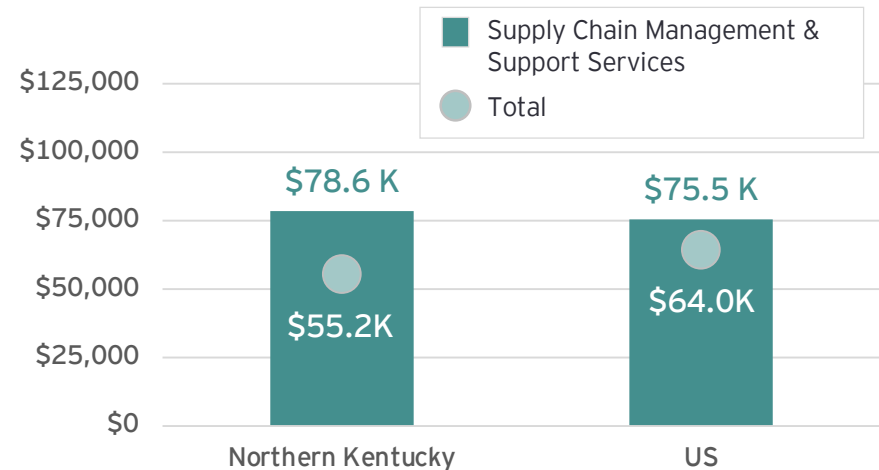
## Niche Sectors

**Aviation Support Services** - Aviation Support Services involves the Maintenance, Repair & Overhaul (MRO) of aircraft. Specific services include engine maintenance, non-engine maintenance, comprehensive airframe maintenance, and line maintenance. Among these services, line maintenance is most typically performed at hub airports. As a result, local growth in Aviation Support Services typically reflects broader air passenger or cargo activity.

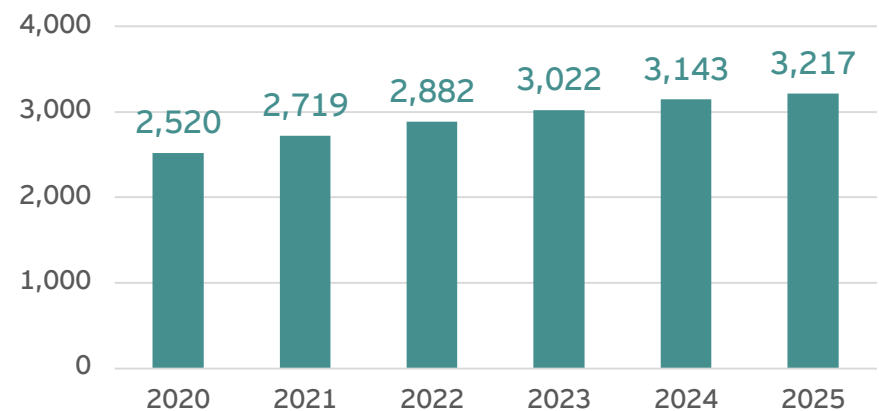
**Logistics Management & Consulting** - Logistics Management & Consulting firms provide operational advice and assistance to companies in areas such as inventory management, distribution infrastructure planning, and materials management and handling. In recent years, growth in Logistics Management & Consulting has been driven by the rise in e-commerce as well as the increasingly sprawling nature of global supply chains. In the years ahead, the sector is likely to be fueled by continued growth in online shopping and delivery, as well as a renewed emphasis on resiliency in the face of recent global supply chain bottlenecks.

**Materials & Packaging** - The sector involves the packaging of individual products as well as the bulk collection of goods into “retail ready” pallet displays that can be easily placed within a store. Historically, the industry has heavily relied on corrugated paper though the industry is increasingly adopting more innovative materials such as films and plastics. Innovation is often fueled by a desire to improve the sustainability of materials and reduce packaging waste. Materials & Packaging operations often concentrate in logistics and distribution hubs due to the close relationship between shipping and packaging

Average annual salary, 2019



Northern Kentucky Supply Chain Management & Support Services projected employment growth, 2020 - 2025



Sources: EMSI

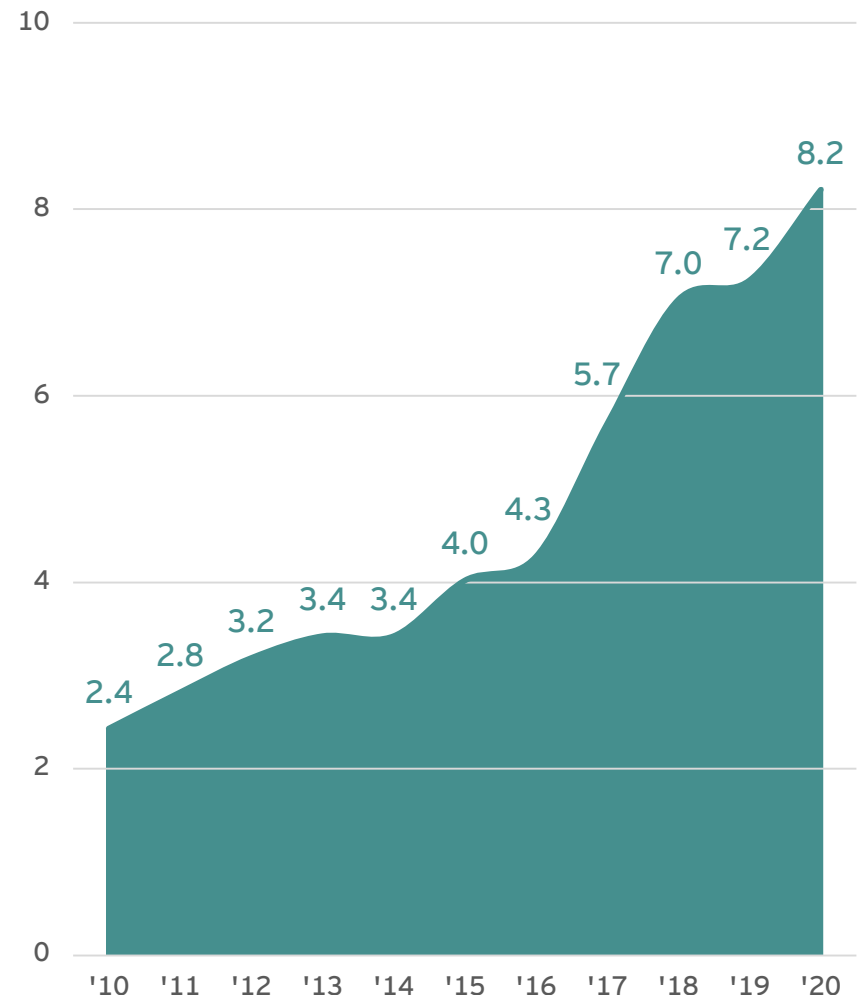


# Supply Chain Management & Support Services, *continued*

## Regional Strengths

- Northern Kentucky is a logistics and distribution juggernaut. In 2020, the Cincinnati/Northern Kentucky International Airport handled 8.2 billion pounds of cargo. Total cargo volumes at the facility has tripled during the past decade. The Cincinnati/Northern Kentucky International Airport is now the fifth busiest cargo airport in the continental United States.
- Cargo activity at the airport is likely to experience significant growth in the years ahead. The Cincinnati/Northern Kentucky International Airport is officially Amazon Air's primary U.S. air cargo hub. The facility, which opened in August, represents a \$1.5 billion investment by Amazon.
- In addition to the airport, Supply Chain Management & Support Services firms (as well as Advanced Manufacturing companies) in Northern Kentucky benefit from significant water and land infrastructure assets. The region is served by three interstates. Additionally, the Ports of Cincinnati and Northern Kentucky are among the busiest inland port districts in the nation.
- In recent years, overall logistics and distribution employment in Northern Kentucky has experienced extraordinary growth. Between 2014 and 2019, logistics and distribution employers added nearly 9,500 jobs in the three-county region. This represents approximately one in ten jobs created in the entire state during this period.

Cargo landed weight at Cincinnati/Northern Kentucky International Airport (billions of pounds)



Source: Federal Aviation Administration

# Information Technology

## About the Industry

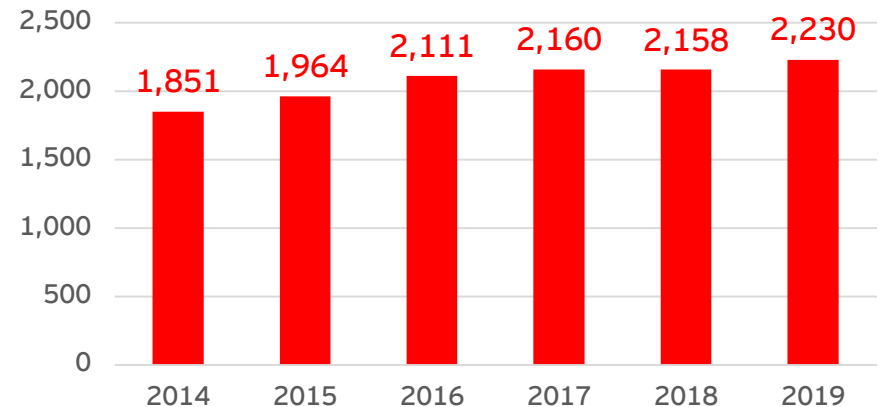
Information Technology involves activities such as software production, internet application development, computer hardware production, and data security. Though a distinct industry in its own right, Information Technology has increasingly become an integral component of other sectors such as health care, transportation, and retail.

The Information Technology sector tends to concentrate in regions rich in tech talent. IT has historically been in short supply nationally. As a result, locations that feature educational institutions capable of delivering a sustained pipeline of new workers with advanced skills are especially appealing. The presence of an innovation district anchored by a large research university, however, is an especially prized asset. Beyond office space and fast, reliable internet, the traditional infrastructure needs of the IT industry are modest. Although the availability of venture capital is critical for many fledging firms, such funding is overwhelmingly concentrated in relatively few regions.

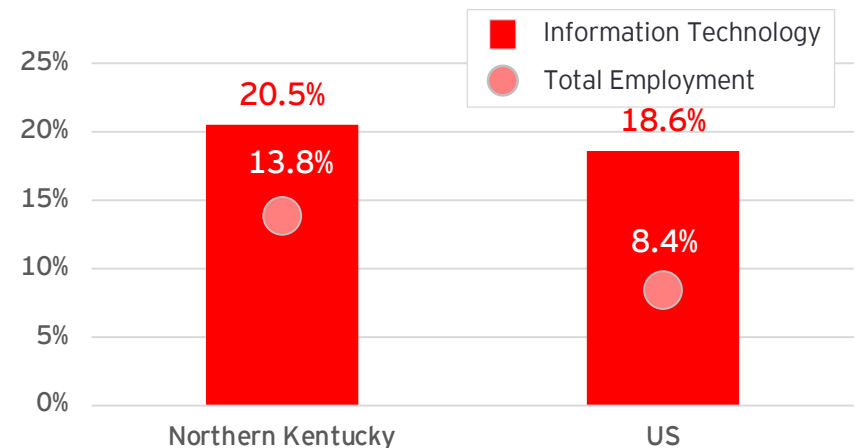
## Employment Trends

Information Technology remains one of the most dynamic areas of the American economy. IT employment has increased nearly 19% during the past five years, twice the national rate of growth. Northern Kentucky's IT sector has grown at an even faster clip during this period. Between 2014 and 2019, local IT employment rose by more than 20%.

Northern Kentucky Information Technology employment growth, 2014 - 2019



Employment growth, 2014 - 2019



Sources: EMSI

# Information Technology, *continued*

## Industry Disruptors

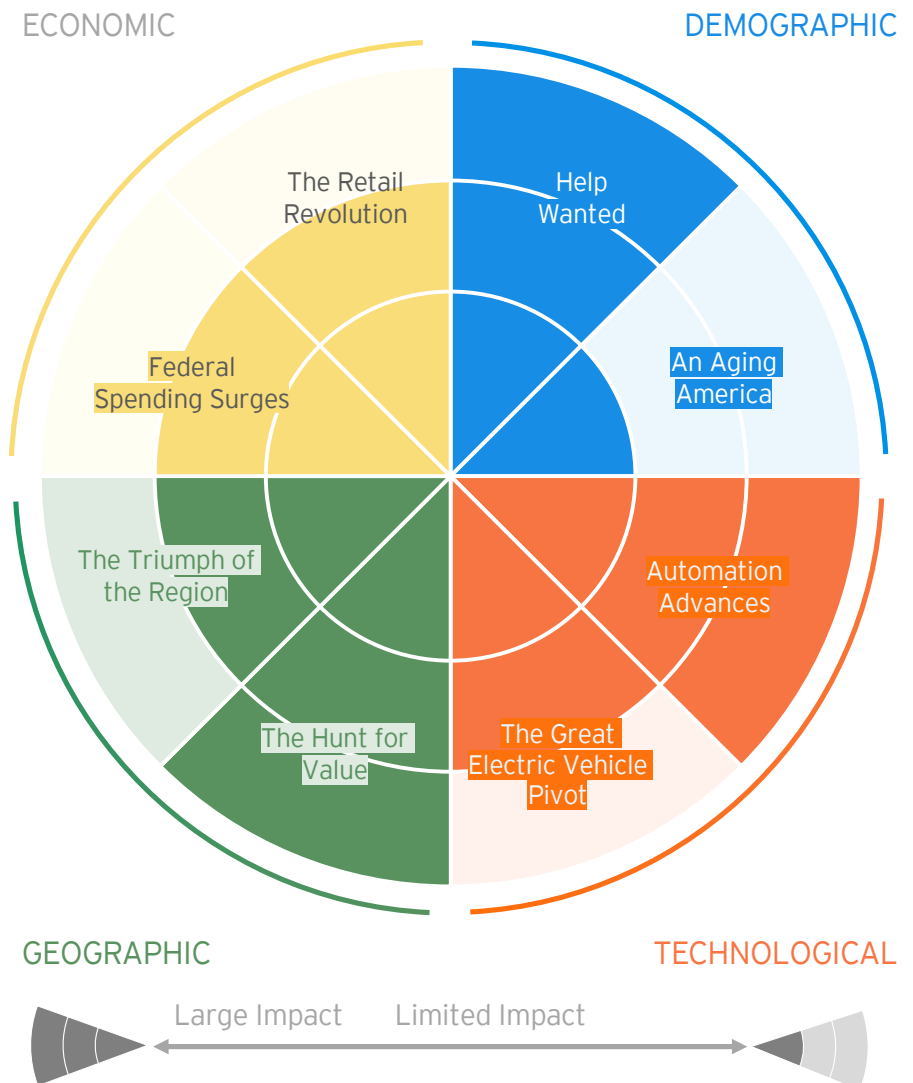
*Economic* - The Information Technology industry is likely to thrive regardless of increased federal spending. A more proactive government, however, may present policy risks such as increased enforcement of antitrust laws or new rules governing social media. Regulatory headwinds aside, the industry is expected to continue to benefit from the growth of online shopping.

*Demographic* - The rapid rise of Information Technology employment continues to drive significant demand for labor, including entry-level positions, to more experienced professionals. As Information Technology employment has increased by more than 50% nationally during the past decade, tech employers have often scrambled to secure recent graduates with the latest technology IT skills. At the same time, the relative youth of the Information Technology workforce can make it difficult to recruit and hire more experienced workers.

*Technological* - The Information Technology industry will play a primary role in advancing technological disruptors. Mass deployment of Artificial Intelligence, for example, will only be possible thanks to continued advancements in areas such as Big Data. Additionally, autonomous and electric vehicles may emerge as the biggest digital platform since the rise of mobile phones.

*Geographic* - The pandemic and its geographic aftershocks are likely to broaden the number of US regions that can support the IT sector. As IT work can often be performed anywhere, the rise of remote work may allow companies to hire workers in communities beyond the traditional tech hubs. Additionally, a recent report from the Brookings Institution suggest that IT employment growth is increasingly being driven by less established tech hubs.

Disruptors impact on Information Technology



# Information Technology

## Niche Sectors

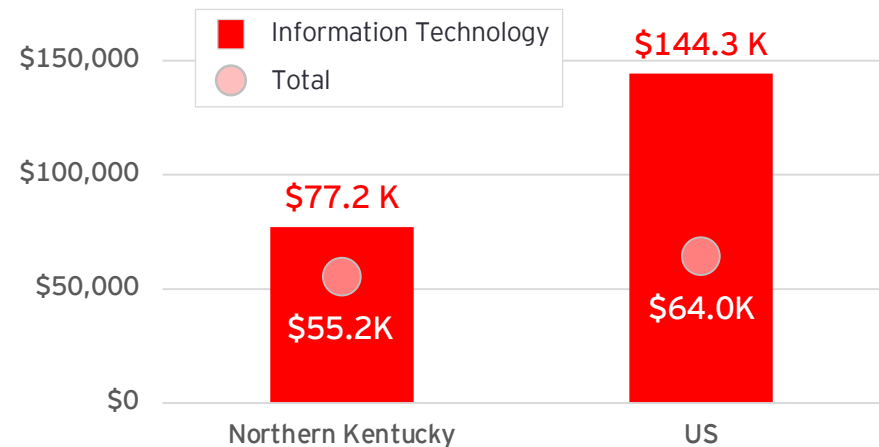
**Software/IT** - The Software/IT sector involves the development of digital programs and services. In recent years, the rise of mobile computing and IoT devices has helped sustain the industry's impressive growth trajectory. Looking ahead, the continued digitization of the American economy is likely to fuel additional Software/IT sector growth. Continued innovations in areas such as transportation and healthcare, for example, are likely to depend on Software/IT applications.

**Electronics Manufacturing** - Electronics Manufacturing may involve the direct fabrication of semiconductor and related technologies or (more commonly) the final assembly of component parts produced by third-parties. Given the wide variety of electronics applications, the manufacturing sector serves a variety of industries, including automotive (sensors), information technology (servers and telecom equipment), and energy (solar panels).

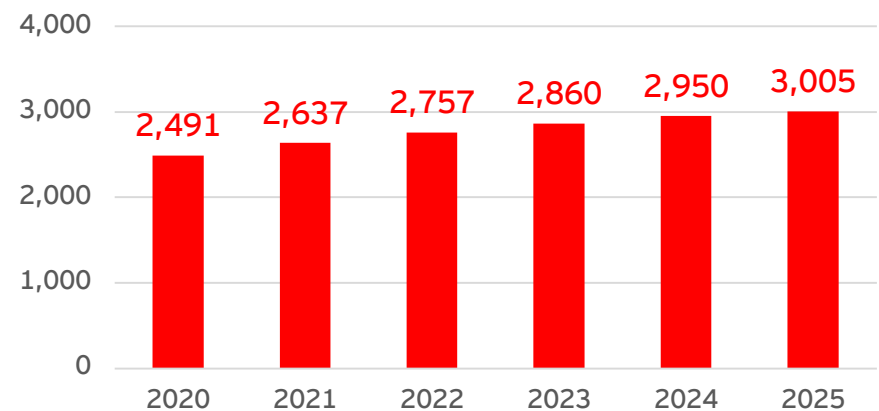
**Logistics Technology** - Historically, the logistics and distribution industry has been characterized more by its labor-intensive nature than an embrace of technology-led innovation. The Logistics Technology sector looks to change this dynamic via technologies such as artificial intelligence and robotics. Load-matching technologies that can efficiently match shippers with freight carriers, for example, could disrupt the traditional brokers. Similarly, advances in robotics may streamline warehouse operations.

**Health Informatics** - Health Informatics involves the integration of data science and health care to enhance human health and improve the delivery of services. Although Health Informatics is an emerging field, the discipline has two immediate applications. Modeling and simulation applications, for example, Health Informatics can help identify promising molecules and anticipate their impact on various populations, thus speeding up the pace of drug development. In a clinical settings, Health Informatics can also help evaluate healthcare information systems to improve individual patient outcomes.

Average annual salary, 2019



Northern Kentucky Information Technology projected employment growth, 2020 - 2025



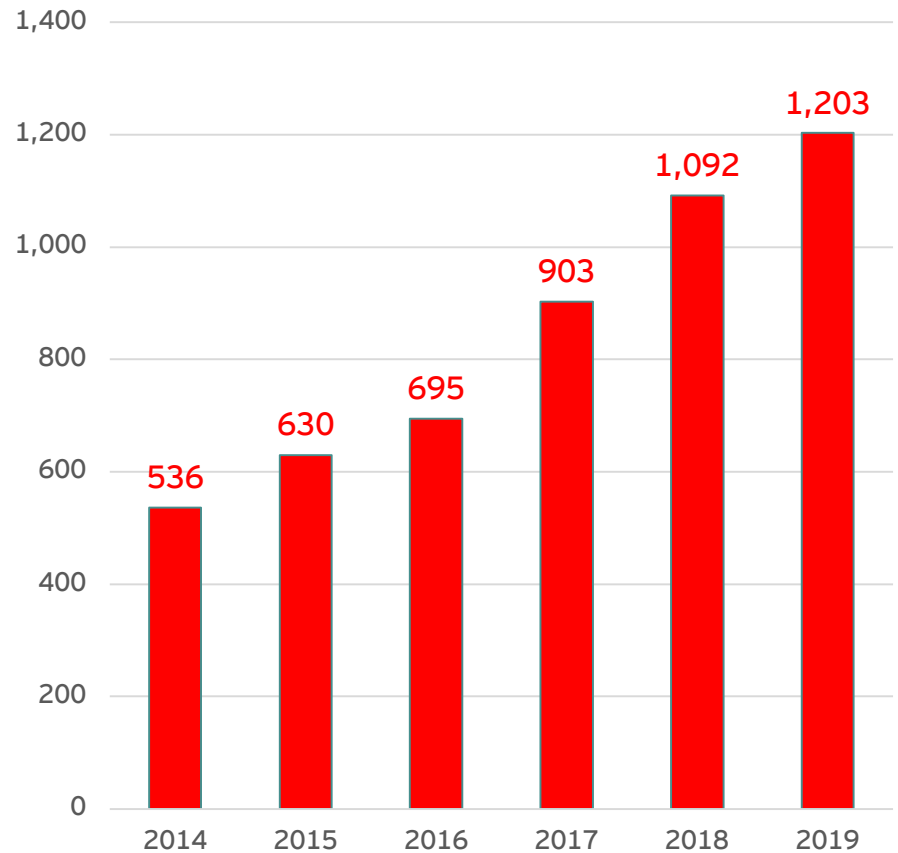
Sources: EMSI

# Information Technology, *continued*

## Regional Strengths

- In recent years, Information Technology employment in Northern Kentucky has increased at a rapid pace. Between 2014 and 2019, Information Technology employment increased more than 20%, outpacing the industry's national rate of growth during this period.
- Northern Kentucky offers existing and prospective Information Technology employers with an incredibly cost-competitive operating environment. In addition to the region's relatively low cost of living, at approximately \$77,000, average Information Technology wages in Northern Kentucky are barely half the national figure.
- Regionally, Northern Kentucky is a significant exporter of Information Technology talent. While more than 5,700 Computer workers reside in Northern Kentucky, just 4,300 are employed in the three-county region.
- Northern Kentucky and the broader region continue to increase the level of locally produced Information Technology talent. Between 2014 and 2019, the collective number of Information Technology-related graduates at Northern Kentucky University, the University of Cincinnati, and Miami University doubled.
- Northern Kentucky University is home to one of the country's few colleges of informatics. The number of computer science graduates produced by the college has increased nearly 80% during the past five years and continues to expand. During the summer of 2021, for example, the college announced the launch of a new applied software engineering degree focused on software security and user experience design.

Information Technology degrees awarded annually -  
University of Cincinnati, Northern Kentucky University, and Miami University



*Includes computer programming, computer science, information science, data processing, computer systems analysis, and computer engineering.*

Source: National Science Foundation

## Appendix: Cluster Descriptions and Target Industry Definitions





# Industry cluster descriptions

**Aerospace:** Operations engaged in research, design, and manufacturing aerospace and space technology, products, and parts, including commercial aircraft, military craft, and unmanned aerial vehicles (UAVs).

**Agribusiness & Food:** Operations engaged in raising, harvesting, processing, and manufacturing crops, food, and beverage products. Operations include farming, dairy, ranching, hunting, fishing, and all support activities, such as pesticide manufacturing. Also includes manufacture of tobacco and processed food products, such as sugar, flour, and canned goods.

**Apparel & Textiles:** Operations engaged in processing natural products such as cotton and leather into consumer textiles and apparel products. These include fabric mills, textile mills, and cut and sew apparel manufacturing.

**Back Office:** Operations engaged in support activities for the day-to-day operations of other businesses, including office administration, facilities support, employment services, and business support.

**Biomedical Supplies & Labs:** Operations engaged in manufacture and wholesale of medicine, pharmaceuticals, and medical equipment. Also includes medical and diagnostics laboratories.

**Construction:** Operations engaged in construction of buildings and engineering projects, such as highways and utility systems. Also includes operations manufacturing products related to construction, such as lumber, clay, glass, cement, and lime.

**Consumer Goods Mfg.:** Operations engaged in manufacture of household appliances and other miscellaneous nondurable goods for consumers.

**Creative Content:** Operations engaged in creative and information sectors such as movie and music production, radio and television programming, newspaper and magazine production, and internet publishing.

**Education:** Operations engaged in education institutions, including elementary and secondary schools (government and private), colleges, universities, professional schools, trade schools, and educational support services.

# Industry cluster descriptions

**Electronics:** Operations engaged in manufacture, wholesale, and repair of electronic equipment, including computers, televisions, semiconductors, and other electronic components.

**Energy:** Operations engaged in all vertically aligned elements of the energy sector, including oil extraction, coal mining, pipeline transportation of oil and gas, and electric power generation, transmission, and distribution.

**Entertainment:** Operations engaged in leisure and accommodation, including hotels, restaurants, bars, casinos, museums, performing arts, and sporting facilities. Also includes independent performers, artists, and direct tourist activities.

**Finance:** Operations engaged in financial, insurance, and real estate activities, such as banks, insurance carriers, and real estate brokers.

**Furniture:** Operations engaged in manufacture and wholesale of household, office, and commercial furniture and cabinets.

**Government:** Operations of federal, state, and local government agencies, waste collection and management, and water treatment. Military employment is not included in these numbers.

**Healthcare:** Operations engaged in direct provision of healthcare and social services, including private hospitals, doctor offices, elderly care, child day care, family services, and home nursing care.

**Industrial Machinery:** Operations engaged in manufacture and wholesale of industrial application machinery, including agricultural and mining equipment, HVAC systems, metalworking machinery, turbines, lighting, and other equipment.

**Mining & Logging:** Operations engaged in forestry, logging, and mining: not including oil, gas, and coal extraction.

**Materials:** Operations engaged in design, wholesale, and manufacture of traditional and complex materials, including paper, chemicals, plastics, rubber, and other advanced materials.

# Industry cluster descriptions

**Metalworking:** Operations engaged in processing minerals into metal products and manufacture of components and products from metal. This includes steel mills, foundries, fabricated metal and structural metal manufacturing, and hand-tool manufacturing.

**Non-Profits:** Operations engaged in non-profit activities, including churches, social advocacy, and civic and professional associations.

**Professional Services:** Operations engaged in architecture, engineering, legal, accounting, management, and other technical services.

**Research:** Operations engaged in scientific research and development and scientific consulting services.

**Retail:** Operations engaged in retail sale of goods and services to consumers, including car dealers, grocery stores, clothing stores, gas stations, auto repair, personal care, and equipment rental.

**Shipbuilding:** Operations engaged in construction of ships and boats.

**Software / Information Technology:** Operations engaged in information technology sectors, including software publishing, internet service providers, computer system design, data processing and hosting, and other information services.

**Telecom Services:** Operations engaged in wired, wireless, and satellite telecommunications, including cell phone and cable providers.

**Transportation & Logistics:** Operations engaged in transportation of goods and individuals; warehousing and storage of goods; and delivery of post and packages. This includes commercial, personal, and tourism transportation on air, rail, water, and roads.

# Target industry definitions

INDUSTRY	NAICS	NAICS Description
Advanced Manufacturing	3364	Aerospace Product and Parts Manufacturing
	3361	Motor Vehicle Manufacturing
	3362	Motor Vehicle Body and Trailer Manufacturing
	3363	Motor Vehicle Parts Manufacturing
	3113	Sugar and Confectionery Product Manufacturing
	3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing
	3118	Bakeries and Tortilla Manufacturing
	3119	Other Food Manufacturing
	3121	Beverage Manufacturing
	3261	Plastics Product Manufacturing
	3221	Pulp, Paper, and Paperboard Mills
	3222	Converted Paper Product Manufacturing
	3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Mfg.
Life Sciences	541690	Other Scientific and Technical Consulting Services
	54171	Research and Development in the Physical, Engineering, and Life Sciences
	3254	Pharmaceutical and Medicine Manufacturing
	3391	Medical Equipment and Supplies Manufacturing
	6215	Medical and Diagnostic Laboratories
Supply Chain Support Services	48819	Other Support Activities for Air Transportation
	541614	Process, Physical Distribution, and Logistics Consulting Services
Information Technology	5112	Software Publishers
	5182	Data Processing, Hosting, and Related Services
	5191	Other Information Services
	5415	Computer Systems Design and Related Services
	3344	Semiconductor and Other Electronic Component Manufacturing
	3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing

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