

MICHIGAN MOBILITY

INDUSTRY CLUSTER WORKFORCE ANALYSIS



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WORKFORCE ANALYSIS

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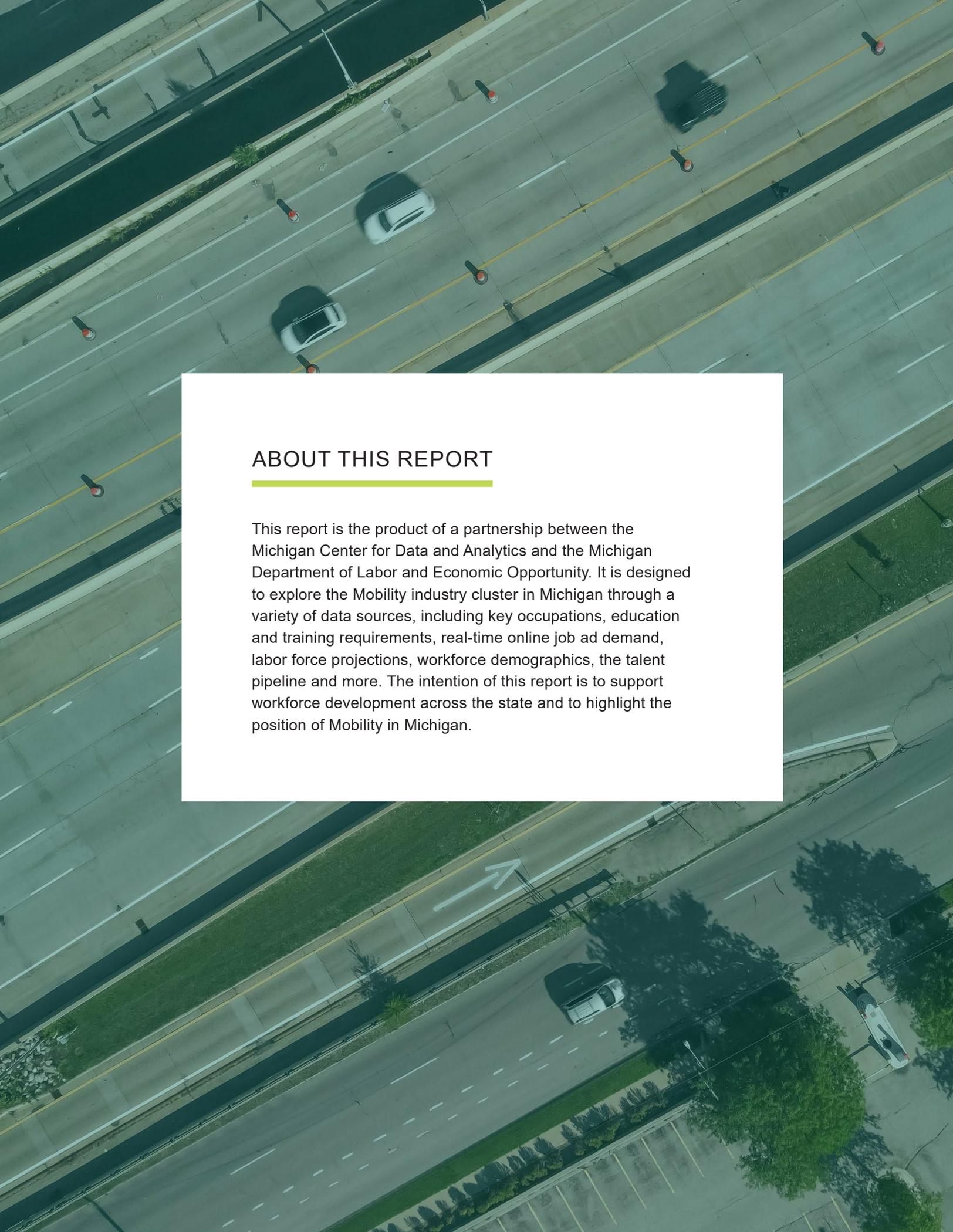
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An aerial, top-down view of a multi-lane highway. The road is divided into several lanes by white and yellow lines. Several cars are visible, including a white sedan and a dark SUV. Traffic lights are positioned at intervals along the road. The surrounding area includes green grass, trees, and a parking lot with a white van. The overall scene is captured from a high angle, providing a clear view of the road's layout and traffic flow.

ABOUT THIS REPORT

This report is the product of a partnership between the Michigan Center for Data and Analytics and the Michigan Department of Labor and Economic Opportunity. It is designed to explore the Mobility industry cluster in Michigan through a variety of data sources, including key occupations, education and training requirements, real-time online job ad demand, labor force projections, workforce demographics, the talent pipeline and more. The intention of this report is to support workforce development across the state and to highlight the position of Mobility in Michigan.



Key Findings

- Employment in Mobility has grown by 5.4 percent between 2015 and 2021. This is compared to all employment in Michigan, which has decreased 0.7 percent over the period. Current employment in the cluster sits at 433,000 and accounts for 10.5 percent of Michigan's total employment.
- The nominal (not inflation-adjusted) average salary in the Mobility cluster is significantly greater than the average salary for all employment in Michigan. The average salary measured \$71,900 in 2021 in the cluster compared to \$61,700 for all employment. Most key occupations reported a median hourly wage greater than the statewide median hourly wage in 2021.
- With men making up almost three-quarters of its employment, Mobility joins clusters such as Construction and Manufacturing with a significant share of men. Comparatively, men accounted for just over half of all employment statewide.
- Mobility employment and job advertisements are mostly concentrated in the Detroit Metro region and other southern portions of Michigan. There are not as many opportunities to work in the cluster in the more rural northern areas of the state.
- Individuals ages 19 to 24 account for 8.3 percent of cluster employment compared to 12.3 percent for all employment in Michigan. Those ages 45 to 54 and 55 to 64 are more highly represented in Mobility cluster employment compared to all employment in Michigan.



Introduction

An **industry cluster** is a strong concentration of related industries in one location.

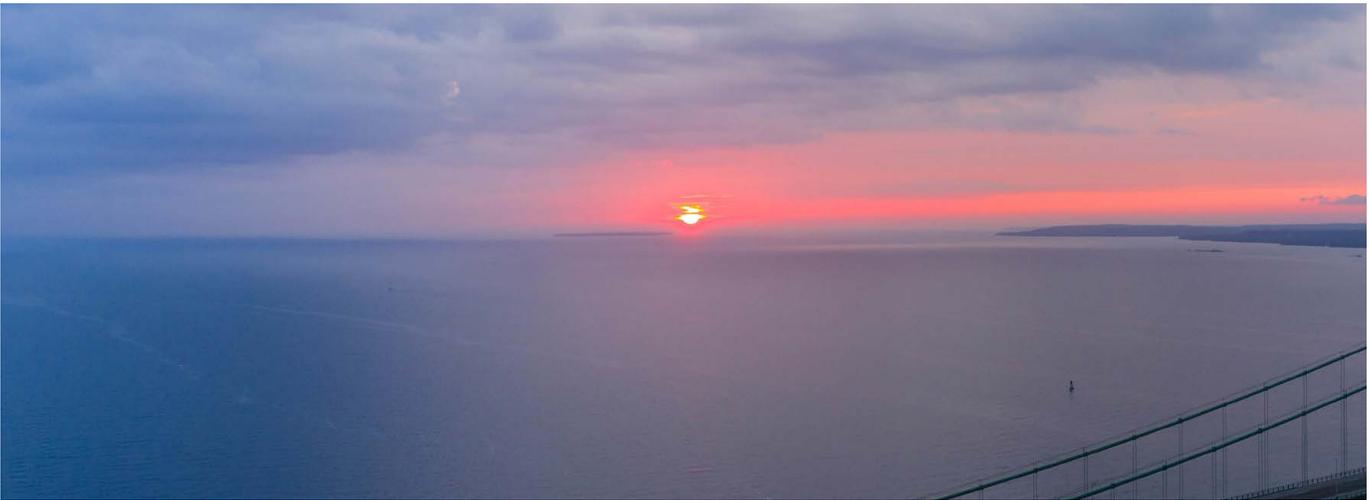
These clusters consist of related employers, suppliers, and support institutions in a product or service field. Industry clusters that are prevalent in a particular region fuel the regional economy, generate payrolls, and create innovation by leveraging the knowledge and resources of all involved.

In Michigan, the Mobility cluster has long been vital to the statewide economy and labor force. With an increasing emphasis on electrification and automation within the cluster, there has been a focus on keeping Michigan among the leaders nationwide in terms of innovation and production of these new technologies. This cluster offers a diverse range of careers and opportunities to Michigan residents across education and training levels.

The Mobility cluster consists of three subclusters:

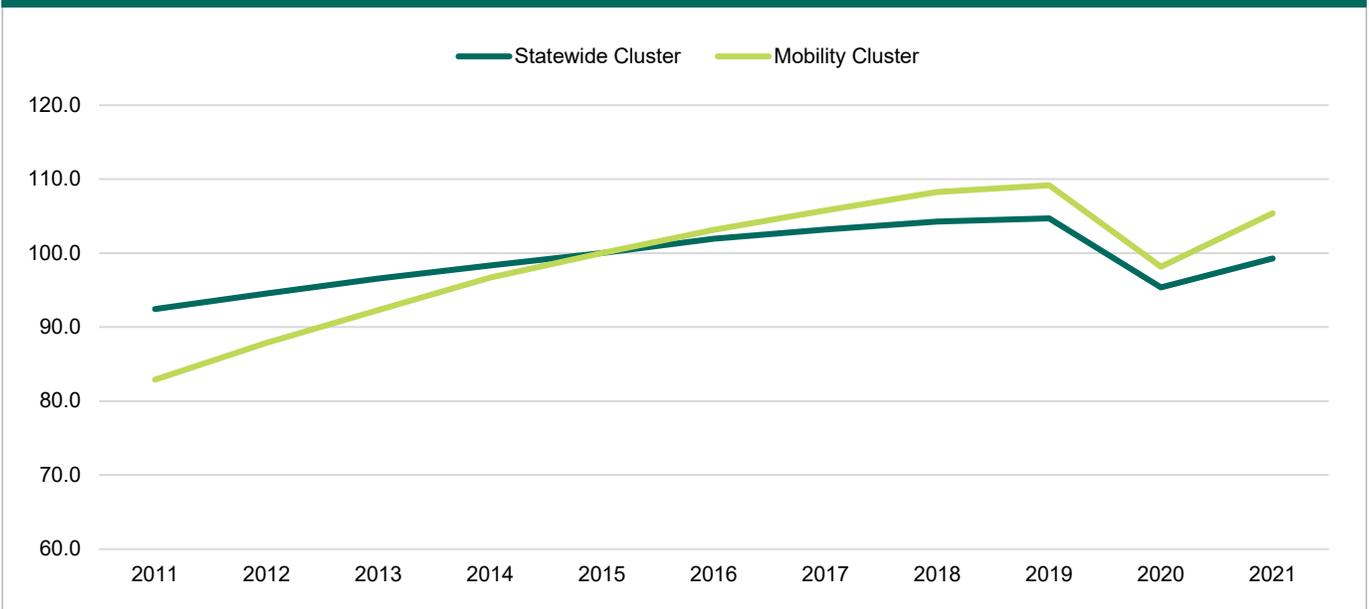
- Manufacturing
- Service
- Transportation

The Mobility cluster consists of three subclusters: *Manufacturing*, *Service*, and *Transportation*. Each subcluster is a high-wage industry which offers average salaries well above the median wage earned in Michigan.



Employment and Wages

FIGURE 1: EMPLOYMENT INDEX, MICHIGAN MOBILITY CLUSTER (INDEX YEAR: 2015)



Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics

Figure 1 displays both total statewide employment as well as employment in the Mobility cluster indexed to 2015. Over the past decade, employment growth in Mobility has outpaced that of total employment. Since 2015, Mobility employment increased by 5.4 percent, 6.1 percentage points greater than the change for all employment, which has yet to recover from the impacts of the COVID-19 pandemic. Varying time periods can paint a different picture for Mobility employment. Since 2011, the cluster has grown 27.1 percent compared to 7.4 percent for all employment. From 2006 to 2021, employment has held steady in the cluster while all employment decreased 2.1 percent. Employment now measures just under 433,000 in Mobility.

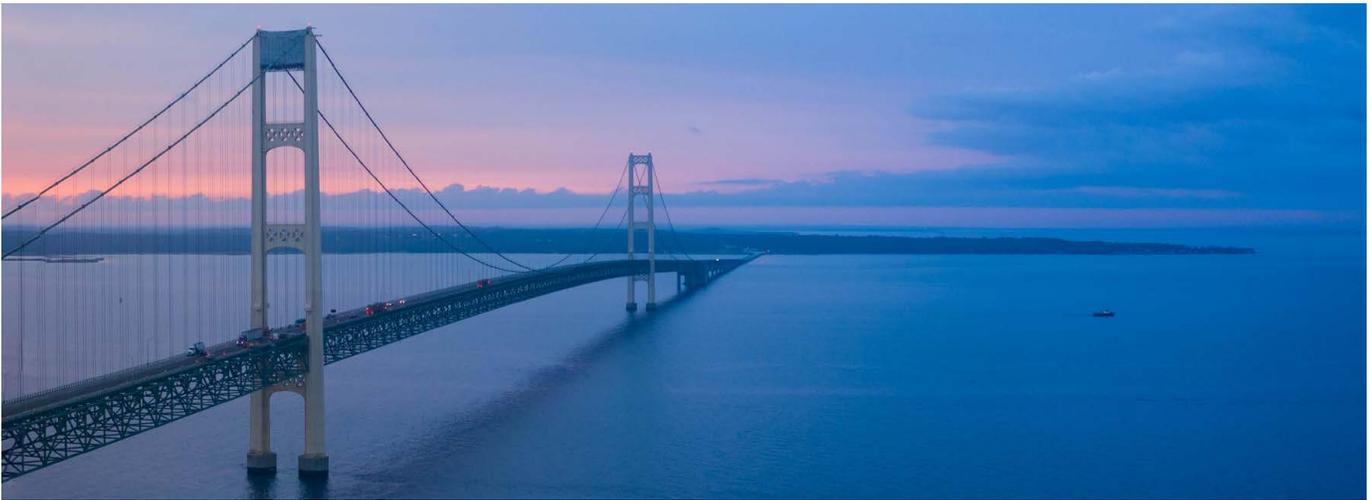
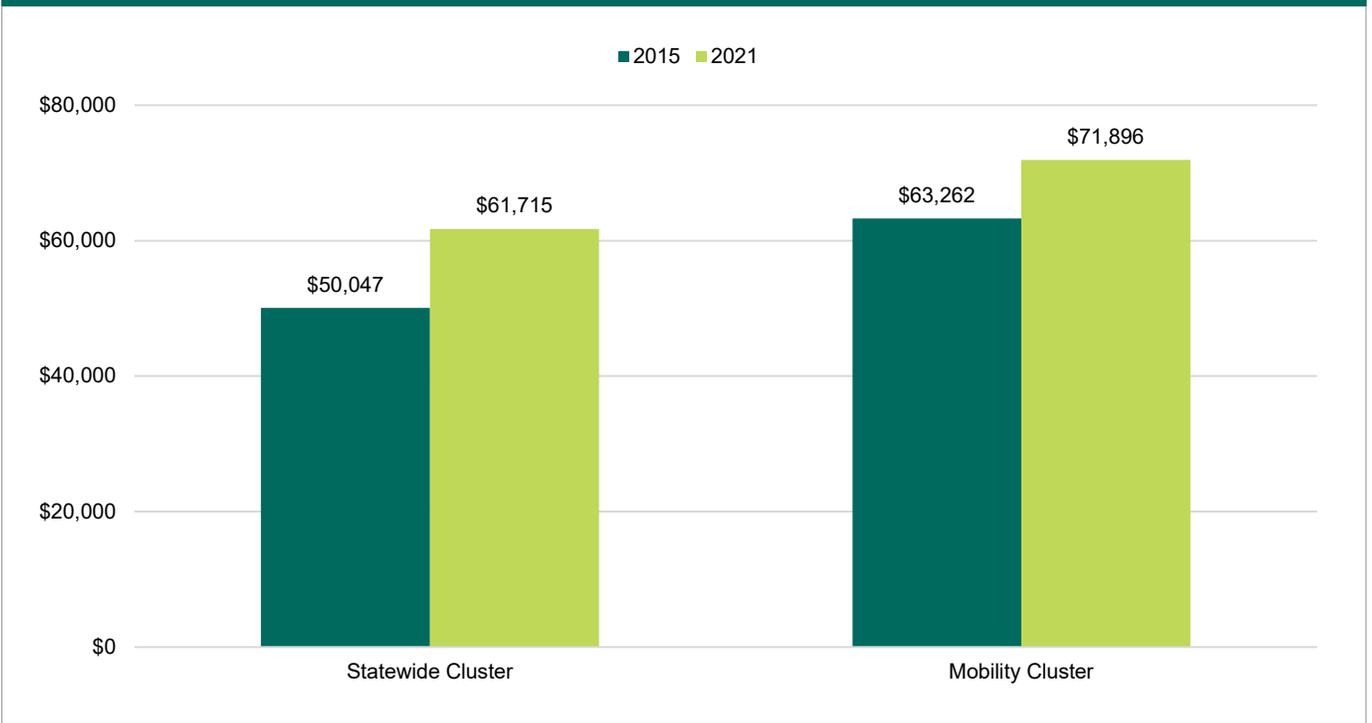


FIGURE 2: NOMINAL WAGE CHANGE, MICHIGAN MOBILITY CLUSTER, 2015–2021

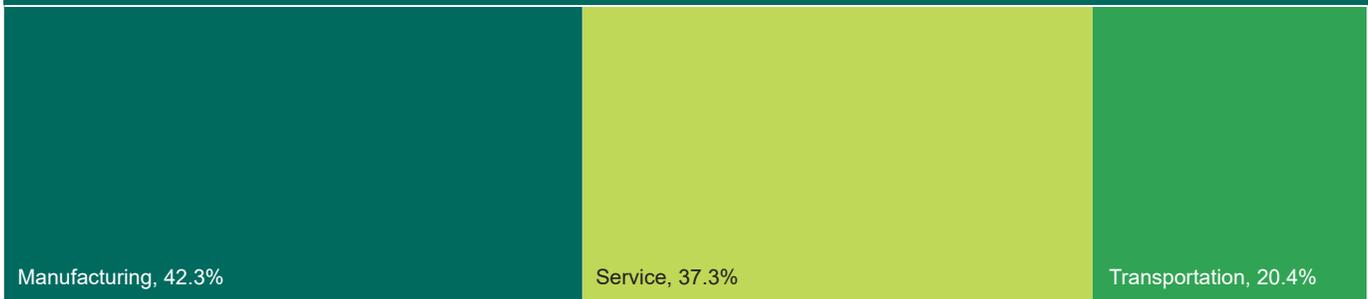


Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics
*Nominal wages are not adjusted for inflation.

Figure 2 displays the average salary in 2015 and 2021 for all employment statewide and the Mobility cluster. Since 2015, average salary growth for all employment statewide has outpaced that observed in Mobility, increasing by \$11,700 (23.3 percent) compared to \$8,600 (13.6 percent). Mobility remains one of the higher-paying clusters, however, with an average salary \$71,900 in 2021. This was \$10,100 more than the average salary observed among all employment statewide, but is less than the roughly \$13,200 gap seen in 2015.

Subclusters

FIGURE 3: SUBCLUSTER EMPLOYMENT DISTRIBUTION, MICHIGAN MOBILITY CLUSTER, 2021



Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics

Manufacturing

Transportation Equipment Manufacturing

The *Manufacturing* sector is the largest subcluster within Mobility (42.3 percent). It consists of a single industry (*Transportation equipment manufacturing*) and employed over 183,200 individuals in 2021. This industry includes (but is not limited to) the production of motor vehicles, campers, aircraft, and boats. The average annual salary of those employed in this subcluster is \$74,100, slightly higher than the average salary in the Mobility cluster (\$71,900).

Service

- Couriers and Messengers, Air
- Engineering Services
- Gasoline Stations
- Motor Vehicle and Parts Dealers

Service industries employ 37.3 percent of the Mobility cluster making it the second-largest subcluster. In 2021, the subcluster employed just over 161,300 workers in Michigan. Nearly 73 percent of the employment in the subcluster is in the industries of *Motor vehicle and parts dealers* and *Engineering services*. The average annual salary in *Service* is about \$72,800, slightly more than the average salary in Mobility.

Transportation

- Air Transportation
- Rail Transportation
- Scenic and Sightseeing Transportation
- Support Activities for Transportation
- Transit and Ground Passenger Transport
- Truck Transportation
- Water Transportation

The *Transportation* subcluster employed roughly 88,400 individuals in Michigan in 2021, making up 20.4 percent of Mobility employment. About 53 percent of employment within the subcluster is in *Truck transportation*. This was followed by *Support activities for transportation* at 17.8 percent. This industry includes establishments such as air traffic control services and motor vehicle towing. The average annual salary of \$65,700 in *Transportation* makes it the lowest-paying subcluster in Mobility.

Key Occupations

Occupational analysis is important to understanding an industry cluster. Key occupations are chosen by a favorable mix of criteria that include the occupation's share of the cluster's total employment, the concentration within the cluster, and the projected outlook for that occupation. Due to the occupations having large volumes within the cluster, they are generally representative of the expected wages, education, and skills within the industry cluster.

- All but seven key occupations in the Mobility cluster have a median hourly wage greater than the median wage for the cluster itself (\$23.09). With more experience and time on the job, four of these lower-paying occupations can pay wages greater than the median wage for the cluster.
- Nearly half of the key Mobility occupations require some form of higher education or postsecondary nondegree award. Eight occupations require at least a bachelor's degree. There are also an ample number of key occupations requiring a high school diploma or no formal credential, but also requiring some sort of on-the-job training.
- There are projected to be over 32,400 average annual openings among the 25 key occupations in the Mobility cluster between 2020 and 2030, many of these among *Heavy and tractor-trailer truck drivers*. These openings are due to a variety of reasons such as labor force exits and retirements, occupational transfers, and growth in the occupation.

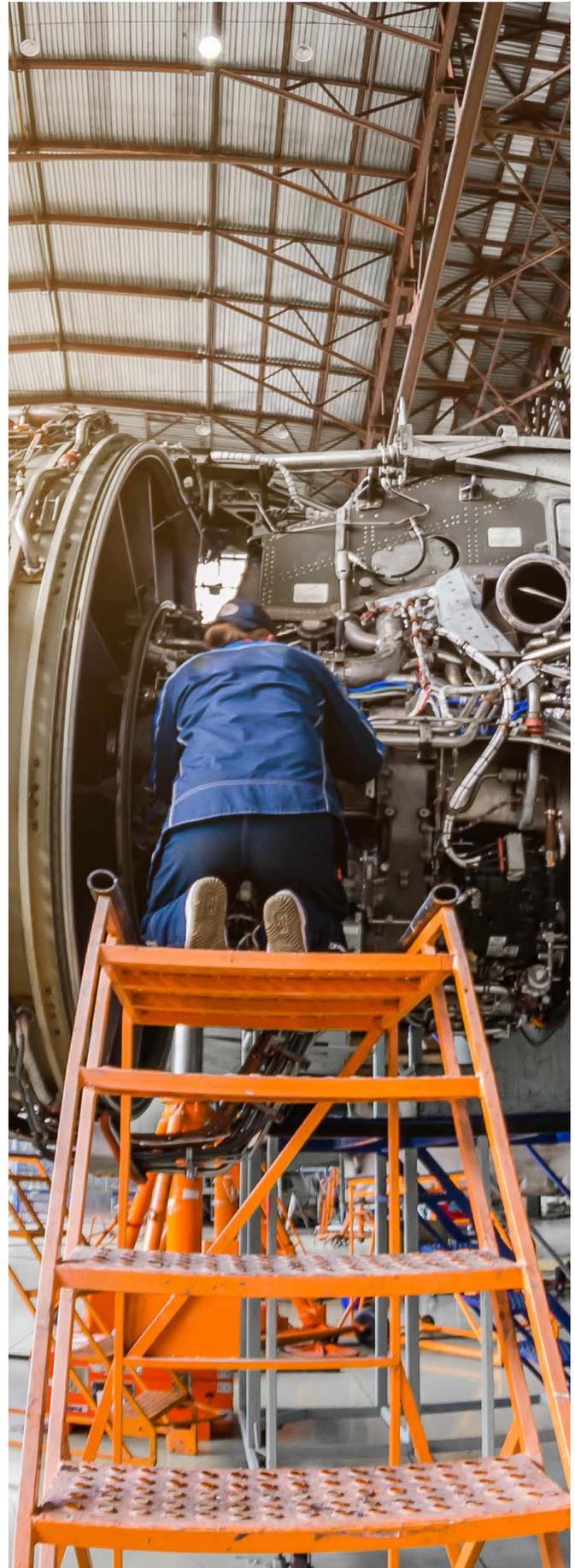


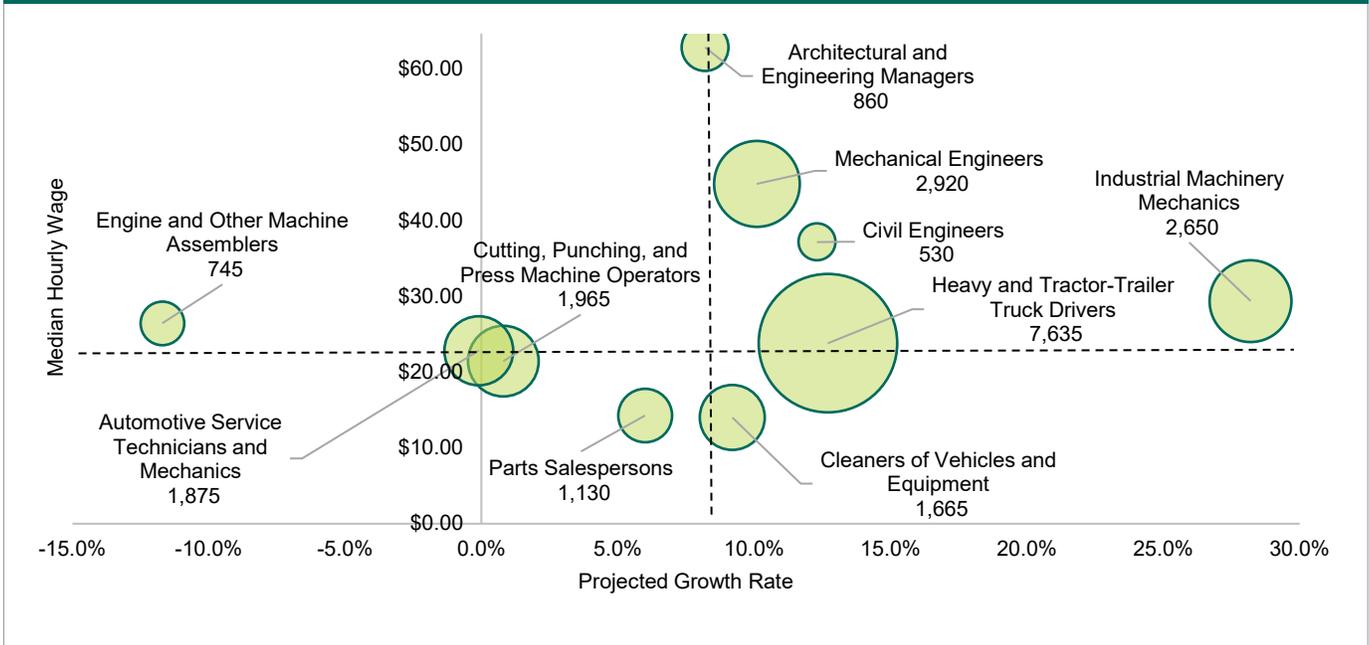
FIGURE 4: KEY OCCUPATIONS, MICHIGAN MOBILITY CLUSTER, 2021

KEY OCCUPATION	CLUSTER EMP.	MICHIGAN EMP.	CLUSTER WAGE RANGE (HOURLY)	ANNUAL OPENINGS	TYPICAL EDUCATION AND TRAINING OJT: ON-THE-JOB TRAINING
Heavy and Tractor-Trailer Truck Drivers	27,310	59,600	\$22–\$30	7,635	Postsecondary Nondegree Award and Short-term OJT
Cutting, Punching, and Press Machine Operators	15,060	23,610	\$18–\$28	1,965	High School Diploma or Equivalent and Moderate-term OJT
Mechanical Engineers	13,380	32,520	\$37–\$49	2,920	Bachelor's Degree
Automotive Service Technicians and Mechanics	9,900	19,460	\$15–\$29	1,875	Postsecondary Nondegree Award and Short-term OJT
Engine and Other Machine Assemblers	6,930	7,830	\$18–\$29	745	High School Diploma or Equivalent and Moderate-term OJT
Parts Salespersons	5,820	7,890	\$11–\$17	1,130	No Formal Education Credential and Moderate-term OJT
Industrial Machinery Mechanics	5,390	22,120	\$24–\$37	2,650	High School Diploma or Equivalent and Long-term OJT
Architectural and Engineering Managers	4,390	11,380	\$61–\$79	860	Bachelor's Degree
Cleaners of Vehicles and Equipment	3,840	9,690	\$12–\$15	1,665	No Formal Education Credential and Short-term OJT
Civil Engineers	3,770	6,640	\$30–\$47	530	Bachelor's Degree
Industrial Production Managers	3,690	13,470	\$46–\$63	930	Bachelor's Degree
Multiple Machine Tool Setters and Operators	3,670	7,400	\$17–\$30	945	High School Diploma or Equivalent and Moderate-term OJT
Mechanical Engineering Technologists and Technicians	3,530	6,720	\$23–\$37	420	Associate Degree
Flight Attendants	2,880	2,920	\$29–\$37	520	High School Diploma or Equivalent and Moderate-term OJT
Supervisors of Mechanics, Installers, and Repairers	2,850	12,890	\$29–\$46	1,340	High School Diploma or Equivalent
Electrical Engineers	2,490	10,050	\$38–\$50	645	Bachelor's Degree
Aircraft Mechanics and Service Technicians	2,210	2,740	\$22–\$37	305	Postsecondary Nondegree Award
Airline Pilots, Copilots, and Flight Engineers	2,140	2,250	\$62–\$100+	320	Bachelor's Degree and Moderate-term OJT
Shuttle Drivers and Chauffeurs	2,090	5,160	\$14–\$18	2,870	No Formal Education Credential and Short-term OJT
Industrial Engineering Technologists and Technicians	2,010	4,800	\$27–\$29	360	Associate Degree
Cargo and Freight Agents	1,680	2,490	\$18–\$28	365	High School Diploma or Equivalent and Short-term OJT
Transportation, Storage, and Distribution Managers	1,510	5,730	\$29–\$49	405	High School Diploma or Equivalent
Electronics Engineers, Except Computer	1,380	3,830	\$47–\$61	305	Bachelor's Degree
Millwrights	1,270	2,520	\$36–\$37	310	High School Diploma or Equivalent and Apprenticeship
Commercial and Industrial Designers	1,260	3,610	\$37–\$48	410	Bachelor's Degree

Source: Cluster employment, Michigan employment, and Wage range: Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (2021); Annual Openings: 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics; Typical Education and Training: U.S. Bureau of Labor Statistics

Note: Cluster employment is the total count of the occupation within the defined industry cluster, while Michigan employment is the total count of that occupation in the state across all industries.

FIGURE 5: KEY OCCUPATIONS, MICHIGAN MOBILITY CLUSTER, 2021



Source: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (Wages); 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics (Projected Growth Rate and Annual Openings)

Several key occupations within Mobility are displayed in Figure 5 and show a mix of projected long-term growth, projected annual openings, and statewide median wages. The circle sizes are determined by projected annual openings. The lines at 8.8 percent and \$21.73 indicate statewide projected employment growth through 2030 and the statewide median wage from 2021.

There is a wide range of long-term growth rates among the key occupations displayed. They range from 28.2 percent for *Industrial machinery mechanics* to -11.7 percent for *Engine and other machine assemblers*. However, while some occupations may have low or even negative growth rates, they still display a number of projected annual openings. Occupations with the largest numbers of projected annual openings also show higher-than-average growth rates including *Heavy and tractor-trailer drivers* (12.7 percent) and *Mechanical engineers* (10.1 percent).

All but three occupations in the chart earn a median hourly wage greater than that of the statewide median wage, with *Cutting, punching, and press machine operators* just missing the cut at \$21.46. Several occupations have a median hourly wage much greater than the statewide median wage, led by *Architectural and engineering managers* at \$62.87. This is followed by *Mechanical engineers* (\$44.84) and *Civil engineers* (\$37.21).



Potential Mobility Career Pathway



Pathway Source: <https://careerwise.minnstate.edu/careers/transportation-systems-infrastructure-pathway.html>
 Wage Range: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics
 Typical Education and Training: U.S. Bureau of Labor Statistics



High School Diploma or Equivalent and Short-term Training

Cleaners of Vehicles and Equipment
Industrial Truck and Tractor Operators
Laborers and Freight, Stock, and Material Movers, Hand
Light Truck Drivers
Tire Repairers and Changers

There are an ample number of Mobility-related opportunities in Michigan requiring a high school diploma or equivalent and short-term training. These occupations provide great opportunities for those interested in working in Mobility without having to obtain further postsecondary education or longer-term training and can offer a wide array of wages. The median hourly wages in the five occupations highlighted within this category range from \$14.01 to \$23.06.

Postsecondary Certificate or Moderate-term Training

Automotive Service Technicians and Mechanics
Engine and Other Machine Assemblers
Miscellaneous Assemblers and Fabricators
Surveying and Mapping Technicians
Transportation Inspectors

Many occupations within the Mobility cluster require a high school diploma and moderate-term training or a postsecondary certificate. Individuals looking for advanced wages without the commitment of obtaining a postsecondary degree or completing an apprenticeship may find these occupations to be an opportunity to advance their career. The highlighted occupations in this category earn a median hourly wage from \$18.55 to \$29.86.

Associate Degree or Long-term Training or Apprenticeships

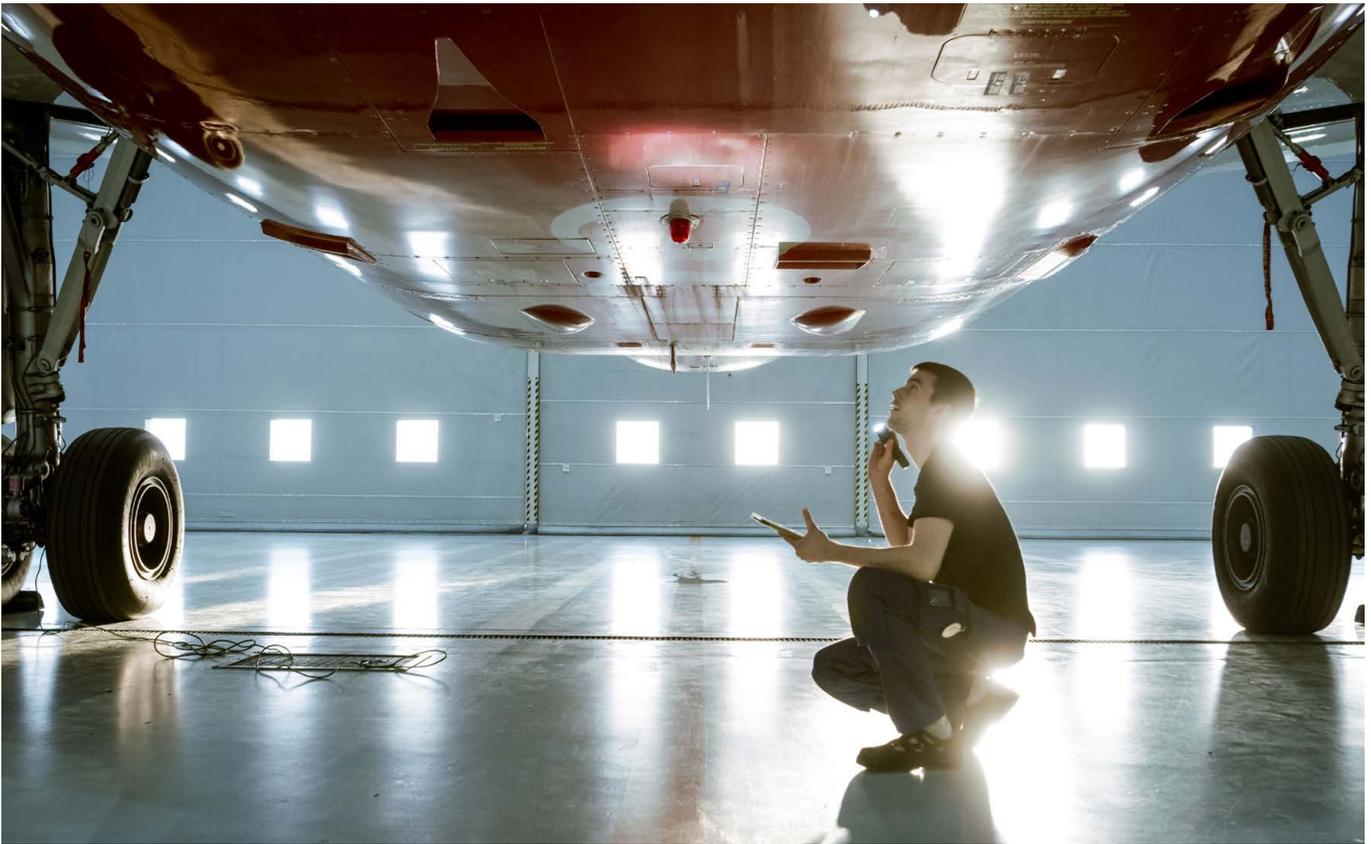
Automotive Body and Related Repairers
Civil Engineering Technicians
Electricians
Industrial Machinery Mechanics
Machinists

Completing an associate degree, apprenticeship, or long-term training (longer than 12 months) can provide several pathways to occupations which pay above the statewide median hourly wage of \$21.73. Most of the occupations highlighted in this tier require apprenticeship or long-term training rather than an associate degree. The occupations listed under this category have a median hourly wage of \$22.71 to \$36.98 and are vital to the Mobility cluster due to their high employment.

Bachelor's Degree or Higher

Architects, Except Landscape and Naval
Civil Engineers
Mechanical Engineers
Software Developers
Surveyors

Several occupations in the Mobility cluster require a bachelor's degree or higher and are often high-paying jobs. Many of the jobs in this category also require years of experience and additional training, but several are obtainable with just a bachelor's degree. This category of Mobility occupations ranges from managers to several types of engineering. The *Mechanical engineers* occupation employed over 13,000 individuals across Michigan. The median hourly wages for the occupations listed in this category vary between \$34.68 and \$49.49.



Apprenticeships

In 2021, there were more than 1,800 active registered apprentices in Mobility across Michigan. Nearly 91 percent of the active registered apprentices were in the industry of *Transportation equipment manufacturing*. Other industries which had active registered apprentices included *Air transportation* and *Truck transportation*. The cluster had a larger share of people of color (18.7 percent) than that for all registered apprentices statewide (12.2 percent). Both women (11.5 percent) and veterans (6.3 percent) had similar shares of active apprentices compared to that of all registered apprentices at 11.6 percent and 6.2 percent, respectively. The Detroit Metro region had the largest share of Mobility active apprentices at 66.8 percent. West Michigan had the second largest share at 11.8 percent.

The number of new registered apprentices in Mobility rose drastically during the last decade. There were fewer than 100 new registered apprentices each year from 2008 to 2010 and the number increased nearly every year until 2018. In 2021, there were a record 686 new registered apprentices in Mobility. Completers in the cluster dipped below 100 between 2010 and 2015, however it has significantly increased over the last few years. In 2021, there were 385 registered apprenticeship completers in Mobility.

Real-Time Demand

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry. The data is provided by Burning Glass Technologies and The Conference Board Help Wanted Online. Over time, online job advertisements have become more prevalent as technology becomes a more prominent method of communication. The use of online job postings still varies by industry with some areas of the economy being more reliant on methods such as word-of-mouth or local advertisements. However, online job advertisements can provide a mix of information about an industry cluster such as total available ads, top requested skills and certifications, minimum education requirements, and more.

Online job advertisements in the Mobility cluster were nearly stagnant in terms of growth for multiple years before dipping between 2018 and 2020, and then ultimately increasing again following the impacts of the pandemic. The stagnant years for Mobility are unlike any other industry cluster in the state. The cluster began to recover in online job ads from 2020 to 2022, and it is now nearly even with 2015 levels. In Figure 6, online job advertisements in the Mobility cluster and the state are indexed to 2015. Each level of 2015 online job advertisements were set equal to 100 and the changes were calculated from there.

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry.

FIGURE 6: ONLINE JOB ADVERTISEMENTS INDEX, MICHIGAN MOBILITY CLUSTER (INDEX YEAR: 2015)



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

Mobility is generally not a cluster that has a very high number of online job advertisements. In 2022, it had just under 49,000 online job ads (Figure 7) for the entire year, accounting for 4.6 percent of the more than one million job ads in Michigan. Looking at the cluster's obvious decline between 2018 and 2020, one occupation is a clear driving force of the drop: *Heavy and tractor-trailer truck drivers*. This occupation had a total online job advertisement decline of 6,000 ads during the time frame. Other occupations that contributed to the decrease were *Software developers, applications; Computer occupations, all other; and Engineers, all other* which all saw a drop of at least 500. Between 2020 and 2022, *Heavy and tractor-trailer truck drivers* actually increased by 1,200 online ads, making it the topmost occupation for the cluster in terms of numerical job ad growth. Additional occupations that stood out in the declining years also contributed to the growth in online ads for the cluster from 2020 to 2022.

The number of job advertisements in Mobility specifying a minimum education requirement of a bachelor's degree made up over half (53.1 percent) of all ads. Those requiring a high school diploma or equivalent were right behind at 41.7 percent. These two education levels, along with associate degrees (3.3 percent of job ads), are the driving education factors in the cluster. This can also be observed at the key occupation level (Figure 4) where typical education and training required reflects similar outcomes.

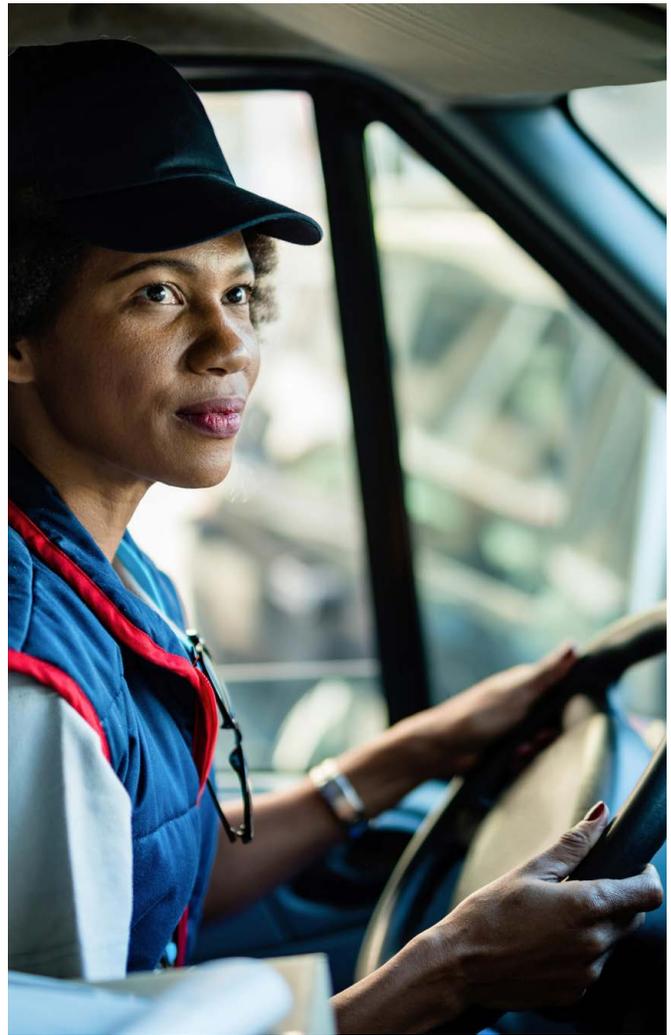
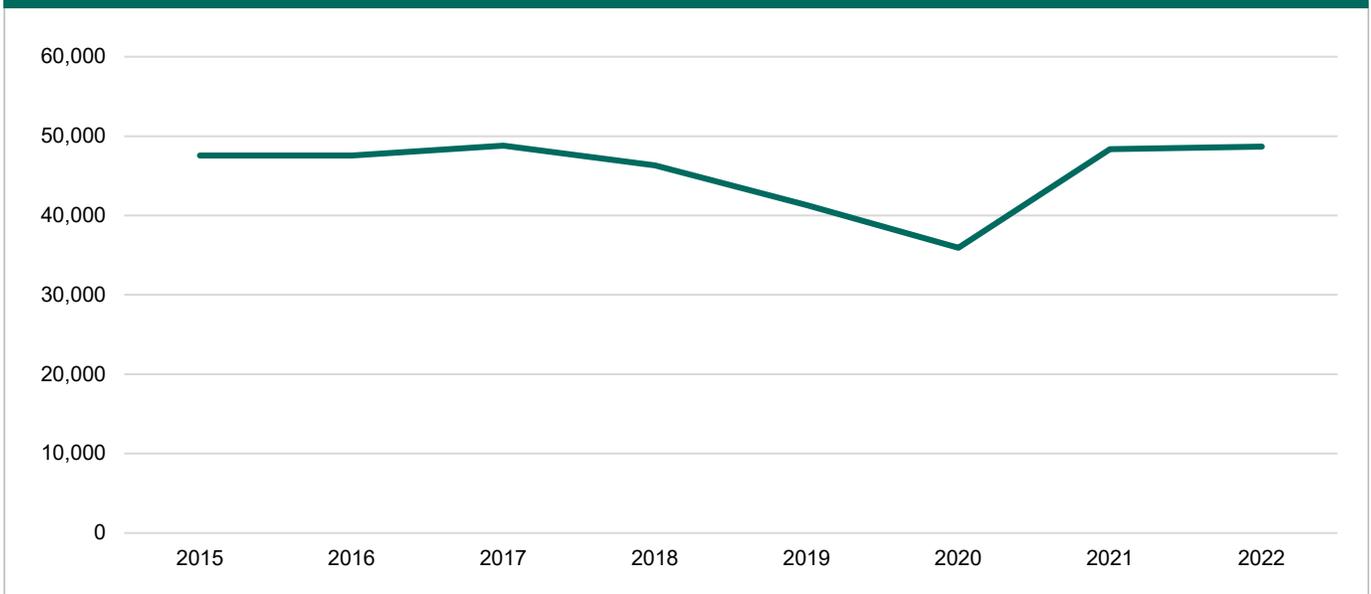
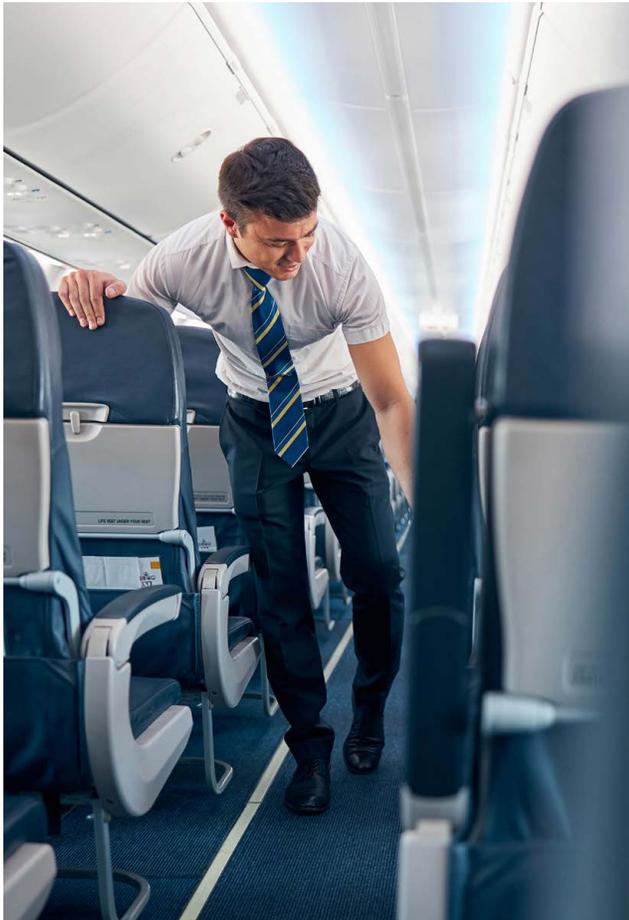


FIGURE 7: ONLINE JOB ADVERTISEMENTS, MICHIGAN MOBILITY CLUSTER



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies



The top 10 certifications and baseline or specialized skills are based on the number of times the skill or certification is listed in an online job advertisement for the specific time period (July 2021 to June 2022). Certifications are designated credentials earned by an individual to verify skills or knowledge gained to perform a job. Baseline skills are often called “foundational skills” and are defined as the common, non-specialized skills that cut across a broad range of occupations. Lastly, specialized skills include professional and job-specific skills requested in job advertisements.

Certifications and Skills Requested in Michigan Mobility Cluster Online Job Ads

Top 10 Certifications

- American Board for Engineering and Technology (ABET) Accredited
- Automotive Service Excellence (ASE) Certification
- CDL Class A
- CDL Class B
- Licensed Professional Engineer
- OSHA Forklift Certification
- Project Management Certification
- Project Management Professional (PMP)
- Security Clearance
- Six Sigma Black Belt Certification

Note: Driver's license is not listed here but did appear in the top 10 certifications for every industry cluster.

Top 10 Baseline Skills

- Communication Skills
- Detail-Oriented
- Microsoft Excel
- Microsoft Office
- Organizational Skills
- Physical Abilities
- Planning
- Problem Solving
- Teamwork/Collaboration
- Written Communication

Top 10 Specialized Skills

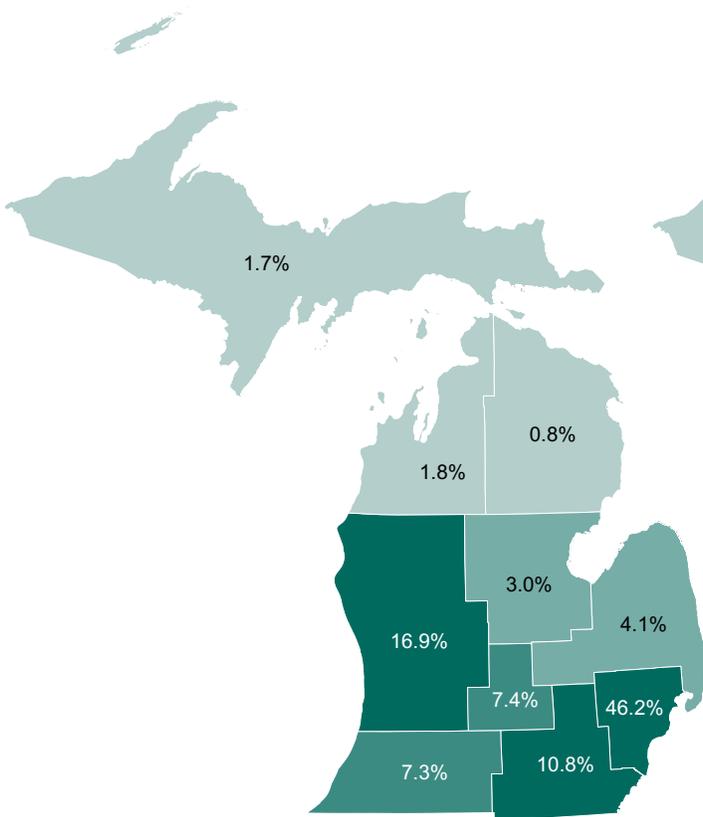
- Budgeting
- Customer Contact
- Customer Service
- Product Development
- Project Management
- Repair
- Retail Industry Knowledge
- Sales
- Scheduling
- Software Development

Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

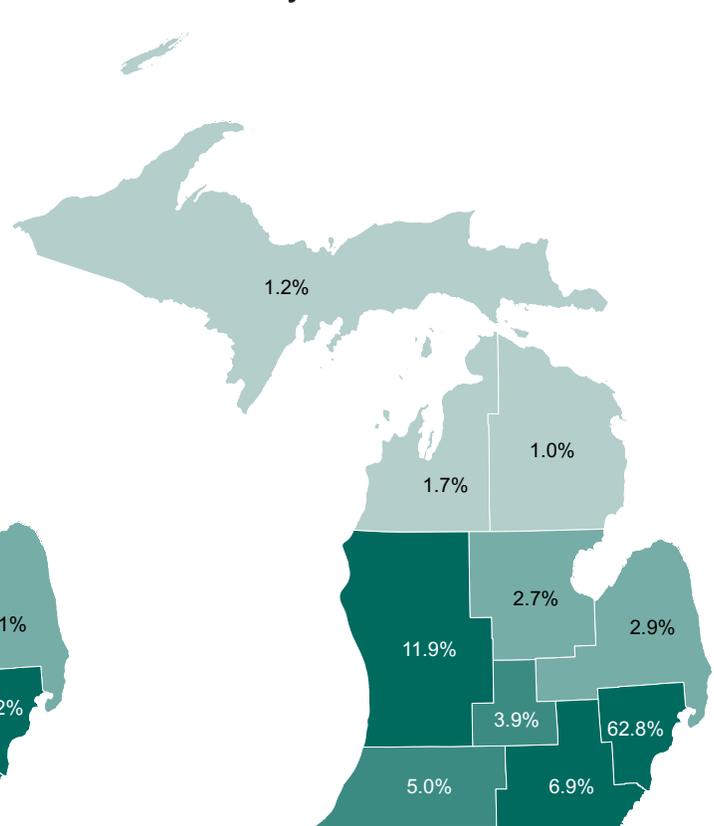


Online job advertisements in Mobility are highly concentrated in the Detroit Metro Prosperity Region. This region holds 63 percent of all ads in the cluster for the time period (July 2021 to June 2022), which is much higher than its 46 percent share of all ads across the state. This is on par with the cluster’s employment concentration (See page 20), where Mobility is over 15 percent of the region’s total employment share.

Share of Total Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Share of Mobility Cluster Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

Employment Projections

Projections do not exist by industry cluster, but they do exist for industries and occupations that make up the industry cluster. Although projections through 2030 show nearly 9 percent growth in total statewide employment, it is important to remember that these projections begin with a base year of 2020, where total employment was down compared to prior years.

The occupations with the largest projected growth rates within the Mobility cluster are shown in Figure 8. Most of these occupations appear in the key occupations for the cluster. With the exception of *Industrial engineers*, which requires a bachelor’s degree, the completion of on-the-job training or an apprenticeship is the only

requirement for these occupations. Together, these five occupations are expected to expand by more than 16,000 jobs between 2020 and 2030.

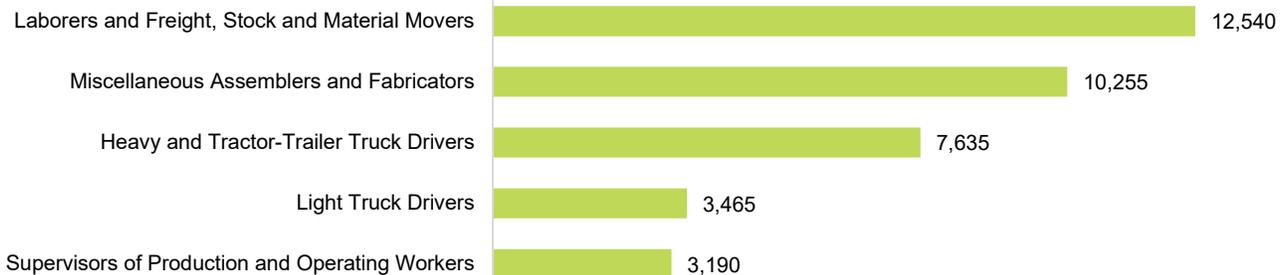
Figure 9 shows the occupations in the Mobility cluster with the greatest number of projected annual openings through 2030. Of these occupations, only *Heavy and tractor-trailer truck drivers* require a postsecondary nondegree award. The other four only require some combination of on-the-job training or experience and a high school diploma. With these occupations making up the most annual openings in the cluster, there are ample opportunities for individuals who are not furthering their education after high school.

FIGURE 8: MICHIGAN MOBILITY CLUSTER OCCUPATIONS WITH THE MOST PROJECTED GROWTH THROUGH 2030



Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

FIGURE 9: MICHIGAN MOBILITY CLUSTER OCCUPATIONS WITH THE MOST PROJECTED ANNUAL OPENINGS THROUGH 2030

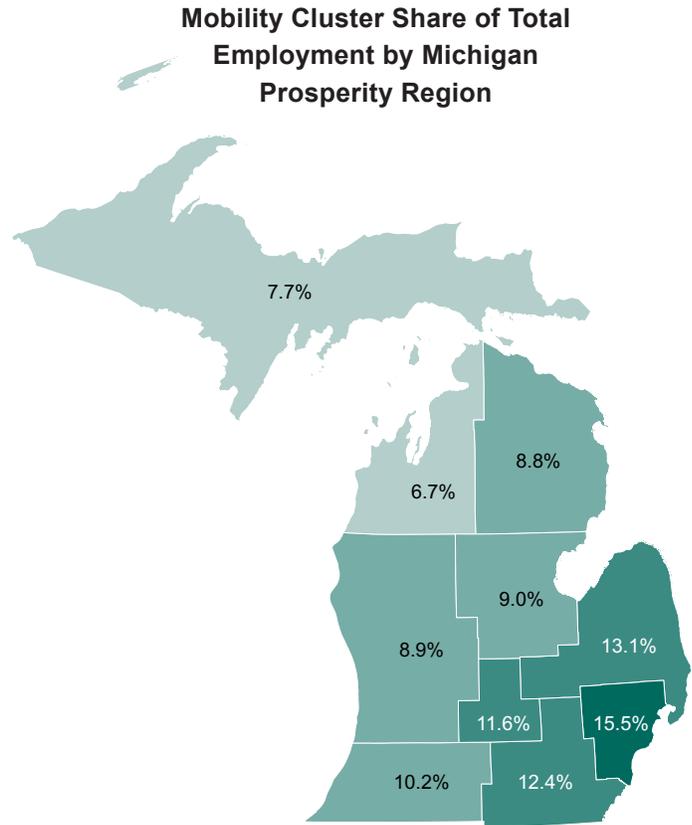


Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

Workforce Demographics

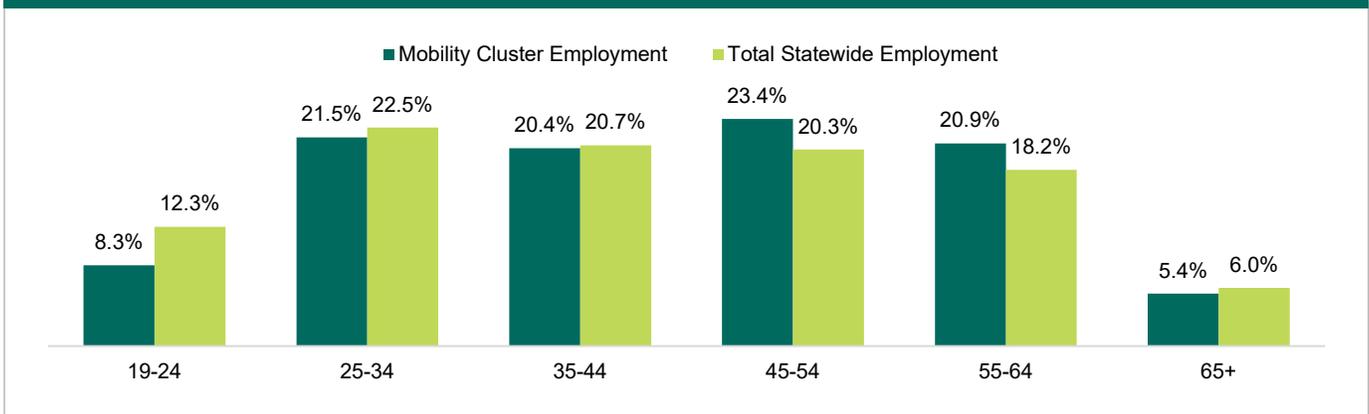
Data on workforce demographics such as gender, age, education, and race or ethnicity are important to identifying industry cluster characteristics and evaluating potential disparities. Understanding and addressing gaps in education and skills across demographic groups can aid the growth of an industry cluster. In order to maintain or attract younger workers across an industry cluster, employers may need to acclimate to what their workforce values, such as opportunities for financial and professional gain. The following section displays characteristics of the Mobility cluster workforce in Michigan. These data analyses rely on the Longitudinal Employer-Household Dynamics program and may vary from industry data published by the Quarterly Census of Employment and Wages due to limitations of data availability and differences in collection time periods.

The Mobility cluster is most heavily represented in the Detroit Metro Prosperity Region. Other regions with a greater concentration of Mobility employment include the East, Southeast, and South Central Michigan regions. Both the Upper Peninsula and Northwest Michigan regions have a lower share of Mobility cluster employment compared to the rest of the state.



Source: Longitudinal Employer-Household Dynamics, U.S. Census Bureau

FIGURE 10: MICHIGAN MOBILITY CLUSTER EMPLOYMENT BY AGE, THIRD QUARTER 2021

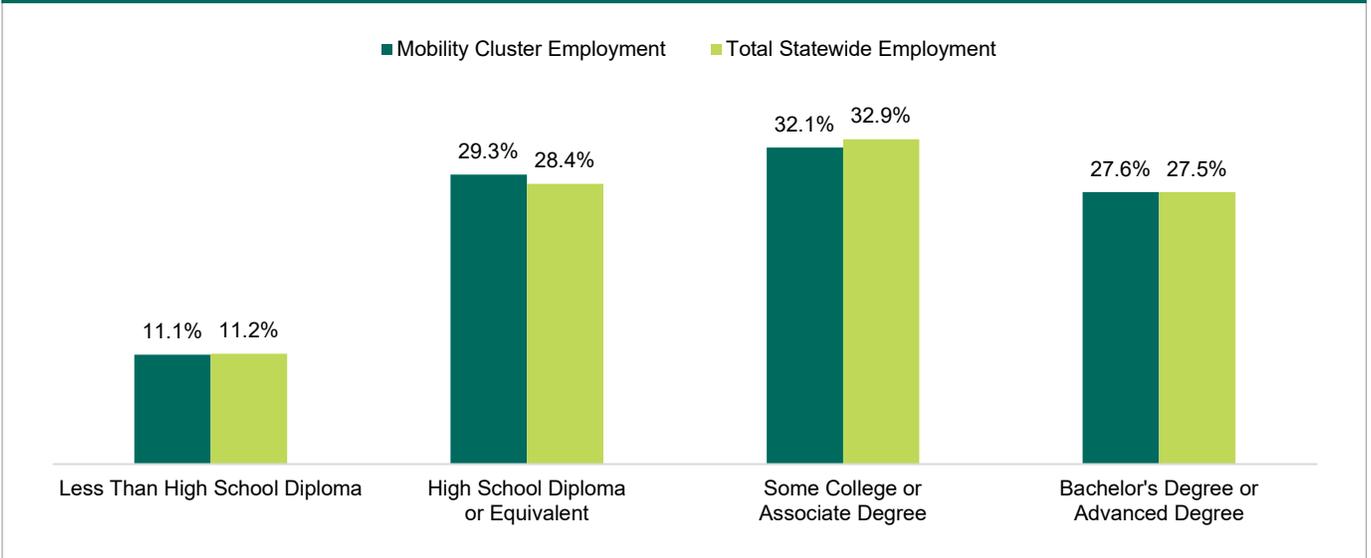


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

The older age groups of 45 to 54 and 55 to 64 are more represented in the Mobility cluster compared to statewide employment, each having a share over 2.5 percentage points greater in the cluster than total. This difference is largely offset by the share of 19- to 24-year-olds employed in the cluster, which is 4.0 percentage points less than the share for total statewide employment.



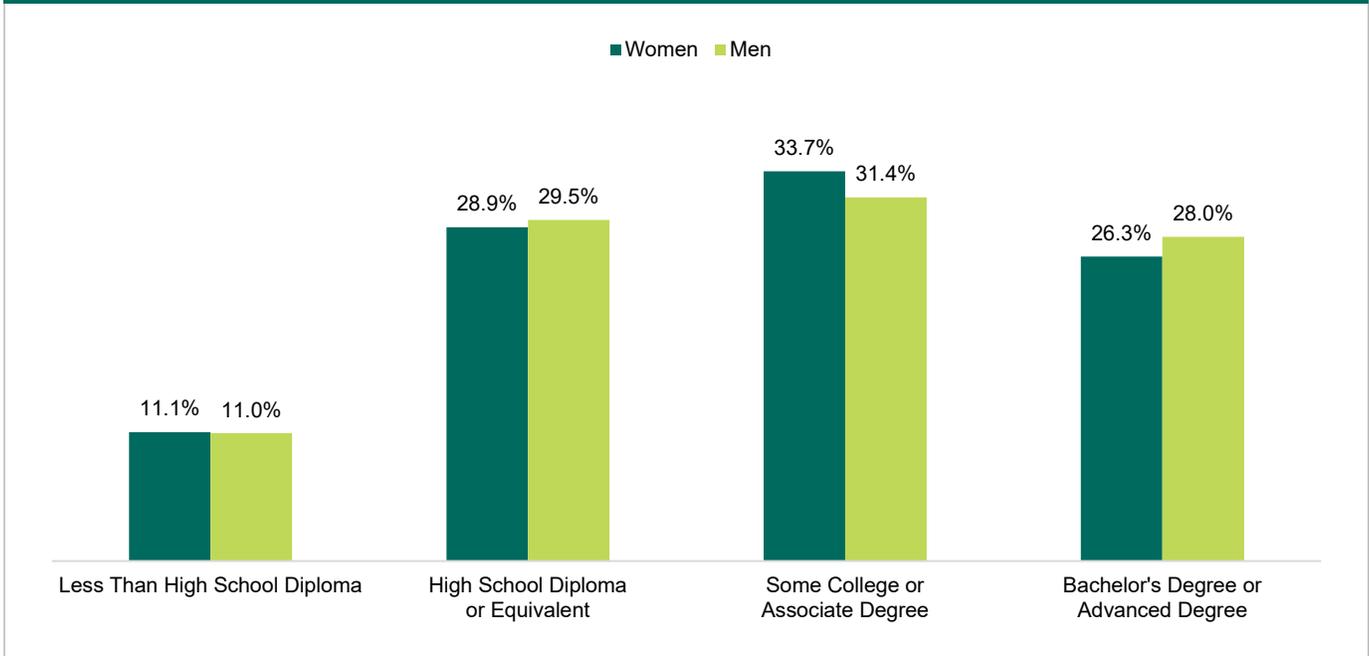
FIGURE 11: MICHIGAN MOBILITY CLUSTER EMPLOYMENT BY EDUCATION, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Employment by educational attainment level in the Mobility cluster is similar to that of the total statewide employment. Mobility's employment level of those with a high school diploma or equivalent but less than a postsecondary degree is nearly 1 percentage point greater than that of the total employment, while having about a 1 percentage point smaller share of those with some college or an associate degree.

FIGURE 12: MICHIGAN MOBILITY CLUSTER EMPLOYMENT BY EDUCATION AND GENDER, THIRD QUARTER 2021

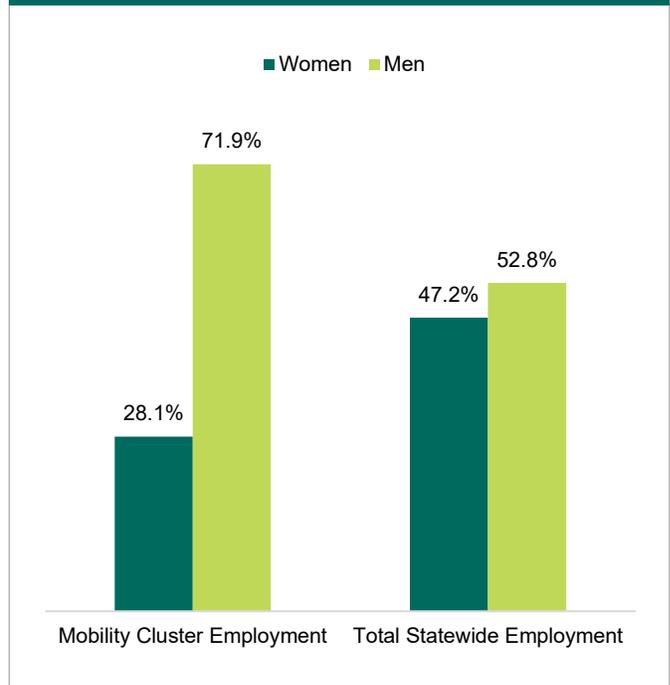


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Educational attainment between men and women is similar across each educational category. However, men have much higher quarterly average earnings within each category. The difference in average quarterly wages also increases with higher educational attainment. In order to earn what a man with an associate degree earns in the Mobility cluster on average, a woman would need to obtain a bachelor's degree or higher.

While there is a slightly higher share of men employed across all clusters statewide, the Mobility cluster employs a significantly greater number of men than women. Just under 72 percent of cluster employment were men compared to the 52.8 percent share within statewide employment. This is in line with related clusters such as Construction, Energy, and Manufacturing where men account for over 70 percent of cluster employment.

FIGURE 13: MICHIGAN MOBILITY CLUSTER EMPLOYMENT BY GENDER, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

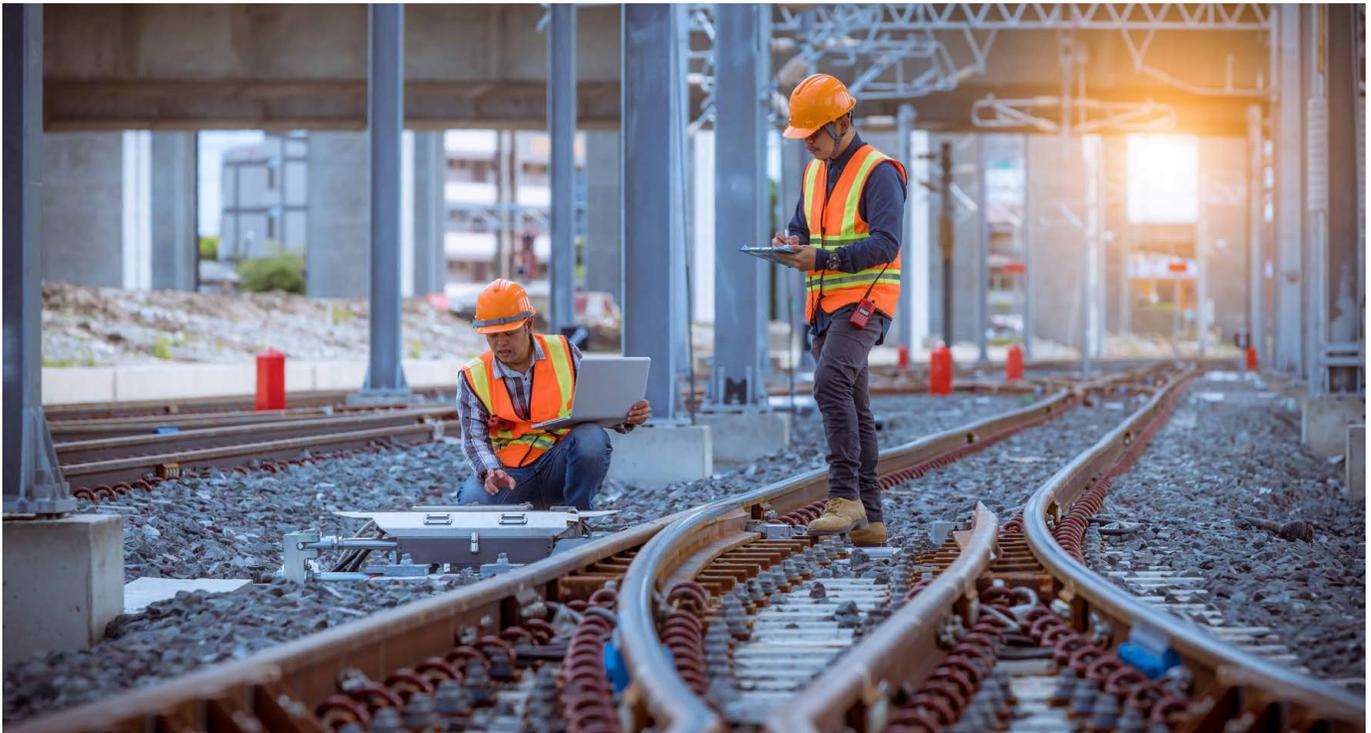
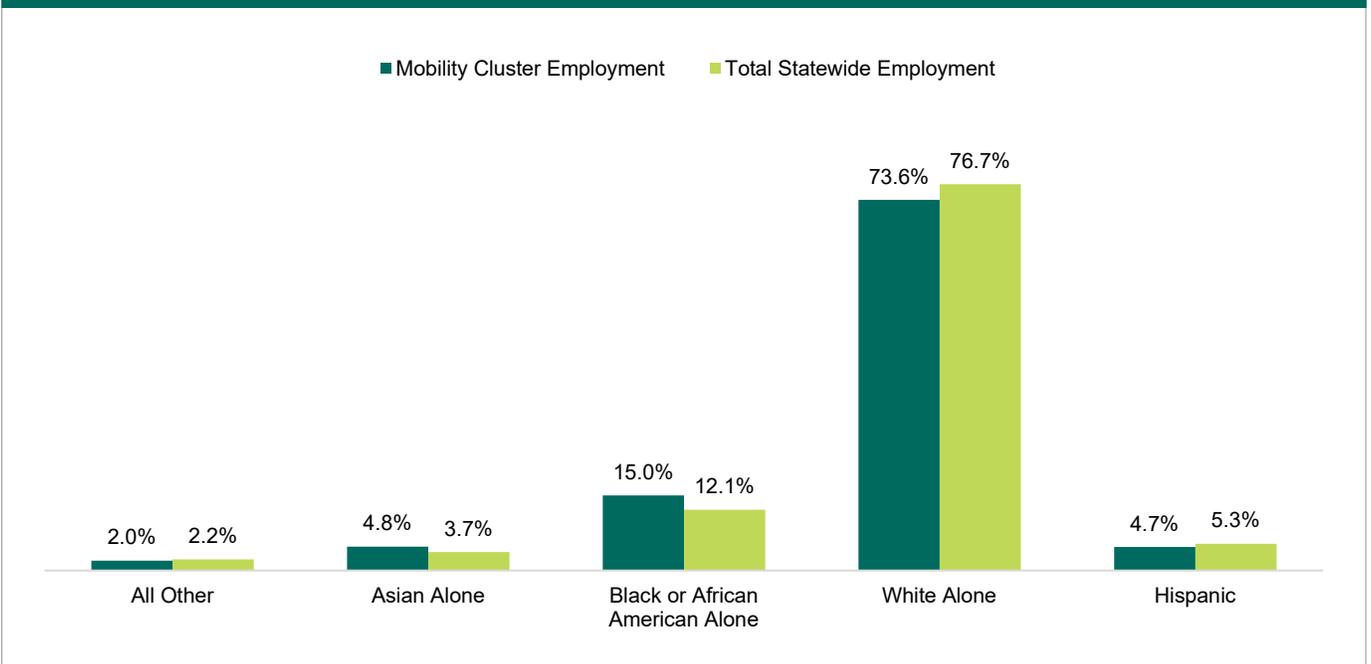


FIGURE 14: MICHIGAN MOBILITY CLUSTER EMPLOYMENT BY RACE AND ETHNICITY, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Those who are Black or African American alone have a share of employment in the Mobility cluster that is nearly 3 percentage points greater than what is observed in total statewide employment. On the opposite end, those who are white alone have a cluster employment share just over 3 percentage points less than that for all statewide employment. The Mobility cluster includes a slightly larger share of those who are Asian, while having fewer Hispanic persons.

Talent Pipeline

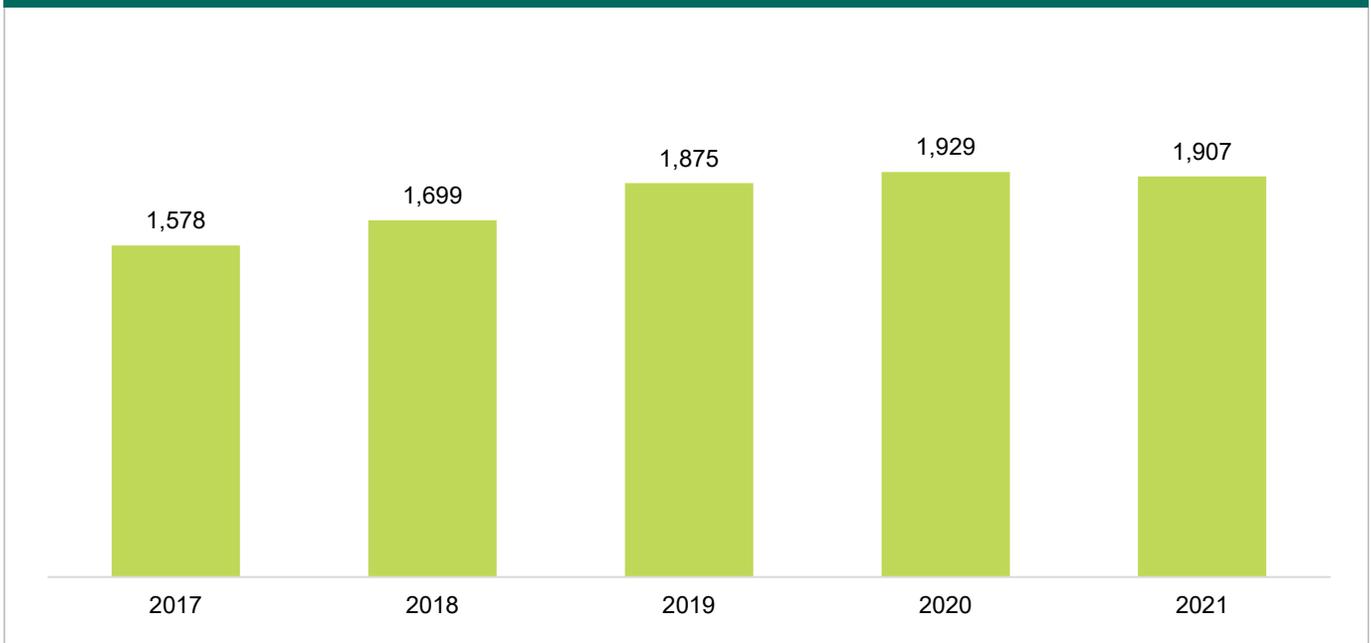
Data for education program completers of instructional programs are available from the National Center for Education Statistics. These data can be used to estimate ever-changing levels of supply for some occupations in the labor market. There are no officially defined programs for clusters. Certain programs are more likely to lead to work in the Mobility cluster than others, but there are opportunities across the educational spectrum including business, social work, and manufacturing programs to name a few. This section will highlight only a few of hundreds of possible programs that can lead to a job in the Mobility cluster. Many factors can shift completers, such as increase in student enrollment during periods of high unemployment or difficulties attending school during a pandemic. For example, demand for workers may be causing upward pressures on programs while other factors such as a lack of instructors are causing total completers to decrease.

The top two bachelor's level programs leading to careers in the Mobility cluster were *Business administration and management, general* and

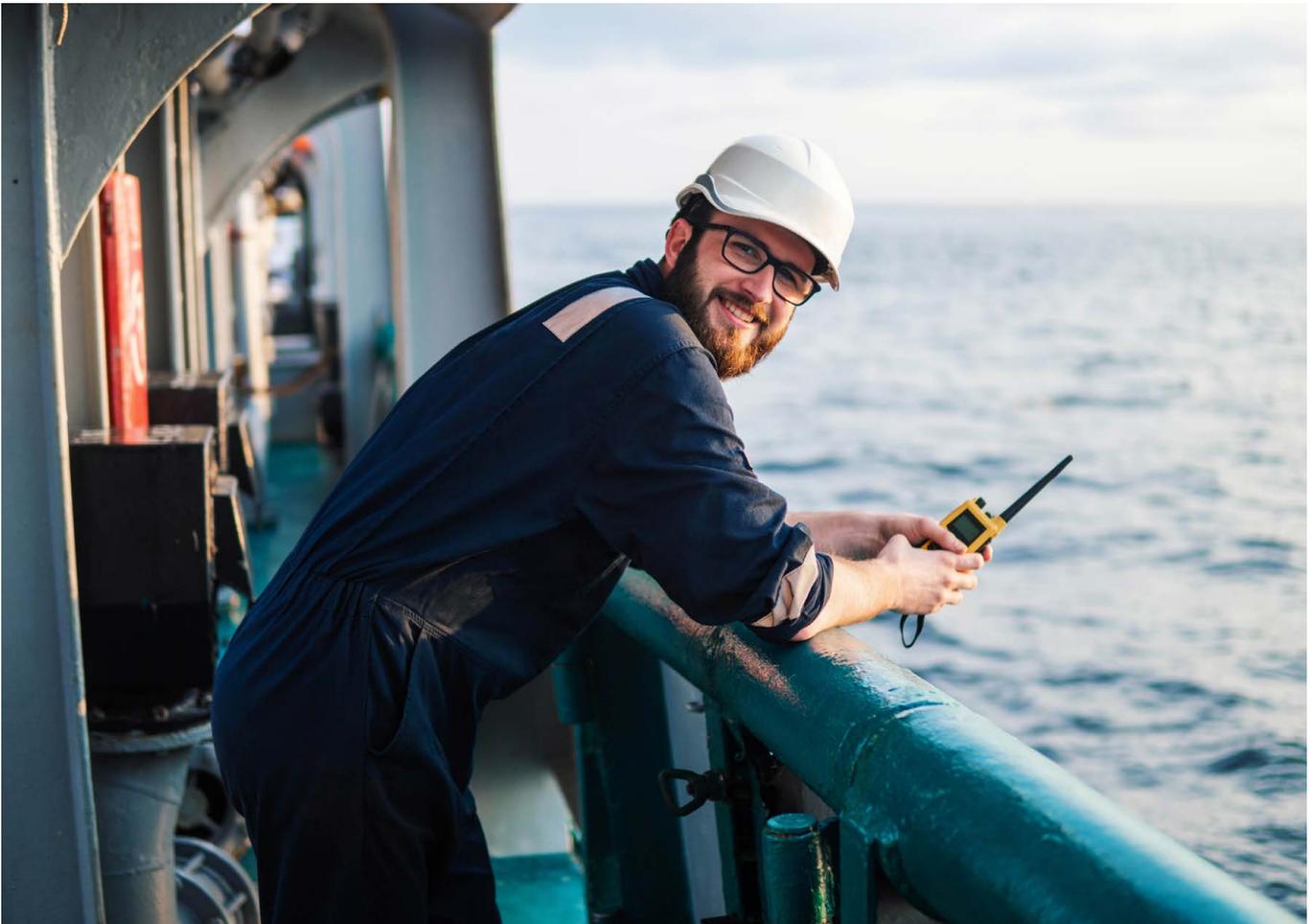
Mechanical engineering with 2,865 and 1,907 completers in 2021, respectively. Those who completed a bachelor's degree in *Mechanical engineering* came from 18 unique programs across the state and the University of Michigan-Ann Arbor had the highest number of completers with 316. Other common bachelor programs in the state which lead to the Mobility cluster include, but are not limited to, *Finance, general* (1,544), *Electrical and electronics engineering* (873), and *Logistics, materials, and supply chain management* (832).

Those with master's degrees are also very important to the cluster. While the large majority of completers with a master's degree in Mobility were *Business administration and management, general* (3,010), other critical programs included *Mechanical engineering* (507) and *Electrical and computer engineering* (309).

FIGURE 15: MICHIGAN MECHANICAL ENGINEERING BACHELOR'S PROGRAM COMPLETERS, 2017–2021



Source: National Center for Education Statistics, Integrated Postsecondary Education Data System



Several short-term certificate programs also see many completers in the Mobility cluster. Programs such as *Truck and bus driver/commercial vehicle operator and instructor* (396), *Welding technology/welder* (224), and *Airframe mechanics and aircraft maintenance technology/technician* (162) all make up majority of such completers. These programs are typically only captured in the data if they are completed at federally funded institutions. There are likely further short-term training programs in the state at unreported educational centers.

Other programs which could lead to employment within the Mobility cluster include supply chain management, computer science, and civil engineering.

Conclusion

Mobility is a rapidly evolving cluster in Michigan and offers high wages, many occupations with large growth rates, and a wide variety of opportunities regardless of educational attainment and skill level. There are also some challenges that the cluster faces, such as lack of regional diversity and a lower representation of women than other clusters.

Strengths

Many Employment Opportunities for Those with a High School Diploma but Less Than a Postsecondary Degree

The share of those with a high school diploma or equivalent but less than a postsecondary degree is slightly higher in the Mobility cluster than the total statewide employment by about 1 percentage point. Providing opportunities for a wide range of educational attainment allows the Mobility cluster to employ a wider range of individuals compared to other clusters, potentially making it more attractive to those who may not choose to continue their education beyond high school.

Mobility is a High-Paying Cluster

The average Mobility cluster salary of \$71,900 is significantly higher than the \$61,700 average salary for all employment in Michigan. Furthermore, each subcluster within Mobility offers a higher average salary than the average salary for statewide employment. Offering high wages in the cluster across an array of different occupations means that the cluster can be more competitive with attracting talent.

Many High-Growth Occupations

There are several occupations projected to have extremely high growth rates between 2020 and 2030. These occupations include (but are not limited to) *Industrial machinery mechanics* (28.2 percent), *Software developers and quality assurance analysts* (22.8 percent), *Flight attendants* (21.5 percent), and *Industrial engineers* (20.4 percent). This is compared to the projected growth rate for all occupations in Michigan, which is 8.8 percent over the same time period.

Increases in Apprenticeship

Over the last few years, the number of apprentices in the Mobility cluster has grown drastically. This is important, as apprenticeships often lead to high-paying jobs for those who complete their programs. Mobility apprentices also tend to be more racially diverse than Michigan apprentices overall, allowing pathways toward good jobs for a multitude of individuals.

Mobility is a Rapidly Evolving Cluster

Mobility has always been a critical sector in Michigan, but historically it has been grouped with Manufacturing, since automobile manufacturing was dominant. However, over the last decade, the focus on electric and autonomous vehicles has changed the way many think about Mobility. With changing technology and innovation around Mobility in Michigan, the definition of the cluster has evolved and will continue to change. While an inconsistent definition of Mobility may be seen as a challenge, Michigan can view this as a strength as the state looks to remain on the forefront of the cluster nationally.



Challenges

Heavier Reliance on Older Age Groups

The Mobility cluster has an above-average share of employment among the age groups of 45 to 54 and 55 to 64, and a significantly lower share of those age 19 to 24 compared to statewide employment. As older workers begin to retire, the importance of younger age groups in Mobility will increase.

Small Share of Women

Women are significantly less represented in Mobility than men. Just over 28 percent of total employment in the cluster are women compared to 72 percent being men. Statewide, women make up about 47 percent of total employment. This may be due to certain occupations in the Mobility cluster being historically male dominated, but a push toward making the cluster more accessible to women could help expand Mobility in Michigan.

Wages in Mobility Have Grown Slower

Over the last 10 years, wages in the Mobility cluster have grown much slower compared to wages for all clusters in Michigan. In fact, since 2015, wages have grown 9.7 percentage points slower than the statewide. So, while the cluster may be higher paying, wage progression in the cluster has lagged behind other clusters.

Employment is Concentrated in Populous Regions of Michigan

Mobility employment and opportunities tend to be more heavily represented in the populated regions of Michigan. Most job advertisements were in the Detroit Metro region, and West Michigan had the second most. The Detroit Metro region, along with East, Southeast, and South Central Michigan all have a greater concentration of Mobility jobs than the statewide share of employment in Mobility. The more rural northern regions of the state tend to have fewer Mobility jobs in their labor markets.



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