



Workforce Analysis Manufacturing Summer 2023



Table of Contents

Introduction.....	1
Analysis Methodology.....	1
Research Limitations.....	1
The Manufacturing Industry.....	4
Employment in Manufacturing.....	4
Manufacturing Employment by Broad Occupational Group.....	7
Occupations in Manufacturing with High-demand and High-wages.....	9
Highlighting Educational Programs Preparing Arizona’s Advanced Manufacturing Workforce.....	12
Key Findings.....	15
Recent Manufacturing Expansions/Relocations.....	17
Conclusions.....	18

This report is one industry of a larger analysis covering five target industries: construction, cybersecurity/IT, financial services, healthcare, and manufacturing.



Introduction

The Greater Phoenix region is a leader in the development of the state's economy and has become a notable leader across the nation as a whole. The state has become a destination for not only new residents, but for new businesses as well. Workforce quality, availability, and cost effectiveness are keys to maintaining this momentum.

Rounds Consulting Group ("RCG") partnered with the Greater Phoenix Chamber Foundation ("Foundation") to perform a workforce summary of key target industries including a "high-level" review of supply and demand opportunities and constraints. The analysis examined multiple data points from various sources in order to determine if the supply of labor in the target sectors is expected to meet the demand. The five target industries include: Manufacturing, Construction, Healthcare, Financial Services, and Cybersecurity/IT.

Analysis Methodology

Within the analysis, employment projections from the Arizona Office of Economic Opportunity ("OEO") were used to determine the number of jobs that are expected to be demanded by either industry sub-sector or occupation within the given industries over the next 10 years. Information was then collected related to the educational requirements needed for entry into each occupation or industry sub-sector.

The information was analyzed and displays the total number of jobs that will be demanded by industry sub-sector or occupation at each educational attainment level (i.e., requiring a high school diploma, associate's degree, bachelor's degree, etc.). The statistics were then compared to degrees awarded, graduation rates, post-secondary education outcomes, and retention rates, among other data, from the Arizona Department of Education ("ADE") and the Arizona Board of Regents ("ABOR").

These figures were combined with projected population inflow data to determine the overall workforce supply that is expected in Arizona over the next 10 years. The information is presented from top to bottom. In other words, the broader industry data is presented first followed by more detailed occupational data and detailed information about degrees awarded.

The gap between supply and demand that was identified provides an insight into the strengths and weaknesses in the state's workforce and education pipeline. This information can also serve as a high-level guide in forming public policy recommendations and decisions.

Research Limitations

This research analysis is subject to certain limitations arising from the limited availability of data and the classification of the available data. These limitations should be taken into consideration when interpreting and generalizing the findings of this high-level analysis.

First, the entire scope of degrees awarded by all of the state's universities and colleges is limited and can vary among the institutions and regions. Variations in data collection methods, reporting, and disclosure policies may contribute to gaps or discrepancies in the information obtained. Furthermore, predicting the industry that specific graduates will enter upon earning their degree is a challenging task due to the dynamic nature of the job market and evolving industry trends. Factors such as individual preferences, market demands, technological advancements, and economic conditions greatly influence the career choices made by graduates, making it difficult to make precise projections. Consequently, the research outcomes may not represent the entire landscape of degrees or the industries in which graduates will enter; therefore, caution should be used when interpreting the information related to university and college degrees.

Introduction

Secondly, there are two standard classification systems of the available data regarding employment counts, occupations, wages, and projections utilized by both the federal and local governments: the North American Industry Classification System (“NAICS”) and the Standard Occupational Classification (“SOC”).

NAICS and SOC are distinct classification systems designed to categorize different aspects of employment data. NAICS primarily focus on classifying establishments and industries based on the primary activity of a business – while SOC classifies occupations based on job duties, skills, and qualifications across various industries. The differences in the classification framework and criteria make it difficult to cross-reference and reconcile the data between the two systems.

Furthermore, the NAICS and SOC systems have different hierarchical structures. The NAICS system organizes industries into hierarchical levels based on broad economic sectors, industries, and sub-industries. While the SOC system classifies occupations into hierarchical levels based on broad occupations and detailed occupations within the broader group.

Utilizing NAICS data provides insights into industry trends or sector-specific research. However, caution should be used when analyzing the industry’s workforce as several varying occupations can be employed at establishments that are classified under similar industries. SOC data should be used when analyzing occupations with similar skills, job duties, and education. However, the workers in the occupational groups can be employed in various industries.

While cross-referencing NAICS data with SOC data presents its challenges due to the differing classification systems, both are valuable resources and analyzed in this report. Further NAICS and SOC definitions and information regarding the classifications are summarized in the following table.

Due to the research limitations, it is essential to interpret and utilize the findings of this research with caution. The intent of this disclosure is to ensure transparency and promote a responsible understanding of the scope and implications of the research conducted for this assignment. It is recommended that further research by industries employing more extensive data collection methods should be considered to enhance the validity and reliability of the findings.

For any inquiries or clarifications regarding this disclosure statement or the research conducted, please feel free to contact RCG or the Foundation.

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Introduction

Table 1: NAICS and SOC Definitions and Classifications

North American Industry Classification System - NAICS

NAICS employment and payroll data is based on survey information collected from establishments (i.e., employers). The establishments are grouped into industries according to similarity in the processes used to produce goods or services.

For example, a semiconductor manufacturing company would be classified under the broader manufacturing industry (i.e., NAICS 31-33) and the semiconductor and related device manufacturing sub-industry (i.e., NAICS 33-4413).

Although the sub-industry is comprised of establishments primarily engaged in similar activity, the employment and payroll data include occupations of all types such as management professionals, accountants, human resource managers, engineers, production workers, janitorial staff, etc.

Standard Occupational Classification - SOC

The SOC system classifies occupations based on their job duties, skills, and qualifications. It encompasses a wide range of occupations across various industries and sectors. Each broad occupational group is further broken down into detailed occupations, representing specific job titles and roles.

Examples of detailed occupations within the broad occupational “nurse” group include registered nurses, nurse anesthetists, nurse midwives, nurse practitioners, etc. Nurses, however, can be employed across different industries such as the ambulatory healthcare services industry, hospital industry, nursing and residential care industry, and the social assistance industry.

The SOC system is widely used for various purposes, including labor market analysis, workforce policy development, and research on occupational trends. The data is compiled through collaboration with government agencies, subject matter experts, employers, and labor market analysts as well as various surveys.

Source: U.S. Census Bureau; U.S. Bureau of Labor Statistics

The Manufacturing Industry

The manufacturing industry in Arizona has traditionally created economic stability and has been a driver of economic activity in the state for decades. Recent attraction efforts have resulted in several international manufacturing organizations relocating into the state and other established businesses opting for local expansion.

The state has grown into a premier center for advanced manufacturing operations (i.e., semiconductors, electric vehicles, and batteries, etc.), and offers employment opportunities that are higher-wage and disproportionately contribute to the region's growing economic activity¹.

The West Valley in particular, over the past few years, has recruited well-known manufacturing businesses including TSMC, Nestle, U.S. Merchants, Enviro-Log Company LLC, HyRel Technologies, Avanti Windows and Doors, and Rehrig Pacific, among many others.

“Arizona’s emergence as an advanced manufacturing powerhouse means (the creation of additional) high paying jobs and high-value industries in our state.”

- Sandra Watson, President and CEO of the Arizona Commerce Authority

Employment in Manufacturing

According to the Arizona Office of Economic Opportunity (“OEO”), the manufacturing industry (as defined under NAICS 31-33²) employed 6.2% of the total statewide workforce as of 2022 (see Figure 1). This is compared to the national manufacturing industry which represented 8.4% of the total national workforce in 2022, according to the U.S. Bureau of Labor Statistics (“BLS”).

However, since manufacturing provides higher wages than average and produces greater opportunities for suppliers to locate nearby, the overall impact on the economy is even larger. As of 2022, 8.7% of state GDP is related to manufacturing, as displayed in Figure 2.

When a region has not reached its full economic potential in certain industries compared to the nationwide average, it presents an opportunity for growth and job opportunities because of the lack of saturation. This will allow the state to leverage its skilled labor force, available land, and relative affordability to continue to attract manufacturing businesses. In fact, the state is currently progressing through a manufacturing transformation. Job counts in manufacturing are increasing along with wages. This is what drives healthy economic growth.

In 2022, there were approximately 192,500 people employed in Arizona’s manufacturing industry, according to the OEO. The industry grew 5.4% from 2021 to 2022, adding over 9,900 new employees.

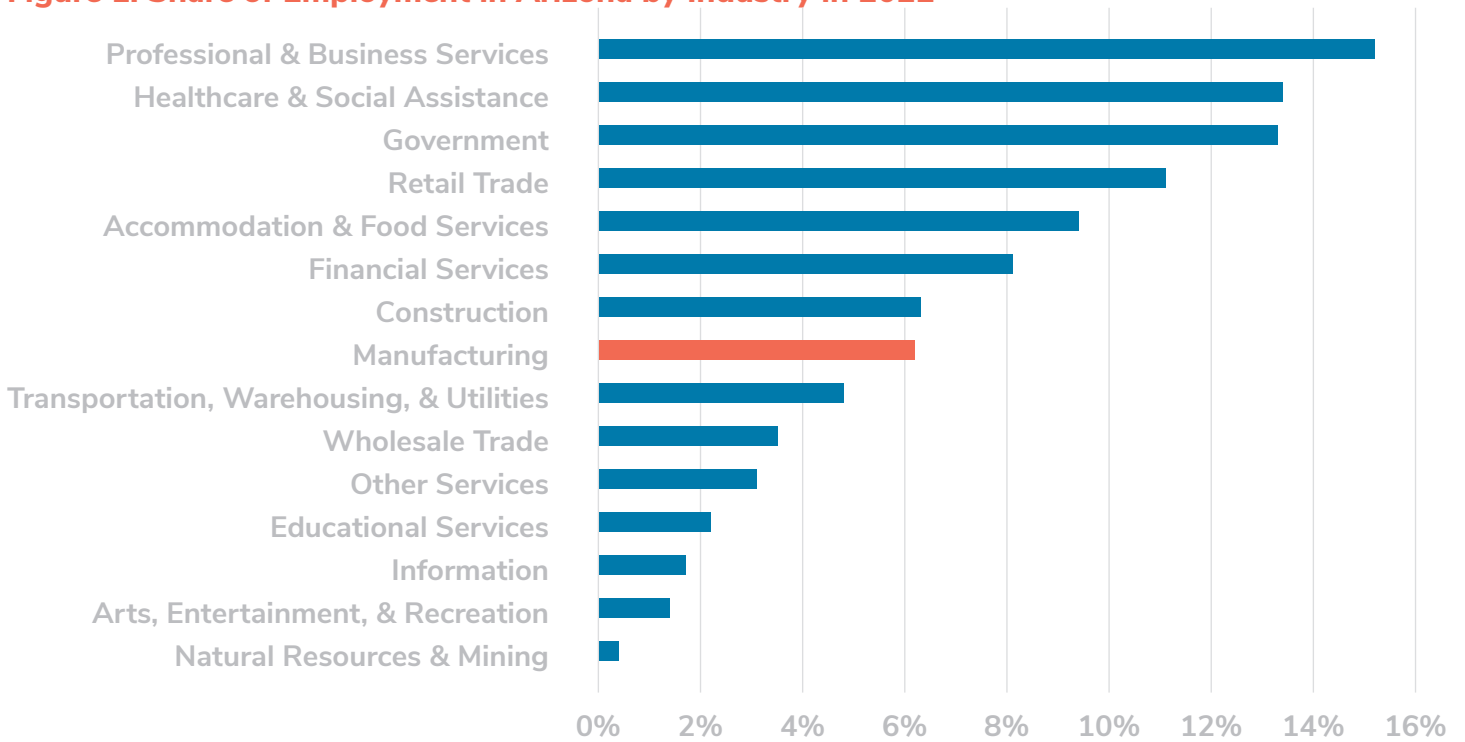
¹ <https://www.azcommerce.com/news-events/news/2022/10/made-in-arizona-manufacturing-month-kicks-off/>

² The North American Industry Classification System, or NAICS, employment and payroll data is based on survey information collected from establishments (i.e., employers). The establishments are grouped into industries according to similarity in the processes used to produce goods or services. NAICS 31-33 is comprised of establishments that primarily engage in the chemical, mechanical, or physical transformation of materials or substances into new products.

The Manufacturing Industry

Over the previous 10 years, the manufacturing industry has grown at an average rate of 2.1% per year, as displayed in Figure 3. This is compared to a national average growth rate of 0.7% within the industry over the same 10-year period. The state's manufacturing industry continues to attract significant investments and foster job opportunity, solidifies the economic base, and makes the economy more resilient to the ebbs and flows of the business cycle.

Figure 1: Share of Employment in Arizona by Industry in 2022

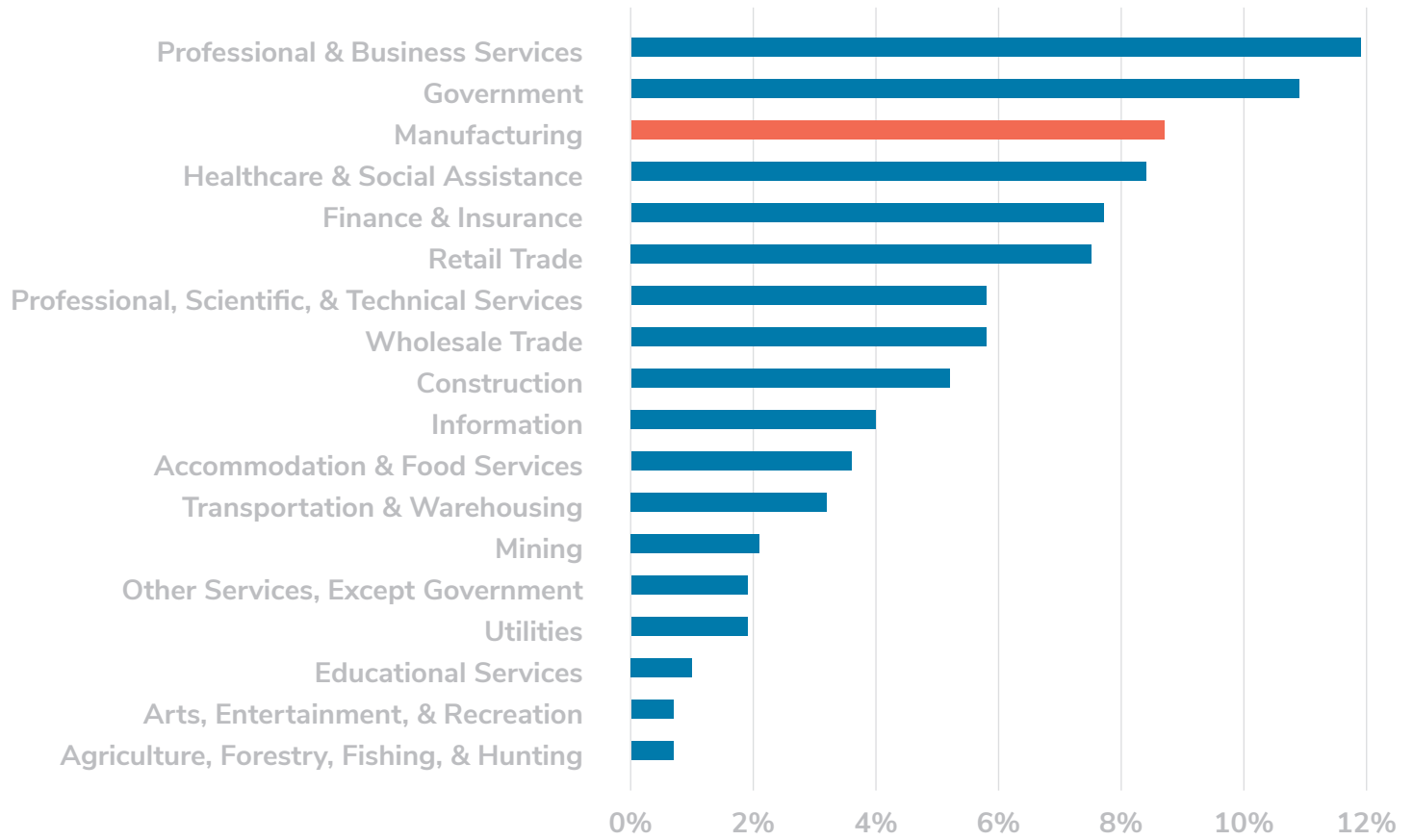


Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity

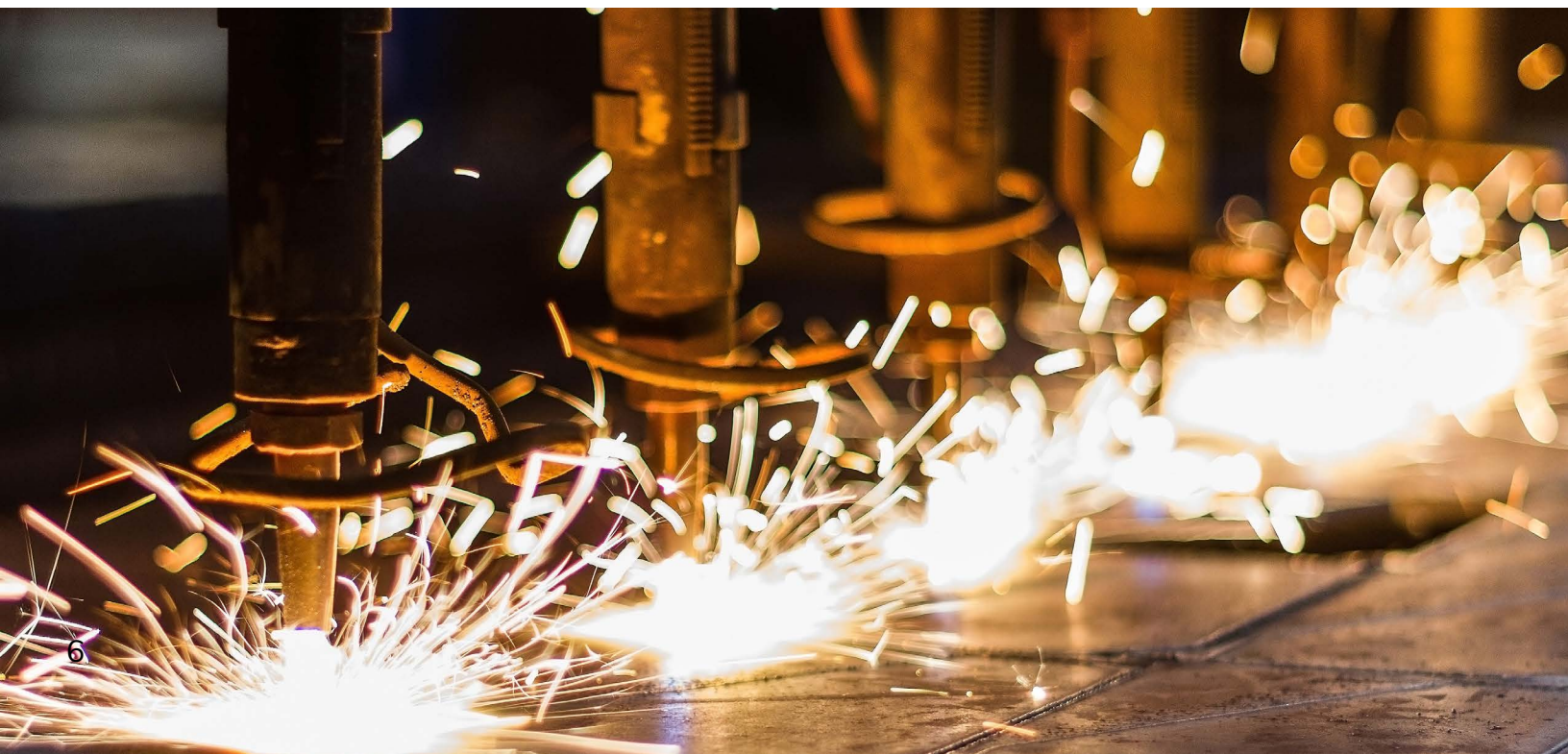


The Manufacturing Industry

Figure 2: Share of Arizona's GDP by Industry in 2022

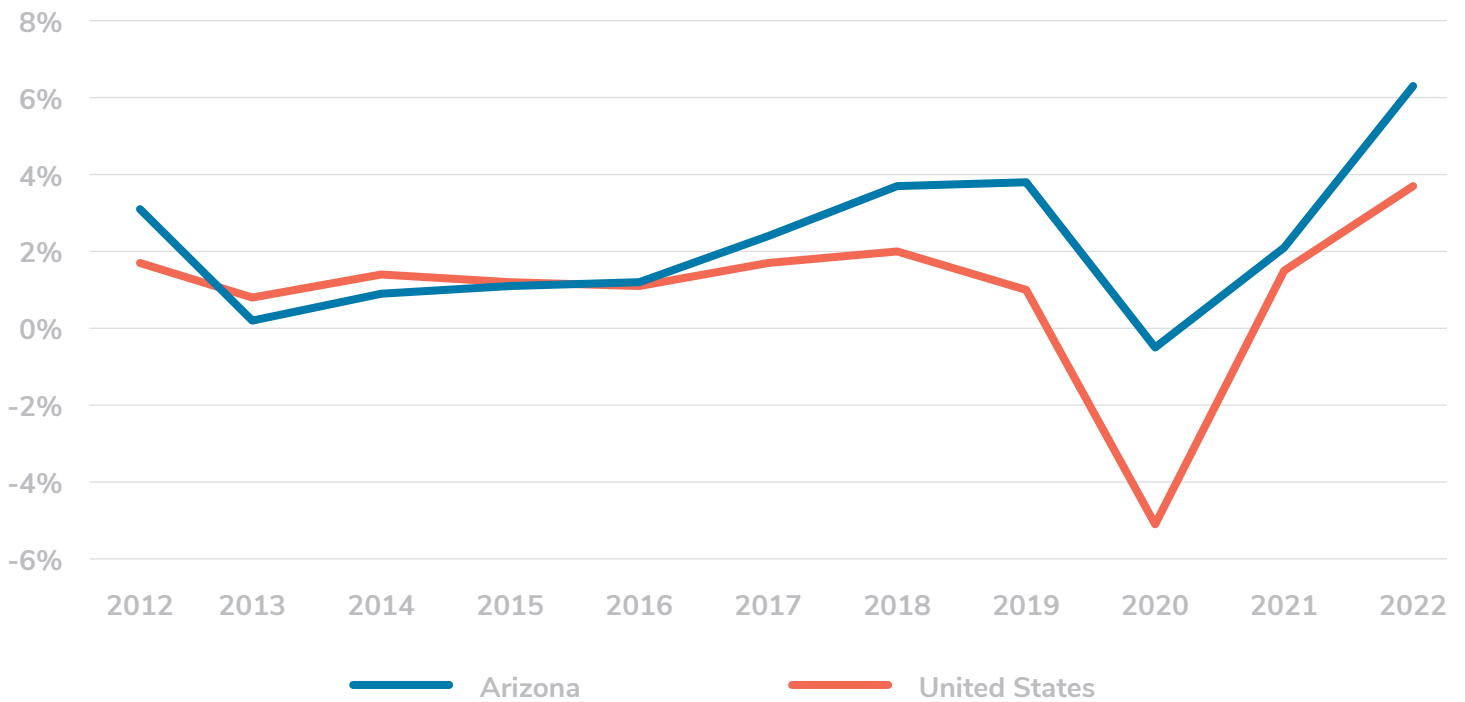


Source: U.S. Bureau of Economic Analysis



The Manufacturing Industry

Figure 3: Annual Manufacturing Industry Employment Change in Arizona and the U.S.



Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity

Manufacturing Employment by Broad Occupational Group

Figure 4 displays a “bubble chart” that provides perspective on the size of the occupational groups, their respective wages, and the growth opportunities of the broad occupational groups with job duties, skills, and/or education related to the manufacturing industry, as defined by the SOC system in Arizona. Keep in mind that the manufacturing industry encompasses a wide range of occupations that would not typically be considered manufacturing jobs such as accountants, managers, and other supporting jobs.

For example, engineers can go into numerous industries such as manufacturing, construction, consulting, and research and development. For this reason, the supply side of manufacturing occupations is difficult to calculate since not all of the positions are employed in the manufacturing industry.

The broad occupational groups in Figure 4 are “mapped” based on the extent the jobs are high-wage versus low-wage and illustrate the level of future demand. Ideally, an economic region would focus on those employment categories that are both higher in wages and are projected to be in high-demand moving forward.

The occupations above the dashed horizontal line have a higher forecasted demand – meaning the occupations are likely to see the largest employment growth relative to the industry average. The occupations that lie below the dashed line have a lower forecasted demand.

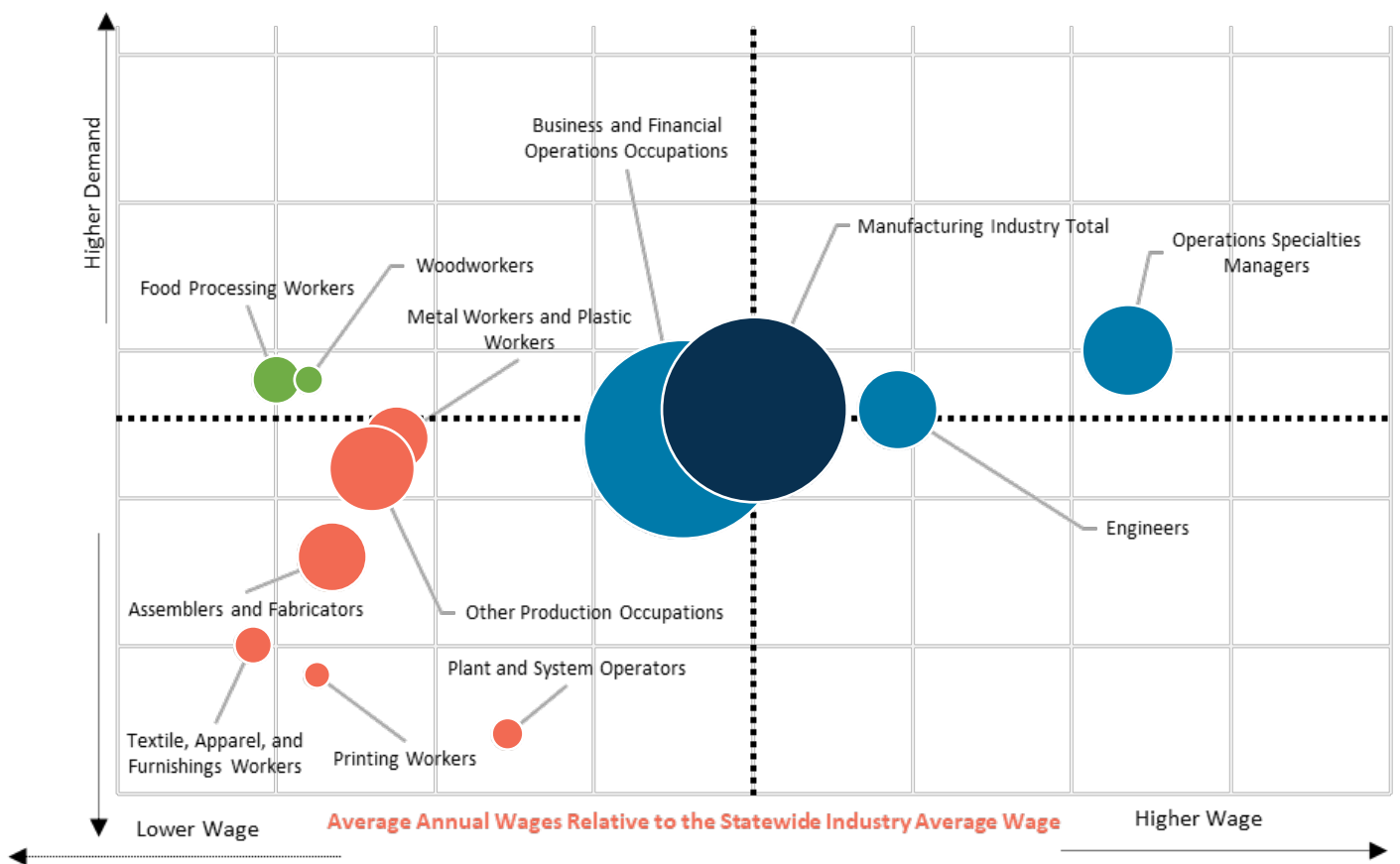
The size of the bubbles represents the size of the base of the broad occupational group as of 2021 (i.e., the current supply or the current number of jobs classified under the occupational group). For example, the assemblers and fabricators circle is larger than the woodworkers circle – meaning that there were more assemblers and fabricators than there were woodworkers as of 2021.

The Manufacturing Industry

It is important to note that while the manufacturing industry has workers classified under the business and financial operations, engineers, and operation specialty managers occupational groups, these occupational groups will be part of different industries as well. These broad-based occupational groups that include workers in the manufacturing industry as well as other industries are shown in light blue.

For perspective on the size of the manufacturing industry relative to the occupational groups, a dark blue bubble was added that represents the manufacturing industry as a whole. Note: The manufacturing bubble is based on NAICS data at the industry level while the occupational group bubbles are based on SOC data, and cross-referencing the data should be done with caution.

Figure 4: Employment Demand and Wage Levels by Sub-Categories - Manufacturing Industry



Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity

Note: Not all the occupations will be within the manufacturing industry.

The Manufacturing Industry

Occupations in Manufacturing with High-demand and High-wages

In order to identify the specific areas of the industry that can best support the state's economic development, occupational data with high-wages and high-demand must be considered. Table 2 displays various occupations supporting the manufacturing industry, as well as expected employment growth rates, mean wage earnings, and the level of educational attainment required for entry for the occupation with high-wages and with high projected employment growth.

Recently, government and community leaders created an optimal environment for advanced manufacturing organizations to locate and expand in the state. Advanced manufacturing is the use of innovative technologies to improve products or processes. These advanced manufacturing jobs typically require postsecondary degrees and advanced skills and offer higher wages than the traditional manufacturing jobs.

Arizona's share of employment in the manufacturing industry is below the national level, suggesting room for growth in the state as mentioned previously. Thus, efforts should continue to attract advanced manufacturing businesses and create new high-wage jobs in the region. The increase of advanced manufacturing businesses that bring in employees with higher education, wages, and growth will spur the state's economic growth.

Table 2 displays detailed information of the high-wage occupations that are in demand by advanced manufacturers and in high-demand overall. The BLS estimated that the 2022 mean wage in the manufacturing industry was \$88,879. Out of the given occupations, industrial production managers earned the highest average wage at \$124,543 as of 2022. While machine maintenance workers earned the lowest average wage of the group as of 2022 at \$60,408, both over the average wage (\$58,620) for the state.



The Manufacturing Industry

Table 2: High-Wage and High Projected Growth Occupations in the Manufacturing Industry			
Occupation Title	10-Year Employment Growth Rate	Mean Wage	Educational Attainment Needed for Entry
Logisticians	46.3%	\$75,415	Bachelor's Degree
Computer Numerically Controlled Tool Programmers	44.9%	\$62,362	Postsecondary Non-degree
Industrial Engineer	33.3%	\$101,642	Bachelor's degree
Machine Maintenance Workers	24.2%	\$60,408	High School Diploma or Equivalent
Industrial Production Manager	22.2%	\$124,543	Bachelor's Degree
Mechanical Engineer	21.2%	\$99,873	Bachelor's Degree
First-Line Supervisors of Production Workers	20.2%	\$69,313	High School Diploma or Equivalent
Materials Engineer	19.2%	\$105,923	Bachelor's Degree
Mechanical Engineering Technologist	18.0%	\$66,027	Associate's degree
Electrical Engineer	16.9%	\$107,848	Bachelor's Degree
Sales Representatives, Wholesale and Manufacturing Technical and Scientific Products	16.0%	\$97,788	Bachelor's Degree
Cost Estimators	15.1%	\$77,744	Bachelor's Degree
Environmental Engineers	11.8%	\$99,575	Bachelor's Degree
Manufacturing Industry Total	20.4%	\$88,879	-
Statewide Total Employment	17.2%	\$58,620	-

Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity

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The Manufacturing Industry

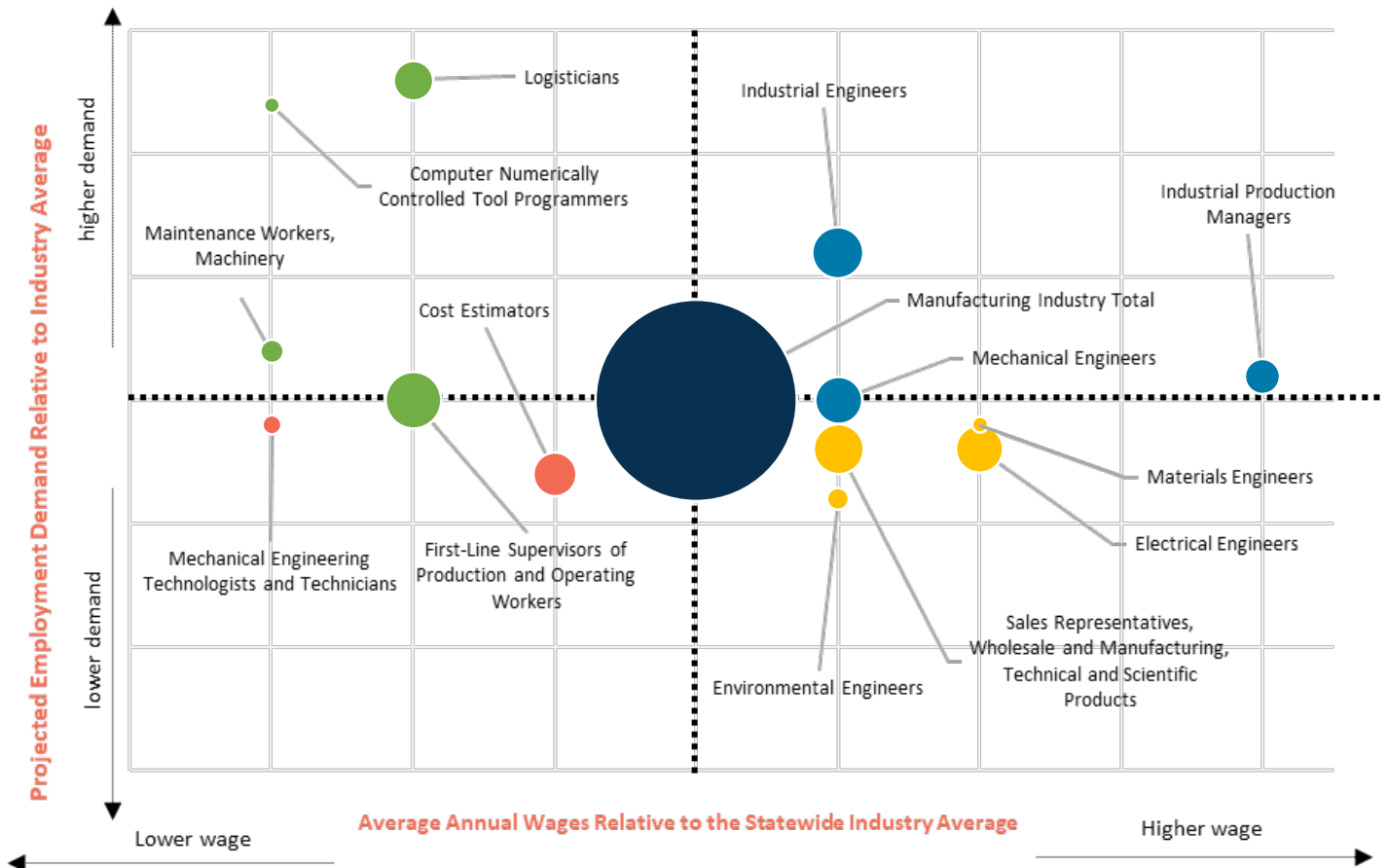
Figure 5 provides perspective into each of the aforementioned target occupations and the projected demand relative to the industry average along with a scale to measure the mean wages and the current size of the workforce.

Those industries that lie in the area above the horizontal line represent the occupations that are expected to grow at a faster rate than the statewide industry average over the next ten years. The occupations that are below the horizontal line are expected to grow at a slower rate than the statewide industry average. For example, logistician occupations are expected to grow at a faster rate than environmental engineer occupations over the next ten years.

Furthermore, the occupations located to the right of the vertical line represent those that reported a higher mean wage in 2022 compared to the statewide mean wage for all manufacturing workers. Those to the left of the vertical line represent those occupations that were lower than the statewide mean wage.

The size of each circle represents the total employment base, or current supply of workers, within that occupation as of 2021 from the OEO's 2021-2031 occupation projections. First-line supervisors of production workers, industrial engineers, and sales representatives of wholesale and manufacturing technical and scientific products employed the largest number of individuals out of the given occupations.

Figure 5: Employment Demand and Wage Level in Manufacturing with High-demand and High-wages



Source: Arizona Office of Economic Opportunity

The Manufacturing Industry

Highlighting Educational Programs Preparing Arizona's Advanced Manufacturing Workforce

- **Maricopa Community Colleges** created an associate in applied science (“AAS”) in engineering technology with the purpose of preparing students for entry-level engineering technician positions. The students in the program will apply basic engineering technical skills and principles that will support engineers in a wide array of projects.

Maricopa’s program gives instruction in various engineering support functions, preparing students with skills in research, production, and operations. It is offered at various community colleges that are part of the Maricopa County network including Chandler-Gilbert, Estrella Mountain, Glendale, Paradise Valley and South Mountain Community Colleges.

This program provides graduates with the skills and training for various entry level occupations in the advanced manufacturing and tech industry such as machine maintenance workers, production workers, and mechanical engineering technologists.

Table 3: Manufacturing Related Certifications and Associate’s Degrees Awarded in Maricopa County (2021-2022)

Level of Attainment	Computer & Info.		Engineers		Engineer Technicians		Business Management		Total	
	Cert.	Degrees	Cert.	Degrees	Cert.	Degrees	Cert.	Degrees	Cert.	Degrees
Scottsdale Community College	12	34	-	-	-	5	200	113	212	152
Paradise Valley Community College	12	21	-	1	-	-	81	87	93	109
South Mountain Community College	53	25	-	-	-	-	68	36	121	61
Rio Salado Community College	65	39	-	2	1	-	1,399	85	1,465	126
Phoenix College	44	34	-	2	-	1	187	118	231	155
Glendale Community College	97	73	-	9	32	15	155	153	284	235
Gateway Community College	91	12	-	-	14	13	46	29	151	54
Chandler-Gilbert Community College	36	58	-	14	-	11	279	227	315	310
Estrella Mountain Community College	26	62	-	15	-	1	128	126	154	204
Mesa Community College	71	72	-	10	33	18	239	229	343	329
Totals	507	430	-	53	80	64	2,782	1,203	3,369	1,735

Note: This table only includes the associate’s degree and certifications awarded in the Maricopa County Community College network. It should also be noted that these include all the degree programs within each major.

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

The Manufacturing Industry

- **Northern Arizona University's ("NAU") W.A. Frank Management College of Business** offers a program that teaches tools for analysis, accounting, budgeting, leadership, strategic planning, and more. Management positions require a wide set of skills including critical analysis, teamwork, and leadership skills. These skills are a priority when preparing students to go into managerial roles within an organization. The Frank Management College has a focus on preparing students for early career success. This degree program will add to the supply of needed management positions within the advanced manufacturing industry along with many other industries.
- **University of Arizona ("UA") College of Engineering** is a top ranked research school in the U.S. The university's College of Engineering offers eight departments with 17 different undergraduate engineering majors including joint programs in collaboration with other colleges. Research is a priority within the school, with over 200 graduate research assistants alongside hundreds of engineering undergraduates conducting research in their laboratories.

UA's College of Engineering has over one hundred highly complex projects that require a wide range of talent and skills to accomplish. The annual research expenditure for the university in the 2022 fiscal year amounted to \$59 million. The UA College of Engineering has made an immense contribution to the state's engineering research and share of graduates for the workforce over the years and will continue to do so.

- **Ira A. Fulton Schools of Engineering at Arizona State University ("ASU")** provides one of the nation's largest and most comprehensive engineering programs. According to ASU, the program ranks #19 in the nation for engineering programs. The Ira A. Fulton Schools of Engineering is comprised of seven schools. Including the school of computing and augmenting intelligence that offers industrial engineering, engineering management, and software engineering among others.

The school has over 25 different undergraduate degree programs offering several online options. The Ira A. Fulton Schools of Engineering includes over sixty different engineering research programs.

ASU has created accelerated degrees to ensure a bachelor's or master's degree in just four to five years. Additionally, the engineering school provides entrepreneurial opportunities along with internships and career opportunities. Arizona State University's contribution to engineering graduates is crucial to the growth of the advanced manufacturing industry.

- **Arizona State University offers a Bachelor of Science in Management** for the overall need to have effective leadership for an organization's operations to be the most efficient, profitable, and reliable. Therefore, the program focuses on building the necessary skills including problem solving, critical thinking, leadership, and analytical research.

Management professionals are in high-demand across multiple industries. ASU's management program curriculum focuses on employee management and engagement and building the foundation necessary for management talents (i.e., case discussions, team building, and ethics). The university offers options for students to take courses in-person or online for the flexibility that some individuals need. This program will contribute to the supply of advanced manufacturing positions that will be in high-demand over the next decade.

The Manufacturing Industry

Table 4: Sample of Degrees Awarded by Classification of Instructional Program (CIP) and Major 2021-2022

CIP or Major Related to the Manufacturing Industry Classification of Instructional Program	ASU	NAU	UA	Total
Bachelor's Degree in Business, Management, Marketing, & Related Support Services	4,432	886	1,291	6,609
Bachelor's Degree in Computer and Information Sciences and Support Services	1,051	156	424	1,631
Bachelor's Degree in Engineering (All Fields)	1,699	241	511	2,451
Bachelor's Degree in Engineering and Engineering Related Technologies and Technicians	178	-	19	197
Master's Degree in Business, Management, Marketing, & Related Support Services	1,322	118	366	1,806
Master's Degree in Computer and Information Sciences and Support Services	610	183	123	916
Master's Degree in Engineering (All Fields)	777	21	205	1,003
Specific Majors				
Bachelor's of Science Degree in Computer Science	582	89	212	883
Bachelor's of Science Degree in Supply Chain Management	388	-	-	388
Bachelor's of Science Degree in Electrical & Computer Engineering	345	-	101	446
Bachelor's of Science Degree in Mechanical Engineering	276	72	-	348
Bachelor's of Science Degree in Management	252	114	180	546
Master's of Science Degree in Computer Science	355	150	-	505
Master's of Science Degree in Electrical & Computer Engineering	99	-	96	195

Source: Arizona Board of Regents



The Manufacturing Industry

Key Findings

The data indicates that Arizona will be well positioned during the next decade in the manufacturing industry as a whole, but only if efforts continue to support the supply of high value-added engineers and operations specialists.

On a broad basis, the occupational groups with a higher projected demand relative to the industry as a whole include food processing workers, woodworkers, engineers, and operations specialties managers groups. However, workers in the engineers and operations specialties managers occupational groups had higher wages than the manufacturing industry average.

Specifically, logisticians, computer tool programmers, industrial engineers, machinery maintenance workers, industrial production managers, and mechanical engineers are expected to be in high-demand relative to the overall manufacturing industry average over the next decade.

The occupations including environmental engineers, cost estimators, sales representatives of wholesale and manufacturing technical and scientific products, and electrical engineers are expected to be in lower demand relative to the industry average over the same period.

Overall, the state's effort in attracting advanced manufacturing businesses to the region has created a high-demand for advanced positions within the industry. The demand for these high-wage occupations will continue to increase as more advanced manufacturing plants are located in Arizona.

The manufacturing industry is projected to grow by 37,000 new jobs over the next decade. The current projected new supply of manufacturing workers, originating from the state's universities and colleges (i.e., the number of Arizona graduates with manufacturing-related majors), is estimated at approximately 26,800 over the next 10 years. This calculation assumes 50% of the graduates remain in the state and work in the manufacturing industry.

If the state does not focus efforts on educating and training highly-skilled individuals, the industry will suffer from a labor shortage of an estimated 10,200 employees over the next ten years or will need to import individuals to meet the demand.

In order to meet the expected demand of the advanced manufacturing businesses in Arizona, a priority should be placed on developing and attracting high-skilled engineers and workers with a business and supply chain management background; otherwise, companies will locate elsewhere if the talent pool does not continue to develop.

The data indicates that Arizona will be well positioned during the next decade in the manufacturing industry as a whole, but only if efforts continue to support the supply of high value-added engineers and operations specialists.

The Manufacturing Industry

The following table summarizes the future employment supply and demand in the manufacturing industry.

Table 5: Future Employment Supply and Demand in the Manufacturing Industry	
No. of Jobs	
10-Year Projected Demand in Manufacturing Workers	37,000
10-Year Projected New Supply of Manufacturing Workers	26,800
Surplus/(Shortage)	(10,200)

Notes: Estimates for the 10-year projected demand in manufacturing workers is based on OEO's estimate job growth for the manufacturing industry as a whole. Estimates for the 10-year projected new supply of manufacturing workers is based on the expected number of graduates in the identified majors related to manufacturing. Since it is difficult to predict the exact industry that graduates will enter upon earning their degree or certification due to the dynamic nature of the job market, evolving industry trends, individual preferences, and market demands, the calculations assume a 50% graduate retention rate for the computer science, supply chain, management, electrical engineering, and mechanical engineering related majors from Arizona's three universities and Maricopa County Community Colleges. In other words, the calculations assume only ½ of the graduates with manufacturing related majors will enter the manufacturing industry upon earning their degree or certification.

Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity; Arizona Board of Regents; National Center for Education Statistics – Integrated Postsecondary Education Data System.

Note: These calculations were conducted to provide context on the state's potential future workforce gap and talent pipeline within the state in the manufacturing industry; however, the estimates are based on a limited availability of data and are highly assumption based. These limitations should be taken into consideration when interpreting and generalizing the findings of this high-level analysis.



The Manufacturing Industry

Recent Manufacturing Expansions/Relocations

There have been numerous announcements for the past few years of new manufacturing opportunities coming to Arizona. The following is a list to highlight select announcements that have been made recently.

- XNRGY, one of the largest custom air handling manufacturers in North America, in January of 2022 announced their plans for a \$300 million investment to construct a facility in the Greater Phoenix area. The manufacturer will focus on research and development and innovation for XNRGY's mission-critical climate systems used in sectors like life sciences, healthcare, data centers, semiconductor cleanrooms and battery manufacturing. The manufacturer is estimated to create more than 900 high-wage jobs once the facility is up and running in June of 2025.
- Corning, a world leading innovator in materials science, made an announcement in August 2022 of their plans to build a new cable manufacturing facility in Gilbert, Arizona. The facility will create 250 jobs and begin operations in 2024. The location will be the western-most U.S. manufacturing site for optical cable.
- Nucor, the largest steel and steel products producer in the United States, also announced in August 2022 plans to invest \$100 million to add a melt shop at their bar mill in Kingman; creating an expected 140 new jobs. The operations are expected to begin in 2024 and have the capacity to produce 600,000 tons annually.
- Procter & Gamble ("P&G") a global consumer goods leader, announced their plans in November of 2022 to build a manufacturing facility in Coolidge, AZ. This facility will support P&G's fabric care portfolio, that includes Tide PODS®, Downy Unstopables® and Bounce® Dryer Sheets. Their investment will amount to \$500 million, and the facility will support approximately 500 new jobs.
- ElectraMeccanica Vehicles Corp. is a designer and manufacturer of electric vehicles. In December of 2022 a ceremony took place to celebrate the nearly completed manufacturing facility in Mesa, Arizona. The plant will serve as the company's new headquarters and will create approximately 500 new jobs in the state.
- JA Solar, a global solar cell and module manufacturing leader, made announcements in January 2023 for its first U.S. facility to be located in Phoenix, Arizona. The company will invest \$60 million into the facility that will be producing high-performance photovoltaic (PV) products (solar panels). It is expected to be operational in Q3 in 2023 and to create over 600 new jobs.
- LG Energy Solution ("LGES"), a leading global manufacturer of lithium-ion-batteries for electric vehicles, mobility, IT, and energy storage systems, announced in March 2023 that the company will be investing \$5.5 billion to build a complex for battery manufacturing in Queen Creek, AZ. There will be two facilities, one of which will be dedicated to electrical storage systems (ESS) and the other will be dedicated to cylindrical batteries for electric vehicles (EV).
- Taiwan Semiconductor Manufacturing Company ("TSMC") is the world's largest dedicated semiconductor foundry. TSMC made the announcement back in 2020 that they have selected Arizona for its first U.S. advanced semiconductor factory. This facility has been under construction and is expected to open for production starting in 2024. The total spending on the project including the capital expenditure is estimated to be \$12 billion from the years 2021 to 2029. The project will provide the state with over 1,600 new high-tech jobs and thousands of additional indirect/induced employees.

Conclusions

This report is one in a series of reports highlighting workforce supply and demand in five target high-wage, high-demand industries. The full series of reports can be accessed at www.phoenixchamberfoundation.com/wfseries.

Efforts by the state, local governments, and economic development organizations in strengthening Arizona's base sector industries and attracting new businesses to the region has created a high-demand for employment in the five target industries outlined in this series. However, based on the current talent pipeline and projections, significant workforce shortages are expected in four of the five target industries if the state does not focus efforts on educating and training individuals.

- The manufacturing industry will suffer from a labor shortage of an estimated 10,200 employees over the next 10 years. On a broad basis, the occupational groups with a high projected demand include the food processing workers, woodworkers, engineers, and operations specialties managers groups.
- Over the next 10 years, the state will demand approximately 36,900 construction jobs. The occupational groups with the highest expected demand include construction trades workers and supervisors of construction and extraction workers.
- The healthcare industry overall will experience a labor shortage of approximately 76,000 over the next decade. The occupations with the highest demand include nurse practitioners, occupational therapist assistants, physician assistants, physical therapist assistants, and home health and personal care aides, among others.
- The financial services industry will be short approximately 5,200 workers over the next 10 years. The occupations including financial examiners, credit counselors, personal financial advisors, and loan officers are expected to have a high-demand relative to the entire financial services industry.
- Over the next decade, the cybersecurity/IT services industry will experience a relatively minor shortage of 700 workers. The occupational groups with higher projected demand compared to the industry as a whole include information securities analysts, computer and information research scientists, web developers, computer systems analysts, web and digital interface designers, and software quality assurance analysts and testers.

Prioritizing education and technical training programs to meet the future demand for workers in the identified fields is critical in continuing Arizona's growth momentum and securing the state's long-term economic sustainability.

Table 6: Future Supply and Demand in the Five Target Industries

Industry	Surplus/(Shortage)
Manufacturing Workers	(10,200)
Construction Workers	(32,100)
Healthcare Workers	(76,000)
Financial Services Workers	(5,200)
Cybersecurity/IT Services Workers	(700)

Notes: Estimates for the 10-year projected demand for workers is based on OEO's estimated job growth by industry. Estimates for the 10-year projected new supply of workers is based on the expected number of graduates and certification awarded in the identified majors related to each industry.

Source: U.S. Bureau of Labor Statistics; Arizona Office of Economic Opportunity; Arizona Board of Regents; National Center for Education Statistics – Integrated Postsecondary Education Data System.



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