



Ways in Which Minority Business Enterprises Can Meet Gaps in the U.S. Supply Chain

December 2024

Acknowledgments

This report was developed under a collaborative effort between the Minority Business Development Agency (MBDA) and the Office of the Under Secretary for Economic Analysis (OUSEA), U.S. Department of Commerce. It contains information and analysis that was developed, reviewed, and edited by:

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We express our gratitude to our authors for their hard work, diligence, and perseverance to make this report a reality. We also thank our support team for their thoughtful comments, insights, and guidance to the report.



Foreword

The Minority Business Development Act of 2021 (Act), 15 U.S.C. § 9501 *et seq.* codifies the Minority Business Development Agency (MBDA) and many of its existing programs for the first time since the Agency's inception in 1969. 15 U.S.C. § 9513(a)(1) calls upon MBDA to conduct research and collect and analyze data, including data relating to the causes of the success or failure of minority business enterprises¹ (MBEs). 15 U.S.C. § 9554 mandates that MBDA conduct a study and produce a report that addresses the ways in which MBEs can meet gaps in the supply chain of the United States, with a particular focus on the supply chain of advanced manufacturing and essential goods and services. This report responds to the latter mandate and opens opportunities to conduct, commission, and collaborate on new studies with other federal, state, and private institutions on MBEs.

MBEs can strengthen the resilience of supply chains in the United States and help narrow the vulnerabilities exposed by disruptions. MBEs have been and continue to be an underutilized part of supply chains throughout a multitude of industries. MBEs seek opportunities to be solution providers whether in private or public-oriented supply chains. MBEs are currently participating in supply chains primarily through high-technology service industries that support manufacturing and that only a small quantity of MBEs are in manufacturing industries. This report summarizes where and how the U.S. can further assist MBEs to access and be a part of critical supply chains and concludes that more effort is needed to increase the quantity and sizes of MBEs to meet supply chain demands.

The Infrastructure Investment and Jobs Act (IIJA) fosters a once in a generation opportunity to rebuild America's infrastructure and create well-paying jobs in all communities. Likewise, the CHIPS and Science Act is working to boost American semiconductor research, development, and production, ensuring U.S. leadership in the technology that forms the foundation of everything from automobiles to household appliances to defense systems. MBEs can and should be leveraged to advance the national security imperatives noted in these laws, in addition to improving the resilience of the supply chain. MBDA is committed to supporting the growth and global competitiveness of existing MBE manufacturers and to seeking public-private solutions to encourage MBE participation in manufacturing industries consistent with our legal mandate.

MBDA is embarking on a new chapter of our long and proud history to serve and support MBEs. The Minority Business Development Act empowers the Agency to work toward equity among U.S. firms and strengthen our national economy. MBDA is committed to its mission and, together with public and private sector partners, will continue to address capital access disparity and highlight sources of alternative financing.

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Introduction

The COVID-19 pandemic forced into profile the vulnerability of U.S. supply chains. Growing economic literature shows that these supply chains can be made more resilient through supplier diversity. Supply chains that rely on a broader diversity of input suppliers are more easily able to switch to alternate suppliers in the event of a concentrated shock to a large supplier.²

Supply chain resilience and domestic on-shoring are related but not identical endeavors. For example, the off-shoring of pharmaceutical production has led to domestic shortages of critical drugs. On-shoring of pharmaceutical production can be key to resilience. Firm level concentration can also create challenges, as demonstrated when disruptions in domestic production in the highly concentrated baby formula industry led to a massive domestic shortage in 2022.³ True resilience will require a broad and geographically diverse base of suppliers able to respond to external shocks and meet the gaps⁴ of supply chains.

Among the potential, and underutilized, partners to achieve supplier diversity are **Minority Business Enterprises (MBEs)⁵ who represent nearly 20 percent of the manufacturing and services firms in supply chain industries.** Further, regionalizing supply chains through minority and community-based organizations may result in more resilient supply lines.⁶

This study and report use publicly available data from the U.S. Bureau of Census, U.S. Department of Labor, and other reports. Additionally, this report uses the terms “minority firm” and “minority employer firm” to describe businesses identified in the underlying data that are owned or controlled by a person(s) who identifies as a minority.⁷

It is MBDA's determination that while MBEs face significant hurdles in both establishment and growth, they can also have competitive advantages that make them valuable partners to corporations and a source of strength to domestic supply chains.

Resilient domestic supply chains require durable and diverse networks. The pandemic highlighted advantages that exist between community and minority run institutions, as compared to large legacy institutions. The post pandemic research on emergent policy response, domestic economic chokepoints and successful integration and deployment of policy solutions produced significant lessons around minority and community-based institutions. For instance, Community Development Financial Institutions and minority financial institutions achieved greater success touching communities and market penetration than their traditional financial counterparts. MBEs have displayed similar comparative advantage and prevailing research reveals that broader diversity of input suppliers are more easily able to switch to alternate suppliers in the event of a concentrated shock to a large supplier.⁸ To that end, MBEs are well positioned as entrants into domestic supply chains to diversify existing lines, better regionalize lines and provide deeper market penetration of products.⁹

Beyond the quantitative value proposition offered to MBEs to the economic ecosystem, there are discrete qualitative benefits. **Utilizing MBEs offers advantages and qualitative benefits that include, but are not limited to:**

- social capital (e.g., building stronger communities),
- similarity to a top tier corporate manufacturer's employee workforce and consumer customer base, and
- innovation (e.g., to identify new market needs and meet those demands).¹⁰

MBEs can also be attractive to corporations for their respective connections to underserved communities. MBEs can establish and expand a customer base to those corporations.¹¹

It is essential to have a clear understanding of the current landscape of MBE supply chain capacity to better understand the potential for growth. The data and analysis are a starting point to answering a key question: what interventions most effectively increase MBE participation, innovation, and competitiveness in manufacturing? The data in this study allows us to analyze and explore MBE representation in different supply chain industries and thus provide general recommendations about interventions toward increasing MBEs' participation and capacity in them.

Using publicly available data and literature studies, the MBDA and Office of the Under Secretary for Economic Analysis (OUSEA), U.S. Department of Commerce developed this exploratory study of the ways in which MBEs can help the United States to meet gaps in critical supply chains. This report examines MBE representation within specific industries based on two of the elements of an MBE: ownership and management. Based on data for these elements, we identified areas for improving industrial participation with MBEs.



Summary

The data provides a snapshot of the current MBE supplier landscape. Key findings include:

- **Ownership** – We found that MBE owners represented 19.9 percent of the manufacturing and services firms we studied, but only 6.3 percent of the total payroll.¹² In our study, payroll acts as a proxy of the size of a firm, and therefore, this indicates that MBEs tend to be smaller than non-MBEs. Among the race and ethnicity groups, Asian owners represented 13.7 percent of MBEs and Black and Hispanic owners represented 2 and 3.8 percent, respectively. As a comparison, MBEs comprise about 20 percent of all employer firms and only about 5 percent of all payrolls, suggesting MBE representation among supply chain firms is consistent with industry norms. MBEs support goods production more than directly manufacturing the goods. MBE firms comprise about 22 percent of the service sector firms supporting manufacturing but represent only about 10 percent of manufacturing firms.
- MBEs have very low representation in manufacturing. For example, there were 23,129 total classifiable manufacturing firms, of which MBEs represented 2,378.
- Among all U.S. manufacturing firms, only 1,628 are Asian-owned, 523 are Hispanic-owned and 110 are Black-owned.
- **Management** – Because mid-career professionals tend to have high levels of education, experience, and assets which could lead to self-employment,¹³ the share of senior level professional workers among minority groups serves as our proxy for a pool of potential new MBE entrepreneurs in advanced industries. We found that minorities represented 21.1 percent of managers. Among minority groups, Asian managers represented 12.5 percent, and Black and Hispanic managers represented 2.9 and 4 percent, respectively. As with ownership, we found that total minority representation among managers is higher in services industries compared to manufacturing.
- **Limited Data** – Further, we found that existing data on MBEs in high technology¹⁴ and supply chains overall is sparse and that public data is often produced with a lag which limits their timeliness. MBE data are often aggregated into selected characteristics such as total revenues and employees, which limits what we can learn about MBEs' needs within supply chain industries. It would be invaluable to have comprehensively collected, publicly available, and high-frequency data to provide more granular details about MBEs in all areas of manufacturing.

To be sure, barriers continue to exist for MBEs in supply chains, including industry-specific barriers. Given the low representation of MBEs in manufacturing, there is ample opportunity for the government or private organizations to support MBEs with:

- Capital – Due to the high cost-to-entry in manufacturing industries, capital barriers impede the establishment and growth of MBE manufacturers. More can be done to support MBEs to access specialized lending with experts in the manufacturing industry including, but not limited to, other forms of patient capital.¹⁵
- Workforce – MBEs may rely on less formal or localized recruitment. Certain manufacturing and competitive supply chain markets may require a higher skilled workforce not readily available. There can be more cross-coordination and collaboration between entrepreneurial and workforce development programs.
- Networks – MBEs need to gain access to markets. Programs such as business-to-business matchmakers foster introductions based on buyer needs and seller capacity. The Federal government can better coordinate through existing program offices to facilitate meetings between Federal supply chain prime contractors and recipients of federal financial assistance and MBE manufacturers.

Our research suggests multiple ways policy makers, technical assistance providers, and large corporations can tap the potential of MBEs to advance supply chain, including:

- Leveraging the number of MBEs in high-tech services to support expanded US manufacturing – There are a relatively large number of MBEs in the high-tech services industry as compared to the numbers of MBEs in advanced manufacturing. By supporting advanced manufacturing firms, MBEs in high-tech services can play a critical role in advancing the scale up of domestic production across sectors and geographies.
 - Expand access for MBEs to participate in Federal investments – Ensure that MBEs are included in the supply chain, including in high-tech services,¹⁶ for significant domestic investments, such as the CHIPS Act and the Inflation Reduction Act, that have catalyzed an investment boom in U.S. manufacturing. Work with manufacturers to share best practices for equitable competition, and work with MBEs to ensure they are prepared to compete in advance supply chains in critical areas, including semiconductor manufacturing.
- Fostering inclusive entrepreneurship in manufacturing – Supply chain diversification can improve if experienced managers/professionals, including those from under-served communities, already in manufacturing industries have equitable opportunities to pursue entrepreneurship in advanced production and service technologies.
 - Promote talent pools of entrepreneurship – Encourage workers, including those from under-served communities, who possess valuable experience, skills, and know-how in advanced technologies to consider becoming business owners.
 - Support training programs and expand innovation incentives – Expanding and fostering awareness of learning opportunities leading to careers in advanced manufacturing can help increase and diversify the skilled workforce.

-
- Expanding corporate supply chain diversity – First tier suppliers strategically search for supply chain partners. MBEs can offer diverse perspectives to generate creative ideas and solutions that can meet market demand, particularly when the market is driven by high consumer purchases from burgeoning minority communities.
 - Expand and strengthen procurement programs – Promote contracting opportunities for MBEs to help them access supply chain networks and foster their capacity to sell, produce and compete.
 - Providing support to MBEs in manufacturing – Provide MBEs an entryway into goods manufacturing which often requires accessing and obtaining specialized capital to start a production business.
 - Leverage business centers and networks – Business centers can assess MBEs’ needs and provide a range of technical assistance and support such as access to key networks, capital, and contracting opportunities.
 - Develop initiatives helping MBEs to grow in scale and size – Through a variety of means such as skills enhancement, business centers, and public-private partnerships, foster MBEs’ capacity to achieve economies of scale and thus succeed in employment and business growth.
 - Foster networks and partnerships – Place-based consortia that foster networks comprised of MBEs, governmental, and private sector organizations can collaboratively address industry opportunities and problems at the local level of MBEs.
 - Ensure stable cashflow for MBEs – Help MBEs to achieve financial stability by fostering prompt and timely payment for their goods and services and leverage the use of payment technologies.
 - Gathering more data – Expand qualitative data gathering with minority managers in manufacturing through requests for information (RFI’s) and industry roundtables to find out what obstacles they face and support required to start an advanced manufacturing business.



Background and Sources

This study uses multiple data sources to provide the best available information on MBE representation in the supply chain and to define the advanced manufacturing industries. The specific data sources and their uses are described below. An overview and explanation of the limitations of this data in examining MBEs engaged in the supply chain for advanced manufacturing can be found in the “Limitations” section.

Defining the Industries in the Supply Chain for Advanced Manufacturing

The supply chain refers to the transactions of all the industries or commodities that enable goods and services to reach final customers.¹⁷ However, defining which specific industries make up the supply chain is complicated. Simply put, there are two types of sales by businesses in the U.S. economy: (1) sales to final users or customers, and (2) sales to other industries, referred to as intermediate output, or as part of the supply chain for those purchasing industries. But companies in most industries sell to both final users and other businesses – making it nearly impossible to observe and accurately describe the precise boundaries and relationships between every final and intermediate user. This is particularly true as industries constantly adapt to rapid and significant changes to domestic and global markets, products, technologies, workforces, and processes.

Researchers have proposed various competing or alternative approaches to identify advanced manufacturing activities and related essential services. These approaches are based on criteria such as measures of technical occupations in the fields of science, technology, engineering, and mathematics or the types of technology-based inputs and outputs.¹⁸

We identified industries using public sources from the U.S. Census Bureau, U.S. Equal Employment Opportunity Commission (EEOC), and academic research. Table 1 shows the identified industries using the North American Industrial Classification (NAICS) at the 3- and 4-digit code levels. For more information on how we selected industries, see the Appendix.

Table 1: Selected Industries in Advanced Manufacturing and Services

NAICS 4	Description	NAICS 3	Description
3251	Basic Chemical Manufacturing	325	Chemical Manufacturing
3254	Pharmaceutical and Medicine Manufacturing		
3332	Industrial Machinery Manufacturing	333	Machinery Manufacturing
3335	Metalworking machinery manufacturing		
3341	Computer and Peripheral Equipment Manufacturing	334	Computer and Electronic Product Manufacturing
3342	Communications Equipment Manufacturing		
3344	Semiconductor and Other Electronic Component Manufacturing		
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing		

NAICS 4	Description	NAICS 3	Description
3364	Aerospace Product and Parts Manufacturing	336	Transportation Equipment Manufacturing
5112	Software Publishers	511	Publishing Industries (except Internet)
5182	Data Processing, Hosting, and Related Services	518	Data Processing, Hosting, and Related Services
5191	Other Information Services	519	Other Information Services
5413	Architectural, Engineering, and Related Services	541	Professional, Scientific, and Technical Services
5415	Computer Systems Design and Related Services		
5417	Scientific Research and Development Services		

Source: OUSEA Analysis of Census data.

For our analysis, we drew from multiple sources' methodologies to balance the strengths and weaknesses of each approach. We include non-manufacturing industries in services with high levels of innovation such as data processing, computer systems design, and scientific research and development. This choice serves to highlight critical roles that service industries play in high tech and advanced industries in terms of STEM skills intensity, growth of patents, linkages with intermediate supply chains, and innovation diffusion.¹⁹

There is no complete and comprehensive data that is publicly available on the numbers and characteristics of minority firms at the 5- and 6-digit NAICS categories for "advanced" manufacturing, supply chains, and related services. Furthermore, insights on the numbers of occupations held by minority groups in key industries is limited to a few data sets.

Data on MBE Ownership and Minorities in Management Occupations

Our data and analysis are a starting point to answering a key question: **what interventions most effectively increase MBE participation, innovation, and competitiveness in manufacturing?** The data in this study allows us to analyze and explore MBE representation in different supply chain industries and thus provide general recommendations about interventions toward increasing MBEs' participation and capacity in them.

To examine employer ownership by race or ethnicity, we relied on the Annual Business Survey (ABS) produced by the Census Bureau. The ABS relies on a survey to employer firms which asks questions about the demography of business owners.²⁰ At the four-digit NAICS level, the ABS contains information on ownership type. These data were released in October 2023, and it covered the year 2021.²¹ Nonemployer firm data is not included in this study.

To examine rates of reported management roles by demographic group, we relied on the EEOC Public Use File (PUF). This data is based on the EEO-1 Component 1 Report – which is legally required for all private sector employers with 100 or more employees, and federal contractors with 50 or more employees meeting certain criteria. Based on this data, the EEOC reports information in minority management at the three-digit NAICS level. Using EEOC data, this study reports on minority representation using the population of non-White or Hispanic managers. This data represents the year 2021.²²

Findings

Supply chain industries account for 43 percent of U.S. employment and average wages are 70 percent higher than in consumer industries.²³ **MBEs can help expand the manufacturing sector and the U.S. economy by accessing the higher-skilled and higher-wage jobs found in the advanced technology supply chains.**

MBEs Represented 21 Percent of Firms in the Examined Industries and 6.1 Percent of Total Payroll

Table 2 presents the number and percentage of employer firms within the industries we examined by the demography of the owners. A limitation to this analysis is that for 5.1 percent of firms, the demography of owners is unclassifiable.²⁴

In the examined industries, we found that MBEs represented 21 percent of total employer firms while White-owned firms represented 77.4 percent.²⁵ Asian-owned firms had the highest percentage of MBEs in the examined industries, at 14.5 percent of total firms. Hispanic- and African American-owned firms represented only 4.1 percent and 2 percent, respectively. For context, MBEs also represented about 20 percent of employer businesses among all industries.²⁶

In addition to the percentage of owners, we also looked at the percentage of total payroll which can be a proxy for the size of the firm. Specifically, we found that MBE employer firms represented only 6.1 percent of payrolls in these industry groups. Thus, MBEs represented a very small percentage of total payrolls compared to non-MBEs. However, a significant limitation to the data is that a large portion of payroll dollars (62.9 percent) are among unclassifiable firms.²⁷ For context, MBEs represented about 5 percent of payroll across all industries.

Table 2: Number and Payroll of Employer Firms by Demography of Owners for Selected Industries, 2021

Group	Employer Firms		Payroll	
	Number	Percent of Total	Dollars (\$000)	Percent of Total
American Indian and Alaska Native	1,464	0.5	968,279	0.1
Asian	42,253	14.5	50,188,990	4.7
Black or African American	5,973	2	5,826,408	0.6
Hispanic	11,910	4.1	7,247,100	0.7
Native Hawaiian and Other Pacific Islander	367	0.1	119,462	0.0
White	226,346	77.4	33,046,5749	31.3
Equally minority/nonminority	3,578	1.2	3,842,378	0.4
Minority	61,387	21	64,904,680	6.1
Nonminority	209,788	71.8	316,890,774	30
Classifiable	276,373	94.5	387,112,424	36.6
Unclassifiable	14,993	5.1	665,210,301	62.9
Total	292,394	100	1,056,728,843	100

Source: Analysis of ABS Data. Note: Because the Hispanic category includes all racial categories, the percentage rows and numbers do not sum to the total for classifiable firms. Some industries may not report ownership by each racial or ethnic group.

MBE Representation Tended to be Higher in Services than in Manufactured Goods Production

The representation of MBE ownership among 4-digit NAICS industry groups is shown in Tables 3a and 3b.²⁸ We find that the total number and percent of MBE employer firms in services (59,009 firms or about 22 percent) far exceeded the numbers of MBE employers in manufacturing (2,378 firms or about 10 percent). In terms of total of annual payroll, we found the same relationship, as MBE firms in services represented about \$61.7 billion payroll (or about 8 percent), compared to \$3.2 billion in manufacturing (or about 2 percent).

In Table 3a on goods manufacturing and Table 3b on services, we report the total counts of MBE employer firms and payrolls as well as the percentage shares of these factors. This allows comparisons of MBEs’ participation in the various industry groups. An important caveat is that in Tables 3a and 3b the representations of MBEs are limited in various ways.²⁹

Manufacturing has Many More Asian Employer Firms than Hispanic and Black Firms

In the Minority column of Table 3a, the overall representation of all minority firms (including those reporting more than one race or ethnicity) in the selected manufacturing groups was 10.3 percent.³⁰ Where data was available, the number of firms varied widely for each race/ethnic group, with Asian (1,628) the highest followed by Hispanic (523), and Black (110). There were also wide differences in the numbers of firms by race/ethnicity and industry group. For example, in Semiconductor and Other Electronic Component Manufacturing, Asian (443) and Hispanic (102) employer firms had their highest concentrations. Black employer firms had their highest presence in Pharmaceutical and Medical Manufacturing (38 firms), although this was very small compared to the number of Asian (270) and slightly more than Hispanic (31) firms. A handful of Black firms were recorded in four industries (Computer and Peripheral Equipment Manufacturing, Semiconductor and Other Electronic Component Manufacturing, Aerospace Product and Parts Manufacturing, and Metalworking Machinery Manufacturing). Except for Aerospace Product and Parts Manufacturing, Asian employer companies had the largest number of firms in every other industry group, while Black firms had the fewest; however, Aerospace Product and Parts Manufacturing was the only industry where Hispanic employer companies (64) exceeded the number of Asian firms. Overall, Asian employer firms were in advanced manufacturing industries in higher numbers than Hispanic and Black firms. Figure 1 illustrates these differences by industry and race/ethnicity.

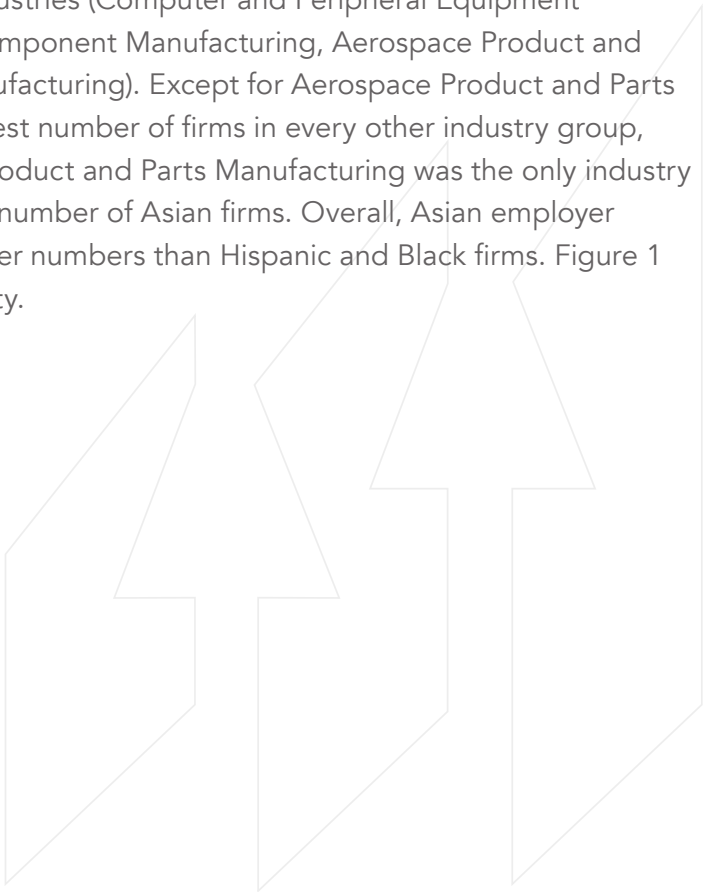
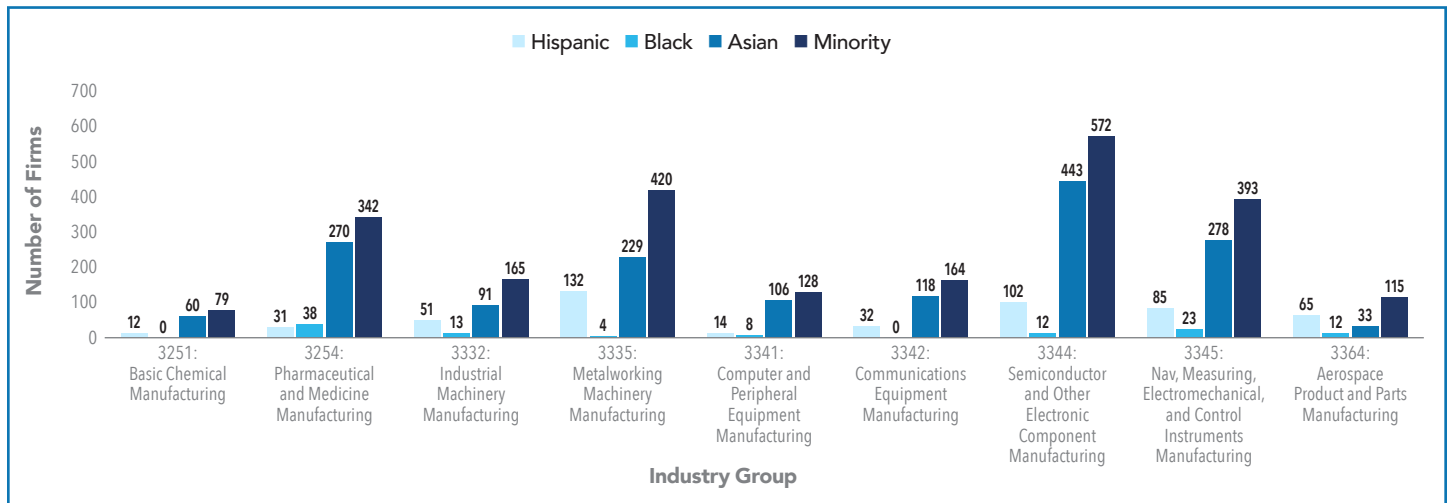


Figure 1: Minority Firms in Manufacturing by Race/Ethnicity and Industry Group, 2021

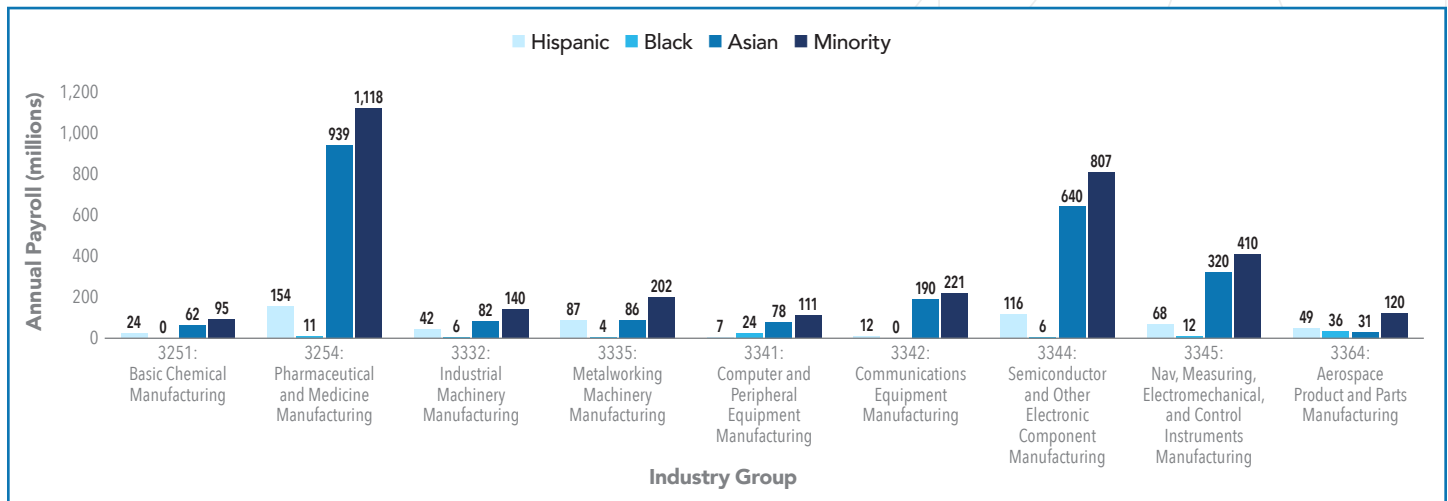


Source: OUSEA Analysis of ABS data. See Appendix for White, Non-Hispanic data.

MBE Manufacturing Payrolls were Concentrated in Semi-Conductor and Pharmaceutical Industries

In Table 3a, the overall minority payroll was just \$3.22 billion compared to \$182.31 billion for all firms in manufacturing. There is considerable variation in total minority firm payroll by race/ethnic groups: Asian firms had the highest total annual payroll (\$2.43 billion) which far exceeded Hispanic (\$559.52 million) and Black (\$98.70 million). Not only were there wide-ranging payroll differences within each minority group, but also large differences in scale or magnitude between each group: Asian employer payrolls ranged from \$31.46 million to \$938.94 million, Hispanic payrolls between \$6.77 million to \$154.09 million, and Black payrolls ranged from \$3.76 million to \$35.50 million. By industry, Asian firms' payrolls were highest in Pharmaceutical and Medical Manufacturing, followed by Semiconductor and Other Electronic Component Manufacturing. Hispanic firms' highest payroll was also in Pharmaceutical and Medical Manufacturing while Black firms' payroll was highest in Aerospace Product and Parts Manufacturing. Figure 2 illustrates the wide variations in MBE payrolls by industry.

Figure 2: Payroll of Minority Firms in Manufacturing by Race/Ethnicity and Industry Group, 2021



Source: OUSEA Analysis of ABS data. See Appendix for White, Non-Hispanic data.

MBE Percentage Shares in Manufacturing Indicate They are Generally Smaller and Fewer in Numbers

In Table 3a on advanced manufacturing, the percentage of MBE ownership among the nine industry groups ranged from 5.8 percent (Basic Chemical Manufacturing) to 18.2 percent (Semiconductor and Other Electronic Component Manufacturing). The minority percentages of payroll varied within a single-digit range, from 0.3 percent (Aerospace Product and Parts Manufacturing) to 3.6 percent (Pharmaceutical and Medicine Manufacturing). The shares of firms and payrolls by race/ethnicity in manufacturing suggest that few MBEs exist in manufacturing and the majority of them are smaller in size:

- Shares among Asian firms ranged from 2.4 percent (Aerospace Product and Parts Manufacturing) to 14.1 percent (for both Computer and Peripheral Equipment Manufacturing and Semiconductor and Other Electronic Component Manufacturing). The two next-highest percentages of Asian firms in manufacturing were in Pharmaceutical and Medical Manufacturing (12 percent) and Communications Equipment Manufacturing (11 percent). For the top three areas, payroll percentages were 0.1 percent (Aerospace Product and Parts Manufacturing), 2.0 percent (Computer and Peripheral Equipment Manufacturing), and 2.6 percent (Semiconductor and Other Electronic Component Manufacturing), respectively. For Asian manufacturing employers, payroll percentages ranged from 0.1 percent to 3 percent.
- Hispanic employer firms comprise 4.6 percent of Aerospace Product and Parts Manufacturing firms and 3.2 percent of both Communications Equipment Manufacturing and Semiconductor and Other Electronic Component Manufacturing. The lowest share of manufacturing among Hispanic firms was 0.9 percent in Basic Chemical Manufacturing. In no manufacturing industry groups were the Hispanic percentages of payroll above 1 percent.
- The percentages of Black ownership in manufacturing are quite small, with the highest at just 1.7 percent in Pharmaceutical and Medicine Manufacturing with even smaller percentages such as Semiconductor and Other Electronic Component Manufacturing (0.4 percent). The percentages of payroll are also very small, with the largest at 0.6 percent for Computer and Peripheral Equipment Manufacturing. It is also notable that there is missing data on Black-owned firms in some of our selected industry groups.

Table 3a: Representation of Minority Ownership by Industry Group (Goods), 2021

NAICS	Hispanic	Black	Asian	Minority	Total
3251: Basic Chemical Manufacturing					
Employer Firms	12	--	60	79	1,361
Percent	0.9	--	4.4	5.8	100
Annual Payroll \$ ('000)	23,830	--	61,840	95,012	16,091,746
Percent	0.1	--	0.4	0.6	100
3254: Pharmaceutical and Medicine Manufacturing					
Employer Firms	31	38	270	342	2,245
Percent	1.4	1.7	12.0	15.2	100
Annual Payroll \$ ('000)	154,093	11,112	938,945	1,117,983	30,871,094
Percent	0.5	*	3.0	3.6	100

NAICS	Hispanic	Black	Asian	Minority	Total
3332: Industrial Machinery Manufacturing					
Employer Firms	51	13	91	165	2,771
Percent	1.8	0.5	3.3	6	100
Annual Payroll \$ ('000)	42,474	5,964	81,801	140,034	11,609,014
Percent	0.4	0.1	0.7	1.2	100
3335: Metalworking Machinery Manufacturing					
Employer Firms	132	4	229	420	6,030
Percent	2.2	0.1	3.8	7	100
Annual Payroll \$ ('000)	86,665	3,756	85,969	202,381	9,112,600
Percent	1	*	0.9	2.2	100
3341: Computer and Peripheral Equipment Manufacturing					
Employer Firms	14	8	106	128	751
Percent	1.9	1.1	14.1	17	100
Annual Payroll \$ ('000)	6,767	23,815	77,769	110,915	3,945,204
Percent	0.2	0.6	2.0	2.8	100
3342: Communications Equipment Manufacturing					
Employer Firms	32	—	118	164	1,069
Percent	3.2	—	11	15.3	100
Annual Payroll \$ ('000)	12,192	—	189,620	220,820	7,453,570
Percent	0.2	—	2.5	3	100
3344: Semiconductor and Other Electronic Component Manufacturing					
Employer Firms	102	12	443	572	3,149
Percent	3.2	0.4	14.1	18.2	100
Annual Payroll \$ ('000)	116,331	6,262	639,985	806,880	24,408,566
Percent	0.5	0.0	2.6	3.3	100
3345: Nav, Measuring, Electromedical, and Control Instruments Manufacturing					
Employer Firms	85	23	278	393	4,376
Percent	1.9	0.5	6.4	9.0	100
Annual Payroll \$ ('000)	67,799	12,293	320,401	410,332	39,567,172
Percent	0.2	*	0.8	1	100
3364: Aerospace Product and Parts Manufacturing					
Employer Firms	64	12	33	115	1,377
Percent	4.6	0.9	2.4	8.4	100
Annual Payroll \$ ('000)	49,367	35,502	31,457	120,189	39,246,377
Percent	0.1	0.1	0.1	0.3	100
Total Employer Firms	523	110	1,628	2,378	23,129
Percent	2.3%	0.5%	7.0%	10.3%	100%
Total Annual Payroll \$ ('000)	559,518	98,704	2,427,787	3,224,546	182,305,343
Percent	0.3%	0.1%	1.3%	1.8%	100%
Average Payroll per Firm \$ ('000)	1,069.8	879.3	1,491.3	1,356	7,882.1

Source: OUSEA Analysis of ABS data. Percentages are rounded. "—" Indicates that there was no reported data for that group and industry. "*" Indicates the percentage values were very small, i.e., rounding to below 0.1 percent. See Appendix for White, Non-Hispanic data.

The Number of MBEs in Services were Concentrated in Two Industries

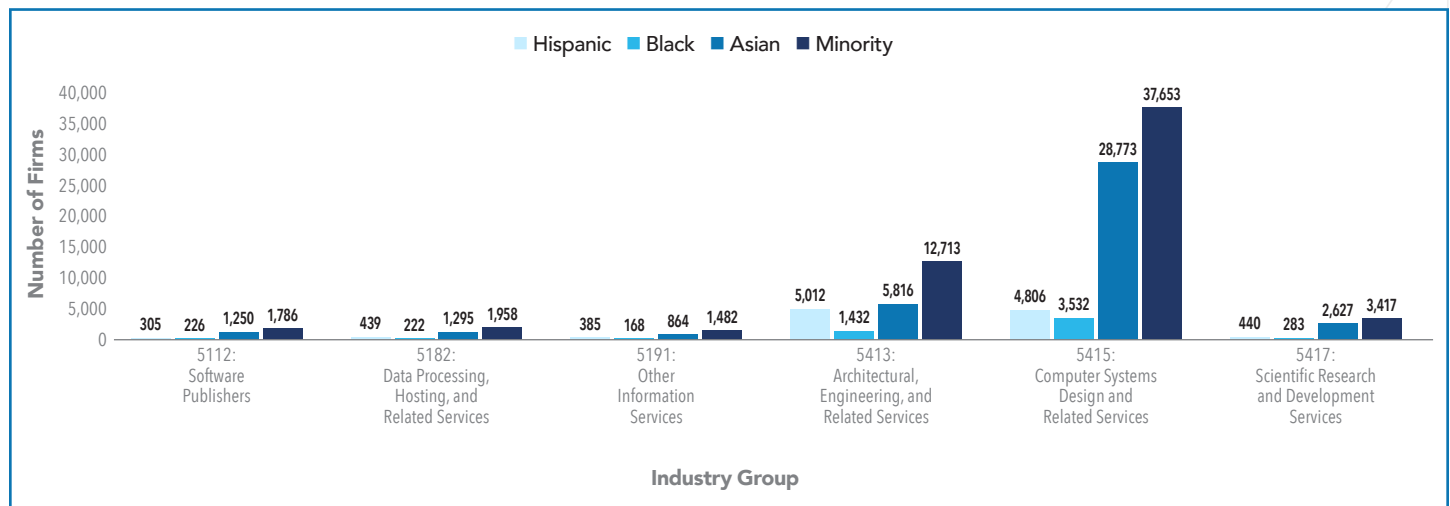
Service industries play key roles in high-tech and advanced industries due to, among other factors, their concentration of STEM skills, patents intensity, links with intermediate supply chains, and innovation diffusion.

Shown in Figure 3, the largest numbers of MBEs were in Architectural, Engineering, and Related Services and Computer Systems Design and Related Services with a combined 50,366 firms, or 85.3 percent, of the 59,009 minority-only firms. If MBEs in these industries experience fewer or less challenging barriers, this might explain their high prevalence in these areas, though in-depth study would be needed to identify specific barriers relative to other industries and, more precisely, how these impact MBEs.

As noted earlier, there were 59,009 minority employer firms in six selected service industries, which far exceeds the 2,378 MBEs in manufacturing. MBEs in these service industries represented 21.9 percent of the 269,265 total firms (second column of Table 3b); in contrast, the share of MBEs in the nine manufacturing industries was 10.3 percent.

Shown in Figure 3, the numbers of MBEs varied by wide margins between race/ethnic groups: the largest number of firms in services were Asian (40,625) followed by Hispanic (11,387) and Black (5,863). The highest numbers for both Asian (28,773) and Black (3,532) employer firms occurred in Computer Systems Design and Related Services, and for Hispanic businesses (5,012) were in Architectural, Engineering, and Related Services. Asian firms (864) and Black firms (168) had their fewest numbers in Other Information Services while Hispanic (305) firms had their smallest number in Software Publishers. The classification with the fewest number of MBEs (1,482) was Other Information Services, which includes services that were not classified into the five other service industries.

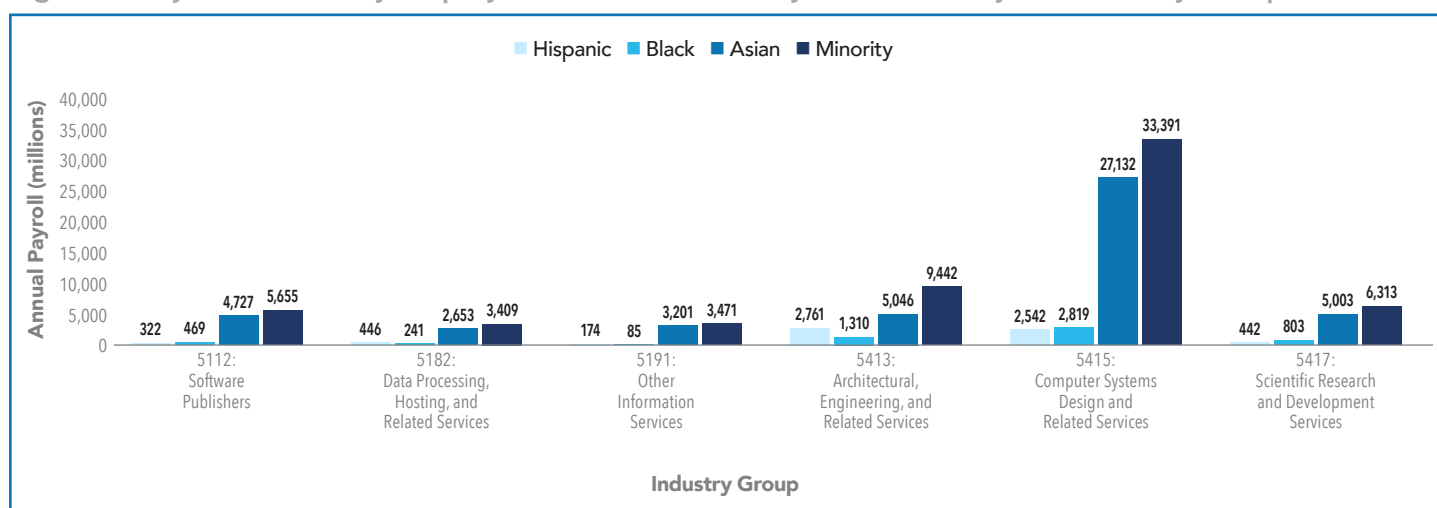
Figure 3: Minority Firms in Services by Race/Ethnicity and Industry Group, 2021



Source: OUSEA Analysis of ABS data. See Appendix for White, Non-Hispanic data.

In Figure 4, the total payroll of minority firms was \$61.68 billion, or just 7.1 percent of \$874 billion for all six service industries. Wide differences in MBEs' annual payrolls reflected the differences in the numbers of firms: Asian employer firms had the largest (\$47.76 billion), followed by Hispanic (\$6.69 billion) and Black (\$5.73 billion). Within each race/ethnic group, Asian firms' highest payroll (\$27.13 billion) was in Computer Systems Design and Related Services. For Hispanic firms, the highest payroll (\$2.76 billion) was in Architectural, Engineering, and Related Services and for Black firms (\$2.82 billion) in Computer Systems Design and Related Services. Asian and Black groups' highest payrolls coincided with their highest numbers of firms in Computer Systems Design and Related Services and for Hispanic firms in Architectural, Engineering, and Related Services.³¹ An open-ended conjecture on why these two service industries were top areas of minority firm numbers and payrolls is that these MBEs assess these markets and supply chains to be sufficiently attractive growth opportunities to justify investments in them.

Figure 4: Payroll of Minority Employer Firms in Services by Race/Ethnicity and Industry Group, 2021



Source: OUSEA Analysis of ABS data.

The Percentage Shares of MBEs in Services Indicate a High Concentration in One Industry

In Table 3b on technology-related service industries, overall minority ownership ranged in double digits, from 13 percent (Other Information Services) to 30.4 percent (Computer Systems Design and Related Services). By industry groupings, the percentages of payroll ranged from a low of 3.1 percent (Other Information Services) to a high of 14.1 percent (Computer Systems Design and Related Services). Computer Systems Design and Related Services also had the highest firm and payroll shares for two (Asian and Black) of the three races/ethnicities. Because many more MBEs appear in services industries, there would be more variation in the shares of firms and payrolls reflecting a wide range of firms' characteristics such as costs of employees' benefits and salaries, firm revenues, and numbers of employees.

- Among Asian services firms, ownership rates ranged from a low of 6.1 percent (Architectural, Engineering, and Related Services) to a high of 23.2 percent (Computer Systems Design and Related Services). The next two top ownership shares for Asian firms were Scientific Research and Development Services (15.5 percent) and Data Processing, Hosting, and Related Services (12 percent). Among these three, Computer Systems Design and Related Services had Asian firms' payroll percentages of 11.4 percent, followed by Scientific Research and Development Services (3.9 percent) and Data Processing, Hosting, and Related Services (3.4 percent).

- Hispanic ownership in technology services ranged from 2.6 percent (Software Publishers as well as Scientific Research and Development Services) to 5.3 percent (Architectural, Engineering, and Related Services). After Architectural, Engineering, and Related Services, the next highest ownership percentages were 4.1 percent (Data Processing, Hosting, and Related Services) and 3.9 percent (Computer Systems Design and Related Services). Payroll shares for Hispanic owned service firms ranged from 0.2 percent (Software Publishers and Other Information Services) to 1.7 percent (Architectural, Engineering, and Related Services).
- Black ownership in the six technology services ranged between 1.5 percent (Other Information Services and Architectural, Engineering, and Related Services) and 2.9 percent (Computer Systems Design and Related Services), with two other top industry shares at 2.1 percent (Data Processing, Hosting, and Related Services) and 2.0 percent (Software Publishers). The payroll percentages ranged only between 0.1 percent (Other Information Services) to 1.2 percent (Computer Systems Design and Related Services).

Table 3b: Representation of Minority Ownership by Industry Group (Services), 2021

NAICS	Hispanic	Black	Asian	Minority	Total
5112: Software Publishers					
Employer Firms	305	226	1,250	1,786	11,526
Percent Firms	2.6	2	10.8	15.5	100
Annual Payroll \$ ('000)	321,862	469,189	4,726,507	5,655,001	156,738,603
Percent Payroll	0.2	0.3	3	3.6	100
5182: Data Processing, Hosting, and Related Services					
Employer Firms	439	222	1,295	1,958	10,789
Percent Firms	4.1	2.1	12	18.1	100
Annual Payroll \$ ('000)	446,353	241,489	2,652,802	3,408,791	78,463,066
Percent Payroll	0.6	0.3	3.4	4.3	100
5191: Other Information Services					
Employer Firms	385	168	864	1,482	11,411
Percent Firms	3.4	1.5	7.6	13.0	100
Annual Payroll \$ ('000)	173,614	85,099	3,201,269	3,470,963	113,559,854
Percent Payroll	0.2	0.1	2.8	3.1	100
5413: Architectural, Engineering, and Related Services					
Employer Firms	5,012	1,432	5,816	12,713	94,721
Percent Firms	5.3	1.5	6.1	13.4	100
Annual Payroll \$ ('000)	2,761,420	1,309,873	5,046,298	9,441,590	159,779,803
Percent Payroll	1.7	0.8	3.2	5.9	100

NAICS	Hispanic	Black	Asian	Minority	Total
5415: Computer Systems Design and Related Services					
Employer Firms	4,806	3,532	28,773	37,653	123,842
Percent Firms	3.9	2.9	23.2	30.4	100
Annual Payroll \$ ('000)	2,542,124	2,819,077	27,131,791	33,390,827	237,235,088
Percent Payroll	1.1	1.2	11.4	14.1	100
5417: Scientific Research and Development Services					
Employer Firms	440	283	2,627	3,417	16,976
Percent Firms	2.6	1.7	15.5	20.1	100
Annual Payroll \$ ('000)	442,209	802,977	5,002,536	6,312,962	128,646,686
Percent Payroll	0.3	0.6	3.9	4.9	100
Total Employer Firms	11,387	5,863	40,625	59,009	269,265
Percent	4.2%	2.2%	15.1%	21.9%	100%
Total Annual Payroll \$ ('000)	6,687,582	5,727,704	47,761,203	61,680,134	874,423,100
Percent	0.8%	0.7%	5.5%	7.1%	100%
Average Payroll per Firm \$ ('000)	587.3	976.9	1,175.7	1,045.3	3,247.4

Source: OUSEA Analysis of ABS data. Percentages are rounded. See Appendix for White, Non-Hispanic data.

Services Has Far More MBEs than in Goods Manufacturing

Across race/ethnicity, the services groups have much greater totals and percent of MBEs and payrolls than in manufacturing. The magnitude differences in the services and manufacturing supply chains are quite large as seen at the bottom of Tables 3a and 3b. From totals summarized in Table 3c, the statistics on annual payroll would suggest that MBE firms in services are more numerous than in manufacturing: the all-minority total annual payroll in services (\$61.68 billion) is over 19 times than in manufacturing (\$3.22 billion). While this magnitude will be sensitive to the method of choosing high-tech industries, the resulting selection of industries alone is unlikely to account for the entire difference in numbers of firms and payrolls in the two sectors.

Table 3c Total Firms, Annual Payrolls, and Average Payroll per Firm, Goods and Services, 2021

Manufacturing	Hispanic	Black	Asian	Minority	Totals
Total Employer Firms	523	110	1,628	2,378	23,129
Percent	2.3%	0.5%	7.0%	10.3%	100%
Total Annual Payroll \$ ('000)	559,518	98,704	2,427,787	3,224,546	182,305,343
Percent	0.3%	0.1%	1.3%	1.8%	100%
Average Payroll per Firm \$ ('000)	1,069.8	897.3	1,491.3	1,356	7,882.1
Services					
Total Employer Firms	11,387	5,863	40,625	59,009	269,265
Percent	4.2%	2.2%	15.1%	21.9%	100%
Total Annual Payroll \$ ('000)	6,687,582	5,727,704	47,761,203	61,680,134	874,423,100
Percent	0.8%	0.7%	5.5%	7.1%	100%
Average Payroll per Firm \$ ('000)	587.3	976.9	1,175.7	1,045.3	3,247.4

Source: OUSEA Analysis of ABS data. See Appendix for White, Non-Hispanic data.

The Average Payroll for MBEs in Manufacturing is Greater than in Services, but Smaller in Size than for Non-MBEs

Manufacturing firms on average have a higher payroll than service firms. Table 3c shows the average payroll per MBE is almost 30 percent greater in manufacturing (\$1.36 million) than in services (\$1.04 million). By comparison, the average payroll per firm of the total of all firms (Totals column, Table 3c) in manufacturing (\$7,882.1) is much larger, almost two and one-half times, than that of services (\$3,247.4).

With many fewer total employer firms in manufacturing than in services, the difference in average payrolls per firm in these sectors suggests a significant portion of the 23,129 total firms in manufacturing operate with higher annual payrolls (and thus are larger in firm characteristics such as numbers of employees, costs of benefits or salaries, and/or revenues) than among firms in services. This might also be occurring to a lesser extent among MBEs due to their relatively smaller manufacturing-services differences in average payroll per firm (29.7 percent) compared to all firms (1.4 times). If so, then this might suggest that MBEs in the selected manufacturing groups are likely to be smaller-sized relative to most other businesses which are largely comprised of White, Non-Hispanic firms.³² Indeed, the average payroll per White, Non-Hispanic manufacturing firm is \$2.18 million, which is about 60 percent higher than the average payroll per minority manufacturing firm of \$1.36 million (see Appendix Table 1).

Tables 3a and 3b show there are higher overall shares of MBEs in services than in manufacturing. One hypothetical observation is that perhaps entry into high-tech services is relatively easier or more efficient for minority employer firms than in goods production. Skills, work experience, supply chain knowledge, and know-how of MBEs might be leveraged more readily and quickly in services-focused markets than in goods manufacturing, which often requires accessing and obtaining specialized capital (e.g., physical, financial, technical, inventory, and human) to start a production business. Thus, to the extent that minority entrepreneurs encounter high barriers to entering goods manufacturing, they may find manufacturing-related services to be less financially and physically capital intensive.

The Share of Minority Managers is Growing

Minorities in executive and senior roles can position themselves as potential entrepreneurs and business owners,³³ but more needs to be done to remove barriers and provide incentives for them to do so.³⁴ Barriers faced by minorities in employment and business formation persist, among other challenges. The fact that a small share (10.3 percent) of MBEs is in the high-tech manufacturing sector is a symptom of the multifaceted challenges that limit or deter MBEs' participation in greater numbers.

In addition to analyzing minority business representation by ownership, we also examined minority percentages among managers using EEOC data for four manufacturing and four services subsectors. For this analysis, managers are defined as executive/senior level employees of a firm. We studied managers because their leadership roles, skills, and experiences can become a potential path into entrepreneurial ownership.³⁵ Because the EEOC data on which we relied does not contain information on management at the four-digit NAICS level, we used the three-digit NAICS level, which is a limitation of our analysis.

Overall, we found that minority managers represented 21.1 percent of all managers in the eight examined subsectors. Asian managers represented 12.5 percent, and Black and Hispanic managers represented 2.9 and 4 percent, respectively. As with ownership, we found that total minority representation among managers was higher in services industries compared to manufacturing, with the highest representation in the category of NAICS 519 Other Information Services (29 percent), and the lowest in NAICS 333 Machinery Manufacturing (13.3 percent).

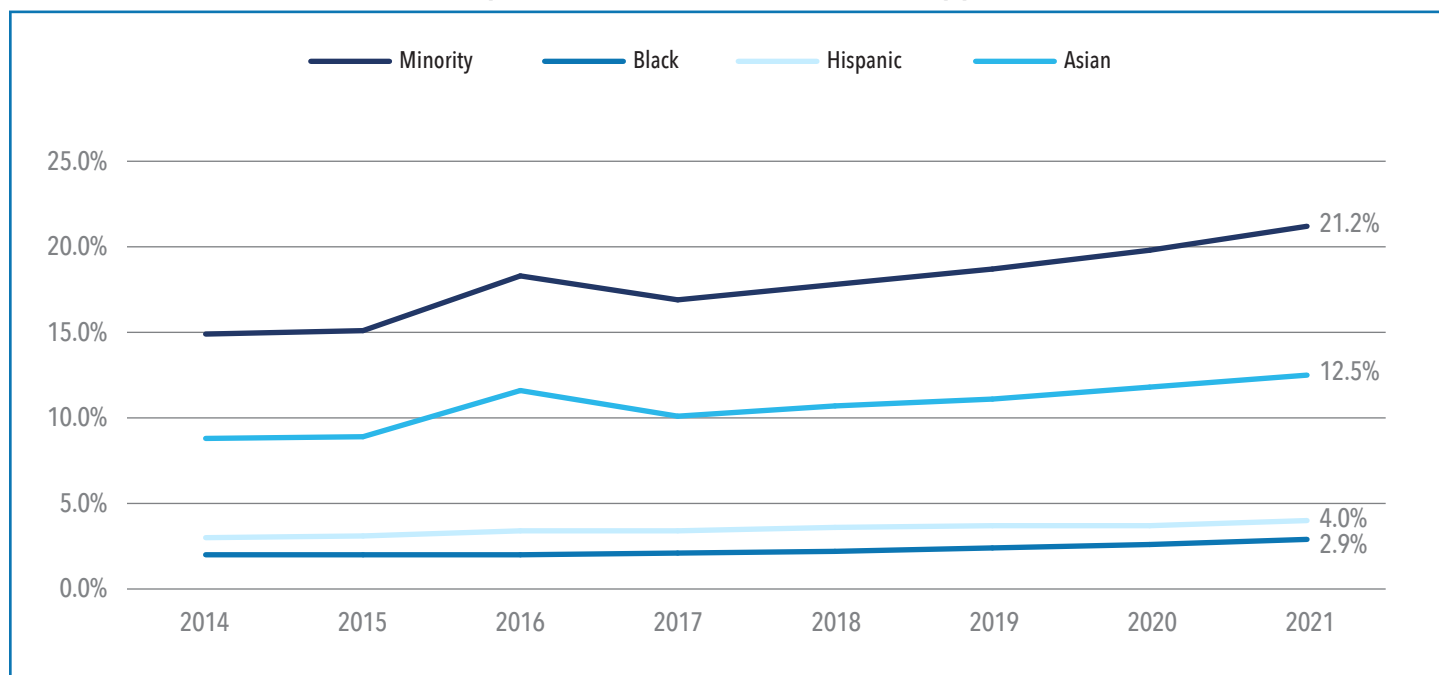
Table 4: Percent of Minority Managers of Selected Manufacturing and Services Industries, 2021

Selected NAICS-3 Industries	Number of Establishments	Black	Hispanic	Asian	Minority
325 Chemical Manufacturing	3,389	2.9%	5.0%	11.6%	21.1%
333 Machinery Manufacturing	3,364	1.9%	3.5%	6.7%	13.3%
334 Computer and Electronic Product Manufacturing	3,194	2.4%	4.4%	16.5%	24.6%
336 Transportation Equipment Manufacturing	3,805	3.6%	3.7%	8.9%	17.5%
511 Publishing Industries (except Internet)	2,140	2.3%	3.9%	12.9%	21.2%
518 Data Processing, Hosting, and Related Services	932	3.2%	3.9%	12.1%	21.2%
519 Other Information Services	963	4.2%	4.0%	17.8%	29.0%
541 Professional, Scientific, and Technical Services	22,145	2.9%	3.9%	12.6%	21.3%
Total Establishments	39,932	2.9%	4.0%	12.5%	21.1%

Source: Analysis of EEOC Data. We estimated the percentage of minority managers using the percentage non-white. In the EEOC-1 data, all of the categories are mutually exclusive. For more information see 2023 EEO-1 Component 1 Data Collection Instruction Booklet (eocdata.org).

Figure 5 shows the EEOC estimated percentage shares of Minority, Black, Hispanic, and Asian groups for the combined examined industry subsectors have grown over time. Overall minority representation increased from 14.9 percent in 2014 to 21.2 percent in 2021, however, this growth was driven by an increase in Asian managers. The percentage share of Black and Hispanic managers has been steady over this time but is significantly lower.

Figure 5: Minority Management Representation, Percent Totals in Supply Chain Industries, 2014-2021



Source: Analysis of EEOC Data. We estimated the percentage of minority managers using the percentage non-white. In the EEOC-1 data, all of the categories are mutually exclusive. For more information see 2023 EEO-1 Component 1 Data Collection Instruction Booklet ([eeocdata.org](https://www.eeocdata.org)).

Table 5: Percent of Minority Management Representation by Year, 2014-2021

Year	Black	Hispanic	Asian	Minority
2014	2.0%	3.0%	8.8%	14.9%
2015	2.0%	3.1%	8.9%	15.1%
2016	2.0%	3.4%	11.6%	18.3%
2017	2.1%	3.4%	10.1%	16.9%
2018	2.2%	3.6%	10.7%	17.8%
2019	2.4%	3.7%	11.1%	18.7%
2020	2.6%	3.7%	11.8%	19.8%
2021	2.9%	4.0%	12.5%	21.2%
Average Percentage	2.3%	3.5%	10.7%	17.8%

Source: Analysis of EEOC Data. We estimated the percentage of minority managers using the percentage non-white. In the EEOC-1 data, all of the categories are mutually exclusive. For more information see 2023 EEO-1 Component 1 Data Collection Instruction Booklet (eocdata.org).

In Table 5, the average annual percentage of the all-minority category was 17.8 percent. By race/ethnicity, the average annual percentage of Asian managers was 10.7 percent, over three times higher than the average for Hispanic managers (3.5 percent) and over four and a half times higher than for Black managers (2.3 percent).

One area of opportunity is in fostering long-term, attractive careers within advanced manufacturing and related services.³⁶ This can build talent pools of potential new minority entrepreneurs with valuable experience and skills who can consider becoming business owners. Such talent pools of experienced executives could bring substantial value as startup founders, for example in working with specialized supply chain requirements, identifying risks, developing product opportunities, fostering innovation, managing logistics, or accessing networks in high-tech communities, to name a few.



Barriers to MBE Involvement in Supply Chains

MBEs face barriers across industries and economic sectors, including advanced manufacturing and supply chain industries. A review of selected literature suggests several prominent reasons for the low representation of MBEs in supply chain industries.³⁷ Three emphasized in this report are (1) capital access disparity, (2) workforce limitations, and (3) barriers to networks. Ultimately, these lead to disparities in representation at each stage of firm development, from startup to growth to maturity.

Capital Access

The disparity in capital access that MBEs face is well documented.³⁸ Compared to non-MBE counterparts, MBEs have greater difficulty securing loans from banks, and when they do receive financing, may be subjected to less favorable interest rates and contract terms. Alternative finance options, like venture capital, also shows racial and regional inequity that impacts minority entrepreneurs.³⁹ This lack of capital access is a significant hurdle to overcome when establishing a business, in supply chain industries and high-tech manufacturing, which often requires more specialized capital and finding lenders with expertise in the target industry. Barriers around capital access also place limitations on growing firm capacity and investing in training and equipment. Both of these limitations prevent MBEs from reaching the scale and consistency that large first-tier manufacturers demand of their suppliers. Based on this study, MBEs also tend to be smaller than average, and smaller firms may face even greater difficulties in attracting capital since smaller loans are less profitable for banks.

Workforce Limitations

Workforce issues stemming from an insufficient labor pool of skilled workers are common across the manufacturing sector, but they may have a greater impact on small MBEs that may rely on less formal or more localized recruitment needs and practices.⁴⁰ However, the higher STEM skills intensity found in high-technology sectors demands higher skills and certifications, making it difficult to enter competitive supply chain markets.

Barriers to Networks

MBEs also lack connections needed to gain access to supply chain markets, in part due to their smaller size. If the MBE is an unknown firm, it is less attractive to large purchasing organizations which prefer to mitigate risk by working with well-established suppliers with high capacity and track records of reliability.⁴¹ Barriers to networking is one commonly cited challenge by MBEs and can include several factors such as the lack of information about networks and exclusivity of networks.⁴²

Even once these hurdles are cleared, evidence suggests small MBEs supplying large corporations may find themselves in unbalanced power relationships⁴³ where the former are highly dependent on the latter for their survival, with outcomes like leaving them unable to negotiate favorable terms or control their own business practices. Significant power imbalances are detrimental to the creation of long-lasting partnerships, as the perception of equality is important for developing relationships.⁴⁴ Poor or weak relationships between large corporate buyers and MBEs can reflect imbalances of information and trust in managing social issues of supply chains.⁴⁵

Inequalities and Disparities

Research has been done on the disparities and barriers found across many socioeconomic aspects of race, ethnicity, and gender that point to the continued limited participation of women and minorities in labor markets, industries, and cyclical economic changes.⁴⁶ Beyond the barriers described here, there are larger forces of structural bias and inequality that disadvantage MBE owners and their firms.⁴⁷

Although these barriers are not the only ones limiting MBE suppliers from competing in high technology markets, overcoming them might at least provide MBEs and would-be minority entrepreneurs some degree of greater certainty, capacity, confidence, and visibility towards becoming key players in industrial supply chains. In fact, encouraging and supporting more MBEs to compete in advanced manufacturing is a component of the CHIPS and Science Act and the Infrastructure Investment and Jobs Act.

Despite social, racial, and economic disparities, MBE supplier firms will continue entering and adapting to their markets, many with the help of private and public sector partnerships. **Diverse business owners' perspectives and practices are a boon to customers and client manufacturers whenever there is real investment in MBEs' success.** To emphasize potential areas for the investment and deployment of both human and physical capital of MBEs in high-tech industries, we describe several key advantages of supplier diversity in the next section.



Ways to Meet Gaps of the U.S. Supply Chain

Many public and private initiatives are directed toward promoting the success of MBEs in supply chain industries, breaking down the aforementioned barriers, and building on MBEs' advantages. Increasing MBE participation in advanced technologies and manufacturing relies on a range of initiatives to ensure MBEs can develop the capacities and skills needed to compete in rapidly changing markets. The approaches and recommendations described below are examples of ways MBEs can help meet gaps in the U.S. supply chain.

I. Leverage the Large Number of MBEs in High-Tech Manufacturing Support Services

Assist MBEs to Access Opportunities as Part of the Growth Spurred by Federal Investments, Including the CHIPS Act

In early 2024, quarterly investment in U.S. manufacturing hit a new record of nearly \$150 billion dollars.⁴⁸ The growth in U.S. manufacturing is driven, in part, by significant public investments in supply chain resilience, including the CHIPS Act to incentivize domestic semiconductor production, and the Inflation Reduction Act to incentivize domestic clean energy production. To the extent consistent with applicable law, both the public and private sectors should encourage firms to identify and partner with MBEs to compete in supply chains. Public incentives and private investment can grow MBEs in manufacturing and tech services, such as through access to workforce training and capital to support research and development. Also, the large number of MBEs in high tech services (59,009 compared to 2,378 MBEs in manufacturing) can play a critical role in supporting expanding domestic manufacturing. The number of MBE manufacturers could grow if MBE high-tech service firms in the manufacturing sector are able to invest in supply chains, particularly as advanced manufacturing markets demand rapid innovations.⁴⁹ Tapping into these growing industries can grow the comparative size of MBEs in services and ensure a robust and diverse domestic supply chain.

II. Foster entrepreneurship among minority managers in manufacturing

Promote Talent Pools of Entrepreneurship

A consistent and growing pool of talent at all levels of experience and skill in the latest technologies or processes not only adds diversity within organizations but also raises the potential for more U.S. businesses in the supply chain, including minority firms. Industry groups could take steps to encourage and facilitate experienced minority managers and senior officers in key industries to pursue business ownership. In addition, firms could increase efforts, to the extent consistent with applicable law, to hire, develop, retain, and promote individuals from underrepresented communities by establishing clear career paths in advanced technology and supply chain firms. Fostering a larger, skilled pool of minority firms could also attract venture capital.⁵⁰ Moreover, increasing venture capital towards entrepreneurs in manufacturing would help enable innovation and growth in communities.⁵¹

Support Training Programs and Expand Innovation Incentives

Fostering awareness and interest among students is the first step to training a skilled labor pool that can support growth in the sector. There is opportunity in expanding training programs by integrating manufacturing curriculums into K-12 and continuing education that promotes manufacturing as an attractive career option.⁵² Additionally, collaboration with Historically Black Colleges and Universities' (HCBU) and other Minority Serving Institutions' (MSI) technology transfer offices could reach a wide audience of students and faculty interested in innovation.⁵³ Focusing these efforts on potential minority entrepreneurs will help to

reduce the inequities present in the field, as would supporting research and development through funding for start-ups, incubators, and makerspaces in areas that are underserved by existing innovation clusters.

III. Expand Corporate Supply Chain Diversity

Expand and Strengthen Procurement Programs

Procurement programs that promote contracting opportunities for MBEs help create footholds that bring together MBEs with buyers. In some cases, procurement promotion and opportunity matching programs in the public sector have led to successful procurement outcomes following competitive processes. The contract awards, in turn, substantially developed firm capacity and helped sustain their long-term growth.⁵⁴ Private sector purchasing councils, such as the National Minority Supplier Development Council, formed in 1972, also helped MBEs grow their networks by bringing MBE suppliers and corporate buyers together.

Build Corporate-MBE Supplier Relationships

Corporate and first tier suppliers can build partnerships with industry trade groups to promote the participation of lower tier MBE suppliers by establishing criteria and evaluation systems for MBE purchasing, setting organizational goals to include purchasing from MBEs, and collecting data on MBE sourcing.⁵⁵ To achieve this, buy-in is essential from top management to support MBE purchasing initiatives and to obtain commitment from purchasing personnel toward implementing them. Corporate commitments from top-level executives have resulted in the success of MBE buying programs.⁵⁶ Managers can demonstrate support by attending conferences or directly communicating with suppliers, leading by example, and developing a corporate culture in which purchasing from MBEs is standard operating procedure.⁵⁷

Ensure Stable Cashflow for MBEs

Faster payment programs are an efficient way to reduce capital burdens on small MBEs by reducing the time between invoice and receipt of payment. One example is the QuickPay program, launched in 2011, increased small businesses' resilience by requiring federal departments to pay small business contractors within 15 days, rather than 30 days. This decreased the time lag between work and payment for small suppliers to the government, lowering their working capital costs.⁵⁸ In addition, there are federal agencies looking to improve payment processing to small business contractors.⁵⁹

IV. Target Needed Support for MBEs in Manufacturing

Foster Public-Private Partnerships

Place-based strategies can ensure that support is targeted to communities which were most affected by the loss of U.S. manufacturing, like the older industrial heartland.⁶⁰ Yudken, Croft, and Stettner refer to the term of industrial commons as a metaphorical shared space of innovation networks that facilitate common use of resources like research and development infrastructure and access to specialized suppliers.⁶¹ This approach draws upon multiple levels of government (federal, state, local) and public-private partnerships. In addition, there are other federal programs such as the Mentor-Protégé Program (MPP) that support the growth of young entrepreneurs and small businesses.⁶²

An important example of a federal public-private partnership is the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, which aims to enable small businesses to exploit technological ideas into commercialization.⁶³ This approach uses competitive awards to incentivize small businesses and non-profit research institutions to support market innovations and realize the potential

of research and development investments. The SBIR/STTR program encourages entrepreneurship among socially disadvantaged persons.

Leverage Business Centers and Networks

Business Centers and Networks can assess MBEs' needs, provide technical assistance and business development resources, make referrals to key networks, and help with gaining access to capital and contracts, among others. There are other programs that bridge gaps for small business growth, including but not limited to, the APEX Accelerator Program through the U.S. Department of Defense.⁶⁴ MBEs need to address gaps in their capacity to integrate a wide range of resources into their supply chain operations. Networks of federal, state, and local governments programs, as well as public and private organizations, facilitate an array of financial and non-financial assistance for MBEs in the manufacturing sector. MBDA's Advanced Manufacturing Centers program provides industry-focused, targeted services and aims to promote new technologies.⁶⁵ In addition, the National Institute of Standards and Technology Manufacturing Extension Partnership (MEP) and Manufacturing USA⁶⁶ initiatives are government programs that have fostered the growth of small manufacturers and encouraged the development of innovation clusters that benefit from co-location.⁶⁷

Develop Initiatives Helping MBEs Grow in Scale and Size

To meet supply chain gaps, smaller MBEs need to increase their production capacities which also increases their ability to win contracts, scale-up production, reach more markets, hire more workers, and enhance their bargaining power in supplier relationships. Our analysis indicates that MBEs tend to be smaller than non-MBEs in advanced manufacturing and supply chain industries. Thus, increasing the size of MBEs by improving their access to capital and ability to take on larger contracts will effectively increase their contribution to supply chains, even if their number of firms does not change.⁶⁸

Encourage Community Engagement

One way that information can be collected from the public regarding barriers, best practices, and ways to encourage minority managers into advanced manufacturing is through federal requests for information (RFI).⁶⁹ The RFI process can provide a forum for individuals and organizations to provide their ideas, viewpoints, and concerns about the obstacles and opportunities for minority participation in supply chains.

Another approach is to bring together industry, government, and public organizations into discussion roundtables about supporting solutions and challenges to minority business enterprises entering advanced manufacturing. Both approaches can provide timely insights while fostering collaboration between industries, businesses, governments, public organizations, and minority professionals.

Addressing Unique Challenges by MBE Group

Barriers may have differential effects on demographic groups. When considering the impacts of removing barriers, policy makers can use unique solutions to address challenges faced by demographic groups.⁷⁰ The industry concentrations of MBEs suggest the effects of barriers to high-technology goods and services businesses occur differently among MBE groups. Thus, in seeking to remove barriers, public policy and business decisions should address how the targeted benefits and costs of removing the impediments could occur among MBE groups.

Appendix

Identifying the Advanced Manufacturing Supply Chain Industries

We produced a list of industries based on available information from Census and other sources by using a recent Census product focused on the Business Dynamics Statistics of U.S. High Tech Industries, termed BDS-High Tech or “BDS-HT”.⁷¹ These industries span advanced manufacturing, as well as some service industries that support them. Census chose those industries based on the proportions of STEM workers.

We also relied on information from the Census international trade release. This release tracks international trade in advanced technology products. We matched the products to the corresponding industry codes. All the Census “high tech” industries also appeared on this list, but we added additional codes based on their proportion of advanced technology products.

To ensure that those industries were also part of the supply chain, we relied on recent research that has identified supply chain industries by looking at the proportion of industry sales to intermediate users. Specifically, Delgado and Mills (2017) categorized each industry by the percentage of its sales to final users or intermediate users. They defined supply chain industries to be those for whom less than a third went to final customers. They found that the industries in the supply chain tended to have higher proportions of STEM workers. To validate our list of industries, we found that the industries we identified are also included as supply chain industries by Delgado and Mills.

One exception was Other Information Services. However, we included it in Table 1 due to its 37 percent sales to intermediate users, a figure which is close to the 35 percent threshold Delgado and Mills specifies. Further, we excluded Motor Vehicles because of their high proportion of sales to consumers.

Caveats on Industry Methodology

An important caveat is that classification methodologies for advanced manufacturing and services use different criteria and therefore can produce different selections of industrial activities. Following Hecker’s approach to identifying high-tech industries, these criteria can be divided into two groups: input-based and output-based. Input-based criteria look at measures like STEM employment intensity, usage of innovative techniques, and investment in research and development (R&D) activities. Output-based criteria are based on the final product, so high-tech industries would be those that produce advanced technologies.

- Hecker (2005) uses only science, engineering, and technician occupation intensity, or STEM intensity, from Bureau of Labor Statistics (BLS) data to identify high-tech industries. Hecker groups high tech industries into three levels based on their proportion of STEM workers compared to the national average (p.57-59).
- Goldschlag and Miranda (2016) highlight concerns about coverage, stability, interpretation, and replicability in their discussion of various methodologies for identifying high-tech industries. Ultimately, their classification scheme builds on Hecker’s methodology, selecting Level I industries which are defined as those with the highest STEM employment, across 2005, 2012, and 2014 (p.20). They use data from Business Dynamics Statistics (BDS), a dataset from Census.

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- Delgado and Mills (2020) suggests a framework that divides industries into supply chain (SC or B2B) industries, which sell primarily to businesses and government, and business-to-consumer (B2C) industries, which sell primarily to consumers. Manufacturing and service industries are found in both groups. Delgado and Mills argue that this framework captures innovation in SC services, which are often overlooked in favor of manufacturing as a driver of innovation despite high STEM intensity (p.4).

Both input-based and output-based criteria have advantages and drawbacks, as input-based criteria suffer from arbitrariness and output-based criteria from subjectivity.

Limitations

This report limited its analysis to MBEs: racial and ethnic minority groups including Asian, Black, and Hispanic groups. There are other groups that are part of MBDA's mission but could not be represented due to data limitations.

This analysis covers the supply chain generally. There may be different representations for specific industries, or for federal procurement.

Data limitations have been noted above. The existing data on MBEs is sparse and existing public data is often produced with a lag past their collection period. Existing data sets also lack greater detail on many key attributes of MBEs such as geographic locations, their specific products or services provided, measures of profitability, and amounts of capital invested. Narrowing our focus to certain industries increases the difficulty of the task, as the number of MBEs in an industry may be too limited for public release of their information.

As we noted in the methodology section, the number and types of industries included in the analysis may vary widely depending on the methodology used to select them. Terms like "high tech" and "advanced manufacturing" may be interpreted in multiple ways, with different definitions recommending the selection of different industries for consideration. The selection of industries may have a significant impact on the results and analysis.

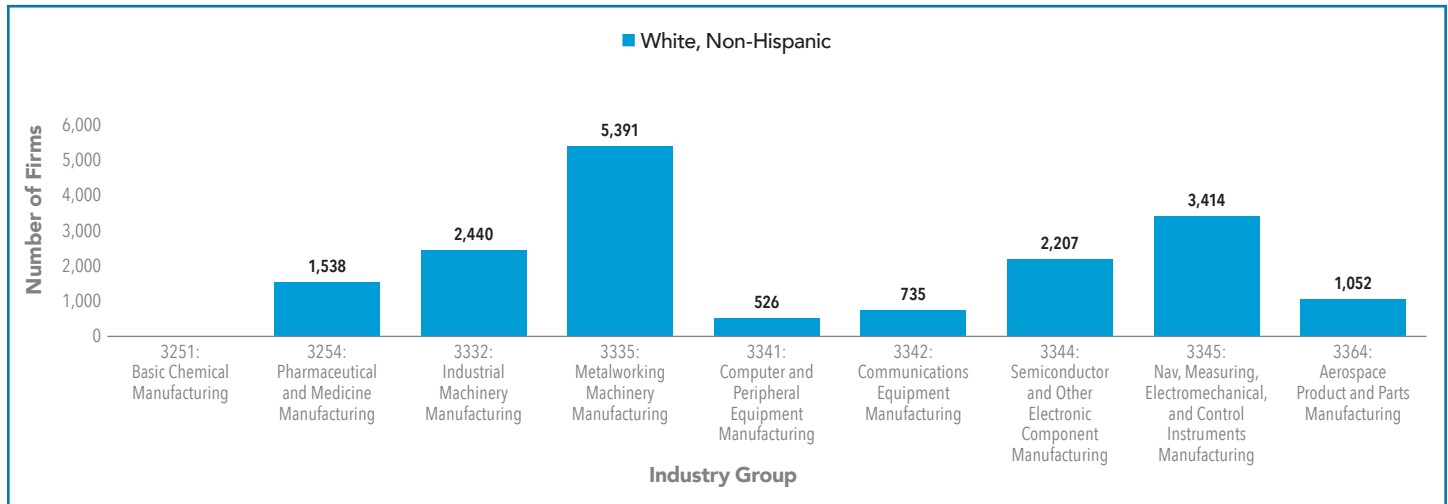
In some areas, there are very few MBEs, making it difficult to draw conclusions or even collect data due to Census privacy protocols.

The scale or size (e.g., small, medium, and large) attributes of MBEs vary depending on the type of production activities, inputs, and outputs needed in a particular supply chain, resulting in different concentrations of firm sizes between supply chains. As discussed above, a general finding is that MBEs tend to be smaller and fewer than non-minority firms based on percentages of payroll and ownership.

Data for White, Non-Hispanic Employer Firms, Payrolls, and Industries

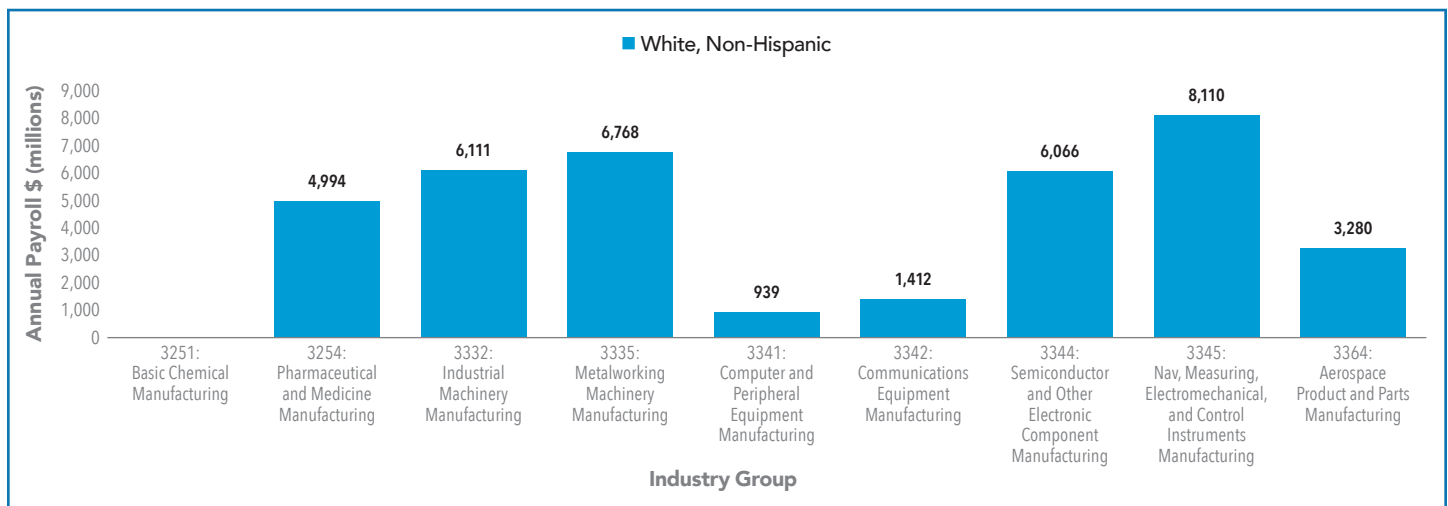
Appendix Figures 1-4 below present data on the number of firms and payroll among White, Non-Hispanic businesses in the examined manufacturing and services industries.

Appendix Figure 1. White, Non-Hispanic Firms in Manufacturing by Industry Group, 2021



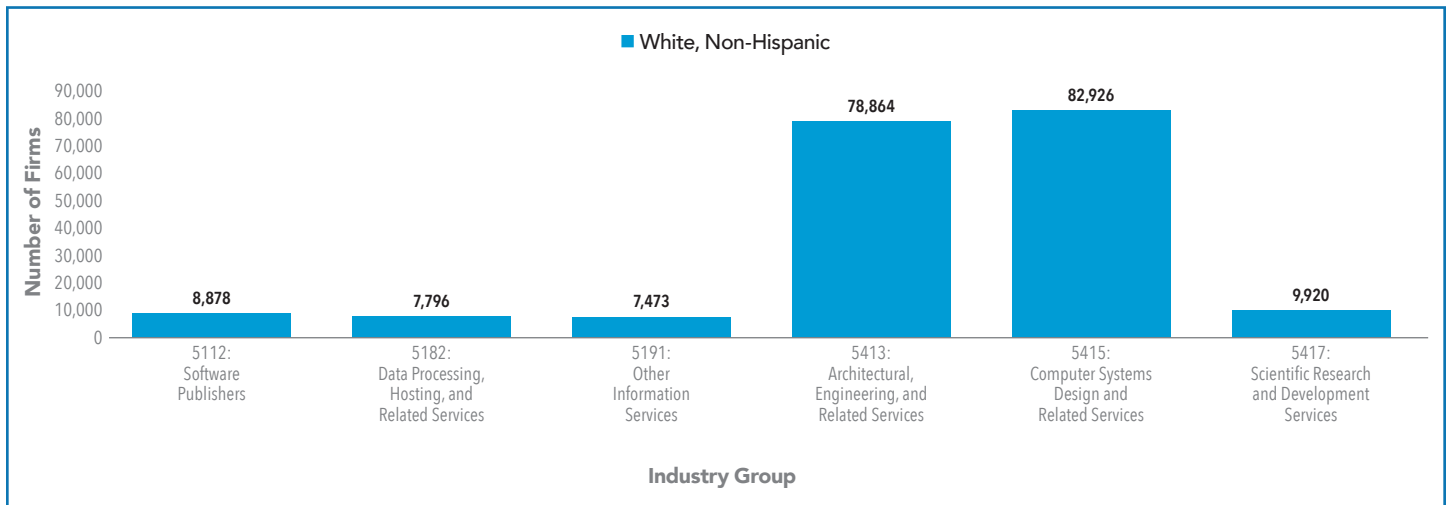
Source: OUSEA Analysis of ABS data. Note that data for 3251: Basic Chemical Manufacturing was suppressed by the U.S. Census Bureau due to data quality, processing, or reporting issues.

Appendix Figure 2. Payroll of White, Non-Hispanic Firms in Manufacturing by Industry Group, 2021



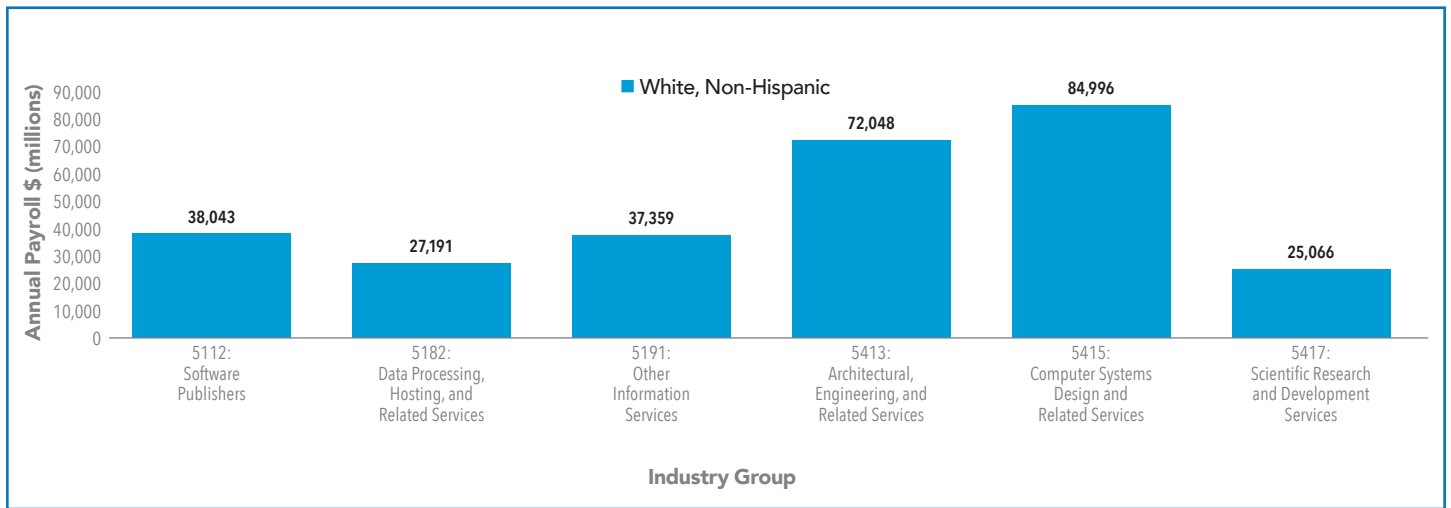
Source: OUSEA Analysis of ABS data. Note that data for 3251: Basic Chemical Manufacturing was suppressed by the U.S. Census Bureau due to data quality, processing, or reporting issues.

Appendix Figure 3. White, Non-Hispanic Firms in Services by Industry Group, 2021



Source: OUSEA Analysis of ABS data.

Appendix Figure 4. Payroll of White, Non-Hispanic Firms in Services by Industry Group, 2021



Source: OUSEA Analysis of ABS data.

Appendix Tables 1-2 below present data on the number and percentages of firms and payroll among White, Non-Hispanic businesses in the selected manufacturing and services industries. Columns for Total and Minority are included for comparison.

Appendix Table 1. White, Non-Hispanic Number of Firms and Payroll in Manufacturing by Industry Group, 2021

NAICS	White, Non-Hispanic	Minority	Total
3251: Basic Chemical Manufacturing			
Employer Firms	**	79	1,361
Percent	**	5.8	100
Annual Payroll \$ ('000)	**	95,012	16,091,746
Percent	**	0.6	100
3254: Pharmaceutical and Medicine Manufacturing			
Employer Firms	1,538	342	2,245
Percent	69	15.2	100
Annual Payroll \$ ('000)	4,993,671	1,117,983	30,871,094
Percent	16.2	3.6	100
3332: Industrial Machinery Manufacturing			
Employer Firms	2,771	2,440	2,771
Percent	100	88.1	100
Annual Payroll \$ ('000)	11,609,014	6,110,595	11,609,014
Percent	100	52.6	100
3335: Metalworking Machinery Manufacturing			
Employer Firms	5,391	420	6,030
Percent	89.4	7	100
Annual Payroll \$ ('000)	6,768,103	202,381	9,112,600
Percent	74.3	2.2	100
3341: Computer and Peripheral Equipment Manufacturing			
Employer Firms	526	128	751
Percent	70.0	17.0	100
Annual Payroll \$ ('000)	939,206	110,915	3,945,204
Percent	23.8	2.8	100
3342: Communications Equipment Manufacturing			
Employer Firms	735	164	1,069
Percent	68.8	15.3	100
Annual Payroll \$ ('000)	1,411,720	220,820	7,453,570
Percent	18.9	3.0	100
3344: Semiconductor and Other Electronic Component Manufacturing			
Employer Firms	2,207	572	3,149
Percent	70.1	18.2	100
Annual Payroll \$ ('000)	6,065,760	806,880	24,408,566
Percent	24.9	3.3	100

NAICS	White, Non-Hispanic	Minority	Total
3345: Nav, Measuring, Electromedical, and Control Instruments Manufacturing			
Employer Firms	3,414	393	4,376
Percent	78.0	9	100
Annual Payroll \$ ('000)	8,109,520	410,332	39,567,172
Percent	20.5	1	100
3364: Aerospace Product and Parts Manufacturing			
Employer Firms	1,052	115	1,377
Percent	76.4	8.4	100
Annual Payroll \$ ('000)	3,279,984	120,189	39,246,377
Percent	8.4	0.3	100
Total Employer Firms	17,303	2,378	23,129
Total Annual Payroll \$ ('000)	37,678,559	3,224,546	182,305,343
Average Payroll per Firm \$ ('000)	2,177.6	1,356	7,882.1

Source: OUSEA Analysis of ABS data. Percentages are rounded. "***" Indicates suppression of data by the U.S. Census Bureau due to quality, processing, or reporting issues. Note: a limitation to this analysis is that for 5.1 percent of firms, the demography of owners is unclassifiable. A significant limitation to the payroll analysis is that a large portion of payroll dollars (64.7 percent) are among unclassifiable firms.

Appendix Table 2. White, Non-Hispanic Number of Firms and Payroll in Services by Industry Group, 2021

NAICS	White, Non-Hispanic	Minority	Total
5112: Software Publishers			
Employer Firms	8,878	1,786	11,526
Percent Firms	77.0	15.5	100
Annual Payroll \$ ('000)	38,042,800	5,655,001	156,738,603
Percent Payroll	24.3	3.6	100
5182: Data Processing, Hosting, and Related Services			
Employer Firms	7,796	1,958	10,789
Percent Firms	72.3	18.1	100
Annual Payroll \$ ('000)	27,191,481	3,408,791	78,463,066
Percent Payroll	34.7	4.3	100
5191: Other Information Services			
Employer Firms	7,473	1,482	11,411
Percent Firms	65.5	13	100
Annual Payroll \$ ('000)	37,359,264	3,470,963	113,559,854
Percent Payroll	32.9	3.1	100
5413: Architectural, Engineering, and Related Services			
Employer Firms	78,864	12,713	94,721
Percent Firms	83.3	13.4	100
Annual Payroll \$ ('000)	72,047,583	9,441,590	159,779,803
Percent Payroll	45.1	5.9	100
5415: Computer Systems Design and Related Services			
Employer Firms	82,926	37,653	123,842
Percent Firms	67	30.4	100
Annual Payroll \$ ('000)	84,996,418	33,390,827	237,235,088
Percent Payroll	35.8	14.1	100

NAICS	White, Non-Hispanic	Minority	Total
5417: Scientific Research and Development Services			
Employer Firms	9,920	3,417	16,976
Percent Firms	58.4	20.1	100
Annual Payroll \$ ('000)	25,066,212	6,312,962	128,646,686
Percent Payroll	19.5	4.9	100
Total Employer Firms	195,857	59,009	269,265
Total Annual Payroll \$ ('000)	284,703,758	61,680,134	874,423,100
Average Payroll per Firm \$ ('000)	1,453.6	1,045.3	3,247.4

Source: OUSEA Analysis of ABS data. Percentages are rounded. Note: a limitation to this analysis is that for 5.1 percent of firms, the demography of owners is unclassifiable. A significant limitation to the payroll analysis is that a large portion of payroll dollars (64.7 percent) are among unclassifiable firms.



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Endnotes

- ¹ 15 U.S.C. § 9501 defines a “minority business enterprise” as “a business enterprise (i) that is not less than 51 percent-owned by one or more socially or economically disadvantaged individuals; and (ii) the management and daily business operations of which are controlled by one or more socially or economically disadvantaged individuals.”
- ² The White House. 2023. “Issue Brief: Supply Chain Resilience.” November 30. <https://www.whitehouse.gov/cea/written-materials/2023/11/30/issue-brief-supply-chain-resilience/>.
- ³ <https://www.nytimes.com/2022/05/20/business/economy/baby-formula-shortage-market.html>.
- ⁴ At this level of writing, we use “gap” as a general term to evoke disparities, disruptions, losses, vulnerabilities, or emerging needs in production or supply.
- ⁵ In addition to 15 USC 9501, definition of MBE, this study and report uses publicly available data from the U.S. Bureau of Census, U.S. Department of Labor, and other reports. This report uses the available statistical data as a proxy to inform our analysis of Minority Business Enterprises.
- ⁶ <https://www.nytimes.com/2022/05/20/business/economy/baby-formula-shortage-market.html>.
- ⁷ This report uses the term “minority” to describe an individual that identifies as a member of a race or ethnicity other than non-Hispanic and White, as classified by the U.S. Bureau of Census. The U.S. Bureau of Census defines race as includes White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, as well as the categories of minority, equally minority/non-minority, and non-minority. Minority also includes members of the Hispanic and equally Hispanic Ethnicity includes Hispanic, equally Hispanic/non-Hispanic, and non-Hispanic. <https://www.census.gov/programs-surveys/abs/technical-documentation/methodology.html>.
- ⁸ The White House. 2023. “Issue Brief: Supply Chain Resilience.” November 30. <https://www.whitehouse.gov/cea/written-materials/2023/11/30/issue-brief-supply-chain-resilience/>.
- ⁹ Iakovou, Eleftherios. and Chelsea C. White III. 2020. “How to Build More Secure, Resilient, Next-Gen U.S. Supply Chains.” The Brookings Institution. December 3. <https://www.brookings.edu/articles/how-to-build-more-secure-resilient-next-gen-u-s-supply-chains/>. West, Darrell. 2022. “Six Ways to Improve Global Supply Chains.” The Brookings Institution. July 12. <https://www.brookings.edu/articles/six-ways-to-improve-global-supply-chains/>. Opportunity Finance Network. 2024. Research Supports It: Community Finance Institutions were PPP Heroes. January 25. <https://www.ofn.org/blog/research-community-finance-institutions-ppp-heroes/#:~:text=And%20CDFIs%20and%20MDIs%20showed,communities%20mainstream%20finance%20leaves%20behind>. Thomas, Gail. 2023. “New York CDFI Delivers Pandemic Relief to Family-Owned Businesses.” U.S. Department of the Treasury Community Development Financial Institutions Fund. April 20. <https://www.cdfifund.gov/impact/101>. Bank of America. 2023. “Critical capital for small businesses: Recommendations for expanding access to credit through Community Development Financial Institutions (CDFIs).” <https://business.bofa.com/content/dam/flagship/public-policy/esg/cdfis-critical-capital-for-small-businesses-november-2022.pdf>.
- ¹⁰ Adobor, Henry, and Ronald S. McMullen. 2007. “Supplier diversity and supply chain management: strategic approach.” *Business Horizons*. May. <http://dx.doi.org/10.1016/j.bushor.2006.10.003>. And also Carter, Craig R, Richard J Auskalnis, and Carol L Ketchum. 1999. “Purchasing from minority business enterprises: Key success factors.” *Journal of Supply Chain Management* 28-32. DOI: 10.1111/j.1745-493X.1999.tb00053.x.
- ¹¹ Ibid., p. 220.
- ¹² For context, as of July 1, 2023, Hispanic or Latino persons represented 19.5 percent of the U.S. population, followed by Black or African American (13.7 percent), Asian (6.4 percent), American Indian and Alaska Native (1.3 percent), and Native Hawaiian and Other Pacific Islander (0.3 percent). Whites alone, not Hispanic or Latino, represented 58.4 percent of the population. See U.S. Census Bureau Quick Facts: <https://www.census.gov/quickfacts/fact/table/US/PST045222>.

- ¹³ Fairlie, Robert W. 2005. "Entrepreneurship among Disadvantaged Groups: An Analysis of the Dynamics of Self-Employment by Gender, Race, and Education." July. <https://people.ucsc.edu/~rfairlie/papers/published/springer%202006%20-%20handbook%20article.pdf>. And also: Reynolds, P.D., Carter, N.M., Gartner, W.B. and Greene, P.G., 2004. "The prevalence of nascent entrepreneurs in the United States: Evidence from the panel study of entrepreneurial dynamics." *Small Business Economics*, 263-284. https://www.academia.edu/download/40557224/The_Prevalence_of_Nascent_Entrepreneurs_20151201-8636-q5gjlw7.pdf.
- ¹⁴ This report generally refers to "high technology" and "advanced technology" industries as (1) having production methods based in recent or continuing innovations in sciences and engineering, or (2) requiring or having a high share of technically skilled (i.e. STEM) workers. The report is based on selected industries; for further details on identification of technology industries, please see the Appendix.
- ¹⁵ "Patient capital" is a term for longer-term financing that may also achieve social impact goals. For one example, see <https://www.kauffmanfellows.org/journal/patient-capital-in-an-impatient-world>.
- ¹⁶ See: <https://www.whitehouse.gov/briefing-room/blog/2023/08/16/the-economics-of-public-investment-crowding-in-private-investment/>.
- ¹⁷ Delgado, Mercedes, and Karen G. Mills. 2020. "The supply chain economy: A new industry categorization for understanding innovation in services." *Research Policy*. (p.15). https://www.hbs.edu/ris/Publication%20Files/1-s2.0-S0048733320301177-main_91317e57-9217-4a3d-9707-7f0b6034febc.pdf.
- ¹⁸ See Appendix, Caveats on Industry Methodology.
- ¹⁹ Delgado, Mercedes, and Karen G. Mills. 2020. "The supply chain economy: A new industry categorization for understanding innovation in services." *Research Policy*. https://www.hbs.edu/ris/Publication%20Files/1-s2.0-S0048733320301177-main_91317e57-9217-4a3d-9707-7f0b6034febc.pdf.
- ²⁰ In the ABS data, Census defines minority ownership of a firm as at least 51 percent or more of the stock or equity in a business having an owner(s) categorized in a minority race or ethnicity. Race includes White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, as well as the categories of minority, equally minority/non-minority, and non-minority. Ethnicity includes Hispanic, equally Hispanic/non-Hispanic, and non-Hispanic. <https://www.census.gov/programs-surveys/abs/technical-documentation/methodology.html#:~:text=Business%20ownership%20is%20defined%20as,%2C%20race%2C%20and%20veteran%20status>.
- ²¹ Source: ABS - Company Summary: 2022 Tables (Employer Businesses) (census.gov).
- ²² "The EEO-1 Component 1 report is a mandatory annual data collection that requires all private sector employers with 100 or more employees, and federal contractors with 50 or more employees meeting certain criteria, to submit demographic workforce data, including data by race/ethnicity, sex and job categories. The filing by eligible employers of the EEO-1 Component 1 Report is required under section 709(c) of Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e-8(c), and 29 CFR 1602.7-.14 and 41 CFR 60-1.7(a)." EEO Data Collections | U.S. Equal Employment Opportunity Commission (eeoc.gov), PUF Data Download User Guide.pdf (eeoc.gov).
- ²³ Delgado, Mercedes, and Karen G. Mills. 2020. "The supply chain economy: A new industry categorization for understanding innovation in services." *Research Policy*. https://www.hbs.edu/ris/Publication%20Files/1-s2.0-S0048733320301177-main_91317e57-9217-4a3d-9707-7f0b6034febc.pdf.
- ²⁴ According to Census Bureau staff, some examples of firms which are unclassifiable by demographics are those owned by foreign corporations, those with no people who own a minimum of 10 percent of the stock of the company, and those firms which are fully 501(c) tax exempt.
- ²⁵ The percentages may not add to 100 percent because: (1) As noted in the preceding paragraph, some firms are not classifiable, and (2) as noted at the bottom of Table 2, because the Hispanic category includes all racial categories, the percentage rows and numbers do not sum to the total for classifiable firms. Some industries may not report ownership by each racial or ethnic group.
- ²⁶ Source AB2100CSA01: Annual Business...- Census Bureau Table. Classifiable firms are those whose business ownerships possess 51 percent or more of their business stock or equity and can be identified by sex, ethnicity, race, and veteran status categories. For details, see Census Bureau: Annual Business Survey Methodology (census.gov).

- ²⁷ Ideally, we would also examine the total revenue of these firms, but this is not reported by ABS for firms at the four-digit level. At the 2-digit level, minority business represented 4.8 percent of total revenue of employer firms.
- ²⁸ Due to display issues, figures for White, Non-Hispanic are presented separately in the Appendix.
- ²⁹ Here and throughout the report, the small numbers of MBEs and payroll values reflect reporting, collection, or methodological considerations and are not intended as a scientific sample of MBEs. Thus, the data should not be considered statistically representative of the universe of MBEs in manufacturing and services.
- ³⁰ The number of Minority firms (2,378) divided by the number of firms (23,129) in the Total column.
- ³¹ The lowest payrolls for Asian firms were in Data Processing, Hosting and Related Services. For Hispanic and Black firms, the lowest payrolls were in Other Information Services.
- ³² Of the total of 23,129 employer firms in advanced manufacturing, about 75 percent (or 17,303) are White, Non-Hispanic firms. Appendix Table 1 contains data on White, Non-Hispanic firms in the selected manufacturing industries.
- ³³ Raimi, Panait, Gigauro, and Apostu (2023), in a thematic review, found multiple studies that cited managerial experience in a previous occupation as one of multiple pull factors for women to pursue entrepreneurship. (pp.12-14).
- ³⁴ Ibid.
- ³⁵ Reynolds, Carter, Gartner, and Green (2004), found that “Those 18–54 years old not involved in the labor force – housewives, retirees, unemployed, students, etc.– are less likely to be involved in business start-up activities than those with full or part time jobs.” (p.275).
- ³⁶ Massey, Sunni (2019). Combatting the Skills Gap by Empowering Underrepresented Communities. NIST. <https://www.nist.gov/blogs/manufacturing-innovation-blog/combating-skills-gap-empowering-underrepresented-communities>.
- ³⁷ For example, see: Bates, Timothy, Joseph Farhat, and Colleen Casey. 2022. “The Economic Development Potential of Minority-Owned Businesses.” *Economic Development Quarterly* 43-56. <https://journals.sagepub.com/doi/pdf/10.1177/08912424211032273>.
- ³⁸ Hwang, V., Desai, S., & Baird, R. (2019). Access to capital for entrepreneurs: Removing barriers. Available at SSRN 3389924. Federal Reserve Board (2022). Availability of Credit to Small Businesses. <https://www.federalreserve.gov/publications/2022-october-availability-of-credit-to-small-businesses.htm>. Toussaint-Comeau, M., & Williams, V. Secular Trends in Minority-Owned Businesses and Small Business Finance. <https://www.chicagofed.org/~media/publications/profitwise-news-and-views/2020/pnv2-2020-trends-in-minority-owned-businesses.pdf>. Robb, A., & Niwot, C.O. (2018). Financing patterns and credit market experiences: A comparison by race and ethnicity for US Employer firms. Office of Advocacy, US Small Business Administration: https://advocacy.sba.gov/wp-content/uploads/2019/04/Financing_Patterns_and_Credit_Market_Experiences_report.pdf.
- ³⁹ Fairlie, R., Robb, A. and Robinson, D.T., 2022. “Black and white: Access to capital among minority-owned start-ups.” *Management Science*, 68(4), pp.2377-2400. https://www.nber.org/system/files/working_papers/w28154/w28154.pdf.p.11. See also, <https://www.csmonitor.com/Business/2021/0222/For-Black-owned-businesses-venture-capital-still-elusive>.
- ⁴⁰ Ram, Woldesenbet, and Jones (2011) noted “In the case of EMB (ethnic minority businesses) supplier firms, employee recruitment can be traditional, i.e., within the informal networks of family and co-ethnics, or open and based on formal credentials.” (p.312).
- ⁴¹ ACORE. 2022. “Opportunities to Diversify the U.S. Renewable Energy Manufacturing Supply Chain.” <https://acore.org/opportunities-to-diversify-the-u-s-renewable-energy-manufacturing-supply-chain/>.
- ⁴² Minority Business Development Agency. 2016. Contracting Barriers and Factors Affecting Minority Business Enterprises: A Review of Existing Disparity Studies. Washington, D.C. Department of Commerce. (p.55) <https://www.mbda.gov/sites/default/files/migrated/files-attachments/FINAL-MBDA-Disparity-Report-Summary.pdf>.
- ⁴³ Ram, Monder, Kassa Woldesenbet, and Trevor Jones. 2011. “Raising the ‘table stakes’? Ethnic minority businesses and supply chain relationships.” *Work, Employment and Society* 309-326. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=f6987a92d10fdfe0e716c7253022b66107288f73>.
- ⁴⁴ Yawar, Sadaat Ali, and Stefan Seuring. 2017. “Management of Social Issues in Supply Chains: A Literature Review Exploring Social Issues, Actions and Performance Outcomes.” *Journal of Business Ethics*. https://www.researchgate.net/profile/Sadaat-Yawar/publication/281235506_Management_of_Social_Issues_in_Supply_Chains_A_Literature_Review_Exploring_Social_Issues_Actions_and_Performance_Outcomes/links/55dc315f08aeb38e8a8ba52b/Management-of-Social-Issues-in-Supply-Chains-A-Literature-Review-Exploring-Social-Issues-Actions-and-Performance-Outcomes.pdf.

- ⁴⁵ Ram, Monder, Kassa Woldeesenbet, and Trevor Jones. 2011. "Raising the 'table stakes'? Ethnic minority businesses and supply chain relationships." *Work, Employment and Society* 309-326. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=f6987a92d10fdfe0e716c7253022b66107288f73>.
- ⁴⁶ Adobor, Henry, and Ronald S. McMullen. 2007. "Supplier diversity and supply chain management: A strategic approach." *Business Horizons*. May. <http://dx.doi.org/10.1016/j.bushor.2006.10.003>.
- ⁴⁷ See "Closing the Wealth Gap: Empowering Minority-Owned Businesses to Reach Their Full Potential for Growth and Job Creation: Hearing Before the S. Comm. on Small Bus. & Entrepreneurship," 113th Cong. 246-47 (2013).
- ⁴⁸ <https://fred.stlouisfed.org/series/C307RX1Q020SBEA>.
- ⁴⁹ "Companies at the front of the pack are capturing benefits across the entire manufacturing value chain—increasing production capacity and reducing material losses, improving customer service and delivery lead times, achieving higher employee satisfaction, and reducing their environmental impact. Scaled across networks, these gains can fundamentally transform a company's competitive position." <https://www.mckinsey.com/capabilities/operations/our-insights/capturing-the-true-value-of-industry-four-point-zero>.
- ⁵⁰ Bates, Farhat, and Casey (2022) noted that, "...the small sector of America's venture-capital industry that targets African American and Latino firms uses a rule of thumb for judging whether applicants forming or expanding a business are worthy of close scrutiny: Does the owner possess the expertise, skills, experience, personal financial resources, and access to financing to grow this business to \$1 million in annual sales quickly?" (p.54).
- ⁵¹ Stettner (2018) noted that, "Manufacturing states (which represent 32 percent of all employment) only received 9.3 percent of all venture capital investment. An advanced manufacturing strategy must not only focus on technology transfer but the transfer of technology into traditional manufacturing communities as productive jobs."
- ⁵² Stettner, Andrew. 2018. How Federal Government Can Foster Stateside Advanced Manufacturing. April 9. <https://tcf.org/content/report/federal-government-can-foster-stateside-advanced-manufacturing/>.
- ⁵³ For example, NASA's MSI Exchange: <https://www.nasa.gov/learning-resources/minority-university-research-education-project/the-minority-serving-institution-msi-exchange/>.
- ⁵⁴ Bates, Timothy, Joseph Farhat, and Colleen Casey. p.46.
- ⁵⁵ Adobor, Henry, and Ronald S. McMullen. 2007. "Supplier Diversity and Supply Chain Management: A Strategic Approach." *Business Horizons*. May.
- ⁵⁶ <https://nmsdc.org/news/nmsdc-releases-the-2023-minority-businesses-economic-impact-report/>.
- ⁵⁷ Carter, Craig R, Richard J Auskalnis, and Carol L Ketchum. 1999. "Purchasing from minority business enterprises: Key success factors." *Journal of Supply Chain Management* 28-32. DOI: 10.1111/j.1745-493X.1999.tb00053.x.
- ⁵⁸ Delgado, Mercedes, and Karen G. Mills. 2017. *The Supply Chain Economy: A New Framework for Understanding Innovation and Services*. MIT Innovation Initiative, MIT Lab for Innovation Science and Policy. https://www.researchgate.net/profile/Mercedes-Delgado-4/publication/320656380_A_New_Categorization_of_the_US_Economy_The_Role_of_Supply_Chain_Industries_in_Innovation_and_Economic_Performance/links/5a450924a6fdcce1971a41d3/A-New-Categorization-of-the-US-Economy-The-Role-of-Supply-Chain-Industries-in-Innovation-and-Economic-Performance.pdf.
- ⁵⁹ For example, the U.S. Department of Defense is currently pursuing a regulatory change to implement a FY2021 NDAA Section 815 requirement to establish a goal to pay small business contractors within 15 days of receiving an invoice.
- ⁶⁰ Stettner, Andrew, and Joel Yudken. 2018. *A Federal Agenda for Revitalizing America's Manufacturing Communities*. The Century Foundation, 85-110. <https://dailyreporter.com/wp-content/blogs.dir/1/files/2012/11/restoring-american-competitiveness.pdf>.
- ⁶¹ Yudken, Joel, Thomas Croft, and Andrew Stettner. 2017. *Revitalizing America's Manufacturing Communities*. The Century Foundation. <https://tcf.org/content/report/revitalizing-americas-manufacturing-communities/>.
- ⁶² For example, the U.S. Department of Energy MPP program. <https://www.energy.gov/osdbu/mentor-protege-program>.
- ⁶³ <https://www.sbir.gov/about>.

⁶⁴ See <https://www.apexaccelerators.us/#/>.

⁶⁵ <https://www.mbda.gov/advanced-manufacturing-centers>.

⁶⁶ Manufacturing USA. <https://www.manufacturingusa.com/>.

⁶⁷ Manufacturing Extension Partnership (MEP). <https://www.nist.gov/mep>.

⁶⁸ The White House (2021). Building resilient supply chains, revitalizing American manufacturing, and fostering broad-based growth 100-Day Reviews under Executive Order 14017. <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>.

⁶⁹ For example, see “Notice of Request for Information (RFI) on Sector Strategies To Meet Critical Workforce Needs Across Industries”, Employment and Training Administration (1/23/2023). <https://www.federalregister.gov/documents/2023/01/23/2023-01142/notice-of-request-for-information-rfi-on-sector-strategies-to-meet-critical-workforce-needs-across>.

⁷⁰ See <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf>, “Other economic and demographic categories such as those based on race and ethnicity, sex, gender, geography, wealth, disability, sexual orientation, religion, national origin, age or birth cohort, family composition, occupation, or veteran status—among others—may be relevant to a particular regulation. When this is the case, when consistent with law, and if relevant data are available, it may be useful to analyze the incidence of regulatory effects on each group of interest, or combinations of those groups. If identifying groups for distributional analysis by race and ethnicity, you should follow OMB’s guidance on the topic. Similarly, distributional analysis by gender should define gender categories according to OMB guidance.”

⁷¹ Details at <https://www.census.gov/programs-surveys/ces/data/public-use-data/experimental-bds/bds-high-tech/data.html>.

