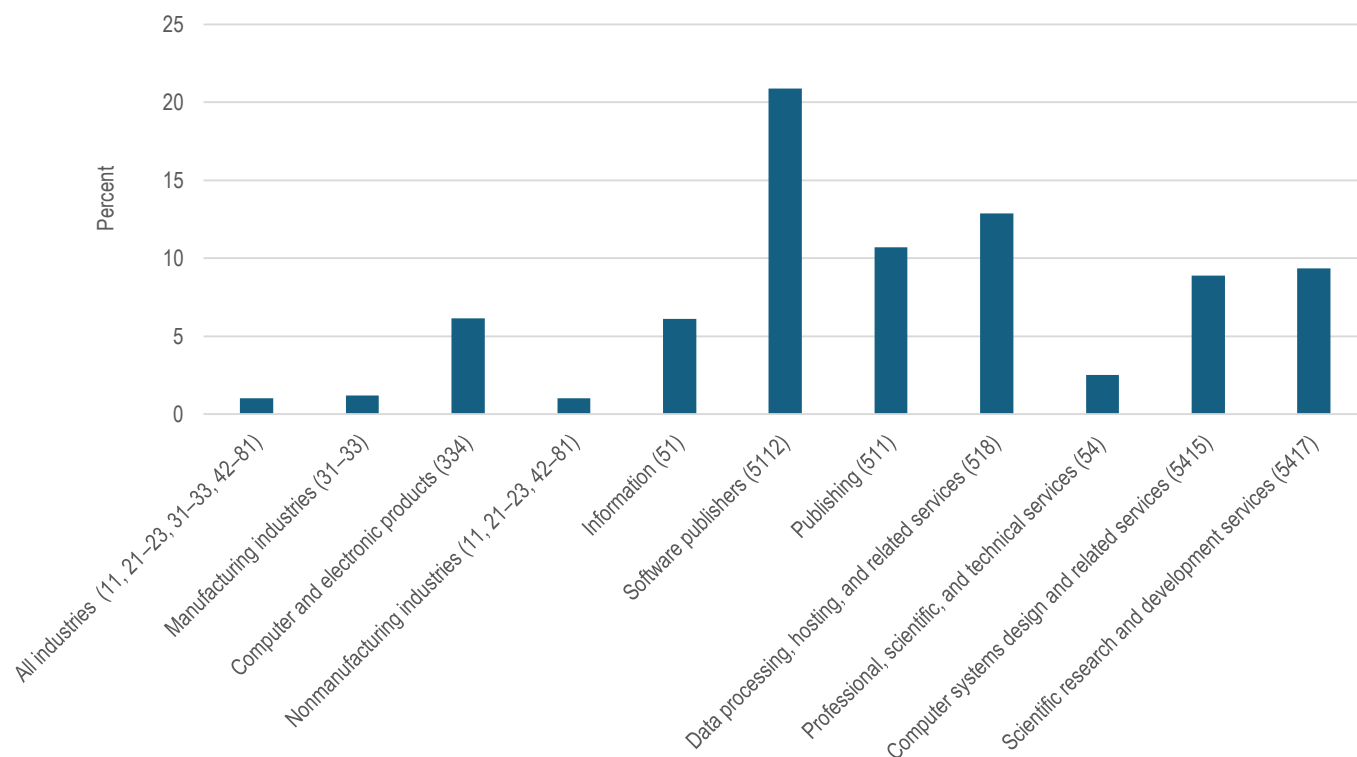




Artificial Intelligence and R&D Funding

Scientific discoveries, technological breakthroughs, and innovation are essential to expand the frontiers of what is possible and to meet the challenges and opportunities of the next century.¹ The Office of Science and Technology Policy identified artificial intelligence (AI) as a critical and emerging technology.² AI is “one of the most powerful technologies of our time” that may “chart new pathways in American innovation and strengthen the nation’s security.”^{3,4} The National Center for Science and Engineering Statistics within the U.S. National Science Foundation in partnership with the Census Bureau measures AI within the business sector on two surveys: the Annual Business Survey (ABS) and the Business Enterprise Research and Development (BERD) Survey. The ABS collects indicators of AI research and development (R&D) activity (i.e., companies that report performing or funding AI R&D), AI usage, and AI impacts from domestic businesses with one or more employees. The BERD Survey estimates the amount of AI R&D performed by businesses with at least 10 employees. Overall, according to the ABS, 1% of businesses with at least one employee reported AI R&D activity for 2021. Within the manufacturing sector, the computer and electronics products subsector (North American Industry Classification System [NAICS] code 334) had one of the highest percentages of companies active in AI R&D at 6%. Within the nonmanufacturing industries, three different subsectors and industry groups in the information sector (NAICS 51), reported higher but not statistically different proportions of AI R&D activity. They are software publishers (NAICS 5112) (21%), data processing, hosting, and related services (NAICS 518) (13%), and publishing (NAICS 511) (11%).

Companies performing or funding artificial intelligence technology R&D, by select industry: 2021

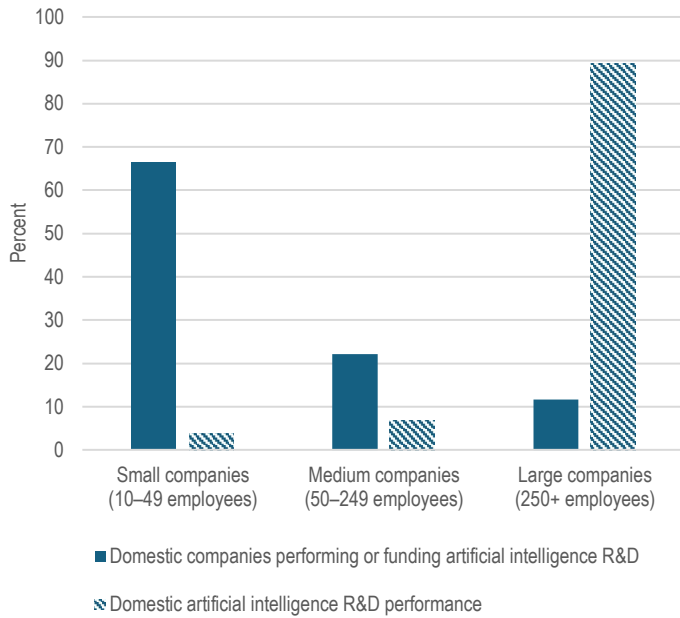


Note: Industries are classified by the North American Industry Classification System.

Source: National Center for Science and Engineering Statistics and Census Bureau, 2022 Annual Business Survey: Data Year 2021, [table CET-5](#).

AI R&D Performance by U.S. Businesses (Based on Dollars)

Companies with 10 or more employees performing or funding artificial intelligence technology R&D, by company size: 2021



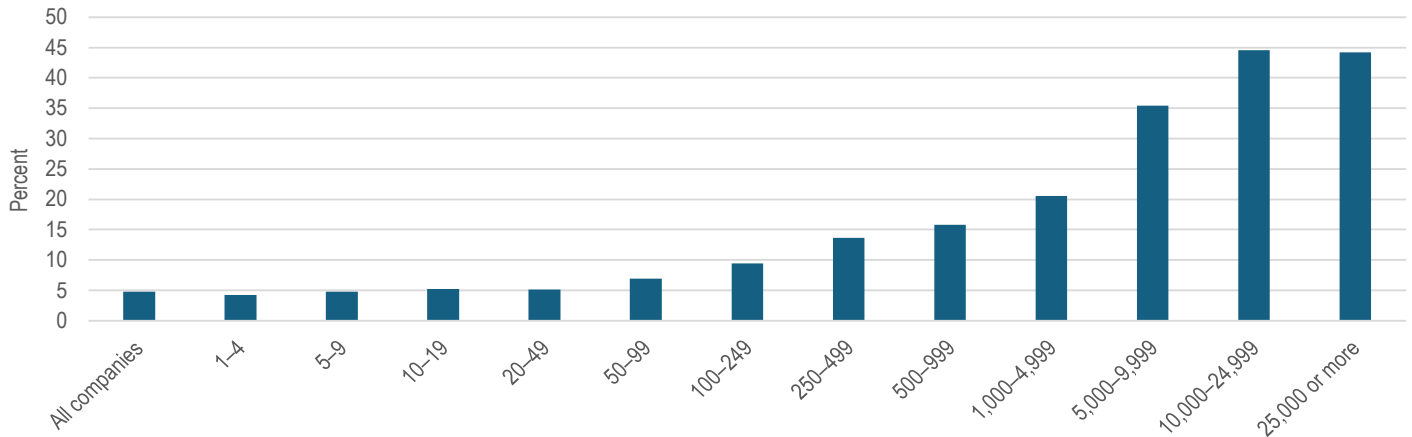
Source: National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021, [table 22](#), and 2022 Annual Business Survey: Data Year 2021, [table CET-6](#).

The distribution by company size of the incidence of AI R&D activity reported on the ABS differs from that of AI R&D funding amounts estimated on the BERD Survey. Overall, companies with 10 or more employees funded \$29 billion of domestic AI R&D in 2021. However, although only 12% of companies that have at least 10 employees and performed or funded AI R&D are large (businesses with 250 or more employees), these businesses performed 89% of total U.S. private sector AI R&D in 2021. Conversely, small companies (10-49 employees) performed just 4% of U.S. domestic AI R&D yet represent 66% of the domestic businesses with 10 or more employees that performed or funded R&D in 2021. Although the amount of AI R&D is available only for companies with at least 10 employees, the ABS indicates that microbusinesses accounted for 69% of U.S. AI R&D active companies in 2021.

Use of AI by U.S. Employer Businesses

In 2021, the ABS shows that although few employer businesses used AI (overall, 5% used AI at least “a little”), there is variation in usage across industries. AI was used at least a little by 33% of software publishers (NAICS 5112), 25% of data processing, hosting, and related services (NAICS 518), and 23% of computer systems design and related services (NAICS 5415). A higher percentage of large companies than smaller companies reported using AI. In 2021, 45% of companies with 10,000 to 24,999 employees used AI; among companies with 25,000 or more employees, 44% used AI. A smaller proportion of smaller companies reported AI usage: 4% of companies with one to four employees and 5% of those with five to nine employees.

Companies using artificial intelligence, by company size: 2021



Note: Company size is based on the number of employees.

Source: National Center for Science and Engineering Statistics and Census Bureau, 2022 Annual Business Survey: Data Year 2021, [table CET-34](#).

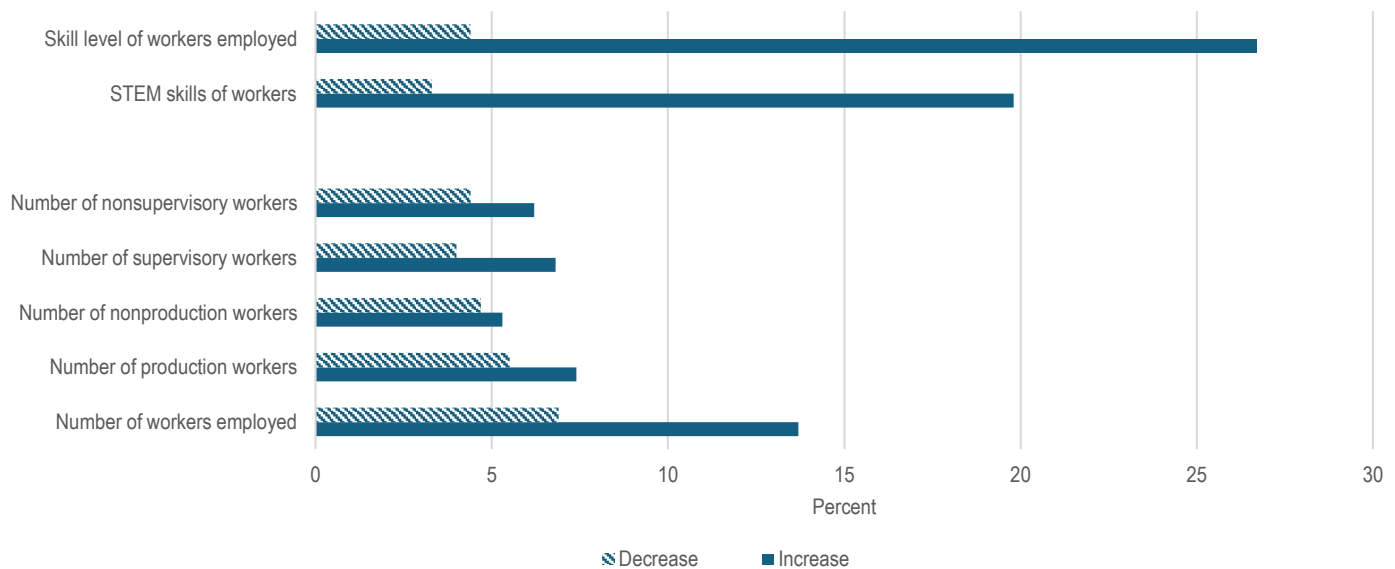
Use of Artificial Intelligence and Impact on Employees: Data from NCSES

Impact of AI Usage on Employees

Although AI has the potential to improve the lives of the American people and advance knowledge, risks are associated with AI, including potential impacts to the labor force. Research based on prior ABS results documents “the technological and organizational context of AI use, particularly among high-potential U.S. startups.”⁵ For companies that reported using AI in 2021, the ABS posed additional questions regarding the impact of AI adoption on the number of different types of workers and the skill levels of workers.⁶ Over one-quarter (27%) of companies said that using AI increased the skill level of their workers, 4% said it decreased the skill level, and over one half (55%) reported that using AI had no impact on the skill level. One out of five companies (20%) using AI said the science, technology, engineering, and mathematics (STEM) skills of their workers increased due to AI use, 3% reported a decrease, and 61% reported no impact.

AI usage also had an impact on the number of workers employed by business, with 14% of companies that use the technology at least “somewhat” reporting the number of workers increased due to the technology, whereas 7% reported a decrease. A higher percentage of companies also reported an increase than reported a decrease in the number of production workers (7% vs. 6%), supervisory workers (7% vs. 4%), and nonsupervisory workers (6% vs. 4%), although there was no significant difference in the percentage of companies reporting an increase or decrease in the number of nonproduction workers (5% for both).

Impact that artificial intelligence technology use had on workforce characteristics for companies using the technology at least “somewhat”: 2021



Source: National Center for Science and Engineering Statistics and Census Bureau, 2022 Annual Business Survey: Data Year 2021, [table CET-57](#).

This product has been reviewed for unauthorized disclosure of confidential information under NCSES-DRN24-074.

¹ Analytical Perspectives: Budget of the U.S. Government FY2025, Chapter 6, available at https://www.whitehouse.gov/wp-content/uploads/2024/03/ap_6_research_fy2025.pdf.

² See <https://www.whitehouse.gov/wp-content/uploads/2024/02/Critical-and-Emerging-Technologies-List-2024-Update.pdf>.

³ Analytical Perspectives: Budget of the U.S. Government FY2025, Chapter 6, available at https://www.whitehouse.gov/wp-content/uploads/2024/03/ap_6_research_fy2025.pdf.

⁴ See <https://www.whitehouse.gov/ostp/news-updates/2022/02/07/technologies-for-american-innovation-and-national-security/>.

⁵ See <https://onlinelibrary.wiley.com/doi/full/10.1111/jems.12576>.

⁶ Questions on the impact of AI on employees were asked only of respondents who reported using AI “a lot,” “somewhat,” or “a little.” Response options were “increase,” “decrease,” “no impact,” and “don’t know.”