National Center for Science and Engineering Statistics

Business Enterprise Research and Development: 2019

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General Notes

The Business Enterprise Research and Development (BERD) Survey is the primary source of information on domestic and global research and development expenditures and the R&D workforce for companies operating in the 50 U.S. states and the District of Columbia. The survey is conducted annually by the Census Bureau in accordance with an interagency agreement with the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation. NCSES has cosponsored an annual business R&D survey since 1953. The Survey of Industrial Research and Development (SIRD) collected data for 1953–2007, and its successor, the Business R&D and Innovation Survey (BRDIS), collected data for 2008–16. Beginning with 2017, the collection of innovation data was moved to the Annual Business Survey, another survey cosponsored with the Census Bureau, and the 2017 and 2018 business R&D data collections reported in this report series were renamed the Business Research and Development Survey. For the data collection in this report, the survey was renamed for international comparability. The BERD Survey **questionnaires**, **reports**, and **data** can be found at **https://www.nsf.gov/statistics/industry/**.

The results of the survey are used to assess trends in the performance and funding of R&D. Government agencies, corporations, and research organizations use the data to investigate productivity, formulate tax policy, and compare individual company performance with industry averages. Individual researchers in industry and academia use the data to investigate a variety of topics and to prepare professional papers, dissertations, and books. Total R&D expenditure statistics are used by the Bureau of Economic Analysis for inclusion in its System of National Accounts and Foreign Direct Investment programs.

Further, statistics from the BERD Survey make it possible to evaluate more fully the status of R&D in the United States and to compare the R&D activities of the United States with those of other nations. The usefulness of the information collected in this survey is enhanced by linking it to the Census Bureau's Longitudinal Establishment and Enterprise Microdata file, which contains information on the outputs and inputs of companies' manufacturing plants. Response to this survey is mandatory and confidential under Title 13 of the United States Code.

For the BERD Survey, data are collected from a probability sample of for-profit companies, which are classified in select manufacturing and nonmanufacturing industries. The BERD Survey is administered both to companies known to have performed R&D and to companies with no known history of R&D activity. The survey is sent to a single coordinator within each company, but it is organized into sections that help the coordinator collect specific types of information from different experts (human resources, accounting, R&D managers, etc.) in the company. Foreign-owned companies are instructed to report only for company operations owned by the U.S. subsidiary and, for purposes of the survey, to treat the foreign owners as if they were unrelated third parties.

The target population for the BERD Survey consists of all for-profit companies that have 10 or more paid employees in the United States, that have at least one establishment in business during the survey year and located in the United States, and that are classified in certain industries, with a particular focus on those companies that perform R&D in the United States. A company is defined as one or more establishments under common domestic ownership or control.

The Census Bureau's Business Register (BR) contains information on more than 7.3 million establishments with paid employees. It serves as the primary input to the sampling frame from which the sample is selected. For companies with more than one establishment, data are summed to the company level to assign an industry classification code and a measure of size, which are used in designing the sample. Companies are excluded from the frame if they are classified in an industry that is outside the scope of the BERD Survey or if they have fewer than 10 employees, based on their prior year aggregated annual payroll and employment data.

In addition to single-year tables for 2019 (table 1 through table 65), this report includes tables containing statistics for multiple years. In these tables, most prior year statistics have been revised since originally published. Revised statistics include adjustments based on information obtained after the original statistics were prepared. For any given year, after the tables are published, the statistical file used to produce the tables stays open for about 1 year before it is permanently closed. During that year, respondents may provide updated data; also, information from other Census Bureau surveys or publicly available sources may become available. The new data and information are evaluated and tested; if appropriate, revisions are made to the statistical file. The multiyear tables in this report (table 66 through table 73) were prepared using the 2019 BERD Survey statistical file and revised BRDIS statistical files for 2008–18.

Also in this report are tables designed to enable comparisons between U.S. BERD Survey statistics and those of other nations (table 74 through table 76). There are three tables corresponding to the three principal measures of domestic R&D in the U.S. BERD Survey—that is, R&D paid for by the respondent company and others outside of the company and performed by the respondent company, R&D paid for and performed by the respondent company, and R&D paid for by others and performed by the company. In each table, an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and then adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D. Also shown in each table are the differences between U.S. BERD Survey estimates in this report and the adjusted internationally comparable estimates for domestic R&D.

Beginning with the tables for the 2017 survey year, the disclosure avoidance is now handled differently than it had been in prior years' tables. Cell suppression is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a symbol. This technique was used in SIRD and BRDIS tables; data in affected cells were replaced with a "D." For most of the tables in this report, disclosure avoidance is accomplished by replacing cells with an estimate range. Confidentiality is maintained while the usefulness of the statistics is enhanced because most of the completely suppressed cells in past years' tables have been eliminated. For cases where confidentiality cannot be maintained even with the new estimate range technique, a "D" is substituted.

Terms used in business accounting and incorporated throughout the tables are defined in the section "Technical Notes." The information and statistics in this report supersede information and statistics in previously published reports.

Data Tables

Survey aggregate estimates

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Worldwide, domestic, and foreign R&D paid for by the company and by others and performed by the company

Table	Title
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Worldwide R&D paid for by the company and performed by the company and others

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Worldwide R&D paid for by others and performed by the company and others

Table	Title
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Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D

Table	Title
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Domestic R&D paid for by the company and others and performed by the company

Table	Title
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Foreign R&D paid for by the company and others and performed by the company

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Domestic R&D paid for by the company and performed by the company and others

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Domestic R&D paid for by the company and performed by the company and others

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Table	Title
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Domestic R&D paid for by others and performed by the company

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Domestic R&D paid for by sources outside the United States and performed by the company

Table	Title
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Domestic R&D paid for by the company and performed by others

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Domestic R&D paid for by the company and others and performed by the company and others

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R&D paid for by the company and others and performed by the company outside of the United States

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Multi-year table: Domestic R&D paid for by the company and others and performed by the company, by business activity

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TABLE 1

Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
Company and financial information (US$millions)			
1.12	Worldwide net sales and operating revenues	14,897,629	
1.13	Net sales and operating revenues from domestic operations	11,180,864	
	R&D paid for by the company and performed by the company and others		
2.1	Worldwide R&D paid for by the company (expense), total	614,273	
2.3	Worldwide R&D paid for by the company (expense), adjustments	43,255	
2.4/2.7c	Worldwide R&D paid for by the company and performed by the company and others	571,019	
2.7a	Domestic R&D paid for by the company and performed by the company and others	466,504	
2.7b	Foreign R&D paid for by the company and performed by the company and others	104,515	
2.5	Indirect R&D charges to be recouped from the U.S. federal government (IR&D, or independent R&D)[a]	6,190	
2.8m(1)	Domestic R&D paid for by the company and performed by the company and others	466,504	
2.8a(1)	Salaries, wages, and fringe benefits	231,648	
2.8b(1)	Stock-based compensation	38,284	
2.8c(1)	Leased or temporary staffing, including on-site contractors, working on R&D	19,261	
2.8d(1)	Expensed equipment (not capitalized)	6,738	
2.8e(1)	Materials and supplies	26,298	
2.8f(1)	Leased facilities and equipment	7,405	
2.8g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	17,058	
2.8h(1)	Royalties and licensing fees	8,894	
2.8i(1)	Collaborative R&D payments	5,717	
2.8j(1)	Contract R&D	31,819	
2.8k(1)	Other purchased services	12,400	
2.8l(1)	All other costs	60,981	
2.9(3)	Worldwide R&D paid for by the company and performed by others	48,107	
2.9(1)	Domestic R&D paid for by the company and performed by others	37,537	
2.9(2)	Foreign R&D paid for by the company and performed by others	10,570	
2.10(3)	Worldwide R&D paid for and performed by the company	522,912	
2.10(1)	Domestic R&D paid for and performed by the company	428,968	
2.10(2)	Foreign R&D paid for and performed by the company	93,944	
2.9(3) + 2.10(3) + 3.4(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company and others	654,757	
2.10(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company	597,420	
2.9(1) + 2.10(1) + 3.4(1) + 3.5(1)	Domestic R&D paid for by the company and others and performed by the company and others	538,835	
2.10(1) + 3.5 (1)	Domestic R&D paid for by the company and others and performed by the company	492,956	
	Domestic R&D paid for and performed by the company		
2.14	Performed at largest domestic location	258,722	
2.16	Performed at second-largest domestic location	39,905	
2.18	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company[a]	27,117	
2.19	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company[a]	18,150	
2.20i/2.9(1)	Domestic R&D paid for by the company and performed by others	37,537	
2.20a	Companies in the United States	31,827	
2.20b	Your company's foreign parent or owner	1,347	
2.20c	Companies outside the United States	3,251	
2.20d	U.S. federal government agencies or laboratories	64	i
2.20e	U.S. state and local government agencies or laboratories	24	
2.20f	U.S. universities, colleges, and academic researchers	439	
2.20g	All other organizations in the United States	465	
2.20h	All other organizations outside the United States	120	

TABLE 1

Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
2.22	Monetary gifts made by the company to U.S. universities and colleges[a]	78	
	Projected worldwide R&D expense paid for and performed by the company in 2020		
2.23(3)	Worldwide R&D to be paid for and performed by the company	606,520	
2.23(1)	Domestic R&D to be paid for and performed by the company	499,435	
2.23(2)	Foreign R&D to be paid for and performed by the company	107,085	
2.24	Projected R&D services and projected payments for collaborative R&D	38,256	
3.1j/3.2c	Worldwide R&D paid for by others and performed by the company and others	83,738	
3.1a	R&D reimbursed by the company's foreign parent or owner	19,820	
3.1b	Collaborative R&D reimbursed by business partners	8,975	
3.1c	R&D paid for by grants (government or private foundation)	5,203	
3.1d	Defense R&D goods or services provided as a prime contractor or subcontractor to the federal government and/or government contractors	16,563	
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	20,748	i
3.1f	Medical R&D services, other than clinical trials, provided to others not owned by the company	2,634	
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	610	
3.1h	Prototype development, production, and testing for customer's products	2,109	
3.1i	All other R&D services provided to the federal government or to others not owned by the company	7,076	i
3.2c/3.1j	Worldwide R&D paid for by others and performed by the company and others	83,738	
3.2a	Domestic R&D paid for by others and performed by the company and others	72,331	
3.2b	Foreign R&D paid for by others and performed by the company and others	11,407	i
3.3m(1)	Domestic R&D paid for by others and performed by the company and others	72,331	
3.3a(1)	Salaries, wages, and fringe benefits	36,350	
3.3b(1)	Stock-based compensation	760	
3.3c(1)	Leased or temporary staffing, including on-site contractors	2,090	
3.3d(1)	Expensed equipment (not capitalized)	453	
3.3e(1)	Materials and supplies	8,127	i
3.3f(1)	Leased facilities and equipment rental payments	831	
3.3g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	1,803	
3.3h(1)	Royalties and licensing fees	343	
3.3i(1)	Collaborative R&D payments	2,698	
3.3j(1)	Contract R&D	5,644	
3.3k(1)	Other purchased services	4,479	i
3.3l(1)	All other costs	8,751	
3.4(3)	Worldwide R&D paid for and performed by others	9,230	
3.4(1)	Domestic R&D paid for and performed by others	8,342	
3.4(2)	Foreign R&D paid for and performed by others	887	
3.5(3)	Worldwide R&D paid for by others and performed by the company	74,508	
3.5(2)	Foreign R&D paid for by others and performed by the company	10,519	i
3.5(1)	Domestic R&D paid for by others and performed by the company	63,989	
3.8a	Other companies in the United States	21,461	
3.8b	Your company's foreign parent or owner	17,563	
3.8c	Other companies outside the United States	1,991	
3.8d/3.11j/3.12c	U.S. federal government agencies or laboratories	21,941	
3.8e	U.S. state and local government agencies or laboratories	100 - 192	
3.8f	Foreign government agencies or laboratories	123	
3.8g	U.S. universities, colleges, and academic researchers	47	
3.8h	Universities, colleges, and academic researchers outside the United States	3 - 16	
3.8i	All other organizations in the United States	627 - 719	
3.8j	All other organizations outside the United States	32 - 44	

TABLE 1

Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
3.11j/3.8d/3.12c	Federally funded R&D performed by the company	21,941	
3.11a	Department of Defense	15,141	
3.11b	Department of Energy	519	
3.11c	National Aeronautics and Space Administration	4,534	i
3.11d	National Institutes of Health	519	
3.11e	Department of Homeland Security	124	
3.11f	Department of Transportation	30	
3.11g	Environmental Protection Agency	1	
3.11h	National Science Foundation	8	
3.11i	Other U.S. federal agencies	1,064	
3.12c/3.8d/3.11j	Federally funded R&D performed by the company by type of agreement	21,941	
3.12a	Contracts	20,844	
3.12b	Grants and all other agreements	1,097	
	Domestic R&D paid for by others and performed by the company		
3.16	Performed at largest domestic location	31,436	
3.18	Performed at second-largest domestic location	5,354	
3.19	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	2,133	
	Projected R&D to be paid for by others and performed by the company in 2020		
3.20	Worldwide R&D to be paid for by others and performed by the company	85,666	
3.21	Domestic R&D to be paid for by others and performed by the company	66,881	
3.22	Domestic R&D to be paid for by the U.S. federal government and performed by the company	21,811	
4.1	Total domestic capital expenditures	781,625	
4.2/4.3f	Domestic capital expenditures for R&D	29,106	
4.3a	Land acquisition	237	
4.3b	Buildings and land improvement	3,739	
4.3c	Equipment	15,663	
4.3d	Capitalized software	5,475	
4.3e	All other capital expenditures for R&D	3,992	
5.1	Worldwide R&D paid for and performed by the company and others directed toward business areas or product lines new to the company	67,132	
5.2/2.10(1)	Domestic R&D paid for and performed by the company	428,968	
	Type of R&D (character of work)		
5.4b	Basic research	25,916	
5.4a	Applied research	59,697	
5.3b	Development	343,355	
	Application areas		
5.5	Energy applications	24,054	i
5.6	Environmental protection applications	10,405	i
5.7	Defense applications	13,290	i
5.8	Health or medical applications	108,075	
5.9	Agricultural applications	8,078	
	Technology focus areas		
5.10	Software products and software embedded in other projects or products	189,553	
5.11	Biotechnology	62,952	
5.12	Nanotechnology	21,626	i
5.13	Artificial intelligence	14,038	i
5.15c	Foreign R&D paid for and performed by the company	93,944	
5.15a	Research	14,324	
5.15b	Development	79,620	
5.16/3.5(1)	Domestic R&D paid for by others and performed by the company	63,989	

TABLE 1

Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
	Type of R&D (character of work)		
5.18b	Basic research	6,324	
5.18a	Applied research	14,333	
5.17b	Development	43,332	
	Application areas		
5.19	Energy applications	2,108	i
5.20	Environmental protection applications	1,390	i
5.21	Defense applications	20,041	
5.22	Health or medical applications	25,691	i
5.23	Agricultural applications	627	
	Technology focus areas		
5.24	Software products and software embedded in other projects or products	11,306	
5.25	Biotechnology	14,841	
5.26	Nanotechnology	1,858	i
5.27	Artificial intelligence	1,313	i
	Federally funded R&D performed by the company		
	Type of R&D (character of work)		
5.30b	Basic research	2,313	i
5.30a	Applied research	4,883	
5.29b	Development	14,745	
	Technology focus areas		
5.31	Software products and software embedded in other projects or products	5,089	i
5.33c	Foreign R&D paid for by others and performed by the company	10,519	i
5.33a	Research	2,742	
5.33b	Development	7,778	i
Employees (thousands)			
	Worldwide		
1.8/1.9(3)	Total employees	32,296	
6.1b(3)	Non-R&D employees	29,620	
6.1a(3)	R&D employees	2,676	
6.4a(3)	Female	745	
6.4b(3)	Male	1,931	
6.5a(3)	Researchers	1,815	
6.5b(3)	Technicians	614	
6.5c(3)	Support staff	246	
	Domestic		
1.9(1)	Total employees	21,213	
6.1b(1)	Non-R&D employees	19,381	
6.1a(1)	R&D employees	1,832	
6.4a(1)	Female	488	
6.4b(1)	Male	1,344	
6.5a(1)	Researchers	1,232	
6.5b(1)	Technicians	426	
6.5c(1)	Support staff	174	
	Foreign		
1.9(2)	Total employees	11,083	
6.1b(2)	Non-R&D employees	10,239	
6.1a(2)	R&D employees	844	
6.4a(2)	Female	256	

TABLE 1

Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
6.4b(2)	Male	587	
6.5a(2)	Researchers	584	
6.5b(2)	Technicians	188	
6.5c(2)	Support staff	72	
	Researchers with PhD		
6.6(3)	Worldwide	165	
6.6(1)	Domestic	130	
6.6(2)	Foreign	36	
	Full-time equivalent		
6.7d	R&D employees	1,677	
6.7a	Full-time R&D employees	1,384	
6.7b	Full-time employees not solely working on R&D	277	
6.7c	Part-time employees working on R&D	17	
6.8d	Researchers	1,147	
6.8a	Full-time R&D employees	989	
6.8b	Full-time employees not solely working on R&D	150	
6.8c	Part-time employees working on R&D	8	
6.9	Non-U.S. citizens employed as researchers under temporary visa[a]	66	
6.10d(1)	Total leased and temporary employees working on R&D	264	i
6.10a(1)	Researchers	171	i
6.5b(1)	Technicians	60	i
6.5c(1)	Support staff	32	i

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

Note(s):
Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 2

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21–23, 31–33, 42–81	597,420	522,912	74,508	492,956	428,968	63,989	104,464	93,944	10,519 i
Manufacturing industries	31–33	350,024	311,115	38,909	285,674	248,109	37,564	64,351	63,006	1,345
Food	311	5,015	4,770	245	4,180	3,937	243	835	833	2
Beverage and tobacco products	312	1,755	1,644	111 i	1,082	971	111 i	674	674	0
Textile, apparel, and leather products	313–16	1,061	1,030	31	904	873	31	157	157	0
Wood products	321	193	187	6	186	180	6	7	7	0
Paper	322	1,165	1,165	*	1,064	1,064	*	101	101	* i
Printing and related support activities	323	429 i	429 i	0	420 i	420 i	0	9 i	9 i	0
Petroleum and coal products	324	1,477 - 1,481	1,375	102 - 106	1,306	1,203	103	171 - 176	172	0 - 3 i
Chemicals	325	115,631	105,612	10,020	97,063	87,288	9,775	18,568	18,323	245
Basic chemicals	3251	3,102	2,938	164	2,360	2,198	162	742	740	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695	1,609	85	1,172	1,092	80	523	518	5
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297	1,932	340 - 365	1,822 - 1,846	1,501	320 - 345	450	431	20
Pharmaceuticals and medicines	3254	103,487	94,306	9,181	87,619	78,652	8,966	15,868	15,654	214
Soap, cleaning compound, and toilet preparation	3256	3,517	3,354	164	2,760	2,596	164	757	757	0
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560	1,473	59 - 87	1,305 - 1,333	1,249	56 - 84	227	224	4
Plastics and rubber products	326	3,359	3,265	94	2,856	2,770	85	503	494	9
Nonmetallic mineral products	327	1,701 i	1,665 i	35	1,508 i	1,473 i	35	192 i	192 i	0
Primary metals	331	740	722	19	665	649	16	76	73	2
Fabricated metal products	332	3,163	2,899	264	2,885	2,632	254	278	267	11
Machinery	333	19,435	18,147	1,288	15,184	13,930	1,254	4,251	4,218	34
Agricultural implement	33311	2,778	2,768	11	1,921	1,913	9	857	855	2 i
Semiconductor machinery	333242	5,374	4,750	623	4,459	3,854	604	915	896	19
Engine, turbine, and power transmission equipment	3336	1,931	1,715	216	1,301	1,096	205	630	619	11
Other machinery	other 333	9,353	8,915	438	7,503	7,067	436	1,850	1,848	1 i

TABLE 2

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Computer and electronic products	334	112,180	100,510	11,671	86,729	75,570	11,159	25,452 i	24,940 i	512
Communications equipment	3342	15,907 - 15,912	14,804	1,103 - 1,107 i	12,595	11,495	1,100 i	3,312 - 3,316	3,309	3 - 7 i
Semiconductor and other electronic components	3344	48,189 i	44,784 i	3,405	35,183 i	31,975 i	3,208	13,007 i	12,809 i	198
Navigational, measuring, electromedical, and control instruments	3345	21,512	14,573	6,939	17,562	10,912	6,650	3,950	3,661	288
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621 i	4,393 i	229	3,342	3,117	225	1,280 i	1,276 i	3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541	4,021	6,520	9,662	3,400	6,262	878	621	258
Other measuring and controlling device	other 3345	6,350	6,160	191	4,558	4,395	163	1,792	1,764	28
Other computer and electronic products	other 334	26,567 - 26,571	26,348	220 - 223	21,388	21,188	201	5,179 - 5,183 i	5,160 i	19 - 22
Electrical equipment, appliances, and components	335	7,006	6,599	407	5,263	4,886	377	1,743	1,713	30
Transportation equipment	336	53,187	38,868	14,319 i	45,375	31,505	13,870 i	7,812	7,363	449 i
Motor vehicles, bodies, trailers, and parts	3361–63	31,110	27,550	3,559 i	24,117	20,883	3,233 i	6,993	6,667	326 i
Aerospace products and parts	3364	18,943 i	9,392	9,551 i	18,358 i	8,900	9,458 i	585	493	93
Aircraft, aircraft engine, and aircraft parts	336411–13	17,476 i	8,833	8,643 i	16,891 i	8,341	8,550 i	585	492	93
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467	559	908	1,467	559	908	*	*	0
Military armored vehicle, tank, and tank component	336992	35	25	10	35	25	10	0	0	0
Other transportation	other 336	3,099	1,901	1,198	2,865	1,697	1,168	234	204	30
Furniture and related products	337	444	442	2	409	407	2	35	35	0
Miscellaneous	339	22,077 - 22,084	21,786	292 - 298	18,596	18,352	244	3,482 - 3,488	3,434	48 - 54
Medical equipment and supplies	3391	19,083	18,835	248	16,014	15,812	202	3,069	3,023	46

TABLE 2

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Other miscellaneous manufacturing	3399	2,995 - 3,002	2,951	44 - 50	2,582	2,540	42	413 - 419	411	2 - 8
Nonmanufacturing industries	21–23, 42–81	247,396	211,797	35,600	207,283	180,858	26,425	40,113	30,939	9,175 i
Mining, quarrying, oil and gas extraction, and support activities	21	3,307	3,096	211	2,717	2,535	183	589	561	28 i
Utilities	22	284	246	38	275	237	38	9	9	0
Wholesale trade	42	1,304	1,217	87	1,191	1,104	87	113	113	0
Electronic shopping and electronic auctions	454111–12	3,200 - 20,013 i	3,157 - 19,970 i	43 - 61	3,131 - 15,818 i	3,088 - 15,775 i	43 - 61	69 - 4,198 i	69 - 4,198 i	0
Transportation and warehousing	48–49	9,952 i	9,566 i	386	9,890 i	9,504 i	386	62	62	0
Information	51	129,277	128,064	1,213	110,227	109,062	1,165	19,051	19,002	48
Publishing	511	39,968	39,348	620	33,019	32,447	572	6,949	6,901	48
Newspaper, periodical, book, and directory publishers	5111	61	61	*	61	61	*	0	0	0
Software publishers	5112	39,907	39,287	620	32,958	32,386	572	6,949	6,901	48
Telecommunications	517	3,856	3,823	33	3,733	3,700	33	124	123	*
Data processing, hosting, and related services	518	36,449	36,045	404	30,558	30,154	404	5,891	5,891	* i
Other information	other 51	49,004	48,849	155	42,917	42,761	155	6,087	6,087	0
Finance and insurance	52	10,092	9,982	110	8,917	8,890	28	1,175	1,092	83
Real estate and rental and leasing	53	1,476	1,476	0	1,371	1,371	0	104	104	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48	48	0	45	45	0	4	4	0
Other real estate and rental and leasing	other 53	1,427	1,427	0	1,326	1,326	0	101	101	0
Professional, scientific, and technical services	54	68,023	34,908	33,115	53,233	29,131	24,103	14,790	5,778	9,012 i
Architectural, engineering, and related services	5413	4,244	2,323	1,921	4,207	2,288	1,919	37	35	2
Computer systems design and related services	5415	26,416	23,689	2,727	21,046	18,395	2,651	5,370	5,294	76
Scientific research and development services	5417	30,675	3,364	27,311 i	21,669	3,265	18,403	9,006 i	99	8,908 i
Research and development in biotechnology	541711	9,250	1,129	8,121	6,457	1,083	5,374	2,793	46	2,748

TABLE 2

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651 i	2,206	18,444 i	14,446 i	2,155	12,291 i	6,205 i	51	6,153 i
Research and development in the social sciences and humanities	541720	774	29	745	766	27	738	8	1	7
Other professional, scientific, and technical services	other 54	6,688	5,532	1,156	6,312	5,182	1,129	376	349	27
Health care services	621–23	2,289	1,952	338	2,265	1,928	337	24	23	* i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,382 - 18,191	1,322 - 18,133	37 - 62	1,380 - 14,067	1,322 - 14,012	34 - 58	2 - 4,124	0 - 4,121	3
All companies (number of domestic employees)	–	597,420	522,912	74,508	492,956	428,968	63,989	104,464	93,944	10,519 i
Small companies										
10–19[a]	–	5,639	4,560	1,079	5,501	4,432	1,070	138	128	10
20–49	–	12,875	10,484	2,392	12,418	10,040	2,378	457	443	14 i
Medium companies										
50–99	–	14,758	12,165	2,593	14,021	11,492	2,529	737	674	64
100–249	–	21,986	18,498	3,487	19,793	16,520	3,274	2,192	1,979	214
Large companies										
250–499	–	21,592	17,995	3,597	18,883	15,356	3,527	2,709	2,639	70
500–999	–	26,922	24,356	2,566	23,969	21,549	2,420	2,953	2,807	146
1,000–4,999	–	92,224	80,615	11,609	75,671	64,475	11,196	16,553	16,140	413
5,000–9,999	–	62,775	54,556	8,220	50,811	44,728	6,083	11,965	9,828	2,137 i
10,000–24,999	–	111,876	92,569	19,307 i	88,263	74,385	13,878 i	23,612	18,183	5,429 i
25,000 or more	–	226,773	207,115	19,658	183,626	165,991	17,635	43,148	41,124	2,024

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 3

Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
All industries	21–23, 31–33, 42–81	597,420		4,942		33,242		42,216		29,813		487,208	
Manufacturing industries	31–33	350,024		2,764		15,855		22,465		18,557		290,383	
Food	311	5,015		172		621		762		441		3,019	i
Beverage and tobacco products	312	1,755		42		84		65		188	i	1,376	
Textile, apparel, and leather products	313–16	1,061		51		208		273		297		232	
Wood products	321	193		19		93		81		0		0	
Paper	322	1,165		11		137		132		0		884	
Printing and related support activities	323	429	i	26		285		118	i	0		0	
Petroleum and coal products	324	1,477 - 1,481		13		67		10 - 581		273		542 - 1,120	
Chemicals	325	115,631		361		2,946		7,344		6,937		98,044	
Basic chemicals	3251	3,102		46		383		638		535		1,501	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695		46		157		167		50 - 256		1,067 - 1,277	
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297		0 - 24		86		90		0		2,098	
Pharmaceuticals and medicines	3254	103,487		77		1,903		5,921		6,038		89,548	
Soap, cleaning compound, and toilet preparation	3256	3,517		76		188		134		60		3,059	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560		89 - 119		229		394		50 - 256		559 - 774	
Plastics and rubber products	326	3,359		165		772		907		607		908	
Nonmetallic mineral products	327	1,701	i	36		146		287		86		1,146	i
Primary metals	331	740		33		230		385		92		0	
Fabricated metal products	332	3,163		456		1,136		730		652		189	
Machinery	333	19,435		426		2,228		2,202		1,379		13,201	
Agricultural implement	33311	2,778		46		128		174		86		2,344	
Semiconductor machinery	333242	5,374		0 - 106		128		211		50 - 156		4,881	
Engine, turbine, and power transmission equipment	3336	1,931		19	i	126		195		71		1,519	
Other machinery	other 333	9,353		255 - 363		1,845		1,621		1,066 - 1,174		4,456	
Computer and electronic products	334	112,180		363		2,802		3,754		2,843		102,418	
Communications equipment	3342	15,907 - 15,912		45 - 54		338		644		746		14,132	
Semiconductor and other electronic components	3344	48,189	i	59		917		1,450		1,182		44,580	i
Navigational, measuring, electromedical, and control instruments	3345	21,512		218		1,245		1,364		538		18,148	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621	i	36		312		576		270		3,428	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541		33		187		314		55		9,952	
Other measuring and controlling device	other 3345	6,350		149		747		473		213		4,768	
Other computer and electronic products	other 334	26,567 - 26,571		33 - 41		301		296		377		25,558	

TABLE 3

Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
Electrical equipment, appliances, and components	335	7,006		209		588		987		977		4,246	
Transportation equipment	336	53,187		108		1,698		2,401		2,198		46,782	
Motor vehicles, bodies, trailers, and parts	3361–63	31,110		0 - 95		748		1,587		1,292 - 1,390		27,387	
Aerospace products and parts	3364	18,943	i	13		703		548		716		16,963	i
Aircraft, aircraft engine, and aircraft parts	336411–13	17,476	i	10		429		351		716		15,970	i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		4		273	i	197		0		993	
Military armored vehicle, tank, and tank component	336992	35		1		34		0		0		0	
Other transportation	other 336	3,099		0 - 95		214		266		91 - 189		2,432	
Furniture and related products	337	444		32		129		219		64		0	
Miscellaneous	339	22,077 - 22,084		240		1,685		1,245 - 1,817		1,524		16,812 - 17,391	
Medical equipment and supplies	3391	19,083		118		1,185		1,236		1,290		15,254	
Other miscellaneous manufacturing	3399	2,995 - 3,002		121		500		10 - 581		235		1,558 - 2,137	
Nonmanufacturing industries	21–23, 42–81	247,396		2,178		17,387		19,751		11,256		196,824	
Mining, quarrying, oil and gas extraction, and support activities	21	3,307		26	i	363		10 - 1,817		0		1,100 - 2,909	
Utilities	22	284		0 - 32		73		131		50 - 82		0	
Wholesale trade	42	1,304		423		882		0		0		0	
Electronic shopping and electronic auctions	454111–12	3,200 - 20,013	i	14		71		10 - 1,817		50 - 231		1,067 - 19,785	i
Transportation and warehousing	48–49	9,952	i	19		125		514		101		9,193	i
Information	51	129,277		377		5,198		6,973		6,945		109,785	
Publishing	511	39,968		186		1,734		1,598		1,239		35,211	
Newspaper, periodical, book, and directory publishers	5111	61		5		18		38		0		0	
Software publishers	5112	39,907		180		1,716		1,560		1,239		35,211	
Telecommunications	517	3,856		38		154		530		180		2,954	
Data processing, hosting, and related services	518	36,449		119		2,778		4,297		5,040		24,214	
Other information	other 51	49,004		34		531		548		485		47,406	
Finance and insurance	52	10,092		14		350		1,257		387		8,085	
Real estate and rental and leasing	53	1,476		9		27		64		0		1,376	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48		4	i	10		35		0		0	
Other real estate and rental and leasing	other 53	1,427		5		17		30		0		1,376	
Professional, scientific, and technical services	54	68,023		1,180		8,018		8,369		3,282		47,173	
Architectural, engineering, and related services	5413	4,244		288		1,548		993		517		899	
Computer systems design and related services	5415	26,416		650		3,003		2,640		841		19,283	
Scientific research and development services	5417	30,675		116		2,566		3,172		1,466		23,354	i

TABLE 3

Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
Research and development in biotechnology	541711	9,250		26		660		786		382	i	7,396	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651	i	89		1,868		2,307		1,084		15,304	i
Research and development in the social sciences and humanities	541720	774		2		38		80		0		654	
Other professional, scientific, and technical services	other 54	6,688		126	i	901		1,565		458		3,637	
Health care services	621–23	2,289		43		1,192		610		213		231	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,382 - 18,191		37 - 78		1,089		10 - 1,817		50 - 231	i	100 - 17,005	
All companies (number of domestic employees)	–	597,420		4,942		33,242		42,216		29,813		487,208	
Small companies													
10–19[a]	–	5,639		1,093		4,009		392		146		0	
20–49	–	12,875		1,729		7,997		2,914		235		0	
Medium companies													
50–99	–	14,758		960		5,765		6,240		1,315		478	
100–249	–	21,986		697		7,259		8,110		3,580		2,340	
Large companies													
250–499	–	21,592		288		3,404		6,240		5,223		6,437	
500–999	–	26,922		95		2,083		6,026		6,718		12,000	
1,000–4,999	–	92,224		73		2,203		8,714		8,680		72,554	
5,000–9,999	–	62,775		3		164		1,850		2,281		58,477	
10,000–24,999	–	111,876		2		245		1,120		1,166		109,343	
25,000 or more	–	226,773		1		115		609		468		225,580	

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 4

Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21–23, 31–33, 42–81	28,430	26,450	4,310	28,270	26,270	4,250	3,050	2,920	300
Manufacturing industries	31–33	15,210	14,450	2,170	15,180	14,410	2,140	1,470	1,430	170
Food	311	870	860	70	870	860	60	50	50	10
Beverage and tobacco products	312	350	350	10 i	350	350	10 i	10	10	0
Textile, apparel, and leather products	313–16	240	210	70	240	210	70	30	30	0
Wood products	321	80	80	10	80	80	10	10 i	10 i	0
Paper	322	90	90	10 i	90	90	10	20	20	10 i
Printing and related support activities	323	200	200	0	200	200	0	10 i	10 i	0
Petroleum and coal products	324	80	70	10	80	70	10	10	10	10 i
Chemicals	325	2,340	2,260	380	2,330	2,260	370	320	310	40
Basic chemicals	3251	240	240	40	240	240	40	60	60	10 i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	170	20	180	170	20	20	20	10 i
Pesticide, fertilizer, and other agricultural chemicals	3253	150	150	10	150	150	10	20	20	10
Pharmaceuticals and medicines	3254	1,060	1,010	280	1,060	1,000	270	200	190	30 i
Soap, cleaning compound, and toilet preparation	3256	270	260	30	270	260	30	20	20	0
Paint, coating, adhesive, and other chemicals	3255, 3259	470	460	30	460	460	30	30	30	10
Plastics and rubber products	326	790	770	110	790	770	110	70	70	10 i
Nonmetallic mineral products	327	170	170	20	170	160	20	20	20	0
Primary metals	331	200	200	30	200	200	30	20	20	10
Fabricated metal products	332	1,840	1,690	200	1,840	1,690	200	60	60	10 i
Machinery	333	2,250	2,090	340	2,240	2,080	340	170	160	20 i
Agricultural implement	33311	190	190	20	190	180	20	20	20	10 i
Semiconductor machinery	333242	80	60	40	80	60	40	20	20	10
Engine, turbine, and power transmission equipment	3336	110	100	40	110	100	40	20	20	10 i
Other machinery	other 333	1,890	1,770	250	1,880	1,760	250	120	120	10 i
Computer and electronic products	334	2,290	2,170	390	2,280	2,160	380	340	330	50
Communications equipment	3342	300	290	30	300	290	30	60	50	10 i
Semiconductor and other electronic components	3344	640	560	170	640	550	160	110	110	30
Navigational, measuring, electromedical, and control instruments	3345	1,140	1,120	180	1,140	1,120	170	120	120	20
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	220	60	230	220	60	30	30	10 i

TABLE 4

Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance						Domestic R&D performance						Foreign R&D performance					
		Total		Paid for by the company		Paid for by others		Total		Paid for by the company		Paid for by others		Total		Paid for by the company		Paid for by others	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		190		40		190		190		40		20		20		10	i
Other measuring and controlling device	other 3345	740		720		90		740		720		90		80		80		10	
Other computer and electronic products	other 334	220		220		30		220		220		30		70		70		10	
Electrical equipment, appliances, and components	335	900		880		70		900		880		60		90		90		20	i
Transportation equipment	336	1,090		980		350	i	1,090		970		350	i	130		120		40	
Motor vehicles, bodies, trailers, and parts	3361–63	550		530		100		540		530		100		90		80		20	
Aerospace products and parts	3364	380	i	290		230	i	380	i	290		230	i	30		30		10	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		180		60		200		180		60		30		30		10	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	110	i	170	i	190	i	110	i	170	i	10		10		0	
Military armored vehicle, tank, and tank component	336992	30		30		10		30		30		10		0		0		0	
Other transportation	other 336	150		140		20		150		140		20		20		20		10	
Furniture and related products	337	190		190		10		190		190		10		20		20		0	
Miscellaneous	339	1,310		1,280		190		1,310		1,280		190		180		170		20	
Medical equipment and supplies	3391	790		770		140		790		770		140		110		100		20	
Other miscellaneous manufacturing	3399	520		520		50	i	520		520		50	i	80		80		10	
Nonmanufacturing industries	21–23, 42–81	13,230		12,010		2,140		13,100		11,880		2,120		1,590		1,500		130	
Mining, quarrying, oil and gas extraction, and support activities	21	160		150		30		160		150		30		30		20		10	i
Utilities	22	40		40		10		40		40		10		10		10		0	
Wholesale trade	42	1,620		1,560		130		1,560		1,500		130		180	i	180	i	0	
Electronic shopping and electronic auctions	454111–12	60		60		10		60		60		10		10	i	10	i	0	
Transportation and warehousing	48–49	130		130		10		130		130		10		20	i	20	i	0	
Information	51	3,110		3,020		230		3,090		3,000		210		710		700		30	
Publishing	511	1,100		1,050		90		1,080		1,040		80		230		230		20	
Newspaper, periodical, book, and directory publishers	5111	40		40		10		40		40		10		0		0		0	
Software publishers	5112	1,060		1,020		90		1,040		1,000		80		230		230		20	
Telecommunications	517	210		210		40		210		210		40		30		30		10	
Data processing, hosting, and related services	518	1,480		1,440		70		1,480		1,440		60		390		390		10	i
Other information	other 51	340		330		40		340		330		40		70		70		0	
Finance and insurance	52	220		220		10	i	220		220		10		50		50		10	

TABLE 4

Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Real estate and rental and leasing	53	50	50	0	50	50	0	10	10	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	20	0	20	20	0	10	10	0
Other real estate and rental and leasing	other 53	30	30	0	30	30	0	10	10	0
Professional, scientific, and technical services	54	6,540	5,590	1,600	6,500	5,540	1,600	580	500	100
Architectural, engineering, and related services	5413	1,470	1,180	440	1,450	1,160	440	70	40	40
Computer systems design and related services	5415	3,040	2,900	240	3,020	2,880	240	340 i	340 i	10
Scientific research and development services	5417	1,240	850	730	1,230	850	730	100	60	50
Research and development in biotechnology	541711	310	210	170	310	210	170	20	20	10
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	630	550	900	630	550	70	50	40
Research and development in the social sciences and humanities	541720	30	20	20	30	20	20	10 i	10 i	10
Other professional, scientific, and technical services	other 54	810	670	210	810	670	210	80	70	20
Health care services	621–23	680	560	140	680	560	140	10	10	10 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	690	680	20	680	670	20	30	30	10
All companies (number of domestic employees)	–	28,430	26,450	4,310	28,270	26,270	4,250	3,050	2,920	300
Small companies										
10–19[a]	–	5,520	5,020	1,040	5,490	4,990	1,040	220 i	190 i	50
20–49	–	8,020	7,270	1,320	7,980	7,220	1,310	550 i	520 i	40 i
Medium companies										
50–99	–	5,000	4,770	600	4,960	4,720	590	430	420	30
100–249	–	4,610	4,390	630	4,580	4,350	620	450	430	50
Large companies										
250–499	–	2,150	2,070	230	2,140	2,050	230	320	310	20 i
500–999	–	1,230	1,180	140	1,230	1,180	130	310	300	20
1,000–4,999	–	1,340	1,230	240	1,330	1,230	220	490	480	50
5,000–9,999	–	240	230	50	240	230	50	130	130	20
10,000–24,999	–	220	220	60	220	220	60	120	120	30 i
25,000 or more	–	140	140	40	130	130	40	80	80	20

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
All industries	21–23, 31–33, 42–81	571,019		522,912		48,107	
Manufacturing industries	31–33	354,917		311,115		43,802	
Food	311	5,036		4,770		266	
Beverage and tobacco products	312	1,931		1,644		286	
Textile, apparel, and leather products	313–16	1,047		1,030		17	
Wood products	321	198		187		11	
Paper	322	1,175		1,165		10	
Printing and related support activities	323	436	i	429	i	7	i
Petroleum and coal products	324	1,722		1,375		346	
Chemicals	325	138,470		105,612		32,859	
Basic chemicals	3251	3,035		2,938		96	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,648		1,609		38	
Pesticide, fertilizer, and other agricultural chemicals	3253	2,228		1,932		297	
Pharmaceuticals and medicines	3254	126,282		94,306		31,977	
Soap, cleaning compound, and toilet preparation	3256	3,741		3,354		387	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,536		1,473		63	
Plastics and rubber products	326	3,345		3,265		80	
Nonmetallic mineral products	327	1,714		1,665	i	49	
Primary metals	331	745		722		24	
Fabricated metal products	332	2,937		2,899		38	
Machinery	333	18,708		18,147		561	
Agricultural implement	33311	3,066		2,768		298	
Semiconductor machinery	333242	4,756		4,750		6	
Engine, turbine, and power transmission equipment	3336	1,735		1,715		21	
Other machinery	other 333	9,151		8,915		236	
Computer and electronic products	334	103,418		100,510		2,909	
Communications equipment	3342	15,881		14,804		1,077	
Semiconductor and other electronic components	3344	45,574		44,784	i	790	i
Navigational, measuring, electromedical, and control instruments	3345	15,168		14,573		594	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,541		4,393	i	148	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,306		4,021		285	
Other measuring and controlling device	other 3345	6,321		6,160		161	
Other computer and electronic products	other 334	26,795		26,348		447	
Electrical equipment, appliances, and components	335	6,763		6,599		164	
Transportation equipment	336	43,959		38,868		5,091	
Motor vehicles, bodies, trailers, and parts	3361–63	31,879		27,550		4,329	
Aerospace products and parts	3364	10,097		9,392		705	
Aircraft, aircraft engine, and aircraft parts	336411–13	9,420		8,833		587	
Guided missile, space vehicle, and related parts	336414–15, 336419	677		559		118	
Military armored vehicle, tank, and tank component	336992	25		25		0	
Other transportation	other 336	1,958		1,901		58	
Furniture and related products	337	470		442		28	
Miscellaneous	339	22,843		21,786		1,058	
Medical equipment and supplies	3391	19,801		18,835		966	
Other miscellaneous manufacturing	3399	3,042		2,951		91	
Nonmanufacturing industries	21–23, 42–81	216,102		211,797		4,305	
Mining, quarrying, oil and gas extraction, and support activities	21	3,255		3,096		159	
Utilities	22	417		246		171	

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
Wholesale trade	42	1,270	i	1,217		53	i
Electronic shopping and electronic auctions	454111–12	3,282 - 20,096	i	3,157 - 19,970	i	125	i
Transportation and warehousing	48–49	9,609		9,566	i	43	
Information	51	130,517		128,064		2,453	
Publishing	511	40,650		39,348		1,302	
Newspaper, periodical, book, and directory publishers	5111	65		61		4	
Software publishers	5112	40,585		39,287		1,297	
Telecommunications	517	4,246		3,823		423	
Data processing, hosting, and related services	518	36,377		36,045		332	
Other information	other 51	49,244		48,849		396	
Finance and insurance	52	10,385		9,982		403	
Real estate and rental and leasing	53	1,491		1,476		15	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	57		48		9	
Other real estate and rental and leasing	other 53	1,434		1,427		7	
Professional, scientific, and technical services	54	35,611		34,908		703	
Architectural, engineering, and related services	5413	2,426		2,323		103	
Computer systems design and related services	5415	23,865		23,689		175	
Scientific research and development services	5417	3,723		3,364		359	
Research and development in biotechnology	541711	1,260		1,129		131	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,434		2,206		228	
Research and development in the social sciences and humanities	541720	29		29		*	
Other professional, scientific, and technical services	other 54	5,598		5,532		66	
Health care services	621–23	2,027		1,952		76	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,425 - 18,237		1,322 - 18,133		104	
All companies (number of domestic employees)	–	571,019		522,912		48,107	
Small companies							
10–19[a]	–	5,199		4,560		639	
20–49	–	12,028		10,484		1,544	
Medium companies							
50–99	–	14,713		12,165		2,548	
100–249	–	20,847		18,498		2,349	
Large companies							
250–499	–	19,984		17,995		1,989	
500–999	–	26,685		24,356		2,330	
1,000–4,999	–	86,167		80,615		5,552	
5,000–9,999	–	61,158		54,556		6,602	
10,000–24,999	–	104,453		92,569		11,884	
25,000 or more	–	219,784		207,115		12,669	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount	
All business activities	21100–81000	571,019	
Oil and gas extraction	21100	902	
Mining	21200	93 - 4,956	
Support activities for mining, including oil and gas	21300	1,650	i
Utilities	22100	415	
Construction	23000	899	
Food manufacturing	31100	5,513	
Beverage manufacturing	31210	723	
Tobacco manufacturing	31220	807	
Textile, apparel, and leather products manufacturing	31990	965	
Wood products manufacturing	32100	225 - 5,087	
Paper manufacturing	32200	1,791	
Printing and related support activities	32300	477	
Petroleum refineries	32401	525 - 5,388	
Asphalt paving, roofing, and saturated materials manufacturing	32402	134	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	106 - 4,969	
Basic chemicals manufacturing	32510	3,267	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,803	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,919	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	81,409	
In vitro diagnostic substances manufacturing	32542	1,591	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	40,986	
Soap, cleaning compound, and toilet preparations manufacturing	32591	3,196	
Paint, adhesive, and other chemical manufacturing	32592	1,747	
Plastics and rubber products manufacturing	32600	3,506	
Clay and glass products manufacturing	32710	1,511	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	546	
Primary metal manufacturing	33100	851	
Fabricated metal products manufacturing	33200	3,129	
Agricultural machinery and equipment manufacturing	33311	2,458	
Construction machinery manufacturing	33312	1,871	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,300	
Semiconductor machinery manufacturing	33321	4,687	
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,406	
Photographic and photocopying equipment manufacturing	33331	147 - 5,010	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,169	
Digital cameras manufacturing	33333	463	
Engine, turbine, and power transmission equipment manufacturing	33360	3,146	
Metalworking and other general purpose machinery manufacturing	33390	2,861	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	25,296	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	11,254	
Radio, television, and wireless communication equipment manufacturing	33422	2,475	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,293	
Audio and video equipment manufacturing	33430	1,714	
Semiconductor and other electronic components manufacturing	33440	46,556	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,656	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	3,198	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	5,370	
Electrical equipment, appliances, and components manufacturing	33500	6,455	

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount	
Motor vehicles manufacturing	33610	21,793	
Motor vehicle body and trailer manufacturing	33620	154 - 5,017	
Motor vehicle parts manufacturing	33630	9,439	
Aircraft manufacturing	33641	5,404	
Aircraft engine and engine parts manufacturing	33642	1,474	
Other aircraft parts and auxiliary equipment manufacturing	33643	1,347	
Guided missiles, space vehicles, and related parts manufacturing	33644	1,140	
Railroad rolling stock manufacturing	33651	210 - 5,073	
Ship and boat building	33660	182 - 5,045	
Motorcycle, bicycle, and parts manufacturing	33691	437	
Military armored vehicle, tank, and tank components manufacturing	33692	381	
All other transportation equipment manufacturing	33699	496	
Furniture and related products manufacturing	33700	517	
Medical equipment and supplies manufacturing	33910	18,875	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,117	
Merchant wholesalers, durable goods	42300	727	
Merchant wholesalers, nondurable goods	42400	1,029	
Wholesale electronic markets and agents and brokers (business to business)	42500	32 - 4,895	i
Retail trade (except electronic shopping and electronic auctions)	44000	279 - 5,142	
Electronic shopping and electronic auctions	45411	0 - 15,636	i
Transportation	48000	9,072	
Couriers, messengers, and express delivery services	49200	290	
Warehousing and storage	49300	162	i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	88	
Software publishers (except Internet)	51120	31,585	
Motion picture and sound recording (except Internet)	51200	52 - 4,915	
Broadcasting (except Internet)	51500	500	
Wired telecommunications carriers	51710	428	
Wireless telecommunications carriers (except satellite)	51720	2,641	
Satellite telecommunications	51740	486	
Other telecommunications (not listed elsewhere)	51790	610	
Data processing, hosting, and related services	51800	10,108	
Cloud computing applications and Internet-based software services	51801	33,022	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	53,120	
Finance: banking and credit intermediation	52200	5,718	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,654	
Insurance carriers and related activities	52400	2,607	
Real estate	53100	398	
Rental and leasing services	53200	1,067	
Lessors of nonfinancial intangible assets, including patent licensing	53300	71	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	2,117	
Architectural, engineering, and related services	54130	2,720	
Specialized design services	54140	111 - 4,974	
Computer systems design and related services	54150	22,598	
Management, scientific, and technical consulting services	54160	2,004	
Research and development services in social sciences and humanities	54172	28	
Research and development services in biotechnology	54173	1,151	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,885	
Advertising and related services	54180	1,261	i

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount
Professional, scientific, and technical services (not listed elsewhere)	54190	1,264
Management of companies and enterprises	55100	0 - 15,636
Administrative and support services	56100	3,576
Waste management and remediation services	56200	16 - 4,879
Offices of physicians	62110	196
Medical and diagnostic laboratories	62150	2,104
Other ambulatory health care services (ambulance, dental, home health care)	62199	146 - 5,009
Hospitals and nursing care facilities	62200	0 - 15,636
Social assistance services	62400	0 - 15,636
Arts, entertainment, and recreation	71000	479
Accommodation and food services	72000	79 - 4,942
Other services (not listed elsewhere)	81000	514
Undistributed	–	0

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.
[b] Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
All industries	21–23, 31–33, 42–81	83,738		74,508		9,230	
Manufacturing industries	31–33	46,404		38,909		7,496	
Food	311	256		245		12	
Beverage and tobacco products	312	114	i	111	i	3	
Textile, apparel, and leather products	313–16	31		31		0	
Wood products	321	6		6		*	
Paper	322	1		*		*	i
Printing and related support activities	323	0		0		0	
Petroleum and coal products	324	105		102 - 106		0 - 3	
Chemicals	325	15,645		10,020		5,625	
Basic chemicals	3251	165		164		1	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85 - 140		85		0 - 55	
Pesticide, fertilizer, and other agricultural chemicals	3253	360 - 374		340 - 365		0 - 33	
Pharmaceuticals and medicines	3254	14,721		9,181		5,540	
Soap, cleaning compound, and toilet preparation	3256	195		164		31	
Paint, coating, adhesive, and other chemicals	3255, 3259	59 - 113		59 - 87		0 - 47	
Plastics and rubber products	326	137		94		43	
Nonmetallic mineral products	327	35		35		*	
Primary metals	331	21		19		3	
Fabricated metal products	332	285		264		21	
Machinery	333	1,347		1,288		59	
Agricultural implement	33311	11		11		0	
Semiconductor machinery	333242	662		623		38	
Engine, turbine, and power transmission equipment	3336	231		216		15	
Other machinery	other 333	443		438		5	
Computer and electronic products	334	12,275		11,671		604	
Communications equipment	3342	1,139	i	1,103 - 1,107	i	32 - 36	i
Semiconductor and other electronic components	3344	3,472		3,405		66	
Navigational, measuring, electromedical, and control instruments	3345	7,432		6,939		493	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	239		229		10	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,960		6,520		440	
Other measuring and controlling device	other 3345	233		191		43	
Other computer and electronic products	other 334	232		220 - 223		10 - 13	
Electrical equipment, appliances, and components	335	409		407		2	
Transportation equipment	336	15,401	i	14,319	i	1,082	i
Motor vehicles, bodies, trailers, and parts	3361–63	3,761		3,559	i	201	
Aerospace products and parts	3364	10,428	i	9,551	i	877	i
Aircraft, aircraft engine, and aircraft parts	336411–13	9,520	i	8,643	i	877	i
Guided missile, space vehicle, and related parts	336414–15, 336419	908		908		0	
Military armored vehicle, tank, and tank component	336992	10		10		0	
Other transportation	other 336	1,202		1,198		3	
Furniture and related products	337	2		2		*	
Miscellaneous	339	335		292 - 298		36 - 43	
Medical equipment and supplies	3391	284		248		36	
Other miscellaneous manufacturing	3399	50		44 - 50		0 - 7	

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
Nonmanufacturing industries	21–23, 42–81	37,334		35,600		1,734	
Mining, quarrying, oil and gas extraction, and support activities	21	211		211		*	
Utilities	22	49		38		11	
Wholesale trade	42	90		87		3	
Electronic shopping and electronic auctions	454111–12	43 - 61		43 - 61		0	
Transportation and warehousing	48–49	386		386		0	
Information	51	1,289		1,213		76	
Publishing	511	667		620		47	
Newspaper, periodical, book, and directory publishers	5111	*		*		0	
Software publishers	5112	667		620		47	
Telecommunications	517	36		33		3	
Data processing, hosting, and related services	518	424		404		20	
Other information	other 51	161		155		6	
Finance and insurance	52	111		110		*	i
Real estate and rental and leasing	53	0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0	
Other real estate and rental and leasing	other 53	0		0		0	
Professional, scientific, and technical services	54	34,756		33,115		1,641	
Architectural, engineering, and related services	5413	2,292		1,921		370	
Computer systems design and related services	5415	2,774		2,727		47	
Scientific research and development services	5417	28,452		27,311	i	1,141	
Research and development in biotechnology	541711	8,243		8,121		122	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	19,341	i	18,444	i	897	
Research and development in the social sciences and humanities	541720	867		745		122	
Other professional, scientific, and technical services	other 54	1,238		1,156		82	
Health care services	621–23	341		338		4	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	37 - 62		37 - 62		0	
All companies (number of domestic employees)	–	83,738		74,508		9,230	
Small companies							
10–19[a]	–	1,229		1,079		150	
20–49	–	2,753		2,392		362	
Medium companies							
50–99	–	2,979		2,593		386	
100–249	–	3,851		3,487		364	
Large companies							
250–499	–	4,002		3,597		405	
500–999	–	2,777		2,566		211	
1,000–4,999	–	14,093		11,609		2,484	
5,000–9,999	–	9,163		8,220		943	
10,000–24,999	–	21,568		19,307	i	2,261	
25,000 or more	–	21,322		19,658		1,664	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 8

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales											
		R&D performers or funders[a]						Domestic R&D performers[b]					
		Worldwide		Domestic		Foreign		Worldwide		Domestic		Foreign	
All industries	21–23, 31–33, 42–81	14,897,629		11,180,864		3,716,765		14,253,081		10,627,588		3,625,493	
Manufacturing industries	31–33	8,202,736		5,675,165		2,527,572		8,083,975		5,594,377		2,489,598	
Food	311	778,392		561,592		216,800		777,972		561,172		216,800	
Beverage and tobacco products	312	266,203		167,169		99,033		234,334		167,169		67,165	
Textile, apparel, and leather products	313–16	93,677		64,883		28,795		93,330		64,536		28,795	
Wood products	321	42,764		39,815		2,949		42,546		39,597		2,949	
Paper	322	115,005		87,338		27,667		113,880		87,136		26,743	
Printing and related support activities	323	68,259	i	58,316	i	9,943	i	68,259	i	58,316	i	9,943	i
Petroleum and coal products	324	503,166		286,579		216,587		503,166		286,579		216,587	
Chemicals	325	1,602,955		1,161,526		441,429		1,600,810		1,159,765		441,045	
Basic chemicals	3251	363,627		300,539		63,088		363,627		300,539		63,088	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	106,740		64,108		42,632		106,740		64,108		42,632	
Pesticide, fertilizer, and other agricultural chemicals	3253	95,707		84,556		11,151		95,673		84,522		11,151	
Pharmaceuticals and medicines	3254	733,143		536,020		197,122		732,059		534,959		197,100	
Soap, cleaning compound, and toilet preparation	3256	201,274		112,889		88,385		201,274		112,889		88,385	
Paint, coating, adhesive, and other chemicals	3255, 3259	102,464		63,413		39,051		101,437		62,747		38,690	
Plastics and rubber products	326	257,562		200,238		57,324		256,084		198,761		57,324	
Nonmetallic mineral products	327	71,067		55,132		15,935	i	60,062		46,046		14,016	i
Primary metals	331	151,020		123,828		27,193		149,813		122,620		27,193	
Fabricated metal products	332	170,530		130,549		39,981		168,293		128,658		39,635	
Machinery	333	567,290		363,337		203,952		565,719		362,718		203,001	
Agricultural implement	33311	82,237		47,403		34,834		81,540		47,108		34,432	
Semiconductor machinery	333242	44,310		24,680		19,629		44,310		24,680		19,629	
Engine, turbine, and power transmission equipment	3336	65,642		36,617		29,025		65,642		36,617		29,025	
Other machinery	other 333	375,101		254,637		120,464		374,226		254,312		119,914	
Computer and electronic products	334	1,217,221		678,010		539,211		1,216,687		677,658		539,030	
Communications equipment	3342	131,370		88,064		43,306		131,080		87,774		43,306	
Semiconductor and other electronic components	3344	394,412		206,402		188,010		394,181		206,352		187,829	
Navigational, measuring, electromedical, and control instruments	3345	271,168		183,042		88,127		271,162		183,035		88,127	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	51,965		29,901		22,064		51,958		29,894		22,064	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	106,313		76,145		30,169		106,313		76,145		30,169	

TABLE 8

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales											
		R&D performers or funders[a]						Domestic R&D performers[b]					
		Worldwide		Domestic		Foreign		Worldwide		Domestic		Foreign	
Other measuring and controlling device	other 3345	112,890		76,997		35,894		112,890		76,997		35,894	
Other computer and electronic products	other 334	420,270		200,502		219,768		420,264		200,496		219,768	
Electrical equipment, appliances, and components	335	219,868		142,538		77,330		219,805		142,474		77,330	
Transportation equipment	336	1,519,757		1,164,905		354,852		1,455,556		1,102,104		353,452	
Motor vehicles, bodies, trailers, and parts	3361–63	1,099,951		805,202		294,749		1,035,750		742,401		293,349	
Aerospace products and parts	3364	323,341		280,327		43,014		323,341		280,327		43,014	
Aircraft, aircraft engine, and aircraft parts	336411–13	314,711		271,821		42,889		314,711		271,821		42,889	
Guided missile, space vehicle, and related parts	336414–15, 336419	8,630		8,506		125		8,630		8,506		125	
Military armored vehicle, tank, and tank component	336992	963		963		0		963		963		0	
Other transportation	other 336	95,502		78,412		17,089		95,502		78,412		17,089	
Furniture and related products	337	45,381		40,782		4,599		45,314		40,715		4,599	
Miscellaneous	339	512,620		348,628		163,991		512,344		348,353		163,991	
Medical equipment and supplies	3391	354,397		245,191		109,206		354,122		244,916		109,206	
Other miscellaneous manufacturing	3399	158,222		103,437		54,785		158,222		103,437		54,785	
Nonmanufacturing industries	21–23, 42–81	6,694,893		5,505,700		1,189,193		6,169,106		5,033,211		1,135,895	
Mining, quarrying, oil and gas extraction, and support activities	21	326,360		181,130		145,230		326,360		181,130		145,230	
Utilities	22	324,549		317,985		6,564		257,178		250,615		6,564	
Wholesale trade	42	132,106	i	125,430	i	6,677	i	127,821	i	122,212	i	5,609	i
Electronic shopping and electronic auctions	454111–12	270,483 - 428,858		270,484		0 - 158,373		270,483 - 428,858		270,484		0 - 158,373	
Transportation and warehousing	48–49	369,527		281,963		87,564		369,014		281,466		87,548	
Information	51	1,852,384		1,435,124		417,259		1,832,964		1,420,447		412,516	
Publishing	511	285,932		187,092		98,841		284,966		186,130		98,836	
Newspaper, periodical, book, and directory publishers	5111	1,116		1,089		27		1,054		1,027		27	
Software publishers	5112	284,817		186,003		98,814		283,913		185,103		98,809	
Telecommunications	517	530,754		510,517		20,237	i	529,508		509,272		20,236	i
Data processing, hosting, and related services	518	606,746		478,977		127,769		606,640		478,961		127,678	
Other information	other 51	428,951		258,538		170,413		411,850		246,084		165,766	
Finance and insurance	52	1,678,912		1,568,443		110,468		1,426,187		1,323,379		102,808	
Real estate and rental and leasing	53	12,557		9,252		3,305		12,552		9,247		3,305	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1,048		1,024		24		1,044		1,020		24	
Other real estate and rental and leasing	other 53	11,509		8,228		3,281		11,509		8,228		3,281	

TABLE 8

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales											
		R&D performers or funders[a]						Domestic R&D performers[b]					
		Worldwide		Domestic		Foreign		Worldwide		Domestic		Foreign	
Professional, scientific, and technical services	54	700,442		486,234		214,208		695,900		482,364		213,536	
Architectural, engineering, and related services	5413	124,288		102,324		21,964		122,569		100,905		21,664	
Computer systems design and related services	5415	335,408		197,389		138,018		333,200		195,512		137,688	
Scientific research and development services	5417	98,632		81,094		17,539	i	98,314		80,775		17,539	i
Research and development in biotechnology	541711	35,636		31,250		4,386		35,612		31,226		4,386	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	61,710		48,646		13,064	i	61,440		48,375		13,064	i
Research and development in the social sciences and humanities	541720	1,287		1,199		88		1,262		1,174		88	
Other professional, scientific, and technical services	other 54	142,114		105,428		36,686		141,817		105,172		36,645	
Health care services	621–23	135,069		134,658		410		134,828		134,418		410	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	734,128 - 892,507		694,995		39,134 - 197,512		557,446 - 715,821		557,447		0 - 158,373	
All companies (number of domestic employees)	–	14,897,629		11,180,864		3,716,765		14,253,081		10,627,588		3,625,493	
Small companies													
10–19[c]	–	22,697		22,272		426		22,225		21,822		403	
20–49	–	114,158		108,914		5,244		111,381		107,012		4,369	
Medium companies													
50–99	–	126,146		120,557		5,589		121,993		118,064		3,930	
100–249	–	324,503		267,171		57,332		289,065		264,042		25,023	
Large companies													
250–499	–	338,682		300,032		38,651		330,756		294,480		36,277	
500–999	–	440,795		371,248		69,547		435,634		366,154		69,480	
1,000–4,999	–	1,945,194		1,475,601		469,594		1,923,534		1,455,656		467,878	
5,000–9,999	–	1,498,357		1,141,851		356,506		1,451,157		1,101,217		349,940	
10,000–24,999	–	3,108,788		2,115,325		993,464		3,051,470		2,058,006		993,464	
25,000 or more	–	6,978,308		5,257,895		1,720,413		6,515,865		4,841,134		1,674,731	

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics are representative of companies located in the United States that performed or funded R&D.
[b] Statistics are representative of companies located in the United States that performed R&D.
[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Sales					
		Worldwide		Domestic		Foreign	
All business activities	21100–81000	14,897,629		11,180,864		3,716,765	
Oil and gas extraction	21100	134,817		76,461		58,356	
Mining	21200	18,446		16,249		2,197	
Support activities for mining, including oil and gas	21300	89,977		52,988		36,989	
Utilities	22100	304,374		299,499		4,875	
Construction	23000	94,478		86,185		8,293	
Food manufacturing	31100	779,512		565,706		213,805	
Beverage manufacturing	31210	119,563		78,304		41,260	
Tobacco manufacturing	31220	70,749		38,302		32,447	
Textile, apparel, and leather products manufacturing	31990	77,152		52,980		24,172	
Wood products manufacturing	32100	41,886		35,775		6,111	
Paper manufacturing	32200	157,322		121,784		35,538	
Printing and related support activities	32300	65,659	i	55,322	i	10,337	i
Petroleum refineries	32401	565,617		362,033		203,584	
Asphalt paving, roofing, and saturated materials manufacturing	32402	18,425		12,625		5,800	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	11,434		10,453		981	
Basic chemicals manufacturing	32510	229,696		162,308		67,388	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	111,490		71,464		40,026	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	67,393		55,221		12,172	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	556,641		390,793		165,848	
In vitro diagnostic substances manufacturing	32542	16,743		9,203		7,540	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	125,658		110,171		15,487	
Soap, cleaning compound, and toilet preparations manufacturing	32591	178,605		98,956		79,648	
Paint, adhesive, and other chemical manufacturing	32592	122,390		79,963		42,427	
Plastics and rubber products manufacturing	32600	208,281		147,611		60,670	
Clay and glass products manufacturing	32710	39,831		24,278		15,553	i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	46,774		40,945		5,829	
Primary metal manufacturing	33100	152,375		124,730		27,645	
Fabricated metal products manufacturing	33200	181,995		131,704		50,291	
Agricultural machinery and equipment manufacturing	33311	64,372		36,555		27,817	
Construction machinery manufacturing	33312	80,265		49,639		30,626	
Mining, oil, and gas field machinery and equipment manufacturing	33319	68,949		41,577		27,372	
Semiconductor machinery manufacturing	33321	45,318		24,628		20,690	
Industrial machinery manufacturing (except semiconductor machinery)	33322	38,121		28,420		9,702	
Photographic and photocopying equipment manufacturing	33331	836		710		127	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	115,672		80,311		35,361	
Digital cameras manufacturing	33333	3,382		1,765		1,617	
Engine, turbine, and power transmission equipment manufacturing	33360	107,601		55,906		51,695	
Metalworking and other general purpose machinery manufacturing	33390	101,485		75,149		26,336	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	457,916		212,050		245,866	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	79,503		44,013		35,490	
Radio, television, and wireless communication equipment manufacturing	33422	37,126		30,687		6,439	i

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Sales					
		Worldwide		Domestic		Foreign	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	16,059		14,584		1,476	
Audio and video equipment manufacturing	33430	16,217		7,917		8,299	
Semiconductor and other electronic components manufacturing	33440	465,467		224,875		240,592	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	49,345		31,332		18,014	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	73,069		62,412		10,658	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	84,362		55,700		28,662	
Electrical equipment, appliances, and components manufacturing	33500	222,663		145,801		76,861	
Motor vehicles manufacturing	33610	529,227		406,293		122,934	
Motor vehicle body and trailer manufacturing	33620	45,991		44,214		1,777	
Motor vehicle parts manufacturing	33630	278,559		182,796		95,763	i
Aircraft manufacturing	33641	144,831		139,088		5,743	
Aircraft engine and engine parts manufacturing	33642	54,264		32,679		21,585	
Other aircraft parts and auxiliary equipment manufacturing	33643	58,491		47,652		10,839	
Guided missiles, space vehicles, and related parts manufacturing	33644	35,217		32,444		2,774	
Railroad rolling stock manufacturing	33651	13,506	i	8,091		5,415	i
Ship and boat building	33660	24,057		21,988		2,069	
Motorcycle, bicycle, and parts manufacturing	33691	10,979		6,948		4,031	
Military armored vehicle, tank, and tank components manufacturing	33692	15,405		13,848		1,557	
All other transportation equipment manufacturing	33699	17,730		16,191		1,539	
Furniture and related products manufacturing	33700	51,330		46,013		5,317	
Medical equipment and supplies manufacturing	33910	301,096		200,226		100,869	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	119,361		89,861		29,501	
Merchant wholesalers, durable goods	42300	165,955		149,138		16,817	
Merchant wholesalers, nondurable goods	42400	602,072		445,786		156,286	
Wholesale electronic markets and agents and brokers (business to business)	42500	5,340		5,089		251	
Retail trade (except electronic shopping and electronic auctions)	44000	662,471		582,203		80,268	
Electronic shopping and electronic auctions	45411	168,456 - 333,088	i	168,457	i	0 - 164,630	i
Transportation	48000	387,986		299,235		88,751	
Couriers, messengers, and express delivery services	49200	2,034		2,014		20	
Warehousing and storage	49300	15,949		8,413		7,536	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	7,147		5,585		1,562	
Software publishers (except Internet)	51120	237,902		143,184		94,718	
Motion picture and sound recording (except Internet)	51200	46,587		43,317		3,270	
Broadcasting (except Internet)	51500	185,587		145,898		39,689	
Wired telecommunications carriers	51710	139,262		137,035		2,226	
Wireless telecommunications carriers (except satellite)	51720	264,976		264,971		5	
Satellite telecommunications	51740	51,337		51,267		70	
Other telecommunications (not listed elsewhere)	51790	19,438		13,883		5,555	i
Data processing, hosting, and related services	51800	98,036		69,214		28,822	
Cloud computing applications and Internet-based software services	51801	218,846		169,605		49,241	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	219,808		124,726		95,082	
Finance: banking and credit intermediation	52200	629,562		574,882		54,679	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	97,896		67,833		30,063	

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Sales			
		Worldwide	Domestic	Foreign	
Insurance carriers and related activities	52400	1,069,279	1,031,450	37,830	i
Real estate	53100	17,104	16,881	223	
Rental and leasing services	53200	12,743	8,259	4,484	
Lessors of nonfinancial intangible assets, including patent licensing	53300	1,671	1,614	56	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	29,565	26,427	3,139	
Architectural, engineering, and related services	54130	127,409	110,906	16,502	
Specialized design services	54140	12,640	3,752	8,888	
Computer systems design and related services	54150	238,778	149,589	89,189	
Management, scientific, and technical consulting services	54160	57,882	49,880	8,002	i
Research and development services in social sciences and humanities	54172	1,233	1,144	89	
Research and development services in biotechnology	54173	13,214	9,066	4,148	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	49,481	38,427	11,054	i
Advertising and related services	54180	84,177 - 248,809	84,178	0 - 164,630	
Professional, scientific, and technical services (not listed elsewhere)	54190	23,046	19,061	3,986	i
Management of companies and enterprises	55100	13,249	13,209	40	
Administrative and support services	56100	89,404	62,356	27,048	
Waste management and remediation services	56200	11,623	11,342	281	
Offices of physicians	62110	102,792	102,792	0	
Medical and diagnostic laboratories	62150	38,599	34,462	4,136	i
Other ambulatory health care services (ambulance, dental, home health care)	62199	22,807	22,613	194	
Hospitals and nursing care facilities	62200	25,795	25,795	0	
Social assistance services	62400	108	108	0	
Arts, entertainment, and recreation	71000	37,623	31,887	5,736	
Accommodation and food services	72000	84,334	56,337	27,997	
Other services (not listed elsewhere)	81000	109,756	90,936	18,820	i
Less: intersegment eliminations	–	182,972	117,720	65,252	
Undistributed	–	0	0	0	

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

Note(s):
Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 10

Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
All industries	21–23, 31–33, 42–81	492,956		267,998		39,045		21,352		7,190		34,426		8,236		18,861		9,238		16,879		69,732	
Manufacturing industries	31–33	285,674		145,807		11,847		10,640		3,567		29,600		4,202		12,419		8,878		10,459		48,253	
Food	311	4,180		2,582		69		92		14		470		72		181		1		186		514	
Beverage and tobacco products	312	1,082		562		10		44		3		91		12		52		0		72		237	
Textile, apparel, and leather products	313–16	904		569		17		22		10		198		5		14		*		12		57	
Wood products	321	186		144		0		4		*		21		9		2		0		2		5	i
Paper	322	1,064		435		*	i	6	i	1	i	485		7	i	8	i	1	i	12	i	108	
Printing and related support activities	323	420	i	285	i	0		4	i	1		64		8	i	5		*	i	7		46	
Petroleum and coal products	324	1,306		666		*		17		7		41		4		40 - 49		*		295		223 - 239	
Chemicals	325	97,063		40,466		4,582		5,557		719		8,598		1,552		3,961		7,410		4,904		19,314	
Basic chemicals	3251	2,360		1,381		4		43		18		242		42		167		23		146		294	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		789		1		46		2		99		14		73		3		53		94	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		951		*		257		2		162		109		104 - 133		27		64		128 - 160	
Pharmaceuticals and medicines	3254	87,619		34,813		4,565		5,124		686		7,834		1,346		3,451		7,357		4,601		17,843	
Soap, cleaning compound, and toilet preparation	3256	2,760		1,645		12		75		1		161		26		97		*		23		719	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		887		*		13		10		100		15		42 - 71		*		18		203 - 234	
Plastics and rubber products	326	2,856		1,655		22		49		44		458		20		85		6		97		420	
Nonmetallic mineral products	327	1,508	i	847	i	6		15		20	i	227	i	20	i	61	i	0		47	i	265	i
Primary metals	331	665		370		4		5		3		161		1		27		4		39		51	
Fabricated metal products	332	2,885		1,891		58		106		44		422		16		47		9		44		249	i
Machinery	333	15,184		8,772		262		581		134		2,129		183		605		35		331		2,154	
Agricultural implement	33311	1,921		1,037		0		136		4		256		6		35		3		41		403	
Semiconductor machinery	333242	4,459		2,337		201		27		5		509		119		351		*		148		762	
Engine, turbine, and power transmission equipment	3336	1,301		778		5		21		19		142		13		50		11		14	i	248	
Other machinery	other 333	7,503		4,620		56		397		105	i	1,222		45		168		21		129		741	i
Computer and electronic products	334	86,729		45,997		6,253		1,629		1,566		6,111		1,766		5,366		777		2,424		14,840	
Communications equipment	3342	12,595		7,468		705		401		187		306		931		574		17		186		1,820	

TABLE 10

Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
Semiconductor and other electronic components	3344	35,183	i	17,781	i	1,754	i	459	i	301	i	2,628	i	319	i	2,784	i	460	i	504	i	8,193	i
Navigational, measuring, electromedical, and control instruments	3345	17,562		11,240		346		574		204		1,982		140		333		10		371		2,362	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		1,899		191		137		46		193		76		73		2		180		546	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		6,346		66		345		76		1,400		34		162		5		73		1,155	
Other measuring and controlling device	other 3345	4,558		2,995		89		92		82		390		31		98		3		118		660	
Other computer and electronic products	other 334	21,388		9,509		3,447		195		874		1,195		375		1,675		290		1,363		2,465	
Electrical equipment, appliances, and components	335	5,263		3,331		106		230		65		483		103		135		10		176		625	
Transportation equipment	336	45,375		26,379		18		1,448		571		8,120	i	303		1,153		504		769		6,108	
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		15,202		3		1,123		514		3,288		261		967		471		183		2,104	
Aerospace products and parts	3364	18,358	i	9,332	i	3 - 6		244		35		4,328	i	19	i	139 - 165		4		521		3,701 - 3,735	
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	8,528	i	3		176		33		4,051	i	13	i	133		4		501		3,450	
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		805		0 - 3		68		2		277		5		6 - 32		1		20		251 - 285	
Military armored vehicle, tank, and tank component	336992	35		20 - 30		*	i	0 - 9		*	i	5		0 - 9		*		*	i	*	i	0 - 10	
Other transportation	other 336	2,865		1,814 - 1,825	i	9 - 13		71 - 83		21	i	499	i	13 - 25		22 - 48	i	28	i	65	i	258 - 304	i
Furniture and related products	337	409		290		3		11		1		50		2		8		3		6		35	
Miscellaneous	339	18,596		10,567		438		820		365		1,472		120		666 - 674		119		1,035		2,983 - 2,997	
Medical equipment and supplies	3391	16,014		8,767		422		731		315		1,208		99		623		70		1,005		2,775	
Other miscellaneous manufacturing	3399	2,582		1,800		15		89		51		263		21		43 - 52		50		30		209 - 223	
Nonmanufacturing industries	21–23, 42–81	207,283		122,191		27,198		10,711		3,623		4,826		4,034		6,442		359		6,420	i	21,479	
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		1,636		0 - 292		158		17		333		35		92		2		78		77 - 370	
Utilities	22	275		113		*		9		1		8		1		0 - 100		3		23		17 - 121	
Wholesale trade	42	1,191		777		3	i	26	i	2	i	68	i	26		18		*	i	7	i	264	i

TABLE 10

Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	16 - 9,465	i	0 - 2,447	i	117	i	0 - 192	i	57	i	0 - 228	i	0 - 793	i	0		5	i	0 - 4,141	i
Transportation and warehousing	48–49	9,890	i	3,310	i	4,683		521	i	51	i	156	i	94	i	71	i	34	i	290	i	680	i
Information	51	110,227		65,595		18,499		5,766		2,571		796		2,806		3,099		230		1,805		9,061	
Publishing	511	33,019		21,046		4,001		1,576		281		432		334		382		91		1,279		3,596	
Newspaper, periodical, book, and directory publishers	5111	61		55		*	i	2		1		*		*		*		0		1		2	
Software publishers	5112	32,958		20,991		4,001		1,574		281		432		334		382		91		1,279		3,594	
Telecommunications	517	3,733		2,742		39		609		15		79		40		33		1		128		45	
Data processing, hosting, and related services	518	30,558		20,672		4,005		736		382		212		609		492		120		309		3,020	
Other information	other 51	42,917		21,134		10,453		2,844		1,894		73		1,823		2,191		16		89		2,400	i
Finance and insurance	52	8,917		5,644		357		1,778		114		41		43		534	i	11		72		324	
Real estate and rental and leasing	53	1,371		887		102		53		49		3		2		2 - 258		0		0		19 - 275	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		17		2		1		1		1		*		3		0		0		20	
Other real estate and rental and leasing	other 53	1,326		870		100		53		48		2		2		0 - 255		0		0		0 - 255	
Professional, scientific, and technical services	54	53,233		33,455		1,055		1,793		601		2,951		764		1,801		74		4,074	i	6,665	
Architectural, engineering, and related services	5413	4,207		3,120		6		88		16		390		35		21		5		187		341	
Computer systems design and related services	5415	21,046		14,921		721		717		346		494		191		722		23		337		2,575	
Scientific research and development services	5417	21,669		10,899		201		686		136		1,665		428		838	i	36		3,407	i	3,373	
Research and development in biotechnology	541711	6,457		3,051		70		177		16		453		119		181		19		1,298	i	1,072	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	7,249		115		490		113		1,199		287		641	i	17		2,083	i	2,252	i
Research and development in the social sciences and humanities	541720	766		599	i	16		19		6		13		22		15		0		27	i	48	
Other professional, scientific, and technical services	other 54	6,312		4,515		128		303		103		403		110		220		10		143		376	
Health care services	621–23	2,265		1,309		55		233		30		303		37		35		1		33		229	

TABLE 10

Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067	0 - 9,453	0 - 2,447	257 i	0 - 192	110	0 - 230	0 - 794	5	32	0 - 4,146 i
All companies (number of domestic employees)	–	492,956	267,998	39,045	21,352	7,190	34,426	8,236	18,861	9,238	16,879	69,732
Small companies												
10–19[a]	–	5,501	3,210	57 i	314	61	723	99	113	42	318	565 i
20–49	–	12,418	7,929	175	436	88	1,222	301	221	58	416	1,573
Medium companies												
50–99	–	14,021	8,026	416	495	134	1,471	323	270	321	836	1,731
100–249	–	19,793	12,233	718	712	202	1,946	363	466	150	881	2,121
Large companies												
250–499	–	18,883	11,044	933	826	376	1,859	366	413	119	626	2,319
500–999	–	23,969	13,514	1,167	1,107	239	1,766	462	739	1,297	627	3,051
1,000–4,999	–	75,671	43,445	7,191	2,589	964	4,453	1,099	2,745	742	2,795	9,649
5,000–9,999	–	50,811	26,130	2,833	2,180	438	2,990	796	2,268	4,341	1,344 i	7,490
10,000–24,999	–	88,263	45,843	7,329	3,928	936	6,456	847	4,058	833	4,783 i	13,250
25,000 or more	–	183,626	96,626	18,225	8,764	3,752	11,542	3,582	7,567	1,334	4,253	27,982

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
All industries	21–23, 31–33, 42–81	492,956	5,501	12,418	14,021	19,793	18,883	23,969	75,671	50,811	88,263	183,626
Manufacturing industries	31–33	285,674	2,301	5,455	7,925	11,137	10,478	14,808	45,577	35,737	59,274	92,981
Food	311	4,180	25	29	98	243	196	208	592	237	1,696 i	856 i
Beverage and tobacco products	312	1,082	15	18	16	10	116 i	26	21	213	101	546
Textile, apparel, and leather products	313–16	904	22	68	9	40	26	14	190	282	86	166
Wood products	321	186	0	4	5	22	5	13	45	85	7	0
Paper	322	1,064	2	12	6	29	24	10	76	119	341	446
Printing and related support activities	323	420 i	123	4	18	22	52 i	11	29 i	72 i	89 i	0
Petroleum and coal products	324	1,306	1	4	0 - 140	34	39	129	44	0 - 279	0 - 193	457 - 1,050
Chemicals	325	97,063	947	2,251	4,577	4,938	4,282	5,450	14,084	13,522	30,612	16,401
Basic chemicals	3251	2,360	0 - 48	103	42 - 56	141 - 161	103	149	1,146	263 - 349	308	14 - 21
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	0 - 48	14	26	98	32	64	170	0	717 - 772	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	21	22	33	39	26	25	512	695 - 783	362 - 476	0
Pharmaceuticals and medicines	3254	87,619	859	2,048	4,330	4,446	3,980	5,128	11,411	12,099	27,236	16,080
Soap, cleaning compound, and toilet preparation	3256	2,760	21	14	49	117	50	33	348	379 i	1,567	181 i
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	0 - 48	49	82 - 99	77 - 97	91	51	498	0	251 - 366	120 - 127
Plastics and rubber products	326	2,856	9	53	159	227	240	323	701	633	336	174
Nonmetallic mineral products	327	1,508 i	*	10	27	29	14	190	168	56	1,014 i	0
Primary metals	331	665	3	17	16	108	24	46	234	98	110	9 i
Fabricated metal products	332	2,885	136	230	294	544	352	420	666	154 i	88	0
Machinery	333	15,184	159	657	639	1,038	555	779	2,967	4,003	1,387	3,000
Agricultural implement	33311	1,921	4	48	13	49	20	82	270	141	0	1,294
Semiconductor machinery	333242	4,459	0 - 126	62	47	88	45	154	1,267	2,666 - 2,799	0	0
Engine, turbine, and power transmission equipment	3336	1,301	19	51	3	35	56	75	91	622	350	0
Other machinery	other 333	7,503	10 - 136	496	576	865	434	469	1,339	440 - 575	1,037	1,706
Computer and electronic products	334	86,729	275	1,362	1,113	1,859	2,481	3,781	15,071	10,043 i	13,974	36,769

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																					
		All companies		10–19[a]		20–49		50–99		100–249		250–499		500–999		1,000–4,999		5,000–9,999		10,000–24,999		25,000 or more	
Communications equipment	3342	12,595		0 - 120		227		36 - 301		218		371		910		2,568		2,137	i	280 - 1,523		4,218 - 5,850	
Semiconductor and other electronic components	3344	35,183	i	0 - 120		538		274		1,016		1,537		1,508		5,643		5,634	i	9,717		9,192 - 9,320	i
Navigational, measuring, electromedical, and control instruments	3345	17,562		156	i	557		536		494		430		858		3,872		602		2,736	i	7,321	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		76	i	132		235		129		131		534		1,186		0		918	i	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		8		105		103		109		136		20		980		338		1,201	i	6,662	
Other measuring and controlling device	other 3345	4,558		72		320		198		256		162		303		1,705		264		617		659	
Other computer and electronic products	other 334	21,388		0 - 120		39		2 - 267		131		143		505		2,988		1,670	i	0 - 1,241	i	14,302 - 15,913	
Electrical equipment, appliances, and components	335	5,263		154		174		201		298		228		888		1,377		482		831		630	
Transportation equipment	336	45,375		252	i	140		250		889		1,003		1,651		5,223		3,804		4,205		27,959	
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		12		14		0 - 84		392 - 513		838		1,057		3,390		2,653	i	1,967 - 2,451		13,106 - 13,796	
Aerospace products and parts	3364	18,358	i	234	i	85		143		342		109		401		1,610		572		1,748		13,114	i
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	15		63		73		255		107		401		571		544		1,748		13,114	i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		220	i	22		69		87		2		0		1,039		27		0		0	
Military armored vehicle, tank, and tank component	336992	35		6		*		24		1		5		0		0		0		0		0	
Other transportation	other 336	2,865		0		41		0 - 85		34 - 155		52		193		223		579		7 - 491		1,048 - 1,738	
Furniture and related products	337	409		0		4		27		33		22		35		116		157		15		0	
Miscellaneous	339	18,596		177		417		339 - 479		775		819		834		3,972		1,505 - 1,785		4,196 - 4,390		4,980 - 5,562	
Medical equipment and supplies	3391	16,014		163		317		339		587		631		470		2,821		1,506		4,197		4,981	
Other miscellaneous manufacturing	3399	2,582		14		100		0 - 140		188		188		364		1,151		0 - 279	i	0 - 193		0 - 581	
Nonmanufacturing industries	21–23, 42–81	207,283		3,200		6,963		6,095		8,657		8,404		9,161		30,094		15,074		28,989	i	90,645	
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		9		8		422		4		56		45		66		256		1,852		0	
Utilities	22	275		*		10		1		5		0		0 - 161		66		3		0 - 161		32 - 193	
Wholesale trade	42	1,191		99		543		135		231		132	i	23		19	i	0		11	i	0	

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																					
		All companies		10–19[a]		20–49		50–99		100–249		250–499		500–999		1,000–4,999		5,000–9,999		10,000–24,999		25,000 or more	
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	0		0 - 170		7		0 - 510		43 - 349		0 - 1,264		0 - 559		0 - 946	i	0		0 - 13,832	i
Transportation and warehousing	48–49	9,890	i	2		0 - 170		0 - 186		0 - 510		62	i	3 - 680		1,175		0 - 676		7,974	i	0 - 676	
Information	51	110,227		556		2,032		1,419		2,911		3,391		5,740		19,674		7,457		6,501		60,546	
Publishing	511	33,019		206		854		400		806		655		695		7,979		2,688		2,246		16,490	
Newspaper, periodical, book, and directory publishers	5111	61		4		1		6		4		44		2		0		0		0		0	
Software publishers	5112	32,958		202		854		394		803		611		693		7,979		2,688		2,246		16,490	
Telecommunications	517	3,733		35		60		135		114		169		87		68		59		23		2,982	
Data processing, hosting, and related services	518	30,558		0 - 316		880		824		1,642		2,132		3,827		8,615		4,097		2,552 - 2,876		5,669	
Other information	other 51	42,917		0 - 316		237		61		349		435		1,131		3,011		613		1,354 - 1,679		35,405	
Finance and insurance	52	8,917		78		0 - 170		0 - 186		224		598		264		1,572		902		1,960		2,960 - 3,323	
Real estate and rental and leasing	53	1,371		*		10		3		7		35		24		1,293		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		*		7		2	i	1		35		0		0		0		0		0	
Other real estate and rental and leasing	other 53	1,326		0		2		1		6		0		24		1,293		0		0		0	
Professional, scientific, and technical services	54	53,233		1,739		4,190		3,740		4,610		3,253		1,796		5,226		5,501		9,902	i	13,275	
Architectural, engineering, and related services	5413	4,207		290		436		453		775		520		150		441		407	i	157		578	
Computer systems design and related services	5415	21,046		452		1,845		1,202		1,148		811		765		2,639	i	288		3,672		8,226	
Scientific research and development services	5417	21,669		914		1,538		1,497		2,054		1,381		700		1,517		3,366	i	5,985	i	2,716	
Research and development in biotechnology	541711	6,457		293		439		462		318	i	230		134		0		0		1,866		2,716	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	616		1,082		982		1,702		1,144		566		1,240	i	2,996	i	4,119	i	0	
Research and development in the social sciences and humanities	541720	766		6		17		54		34		8		0		277		370		0		0	
Other professional, scientific, and technical services	other 54	6,312		83		372		587		633		540		182		629		1,441		88		1,755	
Health care services	621–23	2,265		695		0 - 171		181		150		532		3 - 271		438		1		0 - 267		0 - 268	

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067	23	0 - 173	2 - 191	8 - 519	0 - 305	0 - 1,264 i	10 - 570	11 - 958 i	359 - 793	0 - 13,640

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 12

Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
All industries	21–23, 31–33, 42–81	492,956		32,239		74,031		386,686	
Manufacturing industries	31–33	285,674		22,701		45,769		217,203	
Food	311	4,180		226		801		3,152	
Beverage and tobacco products	312	1,082		96		228		757	
Textile, apparel, and leather products	313–16	904		74		128		703	
Wood products	321	186		26		22		138	
Paper	322	1,064		131 - 133	i	271 - 273		659	
Printing and related support activities	323	420	i	24	i	70	i	325	
Petroleum and coal products	324	1,306		237		425		644	
Chemicals	325	97,063		13,869		19,120		64,075	
Basic chemicals	3251	2,360		261		736		1,362	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		191		293		688	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		469		656		696 - 722	
Pharmaceuticals and medicines	3254	87,619		12,766		16,713		58,139	
Soap, cleaning compound, and toilet preparation	3256	2,760		104		460		2,196	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		77		261		966 - 995	
Plastics and rubber products	326	2,856		156		445		2,254	
Nonmetallic mineral products	327	1,508	i	172	i	250	i	1,086	i
Primary metals	331	665		51		117		497	
Fabricated metal products	332	2,885		179		608		2,099	
Machinery	333	15,184		704		1,696		12,784	
Agricultural implement	33311	1,921		124		243		1,554	
Semiconductor machinery	333242	4,459		106		395		3,958	
Engine, turbine, and power transmission equipment	3336	1,301		47		142	i	1,112	
Other machinery	other 333	7,503		426		916		6,160	
Computer and electronic products	334	86,729		2,175		11,587		72,967	
Communications equipment	3342	12,595		355		1,410		10,830	
Semiconductor and other electronic components	3344	35,183	i	776		3,876	i	30,531	i
Navigational, measuring, electromedical, and control instruments	3345	17,562		660		2,950		13,952	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		124	i	975	i	2,242	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		187		1,340		8,136	
Other measuring and controlling device	other 3345	4,558		350		634		3,574	
Other computer and electronic products	other 334	21,388		383	i	3,352		17,654	
Electrical equipment, appliances, and components	335	5,263		370		713		4,179	
Transportation equipment	336	45,375		3,486	i	7,332	i	34,557	i
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		1,324 - 1,388		4,498 - 4,563	i	18,230	i
Aerospace products and parts	3364	18,358	i	2,041	i	2,543	i	13,774	
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	2,034	i	2,517	i	12,339	i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		7		25		1,435	
Military armored vehicle, tank, and tank component	336992	35		*		0 - 11		24 - 36	
Other transportation	other 336	2,865		58 - 122	i	215 - 291		2,516 - 2,529	
Furniture and related products	337	409		40		73		296	

TABLE 12

Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
Miscellaneous	339	18,596		675 - 693		1,873 - 1,891		16,031	
Medical equipment and supplies	3391	16,014		480		1,560		13,973	
Other miscellaneous manufacturing	3399	2,582		195 - 212		313 - 330		2,058	
Nonmanufacturing industries	21–23, 42–81	207,283		9,538		28,262		169,483	
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		248		633		1,837	
Utilities	22	275		38		79		158	
Wholesale trade	42	1,191		99		140		952	i
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	23		2,777 - 3,677	i	42 - 13,018	i
Transportation and warehousing	48–49	9,890	i	218	i	899	i	8,774	i
Information	51	110,227		3,816		8,690		97,721	
Publishing	511	33,019		1,112		1,821		30,087	
Newspaper, periodical, book, and directory publishers	5111	61		1		2		58	
Software publishers	5112	32,958		1,111		1,818		30,029	
Telecommunications	517	3,733		266		1,567	i	1,899	
Data processing, hosting, and related services	518	30,558		1,727		2,806		26,024	
Other information	other 51	42,917		711		2,495		39,710	
Finance and insurance	52	8,917		289		1,223		7,405	
Real estate and rental and leasing	53	1,371		270		415		686	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		3		39		3	i
Other real estate and rental and leasing	other 53	1,326		267		377		683	
Professional, scientific, and technical services	54	53,233		4,161		11,731		37,341	
Architectural, engineering, and related services	5413	4,207		303		1,373		2,531	
Computer systems design and related services	5415	21,046		1,498		3,521		16,028	
Scientific research and development services	5417	21,669		1,847		5,536		14,286	i
Research and development in biotechnology	541711	6,457		845		495		5,117	i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	581		4,809		9,056	i
Research and development in the social sciences and humanities	541720	766		421		232	i	113	i
Other professional, scientific, and technical services	other 54	6,312		513	i	1,302	i	4,497	
Health care services	621–23	2,265		184		770		1,311	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067		191		6 - 907		281 - 13,261	
All companies (number of domestic employees)	–	492,956		32,239		74,031		386,686	
Small companies									
10–19[a]	–	5,501		377		1,116		4,008	
20–49	–	12,418		931		2,888		8,600	
Medium companies									
50–99	–	14,021		1,230		3,013		9,777	
100–249	–	19,793		1,833		3,517		14,444	
Large companies									
250–499	–	18,883		1,261		3,483		14,138	
500–999	–	23,969		1,788		4,040		18,141	
1,000–4,999	–	75,671		7,044		13,479		55,147	
5,000–9,999	–	50,811		2,900		7,845		40,066	
10,000–24,999	–	88,263		5,072		12,407		70,785	

TABLE 12

Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
25,000 or more	–	183,626	9,804	22,242	151,579

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2019

(Millions of U.S. dollars)

State	Total		Paid for by the company		Paid for by others					
					Total		Federal		Nonfederal	
All states	492,956		428,968		63,989		21,941		42,048	
Alabama	2,423		1,191		1,232		1,155		77	
Alaska	49		41		8		4		5	
Arizona	6,403		4,570		1,832		1,106		726	
Arkansas	461		397		64		28		36	
California	171,961		158,850		13,111		4,713	i	8,397	
Colorado	6,070		5,208		862		598		264	
Connecticut	7,421		6,171		1,250		892		357	
Delaware	2,156		1,436		720		5		715	
District of Columbia	412		277		135		111		23	
Florida	7,259		5,611		1,648		870		778	
Georgia	4,844		3,924		920	i	97	i	822	i
Hawaii	159		86		73		19		54	
Idaho	2,697		2,608		89		6	i	83	
Illinois	14,112		13,383		729		74		655	
Indiana	7,952		6,895		1,057		130		927	
Iowa	3,087	i	2,285		802	i	641	i	161	i
Kansas	2,748		1,857		891	i	11		880	i
Kentucky	1,481		939		541		216		325	
Louisiana	703		534		168		121		48	
Maine	417		373		44		14	i	30	
Maryland	5,852		4,248		1,604		1,042		563	
Massachusetts	30,843		25,955		4,888		1,170		3,718	
Michigan	21,283		18,918		2,364		237		2,127	
Minnesota	8,026		7,547		479		101		378	
Mississippi	324		276		48		19		30	i
Missouri	6,344		4,150		2,194	i	2,036	i	157	i
Montana	205		176		29		11		17	
Nebraska	795		735		60		11		49	
Nevada	1,045		829		216		34		183	
New Hampshire	2,541		1,036		1,505		1,333		171	
New Jersey	20,390		16,648		3,742		195		3,547	
New Mexico	637		391		245		202		43	
New York	20,180		17,968		2,212		759	i	1,453	
North Carolina	13,249		9,188		4,061	i	140		3,920	i
North Dakota	349		340		9		2	e	7	
Ohio	10,642		7,087		3,555	i	765		2,789	i
Oklahoma	1,067		956		111	i	41	i	70	
Oregon	7,890		7,606		284		54		230	
Pennsylvania	15,245		13,353		1,892	i	219		1,673	i
Rhode Island	715		664		52		36		16	
South Carolina	1,784		1,527		257		86		171	
South Dakota	194		170		24		4		20	
Tennessee	1,663		1,381		282		55		228	
Texas	23,906		20,916		2,990		772		2,219	
Utah	2,857		2,463		394		78	i	316	
Vermont	244		218		26		7		19	
Virginia	6,061		4,276		1,785		1,324		461	i
Washington	37,330		35,823		1,507		252	i	1,255	

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2019

(Millions of U.S. dollars)

State	Total		Paid for by the company		Paid for by others					
					Total		Federal		Nonfederal	
West Virginia	246	i	219	i	27		10		17	
Wisconsin	6,517		5,679		837		97		741	
Wyoming	686		670		16		5		11	
Undistributed[a]	1,034		916		117		34		84	

e = > 50% of value is modeled—see Technical Notes; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

Note(s):
Detail may not add to total because of rounding. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2019

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code		Total		Paid for by the company		Paid for by others	
All locations			492,956		428,968		63,989	
San Jose-Sunnyvale-Santa Clara, CA	41940		75,055		70,610		4,445	
San Francisco-Oakland-Berkeley, CA	41860		58,258		56,280		1,977	
Seattle-Tacoma-Bellevue, WA	42660		36,265		34,861		1,404	
New York-Newark-Jersey City, NY-NJ-PA	35620		32,146		28,458		3,688	i
Boston-Cambridge-Newton, MA-NH	14460		28,368		23,938		4,430	
Los Angeles-Long Beach-Anaheim, CA	31080		17,180	i	13,837	i	3,343	i
Detroit-Warren-Dearborn, MI	19820		16,206		14,852		1,354	
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980		13,995		11,676		2,318	
San Diego-Chula Vista-Carlsbad, CA	41740		13,410		11,183		2,227	i
Chicago-Naperville-Elgin, IL-IN-WI	16980		11,718		11,069		648	
Austin-Round Rock-Georgetown, TX	12420		8,966	i	8,004	i	962	
Dallas-Fort Worth-Arlington, TX	19100		7,835	i	6,566		1,269	i
Portland-Vancouver-Hillsboro, OR-WA	38900		7,517		7,325		192	
Minneapolis-St. Paul-Bloomington, MN-WI	33460		7,276		6,794		482	
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900		7,272		5,016		2,256	
Indianapolis-Carmel-Anderson, IN	26900		5,513		4,628		885	
Durham-Chapel Hill, NC	20500		5,378	i	3,560		1,818	i
Houston-The Woodlands-Sugar Land, TX	26420		5,370		4,788		582	
St. Louis, MO-IL	41180		5,358		3,213		2,145	i
Phoenix-Mesa-Chandler, AZ	38060		4,333	i	3,534	i	798	i
Cincinnati, OH-KY-IN	17140		4,091		2,801		1,290	i
Atlanta-Sandy Springs-Alpharetta, GA	12060		3,934		3,109		826	i
Norwich-New London, CT	35980		3,877		2,960		917	
Raleigh-Cary, NC	39580		3,677		2,208		1,469	i
Trenton-Princeton, NJ	45940		2,699		1,271		1,427	
Kansas City, MO-KS	28140		2,617		1,744		874	i
Oxnard-Thousand Oaks-Ventura, CA	37100		2,616		2,222		394	i
Denver-Aurora-Lakewood, CO	19740		2,600		2,413		187	
Boise City, ID	14260		2,485		2,417		69	
Milwaukee-Waukesha, WI	33340		2,347		2,271		76	
Tampa-St. Petersburg-Clearwater, FL	45300		2,241		1,601		640	i
Baltimore-Columbia-Towson, MD	12580		2,210		1,614		596	
Madison, WI	31540		2,158		1,573		585	i
Miami-Fort Lauderdale-Pompano Beach, FL	33100		2,131		1,871		259	i
Columbus, OH	18140		2,127	i	882		1,245	i
Sacramento-Roseville-Folsom, CA	40900		2,110	i	1,935	i	175	
Manchester-Nashua, NH	31700		1,903		504		1,399	
Boulder, CO	14500		1,645		1,513		131	
Cleveland-Elyria, OH	17460		1,638		1,409		229	
Providence-Warwick, RI-MA	39300		1,626	i	1,560	i	66	
Tucson, AZ	46060		1,624	i	640	i	984	i
Bridgeport-Stamford-Norwalk, CT	14860		1,619		1,383		236	
Pittsburgh, PA	38300		1,606		1,497		109	i
Worcester, MA-CT	49340		1,579		1,126		453	
Huntsville, AL	26620		1,505		354		1,151	
Salt Lake City, UT	41620		1,288		1,097		191	i
Charlotte-Concord-Gastonia, NC-SC	16740		1,284	i	1,147	i	137	i
Kalamazoo-Portage, MI	28020		1,164		849		315	
Cedar Rapids, IA	16300		1,113	i	367	i	746	i

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2019

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total		Paid for by the company		Paid for by others	
New Haven-Milford, CT	35300	1,102		1,077		25	
Albany-Schenectady-Troy, NY	10580	1,036		777		259	i
Provo-Orem, UT	39340	1,033		941		92	
Orlando-Kissimmee-Sanford, FL	36740	1,031	i	772	i	259	i
Rochester, NY	40380	965		874		91	i
Akron, OH	10420	892		683		209	i
Corning, NY	18500	885	i	882	i	3	i
Grand Rapids-Kentwood, MI	24340	883		616		266	
Peoria, IL	37900	868	i	856	i	12	i
Riverside-San Bernardino-Ontario, CA	40140	790		716		74	i
Richmond, VA	40060	788	i	638	i	151	i
Lancaster, PA	29540	759	i	699	i	61	i
Santa Maria-Santa Barbara, CA	42200	757	i	522		234	i
Greensboro-High Point, NC	24660	752	i	710	i	41	
Columbus, IN	18020	704		621		84	
Allentown-Bethlehem-Easton, PA-NJ	10900	703		660		43	
Fort Collins, CO	22660	693	i	654	i	39	
Hartford-East Hartford-Middletown, CT	25540	692		630		63	
Las Vegas-Henderson-Paradise, NV	29820	657		619		38	
Wilmington, NC	48900	654	i	183	i	471	i
Des Moines-West Des Moines, IA	19780	628	i	610	i	17	i
Cheyenne, WY	16940	622	i	622	i	1	e
Ann Arbor, MI	11460	614		368		245	
Omaha-Council Bluffs, NE-IA	36540	605		559		45	i
Louisville-Jefferson County, KY-IN	31140	593		331		262	
Colorado Springs, CO	17820	583	i	507	i	76	
Palm Bay-Melbourne-Titusville, FL	37340	576	i	319		257	i
Buffalo-Cheektowaga, NY	15380	574	i	385		189	i
San Antonio-New Braunfels, TX	41700	568	i	480	i	89	
Santa Rosa-Petaluma, CA	42220	564		547		16	i
Dayton-Kettering, OH	19430	541		286		255	
Wichita, KS	48620	537		517		19	
Charleston-North Charleston, SC	16700	534		390		143	
Albuquerque, NM	10740	531		301		230	
Jacksonville, FL	27260	513	i	473	i	41	i
Bloomington, IL	14010	510		491		19	i
Syracuse, NY	45060	480	i	411	i	69	i
Virginia Beach-Norfolk-Newport News, VA-NC	47260	464		313		151	
Nashville-Davidson-Murfreesboro-Franklin, TN	34980	460	i	319		142	i
Pueblo, CO	39380	436		14	i	422	
Davenport-Moline-Rock Island, IA-IL	19340	428		425		3	e
Memphis, TN-MS-AR	32820	421	i	396		25	i
Winston-Salem, NC	49180	419	i	405	i	14	
Oshkosh-Neenah, WI	36780	384		381		3	i
Ogden-Clearfield, UT	36260	378		282		96	
Niles, MI	35660	370		363		7	
Greenville-Anderson, SC	24860	367		343		25	i
Waterloo-Cedar Falls, IA	47940	361		361		1	e
Portland-South Portland, ME	38860	356	i	315	i	41	i
Oklahoma City, OK	36420	347		286		61	i

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2019

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code		Total		Paid for by the company		Paid for by others	
Salisbury, MD-DE	41540		337	i	324	i	13	i
All other CBSAs			26,625		22,937		3,688	
Locations outside a CBSA			2,620		2,327		293	i
Undistributed[a]			1,034		916		117	

e = > 50% of value is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Includes data reported that were not allocated to a specific location by multi-establishment companies. For single-establishment companies, data reported were allocated to the location in the address used to mail the survey form.

Note(s):
Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by the Office of Management and Budget in the Executive Office of the President.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 15

Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
All industries	21–23, 31–33, 42–81	492,956		4,980		32,782		40,807		28,222		386,165	
Manufacturing industries	31–33	285,674		2,784		15,831		22,018		17,938		227,103	
Food	311	4,180		172		613		639		636		2,119	i
Beverage and tobacco products	312	1,082		42		84		60		285		611	
Textile, apparel, and leather products	313–16	904		51		221		246		220		166	
Wood products	321	186		19		86		81		0		0	
Paper	322	1,064		12		133		86		0		832	
Printing and related support activities	323	420	i	26		284		110	i	0		0	
Petroleum and coal products	324	1,306		13		74		105		50 - 372		740 - 1,066	
Chemicals	325	97,063		360		2,952		7,310		7,057		79,384	
Basic chemicals	3251	2,360		46		376		665		521		752	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		0 - 164		162		139		50 - 70		636 - 823	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		0 - 25		80		84		0		1,658	
Pharmaceuticals and medicines	3254	87,619		75		1,933		5,847		6,243		73,521	
Soap, cleaning compound, and toilet preparation	3256	2,760		76		179		172		107		2,227	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		0 - 165		223		403		114 - 138		401 - 592	
Plastics and rubber products	326	2,856		165		768		819		277		827	
Nonmetallic mineral products	327	1,508	i	36		149		223		86		1,014	i
Primary metals	331	665		33		248		304		80		0	
Fabricated metal products	332	2,885		458		1,137		645		457		189	
Machinery	333	15,184		416		2,240		2,173		1,448		8,906	
Agricultural implement	33311	1,921		46		130		134		193		1,419	
Semiconductor machinery	333242	4,459		5		122		218		243		3,870	
Engine, turbine, and power transmission equipment	3336	1,301		19	i	137		174		71		900	
Other machinery	other 333	7,503		346		1,851		1,648		941		2,717	
Computer and electronic products	334	86,729		378		2,787		3,691		2,927		76,946	
Communications equipment	3342	12,595		49		385		602		654		10,905	
Semiconductor and other electronic components	3344	35,183	i	60		916		1,354		1,116		31,736	i
Navigational, measuring, electromedical, and control instruments	3345	17,562		221		1,233		1,409		472		14,227	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		36		310		594		154		2,248	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		32		197		294		55		9,084	
Other measuring and controlling device	other 3345	4,558		153		727		520		263		2,895	
Other computer and electronic products	other 334	21,388		49		253		325		684		20,078	
Electrical equipment, appliances, and components	335	5,263		211		580		919		934		2,619	
Transportation equipment	336	45,375		110		1,703		2,402		1,973		39,186	

TABLE 15

Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		84		761		1,579		1,207		20,485	
Aerospace products and parts	3364	18,358	i	3 - 27		709		559		603 - 629		16,459	i
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	0 - 23		436		362		603 - 629		15,466	i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		4		273	i	197		0		993	
Military armored vehicle, tank, and tank component	336992	35		1		34		0		0		0	
Other transportation	other 336	2,865		0 - 23		199		264		137 - 162		2,242	
Furniture and related products	337	409		31		128		250		0		0	
Miscellaneous	339	18,596		251		1,643		1,954		1,191 - 1,513		13,233 - 13,558	
Medical equipment and supplies	3391	16,014		119		1,164		1,420		1,142		12,169	
Other miscellaneous manufacturing	3399	2,582		132		479		534		50 - 372		1,064 - 1,389	
Nonmanufacturing industries	21–23, 42–81	207,283		2,196		16,951		18,790		10,284		159,062	
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		26		359		91 - 1,808		0		524 - 2,242	
Utilities	22	275		0 - 31		65		131		50 - 81		0	
Wholesale trade	42	1,191		420		771		0		0		0	
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	14		68		10 - 1,726		50 - 317		1,005 - 15,677	i
Transportation and warehousing	48–49	9,890	i	19		115		488		101		9,167	i
Information	51	110,227		402		5,115		6,306		6,529		91,875	
Publishing	511	33,019		206		1,660		1,409		1,043		28,701	
Newspaper, periodical, book, and directory publishers	5111	61		5		18		38		0		0	
Software publishers	5112	32,958		201		1,642		1,372		1,043		28,701	
Telecommunications	517	3,733		39		145		504		90		2,954	
Data processing, hosting, and related services	518	30,558		121		2,817		3,867		4,921		18,833	
Other information	other 51	42,917		36		493		525		475		41,387	
Finance and insurance	52	8,917		14		323		1,313		373		6,893	
Real estate and rental and leasing	53	1,371		10		17		64		0		1,280	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4	i	6		35		0		0	
Other real estate and rental and leasing	other 53	1,326		6		11		30		0		1,280	
Professional, scientific, and technical services	54	53,233		1,176		7,868		8,061		2,697		33,432	
Architectural, engineering, and related services	5413	4,207		287		1,522		990		511		897	
Computer systems design and related services	5415	21,046		648		2,856		2,488		520		14,535	
Scientific research and development services	5417	21,669		115		2,563		3,201		1,281		14,509	i
Research and development in biotechnology	541711	6,457		26		656		800		307		4,668	

TABLE 15

Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	87		1,870		2,321		974		9,193	i
Research and development in the social sciences and humanities	541720	766		1		37		80		0		647	
Other professional, scientific, and technical services	other 54	6,312		126	i	927		1,382		385		3,491	
Health care services	621–23	2,265		43		1,186		602		50 - 317		116 - 386	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067		37 - 77		1,064		10 - 1,726		170		100 - 12,787	
All companies (number of domestic employees)	–	492,956		4,980		32,782		40,807		28,222		386,165	
Small companies													
10–19[a]	–	5,501		1,111		3,875		369		146		0	
20–49	–	12,418		1,720		7,822		2,641		235		0	
Medium companies													
50–99	–	14,021		987		5,528		5,857		1,171		478	
100–249	–	19,793		695		7,182		7,478		3,198		1,240	
Large companies													
250–499	–	18,883		295		3,412		6,209		4,127		4,840	
500–999	–	23,969		95		2,133		5,944		5,704		10,094	
1,000–4,999	–	75,671		71		2,335		8,527		9,302		55,436	
5,000–9,999	–	50,811		2		161		2,001		1,935		46,711	
10,000–24,999	–	88,263		2		232		1,190		1,572		85,267	
25,000 or more	–	183,626		1		103		590		832		182,100	

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
All business activities	21100–81000	492,956		428,968		63,989	
Oil and gas extraction	21100	712		687		24	
Mining	21200	122		94		28	
Support activities for mining, including oil and gas	21300	1,364		1,268	i	96	
Utilities	22100	274		236		38	
Construction	23000	886		859		26	
Food manufacturing	31100	4,199 - 6,169		4,200		0 - 1,969	
Beverage manufacturing	31210	653		551		102	
Tobacco manufacturing	31220	189		180		9	
Textile, apparel, and leather products manufacturing	31990	831		802		29	i
Wood products manufacturing	32100	232		225		6	
Paper manufacturing	32200	1,478		1,478		*	
Printing and related support activities	32300	447		447		0	
Petroleum refineries	32401	525 - 2,495		526		0 - 1,969	
Asphalt paving, roofing, and saturated materials manufacturing	32402	110		110		0	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	106 - 2,076		107		0 - 1,969	
Basic chemicals manufacturing	32510	2,639		2,459		180	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,293		1,203		90	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,094		1,736		359	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	56,018		50,038		5,980	
In vitro diagnostic substances manufacturing	32542	1,388		1,354		34	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	28,850		26,005		2,845	
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,311 - 4,281		2,312		0 - 1,969	
Paint, adhesive, and other chemical manufacturing	32592	1,423		1,372		51	
Plastics and rubber products manufacturing	32600	2,997		2,909		88	
Clay and glass products manufacturing	32710	1,326	i	1,318	i	9	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	439		417		23	
Primary metal manufacturing	33100	743		720		24	i
Fabricated metal products manufacturing	33200	2,816 - 4,786		2,817		0 - 1,969	
Agricultural machinery and equipment manufacturing	33311	1,550		1,542		8	
Construction machinery manufacturing	33312	1,276		1,273		3	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,104		1,060		44	
Semiconductor machinery manufacturing	33321	4,396		3,790		606	
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,387		1,150		237	
Photographic and photocopying equipment manufacturing	33331	162		148		14	i
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,712		1,557		156	
Digital cameras manufacturing	33333	415		411		4	
Engine, turbine, and power transmission equipment manufacturing	33360	2,551		2,233		318	
Metalworking and other general purpose machinery manufacturing	33390	2,396		2,181		215	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	20,122		19,990		132	

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	8,495		8,450		46	
Radio, television, and wireless communication equipment manufacturing	33422	2,589	i	1,628	i	961	i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,781		1,522		259	i
Audio and video equipment manufacturing	33430	1,292		1,285		7	
Semiconductor and other electronic components manufacturing	33440	35,730		32,537		3,194	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,982		3,764		219	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	7,870		2,857		5,013	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,855		3,670		185	
Electrical equipment, appliances, and components manufacturing	33500	5,229		4,819		410	
Motor vehicles manufacturing	33610	15,268		13,564		1,704	i
Motor vehicle body and trailer manufacturing	33620	155		155		0	
Motor vehicle parts manufacturing	33630	8,030	i	6,715		1,315	i
Aircraft manufacturing	33641	10,720	i	5,087		5,633	i
Aircraft engine and engine parts manufacturing	33642	2,104		1,082		1,022	
Other aircraft parts and auxiliary equipment manufacturing	33643	1,434		1,079		355	
Guided missiles, space vehicles, and related parts manufacturing	33644	3,496		954		2,542	
Railroad rolling stock manufacturing	33651	210 - 2,180	i	211	i	0 - 1,969	
Ship and boat building	33660	182 - 2,152		183		0 - 1,969	
Motorcycle, bicycle, and parts manufacturing	33691	367		367		*	
Military armored vehicle, tank, and tank components manufacturing	33692	541		298		243	
All other transportation equipment manufacturing	33699	465		456		9	
Furniture and related products manufacturing	33700	458		450		8	
Medical equipment and supplies manufacturing	33910	14,759		14,538		222	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,558		2,516		42	
Merchant wholesalers, durable goods	42300	756		659		97	
Merchant wholesalers, nondurable goods	42400	945		926		19	
Wholesale electronic markets and agents and brokers (business to business)	42500	37	i	33	i	4	
Retail trade (except electronic shopping and electronic auctions)	44000	280		280		*	
Electronic shopping and electronic auctions	45411	0 - 13,286	i	0 - 11,353	i	0 - 1,969	
Transportation	48000	9,398	i	9,016	i	382	
Couriers, messengers, and express delivery services	49200	290		290		0	
Warehousing and storage	49300	128	i	124	i	4	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	84		84		*	
Software publishers (except Internet)	51120	24,851		24,104		747	
Motion picture and sound recording (except Internet)	51200	72		53		19	
Broadcasting (except Internet)	51500	0 - 2,469		0 - 501		0 - 1,969	
Wired telecommunications carriers	51710	424		416		8	
Wireless telecommunications carriers (except satellite)	51720	2,306		2,271		35	
Satellite telecommunications	51740	475		470		6	
Other telecommunications (not listed elsewhere)	51790	492		459		33	
Data processing, hosting, and related services	51800	8,994		8,836		158	i
Cloud computing applications and Internet-based software services	51801	27,957		27,617		340	

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	46,100 - 48,070		46,101		0 - 1,969	
Finance: banking and credit intermediation	52200	4,924		4,923		1	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,445		1,418		27	
Insurance carriers and related activities	52400	2,202		2,202		0	
Real estate	53100	396		396		0	
Rental and leasing services	53200	945		945		0	
Lessors of nonfinancial intangible assets, including patent licensing	53300	59		58		*	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,979		1,979		0	
Architectural, engineering, and related services	54130	4,474		2,569		1,905	
Specialized design services	54140	163		112		51	
Computer systems design and related services	54150	19,667		17,324		2,343	
Management, scientific, and technical consulting services	54160	2,842		1,897		945	
Research and development services in social sciences and humanities	54172	764		27		736	
Research and development services in biotechnology	54173	5,648		953		4,695	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	15,171	i	2,569		12,603	i
Advertising and related services	54180	1,106	i	1,101	i	6	
Professional, scientific, and technical services (not listed elsewhere)	54190	1,646		1,142		504	
Management of companies and enterprises	55100	0 - 13,286		0 - 11,353		0 - 1,969	
Administrative and support services	56100	3,285		3,263		22	
Waste management and remediation services	56200	20		17		3	
Offices of physicians	62110	508		196		312	
Medical and diagnostic laboratories	62150	2,466		1,860		605	
Other ambulatory health care services (ambulance, dental, home health care)	62199	148		147		1	
Hospitals and nursing care facilities	62200	0 - 11,355		0 - 11,353		1	i
Social assistance services	62400	0 - 11,353		0 - 11,353		0	
Arts, entertainment, and recreation	71000	415		415		0	
Accommodation and food services	72000	80		80		0	
Other services (not listed elsewhere)	81000	660		380		280	
Undistributed	–	0		0		0	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

Note(s):

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 17

Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
All industries	21–23, 31–33, 42–81	492,956		4.4	4.6
Manufacturing industries	31–33	285,674		5.0	5.1
Food	311	4,180		0.7	0.7
Beverage and tobacco products	312	1,082		0.6	0.6
Textile, apparel, and leather products	313–16	904		1.4	1.4
Wood products	321	186		0.5	0.5
Paper	322	1,064		1.2	1.2
Printing and related support activities	323	420	i	0.7	0.7
Petroleum and coal products	324	1,306		0.5	0.5
Chemicals	325	97,063		8.4	8.4
Basic chemicals	3251	2,360		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		1.8	1.8
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		D	D
Pharmaceuticals and medicines	3254	87,619		16.3	16.4
Soap, cleaning compound, and toilet preparation	3256	2,760		2.4	2.4
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		D	D
Plastics and rubber products	326	2,856		1.4	1.4
Nonmetallic mineral products	327	1,508	i	2.7	3.3
Primary metals	331	665		0.5	0.5
Fabricated metal products	332	2,885		2.2	2.2
Machinery	333	15,184		4.2	4.2
Agricultural implement	33311	1,921		4.1	4.1
Semiconductor machinery	333242	4,459		18.1	18.1
Engine, turbine, and power transmission equipment	3336	1,301		3.6	3.6
Other machinery	other 333	7,503		2.9	3.0
Computer and electronic products	334	86,729		12.8	12.8
Communications equipment	3342	12,595		14.3	14.3
Semiconductor and other electronic components	3344	35,183	i	17.0	17.0
Navigational, measuring, electromedical, and control instruments	3345	17,562		9.6	9.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		11.2	11.2
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		12.7	12.7
Other measuring and controlling device	other 3345	4,558		5.9	5.9
Other computer and electronic products	other 334	21,388		10.7	10.7
Electrical equipment, appliances, and components	335	5,263		3.7	3.7
Transportation equipment	336	45,375		3.9	4.1
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		3.0	3.2
Aerospace products and parts	3364	18,358	i	6.5	6.5
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	6.2	6.2
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		17.2	17.2
Military armored vehicle, tank, and tank component	336992	35		3.6	3.6
Other transportation	other 336	2,865		3.7	3.7
Furniture and related products	337	409		1.0	1.0

TABLE 17

Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
Miscellaneous	339	18,596		5.3	5.3
Medical equipment and supplies	3391	16,014		6.5	6.5
Other miscellaneous manufacturing	3399	2,582		2.5	2.5
Nonmanufacturing industries	21–23, 42–81	207,283		3.8	4.1
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		1.5	1.5
Utilities	22	275		0.1	0.1
Wholesale trade	42	1,191		0.9	1.0
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	D	D
Transportation and warehousing	48–49	9,890	i	3.5	3.5
Information	51	110,227		7.7	7.8
Publishing	511	33,019		17.6	17.7
Newspaper, periodical, book, and directory publishers	5111	61		5.6	5.9
Software publishers	5112	32,958		17.7	17.8
Telecommunications	517	3,733		0.7	0.7
Data processing, hosting, and related services	518	30,558		6.4	6.4
Other information	other 51	42,917		16.6	17.4
Finance and insurance	52	8,917		0.6	0.7
Real estate and rental and leasing	53	1,371		14.8	14.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,326		16.1	16.1
Professional, scientific, and technical services	54	53,233		10.9	11.0
Architectural, engineering, and related services	5413	4,207		4.1	4.2
Computer systems design and related services	5415	21,046		10.7	10.8
Scientific research and development services	5417	21,669		26.7	26.8
Research and development in biotechnology	541711	6,457		20.7	20.7
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	29.7	29.9
Research and development in the social sciences and humanities	541720	766		63.9	65.2
Other professional, scientific, and technical services	other 54	6,312		6.0	6.0
Health care services	621–23	2,265		1.7	1.7
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067		D	D
All companies (number of domestic employees)	–	492,956		4.4	4.6
Small companies					
10–19[c]	–	5,501		24.7	25.2
20–49	–	12,418		11.4	11.6
Medium companies					
50–99	–	14,021		11.6	11.9
100–249	–	19,793		7.4	7.5
Large companies					
250–499	–	18,883		6.3	6.4
500–999	–	23,969		6.5	6.5
1,000–4,999	–	75,671		5.1	5.2

TABLE 17

Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)	Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
5,000–9,999	–	50,811	4.4	4.6
10,000–24,999	–	88,263	4.2	4.3
25,000 or more	–	183,626	3.5	3.8

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 18

Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers only[b]
All industries	21–23, 31–33, 42–81	538,835		4.8	5.1
Manufacturing industries	31–33	326,235		5.7	5.8
Food	311	4,373		0.8	0.8
Beverage and tobacco products	312	1,260		0.8	0.8
Textile, apparel, and leather products	313–16	920		1.4	1.4
Wood products	321	197		0.5	0.5
Paper	322	1,068		1.2	1.2
Printing and related support activities	323	426	i	0.7	0.7
Petroleum and coal products	324	1,553 - 1,656		D	D
Chemicals	325	127,629		11.0	11.0
Basic chemicals	3251	2,424		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,196 - 1,245		D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	2,034 - 2,038		D	2.4
Pharmaceuticals and medicines	3254	117,494		21.9	22.0
Soap, cleaning compound, and toilet preparation	3256	3,082		2.7	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	1,347 - 1,400		D	D
Plastics and rubber products	326	2,937		1.5	1.5
Nonmetallic mineral products	327	1,532	i	2.8	3.3
Primary metals	331	682		0.6	0.6
Fabricated metal products	332	2,941		2.3	2.3
Machinery	333	15,657		4.3	4.3
Agricultural implement	33311	2,120		4.5	4.5
Semiconductor machinery	333242	4,502		18.2	18.2
Engine, turbine, and power transmission equipment	3336	1,334		3.6	3.6
Other machinery	other 333	7,701		3.0	3.0
Computer and electronic products	334	89,340		13.2	13.2
Communications equipment	3342	13,564 - 13,567		D	15.5
Semiconductor and other electronic components	3344	35,601		17.2	17.3
Navigational, measuring, electromedical, and control instruments	3345	18,432		10.1	10.1
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,469		11.6	11.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,259		13.5	13.5
Other measuring and controlling device	other 3345	4,704		6.1	6.1
Other computer and electronic products	other 334	21,740 - 21,743		D	10.8
Electrical equipment, appliances, and components	335	5,388		3.8	3.8
Transportation equipment	336	50,457		4.3	4.5
Motor vehicles, bodies, trailers, and parts	3361–63	27,653		3.4	3.7
Aerospace products and parts	3364	19,849		7.1	7.1
Aircraft, aircraft engine, and aircraft parts	336411–13	18,264	i	6.7	6.7
Guided missile, space vehicle, and related parts	336414–15, 336419	1,585		18.6	18.6
Military armored vehicle, tank, and tank component	336992	35		3.6	3.6
Other transportation	other 336	2,920		3.7	3.7
Furniture and related products	337	432		1.1	1.1

TABLE 18

Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers only[b]	
Miscellaneous	339	19,337 - 19,436		D		D	
Medical equipment and supplies	3391	16,755		6.8		6.8	
Other miscellaneous manufacturing	3399	2,582 - 2,680		D		D	
Nonmanufacturing industries	21–23, 42–81	212,601		3.9		4.2	
Mining, quarrying, oil and gas extraction, and support activities	21	2,840		1.6		1.6	
Utilities	22	458		0.1		0.2	
Wholesale trade	42	1,241		1.0		1.0	
Electronic shopping and electronic auctions	454111–12	3,255 - 15,944	i	D		D	
Transportation and warehousing	48–49	9,933	i	3.5		3.5	
Information	51	112,359		7.8		7.9	
Publishing	511	34,064		18.2		18.3	
Newspaper, periodical, book, and directory publishers	5111	64		5.9		6.2	
Software publishers	5112	34,000		18.3		18.4	
Telecommunications	517	4,151		0.8		0.8	
Data processing, hosting, and related services	518	30,827		6.4		6.4	
Other information	other 51	43,317		16.8		17.5	
Finance and insurance	52	9,236		0.6		0.7	
Real estate and rental and leasing	53	1,378		14.9		14.9	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4		4.4	
Other real estate and rental and leasing	other 53	1,333		16.2		16.2	
Professional, scientific, and technical services	54	55,415		11.4		11.5	
Architectural, engineering, and related services	5413	4,672		4.6		4.6	
Computer systems design and related services	5415	21,221		10.8		10.8	
Scientific research and development services	5417	23,065		28.4		28.5	
Research and development in biotechnology	541711	6,693		21.4		21.4	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	15,485	i	31.8		32.0	
Research and development in the social sciences and humanities	541720	887		74.0		75.6	
Other professional, scientific, and technical services	other 54	6,458		6.1		6.1	
Health care services	621–23	2,335		1.7		1.7	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,465 - 14,154		D		D	
All companies (number of domestic employees)	–	538,835		4.8		5.1	
Small companies							
10–19[c]	–	6,158		27.7		28.1	
20–49	–	13,985		12.8		13.0	
Medium companies							
50–99	–	16,569		13.7		14.0	
100–249	–	22,054		8.3		8.3	
Large companies							
250–499	–	21,003		7.0		7.1	
500–999	–	26,280		7.1		7.2	

TABLE 18

Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)	Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers only[b]
1,000–4,999	–	82,404	5.6	5.7
5,000–9,999	–	57,005	5.0	5.2
10,000–24,999	–	99,260	4.7	4.8
25,000 or more	–	194,117	3.7	4.0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 19

Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D															
				Total				Paid for by the company				Paid for by others							
												Total				Federally funded			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270	492,956	12,450	i	200,859		11,640	i	189,553		1,440	i	11,306		710	i	5,089	i
Manufacturing industries	31–33	15,180	285,674	4,410	i	41,105		4,230	i	36,281		500	i	4,824	i	140	i	2,995	i
Food	311	870	4,180	80	i	45	i	80	i	41	i	10		4		0		0	
Beverage and tobacco products	312	350	1,082	20		1		20		1		0		0		0		0	
Textile, apparel, and leather products	313–16	240	904	50	i	60	i	50	i	60	i	0		0		0		0	
Wood products	321	80	186	20	i	8	i	20	i	8	i	0		0		0		0	
Paper	322	90	1,064	20	i	12	i	20	i	12	i	0		0		0		0	
Printing and related support activities	323	200	420	i	70	i	78	i	70	i	78	i	0		0		0		0	
Petroleum and coal products	324	80	1,306	10		10		10		10		0		0		0		0	
Chemicals	325	2,330	97,063	200	i	1,572		190	i	1,538		20		34		10		2	
Basic chemicals	3251	240	2,360	20		21		20		16		10		5		0		0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	10		8	i	10		8	i	0		0		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	20	i	973		20	i	955		10		17		0		0	
Pharmaceuticals and medicines	3254	1,060	87,619	90		470		90		467		10		4		10		2	
Soap, cleaning compound, and toilet preparation	3256	270	2,760	10		17		10		9	i	10		8		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	70	i	84		70	i	84		10		*	i	10		*	i
Plastics and rubber products	326	790	2,856	80	i	75		80	i	75		0		0		0		0	
Nonmetallic mineral products	327	170	1,508	i	20	i	31	i	20	i	31	i	0		0		0		0	
Primary metals	331	200	665	40	i	30	i	40	i	30	i	0		0		0		0	
Fabricated metal products	332	1,840	2,885	390	i	311		360	i	284		30		27	i	0		0	
Machinery	333	2,240	15,184	810	i	1,631		770	i	1,552	i	60		80		10		34	
Agricultural implement	33311	190	1,921	60	i	249		60	i	249		10		1		10		*	
Semiconductor machinery	333242	80	4,459	60		365	i	40		348	i	30		17		0		0	
Engine, turbine, and power transmission equipment	3336	110	1,301	50	i	133		50	i	99	i	10		34		10		31	
Other machinery	other 333	1,880	7,503	650	i	884		640	i	856	i	20		28		10	i	3	i
Computer and electronic products	334	2,280	86,729	1,380	i	29,799		1,320	i	25,864		190	i	3,935	i	40		2,693	i
Communications equipment	3342	300	12,595	240	i	8,231	i	240	i	8,168	i	10		63		10		37	

TABLE 19

Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D																			
				Total				Paid for by the company				Paid for by others											
												Total				Federally funded							
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Semiconductor and other electronic components	3344	640	35,183	i	190	i	8,407		170	i	8,088		60	i	320		10	i	55	i
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562		760	i	7,037	i	730	i	3,544		120	i	3,493	i	30		2,583	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342		130	i	512	i	130	i	419	i	30	i	94		10		1	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662		140	i	5,192	i	130	i	1,853		30		3,339	i	30		2,580	i
Other measuring and controlling device	other 3345	740	4,558		500	i	1,332		490	i	1,272		60	i	60		10		2	
Other computer and electronic products	other 334	220	21,388		200	i	6,124		190	i	6,065		10		59		10		18	
Electrical equipment, appliances, and components	335	900	5,263		550	i	830		540	i	735		30	i	96		10	i	1	
Transportation equipment	336	1,090	45,375		260	i	3,881	i	250	i	3,262	i	130		619	i	90	i	265	i
Motor vehicles, bodies, trailers, and parts	3361–63	540	24,117		180	i	2,076		170	i	1,834		40	i	242	i	10		3	
Aerospace products and parts	3364	380	i	18,358	i	60		1,658	i	60		1,282	i	90		376	i	90	i	261	i
Aircraft, aircraft engine, and aircraft parts	336411–13	200	16,891	i	60		1,550	i	50		1,268	i	20		282		10		170	i
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10		108	i	10		14		80		95	i	80	i	90	i
Military armored vehicle, tank, and tank component	336992	30	35		0		0		0		0		0		0		0		0	
Other transportation	other 336	150	2,865		30		147	i	30		146	i	10		1		10		1	
Furniture and related products	337	190	409		50	i	66	i	50	i	66	i	0		0		0		0	
Miscellaneous	339	1,310	18,596		460	i	2,665		440	i	2,635		70	i	30		10		*	
Medical equipment and supplies	3391	790	16,014		370	i	2,004		350	i	1,974		70	i	30		10		*	
Other miscellaneous manufacturing	3399	520	2,582		90		661		90		661		0		0		0		0	
Nonmanufacturing industries	21–23, 42–81	13,100	207,283		8,050	i	159,754		7,420	i	153,272		940	i	6,482		570	i	2,094	
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717		30	i	951		30	i	943		10		8		10		*	
Utilities	22	40	275		20		45		20		45		0		0		0		0	
Wholesale trade	42	1,560	1,191		290	i	70	i	280	i	7 - 71	i	10	i	0 - 62	i	0		0	
Electronic shopping and electronic auctions	454111–12	60	3,131 - 15,818	i	50	i	1,298 - 15,375	i	50	i	1,293 - 15,375	i	10		0 - 61		0		0	
Transportation and warehousing	48–49	130	9,890	i	50		8,194	i	50		8,194	i	0		0		0		0	
Information	51	3,090	110,227		2,830		102,561		2,760		101,780		130		781		10		10 - 31	

TABLE 19

Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D																			
				Total				Paid for by the company				Paid for by others											
												Total				Federally funded							
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Publishing	511	1,080	33,019	1,020	i	29,191		980	i	28,813		70	i	378		10		7	
Newspaper, periodical, book, and directory publishers	5111	40	61	10		16		10		16		0		0		0		0	
Software publishers	5112	1,040	32,958	1,010	i	29,175		970	i	28,797		70	i	378		10		7	
Telecommunications	517	210	3,733	120	i	2,921	i	120	i	2,916	i	10		6		10		*	
Data processing, hosting, and related services	518	1,480	30,558	1,430		28,571		1,390		28,305		60		266		10		2 - 25	
Other information	other 51	340	42,917	280	i	41,878	i	270	i	41,746	i	10		131		0		0	
Finance and insurance	52	220	8,917	190		8,136		190		8,136		0		0		0		0	
Real estate and rental and leasing	53	50	1,371	20		1,216		20		1,216		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	10	i	7		10	i	7		0		0		0		0	
Other real estate and rental and leasing	other 53	30	1,326	10		1,209		10		1,209		0		0		0		0	
Professional, scientific, and technical services	54	6,500	53,233	4,380	i	22,977		3,830	i	17,344		800	i	5,633		560	i	2,064	
Architectural, engineering, and related services	5413	1,450	4,207	500	i	732	i	350	i	253		190	i	479	i	160	i	369	
Computer systems design and related services	5415	3,020	21,046	2,890	i	15,302		2,760	i	13,193		220	i	2,109		110	i	293	i
Scientific research and development services	5417	1,230	21,669	520	i	3,206	i	300	i	478		330	i	2,729	i	260	i	1,259	
Research and development in biotechnology	541711	310	6,457	50	i	76		40	i	44		40	i	32	i	30		11	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	i 460	i	3,091	i	270	i	430		290	i	2,661	i	230	i	1,213	
Research and development in the social sciences and humanities	541720	30	766	10		39		10		3		10		36		10		35	
Other professional, scientific, and technical services	other 54	810	6,312	490	i	3,736	i	440	i	3,420	i	70		316		40		143	i
Health care services	621–23	680	2,265	30		234	i	30		234	i	10		*		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	210	i	0 - 14,067		210	i	0 - 14,012		10		0 - 58		10		0 - 19	
All companies (number of domestic employees)	–	28,270	492,956	12,450	i	200,859		11,640	i	189,553		1,440	i	11,306		710	i	5,089	i
Small companies																			
10–19[c]	–	5,490	5,501	2,520	i	1,437	i	2,330	i	1,123	i	390	i	314	i	260	i	189	i
20–49	–	7,980	12,418	4,000	i	4,630		3,650	i	3,930		510	i	700		240	i	274	
Medium companies																			

TABLE 19

Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D															
				Total				Paid for by the company				Paid for by others							
												Total				Federally funded			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
50–99	–	4,960	14,021	2,060	i	3,716		1,960	i	3,107		160		609		80		296	
100–249	–	4,580	19,793	1,720	i	5,963		1,640	i	5,127		170	i	835		70	i	425	
Large companies																			
250–499	–	2,140	18,883	780		6,633		730		5,632		90		1,001	i	30		327	
500–999	–	1,230	23,969	510		8,157		500		7,714		40		443		20	i	64	i
1,000–4,999	–	1,330	75,671	590		31,404		580		30,165		50		1,239		20		504	
5,000–9,999	–	240	50,811	120		15,174	i	120		14,470	i	30		704	i	10		140	
10,000–24,999	–	220	88,263	120		29,212		110		26,829	i	20		2,383		10		290	i
25,000 or more	–	130	183,626	80		94,534	i	80		91,455	i	20		3,079	i	10		2,579	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 20

Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Biotechnology R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		2,470	i	77,792		2,010	i	62,952		780	i	14,841	
Manufacturing industries	31–33	15,180		285,674		1,700	i	65,874		1,530	i	60,655		380	i	5,219	
Food	311	870		4,180		110	i	705	i	100	i	657	i	30	i	48	
Beverage and tobacco products	312	350		1,082		30	i	24 - 41		30	i	25		10	i	0 - 16	i
Textile, apparel, and leather products	313–16	240		904		10		*		10		*		0		0	
Wood products	321	80		186		10	i	10		10	i	10		0		0	
Paper	322	90		1,064		10		2		10		2		0		0	
Printing and related support activities	323	200		420	i	0		0		0		0		0		0	
Petroleum and coal products	324	80		1,306		10		142 - 159		10		143		10		0 - 16	
Chemicals	325	2,330		97,063		940		60,577		870		55,562		220		5,015	
Basic chemicals	3251	240		2,360		50	i	370		50	i	254		10		116	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		20	i	94		20	i	94		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		80	i	154 - 295		80	i	155		10		0 - 139	
Pharmaceuticals and medicines	3254	1,060		87,619		770		59,736		700		54,974		210		4,761	
Soap, cleaning compound, and toilet preparation	3256	270		2,760		40	i	79 - 220		40	i	80		10		0 - 139	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		10		5		10		5		0		0	
Plastics and rubber products	326	790		2,856		50	i	55		50	i	55		0		0	
Nonmetallic mineral products	327	170		1,508	i	10		*		10		*		0		0	
Primary metals	331	200		665		10		2		10		2		0		0	
Fabricated metal products	332	1,840		2,885		10		9		10		9		0		0	
Machinery	333	2,240		15,184		80	i	40		30		24		50	i	16	
Agricultural implement	33311	190		1,921		10		*		10		*		0		0	
Semiconductor machinery	333242	80		4,459		0		0		0		0		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		0		0		0		0		0		0	
Other machinery	other 333	1,880		7,503		70	i	39		30		23		50	i	16	
Computer and electronic products	334	2,280		86,729		200	i	2,506	i	170	i	2,435	i	70	i	70	
Communications equipment	3342	300		12,595		10		0 - 48		10		0 - 48		0		0	
Semiconductor and other electronic components	3344	640		35,183	i	10		1		10		1		0		0	
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		190	i	2,456	i	160	i	2,388	i	60	i	68	

TABLE 20

Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Biotechnology R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		100	i	1,830	i	100	i	1,772	i	30	i	58	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		10	i	320	i	10	i	320	i	0		0	
Other measuring and controlling device	other 3345	740		4,558		100	i	307	i	70	i	297	i	40	i	10	
Other computer and electronic products	other 334	220		21,388		10		1 - 50		10		0 - 48		10	i	2	
Electrical equipment, appliances, and components	335	900		5,263		10		12		10		12		10		*	
Transportation equipment	336	1,090		45,375		10		48		10		48		0		0	
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		10		24		10		24		0		0	
Aerospace products and parts	3364	380	i	18,358	i	10		24	i	10		24	i	0		0	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	10		17	i	10		17	i	0		0	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10	i	7	i	10	i	7	i	0		0	
Military armored vehicle, tank, and tank component	336992	30		35		0		0		0		0		0		0	
Other transportation	other 336	150		2,865		0		0		0		0		0		0	
Furniture and related products	337	190		409		0		0		0		0		0		0	
Miscellaneous	339	1,310		18,596		280	i	1,727		270	i	1,670		40	i	57	i
Medical equipment and supplies	3391	790		16,014		270	i	1,621		260	i	1,564		40	i	57	i
Other miscellaneous manufacturing	3399	520		2,582		10		106		10		106		0		0	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		780	i	11,919		490	i	2,297		400	i	9,622	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		10	i	1 - 16		10		0 - 13		10	i	2	
Utilities	22	40		275		0		0		0		0		0		0	
Wholesale trade	42	1,560		1,191		10	i	5	i	10	i	5	i	0		0	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	0		0		0		0		0		0	
Transportation and warehousing	48–49	130		9,890	i	10		2		10		2		0		0	
Information	51	3,090		110,227		40		86		40		80		10		6	
Publishing	511	1,080		33,019		30		58		20		54		10	i	5	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		30		58		20		54		10	i	5	

TABLE 20

Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount		
Telecommunications	517	210	3,733	0	0	0	0	0	0		
Data processing, hosting, and related services	518	1,480	30,558	20	26	20	25	10	1		
Other information	other 51	340	42,917	10	2	10	2	0	0		
Finance and insurance	52	220	8,917	0	0	0	0	0	0		
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0		
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0		
Professional, scientific, and technical services	54	6,500	53,233	700 i	10,971 i	410 i	1,473	390 i	9,498 i		
Architectural, engineering, and related services	5413	1,450	4,207	120 i	93 i	30 i	39 i	90 i	54 i		
Computer systems design and related services	5415	3,020	21,046	20	33	20	33	0	0		
Scientific research and development services	5417	1,230	21,669	530 i	10,747 i	340 i	1,311	280 i	9,436 i		
Research and development in biotechnology	541711	310	6,457	270 i	4,556	170 i	861	150	3,695		
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446 i	260 i	6,061 i	180 i	450	130 i	5,611 i		
Research and development in the social sciences and humanities	541720	30	766	10	130 i	0	0	10	130 i		
Other professional, scientific, and technical services	other 54	810	6,312	50 i	98 i	30 i	89 i	20 i	9		
Health care services	621–23	680	2,265	30	838	30	727	10	111 i		
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	10	3 - 18	10	0 - 13	10	4		
All companies (number of domestic employees)	–	28,270	492,956	2,470 i	77,792	2,010 i	62,952	780 i	14,841		
Small companies											
10–19[c]	–	5,490	5,501	570 i	1,224	420 i	921	220 i	302 i		
20–49	–	7,980	12,418	660 i	2,801	530 i	2,262	240 i	538 i		
Medium companies											
50–99	–	4,960	14,021	440 i	5,075	370	4,334	130	741		
100–249	–	4,580	19,793	320 i	4,736	270 i	3,992	100 i	743		

TABLE 20

Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount		
Large companies											
250–499	–	2,140	18,883	190	4,708	180	4,022	40	686	i	
500–999	–	1,230	23,969	80	5,148	70	4,552	i	20	i	596
1,000–4,999	–	1,330	75,671	140	10,329	130	8,035	30	i	2,294	i
5,000–9,999	–	240	50,811	30	11,326	i	30	7,801	i	10	3,525	i
10,000–24,999	–	220	88,263	40	22,815	i	40	18,655	i	20	4,159
25,000 or more	–	130	183,626	20	9,631	i	20	8,376	i	10	1,255

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 21

Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Nanotechnology R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		900	i	23,484	i	780	i	21,626	i	170		1,858	i
Manufacturing industries	31–33	15,180		285,674		620	i	21,008	i	590	i	19,643	i	70		1,365	i
Food	311	870		4,180		10		2		10		2		0		0	
Beverage and tobacco products	312	350		1,082		10		5		10		5		0		0	
Textile, apparel, and leather products	313–16	240		904		10		*		10		*		0		0	
Wood products	321	80		186		10		*		10		*		0		0	
Paper	322	90		1,064		10		11	i	10		11	i	0		0	
Printing and related support activities	323	200		420	i	0		0		0		0		0		0	
Petroleum and coal products	324	80		1,306		10		0 - 69	i	10		0 - 69	i	0		0	
Chemicals	325	2,330		97,063		180	i	553		170	i	500		20		53	
Basic chemicals	3251	240		2,360		50	i	70		40	i	61		10		8	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		10		12		10		3	i	10		9	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		10		*		10		*		0		0	
Pharmaceuticals and medicines	3254	1,060		87,619		40		379		30		345		10	i	34	i
Soap, cleaning compound, and toilet preparation	3256	270		2,760		10		*		10		*		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		100	i	92		100	i	90		10		2	
Plastics and rubber products	326	790		2,856		70	i	63		70	i	60		10	i	4	i
Nonmetallic mineral products	327	170		1,508	i	20	i	10		20	i	7		10		3	
Primary metals	331	200		665		10	i	5	i	10	i	5	i	0		0	
Fabricated metal products	332	1,840		2,885		10	i	20		10	i	20		0		0	
Machinery	333	2,240		15,184		60		1,138		50	i	1,116	i	20		21	
Agricultural implement	33311	190		1,921		0		0		0		0		0		0	
Semiconductor machinery	333242	80		4,459		20		1,105		20		1,083 - 1,106	i	10		0 - 22	
Engine, turbine, and power transmission equipment	3336	110		1,301		10		*		10		*		0		0	
Other machinery	other 333	1,880		7,503		40	i	32		30	i	10 - 33		20		0 - 22	
Computer and electronic products	334	2,280		86,729		200	i	18,707	i	190	i	17,440	i	30	i	1,267	i
Communications equipment	3342	300		12,595		10		*		10		*		0		0	
Semiconductor and other electronic components	3344	640		35,183	i	120	i	18,317	i	110	i	17,116	i	20	i	1,200	i
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		80	i	287		80	i	221	i	10		66	

TABLE 21

Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Nanotechnology R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		10	i	6		10	i	5	i	10		1	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		10	i	124		10	i	63	i	10		61	
Other measuring and controlling device	other 3345	740		4,558		70	i	157	i	70	i	153	i	10		4	
Other computer and electronic products	other 334	220		21,388		10		103		10		103		10	i	*	
Electrical equipment, appliances, and components	335	900		5,263		20		57	i	20		57	i	0		0	
Transportation equipment	336	1,090		45,375		10	i	101	i	10	i	85	i	10		15	i
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		10	i	91	i	10		76	i	10	i	15	i
Aerospace products and parts	3364	380	i	18,358	i	10		10	i	10	i	9	i	10		1	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	10	i	9	i	10	i	9	i	0		0	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10		1		0		0		10		1	
Military armored vehicle, tank, and tank component	336992	30		35		0		0		0		0		0		0	
Other transportation	other 336	150		2,865		0		0		0		0		0		0	
Furniture and related products	337	190		409		0		0		0		0		0		0	
Miscellaneous	339	1,310		18,596		70	i	273 - 342	i	70	i	271 - 341	i	10	i	2	
Medical equipment and supplies	3391	790		16,014		60	i	274	i	60	i	272	i	10	i	2	
Other miscellaneous manufacturing	3399	520		2,582		10		0 - 69		10		0 - 69		0		0	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		280	i	2,476	i	200	i	1,983	i	110	i	493	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		10	i	41		10		38		10	i	2	i
Utilities	22	40		275		0		0		0		0		0		0	
Wholesale trade	42	1,560		1,191		60	i	10	i	60	i	10	i	0		0	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	10	i	12	i	10	i	12	i	0		0	
Transportation and warehousing	48–49	130		9,890	i	0		0		0		0		0		0	
Information	51	3,090		110,227		20		1,217	i	20		1,213	i	10		4	
Publishing	511	1,080		33,019		20	i	1,216	i	20	i	1,212	i	10		4	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		20	i	1,216	i	20	i	1,212	i	10		4	

TABLE 21

Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D							
				Total		Paid for by the company		Paid for by others	
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount
Telecommunications	517	210	3,733	0	0	0	0	0	0
Data processing, hosting, and related services	518	1,480	30,558	10	1 i	10	1 i	0	0
Other information	other 51	340	42,917	0	0	0	0	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	200 i	1,196	120 i	709	100 i	487 i
Architectural, engineering, and related services	5413	1,450	4,207	20 i	182 i	10	10	20 i	172 i
Computer systems design and related services	5415	3,020	21,046	20 i	642	20 i	544	10 i	98 i
Scientific research and development services	5417	1,230	21,669	160 i	296 i	90 i	114	90	182 i
Research and development in biotechnology	541711	310	6,457	60	48	30 i	34	30	14
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446 i	110 i	248 i	60 i	80	70 i	168 i
Research and development in the social sciences and humanities	541720	30	766	0	0	0	0	0	0
Other professional, scientific, and technical services	other 54	810	6,312	20 i	77 i	10 i	41	10 i	36 i
Health care services	621–23	680	2,265	0	0	0	0	0	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	10 i	* i	10 i	* i	0	0
All companies (number of domestic employees)	–	28,270	492,956	900 i	23,484 i	780 i	21,626 i	170	1,858 i
Small companies									
10–19[c]	–	5,490	5,501	180 i	104	130 i	80	50	23 i
20–49	–	7,980	12,418	220 i	234	200 i	182	40 i	51 i
Medium companies									
50–99	–	4,960	14,021	170 i	303 i	150 i	233 i	30	70
100–249	–	4,580	19,793	150 i	549	140 i	407	20 i	141
Large companies									

TABLE 21

Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Nanotechnology R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
250–499	–	2,140		18,883		70	i	745	i	70	i	439	i	20		306	i
500–999	–	1,230		23,969		30	i	624	i	30	i	412	i	10	i	212	i
1,000–4,999	–	1,330		75,671		60		4,350		60		3,692		10	i	658	i
5,000–9,999	–	240		50,811		20		4,670	i	20		4,526	i	10		145	
10,000–24,999	–	220		88,263		20	i	5,251	i	20		5,146	i	10	i	105	i
25,000 or more	–	130		183,626		20		6,656	i	20		6,508	i	10		147	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 22

Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Artificial intelligence R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		2,590	i	15,351	i	2,340	i	14,038	i	350	i	1,313	i
Manufacturing industries	31–33	15,180		285,674		890	i	4,665	i	850	i	4,484	i	80		181	
Food	311	870		4,180		10		3		10		3		10		1	
Beverage and tobacco products	312	350		1,082		10		1		10		1		0		0	
Textile, apparel, and leather products	313–16	240		904		10		4		10		4		0		0	
Wood products	321	80		186		10		1		10		1		0		0	
Paper	322	90		1,064		10		1		10		1		0		0	
Printing and related support activities	323	200		420	i	0		0		0		0		0		0	
Petroleum and coal products	324	80		1,306		0		0		0		0		0		0	
Chemicals	325	2,330		97,063		40		123		40		119		10		5	
Basic chemicals	3251	240		2,360		10		5		10	i	2	i	10		4	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		10		5		10		5		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		20	i	75		20	i	75		10		1	
Pharmaceuticals and medicines	3254	1,060		87,619		20		33		20		33		10		1	
Soap, cleaning compound, and toilet preparation	3256	270		2,760		0		0		0		0		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		10		4		10		4		0		0	
Plastics and rubber products	326	790		2,856		20		6		20		6		0		0	
Nonmetallic mineral products	327	170		1,508	i	10		5		10		5		0		0	
Primary metals	331	200		665		10		1		10		1		10		*	
Fabricated metal products	332	1,840		2,885		20		16		20		16		0		0	
Machinery	333	2,240		15,184		120	i	209		110	i	200		20		9	
Agricultural implement	33311	190		1,921		20	i	44		20	i	44		10	i	*	i
Semiconductor machinery	333242	80		4,459		10		6		10		6		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		10		4		0		0		10		4	
Other machinery	other 333	1,880		7,503		100	i	155		90	i	150		20		5	
Computer and electronic products	334	2,280		86,729		330	i	2,813	i	310	i	2,733	i	30	i	80	
Communications equipment	3342	300		12,595		60	i	66	i	60	i	66	i	10	i	*	
Semiconductor and other electronic components	3344	640		35,183	i	90	i	1,357	i	90	i	1,323	i	20	i	34	
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		150	i	238	i	140	i	193	i	20	i	45	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		20	i	5		10		3		10	i	3	

TABLE 22

Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Artificial intelligence R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		60	i	120		60	i	79	i	10		41	
Other measuring and controlling device	other 3345	740		4,558		70	i	113	i	70	i	111	i	10		2	
Other computer and electronic products	other 334	220		21,388		40	i	1,151		40	i	1,151		10	i	*	
Electrical equipment, appliances, and components	335	900		5,263		220	i	331	i	220	i	324	i	10	i	6	
Transportation equipment	336	1,090		45,375		50		857		50		781		10		76	i
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		40	i	740		40	i	704		10		36	
Aerospace products and parts	3364	380	i	18,358	i	10		115	i	10		75	i	10		40	i
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	10		113	i	10		74	i	10	i	40	i
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10		1		10		1		10		*	
Military armored vehicle, tank, and tank component	336992	30		35		0		0		0		0		0		0	
Other transportation	other 336	150		2,865		10		2		10		2		0		0	
Furniture and related products	337	190		409		10		1		10		1		0		0	
Miscellaneous	339	1,310		18,596		100	i	293	i	100	i	289	i	20	i	4	i
Medical equipment and supplies	3391	790		16,014		100	i	279	i	90	i	275	i	20	i	4	i
Other miscellaneous manufacturing	3399	520		2,582		10		14		10		14		0		0	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		1,710	i	10,686	i	1,500	i	9,554	i	280	i	1,132	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		10	i	49		10	i	49		0		0	
Utilities	22	40		275		10		*		10		*		0		0	
Wholesale trade	42	1,560		1,191		10	i	1	i	10	i	0 - 2	i	10	i	0 - 2	i
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	10	i	1 - 2,138	i	10	i	0 - 2,135	i	10		1 - 6	
Transportation and warehousing	48–49	130		9,890	i	20		331	i	20		331	i	0		0	
Information	51	3,090		110,227		520		5,426		520		5,396		10		30	
Publishing	511	1,080		33,019		160	i	2,061		160	i	2,057		10		3	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		160	i	2,061		160	i	2,057		10		3	
Telecommunications	517	210		3,733		10		13		10		13		0		0	
Data processing, hosting, and related services	518	1,480		30,558		310		1,647		310		1,620		10		26	

TABLE 22

Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D							
				Total		Paid for by the company		Paid for by others	
		Companies[a] (number)	Amount	Companies[a] (number)	Amount	Companies[a] (number)	Amount	Companies[a] (number)	Amount
Other information	other 51	340	42,917	50 i	1,705 i	50 i	1,705 i	0	0
Finance and insurance	52	220	8,917	20	313	20	313	0	0
Real estate and rental and leasing	53	50	1,371	10	0 - 1,327	10	0 - 1,327	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	10	0 - 1,327	10	0 - 1,327	0	0
Professional, scientific, and technical services	54	6,500	53,233	1,100 i	2,356 i	900 i	1,258	260 i	1,098 i
Architectural, engineering, and related services	5413	1,450	4,207	110 i	115 i	70 i	41 i	50 i	74 i
Computer systems design and related services	5415	3,020	21,046	640 i	1,080	590 i	742	70 i	338 i
Scientific research and development services	5417	1,230	21,669	250 i	883 i	140 i	216	140 i	667 i
Research and development in biotechnology	541711	310	6,457	30	17	20	11	20	6
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446 i	210 i	852 i	130 i	205	120 i	646 i
Research and development in the social sciences and humanities	541720	30	766	10	14	0	0	10	14
Other professional, scientific, and technical services	other 54	810	6,312	120 i	279 i	120 i	260 i	10 i	19 i
Health care services	621–23	680	2,265	10 i	76	10 i	76	0	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	30	0 - 2,135	30	0 - 2,135	0	0
All companies (number of domestic employees)	–	28,270	492,956	2,590 i	15,351 i	2,340 i	14,038 i	350 i	1,313 i
Small companies									
10–19[b]	–	5,490	5,501	630 i	215	560 i	171	100 i	43
20–49	–	7,980	12,418	800 i	589	730 i	466	110 i	123
Medium companies									
50–99	–	4,960	14,021	370 i	520	340 i	461	50	59
100–249	–	4,580	19,793	320 i	929	290 i	773	40 i	157 i
Large companies									
250–499	–	2,140	18,883	160	776 i	140	418	30 i	358 i
500–999	–	1,230	23,969	90	388	80	341	10 i	47 i
1,000–4,999	–	1,330	75,671	150	1,477	140	1,460	10	17 i

TABLE 22

Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Artificial intelligence R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount		Companies[a] (number)		Amount	
5,000–9,999	–	240		50,811		40		947	i	40		870	i	20		78	i
10,000–24,999	–	220		88,263		30		2,279	i	30		1,964	i	10		315	i
25,000 or more	–	130		183,626		30		7,231	i	30		7,114	i	10		117	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse.
[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 23

Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Energy R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		3,880	i	26,162	i	3,450	i	24,054	i	640	i	2,108	i
Manufacturing industries	31–33	15,180		285,674		2,840	i	20,925	i	2,670	i	19,780	i	310	i	1,145	
Food	311	870		4,180		70	i	40	i	60	i	39	i	10		1	
Beverage and tobacco products	312	350		1,082		20		5		20		5		0		0	
Textile, apparel, and leather products	313–16	240		904		20	i	99		20	i	99		0		0	
Wood products	321	80		186		20	i	4	i	20	i	4	i	0		0	
Paper	322	90		1,064		20	i	43	i	20	i	43	i	0		0	
Printing and related support activities	323	200		420	i	10	i	1	i	10	i	1	i	0		0	
Petroleum and coal products	324	80		1,306		20		405 - 421		20		406		10	i	0 - 14	
Chemicals	325	2,330		97,063		250	i	542		240	i	479		20		64	
Basic chemicals	3251	240		2,360		110	i	319		110	i	308		10		12	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		40	i	53		40	i	53		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		10		17		10		*		10		17	
Pharmaceuticals and medicines	3254	1,060		87,619		10		44		10		16		10	i	27	i
Soap, cleaning compound, and toilet preparation	3256	270		2,760		20	i	42		20	i	42		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		80	i	68		80	i	59		10		8	
Plastics and rubber products	326	790		2,856		120	i	250		120	i	250		10	i	1	i
Nonmetallic mineral products	327	170		1,508	i	30	i	169		30	i	169		0		0	
Primary metals	331	200		665		70	i	72		70	i	72		10		*	
Fabricated metal products	332	1,840		2,885		290	i	482		290	i	457		10		25	
Machinery	333	2,240		15,184		620	i	2,529		570	i	2,340		80	i	189	
Agricultural implement	33311	190		1,921		30	i	53		30	i	53		10		*	
Semiconductor machinery	333242	80		4,459		10		13		10		13		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		70	i	808		70	i	713		20		95	
Other machinery	other 333	1,880		7,503		530	i	1,655		480	i	1,561		60	i	94	
Computer and electronic products	334	2,280		86,729		610	i	8,580	i	570	i	8,218	i	100	i	362	i
Communications equipment	3342	300		12,595		70	i	264		70	i	262		10	i	2	
Semiconductor and other electronic components	3344	640		35,183	i	190	i	5,399	i	160	i	5,210	i	50	i	189	i
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		300	i	2,138		280	i	1,979		50	i	159	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		10		1		10		1		0		0	

TABLE 23

Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Energy R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		40	i	1,144		40	i	1,000		10		144	i
Other measuring and controlling device	other 3345	740		4,558		270	i	993	i	250	i	977	i	50	i	16	
Other computer and electronic products	other 334	220		21,388		70	i	779		70	i	767		10		12	
Electrical equipment, appliances, and components	335	900		5,263		480	i	1,729		460	i	1,656		40	i	74	
Transportation equipment	336	1,090		45,375		130	i	5,741	i	110	i	5,328	i	40		413	
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		80	i	5,371	i	70	i	4,978	i	30		393	
Aerospace products and parts	3364	380	i	18,358	i	30		288	i	30		269	i	10		19	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	20		284	i	20		267	i	10		17	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10		4		10	i	2	i	10		2	
Military armored vehicle, tank, and tank component	336992	30		35		10		1		0		0		10		1	
Other transportation	other 336	150		2,865		30	i	81	i	30	i	81	i	10		*	
Furniture and related products	337	190		409		20	i	10	i	20	i	10	i	0		0	
Miscellaneous	339	1,310		18,596		120		211 - 226		90		205		40	i	6 - 21	
Medical equipment and supplies	3391	790		16,014		80	i	76		50		70		40	i	7	i
Other miscellaneous manufacturing	3399	520		2,582		40		135 - 150		40		136		10		0 - 14	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		1,040	i	5,236		780	i	4,274		340	i	963	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		50	i	2,146		40	i	2,073		10	i	72	i
Utilities	22	40		275		40		267		40		231		10		36	
Wholesale trade	42	1,560		1,191		60	i	31	i	60	i	31	i	0		0	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	0		0		0		0		0		0	
Transportation and warehousing	48–49	130		9,890	i	10		165	i	10		165	i	0		0	
Information	51	3,090		110,227		140		815		140		684		10		132	i
Publishing	511	1,080		33,019		70	i	579		70	i	447		10		131	i
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		70	i	579		70	i	447		10		131	i
Telecommunications	517	210		3,733		10		48		10		48		0		0	

TABLE 23

Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Energy R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Data processing, hosting, and related services	518	1,480		30,558		60		172		60		172		10		1	
Other information	other 51	340		42,917		10		17		10		17		0		0	
Finance and insurance	52	220		8,917		0		0		0		0		0		0	
Real estate and rental and leasing	53	50		1,371		0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20		45		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	30		1,326		0		0		0		0		0		0	
Professional, scientific, and technical services	54	6,500		53,233		710	i	1,510	i	460	i	790		320	i	720	i
Architectural, engineering, and related services	5413	1,450		4,207		310	i	639	i	240	i	377		90	i	263	i
Computer systems design and related services	5415	3,020		21,046		40		89		40		87		10		2	
Scientific research and development services	5417	1,230		21,669		330	i	698	i	150	i	247		220	i	450	i
Research and development in biotechnology	541711	310		6,457		30		14		10		2		30		12	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900		14,446	i	310	i	676	i	150	i	246		200	i	431	i
Research and development in the social sciences and humanities	541720	30		766		10		7		0		0		10		7	
Other professional, scientific, and technical services	other 54	810		6,312		40	i	84	i	30	i	80	i	20		5	
Health care services	621–23	680		2,265		0		0		0		0		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680		1,380 - 14,067		70		302		70		299		10		2	
All companies (number of domestic employees)	–	28,270		492,956		3,880	i	26,162	i	3,450	i	24,054	i	640	i	2,108	i
Small companies																	
10–19[c]	–	5,490		5,501		760	i	328	i	610	i	220	i	190	i	107	
20–49	–	7,980		12,418		860	i	689		730	i	553	i	180	i	136	
Medium companies																	
50–99	–	4,960		14,021		620	i	808	i	580	i	706	i	60	i	102	
100–249	–	4,580		19,793		700	i	1,159		640	i	1,021		100	i	138	
Large companies																	
250–499	–	2,140		18,883		290	i	839		270		746		30	i	93	i

TABLE 23

Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Energy R&D							
				Total		Paid for by the company		Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount		
500–999	–	1,230	23,969	190	1,483	180	1,357	30	i	126	
1,000–4,999	–	1,330	75,671	310	3,391	300	3,140	40		251	i
5,000–9,999	–	240	50,811	80	2,978	80	2,679	20		299	i
10,000–24,999	–	220	88,263	60	5,578	i	60	5,128	i	20	450	
25,000 or more	–	130	183,626	40	8,908	i	40	8,502	i	20	406	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 24

Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Environmental protection R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		3,140	i	11,795	i	2,820	i	10,405	i	440	i	1,390	i
Manufacturing industries	31–33	15,180		285,674		2,380	i	10,331	i	2,260	i	9,411	i	190	i	920	i
Food	311	870		4,180		80	i	105		80	i	74	i	10		31	
Beverage and tobacco products	312	350		1,082		10		12		10		6		10	i	5	i
Textile, apparel, and leather products	313–16	240		904		30	i	21		30	i	21		0		0	
Wood products	321	80		186		20	i	5	i	20	i	5	i	0		0	
Paper	322	90		1,064		30	i	74	i	30	i	74	i	0		0	
Printing and related support activities	323	200		420	i	10	i	2	i	10	i	2	i	0		0	
Petroleum and coal products	324	80		1,306		30		179		30		178		10		1	
Chemicals	325	2,330		97,063		430	i	578		420	i	530		20		48	
Basic chemicals	3251	240		2,360		100	i	205		100	i	191		10		13	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		40	i	50		40	i	50		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		40	i	104		40	i	104		10		*	
Pharmaceuticals and medicines	3254	1,060		87,619		10		91		10		63		10	i	27	i
Soap, cleaning compound, and toilet preparation	3256	270		2,760		60	i	52		60	i	52		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		200	i	76		190	i	70		10		7	
Plastics and rubber products	326	790		2,856		140	i	141		140	i	141		10	i	*	i
Nonmetallic mineral products	327	170		1,508	i	50	i	41	i	50	i	41	i	0		0	
Primary metals	331	200		665		50	i	35		50	i	30		10		5	
Fabricated metal products	332	1,840		2,885		150	i	91		140	i	83		10		8	
Machinery	333	2,240		15,184		470	i	1,022	i	420	i	925	i	70	i	97	
Agricultural implement	33311	190		1,921		30	i	100		30	i	100		10	i	*	i
Semiconductor machinery	333242	80		4,459		10		3		10		3		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		60	i	299	i	60	i	260	i	20		39	
Other machinery	other 333	1,880		7,503		380	i	620	i	330	i	563	i	60	i	57	
Computer and electronic products	334	2,280		86,729		350	i	2,557	i	350	i	2,041		20		516	i
Communications equipment	3342	300		12,595		40	i	154		40	i	153		10	i	*	
Semiconductor and other electronic components	3344	640		35,183	i	50	i	630	i	50	i	619	i	10		12	
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		250	i	1,712	i	250	i	1,209		10	i	503	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		10		1		10		1		0		0	

TABLE 24

Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Environmental protection R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		30	i	1,398	i	30	i	897		10	i	501	i
Other measuring and controlling device	other 3345	740		4,558		220	i	313	i	220	i	311	i	10	i	2	
Other computer and electronic products	other 334	220		21,388		30		61		30		60		10	i	1	
Electrical equipment, appliances, and components	335	900		5,263		320	i	772		310	i	678		20	i	95	
Transportation equipment	336	1,090		45,375		190	i	4,526	i	180	i	4,417	i	30	i	109	i
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		80	i	4,108	i	80	i	4,001	i	30	i	106	i
Aerospace products and parts	3364	380	i	18,358	i	100	i	408	i	100	i	405	i	10	i	3	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	20		346	i	20		344	i	10		2	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		90	i	62	i	90	i	61	i	10	i	1	i
Military armored vehicle, tank, and tank component	336992	30		35		10		*		0		0		10		*	
Other transportation	other 336	150		2,865		10	i	10	i	10	i	10	i	0		0	
Furniture and related products	337	190		409		20	i	12	i	20	i	12	i	0		0	
Miscellaneous	339	1,310		18,596		90		161		60		154		40	i	7	i
Medical equipment and supplies	3391	790		16,014		70	i	67		40		60		40	i	7	i
Other miscellaneous manufacturing	3399	520		2,582		30		94		20		94		10		*	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		770	i	1,464		560	i	994		260	i	469	
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		20	i	172		20		166		10	i	6	i
Utilities	22	40		275		20	i	112		20	i	78 - 113		10		0 - 34	
Wholesale trade	42	1,560		1,191		50	i	31	i	50	i	31	i	0		0	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	0		0		0		0		0		0	
Transportation and warehousing	48–49	130		9,890	i	10		*		10		*		0		0	
Information	51	3,090		110,227		90		148		90		148		0		0	
Publishing	511	1,080		33,019		20		85		20		85		0		0	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		20		85		20		85		0		0	
Telecommunications	517	210		3,733		10		0 - 64		10		0 - 64		0		0	

TABLE 24

Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Environmental protection R&D									
				Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Data processing, hosting, and related services	518	1,480	30,558	70		0 - 64		70		0 - 64		0		0	
Other information	other 51	340	42,917	10		0 - 64		10		0 - 64		0		0	
Finance and insurance	52	220	8,917	0		0		0		0		0		0	
Real estate and rental and leasing	53	50	1,371	0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	30	1,326	0		0		0		0		0		0	
Professional, scientific, and technical services	54	6,500	53,233	570	i	933		370	i	503		260	i	431	
Architectural, engineering, and related services	5413	1,450	4,207	350	i	611		240	i	316	i	140	i	295	
Computer systems design and related services	5415	3,020	21,046	20		39		20		39		0		0	
Scientific research and development services	5417	1,230	21,669	180	i	231	i	100	i	111		110	i	120	i
Research and development in biotechnology	541711	310	6,457	40		41		20	i	24		30		17	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	i 140	i	191	i	90	i	87		80	i	103	i
Research and development in the social sciences and humanities	541720	30	766	0		0		0		0		0		0	
Other professional, scientific, and technical services	other 54	810	6,312	40	i	53	i	30	i	37	i	20		16	i
Health care services	621–23	680	2,265	0		0		0		0		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	50		67		50		33 - 68		10		0 - 34	
All companies (number of domestic employees)	–	28,270	492,956	3,140	i	11,795	i	2,820	i	10,405	i	440	i	1,390	i
Small companies															
10–19[c]	–	5,490	5,501	680	i	225	i	570	i	178	i	140	i	48	
20–49	–	7,980	12,418	770	i	424		670	i	347		140	i	77	i
Medium companies															
50–99	–	4,960	14,021	470	i	321		440	i	286		50	i	34	
100–249	–	4,580	19,793	490	i	463		460	i	369		40	i	94	
Large companies															
250–499	–	2,140	18,883	240	i	490		220	i	402		30	i	87	i

TABLE 24

Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Environmental protection R&D							
				Total		Paid for by the company		Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount		
500–999	–	1,230	23,969	150	515	140	470	20	i	45	i
1,000–4,999	–	1,330	75,671	230	1,376	i	220	1,248	i	30	128
5,000–9,999	–	240	50,811	70	1,450	i	70	1,260	i	10	189
10,000–24,999	–	220	88,263	60	1,434	i	60	1,299	i	20	i	134
25,000 or more	–	130	183,626	30	5,098	30	4,543	10	555	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 25

Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Defense R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		3,680	i	33,331	i	2,770	i	13,290	i	1,170	i	20,041	
Manufacturing industries	31–33	15,180		285,674		2,320	i	25,506	i	2,090	i	11,649	i	380	i	13,858	
Food	311	870		4,180		0		0		0		0		0		0	
Beverage and tobacco products	312	350		1,082		0		0		0		0		0		0	
Textile, apparel, and leather products	313–16	240		904		20	i	22		20	i	17		10		4	
Wood products	321	80		186		0		0		0		0		0		0	
Paper	322	90		1,064		10		1		10		1		0		0	
Printing and related support activities	323	200		420	i	0		0		0		0		0		0	
Petroleum and coal products	324	80		1,306		0		0		0		0		0		0	
Chemicals	325	2,330		97,063		170	i	1,689		150	i	128		20	i	1,561	
Basic chemicals	3251	240		2,360		40	i	34		40	i	34		0		0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		10	i	10	i	10	i	10	i	0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		0		0		0		0		0		0	
Pharmaceuticals and medicines	3254	1,060		87,619		30		1,608		20		57		20	i	1,551	
Soap, cleaning compound, and toilet preparation	3256	270		2,760		10		1		10		1		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		100	i	36		100	i	25		10		10	
Plastics and rubber products	326	790		2,856		80	i	82		80	i	81		10		1	
Nonmetallic mineral products	327	170		1,508	i	20	i	123	i	20	i	121	i	10	i	2	i
Primary metals	331	200		665		50	i	45		50	i	41		10		4	
Fabricated metal products	332	1,840		2,885		380	i	127	i	380	i	127	i	0		0	
Machinery	333	2,240		15,184		310	i	423		270	i	255	i	50		169	
Agricultural implement	33311	190		1,921		10	i	*		10	i	*		0		0	
Semiconductor machinery	333242	80		4,459		30		26		10		15		30		12	
Engine, turbine, and power transmission equipment	3336	110		1,301		30	i	209		20	i	73	i	10		136	
Other machinery	other 333	1,880		7,503		250	i	188	i	240	i	167	i	20		21	
Computer and electronic products	334	2,280		86,729		800	i	11,220		740	i	5,780	i	140	i	5,440	
Communications equipment	3342	300		12,595		70	i	343		70	i	264	i	10		79	
Semiconductor and other electronic components	3344	640		35,183	i	300	i	2,872	i	280	i	2,717	i	50	i	155	i
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		410	i	7,789		380	i	2,634		90	i	5,154	

TABLE 25

Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Defense R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		40	i	126	i	30	i	118	i	10	i	7	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		150	i	7,128		140	i	2,014		40		5,115	
Other measuring and controlling device	other 3345	740		4,558		240	i	534	i	220	i	502	i	50	i	32	
Other computer and electronic products	other 334	220		21,388		40		217		30		165		10		52	
Electrical equipment, appliances, and components	335	900		5,263		160	i	121	i	140	i	96	i	30	i	25	
Transportation equipment	336	1,090		45,375		340	i	11,596	i	250	i	4,955	i	130	i	6,641	i
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		40	i	40 - 1,212	i	30	i	22		10	i	18 - 1,190	i
Aerospace products and parts	3364	380	i	18,358	i	280	i	9,951	i	190	i	4,507	i	120	i	5,444	i
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	100		9,089	i	90		4,091	i	30		4,998	i
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		190	i	862		110	i	416		90	i	445	
Military armored vehicle, tank, and tank component	336992	30		35		30		33		20		24		10		9	
Other transportation	other 336	150		2,865		10		401 - 1,571		10		402		10		0 - 1,169	
Furniture and related products	337	190		409		0		0		0		0		0		0	
Miscellaneous	339	1,310		18,596		50		58		30		48		20	i	10	
Medical equipment and supplies	3391	790		16,014		30	i	28		10		22		20	i	5	i
Other miscellaneous manufacturing	3399	520		2,582		20		31		20		25		10		5	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		1,370	i	7,824	i	690	i	1,641	i	790	i	6,183	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		10		14		10		14		0		0	
Utilities	22	40		275		10		*		10		*		0		0	
Wholesale trade	42	1,560		1,191		10		1		10		1		0		0	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	0		0		0		0		0		0	
Transportation and warehousing	48–49	130		9,890	i	0		0		0		0		0		0	
Information	51	3,090		110,227		130		1,105	i	120		942	i	20		163	
Publishing	511	1,080		33,019		70	i	841	i	70	i	825	i	10		16	

TABLE 25

Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D							
				Total		Paid for by the company		Paid for by others	
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0	0
Software publishers	5112	1,040	32,958	70 i	841 i	70 i	825 i	10	16
Telecommunications	517	210	3,733	10 i	3 - 27	10 i	0 - 23	10	4
Data processing, hosting, and related services	518	1,480	30,558	60	239	50	95	10	143
Other information	other 51	340	42,917	10	0 - 23	10	0 - 23	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	1,220 i	6,676 i	550 i	666	780 i	6,010 i
Architectural, engineering, and related services	5413	1,450	4,207	270 i	1,065 i	100 i	76	200 i	989 i
Computer systems design and related services	5415	3,020	21,046	370 i	1,176 i	290 i	394	100 i	782 i
Scientific research and development services	5417	1,230	21,669	470 i	4,021 i	160 i	138	390 i	3,883 i
Research and development in biotechnology	541711	310	6,457	50	58	10	9	40	49
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446 i	420 i	3,734 i	150 i	129	340 i	3,606 i
Research and development in the social sciences and humanities	541720	30	766	10	228	0	0	10	228
Other professional, scientific, and technical services	other 54	810	6,312	120 i	414	20 i	59	110 i	356
Health care services	621–23	680	2,265	10 i	3 i	10 i	2 i	10	2
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	20	25	20	16	10	9
All companies (number of domestic employees)	–	28,270	492,956	3,680 i	33,331 i	2,770 i	13,290 i	1,170 i	20,041
Small companies									
10–19[c]	–	5,490	5,501	830 i	575 i	520 i	204 i	350 i	371 i

TABLE 25

Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D											
				Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
20–49	–	7,980	12,418	1,070	i	1,095		740	i	352		410	i	743	
Medium companies															
50–99	–	4,960	14,021	610	i	1,128		510	i	401		130		727	
100–249	–	4,580	19,793	660	i	1,711		560	i	764		150	i	947	
Large companies															
250–499	–	2,140	18,883	200	i	1,139		170	i	300		60		839	
500–999	–	1,230	23,969	110	i	609	i	100		399		20	i	211	i
1,000–4,999	–	1,330	75,671	140		4,546		130		1,854		40		2,692	
5,000–9,999	–	240	50,811	50		2,038	i	40		887	i	20		1,150	i
10,000–24,999	–	220	88,263	30	i	4,429	i	30		1,812	i	20		2,617	i
25,000 or more	–	130	183,626	20		16,061	i	20		6,318	i	20		9,743	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 26

Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Health or medical R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		7,230	i	133,765		6,440	i	108,075		1,400	i	25,691	i
Manufacturing industries	31–33	15,180		285,674		4,310	i	108,787		4,080	i	99,047		650	i	9,740	i
Food	311	870		4,180		90	i	225		90	i	170	i	10		55	
Beverage and tobacco products	312	350		1,082		10		47	i	10		12		10	i	36	i
Textile, apparel, and leather products	313–16	240		904		30	i	21		30	i	21		0		0	
Wood products	321	80		186		10		*		10		*		0		0	
Paper	322	90		1,064		40	i	95	i	40	i	95	i	0		0	
Printing and related support activities	323	200		420	i	10		1		10		1		0		0	
Petroleum and coal products	324	80		1,306		0		0		0		0		0		0	
Chemicals	325	2,330		97,063		1,370	i	84,796		1,310	i	75,949		260	i	8,848	i
Basic chemicals	3251	240		2,360		90	i	167		90	i	164		10		3	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		40	i	46		40	i	46		0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		10		*		10		*		0		0	
Pharmaceuticals and medicines	3254	1,060		87,619		1,010		84,406		960		75,561		260	i	8,845	i
Soap, cleaning compound, and toilet preparation	3256	270		2,760		80	i	156		80	i	156		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		170	i	22		170	i	22		10		*	
Plastics and rubber products	326	790		2,856		230	i	621		200	i	584		40	i	36	i
Nonmetallic mineral products	327	170		1,508	i	20	i	152		20	i	151		10	i	1	i
Primary metals	331	200		665		30	i	92		30	i	91		10		1	
Fabricated metal products	332	1,840		2,885		360	i	158	i	330	i	130		30		27	i
Machinery	333	2,240		15,184		370	i	285		360	i	262	i	20		23	
Agricultural implement	33311	190		1,921		10		1		10		1		0		0	
Semiconductor machinery	333242	80		4,459		10		*		10		*		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		30	i	59	i	30	i	59	i	0		0	
Other machinery	other 333	1,880		7,503		340	i	225		330	i	202		20		23	
Computer and electronic products	334	2,280		86,729		750	i	7,697	i	670	i	7,296	i	160	i	401	
Communications equipment	3342	300		12,595		50	i	171		40	i	169		10		1	
Semiconductor and other electronic components	3344	640		35,183	i	250	i	2,050	i	200	i	1,904	i	70	i	146	

TABLE 26

Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Health or medical R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		430	i	3,953	i	410	i	3,702	i	90	i	251	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		210	i	2,876	i	200	i	2,660	i	50	i	216	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		10		40		10		19		10		21	
Other measuring and controlling device	other 3345	740		4,558		230	i	1,037	i	210	i	1,023	i	40	i	14	
Other computer and electronic products	other 334	220		21,388		30	i	1,523		30	i	1,520		10	i	3	
Electrical equipment, appliances, and components	335	900		5,263		190	i	183	i	190	i	182	i	10		1	i
Transportation equipment	336	1,090		45,375		70	i	531	i	60		400		10	i	131	i
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		50	i	473	i	50		357		10	i	117	i
Aerospace products and parts	3364	380	i	18,358	i	20		58		20		44		10		14	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	20		40		20		26		10		14	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10	i	18	i	10	i	18		10	i	*	i
Military armored vehicle, tank, and tank component	336992	30		35		0		0		0		0		0		0	
Other transportation	other 336	150		2,865		0		0		0		0		0		0	
Furniture and related products	337	190		409		30	i	18	i	30	i	18	i	0		0	
Miscellaneous	339	1,310		18,596		790	i	13,864		760	i	13,683		130	i	181	
Medical equipment and supplies	3391	790		16,014		760	i	13,659		730	i	13,492		120	i	167	
Other miscellaneous manufacturing	3399	520		2,582		30		205		30		191		10		14	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		2,930	i	24,978	i	2,360	i	9,028		760	i	15,950	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		0		0		0		0		0		0	
Utilities	22	40		275		0		0		0		0		0		0	
Wholesale trade	42	1,560		1,191		180	i	85	i	180	i	83	i	10		2	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	10	i	42		10	i	42		0		0	
Transportation and warehousing	48–49	130		9,890	i	10		83	i	10		83	i	0		0	

TABLE 26

Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Health or medical R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Information	51	3,090		110,227		510	i	2,812		500	i	2,782		10		29	
Publishing	511	1,080		33,019		280	i	1,554	i	280	i	1,527	i	10		27	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		280	i	1,554	i	280	i	1,527	i	10		27	
Telecommunications	517	210		3,733		10		2		10		2		0		0	
Data processing, hosting, and related services	518	1,480		30,558		220		1,186		220		1,184		10		2	
Other information	other 51	340		42,917		20		69		20		69		0		0	
Finance and insurance	52	220		8,917		30		591		30		591		0		0	
Real estate and rental and leasing	53	50		1,371		10		1		10		1		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20		45		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	30		1,326		10		1		10		1		0		0	
Professional, scientific, and technical services	54	6,500		53,233		1,600	i	19,211	i	1,110	i	3,609		670	i	15,602	i
Architectural, engineering, and related services	5413	1,450		4,207		310	i	466	i	170	i	132	i	160	i	334	i
Computer systems design and related services	5415	3,020		21,046		340	i	1,607		330	i	1,546		20	i	61	
Scientific research and development services	5417	1,230		21,669		810	i	16,508	i	510	i	1,653		450	i	14,855	i
Research and development in biotechnology	541711	310		6,457		260	i	5,879		160	i	658		150		5,221	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900		14,446	i	540	i	10,243	i	350	i	977		300	i	9,266	i
Research and development in the social sciences and humanities	541720	30		766		20		386		10		18		10		368	
Other professional, scientific, and technical services	other 54	810		6,312		150	i	630		110	i	279	i	60	i	351	
Health care services	621–23	680		2,265		560		2,075		490		1,758		80		317	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680		1,380 - 14,067		60	i	78		60	i	78		0		0	

TABLE 26

Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Health or medical R&D											
				Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All companies (number of domestic employees)	–	28,270	492,956	7,230	i	133,765		6,440	i	108,075		1,400	i	25,691	i
Small companies															
10–19[c]	–	5,490	5,501	1,720	i	2,561		1,500	i	2,100		360	i	461	i
20–49	–	7,980	12,418	1,860	i	4,206		1,630	i	3,415		390	i	791	i
Medium companies															
50–99	–	4,960	14,021	1,220	i	6,210		1,120	i	5,216		180	i	994	
100–249	–	4,580	19,793	1,100	i	7,054		990	i	5,819		230	i	1,235	
Large companies															
250–499	–	2,140	18,883	560		6,416		520		5,239		80		1,177	
500–999	–	1,230	23,969	240		7,351		230		6,505		40		846	
1,000–4,999	–	1,330	75,671	400		18,070		320		13,674		100		4,396	i
5,000–9,999	–	240	50,811	80		18,646		70		14,705		20		3,941	
10,000–24,999	–	220	88,263	60		37,476		60		28,676		20	i	8,799	i
25,000 or more	–	130	183,626	40		25,775		40		22,725		20		3,050	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 27

Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Agriculture R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	28,270		492,956		2,350	i	8,706		2,230	i	8,078		170		627	
Manufacturing industries	31–33	15,180		285,674		1,770	i	7,502		1,740	i	7,032		50		470	
Food	311	870		4,180		240	i	1,164	i	240	i	1,116	i	10		48	
Beverage and tobacco products	312	350		1,082		40	i	42		40	i	42		0		0	
Textile, apparel, and leather products	313–16	240		904		10	i	24		10	i	24		0		0	
Wood products	321	80		186		10	i	14	i	10	i	14	i	0		0	
Paper	322	90		1,064		20		54	i	20		54	i	0		0	
Printing and related support activities	323	200		420	i	0		0		0		0		0		0	
Petroleum and coal products	324	80		1,306		10		0 - 30		10		0 - 30		0		0	
Chemicals	325	2,330		97,063		400	i	3,969		400	i	3,603		10		366	
Basic chemicals	3251	240		2,360		100	i	108		100	i	108		0		0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180		1,172		30	i	189	i	30	i	189	i	0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150		1,822 - 1,846		130	i	1,820		130	i	1,474 - 1,502		10		318 - 345	
Pharmaceuticals and medicines	3254	1,060		87,619		60		1,809		60		1,760 - 1,789		10	i	20 - 49	
Soap, cleaning compound, and toilet preparation	3256	270		2,760		10		8		10		8		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460		1,305 - 1,333		100	i	35	i	100	i	35	i	0		0	
Plastics and rubber products	326	790		2,856		90	i	55		80	i	54		10		1	
Nonmetallic mineral products	327	170		1,508	i	10		2		10		2		0		0	
Primary metals	331	200		665		10		3		10		3		0		0	
Fabricated metal products	332	1,840		2,885		200	i	54		200	i	53		10		1	
Machinery	333	2,240		15,184		480	i	1,218		470	i	1,207		20		11	
Agricultural implement	33311	190		1,921		180	i	1,066		180	i	1,060		10		6	
Semiconductor machinery	333242	80		4,459		0		0		0		0		0		0	
Engine, turbine, and power transmission equipment	3336	110		1,301		20	i	43	i	20	i	43	i	0		0	
Other machinery	other 333	1,880		7,503		290	i	108	i	280	i	103	i	20		5	
Computer and electronic products	334	2,280		86,729		220	i	353		210	i	316		20		37	
Communications equipment	3342	300		12,595		40	i	59		40	i	59		10	i	*	i
Semiconductor and other electronic components	3344	640		35,183	i	20		27		20		13		10		13	
Navigational, measuring, electromedical, and control instruments	3345	1,140		17,562		170	i	248	i	170	i	225	i	10		23	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230		3,342		10		1		10		1		0		0	

TABLE 27

Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Agriculture R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190		9,662		10		38		10		18		10	i	21	
Other measuring and controlling device	other 3345	740		4,558		160	i	208	i	160	i	206	i	10		3	
Other computer and electronic products	other 334	220		21,388		10		19		10		19		10	i	1	
Electrical equipment, appliances, and components	335	900		5,263		30		23		30		22		10	i	1	i
Transportation equipment	336	1,090		45,375		40		210	i	40		205	i	10		5	
Motor vehicles, bodies, trailers, and parts	3361–63	540		24,117		20		71	i	20		71	i	0		0	
Aerospace products and parts	3364	380	i	18,358	i	20		106	i	20		106	i	10		1	
Aircraft, aircraft engine, and aircraft parts	336411–13	200		16,891	i	20		81	i	20		80	i	10		1	
Guided missile, space vehicle, and related parts	336414–15, 336419	190	i	1,467		10	i	26	i	10	i	26	i	0		0	
Military armored vehicle, tank, and tank component	336992	30		35		0		0		0		0		0		0	
Other transportation	other 336	150		2,865		10		33		10		29		10		4	
Furniture and related products	337	190		409		10		*		10		*		0		0	
Miscellaneous	339	1,310		18,596		20		294 - 325	i	20		294 - 325	i	10		*	
Medical equipment and supplies	3391	790		16,014		10	i	295	i	10	i	295	i	0		0	
Other miscellaneous manufacturing	3399	520		2,582		10		0 - 30		10		0 - 30		10		*	
Nonmanufacturing industries	21–23, 42–81	13,100		207,283		590	i	1,203	i	500	i	1,046	i	120		158	i
Mining, quarrying, oil and gas extraction, and support activities	21	160		2,717		10		*		10		*		0		0	
Utilities	22	40		275		10		3		10		3		0		0	
Wholesale trade	42	1,560		1,191		210	i	50	i	210	i	46	i	10	i	4	
Electronic shopping and electronic auctions	454111–12	60		3,131 - 15,818	i	0		0		0		0		0		0	
Transportation and warehousing	48–49	130		9,890	i	0		0		0		0		0		0	
Information	51	3,090		110,227		60		711	i	60		710	i	10		1	
Publishing	511	1,080		33,019		30		657	i	30		657	i	0		0	
Newspaper, periodical, book, and directory publishers	5111	40		61		0		0		0		0		0		0	
Software publishers	5112	1,040		32,958		30		657	i	30		657	i	0		0	
Telecommunications	517	210		3,733		10		2		10		2		0		0	
Data processing, hosting, and related services	518	1,480		30,558		30		43		30		41		10		1	

TABLE 27

Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D				Agriculture R&D											
						Total				Paid for by the company				Paid for by others			
		Companies[a] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Other information	other 51	340		42,917		10		9		10		9		0		0	
Finance and insurance	52	220		8,917		0		0		0		0		0		0	
Real estate and rental and leasing	53	50		1,371		0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20		45		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	30		1,326		0		0		0		0		0		0	
Professional, scientific, and technical services	54	6,500		53,233		270	i	379		180	i	231		110		148	i
Architectural, engineering, and related services	5413	1,450		4,207		110	i	140	i	80	i	70		50	i	70	i
Computer systems design and related services	5415	3,020		21,046		10		8		10		8		0		0	
Scientific research and development services	5417	1,230		21,669		130	i	198		90	i	131		60		66	
Research and development in biotechnology	541711	310		6,457		50		124		20	i	93		30		31	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900		14,446	i	90	i	67		70	i	39		30		28	
Research and development in the social sciences and humanities	541720	30		766		10		7		0		0		10		7	
Other professional, scientific, and technical services	other 54	810		6,312		30	i	33		20		22		20		11	i
Health care services	621–23	680		2,265		0		0		0		0		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680		1,380 - 14,067		60	i	62	i	60	i	57	i	10		5	
All companies (number of domestic employees)	–	28,270		492,956		2,350	i	8,706		2,230	i	8,078		170		627	
Small companies																	
10–19[c]	–	5,490		5,501		400	i	108	i	370	i	88	i	40		20	
20–49	–	7,980		12,418		570	i	239		530	i	208		50	i	31	
Medium companies																	
50–99	–	4,960		14,021		410	i	281		380	i	236		30		46	
100–249	–	4,580		19,793		430	i	371		410	i	334		30		37	
Large companies																	
250–499	–	2,140		18,883		220	i	262		210	i	241		20	i	21	i
500–999	–	1,230		23,969		140		455		130		431		10		24	
1,000–4,999	–	1,330		75,671		150		1,271		150		928		10		342	
5,000–9,999	–	240		50,811		40		1,254		40		1,218		10		36	
10,000–24,999	–	220		88,263		30		2,387		30		2,361	i	10		26	
25,000 or more	–	130		183,626		20		2,078	i	20		2,034	i	10		44	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 28

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21–23, 31–33, 42–81	104,464	93,944	10,519 i	17,066	14,324	2,742	87,398	79,620	7,778 i
Manufacturing industries	31–33	64,351	63,006	1,345	11,824	11,585	239	52,527	51,421	1,105
Food	311	835	833	2	240	240	*	596	594	2 i
Beverage and tobacco products	312	674	674	0	192	192	0	482	482	0
Textile, apparel, and leather products	313–16	157	157	0	32	32	0	125	125	0
Wood products	321	7	7	0	2	2	0	5	5	0
Paper	322	101	101	* i	5	5	* i	96	96	* i
Printing and related support activities	323	9 i	9 i	0	* i	* i	0	9 i	9 i	0
Petroleum and coal products	324	171 - 176	172	0 - 3 i	0 - 164	0 - 162	0 - 3 i	9 - 173	9 - 173	* i
Chemicals	325	18,568	18,323	245	4,650	4,595	55	13,918	13,728	190
Basic chemicals	3251	742	740	2	236	234	2	506	506	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	518	5	122	117	5	401	401	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	450	431	20	76	60	16	375	371	4
Pharmaceuticals and medicines	3254	15,868	15,654	214	4,033	4,001	31	11,835	11,652	183
Soap, cleaning compound, and toilet preparation	3256	757	757	0	102	102	0	655	655	0
Paint, coating, adhesive, and other chemicals	3255, 3259	227	224	4	82	81	1	146	143	3
Plastics and rubber products	326	503	494	9	79	79	1	424	416	8
Nonmetallic mineral products	327	192 i	192 i	0	143 i	143 i	0	49 i	49 i	0
Primary metals	331	76	73	2	46	46	1	29	27	2
Fabricated metal products	332	278	267	11	82	79	2	196	188	9
Machinery	333	4,251	4,218	34	479	474	6	3,772	3,744	28
Agricultural implement	33311	857	855	2 i	170	170	* i	687	685	2
Semiconductor machinery	333242	915	896	19	58	55	3	857	841	16
Engine, turbine, and power transmission equipment	3336	630	619	11	10	9	1 i	619	610	10
Other machinery	other 333	1,850	1,848	1 i	241	240	1	1,609	1,608	1 i
Computer and electronic products	334	25,452 i	24,940 i	512	3,132 i	3,052 i	80	22,320 i	21,888 i	432
Communications equipment	3342	3,312 - 3,316	3,309	3 - 7 i	439 - 444	440	0 - 3	2,872	2,869	4 i
Semiconductor and other electronic components	3344	13,007 i	12,809 i	198	1,490 i	1,446 i	44	11,517 i	11,363 i	154

TABLE 28

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Navigational, measuring, electromedical, and control instruments	3345	3,950	3,661	288	837	804	33	3,113 i	2,858 i	255
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,280 i	1,276 i	3	62 i	62 i	* i	1,217 i	1,214 i	3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	878	621	258	144	126	18	735	495	240
Other measuring and controlling device	other 3345	1,792	1,764	28	631	615	16	1,161	1,149	12
Other computer and electronic products	other 334	5,179 - 5,183 i	5,160 i	19 - 22	361 - 365 i	362 i	0 - 3	4,818 i	4,798 i	20
Electrical equipment, appliances, and components	335	1,743	1,713	30	340	337	3	1,404	1,376	27
Transportation equipment	336	7,812	7,363	449 i	1,853	1,768	86	5,959	5,595	364 i
Motor vehicles, bodies, trailers, and parts	3361–63	6,993	6,667	326 i	1,604 i	1,558	46 i	5,389	5,108	281 i
Aerospace products and parts	3364	585	493	93	197	181	16	388	311	77
Aircraft, aircraft engine, and aircraft parts	336411–13	585	492	93	197	181	16	388	311	77
Guided missile, space vehicle, and related parts	336414–15, 336419	*	*	0	0	0	0	*	*	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	234	204	30	52	28 i	24	182	176	6
Furniture and related products	337	35	35	0	11	11	0	24	24	0
Miscellaneous	339	3,482 - 3,488	3,434	48 - 54	380 - 544	375 - 537	5 - 9	2,940 - 3,104	2,896 - 3,059	44
Medical equipment and supplies	3391	3,069	3,023	46	381	375	5	2,688	2,647	41
Other miscellaneous manufacturing	3399	413 - 419	411	2 - 8	0 - 164	0 - 162	0 - 4	251 - 415	249 - 412	3
Nonmanufacturing industries	21–23, 42–81	40,113	30,939	9,175 i	5,242	2,740	2,503	34,871 i	28,199 i	6,672 i
Mining, quarrying, oil and gas extraction, and support activities	21	589	561	28 i	187	185	2	402	376	26
Utilities	22	9	9	0	*	*	0	9	9	0
Wholesale trade	42	113	113	0	77	77	0	36	36	0
Electronic shopping and electronic auctions	454111–12	69 - 4,198 i	69 - 4,198 i	0	*	*	0	69 - 4,198 i	69 - 4,198 i	0
Transportation and warehousing	48–49	62	62	0	1	1	0	61	61	0
Information	51	19,051	19,002	48	1,614	1,599	14	17,437	17,403	34

TABLE 28

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Publishing	511	6,949	6,901	48	754	740	14	6,195	6,161	34
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	6,901	48	754	740	14	6,195	6,161	34
Telecommunications	517	124	123	*	19	19	0	104	104	*
Data processing, hosting, and related services	518	5,891	5,891	* i	583	583	* i	5,307	5,307	* i
Other information	other 51	6,087	6,087	0	257 i	257 i	0	5,831 i	5,831 i	0
Finance and insurance	52	1,175	1,092	83	91	91	0	1,084	1,002	83 i
Real estate and rental and leasing	53	104	104	0	3 - 69	3 - 69	0	35 - 101	35 - 101	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4	4	0	4	4	0	0	0	0
Other real estate and rental and leasing	other 53	101	101	0	0 - 65	0 - 65	0	35 - 101	35 - 101	0
Professional, scientific, and technical services	54	14,790	5,778	9,012 i	3,198	711	2,487	11,592 i	5,066 i	6,526 i
Architectural, engineering, and related services	5413	37	35	2	4	4	*	33	31	2
Computer systems design and related services	5415	5,370	5,294	76	697	642	55	4,673 i	4,652 i	21
Scientific research and development services	5417	9,006 i	99	8,908 i	2,449 i	27 i	2,422 i	6,558 i	72	6,486 i
Research and development in biotechnology	541711	2,793	46	2,748	341	*	341	2,452 i	46	2,407 i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	6,205 i	51	6,153 i	2,101 i	27 i	2,074 i	4,104 i	25	4,079 i
Research and development in the social sciences and humanities	541720	8	1	7	7	* i	7	1	1	0
Other professional, scientific, and technical services	other 54	376	349	27	49	39 i	10	327 i	311 i	16
Health care services	621–23	24	23	* i	9	9	0	14	14	* i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2 - 4,124	0 - 4,121	3	0 - 65	0 - 65	0	2 - 4,124	0 - 4,121	3
All companies (number of domestic employees)	–	104,464	93,944	10,519 i	17,066	14,324	2,742	87,398	79,620	7,778 i

TABLE 28

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Small companies										
10–19[a]	–	138	128	10	29	26	3 i	109	102	7
20–49	–	457	443	14 i	67	65	3 i	389	378	11
Medium companies										
50–99	–	737	674	64	162	154	8 i	575	520	56
100–249	–	2,192	1,979	214	428	403	25	1,765	1,576	189 i
Large companies										
250–499	–	2,709	2,639	70	525	499	26	2,184	2,139	45
500–999	–	2,953	2,807	146	749	727	22 i	2,204	2,080	124
1,000–4,999	–	16,553	16,140	413	3,278	3,199	80	13,275	12,942	333 i
5,000–9,999	–	11,965	9,828	2,137 i	2,311	1,263 i	1,048	9,654 i	8,565 i	1,089 i
10,000–24,999	–	23,612	18,183	5,429 i	3,869 i	2,786	1,084 i	19,743 i	15,398	4,345 i
25,000 or more	–	43,148	41,124	2,024	5,648	5,203	445	37,500	35,921	1,579

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 29

For companies that performed foreign R&D, domestic and foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Total		Paid for by the company		Paid for by others		Research (basic and applied)						Development					
								Total		Paid for by the company		Paid for by others		Total		Paid for by the company		Paid for by others	
Total domestic R&D performance																			
All industries	21–23, 31–33, 42–81	359,341		325,595		33,746		66,277		58,001		8,276		293,064		267,594		25,470	i
Manufacturing industries	31–33	209,614		191,043		18,572		44,682		41,208		3,474		164,932		149,834		15,098	
Chemicals	325	65,887		63,703		2,184		22,029		21,473		556		43,858		42,230		1,628	
Pharmaceuticals and medicines	3254	59,464		57,637		1,826		19,626		19,419		207		39,838		38,218		1,619	
Other chemicals	other 325	6,423		6,065		358		2,403		2,053		350		4,020		4,012		9	
Computer and electronic products	334	76,515		69,012		7,503		11,361		9,905	i	1,456		65,154		59,107		6,047	
Semiconductor and other electronic components	3344	31,900	i	30,620	i	1,280		3,747	i	3,376	i	371		28,153	i	27,244	i	910	
Other computer and electronic products	other 334	44,615		38,392		6,223		7,614		6,529		1,085		37,001		31,863		5,138	
Nonmanufacturing industries	21–23, 42–81	149,727		134,552		15,174	i	21,594		16,792		4,802		128,132		117,760		10,373	i
Information	51	94,642		94,184		458		7,852		7,715		137		86,791		86,469		321	
Software publishers	5112	30,216		29,778		438		2,539		2,411		128		27,677		27,367		310	
Other information	other 51	64,427		64,406		21		5,313		5,304		9		59,114		59,102		11	
Professional, scientific, and technical services	54	30,932		16,324		14,608	i	7,672		3,070		4,602		23,260	i	13,254	i	10,006	i
Scientific research and development services	5417	14,174	i	456		13,718	i	4,237		161		4,076		9,936	i	295		9,641	i
Other professional, scientific, and technical services	other 54	16,759		15,868		891		3,435		2,909		526		13,324	i	12,959	i	365	
Total foreign R&D performance																			
All industries	21–23, 31–33, 42–81	104,464		93,944		10,519	i	17,066		14,324		2,742		87,398		79,620		7,778	i
Manufacturing industries	31–33	64,351		63,006		1,345		11,824		11,585		239		52,527		51,421		1,105	
Chemicals	325	18,568		18,323		245		4,650		4,595		55		13,918		13,728		190	
Pharmaceuticals and medicines	3254	15,868		15,654		214		4,033		4,001		31		11,835		11,652		183	
Other chemicals	other 325	2,700		2,669		31		617		594		24		2,083		2,076		7	
Computer and electronic products	334	25,452	i	24,940	i	512		3,132	i	3,052	i	80		22,320	i	21,888	i	432	
Semiconductor and other electronic components	3344	13,007	i	12,809	i	198		1,490	i	1,446	i	44		11,517	i	11,363	i	154	
Other computer and electronic products	other 334	12,445		12,131		314		1,642		1,606		36		10,803		10,525		278	
Nonmanufacturing industries	21–23, 42–81	40,113		30,939		9,175	i	5,242		2,740		2,503		34,871	i	28,199	i	6,672	i
Information	51	19,051		19,002		48		1,614		1,599		14		17,437		17,403		34	
Software publishers	5112	6,949		6,901		48		754		740		14		6,195		6,161		34	

TABLE 29

For companies that performed foreign R&D, domestic and foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Total		Paid for by the company		Paid for by others		Research (basic and applied)						Development					
								Total		Paid for by the company		Paid for by others		Total		Paid for by the company		Paid for by others	
Other information	other 51	12,102		12,101		*	i	859		859		*	i	11,242	i	11,242	i	*	
Professional, scientific, and technical services	54	14,790		5,778		9,012	i	3,198		711		2,487		11,592	i	5,066	i	6,526	i
Scientific research and development services	5417	9,006	i	99		8,908	i	2,449	i	27	i	2,422	i	6,558	i	72		6,486	i
Other professional, scientific, and technical services	other 54	5,784		5,679		105		749		684		65		5,034	i	4,994	i	40	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 30

Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance		Research (basic and applied)		Development	
All locations							
All industries	21–23, 31–33, 42–81	104,464		17,066		87,398	
Manufacturing industries	31–33	64,351		11,824		52,527	
Chemicals	325	18,568		4,650		13,918	
Pharmaceuticals and medicines	3254	15,868		4,033		11,835	
Computer and electronic products	334	25,452	i	3,132	i	22,320	i
Semiconductor and other electronic components	3344	13,007	i	1,490	i	11,517	i
Nonmanufacturing industries	21–23, 42–81	40,113		5,242		34,871	i
Information	51	19,051		1,614		17,437	
Software publishers	5112	6,949		754		6,195	
Professional, scientific, and technical services	54	14,790		3,198		11,592	i
Scientific research and development services	5417	9,006	i	2,449	i	6,558	i
Africa							
All industries	21–23, 31–33, 42–81	372		63	i	309	i
Manufacturing industries	31–33	187		58	i	130	
Chemicals	325	89		23		67	
Pharmaceuticals and medicines	3254	64		17		47	
Computer and electronic products	334	3		0 - 4		0 - 4	
Semiconductor and other electronic components	3344	*		*		0	
Nonmanufacturing industries	21–23, 42–81	184	i	5		179	i
Information	51	47		2		44	
Software publishers	5112	13		1		11	
Professional, scientific, and technical services	54	98	i	3		95	i
Scientific research and development services	5417	85	i	2		83	i
Asia and Pacific							
All industries	21–23, 31–33, 42–81	32,458		4,504		27,954	i
Manufacturing industries	31–33	20,057		3,437		16,620	
Chemicals	325	3,881		934		2,947	
Pharmaceuticals and medicines	3254	3,077		785		2,292	
Computer and electronic products	334	9,987		1,259	i	8,727	i
Semiconductor and other electronic components	3344	5,304		660	i	4,644	i
Nonmanufacturing industries	21–23, 42–81	12,401		1,067		11,334	i
Information	51	6,289		528		5,762	
Software publishers	5112	2,649		256		2,393	
Professional, scientific, and technical services	54	3,740	i	455		3,285	i
Scientific research and development services	5417	1,856	i	193		1,664	i
Canada							
All industries	21–23, 31–33, 42–81	6,862		1,200		5,661	
Manufacturing industries	31–33	3,610		634		2,975	
Chemicals	325	789		169		620	
Pharmaceuticals and medicines	3254	684		154		530	
Computer and electronic products	334	1,764		254		1,510	
Semiconductor and other electronic components	3344	665		47		618	
Nonmanufacturing industries	21–23, 42–81	3,252		566		2,686	i
Information	51	1,877		200		1,677	
Software publishers	5112	1,015		102		913	
Professional, scientific, and technical services	54	1,003		325		678	i
Scientific research and development services	5417	491		256		235	i

TABLE 30

Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance		Research (basic and applied)		Development	
Europe							
All industries	21–23, 31–33, 42–81	48,764		8,298		40,465	
Manufacturing industries	31–33	29,930		6,126		23,804	
Chemicals	325	12,252		3,093		9,160	
Pharmaceuticals and medicines	3254	10,829		2,725		8,104	
Computer and electronic products	334	7,089		1,001	i	6,088	i
Semiconductor and other electronic components	3344	2,660		317	i	2,343	i
Nonmanufacturing industries	21–23, 42–81	18,834		2,172		16,662	i
Information	51	9,063		724		8,339	
Software publishers	5112	2,718		329		2,389	
Professional, scientific, and technical services	54	6,802		1,178		5,624	i
Scientific research and development services	5417	4,941	i	917		4,024	i
Latin America and OWH							
All industries	21–23, 31–33, 42–81	5,407	i	795		4,613	i
Manufacturing industries	31–33	3,613		717		2,896	i
Chemicals	325	1,051		254		798	
Pharmaceuticals and medicines	3254	839		217		622	
Computer and electronic products	334	1,257	i	128	i	1,129	i
Semiconductor and other electronic components	3344	450		68	i	382	i
Nonmanufacturing industries	21–23, 42–81	1,795	i	78		1,717	i
Information	51	354		27		327	
Software publishers	5112	53		0 - 12		41 - 54	
Professional, scientific, and technical services	54	1,241	i	44	i	1,197	i
Scientific research and development services	5417	355	i	11		345	i
Middle East							
All industries	21–23, 31–33, 42–81	6,342		703	i	5,639	i
Manufacturing industries	31–33	4,120		449	i	3,671	i
Chemicals	325	388		132		256	
Pharmaceuticals and medicines	3254	295		116		179	
Computer and electronic products	334	3,091		257	i	2,835	i
Semiconductor and other electronic components	3344	2,207		202	i	2,005	i
Nonmanufacturing industries	21–23, 42–81	2,223		254		1,968	i
Information	51	1,371		128		1,242	
Software publishers	5112	476		57		419	
Professional, scientific, and technical services	54	566		112		454	i
Scientific research and development services	5417	81	i	5		76	i
Puerto Rico[a]							
All industries	21–23, 31–33, 42–81	539	i	73		466	i
Manufacturing industries	31–33	516	i	68		448	i
Chemicals	325	103		42		61	
Pharmaceuticals and medicines	3254	67		15		52	
Computer and electronic products	334	250 - 413	i	0 - 27	i	224 - 387	i
Semiconductor and other electronic components	3344	3		*	i	2	i
Nonmanufacturing industries	21–23, 42–81	23		5		18	i
Information	51	0 - 18		0 - 6	i	0 - 18	i
Software publishers	5112	0 - 6		0 - 6		*	
Professional, scientific, and technical services	54	5 - 24		0 - 6		0 - 19	i

TABLE 30

Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance		Research (basic and applied)		Development	
Scientific research and development services	5417	6		0 - 6		0 - 7	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System; OWH = Other Western Hemisphere.

[a] Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

Note(s):
Detail within a select location may not add to total because of rounding. Sum of locations do not equal all locations due to the undistributed portion not being published. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D and also performed foreign R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 31

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
All industries	21–23, 31–33, 42–81	428,968	231,648	38,284	19,261	6,738	26,298	7,405	17,058	8,894	12,400	60,981
Manufacturing industries	31–33	248,109	123,559	11,417	9,448	3,267	23,249	3,771	11,368	8,553	9,560	43,918
Food	311	3,937	2,433	67	85	13	455	55	169	1	181	479
Beverage and tobacco products	312	971	500	10	39	2	83	8	43	0	59	227
Textile, apparel, and leather products	313–16	873	547	17	22	10	196	4	14	*	12	52
Wood products	321	180	139	0	4	*	21	9	2	0	2	4 i
Paper	322	1,064	434	* i	6 i	1 i	485	7 i	8 i	1 i	11 i	108
Printing and related support activities	323	420 i	285 i	0	4 i	1	64	8 i	5	* i	7	46
Petroleum and coal products	324	1,203	569 - 628	*	11 - 18	7	19 - 42	0 - 5	41	*	283 - 296	166 - 239
Chemicals	325	87,288	34,544	4,222	5,096	585	8,051	1,359	3,475	7,322	4,509	18,125
Basic chemicals	3251	2,198	1,272	4	22 - 44	14	229	42	152	23	142	273 - 295
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	727	1	46	2	98	12	62	3	53	89
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	758 - 826	*	152 - 177	0 - 3 i	143	100 - 110	105	27	60 - 65	61 - 157
Pharmaceuticals and medicines	3254	78,652	29,357	4,205	4,773	559	7,331	1,169	3,028	7,269	4,215	16,746
Soap, cleaning compound, and toilet preparation	3256	2,596	1,540	12	68	1	154	18	86	*	19	698
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	824 - 888	*	13	5 - 11	95	6 - 16	43	*	14 - 19	163 - 234
Plastics and rubber products	326	2,770	1,597	22	48	42	444	20	83	6	97	411
Nonmetallic mineral products	327	1,473 i	827 i	6	9 - 16	20 i	225 i	18 i	59 i	0	35 - 48 i	253 - 266 i
Primary metals	331	649	365	4	5	3	151	0 - 2	27	4	39	48 - 52
Fabricated metal products	332	2,632	1,722	58	86	30	400	14	40	9	32 - 45	225 - 243 i
Machinery	333	13,930	7,944	261	562	123	1,884	177	556	31	287	2,105
Agricultural implement	33311	1,913	1,034	0	136	4	255	6	35	*	41	402
Semiconductor machinery	333242	3,854	1,844	201	26	4	452	118	308	*	145	755
Engine, turbine, and power transmission equipment	3336	1,096	651	5	21	10	99	12	46	11	12 i	230

TABLE 31

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other machinery	other 333	7,067	4,416	56	379	104 i	1,079	41	166	20	88	718 i
Computer and electronic products	334	75,570	38,899	6,186	1,263	1,498	4,575	1,663	5,066	716	2,240	13,465
Communications equipment	3342	11,495	6,636	703	363	182	265	916	556	12	166	1,696
Semiconductor and other electronic components	3344	31,975 i	15,927 i	1,714 i	378 i	294 i	2,163 i	258 i	2,613 i	407 i	408 i	7,814 i
Navigational, measuring, electromedical, and control instruments	3345	10,912	6,975	321	340	150	960	116	229	7	314	1,502
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	1,767	191	117	45	178	71	68	2	175	504
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	2,316	42	135	26	403	15	68	1	38	355
Other measuring and controlling device	other 3345	4,395	2,892	88	88	78	379	30	93	3	101	643
Other computer and electronic products	other 334	21,188	9,361	3,447	182	873	1,188	374	1,668	290	1,352	2,453
Electrical equipment, appliances, and components	335	4,886	3,129	105	182	58	432	100	118	3	172	585
Transportation equipment	336	31,505	18,890	18	1,187	510	4,271	202	990	337	533	4,566
Motor vehicles, bodies, trailers, and parts	3361–63	20,883	13,529	1 - 4	950	478	2,531 - 2,960	177	861	304 - 334	120	1,501 - 1,897
Aerospace products and parts	3364	8,900	4,192	4	154 - 223	17 - 21	1,275	0 - 19	107	4	382	2,669 - 2,766
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341	3,883	3	154	18	1,185	0 - 14 i	100	4	366	2,613 - 2,632
Guided missile, space vehicle, and related parts	336414–15, 336419	559	309	1	0 - 69	0 - 3	91	0 - 6	7	1	16	55 - 137
Military armored vehicle, tank, and tank component	336992	25	21	* i	* i	0 - 1 i	2	* i	0	* i	* i	0 - 3 i
Other transportation	other 336	1,697	1,148 i	9 - 13	12 - 83	9 - 16 i	35 - 462	4 - 25	23	0 - 29	31	0 - 304 i
Furniture and related products	337	407	288	3	11	1	49	2	8	3	6	35
Miscellaneous	339	18,352	10,395 - 10,440	438	815	363	1,414 - 1,435	119	664	119	1,027	2,929 - 2,979
Medical equipment and supplies	3391	15,812	8,639	422	727	313	1,171	98	620	69	997	2,756
Other miscellaneous manufacturing	3399	2,540	1,757 - 1,801	15	88	51	242 - 264	21	44	50	30	174 - 223
Nonmanufacturing industries	21–23, 42–81	180,858	108,089	26,867	9,814	3,471	3,049	3,634	5,690	342	2,840	17,063

TABLE 31

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	1,567	0 - 292	158	17	312	33	86	1	73	0 - 292
Utilities	22	237	103	0 - 1	9	1	7	1	0 - 96	3	21	0 - 96
Wholesale trade	42	1,104	713	3 i	24 i	1 i	65 i	23	16	*	7 i	252
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775 i	0 - 9,404 i	0 - 2,447 i	117 i	0 - 192 i	57 i	0 - 228 i	0 - 793 i	0	5 i	0 - 4,141 i
Transportation and warehousing	48–49	9,504 i	3,240 i	4,683	514 i	34	153 i	93 i	71 i	34 i	206	475
Information	51	109,062	64,708	18,424	5,745	2,552	776	2,787	3,075	229	1,763	9,003
Publishing	511	32,447	20,646	3,956	1,567	263	415	327	372	91	1,251	3,560
Newspaper, periodical, book, and directory publishers	5111	61	55	0	2	1	*	*	*	0	1	2
Software publishers	5112	32,386	20,590	3,956	1,565	263	415	327	371	91	1,250	3,557
Telecommunications	517	3,700	2,720	39	609	13 - 16	78	30 - 41	33	1	118 - 129	35 - 46
Data processing, hosting, and related services	518	30,154	20,294	3,985 - 4,006	723 - 737	381	210	605	492	120	307	3,000 - 3,021
Other information	other 51	42,761	21,049	10,422 - 10,444	2,831 - 2,845	1,892 - 1,895	72	1,813 - 1,824	2,179	16	75 - 89	2,377 - 2,401 i
Finance and insurance	52	8,890	5,625	357	1,778	114	41	43	534 i	11	72	315
Real estate and rental and leasing	53	1,371	887	102	53	49	3	2	2 - 258	0	0	19 - 275
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	17	2	1	1	1	*	3	0	0	20
Other real estate and rental and leasing	other 53	1,326	870	100	53	48	2	2	0 - 255	0	0	0 - 255
Professional, scientific, and technical services	54	29,131	20,745	799 - 826	945	485	1,258	395	1,081	57	629	2,705 - 2,737
Architectural, engineering, and related services	5413	2,288	1,936	4	27	6	133	12	11	4	90	66
Computer systems design and related services	5415	18,395	13,125	611	689	340	448	161 i	707	19	297	1,997
Scientific research and development services	5417	3,265	1,826	81	144	46	345	121	161	25	107	410
Research and development in biotechnology	541711	1,083	578	36	39	8	149	53	60	17	49	95

TABLE 31

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	1,229	45	105	38	196	67	101	8	58	308
Research and development in the social sciences and humanities	541720	27	19	0	0	0	*	1	*	0	0	6
Other professional, scientific, and technical services	other 54	5,182	3,859	102 - 129	85	93	331	100	203	10	135	234 - 266
Health care services	621–23	1,928	1,102	55	213	30	272	34	34	1	32	155
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	0 - 9,404	0 - 2,447	257 i	0 - 192	108	0 - 228	0 - 793	5	32	0 - 4,141 i
All companies (number of domestic employees)	–	428,968	231,648	38,284	19,261	6,738	26,298	7,405	17,058	8,894	12,400	60,981
Small companies												
10–19[a]	–	4,432	2,521	57 i	297	42	623	74	102	5 - 43	288	382 - 426 i
20–49	–	10,040	6,420	163	366	76	998	257	187	55	352	1,167
Medium companies												
50–99	–	11,492	6,676	401	397	112	1,137	264	221	315	677	1,293
100–249	–	16,520	10,338	640	591	183	1,588	296	397	116	750	1,621
Large companies												
250–499	–	15,356	9,168	859	616	348	1,309	297	336	105	501	1,817
500–999	–	21,549	12,025	1,156	1,011	215	1,480	426	662	1,289	548	2,738
1,000–4,999	–	64,475	36,976	6,934	2,098	878	3,336	894	2,191	687	2,165	8,316
5,000–9,999	–	44,728	22,633	2,749	1,958	394	2,490	704	1,969	4,291	679	6,860
10,000–24,999	–	74,385	37,886	7,121	3,500	812	5,704	698	3,673	692	2,626 i	11,674
25,000 or more	–	165,991	87,006	18,204	8,427	3,679	7,634	3,495	7,320	1,297 - 1,335	3,816	25,072 - 25,116

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 32

Domestic R&D paid for and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																					
		All companies		10–19[a]		20–49		50–99		100–249		250–499		500–999		1,000–4,999		5,000–9,999		10,000–24,999		25,000 or more	
All industries	21–23, 31–33, 42–81	428,968		4,432		10,040		11,492		16,520		15,356		21,549		64,475		44,728		74,385		165,991	
Manufacturing industries	31–33	248,109		2,007		4,606		7,013		9,921		8,834		13,163		36,818		33,246		53,071		79,430	
Food	311	3,937		0 - 26		29		91		163		191		184		506		194 - 234		1,687 - 1,697	i	856	i
Beverage and tobacco products	312	971		15		18		16		10		12 - 20		26		21		204		101		541 - 547	
Textile, apparel, and leather products	313–16	873		0 - 23		68		0 - 10		22 - 41		22		14		190		282		86		166	
Wood products	321	180		0		4		5		22		5		7		45		85		7		0	
Paper	322	1,064		2		12		6		29		24		10		76		119		341		446	
Printing and related support activities	323	420	i	123		4		18		22		52	i	11		29	i	72	i	89	i	0	
Petroleum and coal products	324	1,203		1		4		0 - 140		16 - 35		39		25 - 65		44		0 - 279		0 - 193		455 - 1,050	
Chemicals	325	87,288		905		2,072		4,186		4,549		3,949		5,178		10,289		12,926		27,034		16,201	
Basic chemicals	3251	2,198		0 - 45		97		43		142		103		149		1,033		259 - 312		308		15	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		0 - 45		14		13 - 27		96		22		64		99 - 133		0		704 - 772		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		21		22		20 - 34		39		25		25		166 - 237		695 - 751		362 - 476		0	
Pharmaceuticals and medicines	3254	78,652		820		1,880		3,951		4,077		3,663		4,856		8,155		11,538		23,828		15,884	
Soap, cleaning compound, and toilet preparation	3256	2,596		21		10		48		116		50		33		348		379	i	1,410		181	i
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		0 - 45		49		82 - 99		78		85		51		419 - 489		0		239 - 366		121	
Plastics and rubber products	326	2,770		6		50		134		208		233		316		684		633		333		174	
Nonmetallic mineral products	327	1,473	i	*		10		26		11 - 30		0 - 15		190		150		37 - 57		1,014	i	0	
Primary metals	331	649		0 - 4		12 - 18		16		101		24		46		228		98		105 - 111		9	i
Fabricated metal products	332	2,632		110		155		290		520		350		417		547		154	i	88		0	
Machinery	333	13,930		134		554		460		929		535		710		2,384		3,839		1,387		2,997	
Agricultural implement	33311	1,913		4		48		13		44		20		81		270		141		0		1,293	
Semiconductor machinery	333242	3,854		0 - 125		15		0 - 48		87		45		154		709 - 762		2,666 - 2,799		0		0	
Engine, turbine, and power transmission equipment	3336	1,096		7	i	42		1		34		48		64		89		462		350		0	
Other machinery	other 333	7,067		0 - 125		449		397 - 448		764		423		412		1,263 - 1,317		436 - 570		1,037		1,704	

TABLE 32

Domestic R&D paid for and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Computer and electronic products	334	75,570	247	942	912	1,465	1,613	3,137	13,281	9,175 i	12,764	32,034
Communications equipment	3342	11,495	0 - 102	227	0 - 264	194	220 - 367	904	2,554	1,537 - 1,644	0 - 1,131	4,218 - 5,850
Semiconductor and other electronic components	3344	31,975 i	0 - 102	187	224	752	859	1,048	4,348	5,520 - 5,547 i	9,716	9,192 - 9,320 i
Navigational, measuring, electromedical, and control instruments	3345	10,912	146 i	492	426	393	282 - 389	679 - 778	3,474	339 - 421	1,919 i	2,586
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	70 i	113	198	81	131	453	1,155	0	914 i	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	8	65	29 - 104	67	95	20	648	77 - 157	388 i	1,927
Other measuring and controlling device	other 3345	4,395	67	313	124 - 199	244	57 - 163	205 - 304	1,670	263	617	659
Other computer and electronic products	other 334	21,188	0 - 102 i	36	0 - 264	127	32 - 144	406 - 506	2,905	1,670 i	0 - 1,131 i	14,302 - 15,913
Electrical equipment, appliances, and components	335	4,886	132	162	190	291	221	872	1,329	482	578	630
Transportation equipment	336	31,505	143 i	129	165	737	765	1,157	2,973	3,000	3,059	19,375
Motor vehicles, bodies, trailers, and parts	3361–63	20,883	7	14	0 - 84	393	604	762	1,966	2,088 i	1,968	12,993 - 13,085
Aerospace products and parts	3364	8,900	135 i	75	58 - 87	308	108	201 - 231	795	336	1,083	5,774
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341	13	61	11 - 40	223	106	201 - 231	506	336	1,083	5,774
Guided missile, space vehicle, and related parts	336414–15, 336419	559	122 i	14	46	86	2	0	289	0	0	0
Military armored vehicle, tank, and tank component	336992	25	1	*	23	1	1	0	0	0	0	0
Other transportation	other 336	1,697	0	41	0 - 84	35	52	164 - 194	213	575	8	515 - 609
Furniture and related products	337	407	0	1 - 5	27	30 - 34	19 - 23	35	116	157	15	0
Miscellaneous	339	18,352	159	366 - 372	337 - 477	733 - 752	751 - 785	793 - 831	3,924	1,505 - 1,785	4,190 - 4,384	4,953 - 5,535
Medical equipment and supplies	3391	15,812	145	271	338	564	597	466	2,781	1,506	4,191	4,954
Other miscellaneous manufacturing	3399	2,540	14	95 - 101	0 - 140	170 - 189	155 - 189	327 - 365	1,144	0 - 279 i	0 - 193	0 - 581

TABLE 32

Domestic R&D paid for and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																							
		All companies		10–19[a]		20–49		50–99		100–249		250–499		500–999		1,000–4,999		5,000–9,999		10,000–24,999		25,000 or more	
Nonmanufacturing industries	21–23, 42–81	180,858		2,425		5,435		4,478		6,599		6,522		8,386		27,657		11,482		21,314	i	86,561	
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		3		8		322		4		56		43		66		256		1,776		0	
Utilities	22	237		*		4 - 10		0 - 2		5		0		0 - 161		65		3		0 - 161		0 - 161	
Wholesale trade	42	1,104		88 - 100		531		118		196		106 - 121	i	23		19	i	0		11	i	0	
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	0		0 - 170		7		0 - 510		0 - 303		0 - 1,264		0 - 559		0 - 946	i	0		0 - 13,832	i
Transportation and warehousing	48–49	9,504	i	2		0 - 170		0 - 186		0 - 510		62	i	0 - 676		793		0 - 676		7,974	i	0 - 676	
Information	51	109,062		518		1,848		1,367		2,788		3,348		5,603		19,456		7,376		6,396		60,362	
Publishing	511	32,447		173 - 207		809		361		682 - 807		642		592 - 696		7,852		2,606 - 2,689		2,246		16,308	
Newspaper, periodical, book, and directory publishers	5111	61		4		1		6		4		44		2		0		0		0		0	
Software publishers	5112	32,386		169 - 203		808		355		679 - 803		598		590 - 694		7,852		2,606 - 2,689		2,246		16,308	
Telecommunications	517	3,700		29		33		135		114		169		87		67		59		23		2,982	
Data processing, hosting, and related services	518	30,154		0 - 316		769		810		1,622 - 1,643		2,102		3,791		8,524		4,097		2,447 - 2,772		5,668	
Other information	other 51	42,761		0 - 316		237		61		225 - 350		435		1,028 - 1,132		3,011		531 - 614		1,354 - 1,679		35,405	
Finance and insurance	52	8,890		78		0 - 170		0 - 186		197		598		264		1,572		902		1,960		2,960 - 3,323	
Real estate and rental and leasing	53	1,371		*		10		3		7		35		24		1,293		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		*		7		2	i	1		35		0		0		0		0		0	
Other real estate and rental and leasing	other 53	1,326		0		2		1		6		0		24		1,293		0		0		0	
Professional, scientific, and technical services	54	29,131		1,016		2,867		2,332		2,763		1,494		1,169		3,674		2,002		2,407	i	9,408	
Architectural, engineering, and related services	5413	2,288		207		237		313		430		199		121		381		274	i	125		1	
Computer systems design and related services	5415	18,395		409		1,568		993		1,006		758		709		2,639	i	288		2,192	i	7,833	
Scientific research and development services	5417	3,265		353		817		643		890		260		211		27		*		2	i	62	
Research and development in biotechnology	541711	1,083		127		256		247		91	i	169		132		0		0		0		62	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155		224		551		388		800		83		79		27		*		2	i	0	

TABLE 32

Domestic R&D paid for and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Research and development in the social sciences and humanities	541720	27	2	10	7	*	8	0	0	0	0	0
Other professional, scientific, and technical services	other 54	5,182	47	244	383	436	277	127	627	1,441	88	1,512
Health care services	621–23	1,928	695	0 - 170	147	134	523	0 - 267	165	1	0 - 267	0 - 267
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	12 - 24	0 - 170	0 - 186	0 - 510	0 - 303	0 - 1,264 i	0 - 559	0 - 946 i	359 - 793	0 - 13,640

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 33

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
All industries	21–23, 31–33, 42–81	428,968		25,916		59,697		343,355	
Manufacturing industries	31–33	248,109		18,732		38,686		190,691	
Food	311	3,937		209		731		2,997	
Beverage and tobacco products	312	971		85		205		681	
Textile, apparel, and leather products	313–16	873		74		106		694	
Wood products	321	180		26		22		132	
Paper	322	1,064		132	i	272		659	
Printing and related support activities	323	420	i	24	i	70	i	325	
Petroleum and coal products	324	1,203		208 - 238		395 - 426		545 - 590	
Chemicals	325	87,288		11,990		17,547		57,751	
Basic chemicals	3251	2,198		236		683		1,279	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		187		272		633	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		399		380 - 452		650 - 722	
Pharmaceuticals and medicines	3254	78,652		11,000		15,527		52,125	
Soap, cleaning compound, and toilet preparation	3256	2,596		92		434		2,071	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		76		182 - 254		919 - 992	
Plastics and rubber products	326	2,770		155		431		2,185	
Nonmetallic mineral products	327	1,473	i	171	i	242	i	1,060	i
Primary metals	331	649		46		115		487	
Fabricated metal products	332	2,632		165		499		1,968	
Machinery	333	13,930		672		1,524		11,734	
Agricultural implement	33311	1,913		124		240		1,549	
Semiconductor machinery	333242	3,854		80 - 107		284 - 388		3,386 - 3,464	
Engine, turbine, and power transmission equipment	3336	1,096		40		129	i	927	
Other machinery	other 333	7,067		400 - 427		768 - 873		5,792 - 5,872	
Computer and electronic products	334	75,570		1,718		9,729		64,123	
Communications equipment	3342	11,495		349		1,237		9,909	
Semiconductor and other electronic components	3344	31,975	i	482	i	3,118	i	28,374	i
Navigational, measuring, electromedical, and control instruments	3345	10,912		525		2,056		8,331	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		119	i	948	i	2,050	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		74		501		2,825	
Other measuring and controlling device	other 3345	4,395		332		607		3,455	
Other computer and electronic products	other 334	21,188		362	i	3,317		17,509	
Electrical equipment, appliances, and components	335	4,886		353		690		3,842	
Transportation equipment	336	31,505		1,981		4,179		25,345	
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		1,315		2,814		16,754	i
Aerospace products and parts	3364	8,900		607		1,201		7,092	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		603		1,179		6,559	
Guided missile, space vehicle, and related parts	336414–15, 336419	559		4		23		532	
Military armored vehicle, tank, and tank component	336992	25		*		0		25	
Other transportation	other 336	1,697		59	i	164		1,475	

TABLE 33

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
Furniture and related products	337	407		39		72		296	
Miscellaneous	339	18,352		647 - 686		1,818 - 1,858		15,827 - 15,860	
Medical equipment and supplies	3391	15,812		474		1,527		13,811	
Other miscellaneous manufacturing	3399	2,540		173 - 212		291 - 330		2,016 - 2,048	
Nonmanufacturing industries	21–23, 42–81	180,858		7,183		21,011		152,664	
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		233		591		1,712	
Utilities	22	237		33		74		130	
Wholesale trade	42	1,104		85		135		884	i
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	23		2,777 - 3,677	i	0 - 12,975	i
Transportation and warehousing	48–49	9,504	i	218	i	899	i	8,388	i
Information	51	109,062		3,615		8,464		96,983	
Publishing	511	32,447		1,065		1,719		29,663	
Newspaper, periodical, book, and directory publishers	5111	61		1		2		58	
Software publishers	5112	32,386		1,065		1,716		29,605	
Telecommunications	517	3,700		236 - 267		1,536 - 1,568	i	1,872 - 1,897	
Data processing, hosting, and related services	518	30,154		1,644		2,772		25,738	
Other information	other 51	42,761		638 - 671		2,404 - 2,437		39,684 - 39,708	
Finance and insurance	52	8,890		289		1,196		7,404	
Real estate and rental and leasing	53	1,371		270		415		686	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		3		39		3	i
Other real estate and rental and leasing	other 53	1,326		267		377		683	
Professional, scientific, and technical services	54	29,131		2,050		5,111		21,970	
Architectural, engineering, and related services	5413	2,288		186		519		1,582	
Computer systems design and related services	5415	18,395		1,049		2,606		14,740	
Scientific research and development services	5417	3,265		332		816		2,117	
Research and development in biotechnology	541711	1,083		129		283		672	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155		204		521		1,430	
Research and development in the social sciences and humanities	541720	27		*	i	11		16	
Other professional, scientific, and technical services	other 54	5,182		482	i	1,170	i	3,531	
Health care services	621–23	1,928		179		454		1,295	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012		188		0 - 900		234 - 13,217	
All companies (number of domestic employees)	–	428,968		25,916		59,697		343,355	
Small companies									
10–19[a]	–	4,432		314		774		3,344	
20–49	–	10,040		822		2,362		6,856	
Medium companies									
50–99	–	11,492		1,046		2,376		8,070	
100–249	–	16,520		1,424		2,736		12,359	
Large companies									
250–499	–	15,356		994		2,697		11,665	

TABLE 33

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
500–999	–	21,549	1,620	3,729	16,200
1,000–4,999	–	64,475	5,280	10,184	49,011
5,000–9,999	–	44,728	2,464	5,916 i	36,348
10,000–24,999	–	74,385	4,491	9,590	60,304
25,000 or more	–	165,991	7,460	19,334	139,197

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
All industries	21–23, 31–33, 42–81	26,270	428,968	1,191	41	4,570	397	158,850	5,208	6,171	1,436	277	5,611	3,924	86	2,608	13,383	6,895	2,285	1,857	939	534	373	4,248	25,955	18,918	7,547	276	4,150	176
Manufacturing industries	31–33	14,410	248,109	764	16	3,699	306	77,700	2,971	5,452	1,239	54	3,045	2,125	27	2,466	10,753	6,561	1,934	1,297	692	201	246 i	3,192	20,040	17,517	5,976	221	3,290	99 i
Food	311	860	3,937	9	2 e	4	40	170	35	25	322 - 436 i	* e	25	38	1 e	104	807 i	34	497 i	20	26	5	2	50	35	136	354	4	42	3
Beverage and tobacco products	312	350	971	* i	* e	3	* e	59	9	1	* e	* e	14	87	* e	* e	96	1 e	* e	3	36	* e	* e	1 e	4	3	1 e	* e	1 e	* e
Textile, apparel, and leather products	313–16	210	873	4	* e	1 e	3	322	9	1 e	* e	0	16 i	101	*	* e	10	2 i	* e	2	2 i	* e	1 e	1 e	36	16	7	1 e	1 e	* e
Wood products	321	80	180	1	* e	*	1	29	* e	* e	* e	0	3	9	* e	* e	* i	1	28	* e	* e	1	*	* e	* e	1 i	14	1	* e	* e
Paper	322	90	1,064	13	0	1	34	11	*	4	*	0	19	36	* e	* e	18	2 i	1	4	12	6	14	1	11	10	4	* e	1 e	* e
Printing and related support activities	323	200	420 i	1 e	* e	3 e	1 e	27	19 i	4	* e	* e	7 e	6 e	* e	* e	16 e	5 e	3 e	3 e	6 i	1 e	1 e	3 e	15 i	9	37 i	* e	17 i	10 i
Petroleum and coal products	324	70	1,203	* e	* e	* e	3	13	3	* e	* e	0	6	2	0	* e	34	27	0	5	0 - 31	1 e	* e	9	* e	* e	* e	2	3	0
Chemicals	325	2,260	87,288	83 i	9	246	40	20,912	227	4,490	662	27	760	274	8	25	5,043	3,887	112	178	235	69	13	1,843	12,912	963	384	15	2,229	8
Basic chemicals	3251	240	2,198	4	0	18	6	87	2	72	91	0	4	80	* e	* e	63	16	52	5	15	26	* e	70	97	20	2	6	18	* e
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	170	1,092	10	0	* e	*	19	* e	1 e	0 - 149	0	2 e	18	* e	* e	18	5	4	2	19	0 - 35	3	* e	11	125 - 292	8	* e	1	0
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,501	1	9	44	10	55	5	* e	0 - 149	0	6	19	3	2	33	10	5	5	*	2 e	* e	4	0 - 146	20	2	2	29	1
Pharmaceuticals and medicines	3254	1,000	78,652	61 i	* e	177	20	20,507	209	4,200	424	27	733	136	4	14	4,734	3,836	38	99	27	8	10	1,768	12,590	633	176	4 e	2,142	7
Soap, cleaning compound, and toilet preparation	3256	260	2,596	1 e	0	2	2	170	2 e	100	* e	0	12	13	* e	9	124	4 e	5 i	63 i	* e	* e	* e	1 e	71	1 e	135	* e	12	* e
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,249	5	0	5	* e	75	9	117	* e	0	3	8 i	0	* e	71 i	16	8	4	174	0 - 35 e	* e	* e	0 - 146	0 - 161	61	3	26	1 i
Plastics and rubber products	326	770	2,770	14	* e	375	7	155	60	61	16	0	59	51	* e	2	134	75	13	9	41	34	1 e	116	88	197	87	9	18	* e
Nonmetallic mineral products	327	160	1,473 i	4	* e	* e	* e	122	45	* e	* e	* e	3	3 i	*	* e	35	22	* e	4	2	* e	* e	4	6	8	12	40	3	* e
Primary metals	331	200	649	8	0	11	13	21	8	3	4	* e	1 e	7	0	1	20	55	23	1 e	5	1 e	* e	12	6	85	23	16	3	* e

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Fabricated metal products	332	1,690	2,632	34 i	* e	48	14 i	262	33	93	1 e	* e	17 e	26 i	* e	5	171	101	15 i	56	27	9 e	1 e	11	40	112	75	8	66	2 i
Machinery	333	2,080	13,930	31	0	122	34	3,368	51	82	4	0	189	159	1	32 i	1,599	323	877	132	85	36	16 i	182 i	556	534	569	17 i	124	52 i
Agricultural implement	33311	180	1,913	3	0	16	4 e	88	3	* e	0	0	1 e	42	0	1 e	393	5	841	62	1 e	13	* e	* e	0	9	116	1 e	1 e	* e
Semiconductor machinery	333242	60	3,854	0	0	68	0	2,622	* i	* e	0	0	10	0	0	22 i	0	2	0	0	0	0	0	1 i	248 i	0	0 - 439	0	0	0 - 53 i
Engine, turbine, and power transmission equipment	3336	100	1,096	* e	0	*	* e	14	1 e	*	0	0	47	11	0	* e	25	24	* e	* e	* e	11	12 i	8	19	49 i	16	* e	13	* e
Other machinery	other 333	1,760	7,067	29	0	38	30	645	46	81	4	0	131	106	1	9	1,181	292	35	69	84	13 e	4 e	173 i	289	475	0 - 439	16 i	110	0 - 53 e
Computer and electronic products	334	2,160	75,570	151	1	2,517	51 i	41,446	1,784	240	100	27	1,116	624	13	2,271	1,132	156	292 i	548	35 i	20	48	261	3,566	301	903	13	61	12
Communications equipment	3342	290	11,495	92	1	76	8	5,086	205	32	14 - 47	0 - 27	445	389	12	46	651	61	7	48 i	11	6	4	167	422	96	115	6	31	3
Semiconductor and other electronic components	3344	550	31,975 i	32	0	1,681	8 i	16,342 i	706 i	22	1	1	100	17	*	2,119	73	35	51 i	0 - 102 e	9 i	* e	28	34	1,465 i	78	131	3	6	3
Navigational, measuring, electromedical, and control instruments	3345	1,120	10,912	15	* e	732	34 i	3,372	376	182	53	1 i	201	152	1	7 i	299	47	226 i	400	12 i	7	16	54	977	108	298	4	17 i	5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	220	3,117	* e	0	41 i	18 i	1,465	56 i	66 i	3	0	53	31 i	0	*	97 i	9 i	6 i	* e	7 i	* e	1 e	14 i	413	20 i	36	0	* e	* e
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	3,400	13	0	646	0	385	64	9	* e	0	92 i	39	* i	* e	140	9	195 i	394	0	2	11	9	245	7	142	2	5	1
Other measuring and controlling device	other 3345	720	4,395	1 e	* e	45 i	16	1,522	256	107	51	1 i	57	82	1	7 i	62	29	26 i	6	5	5 e	4	31	319	81	120	2 e	12 i	4
Other computer and electronic products	other 334	220	21,188	13	0	29	1	16,647	497	3	0 - 33	0 - 27	369	67 i	*	98 i	109	13	7	0 - 102	3	7	*	5	702	20	360	1 e	6 i	1
Electrical equipment, appliances, and components	335	880	4,886	15	* i	35	16	1,098	26	100	0 - 36 e	* i	42	107	0 - 6 i	2 e	306	39	27	12	12	5	2 i	25	490	485	79	16	49	3

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Transportation equipment	336	970	31,505	354	3	147	43	4,115 i	390	220	3	* i	516 i	420	0 - 6	13	716	1,311	19	307	134	7	10	468 i	231	14,209	460	65 i	628	3
Motor vehicles, bodies, trailers, and parts	3361–63	530	20,883	158	* e	28	21	2,340 i	0 - 27	10	3	0	14	0 - 346	* e	4	580	1,143	11 e	9	133	1 e	0 - 5 e	0 - 131	59	13,953	180	42 i	30	3
Aerospace products and parts	3364	290	8,900	138	3	104	21	1,692	364	195	* e	* i	433 i	75	0 - 6	9	97	157	7	293	1 e	0 - 7	6	338 i	168	71	0 - 70	13	587	* e
Aircraft, aircraft engine, and aircraft parts	336411–13	180	8,341	98	2	68	21	1,587	212	181	* e	* i	307 i	75	0 - 6	9	96	157	7	293	* e	0 - 7	1	338 i	168	70	0 - 70	7	584	* e
Guided missile, space vehicle, and related parts	336414–15, 336419	110 i	559	40	1	36	*	106	151	13	0	*	125 i	1	0	0	1	*	0	*	1 e	0	5	*	*	*	*	6 i	2	0
Military armored vehicle, tank, and tank component	336992	30	25	2 e	0	0 - 8 i	0	0 - 8 i	0	0	0	0	4 e	0	0	0	0	0	0	0	0	0	0	0 - 8	0	7 e	0	0	1 e	0
Other transportation	other 336	140	1,697	57	* e	5 - 17	* e	73 - 84	0 - 27	15	* e	0	66	0 - 346	0 - 6 e	* e	40	11	* e	5	* e	0 - 7	0 - 5	0 - 131 i	4	178	209 - 281	9	11	* e
Furniture and related products	337	190	407	3	0	3	* e	28	30	* e	* e	* e	* e	20	* e	* e	7	24	6	* e	3	* e	* e	* e	9	82	19	12	1	* e
Miscellaneous	339	1,280	18,352	38	* e	183	9 i	5,542	241	129	17 - 83	*	251	155	1 e	9	607	497	23	14	8 - 39	7 i	135 i	204	2,036	366 i	2,946	2 e	45	6
Medical equipment and supplies	3391	770	15,812	34	* e	145	3 e	5,035	200	76	18	*	220	145	1 e	2 e	525	482	3 e	4 e	9	3 i	134 i	198	1,936	264 i	2,886	1 e	32	1 e
Other miscellaneous manufacturing	3399	520	2,540	4 e	* e	38	6 i	507	42	53 i	0 - 65 i	0	31	10	*	7	81	15	19	9	0 - 31	4 e	1 e	7	100	102	60	1 e	12	5
Nonmanufacturing industries	21–23, 42–81	11,880	180,858	426	25	871	91	81,150	2,237	719	197	223	2,565	1,799	59	143	2,630	334	351	560	247	334 i	127	1,056	5,915	1,402	1,571	54	860	76
Mining, quarrying, oil and gas extraction, and support activities	21	150	2,535	3 e	3 e	5	0 - 10 e	172 i	35	7	* e	0	1 e	11	* e	2 e	5 e	3 e	1 e	3 e	6 e	27 e	* e	* e	37	2 e	2 e	4 i	0 - 25 e	0 - 10 e
Utilities	22	40	237	0 - 42	0	0	0 - 10	27	0	0	0 - 11	0 - 13	0	25	1	0	13	0 - 50	0	*	0 - 50	7	0	9	5	0	0	0 - 8	2	* i
Wholesale trade	42	1,500	1,104	9 e	0 - 15 e	16	6 e	154 e	17 e	9 e	0 - 11 e	0 - 13 e	36 e	34 e	2 e	6	44 e	23	18	21 i	33 i	11 e	3 e	20	24 e	30 e	46 i	4 e	26	2 e
Electronic shopping and electronic auctions	454111–12	60	3,088 - 15,775 i	0 - 42 i	* e	0 - 123 i	*	2,980 i	0 - 175 i	4 i	0 - 11 i	0 - 13 i	25 i	0 - 109 i	* i	1 i	24 i	0 - 53 i	* i	1 i	0 - 50 i	* e	*	3 i	0 - 660 i	0 - 461 i	0 - 95 i	* e	2 i	0 - 10 i
Transportation and warehousing	48–49	130	9,504 i	2 e	0 - 15 e	3 e	9	6,346 i	25	2 e	0 - 11 e	0 - 13	46	10	19	1 e	140	6 e	2 e	10	2 e	3 e	1 e	2 e	73	14	122	0 - 8 e	14	* e

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Information	51	3,000	109,062	226	3 e	385	21 e	57,930	1,360	440	38 e	161	1,433	1,010	13	31 e	844	132	217	136	120	155 i	35	401	3,440	523	605	9 e	137	39
Publishing	511	1,040	32,447	99	1	144	4	8,296	333	85 - 99	9 e	17	341	173	4 - 7	20	196	84	33	51	8	5 e	15	163	1,559	291	345	2	40	5
Newspaper, periodical, book, and directory publishers	5111	40	61	*	* e	2	* e	12	*	0 - 13	* e	3	4	1	0 - 3	*	2	1	* e	*	* e	* e	*	*	13	1 i	* e	* e	*	* e
Software publishers	5112	1,000	32,386	98	1	142	4	8,284	333	86	9 e	14	337	172	5	20	194	83	33	51	8	5 e	14	163	1,545	291	345	2	39	5
Telecommunications	517	210	3,700	4	0 - 3 e	25	0 - 4 e	244	67	1	1	0 - 27 e	555	94	0 - 3	0 - 5 e	23	3	1 e	18	65	5	1 e	13	91	4	2 e	0 - 3 e	2 e	1 e
Data processing, hosting, and related services	518	1,440	30,154	74	1 e	190	15 e	17,953	583	63 - 197	27 e	71	492	571	7 i	8 e	471	41 e	91	65 e	42	142 i	17	217	1,236	187	243	6 e	88	33
Other information	other 51	330	42,761	49	0 - 3 e	26	0 - 4 e	31,438	377	142 - 291	* e	44 - 75 i	45	172	0 - 3 e	0 - 5 e	154	5 e	91	2 e	4	2 e	1	8 e	555	40	15	0 - 3 e	7	1 e
Finance and insurance	52	220	8,890	0 - 42 i	* e	125 i	0 - 10 i	3,342	35	32	130	0 - 13	370 i	91	* e	* e	786	0 - 53	28	0 - 29	0 - 50	1 e	52	85	214	73 i	191	* e	0 - 46	1
Real estate and rental and leasing	53	50	1,371	* e	* e	*	*	1,011	6	* e	* e	*	2	6	* e	* e	1	* e	2	*	1 i	* i	* e	* e	*	1	1 i	* e	* e	* e
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	40	0	0	0	0	1 i	0	0	0	0	0	0	0	1 i	0	0	0	0	* i	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	* e	* e	*	*	971	6	* e	* e	*	1	6	* e	* e	1	* e	2	*	* e	* i	* e	* e	*	1	1 i	* e	* e	* e
Professional, scientific, and technical services	54	5,540	29,131	134	6 e	184	39	7,737	562	159	20	51	531	489	17	89	603	108	51	350	31	86	30	469	1,375	272	500	25	625	27
Architectural, engineering, and related services	5413	1,160	2,288	37	3	20	2 e	268	52	51	2	6	104	55	7	33	78	24	10	17	9	57	25	98	62	61	29	9	17	13
Computer systems design and related services	5415	2,880	18,395	80	2 e	133	34	3,879	354	74	7 e	26 e	273	337	7	44	277	50	34	303	15 e	17	3 e	193 e	739	110	344	9	591	4 i
Scientific research and development services	5417	850	3,265	10	0	23	1 e	1,280	104	6	6	1 i	59	16	2	2 i	44	25	3	13	4	6	* e	131	415	27	46 i	6	6	8
Research and development in biotechnology	541711	210	1,083	* e	0	2	* e	535	4	* i	2	* e	12	4	0	* e	10	11	2	10	3	*	*	16	129 i	*	37 i	*	1	0

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	630	2,155	9	0	21	1 e	736	100	6	5	* e	47	12	2	2 i	33	15	1 e	2	1	5	* e	110	286	27	9	6	6	8
Research and development in the social sciences and humanities	541720	20	27	0	0	0	0	8	0	0	0	1 i	*	0	0	0	* i	0	0	0	0	0	0	5	*	0	0	0	0	0
Other professional, scientific, and technical services	other 54	670	5,182	9	* e	9	2	2,310	52	28	4 i	18	95	82	1	10	204	9	4	17	3 e	7 i	2	47	159	73	81	1 e	11	2
Health care services	621–23	560	1,928	13 e	0 - 15 e	34	9 e	943	27 i	11 e	0 - 11 e	0 - 13 e	56 e	19 e	0 - 10 e	3 e	34 e	13 e	6 e	14	8 e	11 e	0 - 9 e	17 e	92	30 e	14 e	5 e	12 e	0 - 10 e
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	670	1,322 - 14,012	0 - 42 e	0 - 15	0 - 123 i	0 - 10 e	509	0 - 175 i	54	0 - 11	0 - 13 e	65 e	0 - 109	0 - 10 e	9	135	0 - 53	26	0 - 29	0 - 50	32	0 - 9	50	0 - 660	0 - 461 i	0 - 95	3 e	0 - 46	0 - 10
All companies (number of domestic employees)	–	26,270	428,968	1,191	41	4,570	397	158,850	5,208	6,171	1,436	277	5,611	3,924	86	2,608	13,383	6,895	2,285	1,857	939	534	373	4,248	25,955	18,918	7,547	276	4,150	176
Small companies																														
10-19[b]	–	4,990	4,432	35 e	3 e	56 e	14 e	932	82 e	43 e	8 e	13 e	275 i	86 e	9 e	13 e	140 e	70 e	34 e	28 e	27 e	30 e	7 e	102 e	394	111 e	103 e	11 e	42 e	6 e
20–49	–	7,220	10,040	71 e	3 e	96 e	29 e	2,804	163	91 e	46	33 e	240 e	185 e	13	27 e	299 e	138	74	45 e	42 e	36 e	23 i	276	1,073	258 e	212	14 e	82 e	13
Medium companies																														
50–99	–	4,720	11,492	48 e	4 e	108	17 e	3,279	118	452	15	10 e	256	121	4 e	20	339	130	63	46	117	52 e	14	162	1,810	293	130	23	72	11 i
100–249	–	4,350	16,520	126	7	131	55	5,208	313	199	24	16	333	237	4 e	64	425	182	74	164	69	74	11 e	328	1,797	417	368	20	155	20
Large companies																														
250–499	–	2,050	15,356	42	3	206	28	6,330	277	130	3	21	307	215	2 e	21	370	124	99	90	56	46	5 e	246	1,115	430	283	9	111	25
500–999	–	1,180	21,549	52	0 - 8 e	191	16	5,744	526	133	21	13 e	385	281	17	50	661	245	112	106	72	19 e	7	648	3,762	1,028 i	289	49	91	10
1,000–4,999	–	1,230	64,475	486	6	530	71	24,723	1,358	1,038	657	51	1,101	746	5	157	1,256	568	249	540	320	91	92	886	7,095	2,163	1,448	38	361	24
5,000–9,999	–	230	44,728	66	11	756 i	52	21,921	405	527	41	2	359	293	19	2,037	1,079	492	26	175	77	7	125 i	236	921 i	1,579 i	461	53 i	179	5 - 63 i

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
10,000–24,999	–	220	74,385	65	*	406	36 i	25,897 i	937 i	292	511 i	7	531	507	2	138 i	5,158	3,810	681 i	547	116	28	17	845	3,552	1,799	1,053	35	1,519	0 - 49
25,000 or more	–	130	165,991	200	0 - 8	2,091	79	62,010	1,029	3,266	111	110	1,822	1,254	9	80	3,656	1,137	873	115	42	151 i	72	519 i	4,435	10,839	3,200	23	1,538	8

* = amount < $500,000. e = estimated; > 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 34-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
All industries	21–23, 31–33, 42–81	26,270	428,968	735	829	1,036	16,648	391	17,968	9,188	340	7,087	956	7,606	13,353	664	1,527	170	1,381	20,916	2,463	218	4,276	35,823	219 i	5,679	670	916
Manufacturing industries	31–33	14,410	248,109	243	513	734	12,680	220	7,690	6,239	155	5,824	573	5,973	10,177	612	1,088	134	981	9,015	1,037	128	1,480	5,709	169 i	3,829	641	379
Food	311	860	3,937	54	2 e	* e	241	* e	38	56	4	163	14	16	64	1 e	4	4	27	27	6	4	133	45	* e	92	0 - 175 e	0 - 175
Beverage and tobacco products	312	350	971	* e	* e	* e	1 e	* e	260	86	* e	2	1 i	2 e	2 e	* e	* e	* e	1 e	148	* e	1 i	90	49	* e	1 i	0 - 22 e	0 - 22
Textile, apparel, and leather products	313–16	210	873	* e	1	13	2 e	* e	32	50	* e	82	2	21	6	1 e	64	* e	3 e	5 e	5	* e	9	19	* e	12	0 - 29	0 - 29
Wood products	321	80	180	* e	* e	* e	* e	*	* e	10	13	3	0 - 22	3	3 i	3	* e	* e	6	4 i	1 i	* i	11	10	* e	14	* e	0 - 22
Paper	322	90	1,064	1	* e	2	8	* e	7	38	0	20	* e	1	24	4	274	* e	29	16	*	2	93	15	* e	324	0	3
Printing and related support activities	323	200	420 i	1 e	1 e	1 e	5 e	1 i	13	49 i	* e	28 i	1 e	4	21 i	1	3 i	* e	32 i	13	1 e	1 e	3 e	7 i	* e	32 i	* e	8
Petroleum and coal products	324	70	1,203	* e	* e	* e	341	* e	1 e	2	0	6	0 - 62	2	11	* e	9	* e	* e	599 - 682	2	0	1	* e	* e	2	* e	0 - 130
Chemicals	325	2,260	87,288	49	115	92	9,825	16	3,793	2,892	4	2,421	150	89	7,327	63	96	37	285	1,639	251	50 i	221	1,439	128 i	591	5	55
Basic chemicals	3251	240	2,198	9	0 - 40	2	167	* e	24	75	* e	263	11	13	187	2	27	35	238	173	2	0	130	18	13	35	* e	0 - 40
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	170	1,092	* e	* e	* e	6	0	26	6	0	237	*	3	116	2	16	0	1 e	240	* e	* e	4	15	10	9	0	0 - 45
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,501	11	61 - 105	51	207	* e	1	176 - 327	*	2	95	1	97	15	* e	*	1	99	3	* e	4	3	* e	1 e	0	0 - 45
Pharmaceuticals and medicines	3254	1,000	78,652	27	11	35	9,146	15	3,502	2,460	4	532	39	59	6,792	37	40 e	1	34	1,036	237	43 i	78	1,398	105 i	424	5	5
Soap, cleaning compound, and toilet preparation	3256	260	2,596	2	* e	* e	232 i	* e	211 i	27	0	1,206	* e	1 e	7 i	* e	3	* e	4	38	7 i	6	1 e	1 e	1 e	113	0	7
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,249	* e	* e	4	66	* e	29	0 - 150	0	181	4	12	128	6	11	*	8	52	2	* e	4	2 i	* e	9	* e	0 - 45
Plastics and rubber products	326	770	2,770	2 e	3 e	12	37	* e	106	73	1 e	332	44	6	114	8	51	2	38	99	4 i	* e	25	17	8	100 i	0 - 89 e	0 - 89
Nonmetallic mineral products	327	160	1,473 i	* e	1	* e	23	* e	1,030 i	15	* e	17	0 - 25 e	3	30	* e	8	* e	4	3	1	* i	2	4	* e	9	* e	0 - 25
Primary metals	331	200	649	* e	* e	8	2	* e	6	13	* e	38	3	17	146	3	14	*	4	22	2 i	1 i	2	2 i	2	25	0 - 32 e	0 - 32
Fabricated metal products	332	1,690	2,632	12	7	16	235	1 e	78	42	1 e	224	13 e	24	65	4	68	1 e	40	186	18	1 e	19	126	2 e	170	1	49
Machinery	333	2,080	13,930	48	15	51	193 i	3 i	593	325	126	415	172	439	282	37	180	14 i	60	773	45	18	66	120	5 e	721	10	43
Agricultural implement	33311	180	1,913	41	*	0	* e	* e	1 e	49	49	91	24	3	2 e	0	2	3	4	7	2 i	0	1 e	3	1 i	26	* e	4
Semiconductor machinery	333242	60	3,854	0	0	* i	29	0	58 i	2 e	0	1 e	0	0 - 437	22	0	0	0	* i	275 i	2	1	0	* e	0	0	0	1
Engine, turbine, and power transmission equipment	3336	100	1,096	* e	4	2	2	* e	350	13	* e	14	4 i	1	8	* e	159	* e	* e	6	1 i	0	35	14	* e	232	* e	*

TABLE 34-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
Other machinery	other 333	1,760	7,067	7 e	11	50	163 i	3 i	184	262	76	309	144	0 - 437	251	37	19	11 i	56	485	40	17	30	103	4 e	463	10	39
Computer and electronic products	334	2,160	75,570	43	40	446	813	186	982	1,842	1 e	652	57	4,634	972	77	111	62	118	4,217	259	34	323	1,172	6	195	403 - 623	13 - 211
Communications equipment	3342	290	11,495	8	14	119	360	24 i	297	745	* e	113	13	38	319 i	6	17	1	47	772	81	1	195	207	2	26	0	4
Semiconductor and other electronic components	3344	550	31,975 i	6	3 e	150	166 i	152	204	646 i	0	91	2 e	4,207	255	37	33	40	11	2,129	74	16	16	123	2	45	299 - 623	0 - 198
Navigational, measuring, electromedical, and control instruments	3345	1,120	10,912	27	14 i	152	270	8	274	270	1 e	400	39	246	310	28	60	22	55	461	75	15	97	373	1 e	109	1 e	10
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	220	3,117	* e	8 i	36	38 i	0	119 i	30 i	0	92 i	2	18 i	118	* e	17 i	* e	41	62 i	27 i	5 i	25 i	84	0	56 i	0	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	3,400	7	3	93	122	3	92	125 i	0	59	25	94 i	62	24	1	* e	1	153	14	*	37	70	0	5	* e	1
Other measuring and controlling device	other 3345	720	4,395	20	2 e	22	110	4	63	114	1 e	249 i	12	133	130	3 e	42	21	13	247 i	35	10	35	219	1 e	48	* e	8
Other computer and electronic products	other 334	220	21,188	1 i	9	26	16	2	207	182	* e	49 i	3	143	88	7	2	* i	5	855	29	2	15	469	1 e	15 i	0 - 125	0 - 125
Electrical equipment, appliances, and components	335	880	4,886	1 e	2 e	10	141	1 i	107	238	* i	95	23	73	327	11	54	3	36	136	4	3 e	36	49	4	528	1 i	0 - 36
Transportation equipment	336	970	31,505	30	34	38	89	9	332	270	5	923	34	399	254	1 e	137	7	142	808	154	5	362	2,257	12 i	398	4	0 - 34
Motor vehicles, bodies, trailers, and parts	3361–63	530	20,883	11	3	19	25	2	128	211	4	0 - 379	24	368	92	* e	101	0 - 8	117	156	44	* e	0 - 261	136	1 e	196	4	0 - 34
Aerospace products and parts	3364	290	8,900	19 i	31	19	59	7	180	44	* i	545	10	30	114	* i	9	*	17	631	109 i	5	102 i	2,119	11 i	15	* e	0 - 34
Aircraft, aircraft engine, and aircraft parts	336411–13	180	8,341	19 i	31	19	59	7	180	43	* i	539	10	30	112	* i	9	*	16	584	109 i	5	95 i	2,115	11 i	15	* e	0 - 34
Guided missile, space vehicle, and related parts	336414–15, 336419	110 i	559	*	*	*	*	*	1	1	0	6	0	0	1	0	*	0	2	47	*	0	7	4	0	* e	0	*
Military armored vehicle, tank, and tank component	336992	30	25	0	0	0	0	0	0	1	0	* i	0	0	0	0	5 e	0	0	0	0	0	0	0	0	0	0	0 - 8
Other transportation	other 336	140	1,697	1	* e	1	6	0	23	14	*	0 - 379	* e	1 e	49 i	* e	21	0 - 8	8	20	* e	0	0 - 261	2 e	* e	187	0	0 - 34
Furniture and related products	337	190	407	* e	* e	* i	3	* e	2	29	* e	4 i	* e	14	21	2	* e	* i	12	5	22	* e	12	2	1	15	* e	14
Miscellaneous	339	1,280	18,352	1 e	293	45	721 i	2 e	310	207	1 e	399	3 - 66	226	506	397 i	14	2 e	141 i	240 - 306	260	7 i	73	376	1 e	601	0 - 72 i	0 - 72
Medical equipment and supplies	3391	770	15,812	1 e	4 e	31	661 i	1 e	164	185	* e	367	4	69	446	24	10	1	133 i	241	223	* e	63	267	* e	555	0 - 25 i	0 - 25

TABLE 34-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
Other miscellaneous manufacturing	3399	520	2,540	1 e	290	14	59	1 e	147	22	* e	32	0 - 62 e	158	61	373 i	4 e	1 e	8	0 - 65	36	7 i	10	109	1 e	46	0 - 65 e	0 - 65
Nonmanufacturing industries	21–23, 42–81	11,880	180,858	492	316 i	302	3,968	171	10,278	2,949	185	1,263	383	1,633	3,177	51	439	36	400	11,901 i	1,427	90	2,796	30,114	50	1,850	29 e	537
Mining, quarrying, oil and gas extraction, and support activities	21	150	2,535	* e	63	* e	0 - 25 e	8 e	7	0 - 25 e	19	4 e	141	0 - 25 e	19	* e	1 e	0 - 6 e	10	1,867	10 i	* e	3 e	0 - 25 e	5 e	8	13 e	21
Utilities	22	40	237	0	0	0	0 - 50	0	11	0 - 50	9	23	*	0 - 50	7	0	0	*	0	44	5	0	0	0 - 50	7	0 - 50	1	0 - 50
Wholesale trade	42	1,500	1,104	4 e	5 e	4 e	57	2 e	73 e	22 e	3 e	30 e	6 e	13 e	29 e	0 - 19 e	16	5	14 e	93 e	8 e	1 e	15 e	0 - 106 e	2 e	25 e	1 e	0 - 105
Electronic shopping and electronic auctions	454111–12	60	3,088 - 15,775 i	0 - 35 e	0 - 127 i	0 - 20 i	0 - 271 i	1 i	0 - 402 i	0 - 116	1 i	0 - 109 i	1 i	0 - 308 i	0 - 138 i	0 - 19 i	0 - 46 i	0 - 6 i	4 i	0 - 713 i	47 i	0 - 14 e	0 - 819 i	0 - 8,532 i	1 i	0 - 96 i	0 - 6 e	0 - 105 i
Transportation and warehousing	48–49	130	9,504 i	13	0 - 26 e	0 - 20 e	17	1 e	787 i	14	6 i	38	2 e	19	824 i	* e	2 e	* e	86	56	4	* e	6	748	* e	9	* e	15
Information	51	3,000	109,062	395	64 e	177	2,137	79	6,262	1,793	103	489	106	854	1,249	13 i	287	12	96 e	2,089	1,003	27	893	20,080	9	954	8	39
Publishing	511	1,040	32,447	34	18	100	196	16	820	1,059	96	291	13 e	401	327	6	15	4	20	697	338	12	232	14,710	3	689	3	20
Newspaper, periodical, book, and directory publishers	5111	40	61	* e	* e	*	*	* e	6	1	* e	1	* e	2	3	* e	*	* e	*	2	* e	* e	1 i	1	* e	*	* e	*
Software publishers	5112	1,000	32,386	34	18	100	195	16	814	1,058	96	290	13 e	399	323	6	15	4	19	696	338	12	232	14,709	3	689	3	20
Telecommunications	517	210	3,700	1 e	1 e	6	1,486	1 e	463	43	1 e	6	2 e	15	7	0 - 3	4	1 e	3	56	8	1 e	59	292	0 - 3 e	18	0 - 4 e	0 - 20
Data processing, hosting, and related services	518	1,440	30,154	304	43 e	68	278	0 - 64	1,442	591	6 e	147	30	309	364	6 i	203	5 e	54 e	1,044	423	14	401	1,147	5	224	3 e	0 - 20
Other information	other 51	330	42,761	56	2 e	3	178	0 - 64	3,537	100	1 e	44	61	130	551	0 - 3 e	65	1	19	292	234	1 e	200	3,931	0 - 3 e	22	0 - 4	0 - 20
Finance and insurance	52	220	8,890	0 - 35	26	0 - 20	396	* e	789	146	* e	188	1 e	0 - 233	339	0 - 19	0 - 46	1	0 - 78	410	125	0 - 14	169	0 - 233	* e	523 i	* e	3
Real estate and rental and leasing	53	50	1,371	8	*	* e	*	* e	24	* e	* e	7	* e	0 - 303	1	* e	* e	* e	* e	2 i	1	*	1	0 - 303	* e	* e	* i	0 - 105
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	1 i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 i	0	0	0	0	0	0	0	* i
Other real estate and rental and leasing	other 53	30	1,326	7	*	* e	*	* e	24	* e	* e	7	* e	0 - 303	1	* e	* e	* e	* e	1	1	*	1	0 - 303	* e	* e	* i	0 - 105
Professional, scientific, and technical services	54	5,540	29,131	35	30	102	1,041	31	1,868	840	41	347	105	425 i	521	18	68	15	88	6,555 i	194	50	868	756	19	182	3 e	357
Architectural, engineering, and related services	5413	1,160	2,288	8	7	6	35	8	117	30	16	51	9	83	76	4 i	7 e	7	26	367 i	24	4	87	70	1 e	30	1	63
Computer systems design and related services	5415	2,880	18,395	9 e	17	43	216 e	16	1,468	597	20	202	12 e	312 i	191	6 e	35	4	25 e	5,755 i	79	45	553	464 i	6 e	111	1 e	268

TABLE 34-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
Scientific research and development services	5417	850	3,265	9	1	50	101	4 e	111	144	4	42	4 e	11	149	8 i	7	3	4 e	80	45	1 i	63	151	10	9 e	1 i	10
Research and development in biotechnology	541711	210	1,083	8	* e	24	4	* e	38	68	0	2	* e	5	56	0	*	2	*	9	20 i	1 i	21	46	*	* e	0	2
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	630	2,155	2 e	1	25	96	4 e	73	77	4	37	4 e	6	93	7 i	7	2	3 e	64	24	* i	42	105	10	9 e	1 i	7
Research and development in the social sciences and humanities	541720	20	27	0	0	*	1	0	0	0	0	2	0	0	0	* i	0	0	0	7	0	0	*	*	0	0	0	1
Other professional, scientific, and technical services	other 54	670	5,182	9	5	3	688	3 i	172	69	1	52	79	19	105	1 e	18	* e	33	353	46	1	165	70	1	31	* e	15
Health care services	621–23	560	1,928	6 e	5 e	2 e	53	6 e	60 e	22 e	0 - 7 e	33 e	7 e	17 e	55 e	3 e	23	0 - 6 e	28 e	77 e	10 e	0 - 14 e	27 e	0 - 86	0 - 11 e	57	0 - 6 e	0 - 86
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	670	1,322 - 14,012	0 - 35	0 - 127 e	0 - 20 e	0 - 271	43	0 - 402	0 - 116	0 - 7	0 - 109	15	0 - 308	0 - 138	0 - 19	0 - 46 e	0 - 6 e	0 - 78	0 - 713	22	0 - 14 i	0 - 819	0 - 8,532	0 - 11	0 - 96	0 - 6 e	0 - 105
All companies (number of domestic employees)	–	26,270	428,968	735	829	1,036	16,648	391	17,968	9,188	340	7,087	956	7,606	13,353	664	1,527	170	1,381	20,916	2,463	218	4,276	35,823	219 i	5,679	670	916
Small companies																												
10-19[b]	–	4,990	4,432	15 e	26 e	47	288	13 e	212 e	94 e	4 e	111 e	29 e	36 e	142 e	24 i	27 e	5 e	41 e	231 e	33 e	6 e	138 e	133	7 e	65 e	3 e	27
20–49	–	7,220	10,040	32 e	51	35 e	368	18 e	412 e	213	19	266 e	40 e	114	403	22 e	54 e	8 e	70 e	458 e	138	14 e	270 e	409	18	148 e	4 e	68
Medium companies																												
50–99	–	4,720	11,492	28	29 e	49	351	23 e	370	329	20	235	48 e	116	492	18	52 e	12	49 e	638	112	20	188	292	14 e	162	14 e	112
100–249	–	4,350	16,520	45	43	75	471	47 i	525	310	19	367	65	180	602	36	80	13	85	974	254	13	204	672	9 e	446	5	158
Large companies																												
250–499	–	2,050	15,356	50	24	41	677	43	840	265	2 e	280	31	135	455	9	54	11	70	584	129	28	185	570	5	170	0 - 129 e	0 - 129
500–999	–	1,180	21,549	95	226	136	578	20	1,038	1,132	22	352	33	117	307	26	88	6 e	119	1,160	213	12	349	578	11	321	4 e	45 - 104
1,000–4,999	–	1,230	64,475	159	120	341	1,046	19	1,259	1,965	101	1,281	222	1,117	1,656	216	327	97	161	2,104	724	14	596	3,681	20	820	16	350
5,000–9,999	–	230	44,728	51	102	80	1,684 i	7	3,022	1,430	13	533	143	440	666	220 i	148	2	100	1,485	142	26	332	437 i	3	1,701	* i	0 - 82 i
10,000–24,999	–	220	74,385	58	79	93	4,500 i	15	4,338	1,737	1	2,003	209	694	3,307 i	43	288	5	320	4,911	415	39 i	229	1,261	116 i	1,208	3	0 - 49
25,000 or more	–	130	165,991	203	127 i	139	6,686	186	5,952	1,712	140	1,658	138	4,657	5,323	49	408	11	366	8,369 i	304	45	1,784 i	27,790	15 i	637	487 - 625	0 - 159

* = amount < $500,000. e = estimated; > 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.
[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.
[c] Includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 35

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
All industries	21–23, 31–33, 42–81	428,968		4,608		28,126		35,140		24,458		336,636	
Manufacturing industries	31–33	248,109		2,637		14,197		19,863		15,920		195,491	
Food	311	3,937		159 - 173		600		566		477 - 591		2,019 - 2,120	i
Beverage and tobacco products	312	971		42		84		60		173 - 274		511 - 612	
Textile, apparel, and leather products	313–16	873		28		213		246		220		166	
Wood products	321	180		19		80		81		0		0	
Paper	322	1,064		12		133		86		0		832	
Printing and related support activities	323	420	i	26		284		110	i	0		0	
Petroleum and coal products	324	1,203		13		24 - 75		77 - 106		0 - 372		645 - 1,066	
Chemicals	325	87,288		336		2,683		6,769		6,411		71,088	
Basic chemicals	3251	2,198		39		364		633		521		640	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		0 - 164		151		118 - 140		0		636 - 823	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		0 - 25		80		84		0		1,313 - 1,339	
Pharmaceuticals and medicines	3254	78,652		59 - 76		1,707		5,373		5,647 - 5,667		65,848	
Soap, cleaning compound, and toilet preparation	3256	2,596		74		174		172		107		2,069	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		0 - 164		207		366 - 391		114 - 137		368 - 562	
Plastics and rubber products	326	2,770		159		706		806		275		825	
Nonmetallic mineral products	327	1,473	i	23 - 37		125 - 140		210		86		1,014	i
Primary metals	331	649		32		233 - 249		302		65 - 81		0	
Fabricated metal products	332	2,632		447		1,013		627		356		189	
Machinery	333	13,930		393		1,958		1,919		1,353		8,307	
Agricultural implement	33311	1,913		46		122		134		193		1,418	
Semiconductor machinery	333242	3,854		5		18 - 96		151		243		3,359 - 3,436	
Engine, turbine, and power transmission equipment	3336	1,096		16	i	106		163		0 - 72		738 - 813	
Other machinery	other 333	7,067		326		1,635 - 1,712		1,471		844 - 918		2,715	
Computer and electronic products	334	75,570		363		2,393		2,948		2,457		67,409	
Communications equipment	3342	11,495		49		312 - 379		531		537 - 604		10,000	
Semiconductor and other electronic components	3344	31,975	i	56		686		1,037		819		29,378	i
Navigational, measuring, electromedical, and control instruments	3345	10,912		212		1,140		1,111		415		8,034	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		35		280		468		154		2,179	i

TABLE 35

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size											
		All companies		Less than $1 million		$1 million–$9.999 million		$10 million–$49.999 million		$50 million–$99.999 million		$100 million or more	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		32		150		169		55		2,994	
Other measuring and controlling device	other 3345	4,395		145		710		474		205		2,861	
Other computer and electronic products	other 334	21,188		47		189 - 254		269		620 - 685		19,996	
Electrical equipment, appliances, and components	335	4,886		192		548		855		933		2,358	
Transportation equipment	336	31,505		110		1,403		2,016		1,568		26,409	
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		84		700		1,280		1,042		17,778	
Aerospace products and parts	3364	8,900		3 - 27		478 - 650		493		363 - 388		7,366 - 7,540	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		0 - 23		376		331		363 - 388		7,248	
Guided missile, space vehicle, and related parts	336414–15, 336419	559		4		102 - 274	i	162		0		118 - 292	
Military armored vehicle, tank, and tank component	336992	25		1		24		0		0		0	
Other transportation	other 336	1,697		0 - 23		28 - 200		244		137 - 162		1,092 - 1,266	
Furniture and related products	337	407		30		127		250		0		0	
Miscellaneous	339	18,352		221 - 234		1,514 - 1,556		1,901 - 1,929		1,163 - 1,486		13,187 - 13,513	
Medical equipment and supplies	3391	15,812		101		1,079		1,394		1,114		12,123	
Other miscellaneous manufacturing	3399	2,540		119 - 133		436 - 477		507 - 535		50 - 372		1,064 - 1,389	
Nonmanufacturing industries	21–23, 42–81	180,858		1,970		13,929		15,276		8,538		141,145	
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		26		346		0 - 1,716		0		446 - 2,164	
Utilities	22	237		0 - 31		29 - 66		127		14 - 81		0	
Wholesale trade	42	1,104		400		704		0		0		0	
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	14		68		0 - 1,720		0 - 293		1,005 - 15,677	i
Transportation and warehousing	48–49	9,504	i	19		111		488		101		8,785	i
Information	51	109,062		393		4,882		6,057		6,354		91,376	
Publishing	511	32,447		204		1,567		1,292 - 1,410		1,043		28,221 - 28,341	
Newspaper, periodical, book, and directory publishers	5111	61		5		18		38		0		0	
Software publishers	5112	32,386		199		1,549		1,255 - 1,372		1,043		28,221 - 28,341	
Telecommunications	517	3,700		35		134		487		90		2,954	
Data processing, hosting, and related services	518	30,154		119		2,707		3,751		4,746		18,831	
Other information	other 51	42,761		35		474		408 - 526		475		41,250 - 41,370	
Finance and insurance	52	8,890		14		322		1,287		373		6,893	
Real estate and rental and leasing	53	1,371		10		17		64		0		1,280	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4	i	6		35		0		0	

TABLE 35

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than $1 million	$1 million–$9.999 million	$10 million–$49.999 million	$50 million–$99.999 million	$100 million or more
Other real estate and rental and leasing	other 53	1,326	6	11	30	0	1,280
Professional, scientific, and technical services	54	29,131	993 - 1,022	5,497	4,957	1,181 - 1,214	16,472
Architectural, engineering, and related services	5413	2,288	222	1,048	580	250	187 i
Computer systems design and related services	5415	18,395	600	2,505	2,098	520	12,673
Scientific research and development services	5417	3,265	72	1,193	1,350	287	363
Research and development in biotechnology	541711	1,083	20	359	377	157	171
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	50	808	974	130	193
Research and development in the social sciences and humanities	541720	27	1	26	0	0	0
Other professional, scientific, and technical services	other 54	5,182	97 - 127 i	751	929	125 - 158	3,249
Health care services	621–23	1,928	26	889	579	50 - 317	116 - 386
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	11 - 77	1,024 - 1,065	0 - 1,720	170	100 - 12,787
All companies (number of domestic employees)	–	428,968	4,608	28,126	35,140	24,458	336,636
Small companies							
10–19[a]	–	4,432	977	2,974	334	146	0
20–49	–	10,040	1,567	6,158	2,079 - 2,126	191 - 236	0
Medium companies							
50–99	–	11,492	951	4,808	4,113	1,141	478
100–249	–	16,520	661	6,514	5,809	2,467	1,069
Large companies							
250–499	–	15,356	286	3,165	5,639	2,834	3,432
500–999	–	21,549	91	2,046	5,497	5,043	8,872
1,000–4,999	–	64,475	69	1,966	8,012	8,657	45,770
5,000–9,999	–	44,728	1	161	1,909	1,745	40,911
10,000–24,999	–	74,385	2	232	1,173	1,399	71,579
25,000 or more	–	165,991	1	102	529 - 577	788 - 833	164,525

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 36

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
All industries	21–23, 31–33, 42–81	428,968		3.8	4.0
Manufacturing industries	31–33	248,109		4.4	4.4
Food	311	3,937		0.7	0.7
Beverage and tobacco products	312	971		0.6	0.6
Textile, apparel, and leather products	313–16	873		1.3	1.4
Wood products	321	180		0.5	0.5
Paper	322	1,064		1.2	1.2
Printing and related support activities	323	420	i	0.7	0.7
Petroleum and coal products	324	1,203		0.4	0.4
Chemicals	325	87,288		7.5	7.5
Basic chemicals	3251	2,198		0.7	0.7
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		1.7	1.7
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		1.8	1.8
Pharmaceuticals and medicines	3254	78,652		14.7	14.7
Soap, cleaning compound, and toilet preparation	3256	2,596		2.3	2.3
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		2.0	2.0
Plastics and rubber products	326	2,770		1.4	1.4
Nonmetallic mineral products	327	1,473	i	2.7	3.2
Primary metals	331	649		0.5	0.5
Fabricated metal products	332	2,632		2.0	2.0
Machinery	333	13,930		3.8	3.8
Agricultural implement	33311	1,913		4.0	4.1
Semiconductor machinery	333242	3,854		15.6	15.6
Engine, turbine, and power transmission equipment	3336	1,096		3.0	3.0
Other machinery	other 333	7,067		2.8	2.8
Computer and electronic products	334	75,570		11.1	11.2
Communications equipment	3342	11,495		13.1	13.1
Semiconductor and other electronic components	3344	31,975	i	15.5	15.5
Navigational, measuring, electromedical, and control instruments	3345	10,912		6.0	6.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		10.4	10.4
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		4.5	4.5
Other measuring and controlling device	other 3345	4,395		5.7	5.7
Other computer and electronic products	other 334	21,188		10.6	10.6
Electrical equipment, appliances, and components	335	4,886		3.4	3.4
Transportation equipment	336	31,505		2.7	2.9
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		2.6	2.8
Aerospace products and parts	3364	8,900		3.2	3.2
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		3.1	3.1
Guided missile, space vehicle, and related parts	336414–15, 336419	559		6.6	6.6
Military armored vehicle, tank, and tank component	336992	25		2.6	2.6
Other transportation	other 336	1,697		2.2	2.2
Furniture and related products	337	407		1.0	1.0
Miscellaneous	339	18,352		5.3	5.3
Medical equipment and supplies	3391	15,812		6.4	6.5

TABLE 36

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
Other miscellaneous manufacturing	3399	2,540		2.5	2.5
Nonmanufacturing industries	21–23, 42–81	180,858		3.3	3.6
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		1.4	1.4
Utilities	22	237		0.1	0.1
Wholesale trade	42	1,104		0.9	0.9
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	D	D
Transportation and warehousing	48–49	9,504	i	3.4	3.4
Information	51	109,062		7.6	7.7
Publishing	511	32,447		17.3	17.4
Newspaper, periodical, book, and directory publishers	5111	61		5.6	5.9
Software publishers	5112	32,386		17.4	17.5
Telecommunications	517	3,700		0.7	0.7
Data processing, hosting, and related services	518	30,154		6.3	6.3
Other information	other 51	42,761		16.5	17.4
Finance and insurance	52	8,890		0.6	0.7
Real estate and rental and leasing	53	1,371		14.8	14.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,326		16.1	16.1
Professional, scientific, and technical services	54	29,131		6.0	6.0
Architectural, engineering, and related services	5413	2,288		2.2	2.3
Computer systems design and related services	5415	18,395		9.3	9.4
Scientific research and development services	5417	3,265		4.0	4.0
Research and development in biotechnology	541711	1,083		3.5	3.5
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155		4.4	4.5
Research and development in the social sciences and humanities	541720	27		2.3	2.3
Other professional, scientific, and technical services	other 54	5,182		4.9	4.9
Health care services	621–23	1,928		1.4	1.4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012		D	D
All companies (number of domestic employees)	–	428,968		3.8	4.0
Small companies					
10–19[c]	–	4,432		19.9	20.3
20–49	–	10,040		9.2	9.4
Medium companies					
50–99	–	11,492		9.5	9.7
100–249	–	16,520		6.2	6.3
Large companies					
250–499	–	15,356		5.1	5.2
500–999	–	21,549		5.8	5.9
1,000–4,999	–	64,475		4.4	4.4
5,000–9,999	–	44,728		3.9	4.1
10,000–24,999	–	74,385		3.5	3.6
25,000 or more	–	165,991		3.2	3.4

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 37

Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
All industries	21–23, 31–33, 42–81	466,504		4.2	4.4
Manufacturing industries	31–33	281,995		5.0	5.0
Food	311	4,127		0.7	0.7
Beverage and tobacco products	312	1,146		0.7	0.7
Textile, apparel, and leather products	313–16	890		1.4	1.4
Wood products	321	191		0.5	0.5
Paper	322	1,068		1.2	1.2
Printing and related support activities	323	426	i	0.7	0.7
Petroleum and coal products	324	1,450 - 1,550		D	D
Chemicals	325	112,954		9.7	9.7
Basic chemicals	3251	2,261		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,117		1.7	1.7
Pesticide, fertilizer, and other agricultural chemicals	3253	1,693		2.0	D
Pharmaceuticals and medicines	3254	103,704		19.3	19.4
Soap, cleaning compound, and toilet preparation	3256	2,887		2.6	2.6
Paint, coating, adhesive, and other chemicals	3255, 3259	1,292		2.0	D
Plastics and rubber products	326	2,823		1.4	1.4
Nonmetallic mineral products	327	1,496	i	2.7	3.2
Primary metals	331	663		0.5	0.5
Fabricated metal products	332	2,666		2.0	2.1
Machinery	333	14,345		3.9	4.0
Agricultural implement	33311	2,111		4.5	4.5
Semiconductor machinery	333242	3,859		15.6	15.6
Engine, turbine, and power transmission equipment	3336	1,114		3.0	3.0
Other machinery	other 333	7,260		2.9	2.9
Computer and electronic products	334	77,590		11.4	11.4
Communications equipment	3342	12,431		14.1	D
Semiconductor and other electronic components	3344	32,338		15.7	15.7
Navigational, measuring, electromedical, and control instruments	3345	11,292		6.2	6.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,235		10.8	10.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,558		4.7	4.7
Other measuring and controlling device	other 3345	4,499		5.8	5.8
Other computer and electronic products	other 334	21,530		10.7	D
Electrical equipment, appliances, and components	335	5,010		3.5	3.5
Transportation equipment	336	35,560		3.1	3.2
Motor vehicles, bodies, trailers, and parts	3361–63	24,254		3.0	3.2
Aerospace products and parts	3364	9,532		3.4	3.4
Aircraft, aircraft engine, and aircraft parts	336411–13	8,855		3.3	3.3
Guided missile, space vehicle, and related parts	336414–15, 336419	677		8.0	8.0
Military armored vehicle, tank, and tank component	336992	25		2.6	2.6
Other transportation	other 336	1,749		2.2	2.2
Furniture and related products	337	430		1.1	1.1
Miscellaneous	339	19,059 - 19,153		D	D

TABLE 37

Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
Medical equipment and supplies	3391	16,520		6.7	6.7
Other miscellaneous manufacturing	3399	2,539 - 2,632		D	D
Nonmanufacturing industries	21–23, 42–81	184,509		3.4	3.7
Mining, quarrying, oil and gas extraction, and support activities	21	2,657		1.5	1.5
Utilities	22	408		0.1	0.2
Wholesale trade	42	1,151		0.9	0.9
Electronic shopping and electronic auctions	454111–12	3,212 - 15,901	i	D	D
Transportation and warehousing	48–49	9,547	i	3.4	3.4
Information	51	111,123		7.7	7.8
Publishing	511	33,448		17.9	18.0
Newspaper, periodical, book, and directory publishers	5111	64		5.9	6.2
Software publishers	5112	33,384		17.9	18.0
Telecommunications	517	4,116		0.8	0.8
Data processing, hosting, and related services	518	30,403		6.3	6.3
Other information	other 51	43,156		16.7	17.4
Finance and insurance	52	9,208		0.6	0.7
Real estate and rental and leasing	53	1,378		14.9	14.9
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,333		16.2	16.2
Professional, scientific, and technical services	54	29,734		6.1	6.2
Architectural, engineering, and related services	5413	2,382		2.3	2.3
Computer systems design and related services	5415	18,524		9.4	9.5
Scientific research and development services	5417	3,581		4.4	4.4
Research and development in biotechnology	541711	1,201		3.8	3.8
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,353		4.8	4.9
Research and development in the social sciences and humanities	541720	27		2.3	2.3
Other professional, scientific, and technical services	other 54	5,247		5.0	5.0
Health care services	621–23	1,994		1.5	1.5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,407 - 14,098		D	D
All companies (number of domestic employees)	–	466,504		4.2	4.4
Small companies					
10–19[c]	–	4,946		22.2	22.6
20–49	–	11,254		10.3	10.5
Medium companies					
50–99	–	13,668		11.3	11.6
100–249	–	18,432		6.9	7.0
Large companies					
250–499	–	17,075		5.7	5.8
500–999	–	23,667		6.4	6.5
1,000–4,999	–	68,986		4.7	4.7
5,000–9,999	–	50,362		4.4	4.5

TABLE 37

Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)	Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
10,000–24,999	–	83,235	3.9	4.0
25,000 or more	–	174,879	3.3	3.6

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 38

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
All industries	21–23, 31–33, 42–81	63,989		36,350		760		2,090		453		8,127	i	831		1,803		343		4,479	i	8,751	
Manufacturing industries	31–33	37,564		22,248		430		1,193		301		6,351	i	432		1,051		325		899		4,335	
Food	311	243		149		2		7		1		15		17		12		0		5		36	
Beverage and tobacco products	312	111	i	63	i	0		5	i	1	i	8	i	4	i	9	i	0		13	i	10	i
Textile, apparel, and leather products	313–16	31		22		*	i	1	i	*	i	2	i	1	i	*		0		*	i	5	i
Wood products	321	6		4		0		0		*		*		*		*		0		*		1	
Paper	322	*		*		*	i	*	i	*	i	*	i	*	i	0		*	i	*	i	*	i
Printing and related support activities	323	0		0		0		0		0		0		0		0		0		0		0	
Petroleum and coal products	324	103		39 - 96		0		0 - 6		0		0 - 21		0 - 5		0 - 7		0		0 - 11		0 - 60	
Chemicals	325	9,775		5,921		360		461		134	i	547		193		486		88		395		1,189	
Basic chemicals	3251	162		108		0		0 - 21		4		13		*		15		0		4		0 - 21	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		62		0		*		0		1		1		11		0		0		4	
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		125 - 192		*	i	80 - 105		0 - 3		19		0 - 9		0 - 28		*		0 - 3		0 - 69	
Pharmaceuticals and medicines	3254	8,966		5,456		360		351		127	i	503		177		423		88		386		1,097	
Soap, cleaning compound, and toilet preparation	3256	164		105		*	i	7		*	i	7		8		12		*	i	4		20	
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		0 - 63		0		*		0 - 5		5		0 - 9		0 - 28		0		0 - 3		0 - 63	
Plastics and rubber products	326	85		58		0		*		3		13		*		1		*		1		9	i
Nonmetallic mineral products	327	35		20		0		0 - 6		*		2		2		2		0		0 - 11		0 - 12	
Primary metals	331	16		5		0		0		0		10		0 - 2		*		0		0		0 - 2	
Fabricated metal products	332	254		169		0		20		14		21		2		7		0		0 - 11		6 - 24	i
Machinery	333	1,254		828		*		18		11		244		6		49		4		45		49	
Agricultural implement	33311	9		3		0		0		0		1		*		0		3		0		1	
Semiconductor machinery	333242	604		493		0		1		1		57		1		43		*		3		7	
Engine, turbine, and power transmission equipment	3336	205		127		*		0		10		43		2		3		0		2	i	18	
Other machinery	other 333	436		205		0		18		1		143		3		3		1		40		23	
Computer and electronic products	334	11,159		7,099		67		366		68		1,536		103		301		61		185		1,375	
Communications equipment	3342	1,100	i	832	i	1	i	38	i	5	i	42	i	15	i	18	i	5	i	20	i	124	i
Semiconductor and other electronic components	3344	3,208		1,854		40		81		7		465		61		172		53		96		379	

TABLE 38

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
Navigational, measuring, electromedical, and control instruments	3345	6,650		4,265		26		235		54		1,022		25		104		3		57		860	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		132		0		21		1		15		5		5		*		5		42	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		4,030		24		210		49		997		19		94		3		35		800	
Other measuring and controlling device	other 3345	163		103		1		4		4		11		1		6		*		17		17	
Other computer and electronic products	other 334	201		148		*	i	12		1		7		1		7		*	i	11		12	
Electrical equipment, appliances, and components	335	377		202		*		48		7		51		2		16		6		4		40	
Transportation equipment	336	13,870	i	7,489	i	1		261	i	61		3,849	i	101	i	163	i	166	i	236	i	1,542	i
Motor vehicles, bodies, trailers, and parts	3361–63	3,233	i	1,674	i	0 - 1		173	i	36		328 - 757	i	84	i	106	i	137 - 167		62	i	206 - 603	
Aerospace products and parts	3364	9,458	i	5,140	i	0 - 1		21 - 89		14 - 18		3,053	i	0 - 18	i	32 - 58		*		139	i	940 - 1,059	i
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550	i	4,645	i	0		22	i	15		2,867	i	0 - 14	i	33		0		134	i	817 - 836	i
Guided missile, space vehicle, and related parts	336414–15, 336419	908		495		0 - 1		0 - 68		0 - 3		187		0 - 6		0 - 26		*		5	i	118 - 223	
Military armored vehicle, tank, and tank component	336992	10		0 - 8		0		0 - 8		0 - 1		3		0 - 8		*		0		0		0 - 8	
Other transportation	other 336	1,168		666 - 677	i	0 - 1	i	0 - 68	i	5 - 12	i	37 - 464	i	0 - 18	i	0 - 26	i	0 - 29	i	34	i	0 - 304	i
Furniture and related products	337	2		2		*	i	*	i	*	i	*	i	*	i	*		*	i	*	i	*	i
Miscellaneous	339	244		127 - 171		0		5		2		36 - 58		1		2 - 10		*		9		18 - 62	
Medical equipment and supplies	3391	202		128		0		4		2		37		1		3		*		8		19	
Other miscellaneous manufacturing	3399	42		0 - 43		0		*		*	i	0 - 21		*	i	0 - 7		*		*		0 - 43	
Nonmanufacturing industries	21–23, 42–81	26,425		14,102		330		898		152		1,777		400		752	i	18		3,579	i	4,416	
Mining, quarrying, oil and gas extraction, and support activities	21	183		69	i	0		0		*		21	i	3		6		1	i	5	i	78	i
Utilities	22	38		11		0 - 1		*		*		1		*		0 - 4		0		2		17 - 26	
Wholesale trade	42	87		64		0		2	i	1	i	3	i	3	i	1		*	i	*		12	i
Electronic shopping and electronic auctions	454111–12	43 - 61		16 - 61		0 - 26		*		0		0		0		0		0		0		*	i

TABLE 38

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Transportation and warehousing	48–49	386	70 i	0	6 i	17 i	3 i	1 i	*	0	84 i	204 i
Information	51	1,165	887	76	21	19	21	19	23	*	42	58
Publishing	511	572	401	46	9	18	17	7	10	*	28	36
Newspaper, periodical, book, and directory publishers	5111	*	0	* i	* i	* i	* i	* i	0	0	* i	* i
Software publishers	5112	572	401	46	9	18	17	7	10	*	28	36
Telecommunications	517	33	23	0	*	0 - 2	1	0 - 10	1	*	0 - 10	0 - 10
Data processing, hosting, and related services	518	404	378	0 - 20	0 - 13	1	2	4	1	* i	2	0 - 20
Other information	other 51	155	85	10 - 31	0 - 13	0 - 2	*	0 - 10	12	0	1 - 13	0 - 23
Finance and insurance	52	28	19	0	0	0	*	0	0	0	0	9 i
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	24,103	12,710	229 - 255	848	115	1,693	369	719 i	16	3,445 i	3,928 - 3,960
Architectural, engineering, and related services	5413	1,919	1,185	1	61	10	257	23	11	1	97	275
Computer systems design and related services	5415	2,651	1,796	110	28	6	45	30	15	4	40	578
Scientific research and development services	5417	18,403	9,074	119	542	89	1,320	306	677 i	12	3,300 i	2,963 i
Research and development in biotechnology	541711	5,374	2,473	34	138	8	304	66	122	2	1,249 i	977
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291 i	6,020	70	386	75	1,003	219 i	540 i	9	2,025 i	1,944 i
Research and development in the social sciences and humanities	541720	738	580 i	16	19	6	12	21	15	0	27 i	42
Other professional, scientific, and technical services	other 54	1,129	656	0 - 26	217	10	72	10	17	* i	8	111 - 143
Health care services	621–23	337	207	*	20	*	32	4	1	0	1	74
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58	0 - 53	0	*	*	2	1	0 - 4	0	1	0 - 39

TABLE 38

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
All companies (number of domestic employees)	–	63,989	36,350	760	2,090	453	8,127 i	831	1,803	343	4,479 i	8,751
Small companies												
10–19[a]	–	1,070	689	1 i	17	19	100	25	11	0 - 37	30	138 - 182
20–49	–	2,378	1,509	12	70	12	224	44	35	3	64	406
Medium companies												
50–99	–	2,529	1,349	14	98	21	334	59	50	6	160	438
100–249	–	3,274	1,894	78	122 i	20	357	67	70	34	132	500
Large companies												
250–499	–	3,527	1,876	74	210	28	551	69	78	14	125	503
500–999	–	2,420	1,489	11	96	24	286	36	77	8	79	314
1,000–4,999	–	11,196	6,469	257	491	86	1,117	205	553	55	630 i	1,333
5,000–9,999	–	6,083	3,497	84	222	45	500	91 i	299	50 i	665 i	630
10,000–24,999	–	13,878 i	7,957	208	428	124 i	752	149 i	385 i	141	2,158 i	1,576 i
25,000 or more	–	17,635	9,620	21	337	73	3,907 i	87	247	0 - 37 i	437	2,865 - 2,910

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 39

Domestic R&D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–599	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
All industries	21–23, 31–33, 42–81	63,989	1,070	2,378	2,529	3,274	3,527	2,420	11,196	6,083	13,878 i	17,635
Manufacturing industries	31–33	37,564	294 i	850	912	1,216	1,644	1,645	8,759	2,490	6,203	13,551 i
Food	311	243	0 - 25 i	1	7	80	6	24	86	3 - 42	0 - 9	0
Beverage and tobacco products	312	111 i	0	0	0	0	97 - 103 i	0	0	9	0	0 - 4 i
Textile, apparel, and leather products	313–16	31	0 - 23	0	0 - 10	0 - 18	4	0	0	0	0	0
Wood products	321	6	0	0	0	0	0	6	0	0	0	0
Paper	322	*	0	0	0	*	0	0	0	0	0	0
Printing and related support activities	323	0	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	103	0	0	0	0 - 18	0	64 - 104	0	0 - 39 i	0 - 9	0 - 4
Chemicals	325	9,775	42 i	179	391	388	333	272	3,795	596	3,578	200
Basic chemicals	3251	162	0 - 3	7	0 - 13	0 - 19	0	0	113	2 - 37	0	0 - 5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	0 - 3	* i	0 - 13 i	1	10	0	38 - 70	0	0 - 14	0
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345	0	0	0 - 13	0	*	0	275 - 345	0 - 35	0	0
Pharmaceuticals and medicines	3254	8,966	40 i	168	379	369	317	272	3,256	560	3,408	196
Soap, cleaning compound, and toilet preparation	3256	164	0	4	1	1 i	0	0	* i	0	158	0
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84	0 - 3	*	0 - 13	0 - 19	5	0	9 - 79	0	0 - 14	0 - 5
Plastics and rubber products	326	85	3	3	25	19	7	7	17	0	4 i	0
Nonmetallic mineral products	327	35	0	0	1	0 - 18	0 - 15	0	17	0 - 18	0	0
Primary metals	331	16	0 - 4	0 - 5	0	7	*	* i	6	*	0 - 5 i	0
Fabricated metal products	332	254	27 i	76	3	24	2	3	119	0	0	0
Machinery	333	1,254	24	103	179	108	20	69	583	164	0	3
Agricultural implement	33311	9	0	*	0	6	*	1	1	0	0	*
Semiconductor machinery	333242	604	1	47	0 - 48	1	0	0	506 - 557	0	0	0
Engine, turbine, and power transmission equipment	3336	205	12	9 i	2	1	9	11	2	160	0	0
Other machinery	other 333	436	11	47	128 - 178	101	11	57	22 - 76	5	0	2
Computer and electronic products	334	11,159	28	420	200	394	868	644	1,790	869 i	1,210 i	4,736

TABLE 39

Domestic R&D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–599	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Communications equipment	3342	1,100 i	0 - 18	*	37	24	5 - 150	7	14 i	493 - 599 i	280 - 394 i	0
Semiconductor and other electronic components	3344	3,208	0 - 18	351	50	264	677	460	1,295	88 - 113	1	0
Navigational, measuring, electromedical, and control instruments	3345	6,650	11	65	111	102	41 - 147	80 - 179	398	182 - 262	817 i	4,736
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225	6	18	38	47	0	81	31	0	4	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262	0	40	0 - 74	42	42	0	332	181 - 261	813 i	4,736
Other measuring and controlling device	other 3345	163	5	7	0 - 74	13	0 - 105	0 - 98	35	1	0	0
Other computer and electronic products	other 334	201	0 - 18	3	3 i	4	0 - 110	0 - 98 i	83	0	0 - 110	0
Electrical equipment, appliances, and components	335	377	22 i	11	11	7	7	16	48	0	254	0
Transportation equipment	336	13,870 i	109 i	10	85	152 i	238	493	2,250 i	804 i	1,146	8,584 i
Motor vehicles, bodies, trailers, and parts	3361–63	3,233 i	5	0	0 - 28	0 - 120 i	233	295	1,424 i	565 i	0 - 482	87 - 714
Aerospace products and parts	3364	9,458 i	99 i	10	56 - 85	33 i	1	171 - 199 i	816	236	665	7,340 i
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550 i	1	2	33 - 62	32 i	*	171 - 199 i	65	208	665	7,340 i
Guided missile, space vehicle, and related parts	336414–15, 336419	908	98 i	8	23	1	*	0	750	27	0	0
Military armored vehicle, tank, and tank component	336992	10	5	0	1	0	4	0	0	0	0	0
Other transportation	other 336	1,168	0	0	1	0 - 120	0	0 - 28	10	3	0 - 482	529 - 1,156
Furniture and related products	337	2	0	0 - 3	*	0 - 3	0 - 3	*	0	0	0	0
Miscellaneous	339	244	18	45 - 50	1 - 14	23 - 41	34 - 67	3 - 41	48	0	6	27
Medical equipment and supplies	3391	202	18	46	2	24	35	4	41	0	6	27
Other miscellaneous manufacturing	3399	42	* i	0 - 5	0 - 13	0 - 18 i	0 - 33	0 - 36	7	0	0	0
Nonmanufacturing industries	21–23, 42–81	26,425	775	1,528	1,617	2,058	1,883	775	2,437	3,592	7,675 i	4,084
Mining, quarrying, oil and gas extraction, and support activities	21	183	5	0	99	0	0	2	0	0	76 i	0
Utilities	22	38	0	1 - 6	0 - 2	0	0	0	1	0	0	33

TABLE 39

Domestic R&D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19[a]	20–49	50–99	100–249	250–499	500–599	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Wholesale trade	42	87	0 - 10	12	17 i	35	11 - 25 i	0	0	0	0	0
Electronic shopping and electronic auctions	454111–12	43 - 61	0	0	0	* i	43 - 61	0	0	0	0	0
Transportation and warehousing	48–49	386	0	0	0	0	0	4	382	0	0	0
Information	51	1,165	37	184	53	123	44	137	218	81	104	183
Publishing	511	572	0 - 32	46	39	0 - 124	14	0 - 102	127	0 - 82	0	182
Newspaper, periodical, book, and directory publishers	5111	*	0	0	*	0	0	0	0	0	0	0
Software publishers	5112	572	0 - 32	46	39	0 - 124	14	0 - 102	127	0 - 82	0	182
Telecommunications	517	33	6	27	0	0	0	0	1 i	0	0	0
Data processing, hosting, and related services	518	404	0 - 20	111	14	0 - 20	30	36	91	0	104	2
Other information	other 51	155	0 - 32	0	0	0 - 124	0	0 - 102	0	0 - 82	0	0
Finance and insurance	52	28	0	0	0	28	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	24,103	724	1,324	1,408	1,847	1,759	627	1,552	3,499 i	7,495 i	3,867
Architectural, engineering, and related services	5413	1,919	83	199	141	345	320	29	60	133	32	577
Computer systems design and related services	5415	2,651	43	276	209	142	53	55	0	0	1,480	393
Scientific research and development services	5417	18,403	562	721	854	1,163	1,121	489	1,490	3,366 i	5,983 i	2,655
Research and development in biotechnology	541711	5,374	166	183	214	228	61	2	0	0	1,866	2,655
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291 i	392	530	594	902	1,061	487	1,213 i	2,996 i	4,117 i	0
Research and development in the social sciences and humanities	541720	738	4	8	46	34	0	0	277	370	0	0
Other professional, scientific, and technical services	other 54	1,129	36	128	205	198	264	54	2	0	0	243
Health care services	621–23	337	0	1	34	16	9	4	273	*	0	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58	0 - 10	0 - 9	2 - 9	9	1	*	11	12	0	0

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 40

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
All industries	21–23, 31–33, 42–81	63,989		6,324		14,333		43,332	
Manufacturing industries	31–33	37,564		3,969	i	7,083		26,513	
Food	311	243		17		70		155	
Beverage and tobacco products	312	111	i	11	i	23	i	77	i
Textile, apparel, and leather products	313–16	31		0		22		9	
Wood products	321	6		0		0		6	
Paper	322	*		0 - 1		0 - 1		0	
Printing and related support activities	323	0		0		0		0	
Petroleum and coal products	324	103		0 - 29	i	0 - 29	i	54 - 99	i
Chemicals	325	9,775		1,878		1,572		6,324	
Basic chemicals	3251	162		25		53		83	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		3	i	21	i	55	i
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		70		205 - 276		0 - 46	
Pharmaceuticals and medicines	3254	8,966		1,766		1,186		6,014	
Soap, cleaning compound, and toilet preparation	3256	164		12		27		125	
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		2		8 - 79		3 - 50	
Plastics and rubber products	326	85		1		15		69	
Nonmetallic mineral products	327	35		2		8		26	
Primary metals	331	16		5		2		9	
Fabricated metal products	332	254		14		109		131	
Machinery	333	1,254		32		172		1,050	
Agricultural implement	33311	9		1		3		5	
Semiconductor machinery	333242	604		0 - 26		8 - 111		493 - 571	
Engine, turbine, and power transmission equipment	3336	205		7		13	i	185	
Other machinery	other 333	436		0 - 26		43 - 148		288 - 368	
Computer and electronic products	334	11,159		457		1,858		8,844	
Communications equipment	3342	1,100	i	7		172	i	921	i
Semiconductor and other electronic components	3344	3,208		294		757		2,157	
Navigational, measuring, electromedical, and control instruments	3345	6,650		136		894		5,621	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		6		27		192	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		113		839		5,310	
Other measuring and controlling device	other 3345	163		17		27		119	
Other computer and electronic products	other 334	201		21		35		144	i
Electrical equipment, appliances, and components	335	377		17		23		337	
Transportation equipment	336	13,870	i	1,505	i	3,153	i	9,211	i
Motor vehicles, bodies, trailers, and parts	3361–63	3,233	i	9 - 72		1,684 - 1,749	i	1,476	
Aerospace products and parts	3364	9,458	i	1,434	i	1,342	i	6,683	i
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550	i	1,431	i	1,339	i	5,780	i
Guided missile, space vehicle, and related parts	336414–15, 336419	908		3		3		903	
Military armored vehicle, tank, and tank component	336992	10		0		0 - 11		0 - 11	
Other transportation	other 336	1,168		0 - 63		51 - 128		1,041 - 1,054	
Furniture and related products	337	2		1		1		*	
Miscellaneous	339	244		6 - 35		32 - 62		172 - 204	
Medical equipment and supplies	3391	202		7		33		162	

TABLE 40

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
Other miscellaneous manufacturing	3399	42		0 - 29		0 - 29		10 - 41	
Nonmanufacturing industries	21–23, 42–81	26,425		2,355		7,250		16,819	i
Mining, quarrying, oil and gas extraction, and support activities	21	183		15		42		125	
Utilities	22	38		5		6		27	
Wholesale trade	42	87		14		6	i	68	i
Electronic shopping and electronic auctions	454111–12	43 - 61		*	i	*	i	42 - 61	
Transportation and warehousing	48–49	386		0		0		386	i
Information	51	1,165		201		226		738	
Publishing	511	572		46		102		424	
Newspaper, periodical, book, and directory publishers	5111	*		*		0		0	
Software publishers	5112	572		46		102		424	
Telecommunications	517	33		0 - 30		0 - 30		3 - 27	
Data processing, hosting, and related services	518	404		84		34		286	
Other information	other 51	155		40 - 72		58 - 91		2 - 27	
Finance and insurance	52	28		0		27		1	
Real estate and rental and leasing	53	0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0	
Professional, scientific, and technical services	54	24,103		2,112		6,620		15,372	i
Architectural, engineering, and related services	5413	1,919		117		854		949	
Computer systems design and related services	5415	2,651		449		914		1,288	
Scientific research and development services	5417	18,403		1,515		4,720		12,168	i
Research and development in biotechnology	541711	5,374		717		212		4,445	i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	378		4,288		7,626	i
Research and development in the social sciences and humanities	541720	738		421		221	i	97	i
Other professional, scientific, and technical services	other 54	1,129		31		132		966	
Health care services	621–23	337		5		316		16	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58		3	i	7		23 - 48	i
All companies (number of domestic employees)	–	63,989		6,324		14,333		43,332	
Small companies									
10–19[a]	–	1,070		63		342		664	
20–49	–	2,378		109		525		1,744	
Medium companies									
50–99	–	2,529		185		638		1,707	
100–249	–	3,274		408		781		2,085	
Large companies									
250–499	–	3,527		267		786	i	2,474	
500–999	–	2,420		168		311		1,941	
1,000–4,999	–	11,196		1,764		3,296		6,137	
5,000–9,999	–	6,083		436		1,929		3,718	i
10,000–24,999	–	13,878	i	580	i	2,817	i	10,481	i
25,000 or more	–	17,635		2,344	i	2,908		12,382	

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 41

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		Foreign government agencies		U.S. universities, colleges, and academic researchers		Foreign universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
All industries	21–23, 31–33, 42–81	63,989		21,461		17,563		1,991		21,941		100 - 192		123		47		3 - 16		627 - 719		32 - 44	
Manufacturing industries	31–33	37,564		5,470		14,290		1,459		16,023	i	14 - 107		119		8		0 - 11		72 - 164		11 - 23	
Food	311	243		5	i	234		2		*	i	0		0		*	i	0		1	i	0	
Beverage and tobacco products	312	111	i	*	i	111	i	0		0		0		0		0		0		0		0	
Textile, apparel, and leather products	313–16	31		6	i	*	i	5	i	7	i	0		0		*	i	0		12	i	0	
Wood products	321	6		0		6		0		0		0		0		0		0		0		0	
Paper	322	*		*	i	0		*	i	*	i	0		0		0		0		*	i	*	i
Printing and related support activities	323	0		0		0		0		0		0		0		0		0		0		0	
Petroleum and coal products	324	103		0 - 21		72 - 104		0 - 9	i	*	i	0		0		0		0		0		0	
Chemicals	325	9,775		1,967		6,643		816		289		1		*		6		0 - 10		45		0 - 10	
Basic chemicals	3251	162		19		141		*		2	i	0		0		0		0		0		0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		0 - 7		61 - 77		1	i	*	i	*	i	0		0 - 1	i	0		0 - 10	i	*	i
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		0 - 7		287 - 345		0 - 15		0 - 8	i	0		0		0		0		0 - 10		0 - 10	
Pharmaceuticals and medicines	3254	8,966		1,938		5,906		801		269		0 - 2		*		6		0 - 9		35 - 43		0 - 9	
Soap, cleaning compound, and toilet preparation	3256	164		5		158		1	i	*	i	0		0		0		0		*	i	*	i
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		0 - 7	i	14 - 72		0 - 15	i	11 - 20		0 - 2	i	0		0 - 1	i	0 - 10		0 - 10	i	0 - 10	i
Plastics and rubber products	326	85		75	i	10		*	i	*	i	0		0		0		0		0		1	
Nonmetallic mineral products	327	35		2	i	31		*	i	2	i	0		*		*	i	0		*	i	*	i
Primary metals	331	16		0 - 10		0 - 10	i	5		2		0		*	i	*		0		0		0	
Fabricated metal products	332	254		190		60	i	*	i	4		0		0		*	i	0		*	i	*	i
Machinery	333	1,254		371		632		57		193		1	i	*		0		0		*	i	*	
Agricultural implement	33311	9		1	i	6		*	i	1	i	*	i	0		0		0		0		0	
Semiconductor machinery	333242	604		48		497 - 557		0 - 58		*	i	0		0		0		0		0		*	

TABLE 41

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other	
				Company's parent	Unaffiliated companies						In the United States	Outside the United States
Engine, turbine, and power transmission equipment	3336	205	40	11	0	155	* i	0	0	0	*	0
Other machinery	other 333	436	282	57 - 117	0 - 58	37	1 i	*	0	0	* i	0
Computer and electronic products	334	11,159	1,679	3,283	321	5,802	0 - 23	36	1	0 - 2 i	14 - 37	2 - 6
Communications equipment	3342	1,100 i	298 - 471 i	124 - 297	0 - 53	320 - 453 i	* i	* i	*	0	3 i	* i
Semiconductor and other electronic components	3344	3,208	213	2,379	142	468	*	0	1	0 - 2 i	5	0 - 2 i
Navigational, measuring, electromedical, and control instruments	3345	6,650	997	609	128 i	4,852	0 - 22	36	*	0	6 - 28	3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225	15 i	192	* i	11 i	* i	0	0	0	7 i	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262	944	332	119 i	4,813	0 - 21	33	*	0	0 - 21	3
Other measuring and controlling device	other 3345	163	38	85	9	28	0	3	* i	0	0	0
Other computer and electronic products	other 334	201	0 - 170	0 - 170	0 - 53	31 - 161	*	* i	0	0	1	0
Electrical equipment, appliances, and components	335	377	30 i	315	2	27	1	0	1	0	*	0
Transportation equipment	336	13,870 i	1,031	2,778	242	9,652 i	0 - 79	82 i	*	0	0 - 79	9 i
Motor vehicles, bodies, trailers, and parts	3361–63	3,233 i	0 - 374 i	2,564	190	38 - 481	0 - 79	* i	0	0	0 - 79	* i
Aerospace products and parts	3364	9,458 i	658	124 - 205 i	52	8,454 i	1	82 i	*	0	0 - 79	9 i
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550 i	646	124 - 205 i	52	7,558 i	1	82 i	*	0	0 - 79	9 i
Guided missile, space vehicle, and related parts	336414–15, 336419	908	12	0	0	896	0	0	*	0	0	0
Military armored vehicle, tank, and tank component	336992	10	0 - 11	0	0	0 - 11	0 - 11	0	0	0	0	0
Other transportation	other 336	1,168	0 - 374	8 - 91	0	706 - 1,160	0	0	0	0	0	0
Furniture and related products	337	2	0 - 2 i	0	* i	0 - 3 i	* i	* i	0	0	* i	* i

TABLE 41

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other	
				Company's parent	Unaffiliated companies						In the United States	Outside the United States
Miscellaneous	339	244	98 - 120	72 - 104	4 - 14	36 - 48	*	0	0	0	2	* i
Medical equipment and supplies	3391	202	99	73	5	25	*	0	0	0	* i	* i
Other miscellaneous manufacturing	3399	42	0 - 21	0 - 30	0 - 9	11 - 24	0	0	0	0	2	0
Nonmanufacturing industries	21–23, 42–81	26,425	15,991 i	3,273	532	5,918	85	5	39	4	556	21
Mining, quarrying, oil and gas extraction, and support activities	21	183	72	92	17	1	0	0	0	0	0	* i
Utilities	22	38	0	0 - 8	0	27 - 34	3	0	0	0	0	0
Wholesale trade	42	87	12 i	76 i	* i	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111–12	43 - 61	0	35 - 61	0	0 - 8 i	0	0	0	0	0	0
Transportation and warehousing	48–49	386	384	0	0	2	0	0	0	0	0	0
Information	51	1,165	81	674	186	185	* i	* i	*	0	38	*
Publishing	511	572	4	345	131	57	* i	* i	0	0	35	* i
Newspaper, periodical, book, and directory publishers	5111	*	0	0	* i	* i	0	0	0	0	* i	0
Software publishers	5112	572	4	345	131	57	* i	* i	0	0	35	* i
Telecommunications	517	33	2 i	12 - 28	0 - 14 i	4 i	0	0	0	0	1 i	0
Data processing, hosting, and related services	518	404	66	178	43	116	*	0	*	0	0	*
Other information	other 51	155	9	122 - 138	0 - 14 i	8 i	0	0	0	0	2 i	0
Finance and insurance	52	28	28	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	24,103	15,076 i	2,362	312	5,685	81	5	39	4	518	21
Architectural, engineering, and related services	5413	1,919	509	44	14	1,214	49	3	12	3	63	8
Computer systems design and related services	5415	2,651	489	1,491	12	454	5	* i	*	* i	201	0
Scientific research and development services	5417	18,403	13,741 i	760 i	242	3,343	24	2	25	1 i	252	13 i
Research and development in biotechnology	541711	5,374	4,851	231 i	38	108	9	1	2 i	0	129 i	6 i

TABLE 41

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		Foreign government agencies		U.S. universities, colleges, and academic researchers		Foreign universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	8,861	i	530	i	204		2,571		6		1		21		1	i	90		7	
Research and development in the social sciences and humanities	541720	738		30		0		0		664		9		0		2		0		33		0	
Other professional, scientific, and technical services	other 54	1,129		337		67		44		674		4		0		1		*		2		*	i
Health care services	621–23	337		331		0		4		2		0		0		0		0		*	i	0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58		8	i	0 - 29		12		9 - 19		1	i	*	i	0		0		*		0	
All companies (number of domestic employees)	–	63,989		21,461		17,563		1,991		21,941		100 - 192		123		47		3 - 16		627 - 719		32 - 44	
Small companies																							
10–19[a]	–	1,070		315	i	99	i	42	i	502		16		1		7		3		80		6	i
20–49	–	2,378		766		595		65	i	811		6		4		20		0 - 6		107		0 - 6	
Medium companies																							
50–99	–	2,529		796		573		211		697		10		*		7		0 - 5		232		0 - 5	
100–249	–	3,274		1,029		1,060		87		988		0 - 92		*		10		0 - 11	i	0 - 93		0 - 11	
Large companies																							
250–499	–	3,527		623		1,216		189		1,393		10		*	i	1		0		87		8	
500–999	–	2,420		566		1,439		153		248	i	7		*	i	1	i	0		6	i	1	
1,000–4,999	–	11,196		1,924	i	6,993		507		1,710		28		3		*		*		31		*	i
5,000–9,999	–	6,083		3,908	i	795		346		977		0 - 56		*		2		0		0 - 56		2	
10,000–24,999	–	13,878	i	7,183	i	4,623		295	i	1,717	i	18		36		0		0		5		0	
25,000 or more	–	17,635		4,352		171		97		12,897	i	9		79	i	0		0 - 13	i	20		0 - 13	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 42

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
All industries	21–23, 31–33, 42–81	63,989		0.6	0.6
Manufacturing industries	31–33	37,564		0.7	0.7
Food	311	243		*	*
Beverage and tobacco products	312	111	i	0.1	0.1
Textile, apparel, and leather products	313–16	31		*	*
Wood products	321	6		*	*
Paper	322	*		*	*
Printing and related support activities	323	0		0.0	0.0
Petroleum and coal products	324	103		*	*
Chemicals	325	9,775		0.8	0.8
Basic chemicals	3251	162		0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		0.1	0.1
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		D	D
Pharmaceuticals and medicines	3254	8,966		1.7	1.7
Soap, cleaning compound, and toilet preparation	3256	164		0.1	0.1
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		D	D
Plastics and rubber products	326	85		*	*
Nonmetallic mineral products	327	35		0.1	0.1
Primary metals	331	16		*	*
Fabricated metal products	332	254		0.2	0.2
Machinery	333	1,254		0.3	0.3
Agricultural implement	33311	9		*	*
Semiconductor machinery	333242	604		2.4	2.4
Engine, turbine, and power transmission equipment	3336	205		0.6	0.6
Other machinery	other 333	436		0.2	0.2
Computer and electronic products	334	11,159		1.6	1.6
Communications equipment	3342	1,100	i	1.2	1.3
Semiconductor and other electronic components	3344	3,208		1.6	1.6
Navigational, measuring, electromedical, and control instruments	3345	6,650		3.6	3.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		0.8	0.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		8.2	8.2
Other measuring and controlling device	other 3345	163		0.2	0.2
Other computer and electronic products	other 334	201		0.1	0.1
Electrical equipment, appliances, and components	335	377		0.3	0.3
Transportation equipment	336	13,870	i	1.2	1.3
Motor vehicles, bodies, trailers, and parts	3361–63	3,233	i	0.4	0.4
Aerospace products and parts	3364	9,458	i	3.4	3.4
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550	i	3.1	3.1
Guided missile, space vehicle, and related parts	336414–15, 336419	908		10.7	10.7
Military armored vehicle, tank, and tank component	336992	10		1.1	1.1
Other transportation	other 336	1,168		1.5	1.5
Furniture and related products	337	2		*	*
Miscellaneous	339	244		0.1	0.1

TABLE 42

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
Medical equipment and supplies	3391	202		0.1	0.1
Other miscellaneous manufacturing	3399	42		*	*
Nonmanufacturing industries	21–23, 42–81	26,425		0.5	0.5
Mining, quarrying, oil and gas extraction, and support activities	21	183		0.1	0.1
Utilities	22	38		*	*
Wholesale trade	42	87		0.1	0.1
Electronic shopping and electronic auctions	454111–12	43 - 61		D	D
Transportation and warehousing	48–49	386		0.1	0.1
Information	51	1,165		0.1	0.1
Publishing	511	572		0.3	0.3
Newspaper, periodical, book, and directory publishers	5111	*		*	*
Software publishers	5112	572		0.3	0.3
Telecommunications	517	33		*	*
Data processing, hosting, and related services	518	404		0.1	0.1
Other information	other 51	155		0.1	0.1
Finance and insurance	52	28		*	*
Real estate and rental and leasing	53	0		0.0	0.0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	0		0.0	0.0
Professional, scientific, and technical services	54	24,103		5.0	5.0
Architectural, engineering, and related services	5413	1,919		1.9	1.9
Computer systems design and related services	5415	2,651		1.3	1.4
Scientific research and development services	5417	18,403		22.7	22.8
Research and development in biotechnology	541711	5,374		17.2	17.2
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	25.3	25.4
Research and development in the social sciences and humanities	541720	738		61.6	62.9
Other professional, scientific, and technical services	other 54	1,129		1.1	1.1
Health care services	621–23	337		0.3	0.3
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58		D	D
All companies (number of domestic employees)	–	63,989		0.6	0.6
Small companies					
10–19[c]	–	1,070		4.8	4.9
20–49	–	2,378		2.2	2.2
Medium companies					
50–99	–	2,529		2.1	2.1
100–249	–	3,274		1.2	1.2
Large companies					
250–499	–	3,527		1.2	1.2
500–999	–	2,420		0.7	0.7
1,000–4,999	–	11,196		0.8	0.8
5,000–9,999	–	6,083		0.5	0.6
10,000–24,999	–	13,878	i	0.7	0.7

TABLE 42

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)	Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
25,000 or more	–	17,635	0.3	0.4

* = amount < $500,000 or less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 43

Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
All industries	21–23, 31–33, 42–81	72,331		0.6	0.7
Manufacturing industries	31–33	44,239		0.8	0.8
Food	311	246		*	*
Beverage and tobacco products	312	114	i	0.1	0.1
Textile, apparel, and leather products	313–16	31		*	*
Wood products	321	6		*	*
Paper	322	*		*	*
Printing and related support activities	323	0		0.0	0.0
Petroleum and coal products	324	102 - 106		D	D
Chemicals	325	14,675		1.3	1.3
Basic chemicals	3251	163		0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	79 - 128		D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	341 - 345		D	D
Pharmaceuticals and medicines	3254	13,789		2.6	2.6
Soap, cleaning compound, and toilet preparation	3256	195		0.2	0.2
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 109		D	D
Plastics and rubber products	326	114		0.1	0.1
Nonmetallic mineral products	327	35		0.1	0.1
Primary metals	331	19		*	*
Fabricated metal products	332	274		0.2	0.2
Machinery	333	1,312		0.4	0.4
Agricultural implement	33311	9		*	*
Semiconductor machinery	333242	643		2.6	2.6
Engine, turbine, and power transmission equipment	3336	219		0.6	0.6
Other machinery	other 333	441		0.2	0.2
Computer and electronic products	334	11,749		1.7	1.7
Communications equipment	3342	1,133 - 1,136	i	D	D
Semiconductor and other electronic components	3344	3,263		1.6	1.6
Navigational, measuring, electromedical, and control instruments	3345	7,141		3.9	3.9
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	234		0.8	0.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,701		8.8	8.8
Other measuring and controlling device	other 3345	205		0.3	0.3
Other computer and electronic products	other 334	210 - 213		D	D
Electrical equipment, appliances, and components	335	378		0.3	0.3
Transportation equipment	336	14,897	i	1.3	1.4
Motor vehicles, bodies, trailers, and parts	3361–63	3,398	i	0.4	0.5
Aerospace products and parts	3364	10,317	i	3.7	3.7
Aircraft, aircraft engine, and aircraft parts	336411–13	9,409	i	3.5	3.5
Guided missile, space vehicle, and related parts	336414–15, 336419	908		10.7	10.7
Military armored vehicle, tank, and tank component	336992	10		1.1	1.1
Other transportation	other 336	1,171		1.5	1.5
Furniture and related products	337	2		*	*
Miscellaneous	339	277 - 284		D	D

TABLE 43

Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
Medical equipment and supplies	3391	235		0.1	0.1
Other miscellaneous manufacturing	3399	42 - 48		D	D
Nonmanufacturing industries	21–23, 42–81	28,092		0.5	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	183		0.1	0.1
Utilities	22	49		*	*
Wholesale trade	42	90		0.1	0.1
Electronic shopping and electronic auctions	454111–12	43 - 61		D	D
Transportation and warehousing	48–49	386		0.1	0.1
Information	51	1,236		0.1	0.1
Publishing	511	616		0.3	0.3
Newspaper, periodical, book, and directory publishers	5111	*		*	*
Software publishers	5112	616		0.3	0.3
Telecommunications	517	34		*	*
Data processing, hosting, and related services	518	424		0.1	0.1
Other information	other 51	161		0.1	0.1
Finance and insurance	52	28		*	*
Real estate and rental and leasing	53	0		0.0	0.0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	0		0.0	0.0
Professional, scientific, and technical services	54	25,681		5.3	5.3
Architectural, engineering, and related services	5413	2,289		2.2	2.3
Computer systems design and related services	5415	2,697		1.4	1.4
Scientific research and development services	5417	19,484		24.0	24.1
Research and development in biotechnology	541711	5,491		17.6	17.6
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,132	i	27.0	27.1
Research and development in the social sciences and humanities	541720	860		71.8	73.3
Other professional, scientific, and technical services	other 54	1,211		1.1	1.2
Health care services	621–23	341		0.3	0.3
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58		D	D
All companies (number of domestic employees)	–	72,331		0.6	0.7
Small companies					
10–19[c]	–	1,212		5.4	5.5
20–49	–	2,731		2.5	2.5
Medium companies					
50–99	–	2,901		2.4	2.4
100–249	–	3,621		1.4	1.4
Large companies					
250–499	–	3,929		1.3	1.3
500–999	–	2,613		0.7	0.7
1,000–4,999	–	13,418		0.9	0.9
5,000–9,999	–	6,642		0.6	0.6
10,000–24,999	–	16,025		0.8	0.8

TABLE 43

Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)	Percent of domestic sales of R&D performers or funders[a]	Percent of domestic sales of R&D performers[b]
25,000 or more	–	19,239	0.4	0.4

* = amount < $500,000 or less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 44

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
All business activities	21100–81000	41,016	
Oil and gas extraction	21100	46	
Mining	21200	46	
Support activities for mining, including oil and gas	21300	78	
Utilities	22100	1	
Construction	23000	12	
Food manufacturing	31100	216	
Beverage manufacturing	31210	107	
Tobacco manufacturing	31220	9	
Textile, apparel, and leather products manufacturing	31990	*	i
Wood products manufacturing	32100	6	
Paper manufacturing	32200	91	
Printing and related support activities	32300	0	
Petroleum refineries	32401	18	
Asphalt paving, roofing, and saturated materials manufacturing	32402	0	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	*	
Basic chemicals manufacturing	32510	94	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	74	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	0 - 1,155	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	14,149	
In vitro diagnostic substances manufacturing	32542	5	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	7,109	
Soap, cleaning compound, and toilet preparations manufacturing	32591	187	
Paint, adhesive, and other chemical manufacturing	32592	19	
Plastics and rubber products manufacturing	32600	31	i
Clay and glass products manufacturing	32710	1	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	9	
Primary metal manufacturing	33100	5	
Fabricated metal products manufacturing	33200	181	
Agricultural machinery and equipment manufacturing	33311	8	
Construction machinery manufacturing	33312	6	
Mining, oil, and gas field machinery and equipment manufacturing	33319	71	i
Semiconductor machinery manufacturing	33321	0 - 1,155	
Industrial machinery manufacturing (except semiconductor machinery)	33322	75	
Photographic and photocopying equipment manufacturing	33331	0	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	7	
Digital cameras manufacturing	33333	0	
Engine, turbine, and power transmission equipment manufacturing	33360	185	
Metalworking and other general purpose machinery manufacturing	33390	43	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	51	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	0 - 1,155	
Radio, television, and wireless communication equipment manufacturing	33422	604	i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	83	
Audio and video equipment manufacturing	33430	4	
Semiconductor and other electronic components manufacturing	33440	2,881	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	49	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	972	

TABLE 44

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	90	
Electrical equipment, appliances, and components manufacturing	33500	759	
Motor vehicles manufacturing	33610	2,455	i
Motor vehicle body and trailer manufacturing	33620	0	
Motor vehicle parts manufacturing	33630	962	i
Aircraft manufacturing	33641	618	
Aircraft engine and engine parts manufacturing	33642	321	
Other aircraft parts and auxiliary equipment manufacturing	33643	78	
Guided missiles, space vehicles, and related parts manufacturing	33644	355	
Railroad rolling stock manufacturing	33651	0 - 1,155	
Ship and boat building	33660	38	
Motorcycle, bicycle, and parts manufacturing	33691	14	
Military armored vehicle, tank, and tank components manufacturing	33692	0 - 1,155	
All other transportation equipment manufacturing	33699	6	
Furniture and related products manufacturing	33700	1	
Medical equipment and supplies manufacturing	33910	552	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	63	
Merchant wholesalers, durable goods	42300	44	i
Merchant wholesalers, nondurable goods	42400	8	i
Wholesale electronic markets and agents and brokers (business to business)	42500	0	
Retail trade (except electronic shopping and electronic auctions)	44000	41	
Electronic shopping and electronic auctions	45411	0 - 1,155	
Transportation	48000	386	
Couriers, messengers, and express delivery services	49200	0	
Warehousing and storage	49300	*	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	0	
Software publishers (except Internet)	51120	305	
Motion picture and sound recording (except Internet)	51200	0	
Broadcasting (except Internet)	51500	0	
Wired telecommunications carriers	51710	6	
Wireless telecommunications carriers (except satellite)	51720	6	
Satellite telecommunications	51740	2	
Other telecommunications (not listed elsewhere)	51790	17	
Data processing, hosting, and related services	51800	26	
Cloud computing applications and Internet-based software services	51801	150	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	0 - 1,155	
Finance: banking and credit intermediation	52200	*	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	35	
Insurance carriers and related activities	52400	0	
Real estate	53100	0	
Rental and leasing services	53200	2	
Lessors of nonfinancial intangible assets, including patent licensing	53300	0	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	0	
Architectural, engineering, and related services	54130	269	
Specialized design services	54140	7	
Computer systems design and related services	54150	1,608	
Management, scientific, and technical consulting services	54160	1	

TABLE 44

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
Research and development services in social sciences and humanities	54172	2	
Research and development services in biotechnology	54173	104	i
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,088	i
Advertising and related services	54180	0	
Professional, scientific, and technical services (not listed elsewhere)	54190	269	
Management of companies and enterprises	55100	11	
Administrative and support services	56100	0	
Waste management and remediation services	56200	2	
Offices of physicians	62110	5	
Medical and diagnostic laboratories	62150	0	
Other ambulatory health care services (ambulance, dental, home health care)	62199	0	
Hospitals and nursing care facilities	62200	1	
Social assistance services	62400	0	
Arts, entertainment, and recreation	71000	*	
Accommodation and food services	72000	5	
Other services (not listed elsewhere)	81000	53	
Undistributed	–	603	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Data are tabulated independent of the industry classification and business activities of the company that performs R&D.
[b] Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

Note(s):
Detail may not add to total because of rounding. For an R&D performer that did not report the R&D funders' business activities, no systematic imputation of these business activities was conducted. The business activities of the R&D funders may not be assumed to be the same as those of the R&D performer. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 45

Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
All industries	21–23, 31–33, 42–81	21,941		2,313	i	4,883		14,745	
Manufacturing industries	31–33	16,023	i	1,590	i	2,391	i	12,042	i
Food	311	*	i	*	i	0		*	i
Beverage and tobacco products	312	0		0		0		0	
Textile, apparel, and leather products	313–16	7	i	0		4	i	3	
Wood products	321	0		0		0		0	
Paper	322	*	i	*	i	0		0	
Printing and related support activities	323	0		0		0		0	
Petroleum and coal products	324	*	i	0		*	i	0	
Chemicals	325	289		13		57		219	
Basic chemicals	3251	2	i	*	i	*	i	2	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*	i	*	i	*	i	*	i
Pesticide, fertilizer, and other agricultural chemicals	3253	0 - 8	i	0		0 - 8	i	0	
Pharmaceuticals and medicines	3254	269		12		42		214	
Soap, cleaning compound, and toilet preparation	3256	*	i	*	i	*	i	*	i
Paint, coating, adhesive, and other chemicals	3255, 3259	11 - 20		*		6 - 16		4	
Plastics and rubber products	326	*	i	0		0		*	i
Nonmetallic mineral products	327	2	i	0		1	i	1	i
Primary metals	331	2		0 - 2	i	0 - 2		1	
Fabricated metal products	332	4		*	i	2	i	2	i
Machinery	333	193		5		14	i	173	
Agricultural implement	33311	1	i	*		*	i	*	i
Semiconductor machinery	333242	*	i	*	i	0		*	i
Engine, turbine, and power transmission equipment	3336	155		5		7	i	143	
Other machinery	other 333	37		*		6	i	31	
Computer and electronic products	334	5,802		146		910		4,746	
Communications equipment	3342	320 - 453	i	3		102	i	214 - 347	i
Semiconductor and other electronic components	3344	468		26	i	68		374	i
Navigational, measuring, electromedical, and control instruments	3345	4,852		104		721		4,027	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	11	i	*	i	1	i	10	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,813		98		709		4,006	
Other measuring and controlling device	other 3345	28		6		12		10	
Other computer and electronic products	other 334	31 - 161		13		19		0 - 130	
Electrical equipment, appliances, and components	335	27		*	i	1	i	26	
Transportation equipment	336	9,652	i	1,422	i	1,394	i	6,835	i
Motor vehicles, bodies, trailers, and parts	3361–63	38 - 481		10		28 - 158		0 - 442	
Aerospace products and parts	3364	8,454	i	1,413	i	1,237	i	5,804	i
Aircraft, aircraft engine, and aircraft parts	336411–13	7,558	i	1,410	i	1,235	i	4,913	i
Guided missile, space vehicle, and related parts	336414–15, 336419	896		2		2		891	
Military armored vehicle, tank, and tank component	336992	0 - 11		0		0 - 11	i	0 - 11	
Other transportation	other 336	706 - 1,160		*		0 - 128		580 - 1,032	
Furniture and related products	337	0 - 3	i	0 - 2	i	*	i	0 - 1	i
Miscellaneous	339	36 - 48		0 - 6		4 - 13	i	29 - 41	
Medical equipment and supplies	3391	25		1		5	i	19	

TABLE 45

Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
Other miscellaneous manufacturing	3399	11 - 24		0 - 5		0 - 8		10 - 22	
Nonmanufacturing industries	21–23, 42–81	5,918		724		2,491		2,703	
Mining, quarrying, oil and gas extraction, and support activities	21	1		0		0		1	
Utilities	22	27 - 34		*		5		21 - 28	
Wholesale trade	42	0		0		0		0	
Electronic shopping and electronic auctions	454111–12	0 - 8	i	*	i	*	i	0 - 8	i
Transportation and warehousing	48–49	2		0		0		2	i
Information	51	185		11		52		122	
Publishing	511	57		10		33		13	
Newspaper, periodical, book, and directory publishers	5111	*	i	*	i	0		0	
Software publishers	5112	57		10		33		13	
Telecommunications	517	4	i	0		*	i	3	i
Data processing, hosting, and related services	518	116		*		11		105	
Other information	other 51	8	i	*	i	8	i	0	
Finance and insurance	52	0		0		0		0	
Real estate and rental and leasing	53	0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0	
Professional, scientific, and technical services	54	5,685		712		2,429		2,544	
Architectural, engineering, and related services	5413	1,214		96		801		316	
Computer systems design and related services	5415	454		28	i	158		268	
Scientific research and development services	5417	3,343		562		1,415		1,365	
Research and development in biotechnology	541711	108		3		47	i	58	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,571		167		1,186		1,218	
Research and development in the social sciences and humanities	541720	664		392		182	i	89	i
Other professional, scientific, and technical services	other 54	674		25		54		595	
Health care services	621–23	2		*		1		1	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	9 - 19		1		4		3 - 15	
All companies (number of domestic employees)	–	21,941		2,313	i	4,883		14,745	
Small companies									
10–19[a]	–	502		28	i	146	i	328	i
20–49	–	811		30		188		593	
Medium companies									
50–99	–	697		45		162		489	
100–249	–	988		97		279		612	
Large companies									
250–499	–	1,393		121		384		889	i
500–999	–	248	i	22		77		149	i
1,000–4,999	–	1,710		29	i	639		1,042	
5,000–9,999	–	977		378		93		506	
10,000–24,999	–	1,717	i	55	i	255	i	1,407	i
25,000 or more	–	12,897	i	1,509	i	2,660	i	8,729	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 46

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		DOD		DOE		NASA		NIH		DHS	DOT	EPA	NSF	All other agencies
All industries	21–23, 31–33, 42–81	21,941		15,141		519		4,534	i	519		124	30	1	8	1,064
Manufacturing industries	31–33	16,023	i	11,174		266		3,905	i	84		96	7	1	1	489
Food	311	*	i	0		*	i	0		0		0	0	0	0	0
Beverage and tobacco products	312	0		0		0		0		0		0	0	0	0	0
Textile, apparel, and leather products	313–16	7	i	3		0		4	i	0		0	0	0	0	0
Wood products	321	0		0		0		0		0		0	0	0	0	0
Paper	322	*	i	0		*	i	0		*	i	0	0	0	0	0
Printing and related support activities	323	0		0		0		0		0		0	0	0	0	0
Petroleum and coal products	324	*	i	0		*	i	0		0		0	0	0	0	0
Chemicals	325	289		61		10		*		63		82	0	0	0	74
Basic chemicals	3251	2	i	0		0 - 3	i	0		0 - 3	i	0	0	0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*	i	0		0 - 1	i	0		0 - 1	i	0	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	0 - 8	i	0		0 - 4	i	0		0 - 8	i	0	0	0	0	0
Pharmaceuticals and medicines	3254	269		49		7		0		54 - 64		82	0	0	0	65 - 75
Soap, cleaning compound, and toilet preparation	3256	*	i	0		0 - 1	i	0		0 - 1	i	0	0	0	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	11 - 20		12		0 - 4		*		0 - 8	i	0	0	0	0	0 - 8
Plastics and rubber products	326	*	i	*		0		0		*	i	0	0	0	0	0
Nonmetallic mineral products	327	2	i	2		*		*	i	*	i	0	0	0	0	0
Primary metals	331	2		*		1		*	i	0		0	0	0	0	0
Fabricated metal products	332	4		3		*	i	1	i	*	i	0	0	0	0	0
Machinery	333	193		105		87		1		0		0	0	0	0	0
Agricultural implement	33311	1	i	0		1	i	0		0		0	0	0	0	0
Semiconductor machinery	333242	*	i	0		*	i	0		0		0	0	0	0	0
Engine, turbine, and power transmission equipment	3336	155		89		65		0		0		0	0	0	0	0
Other machinery	other 333	37		15	i	21		1		0		0	0	0	0	0
Computer and electronic products	334	5,802		5,019		73		275	i	13		2	7	0	1	411
Communications equipment	3342	320 - 453	i	188 - 329	i	1	i	0 - 130	i	*	i	0	0	0	0	0 - 133
Semiconductor and other electronic components	3344	468		85		26		0 - 130	i	*	i	0	0	0	0	225 - 358
Navigational, measuring, electromedical, and control instruments	3345	4,852		4,607		27		146		8		2	7	0	*	54
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	11	i	3		1	i	3	i	3		0	0	0	*	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,813		4,586		22		141		0		2	7	0	0	54
Other measuring and controlling device	other 3345	28		18		4	i	1	i	5	i	0	0	0	0	0

TABLE 46

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Other computer and electronic products	other 334	31 - 161	0 - 138	19	0 - 130 i	5	0	*	0	1	0 - 133
Electrical equipment, appliances, and components	335	27	17	5	4	0	0	0	0	0	1
Transportation equipment	336	9,652 i	5,944 i	74	3,619 i	0	12	*	1	0	1
Motor vehicles, bodies, trailers, and parts	3361–63	38 - 481	0 - 469	0 - 74	0	0	12	*	1	0	0
Aerospace products and parts	3364	8,454 i	4,758 - 4,835 i	0 - 74	3,619 i	0	0	0	0	0	1
Aircraft, aircraft engine, and aircraft parts	336411–13	7,558 i	4,577 i	0	2,980 i	0	0	0	0	0	1
Guided missile, space vehicle, and related parts	336414–15, 336419	896	182 - 258	0 - 74	639	0	0	0	0	0	0
Military armored vehicle, tank, and tank component	336992	0 - 11	0 - 11	*	0	0	0	0	*	0	0
Other transportation	other 336	706 - 1,160	705 - 1,159	1 i	0	0	0	0	0	0	0
Furniture and related products	337	0 - 3 i	0	0 - 2 i	1 i	* i	0	0	0	0	0
Miscellaneous	339	36 - 48	20	8 - 20	* i	8 i	0	0	0	0	2
Medical equipment and supplies	3391	25	11	5 i	* i	8 i	0	0	0	0	2
Other miscellaneous manufacturing	3399	11 - 24	9	2 - 15	*	0	0	0	0	0	0
Nonmanufacturing industries	21–23, 42–81	5,918	3,968	253	629	435	29	22	1	7	575
Mining, quarrying, oil and gas extraction, and support activities	21	1	* i	1	0	0	0	0	0	0	0
Utilities	22	27 - 34	0	27 - 34	0	0	0	0	0	0	0
Wholesale trade	42	0	0	0	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111–12	0 - 8 i	0	0	0	0 - 8 i	0	0	0	0	0
Transportation and warehousing	48–49	2	0	0	2	0	0	0	0	0	0
Information	51	185	134	21 - 28	1	6 - 14	4	*	0	0	3 - 11
Publishing	511	57	26	18	*	0 - 8	0	*	0	0	3 - 11
Newspaper, periodical, book, and directory publishers	5111	* i	0	* i	0	0	0	0	0	0	0
Software publishers	5112	57	26	18	*	0 - 8	0	*	0	0	3 - 11
Telecommunications	517	4 i	1	1 i	0	1 i	0	0	0	0	0
Data processing, hosting, and related services	518	116	106	0	0	6	4	0	0	0	*
Other information	other 51	8 i	0	1 - 8 i	* i	0 - 7 i	0	0	0	0	0
Finance and insurance	52	0	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	5,685	3,824	195	626	421	24	22	1	7	565

TABLE 46

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Architectural, engineering, and related services	5413	1,214	1,027	76 i	79	0	0	11	0	0	21
Computer systems design and related services	5415	454	405	27	14 i	3 i	2	3	0	*	*
Scientific research and development services	5417	3,343	1,870	90	413	415	18	6	1	4	527
Research and development in biotechnology	541711	108	39	12	*	54	0	0	0	1	1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,571	1,747	77	412	186	18	1	1	3	126
Research and development in the social sciences and humanities	541720	664	83	0	1 i	176	0	5	0	0	400
Other professional, scientific, and technical services	other 54	674	523	2	121	3 i	4	2	*	2	17
Health care services	621–23	2	0	0	0	2	0	0	0	0	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	9 - 19	10	* i	* i	* i	0	0	0	0	0 - 8
All companies (number of domestic employees)	–	21,941	15,141	519	4,534 i	519	124	30	1	8	1,064
Small companies											
10–19[a]	–	502	231	57 i	91 i	107	2	4	*	2	9
20–49	–	811	528	79 i	99	57	2	9	*	1	37
Medium companies											
50–99	–	697	559	32	22	24	1	*	*	3	56
100–249	–	988	753	42	80	38	17	4	0	1	53
Large companies											
250–499	–	1,393	629	12	271	78	*	0	0	0	402
500–999	–	248 i	137 i	14 i	57 i	30 i	4	0	0	0	6
1,000–4,999	–	1,710	740	15	688	157	0	0	0	0	110
5,000–9,999	–	977	315	134	178 i	19	0	5	0	0	325
10,000–24,999	–	1,717 i	1,629 i	70	9 i	5	0	1	1	1	4
25,000 or more	–	12,897 i	9,620	65	3,040 i	5	98	7	0	0	63

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

DHS = Department of Homeland Security; DOD = Department of Defense; DOE = Department of Energy; DOT = Department of Transportation; EPA = Environmental Protection Agency; NAICS = 2012 North American Industry Classification System; NASA = National Aeronautics and Space Administration; NIH = National Institutes of Health; NSF = National Science Foundation.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 47

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies: Subsidiaries[a]		Foreign companies: Company's parent		Foreign companies: Unaffiliated companies		Foreign government agencies		Foreign universities, colleges, and academic researchers		All other	
All industries	21–23, 31–33, 42–81	46,840		27,117		17,563		1,991		123		3 - 16		32 - 44	
Manufacturing industries	31–33	35,363		19,475		14,290		1,459		119		0 - 11		11 - 23	
Food	311	365		129	i	234		2		0		0		0	
Beverage and tobacco products	312	119	i	8		111	i	0		0		0		0	
Textile, apparel, and leather products	313–16	13	i	8		*	i	5	i	0		0		0	
Wood products	321	6		0		6		0		0		0		0	
Paper	322	*	i	0		0		*	i	0		0		*	i
Printing and related support activities	323	0		0		0		0		0		0		0	
Petroleum and coal products	324	154 - 274		74 - 170		72 - 104		0 - 9	i	0		0		0	
Chemicals	325	12,478		5,011		6,643		816		*		0 - 10		0 - 10	
Basic chemicals	3251	160		19		141		*		0		0		0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	77		0 - 16		61 - 77		1	i	0		0		*	i
Pesticide, fertilizer, and other agricultural chemicals	3253	391 - 836		73 - 490		287 - 345		0 - 15		0		0		0 - 10	
Pharmaceuticals and medicines	3254	11,204		4,490		5,906		801		*		0 - 9		0 - 9	
Soap, cleaning compound, and toilet preparation	3256	172		14		158		1	i	0		0		*	i
Paint, coating, adhesive, and other chemicals	3255, 3259	27 - 471		0 - 399		14 - 72		0 - 15	i	0		0 - 10		0 - 10	i
Plastics and rubber products	326	14		4		10		*	i	0		0		1	
Nonmetallic mineral products	327	33		2		31		*	i	*		0		*	i
Primary metals	331	4 - 16		*		0 - 10	i	5		*	i	0		0	
Fabricated metal products	332	69	i	9		60	i	*	i	0		0		*	i
Machinery	333	723		33		632		57		*		0		*	
Agricultural implement	33311	15		8		6		*	i	0		0		0	
Semiconductor machinery	333242	559		3		497 - 557		0 - 58		0		0		*	
Engine, turbine, and power transmission equipment	3336	19		8		11		0		0		0		0	
Other machinery	other 333	130		14		57 - 117		0 - 58		*		0		0	
Computer and electronic products	334	17,144		13,501		3,283		321		36		0 - 2	i	2 - 6	
Communications equipment	3342	3,941	i	3,593 - 3,767	i	124 - 297		0 - 53		*	i	0		*	i
Semiconductor and other electronic components	3344	3,485		964		2,379		142		0		0 - 2	i	0 - 2	i

TABLE 47

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies: Subsidiaries[a]		Foreign companies: Company's parent		Foreign companies: Unaffiliated companies		Foreign government agencies		Foreign universities, colleges, and academic researchers		All other	
Navigational, measuring, electromedical, and control instruments	3345	994		218		609		128	i	36		0		3	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	266		74		192		*	i	0		0		0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	504		17	i	332		119	i	33		0		3	
Other measuring and controlling device	other 3345	224		127		85		9		3		0		0	
Other computer and electronic products	other 334	8,724		8,554 - 8,725		0 - 170		0 - 53		*	i	0		0	
Electrical equipment, appliances, and components	335	403		86		315		2		0		0		0	
Transportation equipment	336	3,306		196		2,778		242		82	i	0		9	i
Motor vehicles, bodies, trailers, and parts	3361–63	2,898		144		2,564		190		*	i	0		*	i
Aerospace products and parts	3364	317 - 400	i	52	i	124 - 205	i	52		82	i	0		9	i
Aircraft, aircraft engine, and aircraft parts	336411–13	317 - 400	i	52	i	124 - 205	i	52		82	i	0		9	i
Guided missile, space vehicle, and related parts	336414–15, 336419	*		*		0		0		0		0		0	
Military armored vehicle, tank, and tank component	336992	0		0		0		0		0		0		0	
Other transportation	other 336	8 - 91		0		8 - 91		0		0		0		0	
Furniture and related products	337	4 - 85		4 - 83		0		*	i	*	i	0		*	i
Miscellaneous	339	396 - 506		319 - 398		72 - 104		4 - 14		0		0		*	i
Medical equipment and supplies	3391	397		320		73		5		0		0		*	i
Other miscellaneous manufacturing	3399	0 - 108		0 - 78		0 - 30		0 - 9		0		0		0	
Nonmanufacturing industries	21–23, 42–81	11,477		7,642	i	3,273		532		5		4		21	
Mining, quarrying, oil and gas extraction, and support activities	21	206		96		92		17		0		0		*	i
Utilities	22	7		0 - 7		0 - 8		0		0		0		0	
Wholesale trade	42	76	i	0		76	i	*	i	0		0		0	
Electronic shopping and electronic auctions	454111–12	232 - 1,209		195 - 1,173		35 - 61		0		0		0		0	
Transportation and warehousing	48–49	2 - 969		2 - 969		0		0		0		0		0	
Information	51	5,956	i	5,095	i	674		186		*	i	0		*	
Publishing	511	1,305		829	i	345		131		*	i	0		*	i
Newspaper, periodical, book, and directory publishers	5111	*	i	0		0		*	i	0		0		0	
Software publishers	5112	1,305		829	i	345		131		*	i	0		*	i
Telecommunications	517	35		8		12 - 28		0 - 14	i	0		0		0	
Data processing, hosting, and related services	518	476		255		178		43		0		0		*	

TABLE 47

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies: Subsidiaries[a]		Foreign companies: Company's parent		Foreign companies: Unaffiliated companies		Foreign government agencies		Foreign universities, colleges, and academic researchers		All other	
Other information	other 51	4,140	i	4,003	i	122 - 138		0 - 14	i	0		0		0	
Finance and insurance	52	1,036		1,036		0		0		0		0		0	
Real estate and rental and leasing	53	0		0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0		0		0		0	
Professional, scientific, and technical services	54	2,944		240		2,362		312		5		4		21	
Architectural, engineering, and related services	5413	113		41		44		14		3		3		8	
Computer systems design and related services	5415	1,581		78		1,491		12		*	i	*	i	0	
Scientific research and development services	5417	1,112	i	94		760	i	242		2		1	i	13	i
Research and development in biotechnology	541711	283	i	8		231	i	38		1		0		6	i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	829	i	86		530	i	204		1		1	i	7	
Research and development in the social sciences and humanities	541720	0		0		0		0		0		0		0	
Other professional, scientific, and technical services	other 54	139		28		67		44		0		*		*	i
Health care services	621–23	4		0		0		4		0		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	42		0 - 31		0 - 29		12		*	i	0		0	
All companies (number of domestic employees)	–	46,840		27,117		17,563		1,991		123		3 - 16		32 - 44	
Small companies															
10–19[b]	–	199	i	48		99	i	42	i	1		3		6	i
20–49	–	782		115		595		65	i	4		0 - 6		0 - 6	
Medium companies															
50–99	–	1,027		240		573		211		*		0 - 5		0 - 5	
100–249	–	1,716		560		1,060		87		*		0 - 11	i	0 - 11	
Large companies															
250–499	–	1,716		303		1,216		189		*	i	0		8	
500–999	–	2,521		928		1,439		153		*	i	0		1	
1,000–4,999	–	9,904		2,401		6,993		507		3		*		*	i
5,000–9,999	–	2,461		1,318		795		346		*		0		2	
10,000–24,999	–	8,261		3,306		4,623		295	i	36		0		0	

TABLE 47

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies						Foreign government agencies		Foreign universities, colleges, and academic researchers		All other	
				Subsidiaries[a]		Company's parent		Unaffiliated companies							
25,000 or more	–	18,254		17,897		171		97		79	i	0 - 13	i	0 - 13	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.
[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. In all other tables, R&D costs of foreign-company subsidiaries of U.S. companies are included in company-funded U.S. domestic R&D totals. Only in this table are such R&D costs classified as being part of R&D paid for by sources located outside of the United States. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 48

Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total[a]		Basic research[b]		Applied research[b]		Development[b]	
All industries	21–23, 31–33, 42–81	27,117		1,005		2,861		23,251	
Manufacturing industries	31–33	19,475		901		2,381		16,193	
Food	311	129	i	9	i	9	i	110	i
Beverage and tobacco products	312	8		1		1		6	
Textile, apparel, and leather products	313–16	8		0		7		1	
Wood products	321	0		0		0		0	
Paper	322	0		0		0		0	
Printing and related support activities	323	0		0		0		0	
Petroleum and coal products	324	74 - 170		20 - 39		54 - 75		0 - 78	
Chemicals	325	5,011		759		666		3,585	
Basic chemicals	3251	19		0 - 14		0 - 14		6	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	0 - 16		0 - 16		*		0 - 16	
Pesticide, fertilizer, and other agricultural chemicals	3253	73 - 490		73 - 186		0 - 135		0 - 188	
Pharmaceuticals and medicines	3254	4,490		574		532		3,383	
Soap, cleaning compound, and toilet preparation	3256	14		0 - 5		0 - 5		10	
Paint, coating, adhesive, and other chemicals	3255, 3259	0 - 399		0 - 76		0 - 135		0 - 188	
Plastics and rubber products	326	4		*		*		3	
Nonmetallic mineral products	327	2		0 - 1		0 - 1		2	
Primary metals	331	*		0		0		*	
Fabricated metal products	332	9		0 - 5		0 - 5		5	
Machinery	333	33		0 - 5	i	0 - 5	i	29	
Agricultural implement	33311	8		*		*		7	
Semiconductor machinery	333242	3		0		0		3	
Engine, turbine, and power transmission equipment	3336	8		0		0		8	
Other machinery	other 333	14		0 - 5	i	0 - 5	i	10	
Computer and electronic products	334	13,501		81		1,602		11,817	
Communications equipment	3342	3,593 - 3,767	i	1		0 - 1,238		2,354 - 3,766	i
Semiconductor and other electronic components	3344	964		33		144		787	
Navigational, measuring, electromedical, and control instruments	3345	218		0 - 33		2 - 35		184	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	74		1		1		72	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	17	i	*	i	2	i	15	i
Other measuring and controlling device	other 3345	127		0 - 31		0 - 31		97	
Other computer and electronic products	other 334	8,554 - 8,725		12 - 48		185 - 1,457		7,078 - 8,494	
Electrical equipment, appliances, and components	335	86		1		3		81	
Transportation equipment	336	196		11		14		171	
Motor vehicles, bodies, trailers, and parts	3361–63	144		10		14		120	
Aerospace products and parts	3364	52	i	*		*		51	i
Aircraft, aircraft engine, and aircraft parts	336411–13	52	i	*		*		51	i
Guided missile, space vehicle, and related parts	336414–15, 336419	*		0		0		*	
Military armored vehicle, tank, and tank component	336992	0		0		0		0	
Other transportation	other 336	0		0		0		0	
Furniture and related products	337	4 - 83		0		5		0 - 78	
Miscellaneous	339	319 - 398		4		4		311 - 389	

TABLE 48

Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total[a]		Basic research[b]		Applied research[b]		Development[b]	
Medical equipment and supplies	3391	320		4		4		312	
Other miscellaneous manufacturing	3399	0 - 78		0		0		0 - 78	
Nonmanufacturing industries	21–23, 42–81	7,642	i	104		479	i	7,058	i
Mining, quarrying, oil and gas extraction, and support activities	21	96		5 - 16		0 - 92		0 - 92	
Utilities	22	0 - 7		0 - 7		0		0	
Wholesale trade	42	0		0		0		0	
Electronic shopping and electronic auctions	454111–12	195 - 1,173		0		195 - 290	i	0 - 965	i
Transportation and warehousing	48–49	2 - 969		1		2		0 - 965	
Information	51	5,095	i	47		128	i	4,921	i
Publishing	511	829	i	15	i	81	i	734	i
Newspaper, periodical, book, and directory publishers	5111	0		0		0		0	
Software publishers	5112	829	i	15	i	81	i	734	i
Telecommunications	517	8		*		0		8	
Data processing, hosting, and related services	518	255		26		31		197	
Other information	other 51	4,003	i	6		16		3,982	i
Finance and insurance	52	1,036		0		0		1,036	
Real estate and rental and leasing	53	0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0	
Professional, scientific, and technical services	54	240		42		61		138	
Architectural, engineering, and related services	5413	41		1		2		38	
Computer systems design and related services	5415	78		1		3		74	i
Scientific research and development services	5417	94		25		55		14	
Research and development in biotechnology	541711	8		1		6		2	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	86		24		49		13	
Research and development in the social sciences and humanities	541720	0		0		0		0	
Other professional, scientific, and technical services	other 54	28		15		1		11	
Health care services	621–23	0		0		0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0 - 31		0		0		0 - 31	
All companies (number of domestic employees)	–	27,117		1,005		2,861		23,251	
Small companies									
10–19[c]	–	48		23		5		20	
20–49	–	115		13		37		65	
Medium companies									
50–99	–	240		25		24		192	
100–249	–	560		116		69		375	
Large companies									
250–499	–	303		14	i	87		202	
500–999	–	928		42		83		803	
1,000–4,999	–	2,401		134	i	283		1,983	
5,000–9,999	–	1,318		197		227		894	
10,000–24,999	–	3,306		339		123		2,844	
25,000 or more	–	17,897		103		1,921		15,873	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

[b] Respondent was not asked to report categorical breakouts of research and development paid for by foreign subsidiaries. Rather, ratios of the company's basic research, applied research, and development were calculated as proportions of the overall domestic R&D performance paid for by the company. These ratios were applied to the company's domestic R&D performance paid for by foreign subsidiaries to get estimates of a company's basic research, applied research, and development paid for by foreign subsidiaries.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 49

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Other		U.S. federal government agencies		U.S. state and local government agencies		U.S. universities, colleges, and academic researchers		All other organizations: In the United States		All other organizations: Outside the United States	
All industries	21–23, 31–33, 42–81	37,537		31,827		1,347		3,251		64	i	24		439		465		120	
Manufacturing industries	31–33	33,886		28,760		1,302		2,866		64	i	13		404		403		75	
Food	311	190		152		*		7		*	i	*	i	9	i	20		1	
Beverage and tobacco products	312	176		161		0		10	i	0		0		3		2		0	
Textile, apparel, and leather products	313–16	16		16		0		*	i	0		0		*	i	*	i	*	i
Wood products	321	11		10		0		0		*		0		*		1		0	
Paper	322	4		3		0		*		0		0		*		1		0	
Printing and related support activities	323	6	i	6	i	0		0		0		0		0		0		0	
Petroleum and coal products	324	248 - 347		137 - 247		0		0 - 17		5		0		0 - 36		56		0 - 35	
Chemicals	325	25,666		22,597		66		2,530		*		*	i	214		224		34	
Basic chemicals	3251	63		58		0		1		0		0		5		*		*	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	25		24		0		*		0		0		*		*		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	192		178		0		2		0		0		2		2		7	
Pharmaceuticals and medicines	3254	25,052		22,036		61		2,518		*		*	i	200		214		24	
Soap, cleaning compound, and toilet preparation	3256	291		271		1	i	8	i	*	i	*	i	1		7		3	
Paint, coating, adhesive, and other chemicals	3255, 3259	42		30		5		1		0		0		6		*	i	*	
Plastics and rubber products	326	53		41		0 - 12		0 - 12		*		0		2		0 - 12		*	
Nonmetallic mineral products	327	23		12		9		2		*		0		*		0		*	
Primary metals	331	15		12		0		*		0		0		2		*		0	
Fabricated metal products	332	35		29		*	i	2		0		0		3		1		*	i
Machinery	333	415		353		0 - 14		46		0		0		4		0 - 14		*	i
Agricultural implement	33311	199		195		0		3		0		0		*		0		0	
Semiconductor machinery	333242	5		4		0		1		0		0		*		0		0	
Engine, turbine, and power transmission equipment	3336	18		17		*		1		0		0		*		0		0	
Other machinery	other 333	194		137		0 - 14		41		0		0		4		0 - 14		*	i

TABLE 49

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies	U.S. state and local government agencies	U.S. universities, colleges, and academic researchers	All other organizations	
				Company's parent	Other				In the United States	Outside the United States
Computer and electronic products	334	2,021	1,115	651 - 733	133	1 i	7	18	8 - 58	1 - 36
Communications equipment	3342	936	174 - 288	632 - 732	0 - 67	* i	* i	0 - 6 i	* i	* i
Semiconductor and other electronic components	3344	363	295	0 - 16 i	52	1 i	0	0 - 6 i	0 - 16 i	1
Navigational, measuring, electromedical, and control instruments	3345	380	302	1	15 - 48	*	6	13	8 - 41	1
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	118	97	1	7 i	*	0	3	9 i	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	158	131	0	9	0	6	10	0	*
Other measuring and controlling device	other 3345	104	74	0	0 - 31	0	0	0	0 - 31	*
Other computer and electronic products	other 334	342	231 - 342	1	0 - 67	0	0	0 - 6	*	0 - 35
Electrical equipment, appliances, and components	335	124	108	* i	10	1	0	4	1	0
Transportation equipment	336	4,055	3,325	496 i	94	56 i	6 i	40	32	6 i
Motor vehicles, bodies, trailers, and parts	3361–63	3,371	2,712	493 i	86	3	3	39	30	4 i
Aerospace products and parts	3364	632	568	0	4	53 i	3 i	1	1	2
Aircraft, aircraft engine, and aircraft parts	336411–13	514	450	0	4	53 i	3 i	1	1	2
Guided missile, space vehicle, and related parts	336414–15, 336419	118	118	0	0	0	0	*	0	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	51	45	3	3	0	0	* i	* i	0
Furniture and related products	337	23	17	* i	6	0	0	* i	* i	* i
Miscellaneous	339	708 - 800	564 - 657	0 - 56	14 - 32	* i	*	74 - 111	0 - 56	0 - 35
Medical equipment and supplies	3391	708	565	0 - 55	15	* i	*	75	0 - 55	0 - 35

TABLE 49

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Other		U.S. federal government agencies		U.S. state and local government agencies		U.S. universities, colleges, and academic researchers		All other organizations: In the United States		All other organizations: Outside the United States	
Other miscellaneous manufacturing	3399	0 - 92		0 - 92		*	i	0 - 17	i	0		0		0 - 36		*		*	i
Nonmanufacturing industries	21–23, 42–81	3,651		3,067		45		385		*		11		35		62		45	
Mining, quarrying, oil and gas extraction, and support activities	21	123		100		0		10		0		0		0 - 10		2 - 14		0	
Utilities	22	171		125		0		*		*		11		2		32		*	
Wholesale trade	42	47		37	i	*	i	5	i	0		0		1	i	5	i	0	
Electronic shopping and electronic auctions	454111–12	125	i	125	i	0		0		0		0		0		0		0	
Transportation and warehousing	48–49	43		43	i	0		0		0		0		*		0		0	
Information	51	2,061		1,848		6		159		0		0		0 - 6		0 - 7		43	
Publishing	511	1,001		818		5		141		0		0		*		1		36	
Newspaper, periodical, book, and directory publishers	5111	4		4		0		0		0		0		0		0		0	
Software publishers	5112	998		815		5		141		0		0		*		1		36	
Telecommunications	517	416		414		*		1		0		0		0		0		0	
Data processing, hosting, and related services	518	249		221		*	i	17		0		0		0 - 5		0 - 5		8	
Other information	other 51	395		394		0		*	i	0		0		0		0		*	i
Finance and insurance	52	319		193		0		124		0		0		2		*		0	
Real estate and rental and leasing	53	7		7		0		0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		0		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	7		7		0		0		0		0		0		0		0	
Professional, scientific, and technical services	54	603		467		39		70		*	i	0		12		13		1	i
Architectural, engineering, and related services	5413	95		65		24		6		*	i	0		*	i	*	i	*	i
Computer systems design and related services	5415	128		98	i	15	i	12	i	*	i	0		3	i	1	i	1	i
Scientific research and development services	5417	316		250		1		44		*		0		9		12		1	
Research and development in biotechnology	541711	118		107		1		5		*	i	0		3		1		1	

TABLE 49

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies	U.S. state and local government agencies	U.S. universities, colleges, and academic researchers	All other organizations	
				Company's parent	Other				In the United States	Outside the United States
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	198	143	0	39	*	0	6	10	*
Research and development in the social sciences and humanities	541720	*	* i	* i	* i	* i	0	* i	* i	* i
Other professional, scientific, and technical services	other 54	64	54	* i	9	0	0	*	1	0
Health care services	621–23	66	39	0	16	0	0	10	* i	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	86	84	0	0	*	*	2 i	0	0
All companies (number of domestic employees)	–	37,537	31,827	1,347	3,251	64 i	24	439	465	120
Small companies										
10–19[a]	–	514	432	4 i	37	* i	0	20	9 i	13
20–49	–	1,214	1,027	0 - 42 i	100	1	* i	39	0 - 42	8
Medium companies										
50–99	–	2,176	1,795	17	242	*	*	55	61 i	7
100–249	–	1,912	1,538	25	285	* i	*	17	46	* i
Large companies										
250–499	–	1,719	1,479	0 - 35	141	* i	* i	54	0 - 35	12
500–999	–	2,118	1,857	37	109 i	*	*	16	54	43
1,000–4,999	–	4,512	3,872	19	554	* i	1	39	22	4
5,000–9,999	–	5,634	4,763	648 - 731	70	* i	* i	65	0 - 81	4
10,000–24,999	–	8,850	7,549	43	1,090	1 i	10	28 i	121	8
25,000 or more	–	8,888	7,514	475 i	622	61 i	12	106	75	21

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2017. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 50

Domestic R&D performance by performer and source of funds, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21–23, 31–33, 42–81	492,956	428,968	63,989	45,879	37,537	8,342
Manufacturing industries	31–33	285,674	248,109	37,564	40,561	33,886	6,675
Food	311	4,180	3,937	243	193	190	3
Beverage and tobacco products	312	1,082	971	111 i	179	176	3
Textile, apparel, and leather products	313–16	904	873	31	16	16	0
Wood products	321	186	180	6	11	11	*
Paper	322	1,064	1,064	*	4	4	0
Printing and related support activities	323	420 i	420 i	0	6 i	6 i	0
Petroleum and coal products	324	1,306	1,203	103	248 - 350	248 - 347	0 - 3
Chemicals	325	97,063	87,288	9,775	30,566	25,666	4,901
Basic chemicals	3251	2,360	2,198	162	65	63	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	1,092	80	24 - 73	25	0 - 47
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	1,501	320 - 345	191 - 216	192	0 - 24
Pharmaceuticals and medicines	3254	87,619	78,652	8,966	29,875	25,052	4,823
Soap, cleaning compound, and toilet preparation	3256	2,760	2,596	164	322	291	31
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	1,249	56 - 84	42 - 90	42	0 - 47
Plastics and rubber products	326	2,856	2,770	85	82	53	29
Nonmetallic mineral products	327	1,508 i	1,473 i	35	23	23	*
Primary metals	331	665	649	16	18	15	3
Fabricated metal products	332	2,885	2,632	254	55	35	21
Machinery	333	15,184	13,930	1,254	473	415	58
Agricultural implement	33311	1,921	1,913	9	199	199	0
Semiconductor machinery	333242	4,459	3,854	604	43	5	38
Engine, turbine, and power transmission equipment	3336	1,301	1,096	205	33	18	14
Other machinery	other 333	7,503	7,067	436	199	194	5
Computer and electronic products	334	86,729	75,570	11,159	2,611	2,021	590
Communications equipment	3342	12,595	11,495	1,100 i	969 - 972	936	32 - 35 i
Semiconductor and other electronic components	3344	35,183 i	31,975 i	3,208	418	363	56
Navigational, measuring, electromedical, and control instruments	3345	17,562	10,912	6,650	870	380	490
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	3,117	225	127	118	9
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	3,400	6,262	597	158	439
Other measuring and controlling device	other 3345	4,558	4,395	163	146	104	42
Other computer and electronic products	other 334	21,388	21,188	201	352 - 355	342	10 - 13
Electrical equipment, appliances, and components	335	5,263	4,886	377	125	124	1
Transportation equipment	336	45,375	31,505	13,870 i	5,082	4,055	1,027 i

TABLE 50

Domestic R&D performance by performer and source of funds, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Motor vehicles, bodies, trailers, and parts	3361–63	24,117	20,883	3,233 i	3,536	3,371	165
Aerospace products and parts	3364	18,358 i	8,900	9,458 i	1,491 i	632	859 i
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891 i	8,341	8,550 i	1,373 i	514	859 i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467	559	908	118	118	0
Military armored vehicle, tank, and tank component	336992	35	25	10	0	0	0
Other transportation	other 336	2,865	1,697	1,168	55	51	3
Furniture and related products	337	409	407	2	23	23	*
Miscellaneous	339	18,596	18,352	244	741 - 840	708 - 800	33 - 40
Medical equipment and supplies	3391	16,014	15,812	202	742	708	33
Other miscellaneous manufacturing	3399	2,582	2,540	42	0 - 98	0 - 92	0 - 7
Nonmanufacturing industries	21–23, 42–81	207,283	180,858	26,425	5,318	3,651	1,667
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	2,535	183	123	123	*
Utilities	22	275	237	38	182	171	11
Wholesale trade	42	1,191	1,104	87	50	47	3
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818 i	3,088 - 15,775 i	43 - 61	125 i	125 i	0
Transportation and warehousing	48–49	9,890 i	9,504 i	386	43	43	0
Information	51	110,227	109,062	1,165	2,132	2,061	72
Publishing	511	33,019	32,447	572	1,045	1,001	44
Newspaper, periodical, book, and directory publishers	5111	61	61	*	4	4	0
Software publishers	5112	32,958	32,386	572	1,042	998	44
Telecommunications	517	3,733	3,700	33	418	416	2
Data processing, hosting, and related services	518	30,558	30,154	404	269	249	20
Other information	other 51	42,917	42,761	155	401	395	6
Finance and insurance	52	8,917	8,890	28	319	319	0
Real estate and rental and leasing	53	1,371	1,371	0	7	7	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	45	0	*	*	0
Other real estate and rental and leasing	other 53	1,326	1,326	0	7	7	0
Professional, scientific, and technical services	54	53,233	29,131	24,103	2,182	603	1,579
Architectural, engineering, and related services	5413	4,207	2,288	1,919	465	95	370
Computer systems design and related services	5415	21,046	18,395	2,651	174	128	46
Scientific research and development services	5417	21,669	3,265	18,403	1,397	316	1,081
Research and development in biotechnology	541711	6,457	1,083	5,374	236	118	118
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446 i	2,155	12,291 i	1,039	198	841
Research and development in the social sciences and humanities	541720	766	27	738	122	*	122

TABLE 50

Domestic R&D performance by performer and source of funds, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Other professional, scientific, and technical services	other 54	6,312	5,182	1,129	146	64	82
Health care services	621–23	2,265	1,928	337	69	66	4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067	1,322 - 14,012	34 - 58	86	86	0
All companies (number of domestic employees)	–	492,956	428,968	63,989	45,879	37,537	8,342
Small companies							
10–19[a]	–	5,501	4,432	1,070	657	514	143
20–49	–	12,418	10,040	2,378	1,567	1,214	353
Medium companies							
50–99	–	14,021	11,492	2,529	2,548	2,176	372
100–249	–	19,793	16,520	3,274	2,260	1,912	348
Large companies							
250–499	–	18,883	15,356	3,527	2,120	1,719	402
500–999	–	23,969	21,549	2,420	2,311	2,118	193
1,000–4,999	–	75,671	64,475	11,196	6,733	4,512	2,221
5,000–9,999	–	50,811	44,728	6,083	6,194	5,634	559
10,000–24,999	–	88,263	74,385	13,878 i	10,996	8,850	2,147
25,000 or more	–	183,626	165,991	17,635	10,492	8,888	1,604

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 51

Domestic R&D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company						Paid for by others									
												R&D performed by the company					
		Total		R&D performed by others (purchased and collaborative R&D)		R&D performed by the company		Total		R&D performed by others (subcontracted/ passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
All industries	21–23, 31–33, 42–81	466,504		37,537		428,968		72,331		8,342		63,989		21,941		42,048	
Manufacturing industries	31–33	281,995		33,886		248,109		44,239		6,675		37,564		16,023	i	21,542	
Food	311	4,127		190		3,937		246		3		243		*	i	242	
Beverage and tobacco products	312	1,146		176		971		114	i	3		111	i	0		111	i
Textile, apparel, and leather products	313–16	890		16		873		31		0		31		7	i	24	i
Wood products	321	191		11		180		6		*		6		0		6	
Paper	322	1,068		4		1,064		*		0		*		*	i	*	i
Printing and related support activities	323	426	i	6	i	420	i	0		0		0		0		0	
Petroleum and coal products	324	1,450 - 1,550		248 - 347		1,203		102 - 106		0 - 3		103		*	i	103	
Chemicals	325	112,954		25,666		87,288		14,675		4,901		9,775		289		9,485	
Basic chemicals	3251	2,261		63		2,198		163		1		162		2	i	160	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,117		25		1,092		79 - 128		0 - 47		80		*	i	80	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,693		192		1,501		341 - 345		0 - 24		320 - 345		0 - 8	i	312 - 345	
Pharmaceuticals and medicines	3254	103,704		25,052		78,652		13,789		4,823		8,966		269		8,698	
Soap, cleaning compound, and toilet preparation	3256	2,887		291		2,596		195		31		164		*	i	163	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,292		42		1,249		56 - 109		0 - 47		56 - 84		11 - 20		37 - 72	
Plastics and rubber products	326	2,823		53		2,770		114		29		85		*	i	85	i
Nonmetallic mineral products	327	1,496	i	23		1,473	i	35		*		35		2	i	33	
Primary metals	331	663		15		649		19		3		16		2		14	
Fabricated metal products	332	2,666		35		2,632		274		21		254		4		250	
Machinery	333	14,345		415		13,930		1,312		58		1,254		193		1,061	
Agricultural implement	33311	2,111		199		1,913		9		0		9		1	i	8	
Semiconductor machinery	333242	3,859		5		3,854		643		38		604		*	i	604	

TABLE 51

Domestic R&D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company				Paid for by others											
										R&D performed by the company							
		Total		R&D performed by others (purchased and collaborative R&D)		R&D performed by the company		Total		R&D performed by others (subcontracted/ passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
Engine, turbine, and power transmission equipment	3336	1,114		18		1,096		219		14		205		155		51	
Other machinery	other 333	7,260		194		7,067		441		5		436		37		399	
Computer and electronic products	334	77,590		2,021		75,570		11,749		590		11,159		5,802		5,357	
Communications equipment	3342	12,431		936		11,495		1,133 - 1,136	i	32 - 35	i	1,100	i	320 - 453	i	647 - 780	i
Semiconductor and other electronic components	3344	32,338		363		31,975	i	3,263		56		3,208		468		2,740	
Navigational, measuring, electromedical, and control instruments	3345	11,292		380		10,912		7,141		490		6,650		4,852		1,799	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,235		118		3,117		234		9		225		11	i	214	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,558		158		3,400		6,701		439		6,262		4,813		1,450	
Other measuring and controlling device	other 3345	4,499		104		4,395		205		42		163		28		135	
Other computer and electronic products	other 334	21,530		342		21,188		210 - 213		10 - 13		201		31 - 161		40 - 170	
Electrical equipment, appliances, and components	335	5,010		124		4,886		378		1		377		27		349	
Transportation equipment	336	35,560		4,055		31,505		14,897	i	1,027	i	13,870	i	9,652	i	4,218	i
Motor vehicles, bodies, trailers, and parts	3361–63	24,254		3,371		20,883		3,398	i	165		3,233	i	38 - 481		2,753 - 3,195	i
Aerospace products and parts	3364	9,532		632		8,900		10,317	i	859	i	9,458	i	8,454	i	1,005	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,855		514		8,341		9,409	i	859	i	8,550	i	7,558	i	992	
Guided missile, space vehicle, and related parts	336414–15, 336419	677		118		559		908		0		908		896		13	
Military armored vehicle, tank, and tank component	336992	25		0		25		10		0		10		0 - 11		0 - 11	

TABLE 51

Domestic R&D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company						Paid for by others									
												R&D performed by the company					
		Total		R&D performed by others (purchased and collaborative R&D)		R&D performed by the company		Total		R&D performed by others (subcontracted/ passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
Other transportation	other 336	1,749		51		1,697		1,171		3		1,168		706 - 1,160		9 - 461	
Furniture and related products	337	430		23		407		2		*		2		0 - 3	i	0 - 2	i
Miscellaneous	339	19,059 - 19,153		708 - 800		18,352		277 - 284		33 - 40		244		36 - 48		195 - 208	
Medical equipment and supplies	3391	16,520		708		15,812		235		33		202		25		177	
Other miscellaneous manufacturing	3399	2,539 - 2,632		0 - 92		2,540		42 - 48		0 - 7		42		11 - 24		18 - 32	
Nonmanufacturing industries	21–23, 42–81	184,509		3,651		180,858		28,092		1,667		26,425		5,918		20,507	
Mining, quarrying, oil and gas extraction, and support activities	21	2,657		123		2,535		183		*		183		1		181	
Utilities	22	408		171		237		49		11		38		27 - 34		4 - 11	
Wholesale trade	42	1,151		47		1,104		90		3		87		0		87	i
Electronic shopping and electronic auctions	454111–12	3,212 - 15,901	i	125	i	3,088 - 15,775	i	43 - 61		0		43 - 61		0 - 8	i	35 - 61	
Transportation and warehousing	48–49	9,547	i	43		9,504	i	386		0		386		2		384	
Information	51	111,123		2,061		109,062		1,236		72		1,165		185		980	
Publishing	511	33,448		1,001		32,447		616		44		572		57		515	
Newspaper, periodical, book, and directory publishers	5111	64		4		61		*		0		*		*	i	*	i
Software publishers	5112	33,384		998		32,386		616		44		572		57		515	
Telecommunications	517	4,116		416		3,700		34		2		33		4	i	29	
Data processing, hosting, and related services	518	30,403		249		30,154		424		20		404		116		288	
Other information	other 51	43,156		395		42,761		161		6		155		8	i	148	
Finance and insurance	52	9,208		319		8,890		28		0		28		0		28	
Real estate and rental and leasing	53	1,378		7		1,371		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		*		45		0		0		0		0		0	
Other real estate and rental and leasing	other 53	1,333		7		1,326		0		0		0		0		0	
Professional, scientific, and technical services	54	29,734		603		29,131		25,681		1,579		24,103		5,685		18,418	

TABLE 51

Domestic R&D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others													
											R&D performed by the company							
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total		R&D performed by others (subcontracted/ passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
Architectural, engineering, and related services	5413	2,382	95	2,288	2,289		370		1,919		1,214		705	
Computer systems design and related services	5415	18,524	128	18,395	2,697		46		2,651		454		2,197	
Scientific research and development services	5417	3,581	316	3,265	19,484		1,081		18,403		3,343		15,060	i
Research and development in biotechnology	541711	1,201	118	1,083	5,491		118		5,374		108		5,266	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,353	198	2,155	13,132	i	841		12,291	i	2,571		9,720	i
Research and development in the social sciences and humanities	541720	27	*	27	860		122		738		664		74	
Other professional, scientific, and technical services	other 54	5,247	64	5,182	1,211		82		1,129		674		455	
Health care services	621–23	1,994	66	1,928	341		4		337		2		335	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,407 - 14,098	86	1,322 - 14,012	34 - 58		0		34 - 58		9 - 19		19 - 49	
All companies (number of domestic employees)	–	466,504	37,537	428,968	72,331		8,342		63,989		21,941		42,048	
Small companies														
10–19[a]	–	4,946	514	4,432	1,212		143		1,070		502		568	i
20–49	–	11,254	1,214	10,040	2,731		353		2,378		811		1,567	
Medium companies														
50–99	–	13,668	2,176	11,492	2,901		372		2,529		697		1,832	
100–249	–	18,432	1,912	16,520	3,621		348		3,274		988		2,285	
Large companies														
250–499	–	17,075	1,719	15,356	3,929		402		3,527		1,393		2,133	
500–999	–	23,667	2,118	21,549	2,613		193		2,420		248	i	2,171	
1,000–4,999	–	68,986	4,512	64,475	13,418		2,221		11,196		1,710		9,487	
5,000–9,999	–	50,362	5,634	44,728	6,642		559		6,083		977		5,106	i
10,000–24,999	–	83,235	8,850	74,385	16,025		2,147		13,878	i	1,717	i	12,161	

TABLE 51

Domestic R&D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others				
							R&D performed by the company		
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	Total	Paid for by the U.S. government	Paid for by non-U.S. government sources
25,000 or more	–	174,879	8,888	165,991	19,239	1,604	17,635	12,897 i	4,738

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 52

R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2019

(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Total	104,464		93,944		10,519	i
Puerto Rico[a]	539	i	519	i	20	
Canada	6,862		6,193		669	
Latin America and Other Western Hemisphere	5,407	i	4,944		463	i
Argentina	402		287		115	i
Brazil	1,493		1,347		146	i
Chile	117		95		23	i
Mexico	1,022		937		85	i
Other Latin American and Western Hemisphere locations	2,373	i	2,278	i	95	
Africa	372		280		92	i
South Africa	229	i	142		87	i
Other African locations	143		138		5	i
Asia and Pacific	32,458		30,227		2,231	i
Australia	2,032		1,873		159	i
China	8,195		7,666		528	
Hong Kong	396		375		21	i
India	9,846		9,484		362	i
Indonesia	24		23		1	i
Japan	4,090		3,461		629	i
Malaysia	838		827		11	i
New Zealand	274		239		35	
Singapore	2,376		2,187		189	i
South Korea	1,451		1,308		143	i
Taiwan	1,775		1,677		98	
Thailand	380		355		25	i
Other Asian or Pacific locations	780		751		29	i
Europe	48,764		43,111		5,652	i
Austria	651	i	595	i	56	i
Belgium	2,324		2,150		174	i
Czechia	527		464		62	i
Denmark	593		551		42	i
Finland	600		564		35	
France	3,313		2,831		481	
Germany	8,879		8,399		480	i
Hungary	246		163		84	i
Ireland	4,207		4,071		135	
Italy	1,611		1,382		229	
Luxembourg	274		269		5	
Netherlands	2,108		1,832		276	i
Norway	363		354		9	
Poland	958		800		159	i
Russia	492		364		128	i
Spain	1,033		843		190	i
Sweden	1,247		1,185		62	i
Switzerland	4,536		4,025		512	
Turkey	159		136		23	i
United Kingdom	11,797		9,545		2,252	i
Other European locations	2,847		2,588		259	i
Middle East	6,342		6,231		112	i
Israel	5,974		5,870		104	i

TABLE 52

R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2019

(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Other Middle Eastern locations	369	i	361	i	8	i
Undistributed	3,720	i	2,441	i	1,279	i

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

Note(s):
Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than $1 million of R&D paid for by the company or reporting less than $1 million of R&D paid for by others. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 53-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico[a]	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
All industries	21–23, 31–33, 42–81	104,464	539 i	6,862	651 i	2,324	527	593	600	3,313	8,879	246	4,207	1,611	274	2,108	363	958	492	1,033	1,247	4,536	159	11,797	2,847
Manufacturing industries	31–33	64,351	516 i	3,610	556 i	2,020	180	375	358	2,091	6,917	96	2,281	1,109	206	1,106	260	608	256	661	639	2,946	75	5,565	1,624
Food	311	835	2	28	1	11	*	1	*	46	39	*	1	6	0	13	8	17	2	10	2	18	1	82	86
Beverage and tobacco products	312	674	0	2	0	19	0	0	0	0	0	0	8	32	0	0	0	*	7	*	0	362	2	40	2
Textile, apparel, and leather products	313–16	157	0	5	0	12	0	0	1	18	7	0	0	5	0	4	0	*	0	0	3	7	0	5	32
Wood products	321	7	0	*	0	0 - 8	0	0	0	0 - 8	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	322	101	0	53	0	0	0	0	1	2	14	0	0	0	0	1	0	1	0	0	*	1	1	4	0
Printing and related support activities	323	9 i	0	0	0	0	0	0	0	0	9 i	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	171 - 176	0	0 - 70	*	0 - 39	0	3	0	5	9	0	0	1	*	5	*	*	0	*	*	*	*	0 - 131	*
Chemicals	325	18,568	103	789	360 i	1,631	30	119	48	711	1,128	38	1,454	319	181	398	46	100	97	324	175	1,772	57	2,224	1,041
Basic chemicals	3251	742	0	0 - 87	0 - 3	43	0 - 4	8	0 - 6	54	60	0 - 3	0 - 2	14	0 - 122	65	1	0 - 5	0 - 3	21	0 - 6	29	8	88	24
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	0	0 - 87	0	23	0	0	0 - 6	10	60	0	0	0 - 16	0 - 181	24	0	1	0 - 3	2	0	1	0 - 3	15	0 - 52
Pesticide, fertilizer, and other agricultural chemicals	3253	450	35	0 - 87	8	0 - 12	0 - 4	25	0	2	3	0 - 3	0	*	0	0	0	*	0	1	0	0 - 6	0	15	10
Pharmaceuticals and medicines	3254	15,868	67	684	351 i	1,459	27	87	43	606	810	36	1,453	288	1	277	45	93	95	298	170	1,724	48	1,964 i	956
Soap, cleaning compound, and toilet preparation	3256	757	1	20 i	0	97	*	0	*	20	173	0 - 3	0	3	*	8	0	3	1	0 - 5	0 - 6	15	0 - 3	123	2
Paint, coating, adhesive, and other chemicals	3255, 3259	227	*	0 - 87	0 - 3	0 - 12	0 - 4	0	0	19	21	0 - 3	0 - 2	0 - 16	0 - 116	23	0	0 - 5	0	0 - 5	0	0 - 6	0	20	0 - 52
Plastics and rubber products	326	503	0	17	0	16	2	0	6 i	40	164	3	7 i	15	4	4 i	0	1	1	5	2	2	0	12	6
Nonmetallic mineral products	327	192 i	0	15	0	4	0	1 i	0	12 i	19 i	0	0	*	0	0	0	4 i	3 i	0	0	3	0	2	3
Primary metals	331	76	0	5	0	0	0	0	0	*	10	0	*	0	0	0	1	0	*	3	1	*	0	5	11
Fabricated metal products	332	278	0	22	7	3	*	1	5	2	40	*	*	4	0	3	*	*	*	2	*	18	0	41	*
Machinery	333	4,251	0	147	42 i	25	3	67	58	392	678	3	15 i	104	0	84	12	11	1	39	68	187	*	375	44
Agricultural implement	33311	857	0	19	0 - 12	3	0 - 4	2	46	78	282	1	0	15	0	24	0	0 - 12	0 - 2	11	*	126	0 - 1	5	1
Semiconductor machinery	333242	915	0	1	0 - 43 i	0 - 23	0	0	0	5 i	51 i	0	0 - 14 i	7 i	0	0 - 57	0	0	0	0	0	0	0	2 i	0
Engine, turbine, and power transmission equipment	3336	630	0	20	0	*	0 - 4	51	0	204	40	1	2 i	15	0	5	0	0	0	13	*	31	0 - 1	41	15

TABLE 53-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico[a]	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
Other machinery	other 333	1,850	0	108	0 - 43	0 - 23 i	0 - 4	14	12	105	305	1	0 - 14 i	68	0	0 - 57	12	0 - 12	0 - 2	15	68	31	0	328	28
Computer and electronic products	334	25,452 i	250 - 413 i	1,764	94	104	91	162	202	461 i	2,078	14	507	190	18	234	157	258	86	193 i	225	331	3 i	1,422	257
Communications equipment	3342	3,312 - 3,316	0	607	1	33	0 - 26	24	0 - 14	42 i	126	*	70	65	* i	43	45 - 94	77 i	1	8	49 i	0 - 100	*	183	41
Semiconductor and other electronic components	3344	13,007 i	3	665	88	40	25	58 i	74	195 i	823	4	269	85	0	60	58	157 - 180	71	23 i	22	79	0 - 4 i	411	105 i
Navigational, measuring, electromedical, and control instruments	3345	3,950	*	399	5	24	42	50	116	153	880 i	0 - 11	25	32	17	122	6 - 53	*	13 i	25	132	154	*	659 i	96
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,280 i	0	94 i	0	1	*	*	26 i	62 i	440 i	0	1	6	0	3	0	0	12 i	*	3 i	92 i	0	291 i	16 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	878	*	248	*	4	8	4	0	33 i	77	*	*	4	0	17	7	0	0	1	56	23	*	229 i	8 i
Other measuring and controlling device	other 3345	1,792	0	57	5	19	34	46	90	58	364	0 - 11	24	23	17	102	0 - 45	*	*	24	73	39	0	139	72
Other computer and electronic products	other 334	5,179 - 5,183 i	246 - 410 i	93	* i	7	0 - 26	30	0 - 14	70	249	0 - 11	143	8	0	10	*	0 - 25 i	1	137 i	22	0 - 100	0 - 4	170	16
Electrical equipment, appliances, and components	335	1,743	*	286 i	21	11	1	1	5	52	261	2	8	101	0	17	9	25	4	2	*	67	2	117	27
Transportation equipment	336	7,812	0	325	5 i	135 i	34	*	*	167	2,020	32	13	298	3	219	0	178 i	1	63	60	8	4	907	74
Motor vehicles, bodies, trailers, and parts	3361–63	6,993	0	231	1	135 i	13	0	*	98	1,895	32	13	144	3	214	0	149 i	1	0 - 64	58	0 - 9	2	736	58
Aerospace products and parts	3364	585	0	35	3 i	0	20	0	0	0 - 54	97	0	0	154	*	4	0	26	0	0 - 54 i	1	0 - 9	3	151	12 i
Aircraft, aircraft engine, and aircraft parts	336411–13	585	0	35	3 i	0	20	0	0	0 - 54	97	0	0	154	*	4	0	26	0	0 - 54 i	1	0 - 9	3	151	12 i
Guided missile, space vehicle, and related parts	336414–15, 336419	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 53-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico[a]	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
Other transportation	other 336	234	0	59	0	0	1 i	*	0	14 - 70 i	28 i	0	0	*	0	1	0	3	0	0 - 64	1 i	0 - 9	0	21	4
Furniture and related products	337	35	0	3	0	0	0	5	0	7	3	0	0	3	0	0	0	0	0	0	0	0	0	7	0
Miscellaneous	339	3,482 - 3,488	0 - 159	86 - 156	25	16 - 55	19 i	15	33	162 - 183	436	4	268	31	1 i	125 i	27	12 i	54	20	103	170	5	198 - 329	41
Medical equipment and supplies	3391	3,069	0 - 159	87	19	17	6	14	33	163	415	4	265	29 i	0	123 i	27	1	54	18	80	170	3	199	18
Other miscellaneous manufacturing	3399	413 - 419	0	0 - 70 i	6	0 - 39 i	13 i	*	*	0 - 21	21	0	3 i	2	1 i	1	0	11 i	0	2 i	23	* i	2 i	0 - 131	22
Nonmanufacturing industries	21–23, 42–81	40,113	23	3,252	95	304	346	217	242	1,221	1,961	150 i	1,926	502	68 i	1,002	103	350	236	372	608	1,590	84	6,233	1,222
Mining, quarrying, oil and gas extraction, and support activities	21	589	0	0 - 328 i	0	2	*	0	0	0 - 84	91 i	0	0	0 - 237	0	0 - 239	4 i	0	1 i	0	0	0	0	88 i	0
Utilities	22	9	0	*	*	0	*	0	0	0	0	0	0	0	0	0	0	*	0	*	0	0	0	8	0
Wholesale trade	42	113	0	0 - 28	0	0	0	0	0	* i	86	0	0	0	0	1	0	0	0	0	0	0	0	* i	* i
Electronic shopping and electronic auctions	454111–12	69 - 4,198 i	0	0 - 328 i	3 i	* i	1 i	0 - 24	0 - 6 i	0 - 84 i	0 - 387 i	* i	0 - 738 i	0 - 237 i	0 - 62 i	0 - 239	0 - 11 i	0 - 31 i	*	0 - 38 i	14 - 43 i	6	0 - 29	0 - 332 i	0 - 44 i
Transportation and warehousing	48–49	62	0	0 - 37	0	1	0	0	0	1	0	0	0	0	0	0 - 37	0	0 - 31	9	0	0	0	0	3	0
Information	51	19,051	0 - 18	1,877	46	164	201	156	204	549	636	72	851	56	6 - 32	470	86	188	90	157	453	1,032	5 - 31	2,984	641
Publishing	511	6,949	0 - 6	1,015	0 - 12	0 - 137	63	108	42	225	235	0 - 15	0 - 332	27	7	0 - 227	49	41	45	94	352	72	6	671	358
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	0 - 6	1,015	0 - 12	0 - 137	63	108	42	225	235	0 - 15	0 - 332	27	7	0 - 227	49	41	45	94	352	72	6	671	358
Telecommunications	517	124	0	0 - 28	0	0	0	0 - 28	0	*	0 - 28	0	0 - 28	0	0	*	0	21	0	3	0 - 28	0	0	25	7
Data processing, hosting, and related services	518	5,891	*	634	35	28	135	19	0 - 163	205	198	58 i	317	0 - 30	0 - 25	244	0 - 38	75	43	50	48	0 - 205	0 - 25 i	591	240
Other information	other 51	6,087	0 - 18	198 - 230	0 - 12	0 - 137	4	0 - 31	0 - 163	118	173 - 205	0 - 15	173 - 535	0 - 30	0 - 25	0 - 227	0 - 38	51	1	11	23 - 55	754 - 961	0 - 25	1,697	36
Finance and insurance	52	1,175	0	43	* i	6 i	6	0	0	15 i	0 - 176 i	5	0 - 176	1 i	*	0 - 176	0	0 - 31 i	12	0 - 38 i	61	21	*	315	62
Real estate and rental and leasing	53	104	0	3 - 98	*	*	*	0 - 24	0	0 - 84	0 - 94	*	0 - 94	*	0	*	0	0	5	*	*	*	0	0 - 94	*

TABLE 53-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico[a]	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	101	0	0 - 94	*	*	*	0 - 24	0	0 - 84	0 - 94	*	0 - 94	*	0	*	0	0	5	*	*	*	0	0 - 94	*
Professional, scientific, and technical services	54	14,790	5 - 24	1,003	46 i	131 i	139	38 - 62 i	33 - 39	574	764	73 i	338 - 457	210	0 - 62	294 i	3 - 15	133 i	118 i	179 i	53 i	530	51	2,506	477
Architectural, engineering, and related services	5413	37	*	7	0	*	0	0 - 7	0	1	*	0	0	*	0	2 i	0	0	0	*	0	0	0	2 i	0 - 7
Computer systems design and related services	5415	5,370	0 - 18	458	0 - 7	3	89	0 - 24	0 - 6	114	322	4	244 - 365	30	0 - 62	28	0 - 11	14	5	0 - 16	8	94	1	417	181
Scientific research and development services	5417	9,006 i	6	491	40 i	128 i	50 i	39 i	34	425	417 i	68 i	93 i	172 i	0	240 i	3 - 15 i	117 i	113 i	164 i	45 i	435	5 - 32 i	2,050 i	284 i
Research and development in biotechnology	541711	2,793	0	117	4	42	12	8	5	106	131	14	4	52	0	24	4	35	20	62	11	404	6	904	101
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	6,205 i	0 - 7 i	374	36 i	86 i	38 i	31 i	29	320 i	286 i	54 i	89 i	120 i	0	216 i	0 - 11 i	82 i	93 i	102 i	34 i	31 i	0 - 27 i	1,146 i	183 i
Research and development in the social sciences and humanities	541720	8	0 - 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other professional, scientific, and technical services	other 54	376	0	47	0 - 7	0	0	0	0	33	25	0	*	7	0 - 34	25	0	2	*	0 - 16	0	1	17 - 46	38	4 - 14
Health care services	621–23	24	0	0	*	0	0	0	0	0	*	0	0	0	0	0 - 24	0	0	0	0	0 - 24	0	0	0 - 24	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2 - 4,124	0 - 18	*	*	0	0	0 - 24	0	1	0 - 387	*	0 - 738	0	0	0 - 239	0 - 11	0 - 31 i	1	0 - 38	0	1	*	0 - 332	0 - 44
All companies (number of domestic employees)	–	104,464	539 i	6,862	651 i	2,324	527	593	600	3,313	8,879	246	4,207	1,611	274	2,108	363	958	492	1,033	1,247	4,536	159	11,797	2,847
Small companies																									
10–19[b]	–	138	1 i	9	0	3	*	1	3	2	3	1	0	0	0	*	0	*	0	*	0	14	0	13	13
20–49	–	457	0	39	*	19	0	1	*	3	5	0	3 i	3	0	4	0	3	*	3	11	5	0	71	51
Medium companies																									
50–99	–	737	*	110	13	8	2	*	1	8	144	3	2	3	1	14	5	1	16	5	3	6	*	64	33
100–249	–	2,192	3	175	1	6	21	9	1	34	78	7	13	56	*	24	1	24	32	10	14	407	1	134	80
Large companies																									

TABLE 53-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico[a]	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
250–499	–	2,709	*	201	5	1	3	4	2	127	120	2	144	20	*	50	9	42	23	30	19	54	2	276	78
500–999	–	2,953	0	300	4	34	18	42	38	108	249	31	97	32	0 - 39	45	16	16	43	15	11	52	0 - 39	497	181
1,000–4,999	–	16,553	27	2,294	35	216	68	136	130	546	1,260	62 i	491	192	49	390	33	132	77	139	341	594	42	1,344	893
5,000–9,999	–	11,965	18	809	62 i	81	86	94	55 i	514	878	51	349	151	0 - 50	498	35 i	213 i	52 i	181	243	393 i	0 - 50	1,239	161 i
10,000–24,999	–	23,612	446 i	839	388 i	643	45 i	146	75	1,074	2,105	54 i	332	548	92 - 159	511	75	194	104 i	373 i	283	567	5 - 72	2,983 i	610
25,000 or more	–	43,148	44	2,087	142	1,312	284	160	294	895	4,036	36	2,776	608	67 i	572	188	333	145	278	321	2,443	45	5,176	747

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.
[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than $1 million of R&D paid for by the company or reporting less than $1 million of R&D paid for by others. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 53-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
All industries	21–23, 31–33, 42–81	104,464	402	1,493	117	1,022	2,373 i	2,032	8,195	396	9,846	24	4,090	838	274	2,376	1,451	1,775	380	780	5,974	369 i	229 i	143	3,720 i
Manufacturing industries	31–33	64,351	172	1,101	51	841	1,449 i	1,113	5,923	263	4,483	16	2,722	811	201	1,563	1,097	972	281	612	3,894	226	73	114	2,318 i
Food	311	835	3	58 i	*	23	11	39	105 i	2	16	2	5	2	3	22	2	*	8	5	0 - 32	0 - 17	3	3	82 - 168 i
Beverage and tobacco products	312	674	1	7	1	21	24	5	45	0	8	1	28	0	0	28	0	0	0 - 17	0 - 9	0	16	2	0	0
Textile, apparel, and leather products	313–16	157	*	0 - 14	*	0 - 14	5	2	18	16	*	0	2	*	4	*	2	1	0	5	0	0	0	0	* i
Wood products	321	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	322	101	0	7	0	*	1	0	3	0	0	0	0	0	0	*	12	0	0	*	0	*	0	0	* i
Printing and related support activities	323	9 i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	* i
Petroleum and coal products	324	171 - 176	*	0 - 20	0	0	0	0 - 25	17	0	1	0	1	*	0	2	0 - 10	0	0 - 17	0	0	0 - 17	0	0	* i
Chemicals	325	18,568	133	449	31	172	265	316	1,043	76	400 i	9	1,219	10	108	259	137	84	34	186	276	112	52	37	14 i
Basic chemicals	3251	742	3	24	1	8	5	5	70	1	10	3	14	1	*	61	1	4	2	5	0 - 63	0 - 32	3	0 - 24	* i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	1	16	*	0 - 16	3	0 - 6	34	0 - 6	7	*	27	*	0 - 102	0 - 11	10	1	0 - 13	0 - 56	0	0 - 32	0	0 - 24	0 - 1 i
Pesticide, fertilizer, and other agricultural chemicals	3253	450	11	72	*	2	3	0 - 6	2	0 - 6	0 - 27	0 - 7	1	*	1 - 103	9	8	*	0 - 13	61	0	0	0	0	0 - 1 i
Pharmaceuticals and medicines	3254	15,868	115	309	29	144	243	305	803	70	350 i	0 - 7	1,139	6	6 - 25	108	114	79	19	65	214	81 i	26 - 50	13 - 38 i	14 i
Soap, cleaning compound, and toilet preparation	3256	757	3	27	*	5	12	2	106	1	9 i	*	33	3	*	73	2	*	2	2	*	0 - 25	0 - 24	0 - 24	0
Paint, coating, adhesive, and other chemicals	3255, 3259	227	*	1	*	0 - 16	*	0 - 6	27	0 - 6	0 - 27	0 - 7	3	*	0	0 - 11	2	*	0	0 - 56	0 - 63	0	0 - 24	*	0 - 1 i
Plastics and rubber products	326	503	3	25 i	0	26	2	2	66	*	3 i	*	24	1	*	1	4	0	5	0	9	0	0	0	27 i
Nonmetallic mineral products	327	192 i	0	0	0	3 i	0	0	13 i	0	1 i	0	31	0	0	0	48 i	10 i	0	0	21 i	0	*	0	0
Primary metals	331	76	0	4	0	*	*	15	5	0	0	0	0	0	0	*	0	1	0	0	0	0	0	0	13 i
Fabricated metal products	332	278	1	1	*	4	1	3	22	0	5	*	60	1	11	1	0	1	*	13	1	2	*	0	* i
Machinery	333	4,251	3	96	2	36	* i	35	396	4	384	* i	190	5	10	59	146	111 i	4	27	363	2 i	8	1	11 i
Agricultural implement	33311	857	3	76	2	21	*	2	36	0	100	0	*	1	3	*	0	0	0	*	0	0	*	0	0

TABLE 53-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Semiconductor machinery	333242	915	0	0	0	0	0	0	89 i	0 - 5	144 i	0	39 i	0 - 5	0	55	139	95 i	0	0 - 25	200	0	0	0	0
Engine, turbine, and power transmission equipment	3336	630	0	1	0	2	0	1	36	0	10	0	0	0	0	0	0	*	3	3	137	0	0	0	0
Other machinery	other 333	1,850	*	20	*	13	* i	32	235	0 - 5	130	* i	151	0 - 5	7	4	7	16	1	0 - 25	26 i	2 i	8	1	11 i
Computer and electronic products	334	25,452 i	5 - 25	33 - 53 i	1	137	1,059 i	127	2,470	113	3,216	2	798	785	55	992	215	708	188	318 i	3,061	30	3	*	1,845 - 2,014 i
Communications equipment	3342	3,312 - 3,316	0 - 25 i	0 - 49 i	* i	0 - 20	0 - 205 i	38	337	4	986	*	16 i	0 - 205 i	8	16 i	29	53	0 - 158	13 i	209	1	0	0 - 1	0 - 205 i
Semiconductor and other electronic components	3344	13,007 i	0 - 25	0 - 49 i	0	113	262 - 338	18	1,530	54	1,549	*	326	470	7	617	88	387	31 i	226 i	2,207	0	*	0	1,719 i
Navigational, measuring, electromedical, and control instruments	3345	3,950	0 - 25	4	*	6	0	33	206	5	383	2	50	27	27	107	10	8	*	75 i	22	1	0 - 4	0 - 1	0 - 50 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,280 i	*	2	0	*	0	1	38 i	0	142 i	0	5 i	*	0	44	1	0	0	0	0	0	0	0	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	878	0	0	0	5	0	7	56	1	10	1	1 i	0	0	*	8	2	0	62 i	5	1	*	0 - 1	0 - 14 i
Other measuring and controlling device	other 3345	1,792	0 - 25	3	*	1	0	25	112	4	231	1	45	27	27	63	2	6	*	13	17	0	0 - 4	0	0 - 45 i
Other computer and electronic products	other 334	5,179 - 5,183 i	0	0 - 49 i	*	0 - 20	516 - 797 i	37 i	397	50	299	0	406 i	82 - 290 i	13	252	88 i	259	0 - 158	5	623	28	0 - 4	0	0 - 295 i
Electrical equipment, appliances, and components	335	1,743	1	57	*	30	*	3	370	12	50	0	75	*	3	38	43	16	3	15	0 - 19	0 - 17	*	4	4 i
Transportation equipment	336	7,812	3 i	319	1	370	9	448	999	5 i	226	*	103	3	0	71 i	463	28	24	14	4	*	3 i	69	105 i
Motor vehicles, bodies, trailers, and parts	3361–63	6,993	3 i	317	1	343	9	444	989	3 i	212	*	99	3	0	71 i	463	0 - 29	0 - 25	14	4	0	3 i	69	101 i
Aerospace products and parts	3364	585	0	1	0	26	0	2	0 - 11	0	0 - 15	0	4	0	0	*	0	0	0 - 25	0	0	0	0	0	0
Aircraft, aircraft engine, and aircraft parts	336411–13	585	0	1	0	26	0	2	0 - 11	0	0 - 15	0	4	0	0	*	0	0	0 - 25	0	0	0	0	0	0
Guided missile, space vehicle, and related parts	336414–15, 336419	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 53-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	234	0	1 i	0	*	0	2 i	0 - 11 i	3 i	0 - 15 i	0	0	0	0	0	* i	0 - 29	0 - 25 i	0	0	*	* i	* i	3 i
Furniture and related products	337	35	0	0	0	2	0	0	2	1	1	0	0	*	0	0	0	*	0	0	0	0	0	0	1 i
Miscellaneous	339	3,482 - 3,488	3 - 23	31	15	9 - 23	72	99 - 124	351	33 i	171	1	188	4	6	89	20 - 31	13	3	24 - 33	131 - 163	50 - 67 i	1	1	0 - 219 i
Medical equipment and supplies	3391	3,069	4	30	11	10	51	100	310	3	138	1	188	4	3	85	21	12	3	25	132	51 i	1	1	0 - 159 i
Other miscellaneous manufacturing	3399	413 - 419	0 - 20 i	*	4 i	0 - 14 i	20 i	0 - 25	41 i	30 i	33	0	*	0	3	3	0 - 10	1	0	0 - 9 i	0 - 32	0 - 17 i	0	* i	0 - 185
Nonmanufacturing industries	21–23, 42–81	40,113	230 i	393 i	66	181	924 i	919	2,272	133	5,364	9	1,369 i	26	73	813 i	354 i	804	99	169	2,080	143 i	156 i	29	1,402 i
Mining, quarrying, oil and gas extraction, and support activities	21	589	0 - 5	0 - 138	0	* i	0 - 20	0 - 238	14	0	0 - 393	*	0 - 393 i	0	0	0 - 214	0	0	*	0	0	0 - 107	0	0 - 10	0 - 59 i
Utilities	22	9	0	*	0	*	0	0 - 2	*	0	0	*	0	0	0 - 2	0	0	0	*	0	0	0	*	0	0
Wholesale trade	42	113	0	0	0	0	0	0	0 - 28	0 - 28	0	0	0 - 28 i	0 - 13	0	0	0	0	0	0	0	0	0	0	0 - 28 i
Electronic shopping and electronic auctions	454111–12	69 - 4,198 i	0 - 5 i	0 - 138 i	1 i	0 - 17 i	0 - 20 i	0 - 238 i	0 - 285 i	0 - 48 i	0 - 462 i	0 - 8 i	0 - 468 i	0 - 13 i	0 - 14 i	0 - 214 i	0 - 162 i	0 - 19 i	0 - 82 i	1 i	0 - 182 i	0 - 107 i	0 - 40 i	0 - 10 i	0
Transportation and warehousing	48–49	62	0	*	0	0	0	1	8	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Information	51	19,051	67	104	37	75	71	450	1,173	57	3,231	1 - 9	237 - 349	0 - 13	37	297	65	520	0 - 82	114	1,346	25	27 - 36	11 - 20	29 - 53
Publishing	511	6,949	11	0 - 35	0 - 35	0 - 12	9	0 - 237	690	17	1,446	1	84	0 - 13	15	59	26	0 - 237	0 - 82	79	468	8	4	9	16 - 29
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	11	0 - 35	0 - 35	0 - 12	9	0 - 237	690	17	1,446	1	84	0 - 13	15	59	26	0 - 237	0 - 82	79	468	8	4	9	16 - 29
Telecommunications	517	124	0	0	0	0 - 12	5	0 - 28	10	0 - 28	10	0	0 - 28	0	0	*	0	0	0 - 28	0	19	*	0	0	* i
Data processing, hosting, and related services	518	5,891	53	31	1	64	57	148	347	0 - 41	1,530	1 i	44	0 - 13	20	0 - 205	0 - 40	0 - 205 i	0 - 82 i	34	403	15	24	3	8 i
Other information	other 51	6,087	3	37 - 74	0 - 37	0 - 12	1	36 - 303	126	0 - 41	245	0 - 8	80 - 222	0 - 13	2	32 - 239	0 - 40	78 - 521	0 - 82	1	456	1	0 - 9	0 - 9	0 - 29 i
Finance and insurance	52	1,175	0 - 5	0 - 138	4	0 - 17	22	23 i	21	9 i	320	0	0 - 176	0 - 13	0 - 14 i	63	0 - 162	0 - 19	0 - 82 i	0 - 24	0 - 176	0 - 107	0 - 40 i	0 - 10 i	0 - 59 i

TABLE 53-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Real estate and rental and leasing	53	104	*	*	0	*	0 - 20	*	0 - 94	*	*	*	0 - 94	*	*	3	*	*	*	*	*	*	0	*	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	101	*	*	0	*	0 - 20	*	0 - 94	*	*	*	0 - 94	*	*	3	*	*	*	*	*	*	0	*	0
Professional, scientific, and technical services	54	14,790	160 i	152 i	25 i	91	813 i	210 i	774	21 i	1,347	1 i	665 i	14 i	24 i	239 i	129 i	266 i	18 i	32 i	554	12 i	89 i	8 i	1,313 - 1,338 i
Architectural, engineering, and related services	5413	37	0	*	* i	*	0	* i	1 i	*	17	*	*	0	0	*	*	*	0	*	*	2	* i	*	3 i
Computer systems design and related services	5415	5,370	48 i	32	*	23	767 i	45	347	* i	994	0	70	3	2 i	71 i	6	194 i	1	13	463	3	9	3	118 - 146 i
Scientific research and development services	5417	9,006 i	111 i	109 i	23 i	68 i	46 i	158 i	403	21 i	267 i	1 i	595 i	11 i	21 i	167 i	120 i	56 i	17 i	19 i	74 i	7 i	80 i	5 i	1,190 i
Research and development in biotechnology	541711	2,793	22	24	7	30	12	67	195	6	103	0	145	2	11	15	39	14	3	4	24	0	5	0	* i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	6,205 i	89 i	85 i	15 i	38 i	26 - 35 i	92 i	208 i	15 i	163 i	1 i	449 i	9 i	11 i	152 i	81 i	42 i	14 i	15 i	49 i	7 i	74 i	5 i	1,181 - 1,191 i
Research and development in the social sciences and humanities	541720	8	0	0	0	0	0 - 7	0	0	0	1	0	0	0	0	0	0	0	*	0	0	0	1	0	0 - 8 i
Other professional, scientific, and technical services	other 54	376	1	12	2	0	*	6	23	0	70	0	*	0	*	1	3	16	0	1	18	*	0	0	1 i
Health care services	621–23	24	0	0	0	0	0	0 - 24	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	* i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2 - 4,124	0 - 5	0 - 138	*	*	0 - 20	0 - 238	0 - 285	0 - 48	0 - 462 i	0	0 - 468	0 - 13	0	0 - 214	0 - 162	0	0 - 82	0 - 24	0 - 182 i	1	0	0	1 i
All companies (number of domestic employees)	–	104,464	402	1,493	117	1,022	2,373 i	2,032	8,195	396	9,846	24	4,090	838	274	2,376	1,451	1,775	380	780	5,974	369 i	229 i	143	3,720 i
Small companies																									
10–19[a]	–	138	0	0	0	*	2	5	19	1	20	0	*	*	* i	*	11	1	0	0	3	*	0	0	10 i
20–49	–	457	2	2	0	1	2	4	89	3	72	0	6	3	*	4	4	7	0	2	3	*	3	2	28 i

TABLE 53-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Medium companies																									
50–99	–	737	3	3	2	2	1	11	64	*	107	0	3	*	2	6	*	19	0	4	47	11	*	0	12 i
100–249	–	2,192	3	4	1	8	35	22	270	20	129	1	23	*	7	47	33	118	6	31	264	4	3	*	31 i
Large companies																									
250–499	–	2,709	11	25	1	81 i	6	19	169	43	260	*	47	4	8	55	93	64	1	43	529	*	1	*	36
500–999	–	2,953	31	17	0	27	12	63	205	15	241	1 i	86	5	11	48	20	57	11	37	182	6	1 i	4	27 i
1,000–4,999	–	16,553	60 i	126	8	77	86	308	1,428	70	2,275	5	345	61	37	447	96	207	174	168 i	752	15	22	1	297 i
5,000–9,999	–	11,965	35 i	149	14 i	127 i	920 i	136	691 i	45 i	916 i	*	675 i	275 i	110	317	184 i	185 i	96 i	180	417	28	14	2	258 i
10,000–24,999	–	23,612	202	427	25	219	217	327	1,476	39	1,912	4	1,194	23	40	701 i	306 i	268 i	33	233	382 i	80	108 i	32	2,783 i
25,000 or more	–	43,148	55	740	68	480	1,093 i	1,137	3,784	159	3,912	13	1,712	466	59	751	703	849	58	83	3,395	224 i	77 i	103	239 i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than $1 million of R&D paid for by the company or reporting less than $1 million of R&D paid for by others. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 54

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D													
				Total		Land acquisition		Buildings and land improvement		Equipment		Capitalized software		All other	
All industries	21–23, 31–33, 42–81	781,625		29,106		237		3,739		15,663		5,475		3,992	
Manufacturing industries	31–33	337,722		17,674		230		2,987		10,745		1,669		2,043	
Food	311	18,408		432		102		77		180		42		31	
Beverage and tobacco products	312	8,239		160		0		101		46		1		12	i
Textile, apparel, and leather products	313–16	2,717		85		*	i	14		38		19		15	
Wood products	321	1,445		7		0		*		6		*		*	
Paper	322	6,715		65	i	0		2	i	59	i	1	i	4	i
Printing and related support activities	323	3,140	i	11	i	*	i	0 - 6	i	7	i	0 - 6		0 - 6	i
Petroleum and coal products	324	29,185		125		*		0 - 14		91		0 - 29		0 - 18	
Chemicals	325	69,379		5,634		74		1,934		2,763		309		554	
Basic chemicals	3251	23,038		358		*		81		239		22		17	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	8,732		225		*		42		153		5		25	
Pesticide, fertilizer, and other agricultural chemicals	3253	3,978		57		0		0 - 20		20		0 - 18		19	i
Pharmaceuticals and medicines	3254	24,722		4,476		74		1,603		2,054		267		478	
Soap, cleaning compound, and toilet preparation	3256	5,528		170		0		40		114		0 - 18	i	0 - 18	i
Paint, coating, adhesive, and other chemicals	3255, 3259	3,380		347	i	0		143 - 165	i	184	i	0 - 18		0 - 18	
Plastics and rubber products	326	12,138		393		*		20		221		24		129	
Nonmetallic mineral products	327	4,445		69		0		10		42		1		16	
Primary metals	331	6,724		89		3	i	9		58		1	i	19	i
Fabricated metal products	332	6,408		204		*		10		136		9		50	
Machinery	333	15,899		953		1		95		588		130		139	
Agricultural implement	33311	1,963		58		*		14		27		4		13	
Semiconductor machinery	333242	1,226		419		1		37		284		39		58	
Engine, turbine, and power transmission equipment	3336	3,190		85		0		15		56		3		11	
Other machinery	other 333	9,521		391		*		29		221		83		58	
Computer and electronic products	334	38,870	i	5,765		18	i	439		4,111		759		438	
Communications equipment	3342	3,712		780		0		21		586		54	i	120	
Semiconductor and other electronic components	3344	20,031	i	2,698	i	8	i	67	i	2,016	i	403		204	
Navigational, measuring, electromedical, and control instruments	3345	7,975		899		10	i	41	i	667		74		105	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,340		222	i	9	i	5	i	181	i	11	i	15	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,429		448	i	1		21	i	302	i	50		74	i
Other measuring and controlling device	other 3345	4,206		228		0		15		184		14		15	
Other computer and electronic products	other 334	7,151		1,388		0		310		841		228		10	

TABLE 54

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D													
				Total		Land acquisition		Buildings and land improvement		Equipment		Capitalized software		All other	
Electrical equipment, appliances, and components	335	4,785		477		1		35		346		20		76	
Transportation equipment	336	90,041		2,066		13		147		1,366		186		354	
Motor vehicles, bodies, trailers, and parts	3361–63	77,242		1,454		12		115		978		176		172	
Aerospace products and parts	3364	8,344		486 - 495		1		30		297		4 - 7		156	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,090		438		0		12 - 18		265 - 269		3 - 6		146 - 157	
Guided missile, space vehicle, and related parts	336414–15, 336419	253		48 - 57		1		12 - 19		30 - 32		1		0 - 11	
Military armored vehicle, tank, and tank component	336992	21		1		0		0		1		0		*	i
Other transportation	other 336	4,434		117 - 127	i	0		2		90	i	1 - 8		25	
Furniture and related products	337	1,293		48		0		11		28		3		6	
Miscellaneous	339	17,892		1089		16	i	78		660		144		191	
Medical equipment and supplies	3391	13,545		954		16	i	71		561		135		171	
Other miscellaneous manufacturing	3399	4,348		135		0		7		99		9		19	
Nonmanufacturing industries	21–23, 42–81	443,902		11,432		7		752		4,918		3,807		1,949	
Mining, quarrying, oil and gas extraction, and support activities	21	35,505		441		0		4		168		194		75	
Utilities	22	104,459		210	i	0		*	i	20 - 36	i	1 - 12		175	i
Wholesale trade	42	66 - 26,950	i	66 - 155	i	1		3	i	6 - 90	i	12 - 17	i	45	i
Electronic shopping and electronic auctions	454111–12	77 - 26,961		77 - 89	i	0		4	i	16 - 71	i	14 - 26		0 - 31	
Transportation and warehousing	48–49	31,551		495		*	i	23		168	i	216	i	88	
Information	51	163,057		5,270		2		445		2,641		1,724		458	
Publishing	511	21,758		1,166		2		266		548		256		94	
Newspaper, periodical, book, and directory publishers	5111	12		1		0		0		*		1		0	
Software publishers	5112	21,747		1,165		2		266		548		255		94	
Telecommunications	517	72,902		241	i	0		4		182	i	52		4	i
Data processing, hosting, and related services	518	21,341		2,260		*		87		736		1,153		283	i
Other information	other 51	47,056		1,603		0		87		1,175		263		77	
Finance and insurance	52	28,091		1,548	i	0		20	i	302	i	796	i	430	
Real estate and rental and leasing	53	886		5 - 78		0		0		3		2 - 73		*	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	9		*		0		0		*		*	i	0	
Other real estate and rental and leasing	other 53	878		5 - 78		0		0		3		1 - 73		*	
Professional, scientific, and technical services	54	22,719		2,371		4		237		1,114		512		505	
Architectural, engineering, and related services	5413	6,585		153		*		4	i	64	i	38	i	47	i
Computer systems design and related services	5415	10,079		935		3		37		506		246		144	

TABLE 54

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D													
				Total		Land acquisition		Buildings and land improvement		Equipment		Capitalized software		All other	
Scientific research and development services	5417	2,990		944		1		194		481	i	43		224	i
Research and development in biotechnology	541711	1,035		228	i	0		27	i	172	i	2	i	27	i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,945		707		1		166		304		40		196	i
Research and development in the social sciences and humanities	541720	10		9		0		1		5		1		2	
Other professional, scientific, and technical services	other 54	3,064		340		0		3		63		185		90	
Health care services	621–23	2,863		385	i	0		10	i	308	i	33 - 70	i	0 - 31	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	27,749		480		*		6		93	i	234	i	147	
All companies (number of domestic employees)	–	781,625		29,106		237		3,739		15,663		5,475		3,992	
Small companies															
10–19[a]	–	4,330		610		1		33		345		61	i	171	
20–49	–	5,957		1,086		1		77		478		135		394	
Medium companies															
50–99	–	9,279		958		*	i	127		548		117		166	
100–249	–	16,050		1,492		6		167		721		286		311	
Large companies															
250–499	–	13,374		1,502		4		185		774		326		213	
500–999	–	23,324		1,612		2		119		777		371		344	
1,000–4,999	–	85,589		5,382		19		855		2,566		1,082		859	
5,000–9,999	–	91,179		3,100		14		449		1,791		616		231	
10,000–24,999	–	151,268		4,606		78		783		2,167		844		733	
25,000 or more	–	381,274		8,758		112		943		5,497		1,637		569	i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2015. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 55

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
All industries	21–23, 31–33, 42–81	32,296	2,676	8.3	21,213	1,832	8.6	11,083	844	7.6
Manufacturing industries	31–33	17,529	1,409	8.0	10,100	962	9.5	7,429	447	6.0
Food	311	1,558	35	2.2	985	23	2.3	573	12	2.2
Beverage and tobacco products	312	849	8	1.0	391	6	1.5	458	3	0.6
Textile, apparel, and leather products	313–16	401	8	2.1	220	7	3.1	181	1	0.8
Wood products	321	115	3	2.5	105	3	2.7	11	*	1.0
Paper	322	307	7	2.4	193	5	2.8	114	2	1.7
Printing and related support activities	323	305 i	5 i	1.5	262 i	5 i	1.7	43 i	* i	0.2
Petroleum and coal products	324	155	9	5.8	91	6	7.1	64	3	3.9
Chemicals	325	2,439	255	10.5	1,451	186	12.8	988	70	7.1
Basic chemicals	3251	361	17	4.8	246	12	4.7	115	6	5.0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	156	10	6.5	83	6	7.5	74	4	5.4
Pesticide, fertilizer, and other agricultural chemicals	3253	101	10	9.8	69	7	10.8	31	2	7.4
Pharmaceuticals and medicines	3254	1,068	184	17.3	648	139	21.5	421	45	10.8
Soap, cleaning compound, and toilet preparation	3256	459	17	3.6	245	11	4.5	214	6	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	293	17	5.8	160	10	6.4	134	7	4.9
Plastics and rubber products	326	694	31	4.4	495	25	5.0	199	6	3.1
Nonmetallic mineral products	327	206	7 i	3.6	139	7 i	4.9	67 i	1 i	1.1
Primary metals	331	298	9	2.9	216	8	3.7	83	1	0.9
Fabricated metal products	332	558	36	6.4	387	34	8.7	171	2	1.2
Machinery	333	1,599	138	8.7	869	95	10.9	729	43	6.0
Agricultural implement	33311	180	22	12.1	100	13	12.8	80	9	11.1
Semiconductor machinery	333242	96	20	21.2	37	12	34.1	59	8	13.2
Engine, turbine, and power transmission equipment	3336	191	12	6.4	79	7	9.0	112	5	4.6
Other machinery	other 333	1,131	84	7.4	654	63	9.6	478	22	4.5
Computer and electronic products	334	2,525	446	17.7	1,167	264	22.6	1,358	182	13.4
Communications equipment	3342	266	72	27.0	151	40	26.5	114	32	27.7
Semiconductor and other electronic components	3344	890	181	20.3	309	95	30.8	581	85	14.7
Navigational, measuring, electromedical, and control instruments	3345	869	110	12.7	485	75	15.5	384	35 i	9.2

TABLE 55

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	181	24 i	13.3	96	16 i	16.8	85	8 i	9.3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	307	40 i	13.1	205	33	16.1	102	7 i	7.1
Other measuring and controlling device	other 3345	381	46	12.1	185	26	14.1	196	20	10.2
Other computer and electronic products	other 334	500	84	16.7	221	54	24.3	279	30	10.7
Electrical equipment, appliances, and components	335	776	48	6.1	319	25	7.8	458	23 i	5.0
Transportation equipment	336	3,115	254	8.2	1,835	183	9.9	1,280	72	5.6
Motor vehicles, bodies, trailers, and parts	3361–63	2,120	169	8.0	1,040	108	10.4	1,080	61	5.6
Aerospace products and parts	3364	742	70	9.4	612	61	10.0	130	8	6.2
Aircraft, aircraft engine, and aircraft parts	336411–13	717	62	8.7	588	54	9.2	130	8	6.3
Guided missile, space vehicle, and related parts	336414–15, 336419	25	7	29.5	24	7	29.9	*	*	0.7
Military armored vehicle, tank, and tank component	336992	3	1	27.5	3	1	27.6	* i	0	0.0
Other transportation	other 336	250	15	6.0	180	12	6.8	70	3 i	3.9
Furniture and related products	337	164	4	2.7	139	4	2.8	25	*	1.8
Miscellaneous	339	1,466	104	7.1	837	78	9.4	630	26	4.2
Medical equipment and supplies	3391	1,079	82	7.6	586	59	10.1	492	23	4.7
Other miscellaneous manufacturing	3399	388	22	5.8	250	19	7.7	137	3	2.4
Nonmanufacturing industries	21–23, 42–81	14,766	1,267	8.6	11,113	870	7.8	3,654	396	10.9
Mining, quarrying, oil and gas extraction, and support activities	21	392	22 i	5.7	181	12	6.6	211	11 i	5.0
Utilities	22	359	0 - 35	D	348	0 - 23	D	12	0 - 12	D
Wholesale trade	42	303 i	16	5.1	255 i	13	5.2	48	2	4.6
Electronic shopping and electronic auctions	454111–12	1,008	42 - 114	D	413 - 1,005	38 - 64	D	3 - 595	3 - 52	D
Transportation and warehousing	48–49	1,357	19 i	1.4	1,047	18 i	1.7	310	1 i	0.2
Information	51	3,043	533	17.5	2,107	359	17.0	936	174	18.6
Publishing	511	599	181	30.2	359	110	30.6	241	71	29.5
Newspaper, periodical, book, and directory publishers	5111	4	1	17.7	3	1	17.5	*	*	27.5

TABLE 55

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Software publishers	5112	596	180	30.3	355	109	30.8	241	71	29.5
Telecommunications	517	682	20	2.9	606	19	3.1	77	1	1.1
Data processing, hosting, and related services	518	1,239	201	16.2	768	126	16.4	471	75	16.0
Other information	other 51	522	130	25.0	375	104	27.7	147	27	18.1
Finance and insurance	52	2,159	71	3.3	1,795	54	3.0	364	17	4.6
Real estate and rental and leasing	53	30	4	12.6	25	4	14.3	5	*	4.2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	13.4	1	*	13.0	*	*	30.8
Other real estate and rental and leasing	other 53	28	4	12.6	24	3	14.3	5	*	4.0
Professional, scientific, and technical services	54	2,595	441	17.0	1,421	299	21.1	1,175	142	12.1
Architectural, engineering, and related services	5413	464	59	12.7	323	58	18.0	140	1	0.6
Computer systems design and related services	5415	1,068	154	14.4	482	99	20.5	586	55	9.5
Scientific research and development services	5417	418	178	42.6	300	98	32.8	118 i	80	67.5
Research and development in biotechnology	541711	172	59	34.3	141	30	21.6	31	29	91.5
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	232	110 i	47.2	146	59	40.3	87 i	51 i	58.9
Research and development in the social sciences and humanities	541720	13	9	70.5	13	9	70.8	*	*	59.1
Other professional, scientific, and technical services	other 54	646	50	7.7	316	44	14.0	330 i	6	1.7
Health care services	621–23	510	12	2.4	507	12	2.4	3	*	3.1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,010	38 - 88	D	2,418 - 3,011	39	D	0 - 591	0 - 49	D
All companies (number of domestic employees)	–	32,296	2,676	8.3	21,213	1,832	8.6	11,083	844	7.6
Small companies										
10–19[a]	–	83	37	44.4	79	35	44.7	4	2	39.8
20–49	–	325	92	28.3	257	83	32.4	69	9	12.9
Medium companies										
50–99	–	423	95	22.5	356	85	23.8	67	10	15.4
100–249	–	975	150	15.4	719	127	17.7	256	23	8.8

TABLE 55

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Large companies										
250–499	–	991	130	13.1	760	105	13.8	231	25	10.8
500–999	–	1,202	134	11.1	859	100	11.6	343	34	9.9
1,000–4,999	–	4,575	454	9.9	2,854	305	10.7	1,721	149	8.6
5,000–9,999	–	2,971	280	9.4	1,677	182	10.9	1,294	97	7.5
10,000–24,999	–	6,282	465	7.4	3,518	267	7.6	2,764	198 i	7.2
25,000 or more	–	14,468	840	5.8	10,135	542	5.3	4,334	298	6.9

* = amount < 500 employees; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 56

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21–23, 31–33, 42–81	597,420	492,956	104,464	2,676	1,832	844	223.2	269.0	123.8
Manufacturing industries	31–33	350,024	285,674	64,351	1,409	962	447	248.4	297.0	143.8
Food	311	5,015	4,180	835	35	23	12	143.3	184.7	67.5
Beverage and tobacco products	312	1,755	1,082	674	8	6	3	209.1	190.5	248.0
Textile, apparel, and leather products	313–16	1,061	904	157	8	7	1	128.4	132.1	110.4
Wood products	321	193	186	7	3	3	*	66.1	66.0	69.4
Paper	322	1,165	1,064	101	7	5	2	157.4	195.6	51.5
Printing and related support activities	323	429 i	420 i	9 i	5 i	5 i	* i	93.8	93.1	144.4
Petroleum and coal products	324	1,477 - 1,481	1,306	171 - 176	9	6	3	D	202.1	D
Chemicals	325	115,631	97,063	18,568	255	186	70	452.7	523.1	265.8
Basic chemicals	3251	3,102	2,360	742	17	12	6	178.9	203.8	128.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695	1,172	523	10	6	4	166.3	188.1	131.9
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297	1,822 - 1,846	450	10	7	2	D	D	193.3
Pharmaceuticals and medicines	3254	103,487	87,619	15,868	184	139	45	561.0	630.1	349.5
Soap, cleaning compound, and toilet preparation	3256	3,517	2,760	757	17	11	6	210.5	253.1	130.5
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560	1,305 - 1,333	227	17	10	7	D	D	34.5
Plastics and rubber products	326	3,359	2,856	503	31	25	6	109.1	115.7	82.5
Nonmetallic mineral products	327	1,701 i	1,508 i	192 i	7 i	7 i	1 i	227.2	223.0	266.6
Primary metals	331	740	665	76	9	8	1	85.3	83.6	103.9
Fabricated metal products	332	3,163	2,885	278	36	34	2	88.2	85.4	133.0
Machinery	333	19,435	15,184	4,251	138	95	43	140.4	159.8	98.0
Agricultural implement	33311	2,778	1,921	857	22	13	9	127.5	149.1	96.3
Semiconductor machinery	333242	5,374	4,459	915	20	12	8	264.7	356.9	117.2
Engine, turbine, and power transmission equipment	3336	1,931	1,301	630	12	7	5	157.6	183.7	121.8
Other machinery	other 333	9,353	7,503	1,850	84	63	22	111.3	120.0	86.0
Computer and electronic products	334	112,180	86,729	25,452 i	446	264	182	251.4	328.5	139.7
Communications equipment	3342	15,907 - 15,912	12,595	3,312 - 3,316	72	40	32	D	315.1	D
Semiconductor and other electronic components	3344	48,189 i	35,183 i	13,007 i	181	95	85	266.9	369.2	152.6
Navigational, measuring, electromedical, and control instruments	3345	21,512	17,562	3,950	110	75	35 i	195.2	234.2	112.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621 i	3,342	1,280 i	24 i	16 i	8 i	192.1	206.9	161.9

TABLE 56

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541	9,662	878	40 i	33	7 i	262.4	294.2	119.9
Other measuring and controlling device	other 3345	6,350	4,558	1,792	46	26	20	138.1	175.3	89.7
Other computer and electronic products	other 334	26,567 - 26,571	21,388	5,179 - 5,183 i	84	54	30	D	397.8	D
Electrical equipment, appliances, and components	335	7,006	5,263	1,743	48	25	23 i	147.1	212.3	76.3
Transportation equipment	336	53,187	45,375	7,812	254	183	72	209.2	248.5	109.0
Motor vehicles, bodies, trailers, and parts	3361–63	31,110	24,117	6,993	169	108	61	184.2	223.2	115.0
Aerospace products and parts	3364	18,943 i	18,358 i	585	70	61	8	272.4	298.8	72.1
Aircraft, aircraft engine, and aircraft parts	336411–13	17,476 i	16,891 i	585	62	54	8	280.9	312.2	72.1
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467	1,467	*	7	7	*	200.1	200.2	100.0
Military armored vehicle, tank, and tank component	336992	35	35	0	1	1	0	39.5	39.5	NA
Other transportation	other 336	3,099	2,865	234	15	12	3 i	207.3	234.4	85.9
Furniture and related products	337	444	409	35	4	4	*	101.7	104.1	79.7
Miscellaneous	339	22,077 - 22,084	18,596	3,482 - 3,488	104	78	26	D	237.4	D
Medical equipment and supplies	3391	19,083	16,014	3,069	82	59	23	232.6	270.7	134.0
Other miscellaneous manufacturing	3399	2,995 - 3,002	2,582	413 - 419	22	19	3	D	134.6	D
Nonmanufacturing industries	21–23, 42–81	247,396	207,283	40,113	1,267	870	396	195.3	238.1	101.2
Mining, quarrying, oil and gas extraction, and support activities	21	3,307	2,717	589	22 i	12	11 i	147.1	228.3	55.7
Utilities	22	284	275	9	0 - 35	0 - 23	0 - 12	D	D	D
Wholesale trade	42	1,304	1,191	113	16	13	2	84.0	89.4	51.4
Electronic shopping and electronic auctions	454111–12	3,200 - 20,013 i	3,131 - 15,818 i	69 - 4,198 i	42 - 114	38 - 64	3 - 52	D	D	D
Transportation and warehousing	48–49	9,952 i	9,890 i	62	19 i	18 i	1 i	532.9	550.9	86.0
Information	51	129,277	110,227	19,051	533	359	174	242.7	307.3	109.5
Publishing	511	39,968	33,019	6,949	181	110	71	220.9	300.8	97.7
Newspaper, periodical, book, and directory publishers	5111	61	61	0	1	1	*	97.4	99.6	0.0
Software publishers	5112	39,907	32,958	6,949	180	109	71	221.3	301.9	97.7
Telecommunications	517	3,856	3,733	124	20	19	1	194.0	196.4	141.8
Data processing, hosting, and related services	518	36,449	30,558	5,891	201	126	75	181.0	242.5	78.2
Other information	other 51	49,004	42,917	6,087	130	104	27	375.6	413.2	228.9
Finance and insurance	52	10,092	8,917	1,175	71	54	17	142.7	164.8	70.8

TABLE 56

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Real estate and rental and leasing	53	1,476	1,371	104	4	4	*	395.8	389.0	512.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48	45	4	*	*	*	288.6	283.4	373.5
Other real estate and rental and leasing	other 53	1,427	1,326	101	4	3	*	400.8	394.0	519.8
Professional, scientific, and technical services	54	68,023	53,233	14,790	441	299	142	154.3	177.9	104.4
Architectural, engineering, and related services	5413	4,244	4,207	37	59	58	1	71.9	72.3	44.2
Computer systems design and related services	5415	26,416	21,046	5,370	154	99	55	171.5	213.5	96.9
Scientific research and development services	5417	30,675	21,669	9,006 i	178	98	80	172.3	220.5	112.9
Research and development in biotechnology	541711	9,250	6,457	2,793	59	30	29	156.7	211.9	97.8
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651 i	14,446 i	6,205 i	110 i	59	51 i	188.2	246.1	121.6
Research and development in the social sciences and humanities	541720	774	766	8	9	9	*	83.6	84.2	49.5
Other professional, scientific, and technical services	other 54	6,688	6,312	376	50	44	6	134.6	143.0	67.8
Health care services	621–23	2,289	2,265	24	12	12	*	188.1	187.6	247.6
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,382 - 18,191	1,380 - 14,067	2 - 4,124	38 - 88	39	0 - 49	D	D	D
All companies (number of domestic employees)	–	597,420	492,956	104,464	2,676	1,832	844	223.2	269.0	123.8
Small companies										
10–19[a]	–	5,639	5,501	138	37	35	2	152.5	156.0	80.5
20–49	–	12,875	12,418	457	92	83	9	140.1	149.5	51.7
Medium companies										
50–99	–	14,758	14,021	737	95	85	10	154.9	165.1	71.4
100–249	–	21,986	19,793	2,192	150	127	23	146.7	155.4	97.4
Large companies										
250–499	–	21,592	18,883	2,709	130	105	25	166.6	180.4	108.8
500–999	–	26,922	23,969	2,953	134	100	34	201.5	240.1	87.4
1,000–4,999	–	92,224	75,671	16,553	454	305	149	203.1	247.8	111.3
5,000–9,999	–	62,775	50,811	11,965	280	182	97	224.3	278.6	122.8
10,000–24,999	–	111,876	88,263	23,612	465	267	198 i	240.6	330.3	119.4
25,000 or more	–	226,773	183,626	43,148	840	542	298	270.0	338.7	144.9

* = amount < $500,000 or < 500 employees; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Ratios were calculated using unrounded data. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 57

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
All industries	21–23, 31–33, 42–81	2,676	1,931	745	1,832	1,344	488	844	587	256
Manufacturing industries	31–33	1,409	1,049	360	962	720	241	447	329	119
Food	311	35	19	16	23	13	10	12	6	6
Beverage and tobacco products	312	8	5	3	6	4	2	3	1	1
Textile, apparel, and leather products	313–16	8	5	3	7	4	3	1	1	1
Wood products	321	3	3	*	3	2	*	*	*	*
Paper	322	7	6	2	5	4	1	2	1	*
Printing and related support activities	323	5 i	3 i	1 i	5 i	3 i	1 i	* i	* i	* i
Petroleum and coal products	324	9	6	3	6	5	2	3	1	1
Chemicals	325	255	135	121	186	99	86	70	35	34
Basic chemicals	3251	17	11	6	12	8	3	6	3	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	10	8	3	6	5	1	4	3	1
Pesticide, fertilizer, and other agricultural chemicals	3253	10	6	3	7	5	3	2	2	1
Pharmaceuticals and medicines	3254	184	88	96	139	68	71	45	20	25
Soap, cleaning compound, and toilet preparation	3256	17	8	8	11	6	5	6	3	3
Paint, coating, adhesive, and other chemicals	3255, 3259	17	12	5	10	8	3	7	5	2
Plastics and rubber products	326	31	25	6	25	20	5	6	5	1
Nonmetallic mineral products	327	7 i	6 i	1 i	7 i	6	1 i	1 i	1 i	* i
Primary metals	331	9	8	1	8	7	1	1	1	*
Fabricated metal products	332	36	32	4	34	30	4	2	2	1
Machinery	333	138	118	20	95	82	13	43	36	7
Agricultural implement	33311	22	19	3	13	11	1	9	7	2
Semiconductor machinery	333242	20	17	3	12	11	2	8	7	1
Engine, turbine, and power transmission equipment	3336	12	10	2	7	6	1	5	4	1
Other machinery	other 333	84	72	13 i	63	54	9	22	18 i	4 i
Computer and electronic products	334	446	356	90 i	264	212	52	182	144 i	38 i
Communications equipment	3342	72	60	12	40	33	7	32	27	5
Semiconductor and other electronic components	3344	181	144 i	37 i	95	77 i	19 i	85	67 i	18 i
Navigational, measuring, electromedical, and control instruments	3345	110	85 i	25 i	75	58 i	17 i	35 i	26 i	9 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	24 i	16 i	8 i	16 i	11 i	5 i	8 i	5 i	3 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	40 i	33 i	7 i	33	27 i	6 i	7 i	6 i	2 i
Other measuring and controlling device	other 3345	46	35	11	26	20	6	20	15	5
Other computer and electronic products	other 334	84	67	16	54	43	10	30	24 i	6 i
Electrical equipment, appliances, and components	335	48	37	10 i	25	20	5	23 i	18 i	5 i
Transportation equipment	336	254	211	43	183	152	30	72	59	12
Motor vehicles, bodies, trailers, and parts	3361–63	169	140	29	108	90	18	61	50	11

TABLE 57

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Aerospace products and parts	3364	70	59	11	61	52	9 i	8	7	1
Aircraft, aircraft engine, and aircraft parts	336411–13	62	53	9	54	46 i	8 i	8	7	1
Guided missile, space vehicle, and related parts	336414–15, 336419	7	6	1	7	6	1	*	*	0
Military armored vehicle, tank, and tank component	336992	1	1	*	1	1	*	0	0	0
Other transportation	other 336	15	12	3	12	9	3	3 i	2 i	* i
Furniture and related products	337	4	3	1	4	3	1	*	*	*
Miscellaneous	339	104	71	33	78	54	24	26	17	9
Medical equipment and supplies	3391	82	55	27	59	40	19	23	15	8
Other miscellaneous manufacturing	3399	22	16	6	19	14	5	3	2	1
Nonmanufacturing industries	21–23, 42–81	1,267	882	385	870	624	247	396	259	138
Mining, quarrying, oil and gas extraction, and support activities	21	22 i	19 i	4 i	12	10	2	11 i	9 i	2 i
Utilities	22	0 - 35	0 - 35	*	0 - 23	0 - 23	*	0 - 12	0 - 12	*
Wholesale trade	42	16	13	3	13	10 - 14	0 - 4	2	0 - 3	0 - 3
Electronic shopping and electronic auctions	454111–12	42 - 114	12 - 102	0 - 40	38 - 64	12 - 64	0 - 27	3 - 52	0 - 38	0 - 19
Transportation and warehousing	48–49	19 i	14 i	4 i	18 i	14 i	4 i	1 i	1 i	* i
Information	51	533	396	137	359	270	89	174	126	48
Publishing	511	181	129	52 i	110	81 i	29 i	71	48	23 i
Newspaper, periodical, book, and directory publishers	5111	1	*	*	1	*	*	*	*	*
Software publishers	5112	180	128	52 i	109	81 i	29 i	71	48	23 i
Telecommunications	517	20	15 i	5	19	14 i	5	1	1	*
Data processing, hosting, and related services	518	201	151	51	126	94	32	75	57 i	19 i
Other information	other 51	130	101	29	104	80	23	27	21	6
Finance and insurance	52	71	45	26	54	33	21	17	11	5
Real estate and rental and leasing	53	4	3	1	4	3	1	*	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	*	*	*	*	*	*	*
Other real estate and rental and leasing	other 53	4	2	1	3	2	1	*	*	*
Professional, scientific, and technical services	54	441	274	167	299	198	101	142	76	66 i
Architectural, engineering, and related services	5413	59	46	13	58	45	13	1	1	*
Computer systems design and related services	5415	154	119	35	99	76	23	55	43	12
Scientific research and development services	5417	178	76	102	98	48	50	80	28 i	52 i
Research and development in biotechnology	541711	59	26	33	30	14	17	29	12	17
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	110 i	48 i	62 i	59	32	27 i	51 i	16 i	35 i
Research and development in the social sciences and humanities	541720	9	3	7	9	3	7	*	*	*

TABLE 57

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Other professional, scientific, and technical services	other 54	50	33	17	44	29	16	6	4 i	2 i
Health care services	621–23	12	6	6	12	6	6	*	*	*
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	38 - 88	12 - 78	0 - 40	39	12 - 40	0 - 27	0 - 49	0 - 38	0 - 19
All companies (number of domestic employees)	–	2,676	1,931	745	1,832	1,344	488	844	587	256
Small companies										
10–19[a]	–	37	28	9	35	27	9	2	1	*
20–49	–	92	73	19	83	67	17	9	6	2
Medium companies										
50–99	–	95	73	22	85	65	20	10	8	2
100–249	–	150	117	33	127	100	27	23	16	6
Large companies										
250–499	–	130	99	30	105	80	25	25	19	5
500–999	–	134	101	32	100	76	24	34	26	8
1,000–4,999	–	454	334	121	305	225	80	149	108	40
5,000–9,999	–	280	193	87	182	127	55	97	65	32
10,000–24,999	–	465	307 i	158 i	267	181 i	87	198 i	127 i	71 i
25,000 or more	–	840	606	234	542	396	146	298	210	88

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 58

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a]				R&D technicians and equivalent staff		Other R&D supporting staff	
						Total		With PhD					
All industries	21–23, 31–33, 42–81	32,296		2,676		1,815		165		614		246	
Manufacturing industries	31–33	17,529		1,409		1,003		104		265		141	
Food	311	1,558		35		21		2	i	9		5	
Beverage and tobacco products	312	849		8		5		2		2		1	
Textile, apparel, and leather products	313–16	401		8		4		1		3		1	
Wood products	321	115		3		1		*		1		*	
Paper	322	307		7		5		*		2		*	
Printing and related support activities	323	305	i	5	i	3	i	*	i	1	i	1	
Petroleum and coal products	324	155		9		2		*		6		1	
Chemicals	325	2,439		255		173		41		44		38	
Basic chemicals	3251	361		17		9		3		7		1	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	156		10		7		2		3		1	
Pesticide, fertilizer, and other agricultural chemicals	3253	101		10		5		2		2		2	
Pharmaceuticals and medicines	3254	1,068		184		126		31		27		32	
Soap, cleaning compound, and toilet preparation	3256	459		17		14		2		2		1	
Paint, coating, adhesive, and other chemicals	3255, 3259	293		17		12		2		4		1	
Plastics and rubber products	326	694		31		14		1	i	13		4	
Nonmetallic mineral products	327	206		7	i	5	i	1	i	2	i	1	
Primary metals	331	298		9		3		*	i	2		3	
Fabricated metal products	332	558		36		16		*		15		6	
Machinery	333	1,599		138		98		5		29		11	
Agricultural implement	33311	180		22		15		*		5		2	
Semiconductor machinery	333242	96		20		17		3		3		1	
Engine, turbine, and power transmission equipment	3336	191		12		10		*		2		1	
Other machinery	other 333	1,131		84		56		2	i	20		8	
Computer and electronic products	334	2,525		446		364		30	i	52	i	30	
Communications equipment	3342	266		72		57		2		8		6	
Semiconductor and other electronic components	3344	890		181		158		15	i	16		6	
Navigational, measuring, electromedical, and control instruments	3345	869		110		83	i	8		19	i	8	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	181		24	i	17	i	2	i	6	i	2	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	307		40	i	32	i	2		5	i	3	i
Other measuring and controlling device	other 3345	381		46		34		4		8	i	4	i
Other computer and electronic products	other 334	500		84		66		5	i	9	i	10	
Electrical equipment, appliances, and components	335	776		48		36	i	4	i	9		3	
Transportation equipment	336	3,115		254		186		10		44		24	
Motor vehicles, bodies, trailers, and parts	3361–63	2,120		169		128		6		25		15	
Aerospace products and parts	3364	742		70		49		3	i	14		6	
Aircraft, aircraft engine, and aircraft parts	336411–13	717		62		44		3	i	13		5	

TABLE 58

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
Guided missile, space vehicle, and related parts	336414–15, 336419	25		7		5		*		2		1	
Military armored vehicle, tank, and tank component	336992	3		1		*		*		1		0	
Other transportation	other 336	250		15		8		*		4		3	
Furniture and related products	337	164		4		2		*		2		1	
Miscellaneous	339	1,466		104		66		6		29		10	
Medical equipment and supplies	3391	1,079		82		54		5		22		6	
Other miscellaneous manufacturing	3399	388		22		12		*	i	7		4	
Nonmanufacturing industries	21–23, 42–81	14,766		1,267		813		61	i	349		105	
Mining, quarrying, oil and gas extraction, and support activities	21	392		22	i	10	i	1		9	i	4	i
Utilities	22	359		0 - 35		1		*		0 - 33		*	
Wholesale trade	42	303	i	16		7		1		6		3	
Electronic shopping and electronic auctions	454111–12	1,008		42 - 114		22 - 91		5	i	0 - 54		3 - 13	
Transportation and warehousing	48–49	1,357		19	i	13	i	1	i	3	i	2	i
Information	51	3,043		533		388		26		109		36	
Publishing	511	599		181		139		9	i	30		12	
Newspaper, periodical, book, and directory publishers	5111	4		1		*		*		*		*	i
Software publishers	5112	596		180		139		9	i	30		12	
Telecommunications	517	682		20		9	i	1	i	10	i	*	
Data processing, hosting, and related services	518	1,239		201		134		4	i	48		20	
Other information	other 51	522		130		106		12		21		4	
Finance and insurance	52	2,159		71		35		1	i	26		9	
Real estate and rental and leasing	53	30		4		3		*		*	i	*	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1		*		*		*		*	i	*	
Other real estate and rental and leasing	other 53	28		4		3		*		*	i	*	
Professional, scientific, and technical services	54	2,595		441		256		24	i	144		40	
Architectural, engineering, and related services	5413	464		59		41		3		14		5	
Computer systems design and related services	5415	1,068		154		122		7	i	24		8	
Scientific research and development services	5417	418		178		69		11		87	i	22	
Research and development in biotechnology	541711	172		59		26		4		32		1	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	232		110	i	40		7		54	i	15	i
Research and development in the social sciences and humanities	541720	13		9		2		*		1		6	
Other professional, scientific, and technical services	other 54	646		50		25	i	3	i	20		5	i
Health care services	621–23	510		12		9		2		2		1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,010		38 - 88		3 - 67		*	i	0 - 54		0 - 9	
All companies (number of domestic employees)	–	32,296		2,676		1,815		165		614		246	
Small companies													

TABLE 58

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers[a]		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19[b]	–	83	37	26	4	8	3
20–49	–	325	92	55	8	29	8
Medium companies							
50–99	–	423	95	53	7	33	9
100–249	–	975	150	91	9	42	17
Large companies							
250–499	–	991	130	82	8	35	13
500–999	–	1,202	134	79	7	43	12
1,000–4,999	–	4,575	454	325	26	89	40
5,000–9,999	–	2,971	280	186	19	55	39
10,000–24,999	–	6,282	465	294	28 i	134 i	37 i
25,000 or more	–	14,468	840	625	50 i	147	68

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.

[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 59

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a]				R&D technicians and equivalent staff		Other R&D supporting staff	
						Total		With PhD					
All industries	21–23, 31–33, 42–81	21,213		1,832		1,232		130		426		174	
Manufacturing industries	31–33	10,100		962		652		79		206		105	
Food	311	985		23		12		2	i	6		4	
Beverage and tobacco products	312	391		6		3		1		2		1	
Textile, apparel, and leather products	313–16	220		7		3		1		3		1	
Wood products	321	105		3		1		*		1		*	
Paper	322	193		5		4		*		2		*	
Printing and related support activities	323	262	i	5	i	3	i	*	i	1	i	1	
Petroleum and coal products	324	91		6		1		*		4		1	
Chemicals	325	1,451		186		127		34		33		26	
Basic chemicals	3251	246		12		7		3		4		1	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	83		6		4		1		1		*	
Pesticide, fertilizer, and other agricultural chemicals	3253	69		7		4		1		2		1	
Pharmaceuticals and medicines	3254	648		139		95		27		22		21	
Soap, cleaning compound, and toilet preparation	3256	245		11		9		1		1		1	
Paint, coating, adhesive, and other chemicals	3255, 3259	160		10		7		1		2		1	
Plastics and rubber products	326	495		25		11		1		10		3	
Nonmetallic mineral products	327	139		7	i	4	i	*	i	1	i	1	
Primary metals	331	216		8		2		*		2		3	
Fabricated metal products	332	387		34		14		*		14		6	
Machinery	333	869		95		62		4		25		8	
Agricultural implement	33311	100		13		8		*		4		1	
Semiconductor machinery	333242	37		12		10		2		2		1	
Engine, turbine, and power transmission equipment	3336	79		7		5		*		1		*	
Other machinery	other 333	654		63		39		2	i	17		6	
Computer and electronic products	334	1,167		264		210		22	i	35		19	
Communications equipment	3342	151		40		31		1		6		3	
Semiconductor and other electronic components	3344	309		95		80		10	i	10		5	
Navigational, measuring, electromedical, and control instruments	3345	485		75		56	i	5		14	i	5	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	96		16	i	12	i	1	i	3	i	1	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	205		33		26	i	2		5		2	i
Other measuring and controlling device	other 3345	185		26		18		3		6		2	
Other computer and electronic products	other 334	221		54		43		5	i	5	i	5	
Electrical equipment, appliances, and components	335	319		25		16		1		6		2	
Transportation equipment	336	1,835		183		126		7		36		20	
Motor vehicles, bodies, trailers, and parts	3361–63	1,040		108		78		4		18		12	
Aerospace products and parts	3364	612		61		42		3	i	14		6	
Aircraft, aircraft engine, and aircraft parts	336411–13	588		54		37		3	i	12		5	

TABLE 59

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a]				R&D technicians and equivalent staff		Other R&D supporting staff	
						Total		With PhD					
Guided missile, space vehicle, and related parts	336414–15, 336419	24		7		5		*		2		1	
Military armored vehicle, tank, and tank component	336992	3		1		*		*		1		0	
Other transportation	other 336	180		12		6		*		4		2	
Furniture and related products	337	139		4		2		*		1		1	
Miscellaneous	339	837		78		49		5		21		8	
Medical equipment and supplies	3391	586		59		38		4		16		5	
Other miscellaneous manufacturing	3399	250		19		10		*	i	6		3	
Nonmanufacturing industries	21–23, 42–81	11,113		870		580		51	i	221		69	
Mining, quarrying, oil and gas extraction, and support activities	21	181		12		7		1		3		2	
Utilities	22	348		0 - 23		0 - 2		*		0 - 21		*	
Wholesale trade	42	255	i	13		4 - 7		*		3 - 7		3	
Electronic shopping and electronic auctions	454111–12	413 - 1,005		38 - 64		22 - 64		5	i	0 - 30		0 - 8	
Transportation and warehousing	48–49	1,047		18	i	13	i	1	i	3	i	2	i
Information	51	2,107		359		266		21		73		20	
Publishing	511	359		110		87		7	i	16		6	
Newspaper, periodical, book, and directory publishers	5111	3		1		*		*		*		*	i
Software publishers	5112	355		109		87		7	i	16		6	
Telecommunications	517	606		19		9	i	1	i	10	i	*	
Data processing, hosting, and related services	518	768		126		84		3	i	31		10	
Other information	other 51	375		104		86		11		15		3	
Finance and insurance	52	1,795		54		27		1	i	21		6	
Real estate and rental and leasing	53	25		4		3		*		*	i	*	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1		*		*		*		*	i	*	
Other real estate and rental and leasing	other 53	24		3		3		*		*	i	*	i
Professional, scientific, and technical services	54	1,421		299		181		19		88		31	
Architectural, engineering, and related services	5413	323		58		40		3		14		5	
Computer systems design and related services	5415	482		99		74		5	i	20		5	
Scientific research and development services	5417	300		98		46		9		36		17	
Research and development in biotechnology	541711	141		30		14		3		16		1	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	146		59		30		6		19	i	10	i
Research and development in the social sciences and humanities	541720	13		9		2		*		1		6	
Other professional, scientific, and technical services	other 54	316		44		21	i	2	i	19		4	i
Health care services	621–23	507		12		9		2		2		1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,418 - 3,011		39		3 - 40		*	i	0 - 30		0 - 8	
All companies (number of domestic employees)	–	21,213		1,832		1,232		130		426		174	
Small companies													

TABLE 59

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers[a]		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19[b]	–	79	35	25	4	8	3
20–49	–	257	83	50	7	26	8
Medium companies							
50–99	–	356	85	47	7	29	9
100–249	–	719	127	74	8	38	15
Large companies							
250–499	–	760	105	62	7	31	12
500–999	–	859	100	61	6	29	10
1,000–4,999	–	2,854	305	213	20	63	29
5,000–9,999	–	1,677	182	117	14	37	28
10,000–24,999	–	3,518	267	178	20	68	22
25,000 or more	–	10,135	542	405	37 i	98	40

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.

[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 60

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
All industries	21–23, 31–33, 42–81	11,083		844		584		36		188		72	
Manufacturing industries	31–33	7,429		447		351		25		60		36	
Food	311	573		12		9		*		2		1	i
Beverage and tobacco products	312	458		3		2		1		1		*	
Textile, apparel, and leather products	313–16	181		1		1		*		1		*	
Wood products	321	11		*		*		*		*		*	
Paper	322	114		2		2		*		*		*	
Printing and related support activities	323	43	i	*	i	*	i	0		*		*	i
Petroleum and coal products	324	64		3		1		*		2		*	
Chemicals	325	988		70		46		7		11		12	
Basic chemicals	3251	115		6		3		1		3		*	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	74		4		2		*		1		*	
Pesticide, fertilizer, and other agricultural chemicals	3253	31		2		1		*		1		1	
Pharmaceuticals and medicines	3254	421		45		31		5		4		10	
Soap, cleaning compound, and toilet preparation	3256	214		6		5		1		*		*	
Paint, coating, adhesive, and other chemicals	3255, 3259	134		7		5		*		1		*	
Plastics and rubber products	326	199		6		3	i	*	i	3		1	
Nonmetallic mineral products	327	67	i	1	i	*	i	*	i	*	i	*	
Primary metals	331	83		1		*		*	i	*		*	i
Fabricated metal products	332	171		2		2		*		*		*	
Machinery	333	729		43		36		1		4		3	
Agricultural implement	33311	80		9		7		*	i	1		*	
Semiconductor machinery	333242	59		8		7		*		1		*	
Engine, turbine, and power transmission equipment	3336	112		5		5		*		*		*	
Other machinery	other 333	478		22		17	i	*		2	i	2	
Computer and electronic products	334	1,358		182		153		8	i	17	i	12	i
Communications equipment	3342	114		32		27		*	i	2		3	
Semiconductor and other electronic components	3344	581		85		78		5	i	6		2	i
Navigational, measuring, electromedical, and control instruments	3345	384		35	i	27	i	3	i	5	i	3	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	85		8	i	5	i	1	i	2	i	1	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	102		7	i	6	i	*		1		1	i
Other measuring and controlling device	other 3345	196		20		16		2		2	i	1	i
Other computer and electronic products	other 334	279		30		22		1	i	4	i	4	i
Electrical equipment, appliances, and components	335	458		23	i	19	i	3	i	3		1	
Transportation equipment	336	1,280		72		60		3		8		4	
Motor vehicles, bodies, trailers, and parts	3361–63	1,080		61		50		2		7		4	
Aerospace products and parts	3364	130		8		7		*		1		*	
Aircraft, aircraft engine, and aircraft parts	336411–13	130		8		7		*		1		*	
Guided missile, space vehicle, and related parts	336414–15, 336419	*		*		*		0		0		0	

TABLE 60

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment		Total R&D employment		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
Military armored vehicle, tank, and tank component	336992	*	i	0		0		0		0		0	
Other transportation	other 336	70		3	i	2	i	*	i	*	i	*	i
Furniture and related products	337	25		*		*		0		*		*	
Miscellaneous	339	630		26		17		1		7		2	
Medical equipment and supplies	3391	492		23		16		1		6		1	
Other miscellaneous manufacturing	3399	137		3		2	i	*	i	1		*	
Nonmanufacturing industries	21–23, 42–81	3,654		396		233		10	i	128		36	
Mining, quarrying, oil and gas extraction, and support activities	21	211		11	i	3	i	*		5	i	2	i
Utilities	22	12		0 - 12		0 - 2		*		0 - 12		*	
Wholesale trade	42	48		2		0 - 3		1		0 - 2		*	
Electronic shopping and electronic auctions	454111–12	3 - 595		3 - 52		0 - 27		0		0 - 27		4	
Transportation and warehousing	48–49	310		1	i	*		*	i	*	i	*	i
Information	51	936		174		122		4		36		16	
Publishing	511	241		71		52		2	i	14		6	
Newspaper, periodical, book, and directory publishers	5111	*		*		*		0		*		0	
Software publishers	5112	241		71		52		2	i	14		6	
Telecommunications	517	77		1		1		*	i	*		*	
Data processing, hosting, and related services	518	471		75		50		1	i	16		9	
Other information	other 51	147		27		20		2		6		1	
Finance and insurance	52	364		17		8		*	i	5		3	
Real estate and rental and leasing	53	5		*		*		*		*		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		*		*		0	
Other real estate and rental and leasing	other 53	5		*		*		0		0		0	
Professional, scientific, and technical services	54	1,175		142		75		5	i	57	i	10	
Architectural, engineering, and related services	5413	140		1		1		*		*		*	
Computer systems design and related services	5415	586		55		48		1	i	4		3	
Scientific research and development services	5417	118	i	80		23		2	i	52	i	6	i
Research and development in biotechnology	541711	31		29		12		1		16		*	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	87	i	51	i	10		2	i	35	i	6	i
Research and development in the social sciences and humanities	541720	*		*		*		0		0		*	
Other professional, scientific, and technical services	other 54	330	i	6		4	i	1	i	1	i	1	i
Health care services	621–23	3		*		*		*		*		*	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0 - 591		0 - 49		0 - 27		*	i	0 - 27		*	
All companies (number of domestic employees)	–	11,083		844		584		36		188		72	
Small companies													

TABLE 60

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers[a]		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19[b]	–	4	2	1	*	* i	*
20–49	–	69	9	5	1	3	1
Medium companies							
50–99	–	67	10	6	1	3	1
100–249	–	256	23	17	1	4	2
Large companies							
250–499	–	231	25	20	1 i	4	1
500–999	–	343	34	18	1	13	3
1,000–4,999	–	1,721	149	112	6	26	11
5,000–9,999	–	1,294	97	69	5 i	18 i	11
10,000–24,999	–	2,764	198 i	116	8 i	67 i	15 i
25,000 or more	–	4,334	298	221	12	49	28

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.

[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 61

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D	
All industries	21–23, 31–33, 42–81	1,677		1,384		277		17		1,147		989		150		8	
Manufacturing industries	31–33	878		749		121		9		611		544		63	i	4	
Food	311	19		16		3		*		11		10		1	i	*	i
Beverage and tobacco products	312	5		3		1		*		3		2		*		*	
Textile, apparel, and leather products	313–16	6		4		1		*		3		3		1		*	i
Wood products	321	2		1		1		*		1		1		*		*	
Paper	322	4		4		1		*		3		3		*		*	
Printing and related support activities	323	3	i	2	i	1	i	*	i	2	i	1	i	1	i	*	i
Petroleum and coal products	324	6		6		*		*		1		1		*		*	
Chemicals	325	181		172		8		1		124		119		4		1	
Basic chemicals	3251	11		10		1		*		6		6		*		*	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	5		4		*		*		4		3		*		*	
Pesticide, fertilizer, and other agricultural chemicals	3253	7		6		1	i	*		4		4		*	i	*	
Pharmaceuticals and medicines	3254	138		132		5		1		94		91		3		*	
Soap, cleaning compound, and toilet preparation	3256	11		10		1		*		8		8		*	i	*	
Paint, coating, adhesive, and other chemicals	3255, 3259	10		8		1		*		7		6		*		*	
Plastics and rubber products	326	19		14		5		*		9		8		2		*	
Nonmetallic mineral products	327	5	i	4	i	1		*	i	3	i	2	i	1	i	*	i
Primary metals	331	7		2		5		*		2		1		1		0	
Fabricated metal products	332	24		11		12		*		11		7		5		*	i
Machinery	333	82		57		24		2		57		41		15		1	
Agricultural implement	33311	11		10		1		*		7		7		*		*	
Semiconductor machinery	333242	12		10		2		*		9		8		1	i	*	i
Engine, turbine, and power transmission equipment	3336	7		6		1		*		5		4		*		*	i
Other machinery	other 333	53		31		21		1		35		21	i	13		1	
Computer and electronic products	334	252		227		23		2		202		186		16	i	1	i
Communications equipment	3342	40		38		1	i	*		30		29		1	i	*	i
Semiconductor and other electronic components	3344	88	i	79		9	i	*	i	76	i	70		6	i	*	i
Navigational, measuring, electromedical, and control instruments	3345	70		58		11		1		53	i	44		9	i	*	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	16	i	15	i	1	i	*	i	12	i	11	i	1	i	*	i

TABLE 61

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	31		22		8		1		25	i	18		7	i	*	
Other measuring and controlling device	other 3345	24		21		3		*		16		15		1		*	i
Other computer and electronic products	other 334	54		52		1	i	*		43		43		*	i	*	
Electrical equipment, appliances, and components	335	22		18		4		*		15		13		2	i	*	i
Transportation equipment	336	164		139		23		2		117		105		11		1	
Motor vehicles, bodies, trailers, and parts	3361–63	102		92		9		1		75		70		4		1	
Aerospace products and parts	3364	50		39		10		1		35		30		5		1	i
Aircraft, aircraft engine, and aircraft parts	336411–13	46		37		8		1		33		28		4		1	i
Guided missile, space vehicle, and related parts	336414–15, 336419	4	i	2	i	1		*		3	i	1	i	1		*	i
Military armored vehicle, tank, and tank component	336992	1		*		1		0		*		*		*		0	
Other transportation	other 336	11	i	8	i	3	i	*		6		4		1	i	*	i
Furniture and related products	337	3		2		1		*		2		1		*	i	*	
Miscellaneous	339	72		65		6		1	i	44		41		3	i	*	i
Medical equipment and supplies	3391	57		54		3		1		36		35		2		*	
Other miscellaneous manufacturing	3399	16		12		3		*	i	8	i	7		1	i	*	i
Nonmanufacturing industries	21–23, 42–81	799		635		156		8		536		444		87		4	
Mining, quarrying, oil and gas extraction, and support activities	21	11		10		1		*		7		6		*		*	
Utilities	22	1		*		*		*		*		*		*		*	
Wholesale trade	42	10		5		4	i	*		5		3	i	1	i	*	
Electronic shopping and electronic auctions	454111–12	38 - 64		13		25 - 52		*		17 - 58		4 - 14		8 - 44		*	i
Transportation and warehousing	48–49	15	i	12	i	3	i	*	i	11	i	10	i	1	i	*	i
Information	51	352		323		27	i	1		260		245		14	i	1	
Publishing	511	107		102		4		1		85		83		2		*	i
Newspaper, periodical, book, and directory publishers	5111	1		*		*	i	*		*		*		*		0	
Software publishers	5112	106		102		4		1		85		83		2		*	i
Telecommunications	517	19		7		11	i	*		8	i	3		5	i	*	
Data processing, hosting, and related services	518	123		113		10		*		81		76		5		*	
Other information	other 51	103		101		2		*		85		84		1		*	
Finance and insurance	52	45		33	i	12		*	i	25	i	22	i	3	i	*	i

TABLE 61

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part time		Part-time employees working on R&D	
Real estate and rental and leasing	53	3		3		*		*		3		3		*		*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*	i	0		*		*		*		0	
Other real estate and rental and leasing	other 53	3		3		*		*		3		3		*		*	i
Professional, scientific, and technical services	54	268		212		50		5		156		126		27		3	
Architectural, engineering, and related services	5413	41		18		21		2		27		13		13		1	
Computer systems design and related services	5415	91		78		12		2		67		61		6	i	1	
Scientific research and development services	5417	95		89		4		2		41		39		2		1	
Research and development in biotechnology	541711	30		29		*		*		11		11		*		*	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	56		52		3		1		28	i	26	i	1		1	
Research and development in the social sciences and humanities	541720	9	i	8	i	*	i	*	i	2	i	2	i	*	i	*	
Other professional, scientific, and technical services	other 54	41	i	27	i	13	i	*	i	19	i	13	i	6	i	*	
Health care services	621–23	11		10		1		*		8		8		*		*	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	15 - 40		12		2 - 28		*		3 - 40		3 - 13	i	0 - 28		*	
All companies (number of domestic employees)	–	1,677		1,384		277		17		1,147		989		150		8	
Small companies																	
10–19[c]	–	32		25		7		1		23		20		3		*	
20–49	–	70		52		16		2		44		35		8		1	
Medium companies																	
50–99	–	73		51		21		1		41		33		8		*	
100–249	–	104		73		30		2		64		50		13		1	
Large companies																	
250–499	–	87		65		21		1		54		45		9		1	
500–999	–	87		72		14		1		53		48		5		*	
1,000–4,999	–	271		233		35		3		194		172		20		1	i
5,000–9,999	–	170		147		22		1	i	110		98		12	i	*	i
10,000–24,999	–	255		229		24		2		169		153		15		1	i
25,000 or more	–	527		438		86		3		393		336		56		2	

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

FTE = full-time equivalent; NAICS = 2012 North American Industry Classification System.

[a] Includes scientists and engineers and their managers, as well as technicians, technologists, and support staff.
[b] Includes scientists and engineers and their managers.
[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 62

Domestic employment and R&D employment, by state: 2019

(Thousands)

State	Employees			
	Total		R&D	
All states	21,213		1,832	
Alabama	226		15	
Alaska	31		1	
Arizona	359		27	
Arkansas	147		4	
California	2,312		409	
Colorado	392		33	
Connecticut	166		18	
Delaware	66		5	
District of Columbia	44		3	
Florida	759		36	
Georgia	552		29	
Hawaii	46		1	
Idaho	87		6	
Illinois	999		64	
Indiana	457		32	
Iowa	258		19	
Kansas	218		16	
Kentucky	255		9	
Louisiana	175		4	
Maine	63		4	
Maryland	265		28	
Massachusetts	435		84	
Michigan	794		101	
Minnesota	782		43	
Mississippi	112		3	
Missouri	318		18	
Montana	36		3	
Nebraska	162		7	
Nevada	108		6	
New Hampshire	75		11	
New Jersey	495		62	
New Mexico	56		3	
New York	684		67	
North Carolina	519		53	
North Dakota	44		3	
Ohio	751		56	
Oklahoma	139		9	
Oregon	283		30	
Pennsylvania	764		65	
Rhode Island	42		3	
South Carolina	241		11	
South Dakota	49		2	
Tennessee	419		12	
Texas	1,534		100	
Utah	191		17	
Vermont	31		2	
Virginia	464		38	
Washington	580		121	

TABLE 62

Domestic employment and R&D employment, by state: 2019

(Thousands)

State	Employees			
	Total		R&D	
West Virginia	66		2	
Wisconsin	514		41	
Wyoming	30		1	
Undistributed[a]	2,620		95	

[a] Includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

Note(s):
Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 63

Foreign employment and R&D employment, by location: 2019

(Thousands)

Location	Employees			
	Total		R&D	
Total	11,083		844	
Puerto Rico[a]	40		1	i
Canada	522		44	
Latin America and Other Western Hemisphere	1,664		39	
Argentina	76		5	
Brazil	358		13	
Chile	56		1	
Mexico	881		15	
Other Latin American and Western Hemisphere locations	292		6	
Africa	182		5	
South Africa	48		4	
Other African locations	134		1	
Asia and Pacific	3,184		376	
Australia	168		12	
China	989		85	
Hong Kong	48		2	
India	893		196	
Indonesia	86		1	
Japan	215		21	
Malaysia	101		7	
New Zealand	15		2	
Singapore	133		11	
South Korea	90		11	
Taiwan	72		14	
Thailand	118		4	
Other Asian or Pacific locations	255		12	
Europe	3,075		281	
Austria	26		3	
Belgium	111		12	
Czechia	68		6	
Denmark	25		3	
Finland	16		3	
France	284		20	
Germany	475		55	
Hungary	53		3	
Ireland	113		14	
Italy	158		15	
Luxembourg	11		2	
Netherlands	119		11	
Norway	29		2	
Poland	199		10	
Russia	103		6	
Spain	114		9	
Sweden	42		7	
Switzerland	71		11	
Turkey	45		1	
United Kingdom	736		67	
Other European locations	276		20	
Middle East	184		29	

TABLE 63

Foreign employment and R&D employment, by location: 2019

(Thousands)

Location	Employees			
	Total		R&D	
Israel	59		23	
Other Middle Eastern locations	125		5	
Undistributed[b]	2,231	i	70	i

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.
[b] Includes data reported that were not allocated to a specific country.

Note(s):
Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 64

Domestic temporary R&D employment, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a]		R&D technicians and equivalent staff		Other R&D supporting staff	
All industries	21–23, 31–33, 42–81	264	i	171	i	60	i	32	i
Manufacturing industries	31–33	98	i	61	i	21	i	16	i
Food	311	1	i	1	i	1		*	i
Beverage and tobacco products	312	*		*		*		*	i
Textile, apparel, and leather products	313–16	1	i	*	i	*		1	i
Wood products	321	*		*		*		*	
Paper	322	*	i	*	i	*	i	*	i
Printing and related support activities	323	*	i	*	i	*	i	*	i
Petroleum and coal products	324	1		*	i	*	i	*	i
Chemicals	325	43	i	28	i	6	i	9	
Basic chemicals	3251	1	i	*	i	*	i	*	i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*		*		*	i	*	
Pesticide, fertilizer, and other agricultural chemicals	3253	1		*		*		1	
Pharmaceuticals and medicines	3254	37	i	25	i	4	i	8	
Soap, cleaning compound, and toilet preparation	3256	2	i	1	i	1	i	1	i
Paint, coating, adhesive, and other chemicals	3255, 3259	*	i	*		*		*	i
Plastics and rubber products	326	2	i	1	i	*	i	*	i
Nonmetallic mineral products	327	*	i	*	i	*	i	*	i
Primary metals	331	*	i	*	i	*	i	*	
Fabricated metal products	332	2	i	1	i	1	i	*	
Machinery	333	15	i	12	i	2	i	1	i
Agricultural implement	33311	*		*		*		*	
Semiconductor machinery	333242	1		*		*		*	
Engine, turbine, and power transmission equipment	3336	*		*		*	i	*	i
Other machinery	other 333	14	i	11	i	2	i	1	i
Computer and electronic products	334	16	i	10	i	4	i	2	i
Communications equipment	3342	5	i	3	i	1	i	1	i
Semiconductor and other electronic components	3344	5	i	4	i	1	i	1	i
Navigational, measuring, electromedical, and control instruments	3345	3	i	2	i	1	i	*	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1	i	*	i	*	i	*	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2	i	1	i	*		*	i
Other measuring and controlling device	other 3345	1	i	1	i	*	i	*	i
Other computer and electronic products	other 334	2	i	1	i	1	i	*	i
Electrical equipment, appliances, and components	335	3	i	1	i	1	i	*	i
Transportation equipment	336	9	i	5	i	3	i	1	i
Motor vehicles, bodies, trailers, and parts	3361–63	7	i	4	i	2	i	1	i
Aerospace products and parts	3364	2		1		1	i	*	
Aircraft, aircraft engine, and aircraft parts	336411–13	1		1		*	i	*	
Guided missile, space vehicle, and related parts	336414–15, 336419	*		*		*		*	
Military armored vehicle, tank, and tank component	336992	*		*		*		0	
Other transportation	other 336	*		*		*	i	*	
Furniture and related products	337	*		*		*		*	
Miscellaneous	339	5	i	2	i	2	i	*	i
Medical equipment and supplies	3391	5	i	2	i	2	i	*	i
Other miscellaneous manufacturing	3399	1	i	*	i	*	i	*	i
Nonmanufacturing industries	21–23, 42–81	166	i	110	i	39	i	17	i

TABLE 64

Domestic temporary R&D employment, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a]		R&D technicians and equivalent staff		Other R&D supporting staff	
Mining, quarrying, oil and gas extraction, and support activities	21	4	i	3	i	1		*	
Utilities	22	*		*		*		*	
Wholesale trade	42	1	i	1	i	*	i	*	i
Electronic shopping and electronic auctions	454111–12	6		2		3		2	
Transportation and warehousing	48–49	9	i	2	i	2	i	5	i
Information	51	79	i	57	i	18	i	4	i
Publishing	511	17	i	11	i	6	i	*	i
Newspaper, periodical, book, and directory publishers	5111	*	i	*	i	*	i	*	i
Software publishers	5112	17	i	11	i	6	i	*	i
Telecommunications	517	19	i	14	i	5	i	*	i
Data processing, hosting, and related services	518	10	i	7	i	2	i	1	i
Other information	other 51	33	i	26	i	5	i	2	i
Finance and insurance	52	34	i	28	i	5		1	
Real estate and rental and leasing	53	2	i	*		1	i	1	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		*	
Other real estate and rental and leasing	other 53	2	i	*		1	i	1	i
Professional, scientific, and technical services	54	24	i	14	i	7	i	2	i
Architectural, engineering, and related services	5413	1		1		*		*	
Computer systems design and related services	5415	10	i	7	i	3	i	1	i
Scientific research and development services	5417	7	i	3	i	3	i	1	i
Research and development in biotechnology	541711	2		*		1		*	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	5	i	2	i	2	i	1	i
Research and development in the social sciences and humanities	541720	*	i	*	i	0		0	
Other professional, scientific, and technical services	other 54	5	i	3	i	1	i	1	i
Health care services	621–23	3	i	2		1	i	*	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3	i	2	i	*	i	*	i
All companies (number of domestic employees)	–	264	i	171	i	60	i	32	i
Small companies									
10–19[b]	–	6		4		2		1	i
20–49	–	8	i	5	i	2	i	1	i
Medium companies									
50–99	–	7	i	3	i	2		1	i
100–249	–	10	i	6	i	3	i	1	i
Large companies									
250–499	–	10	i	6	i	2	i	2	i
500–999	–	12	i	6	i	5	i	1	i
1,000–4,999	–	35	i	18	i	9	i	8	
5,000–9,999	–	24	i	15	i	5	i	4	i
10,000–24,999	–	45	i	28	i	9	i	8	i
25,000 or more	–	107	i	80	i	21	i	6	i

* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.
[b] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 65

R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost								Projected foreign R&D cost paid for by the company	
				Paid for by the company			Paid for by others						
		Paid for by the company	Paid for by others	Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources				
All industries	21–23, 31–33, 42–81	606,520	85,666	499,435	38,256	461,179	66,881	21,811	45,070			107,085	
Manufacturing industries	31–33	368,158	47,582	294,784	33,882	260,902	39,632	15,117	i	24,516		73,373	
Food	311	5,672	251	4,800	i	166	i	4,634	i	241	*	i	241	871	
Beverage and tobacco products	312	1,987	124	i	1,115	149	965	124	i	0	124	i	873	
Textile, apparel, and leather products	313–16	1,094	31	i	892	32	861	31	i	5	i	26	i	202	
Wood products	321	200	7	194	7	187	7	0	7	6	i
Paper	322	1,506	i	1	i	1,396	i	7	1,389	i	*	i	*	i	*	i	110	
Printing and related support activities	323	372	i	0	362	i	3	i	358	i	0	0	0	10	i
Petroleum and coal products	324	1,365	111	i	1,178	196	i	981	i	108	i	*	i	108	i	187	
Chemicals	325	146,932	15,854	120,656	25,215	95,441	10,936	450	10,486	26,276	
Basic chemicals	3251	3,080	168	2,303	58	i	2,245	165	i	2	i	164	i	777	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,669	120	i	1,132	92	1,039	74	i	*	i	74	i	538	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,175	0 - 395	856	71	785	0 - 385	1	i	0 - 384	318	
Pharmaceuticals and medicines	3254	135,729	14,974	112,225	24,667	87,558	10,157	428	9,729	23,504	
Soap, cleaning compound, and toilet preparation	3256	3,722	181	2,838	291	2,546	138	*	i	138	884	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,557	18 - 413	1,302	35	1,267	18 - 403	19	0 - 384	255	
Plastics and rubber products	326	3,517	167	2,939	38	i	2,901	143	6	137	579	
Nonmetallic mineral products	327	1,702	i	37	1,483	i	25	1,458	i	37	3	35	219	i
Primary metals	331	841	16	754	17	737	15	*	i	15	87	
Fabricated metal products	332	2,645	270	2,410	82	2,328	175	i	7	168	i	234	
Machinery	333	19,095	1,344	14,366	419	i	13,947	1,308	190	1,119	4,729	
Agricultural implement	33311	3,008	10	1,971	186	i	1,786	i	9	4	6	i	1,036	
Semiconductor machinery	333242	4,986	768	4,095	5	4,090	749	*	i	749	891	
Engine, turbine, and power transmission equipment	3336	2,168	i	228	1,267	13	i	1,254	219	153	66	i	901	i
Other machinery	other 333	8,933	338	7,032	216	6,816	331	33	298	1,901	
Computer and electronic products	334	108,549	i	12,864	82,301	i	1,747	80,554	i	11,583	5,248	6,335	26,249	i
Communications equipment	3342	15,401	1,442	i	12,096	762	11,334	1,302	i	152	1,151	i	3,305	
Semiconductor and other electronic components	3344	48,625	i	3,477	34,883	i	437	34,446	i	3,101	576	i	2,525	13,742	i

TABLE 65

R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost								Projected foreign R&D cost paid for by the company	
				Paid for by the company			Paid for by others						
		Paid for by the company	Paid for by others	Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources				
Navigational, measuring, electromedical, and control instruments	3345	15,030	7,690	11,316	290	11,026	6,953	4,433	2,520			3,715	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,432 i	248	3,227	106	3,121	238	10 i	229			1,205	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,102	7,207	3,474	93	3,381	6,521	4,392	2,129			628	
Other measuring and controlling device	other 3345	6,497	235	4,615	91	4,524	193	32	162			1,882	
Other computer and electronic products	other 334	29,493 i	254	24,006 i	258	i 23,748 i	227	87	140			5,487	i
Electrical equipment, appliances, and components	335	6,977	426	5,190	175	5,016	402	32	370			1,787	
Transportation equipment	336	42,594	15,801 i	35,167	4,693	30,474	14,298 i	9,133 i	5,164	i		7,427	
Motor vehicles, bodies, trailers, and parts	3361–63	30,443	4,218 i	23,738	3,847	19,891	3,759 - 4,219	i 0 - 1,188	2,572 - 3,774	i		6,706	
Aerospace products and parts	3364	9,728	10,373 i	9,325	797	8,528	9,328 i	7,938 i	1,390			404	
Aircraft, aircraft engine, and aircraft parts	336411–13	9,053	9,392 i	8,650	663	7,987	8,346 i	7,007 i	1,339			403	
Guided missile, space vehicle, and related parts	336414–15, 336419	675	982 i	675	134	541	982 i	931 i	51	i		*	
Military armored vehicle, tank, and tank component	336992	23	11	23	0	23	11	9	2			0	
Other transportation	other 336	2,399	1,198	2,081	49	2,033	739 - 1,199	0 - 1,188	0 - 1,199			318	i
Furniture and related products	337	457	2 i	420	17	i 403	2 i	1 i	1	i		38	
Miscellaneous	339	22,652	278	19,162	895	18,267	223	40	183			3,490	
Medical equipment and supplies	3391	19,706	231	16,610	772	15,838	176	18	159			3,097	
Other miscellaneous manufacturing	3399	2,945	47	2,552	123	2,429	46	22	24			393	
Nonmanufacturing industries	21–23, 42–81	238,363	38,084	204,651	4,374	200,277	27,249	6,695	20,554			33,712	i
Mining, quarrying, oil and gas extraction, and support activities	21	3,031	155	2,416	118	i 2,298 i	147	39	108			615	
Utilities	22	382	49	373	149	225	49	43	6			9	
Wholesale trade	42	1,287 i	83 i	1,174 i	49	i 1,125 i	81 i	0	81	i		113	
Electronic shopping and electronic auctions	454111–12	23 - 25,450 i	* i	23 - 20,431 i	24	0 - 20,408 i	* i	* i	0			0 - 5,023	i
Transportation and warehousing	48–49	10,452 i	208	10,375 i	30	i 10,345 i	208	0	208			77	
Information	51	148,502	1,255	126,797	2,536	124,260	1,194	121	1,074			21,705	
Publishing	511	44,391	661	37,251	1,175	36,076	611	74	536			7,140	
Newspaper, periodical, book, and directory publishers	5111	59	* i	58	3	55	* i	* i	*	i		1	

TABLE 65

R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost								Projected foreign R&D cost paid for by the company	
				Paid for by the company			Paid for by others						
		Paid for by the company	Paid for by others	Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources				
Software publishers	5112	44,332	661	37,193	1,172	36,021	610	74	536			7,139	
Telecommunications	517	4,338	41	4,178	419	3,760	41	12	i	29		159	
Data processing, hosting, and related services	518	39,687	396	32,969	512	32,458	386	26		360		6,718	
Other information	other 51	60,086	i 157	52,399	i 431	i 51,967	i 157	8	i	149		7,688	i
Finance and insurance	52	10,797	3	i 9,581	347	9,233	1	i 0		1	i	1,217	i
Real estate and rental and leasing	53	1,876	0	1,713	*	i 1,713	0	0		0		163	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	56	0	40	*	40	0	0		0		16	
Other real estate and rental and leasing	other 53	1,820	0	1,673	*	i 1,672	0	0		0		148	
Professional, scientific, and technical services	54	34,193	i 35,892	29,422	i 965	28,456	i 25,148	6,465		18,683		4,772	i
Architectural, engineering, and related services	5413	2,552	1,984	2,480	195	2,285	1,937	1,315		622		73	
Computer systems design and related services	5415	21,429	i 2,496	17,238	i 256	16,982	i 2,395	601		1,794		4,191	i
Scientific research and development services	5417	4,163	30,029	i 3,975	421	3,554	19,481	3,710		15,771	i	188	
Research and development in biotechnology	541711	1,290	8,647	1,248	149	1,099	5,628	138		5,489		42	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,844	20,525	i 2,699	272	2,427	13,077	i 2,865		10,212	i	146	
Research and development in the social sciences and humanities	541720	29	856	i 29	*	i 29	776	i 707	i	70		*	i
Other professional, scientific, and technical services	other 54	6,049	1,384	5,729	94	5,635	1,335	839	i	496		320	
Health care services	621–23	2,311	389	2,288	70	2,218	374	16		358		23	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	85 - 25,512	i 50	85 - 20,493	i 86	0 - 20,408	i 47	11		36		0 - 5,023	
All companies (number of domestic employees)	–	606,520	85,666	499,435	38,256	461,179	66,881	21,811		45,070		107,085	
Small companies													
10–19[a]	–	5,312	1,161	4,911	434	4,476	1,122	i 458		664	i	402	
20–49	–	13,559	2,707	12,640	1,561	11,079	2,297	1,030		1,267		919	
Medium companies													
50–99	–	15,033	2,947	13,787	2,272	11,515	2,607	911		1,696		1,246	
100–249	–	23,287	3,722	20,109	2,138	17,972	3,427	1,166		2,261		3,178	
Large companies													
250–499	–	20,623	4,182	17,603	1,793	15,810	3,923	1,600		2,323		3,020	

TABLE 65

R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost										Projected foreign R&D cost paid for by the company	
				Paid for by the company					Paid for by others						
		Paid for by the company	Paid for by others	Total		Purchased and collaborative R&D		R&D performed by the company		Total		U.S. government		Non-U.S. government sources	
500–999	–	31,319	3,383	28,117		2,761	i	25,355		2,993		455	i	2,537	3,202
1,000–4,999	–	91,228	14,576	72,823		5,595		67,228		11,850		1,938	i	9,913	18,405
5,000–9,999	–	61,740	9,696 i	51,198		3,439		47,759		6,648	i	901		5,747	i 10,542
10,000–24,999	–	106,911	21,790 i	86,851		8,530		78,322	i	14,414	i	750		13,663	i 20,060
25,000 or more	–	237,509	i 21,500	191,397	i	9,734		181,663	i	17,602		12,602	i	5,000	46,112 i

* = amount < $500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 66

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All industries	21–23, 31–33, 42–81	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	597,420
Manufacturing industries	31–33	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,044	314,167	339,076	350,024
Food	311	4,916	D	5,589	5,163	6,335	6,136	6,058 i	5,824	5,424	5,459	5,015
Beverage and tobacco products	312	933	D	D	D	1,358	1,423	1,529	1,076 - 1,654	1,769	1,628	1,755
Textile, apparel, and leather products	313–16	519	522	656	605	759	734	818	1,247 i	1,131	1,223	1,061
Wood products	321	283	254	211	282	222	341 i	198	166 - 751	174	206	193
Paper	322	NA	1,665	769	858	1,022	880	867	943	1,594	1,013	1,165
Printing and related support activities	323	217	269	212	291 i	258 i	238	198 i	223 i	236	246	429 i
Petroleum and coal products	324	NA	D	1,281	D	327	298	252	312	377	1,460 - 1,463	1,477 - 1,481
Chemicals	325	64,442	72,610	72,068	70,218	74,551	79,428	80,961	84,612	90,236	101,132	115,631
Basic chemicals	3251	NA	2,671	5,166	3,400	3,336	3,633	3,677	536 - 5,694	3,101	3,046	3,102
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	1,038	1,117	D	1,794	1,842	1,780	332 - 5,490	805	2,435	1,695
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	D	2,049	D	1,966 i	2,042 i	3,405	0 - 5,157	1,864	1,782 - 1,797	2,272 - 2,297
Pharmaceuticals and medicines	3254	53,456	60,537	58,866	58,920	62,480	66,731	D	73,193	79,004	88,776	103,487
Soap, cleaning compound, and toilet preparation	3256	NA	3,285	3,386	3,212	3,358	3,501	D	3,589	3,699	3,567	3,517
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	D	1,485	D	1,617	1,679 i	1,664	1,806 - 1,830	1,764	1,508 - 1,529	1,532 - 1,560
Plastics and rubber products	326	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583	4,626	3,170	3,359
Nonmetallic mineral products	327	1,153 i	1,596	1,428	1,588 i	1,578	1,599	1,487	1,474	1,485	1,567 i	1,701 i
Primary metals	331	993	802	763	818	700	770	711	662	862	990	740
Fabricated metal products	332	2,174	1,818	1,993	1,949 i	2,303 i	2,329	2,467 i	2,273	2,405	2,533	3,163
Machinery	333	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,958	16,626	19,279	19,435
Agricultural implement	33311	NA	D	1,570	2,142	2,243	D	2,152	2,189	2,132	2,730	2,778
Semiconductor machinery	333242	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138	4,530	5,077	5,374
Engine, turbine, and power transmission equipment	3336	NA	D	D	D	1,795	2,894	2,920	2,484	2,577	3,418 - 3,440	1,931
Other machinery	other 333	NA	6,566	D	D	7,736	D	7,943	7,147	7,387	8,030 - 8,057	9,353
Computer and electronic products	334	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,319	101,910	112,188	112,180
Communications equipment	3342	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,124	15,568	16,467	15,907 - 15,912

TABLE 66

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Semiconductor and other electronic components	3344	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,789	41,362	45,795	48,189 i
Navigational, measuring, electromedical, and control instruments	3345	16,498	17,905	18,242	18,640	18,046	18,993	17,020	18,112	17,965	20,828	21,512
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553	3,702	1,167 - 14,309 i	4,621 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	NA	8,769	8,641	8,312	8,753	8,486	8,033	8,372	8,347	0 - 13,142	10,541
Other measuring and controlling device	other 3345	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,187	5,916	6,520	6,350
Other computer and electronic products	other 334	NA	11,017	13,559	11,589	11,065	11,130	12,443	22,294	27,016	29,099	26,567 - 26,571
Electrical equipment, appliances, and components	335	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207	6,154	6,179	7,006
Transportation equipment	336	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,161	59,432	59,850	53,187
Motor vehicles, bodies, trailers, and parts	3361–63	NA	17,764	D	D	23,610	D	25,735	6,671 - 54,230	30,069	31,869 - 31,899	31,110
Aerospace products and parts	3364	36,409	31,627	26,858	D	25,684	D	29,113	3,240 - 50,799	26,189	25,006	18,943 i
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	D	D	D	D	D	27,463	1,812 - 49,371	24,666	23,683	17,476 i
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	D	D	1,425	D	D	1,649 i	1,428 i	1,523	1,323	1,467
Military armored vehicle, tank, and tank component	336992	NA	D	52	D	9 i	D	16	3 - 38	9	11	35
Other transportation	other 336	NA	D	D	D	2,245	D	2,834	2,653 - 2,690 i	3,164	2,936 - 2,961	3,099
Furniture and related products	337	433	407	347	383	401	422	477	381	470	418 - 444	444
Miscellaneous	339	NA	9,528	D	D	18,900	14,951	15,869	18,045	19,257	20,515	22,077 - 22,084
Medical equipment and supplies	3391	NA	7,461	D	10,311	15,938	12,091	13,166	15,387 - 15,400	16,470	17,443	19,083
Other miscellaneous manufacturing	3399	NA	2,066	D	D	2,962	2,860	2,703 i	2,646 - 2,657 i	2,788	3,072	2,995 - 3,002
Nonmanufacturing industries	21–23, 42–81	99,713	94,840	105,669	113,220	120,242	130,682	141,279	154,547	170,574	204,293	247,396
Mining, quarrying, oil and gas extraction, and support activities	21	NA	2,785	2,597	D	4,452	D	4,348	3,604	3,647	1,990	3,307
Utilities	22	NA	442	396	368	317	314	483	353	336	283	284

TABLE 66

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wholesale trade	42	NA	1,145	1,697 i	2,165 i	459 i	D	1,723 i	489 i	0 - 12,105	883 i	1,304
Electronic shopping and electronic auctions	454111–12	NA	D	D	D	1,845	D	D	0 - 14,624	0 - 12,105	11,715 - 15,515 i	3,200 - 20,013 i
Transportation and warehousing	48–49	NA	124	159	186	D	692	416	495	1,221	2,562 i	9,952 i
Information	51	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,400	94,412	111,653	129,277
Publishing	511	33,171	33,883	36,310	36,947	43,821	46,806	42,190	42,156	42,368	39,890	39,968
Newspaper, periodical, book, and directory publishers	5111	NA	826	401	221 i	348 i	92 i	107 i	84 i	72	150	61
Software publishers	5112	NA	33,058	35,910	36,726	43,473	46,714	42,083	42,073	42,296	39,739	39,907
Telecommunications	517	1,609	2,043	2,267	2,787 i	3,112	3,830	3,648	3,617 - 3,659	3,828	3,827 - 3,833	3,856
Data processing, hosting, and related services	518	3,008	2,895	5,450	5,574	7,787	10,356	10,600	14,051 - 14,099	18,893	28,214 - 28,226	36,449
Other information	other 51	5,410	6,278	8,313	11,506	13,654	17,022	21,526	24,530	29,323	39,713	49,004
Finance and insurance	52	NA	2,568	3,943	4,159	4,999	4,748	6,359	8,468	8,582	8,347	10,092
Real estate and rental and leasing	53	NA	367	D	400	202	268	313	477	892	1,072	1,476
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	365	379	D	58	D	27	77	6	48
Other real estate and rental and leasing	other 53	NA	NA	D	21 i	D	210	D	450	814	1,066	1,427
Professional, scientific, and technical services	54	47,709	37,108	39,731	40,843	37,345	37,995 i	46,255	39,585 - 54,209	46,587	58,333	68,023
Architectural, engineering, and related services	5413	3,384	4,156	D	2,541 i	3,173	3,374	4,158 i	56 - 9,557	2,575	4,005	4,244
Computer systems design and related services	5415	15,310	12,458	13,181	13,404 i	10,535 i	12,579 i	17,227	15,483 - 20,617	17,190	20,378	26,416
Scientific research and development services	5417	19,307	16,408	19,295	20,225	18,478	17,870	20,630	20,194	22,635	28,620	30,675
Research and development in biotechnology	541711	8,492	6,266	7,985	8,364	5,889	4,898	7,114 i	6,062	6,076	8,428 - 8,442	9,250
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	10,129	9,591	10,697	11,261	11,794	12,291	12,807	13,409	15,680	19,507	20,651 i
Research and development in the social sciences and humanities	541720	686	551	613	600	795	682	709	723	879	672 - 683	774
Other professional, scientific, and technical services	other 54	9,708	4,086	D	4,674	5,158	4,172 i	4,240	3,852	4,188	5,330	6,688
Health care services	621–23	NA	D	D	708 i	535 i	501 i	771 i	1,002	1,132	1,497	2,289

TABLE 66

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	D	D	D	D	D	1,054 - 6,188 i	1,665	2,162 - 5,963	1,382 - 18,191
All companies (number of domestic employees)	–	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	597,420
Micro companies[a]												
5–9	–	NA	3,792	4,143	3,025 i	3,442 i	3,409 i	3,101 i	1,728 i	NA	NA	NA
Small companies												
10–19	–	NA	NA	NA	NA	NA	NA	5,750 i	5,031 i	3,532	4,511	5,639
20–49	–	NA	NA	NA	NA	NA	NA	10,654 i	9,972	9,513	11,825	12,875
Medium companies												
50–99	–	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,639	10,635	13,095	14,758
100–249	–	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,160	18,584	20,486	21,986
Large companies												
250–499	–	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,751	16,522	21,971	21,592
500–999	–	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,601	20,173	20,309	26,922
1,000–4,999	–	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,017	79,494	83,959	92,224
5,000–9,999	–	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,479	54,572	61,047	62,775
10,000–24,999	–	61,681	50,710	61,593	60,544	60,844	63,818	70,864	81,547	87,965	108,249	111,876
25,000 or more	–	118,424	125,067	132,719	144,097	152,547	155,180	159,959	173,666	183,750	197,916	226,773

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

[a] Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 67

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All industries	21–23, 31–33, 42–81	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	249,999	255,602	274,315	285,674
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854 i	4,828	4,830	4,588	4,595	4,180
Beverage and tobacco products	312	780	477	D	D	D	827	920	1,006	1,076 - 1,099	1,098	1,113	1,082
Textile, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166 i	959	1,005	904
Wood products	321	273	280	252	211	280	220	336 i	195	166 - 204	173	203	186
Paper	322	NA	NA	1,341	676	752	920	723	766	854	1,327	933	1,064
Printing and related support activities	323	349	210	231	181	256 i	252 i	234	196 i	219 i	231	242	420 i
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	268	324	1,269	1,306
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	71,803	75,733	84,367	97,063
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	0 - 5,157	2,544	2,443	2,360
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	783	798	997	1,197	1,154	1,201	0 - 5,157	541	1,636 - 1,662	1,172
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	NA	D	D	D	1,691 i	1,743 i	D	0 - 5,157	1,469	1,460	1,822 - 1,846
Pharmaceuticals and medicines	3254	48,131	46,415	49,469	46,308	47,851	52,790	56,482	57,332	62,346 - 67,504	66,870	74,815	87,619
Soap, cleaning compound, and toilet preparation	3256	NA	NA	2,400	2,476	2,342	2,434	2,548	2,579	2,800	2,860	2,720	2,760
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	NA	D	1,290	D	1,354	1,357 i	D	1,500 - 1,523	1,450	1,265 - 1,294	1,305 - 1,333
Plastics and rubber products	326	1,817	2,388	2,129	2,278	3,585	3,647	3,614	2,549	3,752	3,722	2,742	2,856
Nonmetallic mineral products	327	1,556	1,098 i	1,314 i	1,175	1,327 i	1,329 i	1,445 i	1,259	1,289	1,304	1,385	1,508 i
Primary metals	331	695	863	681	655	741	618	677	625	592	747	839	665
Fabricated metal products	332	2,419	2,057	1,727	1,857	1,827 i	2,194 i	2,107 i	2,273 i	2,094	2,234	2,316	2,885
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,718	13,341	14,770	15,184
Agricultural implement	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565	1,565	1,872	1,921
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411	3,737	4,166	4,459
Engine, turbine, and power transmission equipment	3336	NA	NA	1,430	4,273	4,336	1,448	2,356	2,515	2,060	649 - 2,579	2,483	1,301
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,683	5,459 - 7,388	6,249	7,503
Computer and electronic products	334	60,464	55,856	61,623	62,438	66,290	68,629	73,256	72,182	77,451	78,003	83,948	86,729

TABLE 67

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,156	12,492	13,090	12,595
Semiconductor and other electronic components	3344	22,324	20,023	23,011	24,237	28,218	30,176	31,668	30,451	31,413	30,373	30,232 - 43,377	35,183 i
Navigational, measuring, electromedical, and control instruments	3345	15,460	14,318	15,747	15,852	15,918	15,119	15,871	14,202	14,885	14,325	4,671 - 17,814	17,562
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	NA	4,189	4,430	4,413	2,634	3,975	2,676	2,632	2,632	0 - 13,142	3,342
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	NA	NA	8,293	8,066	7,734	8,106	7,861	7,360	7,532	7,379	0 - 13,142	9,662
Other measuring and controlling device	other 3345	NA	NA	3,265	3,356	3,772	4,379	4,035	4,165	4,722	4,314	4,672	4,558
Other computer and electronic products	other 334	NA	NA	8,990	10,014	7,801	7,671	7,372	8,105	17,997	20,814	22,811	21,388
Electrical equipment, appliances, and components	335	3,143	3,317	3,320	3,624	3,078	4,133	4,323	4,359	4,771	4,319	4,487	5,263
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,569	50,698	52,446	45,375
Motor vehicles, bodies, trailers, and parts	3361–63	NA	NA	D	D	D	16,733	18,518	19,113	0 - 47,558	23,542	25,393	24,117
Aerospace products and parts	3364	36,941	34,563	29,857	26,086 i	24,874 i	24,783	26,292 i	27,440	1,423 - 48,982	24,154	24,301	18,358 i
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	NA	24,777 i	24,839 i	23,454 i	D	25,002 i	25,793	0 - 47,558	22,629 - 24,155	22,978	16,891 i
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	NA	5,080	1,247	1,420	D	1,290 i	1,647 i	1,424 i	0 - 1,524	1,323	1,467
Military armored vehicle, tank, and tank component	336992	NA	NA	D	51	D	9 i	18	16	3 - 38	9	11	35
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148 i	2,716	2,549 - 2,586 i	2,993	2,741	2,865
Furniture and related products	337	477	395	374	319	360	374	377	452	359	430	409	409
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	14,988	16,370	17,245	18,596
Medical equipment and supplies	3391	NA	NA	6,459	7,796	8,333	12,741	10,309	11,353	12,647 - 12,660	13,930	14,559	16,014
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309 i	2,329 - 2,340 i	2,439	2,686	2,582
Nonmanufacturing industries	21–23, 42–81	86,926	86,064	80,142	87,877	94,183	100,389	108,834	119,501	128,591	141,377	169,318	207,283

TABLE 67

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mining, quarrying, oil and gas extraction, and support activities	21	NA	NA	2,545	2,365	3,031	4,000	4,633	4,012	3,296	3,292	1,827	2,717
Utilities	22	NA	NA	425	358	348	294	313	480	351	326	275	275
Wholesale trade	42	NA	NA	1,092	1,556 i	2,053 i	452 i	339 i	1,698 i	467 i	0 - 9,599	851 i	1,191
Electronic shopping and electronic auctions	454111–12	NA	NA	D	949 i	1,353	1,356 i	1,388	D	0 - 9,499 i	0 - 9,599	11,652 i	3,131 - 15,818 i
Transportation and warehousing	48–49	NA	NA	95	132	178	D	679	403	488	1,214	2,548 i	9,890 i
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,946	80,120	94,507	110,227
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,459	33,868	32,716	33,019
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219 i	342 i	88 i	98 i	79 i	66	131	61
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,379	33,802	32,585	32,958
Telecommunications	517	1,684	1,523	1,912	2,169	2,729 i	3,049	3,768	3,607	3,568 - 3,611 i	3,733	3,696	3,733
Data processing, hosting, and related services	518	6,567	2,741	2,753	5,111	4,914	7,156	9,062	9,355	9,344 - 14,099	16,623	23,472	30,558
Other information	other 51	1,016	4,850	5,466	7,006	10,190	12,039	14,826	19,147	19,820 - 24,532	25,896	34,623	42,917
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331	7,611	7,425	8,917
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475	772 - 852	1,021	1,371
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58 i	55	68	27	0 - 79	6	45
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21 i	133	207	232	448	773	1,015	1,326
Professional, scientific, and technical services	54	37,954	42,380	31,798	33,307	34,121	30,926	31,461 i	38,601	33,839 - 43,338	36,024	45,575	53,233
Architectural, engineering, and related services	5413	3,422	3,258	4,008	3,114	2,483 i	3,132	3,309	4,100 i	0 - 9,499	2,525	3,463 - 4,007	4,207
Computer systems design and related services	5415	12,146	13,351	10,359	10,938	11,006 i	9,241 i	11,053 i	14,334	15,484	13,702	16,553	21,046
Scientific research and development services	5417	17,913	16,402	13,712	15,713	16,415	14,219	13,324	16,249	14,778	16,029	20,225	21,669
Research and development in biotechnology	541711	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594 i	4,445	4,207	5,848	6,457
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	NA	7,916	7,628	8,058	8,431	8,935	9,187	9,950	9,613	10,946	13,707	14,446 i

TABLE 67

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Research and development in the social sciences and humanities	541720	NA	676	547	612	598	792	678	705	719	876	671	766
Other professional, scientific, and technical services	other 54	4,474	9,370	3,720	3,542	4,216	4,334	3,775	3,918	3,579	3,770	4,788 - 5,332	6,312
Health care services	621–23	NA	NA	1,049	542	672 i	528 i	501 i	758 i	848	921	1,475	2,265
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	2,181	1,635	D	857 i	D	1,055 i	1,503	2,163	1,380 - 14,067
All companies (number of domestic employees)	–	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956
Micro companies[a]													
5–9	–	NA	NA	3,614	4,060	2,926 i	3,390 i	3,314 i	2,983 i	1,583 i	NA	NA	NA
Small companies													
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,674 i	4,930 i	3,390	4,383	5,501
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,281 i	9,635 i	9,084	11,255	12,418
Medium companies													
50–99	–	9,351	13,277	8,781	9,295	9,100 i	8,939	10,130 i	11,538	9,275	10,164	12,412	14,021
100–249	–	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,860	17,205	18,611	19,793
Large companies													
250–499	–	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	12,978	14,312	19,775	18,883
500–999	–	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,441	17,736	17,753	23,969
1,000–4,999	–	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,431	64,838	68,764	75,671
5,000–9,999	–	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,530	40,340	45,509	50,811
10,000–24,999	–	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	66,032	73,540	86,463	88,263
25,000 or more	–	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	140,895	146,369	158,707	183,626

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

[a] Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 68

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All industries	21–23, 31–33, 42–81	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,464
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	53,045	58,565	64,761	64,351
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994	835	865	835
Beverage and tobacco products	312	123	455	783 i	599	532	531	503	523	0 - 555	671	516	674
Textile, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81	172	218	157
Wood products	321	4	2	3	1	2	2	5 i	3	0 - 555	1	3	7
Paper	322	274	257	324	93	106	103	158	102	89	267	80	101
Printing and related support activities	323	9	7	38	30	35	6	3	2	4	5	4	9 i
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44	53	192 - 194	171 - 176
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,809	14,503	16,766	18,568
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537	557	603	742
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333	264	774 - 798	523
Pesticide, fertilizer, and other agricultural chemicals	3253	371	D	D	D	D	275 i	299 i	D	0 - 5,157	396	321 - 337 i	450
Pharmaceuticals and medicines	3254	10,862	7,041	11,068	12,557	11,069	9,690	10,249	D	5,688 - 10,846	12,133	13,962	15,868
Soap, cleaning compound, and toilet preparation	3256	965	873	884	910	870	924	952	D	789	839	847	757
Paint, coating, adhesive, and other chemicals	3255, 3259	370	D	D	195	210	263	321 i	D	307	314	235 - 259	227
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831	904	428	503
Nonmetallic mineral products	327	106	54	282 i	253	261	249 i	155 i	228	185	181	181 i	192 i
Primary metals	331	114	130	121	108	77	82	94	86	69	116	151	76
Fabricated metal products	332	188	117	91	135	122	109	222	194	179	171	216	278
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,239	3,285	4,509	4,251
Agricultural implement	33311	399	391	D	293	596	646	D	621	625	566 i	858	857
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727	793	911	915
Engine, turbine, and power transmission equipment	3336	92	83	D	D	D	347	537	405	424	0 - 1,928	935 - 958	630
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,464	0 - 1,928	1,781 - 1,807	1,850
Computer and electronic products	334	15,774	12,917	13,722	16,708	21,117	21,485	20,943	20,678	20,868	23,907	28,240	25,452 i
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,967	3,076	3,377	3,312 - 3,316

TABLE 68

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Semiconductor and other electronic components	3344	7,075	6,058	6,343	7,909	10,082	10,434	10,360	9,896	10,377	10,989	2,418 - 15,563	13,007 i
Navigational, measuring, electromedical, and control instruments	3345	2,308	2,180	2,158	2,390	2,722	2,927	3,122	2,819	3,227	3,640	3,015 - 16,157	3,950
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	838	522	360	557	586	202	1,073	923	922	1,069	1,168 i	1,280 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	D	508	475	575	578	647	625	673	840	968	0 - 13,142	878
Other measuring and controlling device	other 3345	D	1,149	1,324	1,258	1,557	2,077	1,423	1,222	1,465	1,603	1,848	1,792
Other computer and electronic products	other 334	3,440	1,817	2,027	3,546	3,788	3,395	3,759	4,338	4,297	6,202 i	6,287	5,179 - 5,183 i
Electrical equipment, appliances, and components	335	1,162	1,158	1,447	1,695	1,062	1,605	1,382	1,351	1,436	1,835	1,692	1,743
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	8,592	8,734	7,404	7,812
Motor vehicles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	6,672	6,527	6,476 - 6,506	6,993
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817	2,035	705	585
Aircraft, aircraft engine, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813	511 - 2,036	705	585
Guided missile, space vehicle, and related parts	336414–15, 336419	74	85	D	D	5	D	D	2	4	0 - 1,524	1	*
Military armored vehicle, tank, and tank component	336992	0	D	D	1	0	0	D	0	0	0	0	0
Other transportation	other 336	3	D	D	D	D	121	D	118	104	171	195 - 221	234
Furniture and related products	337	27	38	33	28	23	28	45	25	22	40	9 - 33	35
Miscellaneous	339	D	4,044	D	D	D	3,608	2,194	2,207	3,057	2,888	3,271	3,482 - 3,488
Medical equipment and supplies	3391	766	3,813	1,003	D	1,978	3,197	1,782	1,813	2,739	2,539	2,884	3,069
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394 i	317 i	348	386	413 - 419
Nonmanufacturing industries	21–23, 42–81	14,903	13,648	14,698	17,792	19,037	19,853	21,849	21,778	25,956	29,196	34,975	40,113
Mining, quarrying, oil and gas extraction, and support activities	21	D	D	239	232	D	452	D	336	308	355 i	163	589
Utilities	22	6	13	17	38	21	23	1	3	1	10	8	9
Wholesale trade	42	509	D	53	141 i	112 i	7	D	25 i	21 i	0 - 2,590	32	113

TABLE 68

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	0 - 5,132 i	0 - 2,590	63 - 3,863 i	69 - 4,198 i
Transportation and warehousing	48–49	2	1	29	28 i	8 i	D	13	13	7	7	14	62
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,454	14,292	17,146	19,051
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698	8,500	7,174	6,949
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2 i	6 i	4 i	9	4	6	19	0
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693	8,494	7,154	6,949
Telecommunications	517	175	86	131	98	59	63	61	41	49	96	131 - 138	124
Data processing, hosting, and related services	518	1,089 i	266	142 i	339	661	631	1,294	1,245	0 - 4,710	2,270	4,742 - 4,753	5,891
Other information	other 51	93	559	812	1,308	1,316	1,616	2,196	2,378	0 - 4,710	3,427	5,090	6,087
Finance and insurance	52	74	518	467	496	628	587	625	950	1,136	971	923	1,175
Real estate and rental and leasing	53	65	28	37	D	38	11	6	13	2	40 - 120	51	104
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	41	37	D	3	D	*	0 - 79	0	4
Other real estate and rental and leasing	other 53	NA	NA	NA	D	* i	D	3	D	2	41	51	101
Professional, scientific, and technical services	54	6,150	5,328	5,309	6,424	6,723	6,418	6,534	7,653	5,744 - 10,877	10,563	12,758	14,790
Architectural, engineering, and related services	5413	200	126	148 i	D	57	41	65	58	57 i	50	0 - 542 i	37
Computer systems design and related services	5415	2,164	1,959	2,099	2,243 i	2,398 i	1,293	1,525 i	2,893	0 - 5,132	3,488	3,825	5,370
Scientific research and development services	5417	3,544	2,905	2,696	3,581	3,810	4,259	4,546	4,380	5,416	6,606	8,394	9,006 i
Research and development in biotechnology	541711	NA	683	729	942	977	1,398	1,438	1,520	1,616	1,869	2,580 - 2,594	2,793
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	NA	2,213	1,962	2,638	2,830	2,859	3,103	2,858	3,796	4,733	5,801	6,205 i
Research and development in the social sciences and humanities	541720	NA	9	5	1	2	3	4 i	3	4	3	1 - 12	8
Other professional, scientific, and technical services	other 54	241	338	366	D	458	825	398 i	322	273	418	0 - 542	376
Health care services	621–23	1	10	D	D	36	7	*	12 i	154	211	22	24

TABLE 68

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	0 - 5,132	162	0 - 3,800	2 - 4,124
All companies (number of domestic employees)	–	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,464
Micro companies[a]													
5–9	–	NA	NA	178	83	99 i	52 i	95 i	118 i	145	NA	NA	NA
Small companies													
10–19	–	NA	NA	NA	NA	NA	NA	NA	76	101	142	128	138
20–49	–	NA	NA	NA	NA	NA	NA	NA	373	337	429	569	457
Medium companies													
50–99	–	976	509	688 i	539	628	351	547	407	364	471	684	737
100–249	–	1,735	1,574	1,358 i	1,051	1,212	1,276	1,475	1,378	1,300	1,379	1,875	2,192
Large companies													
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,773	2,210	2,196	2,709
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159	2,437	2,557	2,953
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,587	14,656	15,195	16,553
5,000–9,999	–	7,000	5,692	6,907	8,126	10,298	11,430	12,979	9,541	8,949	14,232	15,538	11,965
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	15,515	14,425	21,787	23,612
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	32,771	37,381	39,208	43,148

* = amount < $500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

[a] Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	328,040	311,170	316,262	336,629	352,951	376,974	399,656	412,590	440,429	471,440	523,512	571,019
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089	986	0 - 23,467	902
Mining	21200	NA	D	75	128	92	114	56	71	63	170	114	93 - 4,956
Support activities for mining, including oil and gas	21300	NA	993	1,638	1,386	1,814	1,749	1,995	1,831	1,380	1,577	951 i	1,650 i
Utilities	22100	NA	1,607	903	639	686	615	549	726	515	501	0 - 23,467	415
Construction	23000	NA	198	918	269	393 i	307	297	700	276	501	691	899
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,073	5,827	5,806	5,513
Beverage manufacturing	31210	605	564	926	668	641	772	753	728	787 i	851	762	723
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	731	853	722	807
Textile, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,333	1,093	1,155	965
Wood products manufacturing	32100	264	304	239	208	D	244	336 i	251	0 - 7,094	263	297	225 - 5,087
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,555	1,743	1,592	1,791
Printing and related support activities	32300	297	241	244	265	356 i	391	390	321	340	286	359	477
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625	567	640	525 - 5,388
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93	137	134	134
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	403	415	382	488	460 i	416	339	383	258	106 - 4,969
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,579	3,576	3,540	3,267
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,152	1,459	1,444	1,228	1,437	1,383	1,771	1,703	1,401	1,200	1,743	1,803
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,100	1,990	1,722	2,333	2,307	2,364 i	2,508 i	D	2,338 i	2,479 i	3,196 i	2,919
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	69,518	71,762	77,733	81,409
In vitro diagnostic substances manufacturing[c]	32542	1,988	1,159	1,207	1,544	1,371 i	1,066	1,159	972	1,286	1,567	1,381	1,591

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	10,356	14,947	23,172	24,458	30,555	36,012	40,986
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,787	2,883	3,147	3,472	3,266	3,406	3,493	3,353	3,361	3,257	3,380	3,196
Paint, adhesive, and other chemical manufacturing	32592	2,152	2,320	2,238	2,011	2,087	1,979	2,131	D	2,121	2,094	1,666	1,747
Plastics and rubber products manufacturing	32600	2,536	2,842	3,128	3,689	3,739	3,586	3,592	3,251	3,926	3,904	3,643	3,506
Clay and glass products manufacturing	32710	966 i	312	1,056 i	920 i	1,154 i	1,077	1,130	1,145	1,198	1,345	1,521	1,511
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738	555	522	590	621	618 i	800	601	652	443	446	546
Primary metal manufacturing	33100	NA	840	933	783	882	792	853	719	0 - 7,094	714	808	851
Fabricated metal products manufacturing	33200	2,935	2,438	1,971	2,471	2,517	2,460	2,560	2,521	2,562	2,695	2,798	3,129
Agricultural machinery and equipment manufacturing	33311	1,404	1,507	1,523	1,430	1,893	2,055	1,990	1,916	1,977	1,867	2,440	2,458
Construction machinery manufacturing	33312	581	653	682	875	816	1,693	1,729	1,556	1,462	1,588	1,880 i	1,871
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	1,629	1,765	2,204	2,589	1,942 i	1,462	2,115	1,528	1,586	1,739	1,300
Semiconductor machinery manufacturing	33321	2,553	1,978	2,279	2,574	1,266 i	3,500	3,363	3,459	3,688	3,996	4,465	4,687
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191	853	806	1,128	1,031	1,006	1,237	1,181	893	1,222	0 - 23,467	1,406
Photographic and photocopying equipment manufacturing	33331	NA	852	270	757	25 i	108	25	114	59	52	67	147 - 5,010
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	977	1,268	1,143	1,621	1,661	2,251	1,947	0 - 7,094	2,245	2,263	2,169
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587 i	519	571	274	463
Engine, turbine, and power transmission equipment manufacturing	33360	2,386	1,589	3,481	3,623	4,068	3,870	3,346	2,626	2,641	3,164	2,756	3,146
Metalworking and other general purpose machinery manufacturing	33390	2,039	1,618	1,998	2,359	1,916	2,052	2,585	2,728	2,591	2,547	2,996	2,861
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,130	27,553	27,801	25,296
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	6,739	7,758	9,010	9,530	9,335	9,622	10,526	12,366	10,715	10,403	11,487	11,254

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Radio, television, and wireless communication equipment manufacturing	33422	5,958	5,181	5,719	4,383	4,773	5,967	5,848 i	3,542	2,839	2,482	0 - 23,467	2,475
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,482	1,352	715	1,092	2,111	1,826	1,782	1,844 i	1,660	1,977	0 - 23,467	2,293
Audio and video equipment manufacturing	33430	773	977	1,352	1,019	1,081	1,108	1,282	1,587	1,535	1,252	1,461	1,714
Semiconductor and other electronic components manufacturing	33440	29,911	26,118	29,457	32,354	38,109	40,001	41,125	39,810	40,585	41,053	44,130	46,556
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,822	2,544	3,046	3,230	3,494	3,816	4,330	3,875	4,053	3,865	4,815	4,656
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	1,845	2,229	2,417	2,161	2,337	2,564	2,424	2,033	2,614	2,378	3,136	3,198
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,458	4,425	4,579	4,566	4,871	5,308	5,424	5,637	5,662	5,505	5,469	5,370
Electrical equipment, appliances, and components manufacturing	33500	4,687	4,229	4,500	4,768	4,773	5,272	5,501	5,313	5,905	6,177	5,456	6,455
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984	18,357	20,573	22,481	23,693	21,793
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98 i	107 i	104	160	118	47	99	154 - 5,017
Motor vehicle parts manufacturing	33630	5,401	4,158	4,310	4,681	4,736	5,600	7,146	7,285	6,801	7,621	8,852	9,439
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716 i	4,373	4,221	4,859	5,639	4,671	6,467	5,404
Aircraft engine and engine parts manufacturing	33642	2,433	1,765	1,978	2,136	D	1,787	2,068 i	D	0 - 7,094	1,455	1,759	1,474
Other aircraft parts and auxiliary equipment manufacturing	33643	1,222	1,135	1,825	1,752	3,121	3,270	2,980	3,482	3,047	3,239	2,054	1,347
Guided missiles, space vehicles, and related parts manufacturing	33644	1,402	1,176	1,132	1,050	659	487	877	1,034	954	1,055	1,210	1,140
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363	310	224	251	213	210 - 5,073
Ship and boat building	33660	151	616 i	608 i	154	143 i	192	489	251	618	157	144	182 - 5,045
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283	320	335	355	429	437
Military armored vehicle, tank, and tank components manufacturing	33692	107	228	182	118	135	90	159	202	130	367 i	0 - 23,467 i	381
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361	430	478	505	521	496
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455	509	411	479	467	517

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Medical equipment and supplies manufacturing	33910	11,587	11,457	13,226	13,701	14,259	15,264	14,317	15,145	15,939	17,055	16,832	18,875
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,976	2,793	2,341	2,698	D	2,976	2,816	D	3,121	3,130	3,415	3,117
Merchant wholesalers, durable goods	42300	449	923 i	714	711	1,277 i	589	516	1,551	637	448	771 i	727
Merchant wholesalers, nondurable goods	42400	257	365 i	348	605	699 i	327	209	484	219	273	322	1,029
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43 i	19 i	70	173 i	18	D	35	24	0 - 12,866 i	89 i	32 - 4,895 i
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100 i	120	65	D	120	119	263	279 - 5,142
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	8,200 i	0 - 12,866	0 - 23,467 i	0 - 15,636 i
Transportation	48000	NA	319	211	111	199	377	412	229 i	123	722	2,080	9,072
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394	425	451	290
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0	82	79	162 i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408 i	257 i	339 i	103	117	87	99	175	88
Software publishers (except Internet)[e]	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,699	31,400	32,842	31,585
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83 i	12	20	42 i	155	52 - 4,915
Broadcasting (except Internet)	51500	NA	89	100	115	165 i	179	206	306	347	460	424	500
Wired telecommunications carriers	51710	673	D	1,499 i	1,685	1,631 i	1,012 i	1,166	1,269 i	1,180	1,027	476	428
Wireless telecommunications carriers (except satellite)	51720	532 i	186	724 i	815 i	860 i	1,732 i	2,500	1,192 i	1,458 i	1,969	2,439	2,641
Satellite telecommunications	51740	153	108	229	114	163	176	134	705 i	746	625	476	486
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362	381	745	610
Data processing, hosting, and related services[e]	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	7,040	6,975	7,699	10,108
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,913	19,581	24,607	33,022
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,524	32,484	43,287	53,120
Finance: banking and credit intermediation	52200	NA	D	1,235	1,703	2,454	3,238	3,553	3,299	5,171	5,657	4,975	5,718

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	678	903	1,347	1,110	1,323	1,147	1,597	1,683	1,785	1,445	1,654
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444	1,430	0 - 23,467	2,607
Real estate	53100	20	32	3	13	27	105	199	288	440	253	380	398
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	106 i	571 i	699	1,067
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45	97	24 i	71
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705 i	535	696	1,128	1,587	1,052	1,130	1,426	2,117
Architectural, engineering, and related services	54130	1,742	1,115	1,390	1,380	1,232	1,495	1,649	2,449	1,975	1,795	2,575	2,720
Specialized design services	54140	75	76	65	283	157 i	81	42	13	26	133	0 - 23,467	111 - 4,974
Computer systems design and related services[e]	54150	11,476	12,292	11,528	13,673	13,909 i	12,577	13,288	14,090	14,864	13,998	18,287	22,598
Management, scientific, and technical consulting services	54160	1,110	2,246	1,380	1,618	2,066 i	1,428	1,681	1,531	1,668	1,591	2,443	2,004
Research and development services in social sciences and humanities	54172	NA	96	8	19	64	36	47	15	0 - 7,094 i	348	27	28
Research and development services in biotechnology[c]	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,176	930	1,147	1,151
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,208	1,447	2,751	3,166	2,143	3,040	3,197	2,767	2,226	2,324	2,885
Advertising and related services	54180	37	1,950	422	97	375 i	390	424	452	373	412	1,160 i	1,261 i
Professional, scientific, and technical services (not listed elsewhere)	54190	439	1,036	543	1,242	1,199	1,627	810	944	622	695	912	1,264
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	20	71	0 - 23,467	0 - 15,636
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588	1,558	2,668	3,576
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8	0 - 12,866	0 - 23,467	16 - 4,879
Offices of physicians	62110	40	37	371	36	42 i	43	39	28	70	102 i	113	196
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	0 - 7,094 i	855	1,739 i	2,104

TABLE 69

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145 i	15	45 i	52	37	39	23	70	48	146 - 5,009
Hospitals and nursing care facilities	62200	NA	62 i	68	2	2 i	2	2	4	6	18	0 - 23,467	0 - 15,636
Social assistance services	62400	NA	D	15	13	36	47	17	2	2	6	13	0 - 15,636
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103 i	50	45	42	45	479
Accommodation and food services	72000	NA	50	119	84	149 i	163	D	106	76	62	126	79 - 4,942
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	0 - 7,094	0 - 12,866	0 - 23,467	514
Undistributed	–	10,660	14,175	5,373 i	D	491	359 i	69	0	0	0	0	0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

[c] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

[d] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

[e] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	10,976,518	10,221,923	12,204,773	12,874,185	12,975,886	13,279,075	13,409,822	12,201,595	12,246,930	12,878,032	14,493,394	14,897,629
Oil and gas extraction	21100	271,493	153,939	212,469	331,320	271,983	250,884	241,227	141,687	117,720	108,940	178,064	134,817
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	29,976	23,057	44,867	18,446
Support activities for mining, including oil and gas	21300	NA	45,184	61,062	68,523	79,788	100,175	129,989	74,421	44,705	64,412	84,366	89,977
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	309,116	407,052	4,778 - 1,152,314	304,374
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,363	69,900	87,053	94,478
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	705,021	789,784	718,760	779,512
Beverage manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,459	146,561	138,524	119,563
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	64,978	72,291	67,629	70,749
Textile, apparel, and leather products manufacturing	31990	NA	56,131	68,515	66,416	89,086	70,260	66,546	83,170	109,296	88,817	84,900	77,152
Wood products manufacturing	32100	34,563	27,826	28,342	24,165	32,908	42,472	51,879	33,713	0 - 373,524	36,180	41,001	41,886
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	129,369	146,927	157,969	157,322
Printing and related support activities	32300	26,426	37,743	37,398	32,823	32,152	29,576	34,227	42,885	31,310	47,910	36,015	65,659 i
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,433	325,034 - 733,821	586,670	565,617
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,566	8,872	8,563	14,504	11,150	10,324	12,322	16,662	17,798	18,425
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	32,282	43,514	D	23,425	22,348	20,440	15,665	20,790	16,008	11,434
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666 i	278,661	270,287	212,951	264,935	231,673	262,007	229,696

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	89,805	94,915	108,693	88,762	97,410	95,249	108,867	92,708	91,399	92,324	128,075	111,490
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	40,337	71,003	51,940	47,381	57,246	67,823	68,738	72,737	58,476	74,274	83,310	67,393
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	608,453	636,157	669,845	556,641
In vitro diagnostic substances manufacturing[c]	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	7,892 - 171,885	15,915	17,050	16,743
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	40,409	56,454	84,437	0 - 373,524	90,419	110,160	125,658
Soap, cleaning compound, and toilet preparations manufacturing	32591	142,212	151,565	167,258	170,417	166,942	185,266	196,651	180,201	164,810	179,865	192,314	178,605
Paint, adhesive, and other chemical manufacturing	32592	113,118	104,308	103,452	120,242	128,998	113,108	128,730	107,146	118,885	124,026	131,768	122,390
Plastics and rubber products manufacturing	32600	162,401	161,057	193,471	243,447	265,623	219,020	241,780	201,164	232,466	229,347	227,659	208,281
Clay and glass products manufacturing	32710	36,417	27,803	37,853	34,184	36,960	39,365	34,863	39,676	47,603	41,355	48,534	39,831

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	48,680	35,530	31,789	32,864	40,193	42,592	35,322	35,377	34,503	29,688	41,567	46,774
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,321	100,279	158,304	152,375
Fabricated metal products manufacturing	33200	188,359	132,465	161,593	179,228	207,423	199,678	235,784	194,098	165,184	175,986	203,494	181,995
Agricultural machinery and equipment manufacturing	33311	48,185	46,695	53,946	43,410	59,651	68,793	63,617	53,559	51,776	60,038	67,224	64,372
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,267	60,563	74,106	80,265
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	69,074	75,563	101,549	110,356	84,384	76,466	73,725	48,023	65,286	86,513	68,949
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749	38,320	47,008	45,318
Industrial machinery manufacturing (except semiconductor machinery)	33322	26,984	21,368	30,723	44,666	42,619	39,357	51,615	39,189	37,659	38,252	44,624	38,121
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307 i	7,502	9,162	8,602	6,775 - 170,768	6,849	0 - 1,147,536	836
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	49,546	76,811	73,896	90,814	97,984	111,674	101,920	113,832	100,874	116,411	115,672

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	5,579 i	5,947 i	0 - 1,147,536	3,382
Engine, turbine, and power transmission equipment manufacturing	33360	86,660	46,879	84,686	112,562	120,116	146,129	D	85,560	87,887	106,205 i	95,099	107,601
Metalworking and other general purpose machinery manufacturing	33390	90,067	66,350	95,017	112,947	125,495	105,487	149,607	140,673	116,838	117,535	124,745	101,485
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890	414,641	452,483	479,840	457,916
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	48,816	66,123	87,159	64,811	64,652	75,886	72,421	202,399 i	76,218	74,054	80,804	79,503
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774 i	D	39,937 - 203,930	37,092	0 - 1,147,536	37,126
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	17,976	13,324	12,856	21,004	15,949	23,299	14,548	15,997	0 - 373,524	13,808	14,852 - 257,625	16,059
Audio and video equipment manufacturing	33430	13,212	15,041	22,242	11,476	17,926	19,596	18,333	38,954 i	35,473	3,724 - 417,696	11,671	16,217

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Semiconductor and other electronic components manufacturing	33440	220,272	196,399	296,058	336,789	332,771	320,780	350,779	D	323,512	373,892	464,768	465,467
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	41,395	27,437	29,041	38,560	39,590	43,130	43,537	44,739	46,152	44,317	54,101 i	49,345
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	38,474	55,866	68,907	47,701	63,724	66,326	67,154	58,670	59,653	65,730 i	72,999	73,069
Measuring and control instruments manufacturing (not listed elsewhere)	33459	57,989	78,228	88,305	84,368	99,774	97,153	102,909	101,098	102,226	91,098	80,604	84,362
Electrical equipment, appliances, and components manufacturing	33500	154,206	129,174	160,532	165,156	164,998	182,490	198,505	195,327	213,284	185,233	189,043	222,663
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	693,548	616,741	700,801	529,227
Motor vehicle body and trailer manufacturing	33620	D	15,688	23,105	15,325	34,284	25,913	32,719	23,229	63,232	20,086	26,219	45,991
Motor vehicle parts manufacturing	33630	163,993	126,638	242,201	224,450	228,418	269,022	379,492	294,414	238,521	270,643	284,735	278,559
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484 i	154,241	139,924	148,986	136,497	128,861	190,692	144,831
Aircraft engine and engine parts manufacturing	33642	42,829	37,086	34,925	42,514	40,376	54,024	48,134	D	38,176	42,340	60,557	54,264

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other aircraft parts and auxiliary equipment manufacturing	33643	30,319	36,714	41,704	56,509	44,556	60,520	84,966	97,198	85,111	103,682	67,880	58,491
Guided missiles, space vehicles, and related parts manufacturing	33644	D	51,326	D	D	16,554	17,200	30,237	31,776	30,600	37,204	51,013	35,217
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075 i	8,870	14,255	12,639	19,679	19,353	14,852	13,416	14,083	13,506 i
Ship and boat building	33660	16,461	37,439 i	D	D	23,966 i	16,927 i	39,049	15,426	33,496 - 134,100	22,538	16,295	24,057
Motorcycle, bicycle, and parts manufacturing	33691	8,423	6,677	6,646	8,948	7,829	11,331	9,142	9,067	9,507	9,107	4,253 - 1,151,789	10,979
Military armored vehicle, tank, and tank components manufacturing	33692	13,341	10,136	D	6,239	4,893	4,354 i	7,502	D	77 - 229,474	11,306 i	18,524 i	15,405
All other transportation equipment manufacturing	33699	9,513	6,332	13,008	13,415	18,469	28,933	12,026	14,565	14,435	14,658	21,096	17,730
Furniture and related products manufacturing	33700	43,401	35,821	37,487	39,031	43,719	41,407	45,760	43,530	43,362	47,260	48,896	51,330
Medical equipment and supplies manufacturing	33910	164,066	159,611	243,406	304,215	217,549	237,729	234,177	235,706	244,748	250,637	271,188	301,096
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	122,669	114,088	101,526	D	118,660	140,793	134,415	D	131,728	135,910	170,909	119,361
Merchant wholesalers, durable goods	42300	412,269	313,095	334,004	214,772	246,702	378,550	180,014	260,038	221,852	165,345	247,956	165,955

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Merchant wholesalers, nondurable goods	42400	340,956	273,118	280,982	496,309	587,019	571,742	698,182	547,921	512,867	506,120	633,916	602,072
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722 i	115,452 i	53,497	86,215	41,905	60,197	50,155	435 - 1,147,971	5,340
Retail trade (except electronic shopping and electronic auctions)	44000	NA	206,489	223,211	104,922	257,466	156,839	442,527	210,412	296,019	322,049	537,429	662,471
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	110,617 - 274,610	198,755	191,380 - 434,154 i	168,456 - 333,088 i
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	0 - 373,524	278,263	277,801	387,986
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345	136,436	90,988	2,034
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652	15,714	0 - 1,147,536	15,949
Newspaper, periodical, book, and directory publishers (except Internet)	51110	17,053	24,528	26,671	30,831	33,557 i	17,955	10,520	7,008	8,704	6,010	0 - 1,147,536	7,147
Software publishers (except Internet)[e]	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,293	231,880	244,928	237,902
Motion picture and sound recording (except Internet)	51200	16,774	20,697	18,011	14,964	9,467	20,861	D	7,142	9,353	8,936	37,326	46,587
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,879	88,160	151,227	185,587
Wired telecommunications carriers	51710	D	187,439	210,704	268,345	223,829	181,992	230,630	216,588	181,904	222,699	129,766	139,262

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wireless telecommunications carriers (except satellite)	51720	135,248	154,682	138,479	156,696	193,408	D	247,759	D	172,416	201,063	264,219	264,976
Satellite telecommunications	51740	19,330	12,662 i	16,021	2,783	3,056	D	3,581	44,400	61,927	57,588	53,333	51,337
Other telecommunications (not listed elsewhere)	51790	5,603	9,122	7,737	18,803	17,803	18,504	6,507	14,561	8,524	16,040	12,551 - 255,324	19,438
Data processing, hosting, and related services[e]	51800	NA	36,196	38,523	60,641	95,872 i	58,502	81,059	79,017	76,345	77,859	141,006	98,036
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	57,770	98,224	167,679	218,846
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	113,123	160,826	191,042	219,808
Finance: banking and credit intermediation	52200	NA	D	1,068,703	631,129	673,238 i	347,139	364,224	377,622	400,369	472,203	536,280	629,562
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	148,454	148,014	152,435	104,915	107,027	74,030	75,325	72,115	102,310	20,889 - 1,168,425	97,896
Insurance carriers and related activities	52400	NA	294,233	281,344	280,278	358,159	397,971	380,117	420,526	372,903	312,922	0 - 1,147,536	1,069,279
Real estate	53100	D	7,738	D	D	D	D	D	8,537	9,292	10,114	11,565	17,104
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033	35,488	21,986	29,238	14,235	21,642	3,607 - 1,151,143	12,743

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,835	1,927	2,709	2,890	11,404 i	2,125	2,150	1,468	3,513	0 - 1,147,536	1,671
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	16,188	D	11,315	14,588	22,315	22,259	19,526	21,336	24,044	29,565
Architectural, engineering, and related services	54130	42,680	96,534	147,309	102,126	114,240 i	125,923	134,541	139,846	103,412	84,387	102,795	127,409
Specialized design services	54140	D	6,504	3,976	2,581	3,646 i	3,614	2,165	D	706	4,584 i	25,655	12,640
Computer systems design and related services[e]	54150	210,916	216,477	224,026	377,919 i	272,065	249,600	272,937	243,790	249,430	223,281	251,167	238,778
Management, scientific, and technical consulting services	54160	52,497	60,125	43,190	76,910	85,161	81,834	93,077	92,120	63,143	49,057	69,344	57,882
Research and development services in social sciences and humanities	54172	NA	980	1,170	827	D	1,301	992	D	1,131	1,185	941	1,233
Research and development services in biotechnology[c]	54173	NA	22,354 i	8,493	8,657	11,316	12,390	17,543	10,962	9,026	9,340	3,772 - 1,151,308	13,214
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	19,858	18,840	23,446	33,296	36,913	32,703	36,038	37,997	37,955	41,855	49,481
Advertising and related services	54180	D	48,883	12,992 i	D	52,764	D	D	D	44,669 - 208,661	107,640	140,254	84,177 - 248,809

TABLE 70

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Professional, scientific, and technical services (not listed elsewhere)	54190	19,146	30,323	35,320	50,949	63,254	47,353	32,811	30,775	12,204 - 176,196	31,239	21,496	23,046
Management of companies and enterprises	55100	828	2,333	3,613	17,275	5,435	177,880	9,213	16,180	11,794 i	18,180	13,915	13,249
Administrative and support services	56100	NA	35,867	45,135	32,735	50,684 i	44,004	243,644	50,037	55,602	49,518	66,944	89,404
Waste management and remediation services	56200	NA	6,242	14,172	8,182	6,564	6,245	4,766	24,985	27,470	22,609	88,502	11,623
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,118	50,891	102,792
Medical and diagnostic laboratories	62150	20,968	15,216	37,950	17,047	21,038	17,914	5,919	20,904	27,539 i	28,636	39,514 i	38,599
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	8,127	8,487	D	3,361 i	10,919	5,274	5,651	0 - 229,395	10,819	176 - 1,147,712	22,807
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896	32,276	35,119	25,795
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77	112	0 - 1,147,536	108
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	17,509 - 181,502	24,540	34,697	37,623
Accommodation and food services	72000	NA	D	69,474	39,421	88,878 i	107,255	46,228	76,898	66,849	26,196	54,566	84,334
Other services (not listed elsewhere)	81000	NA	15,585	43,778	129,084	57,612	142,029	78,365	70,781	237,671	0 - 413,972	0 - 1,147,536	109,756
Less: intersegment eliminations	–	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	226,993	196,040	255,127	182,972
Undistributed	–	1,092,275	1,590,109	516,754	598,369 i	167,240 i	D	4,602	9,547 i	0	0	8 i	0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

[c] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

[d] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

[e] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	7,796,340	7,448,495	8,831,739	9,059,299	9,260,168	9,663,848	9,785,269	9,084,789	9,151,764	9,583,098	10,680,515	11,180,864
Oil and gas extraction	21100	127,788	61,582	85,797	178,926 i	124,569	120,495	124,534	71,385	58,231	51,790	91,319	76,461
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589 i	19,449	17,583	25,823	16,249
Support activities for mining, including oil and gas	21300	NA	23,022	34,840	42,645	51,327	72,553	97,302	47,711	25,825	39,547	54,528	52,988
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	304,643	400,104	0 - 1,147,536	299,499
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,660	64,968	79,414	86,185
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	520,546	617,230	527,904	565,706
Beverage manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,431	96,676	92,210	78,304
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196	35,945	35,691	38,302
Textile, apparel, and leather products manufacturing	31990	NA	45,893	56,890	52,532	68,545	55,066	51,532	70,105	89,019	66,734	59,379	52,980
Wood products manufacturing	32100	28,183	26,213	25,241	22,344	28,764	36,703	44,706	28,998	0 - 229,395	31,890	34,871	35,775
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	95,481	110,534	118,261	121,784
Printing and related support activities	32300	22,678	33,532	32,163	26,809	26,267	26,281	29,178	35,056	26,808	39,492	31,019	55,322 i
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,323	325,035	332,542	362,033
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,549	8,781	8,489	13,260	8,873	9,694	9,088	13,350	11,426	12,625
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	21,658	20,509	20,440	13,722	12,852	11,797	10,565	15,821	13,238	10,453
Basic chemicals manufacturing	32510	158,621	103,950	150,240	206,723	344,515 i	198,843	195,066	154,351	205,221	164,502	181,046	162,308
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	60,269	61,805	64,684	58,263	68,104	67,845	73,542	61,729	58,345	56,121	76,816	71,464

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	28,010	47,317	41,528	33,380	40,317	45,660	55,122	D	41,963	55,687	53,085	55,221
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	463,633	486,877	510,204	390,793
In vitro diagnostic substances manufacturing[c]	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,893	9,215	8,119	9,203
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	36,856	48,419	71,205	0 - 229,395	0 - 90,420	96,814	110,171
Soap, cleaning compound, and toilet preparations manufacturing	32591	69,942	71,452	81,151	70,851	82,518	87,034	101,458	94,015	83,083	94,133	107,951	98,956
Paint, adhesive, and other chemical manufacturing	32592	63,149	62,724	60,506	64,497	79,372	67,504	73,975	68,020	73,446	78,668	86,077	79,963
Plastics and rubber products manufacturing	32600	118,523	114,191	137,777	173,290	194,568	153,705	165,082	156,033	175,524	162,892	171,981	147,611
Clay and glass products manufacturing	32710	24,394	19,014	25,143	21,754	20,164	22,987	21,577	23,739	30,753	27,302	29,698	24,278
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	43,373	31,599	24,141	24,235	33,359	33,428	25,941	27,882	28,170	25,524	36,064	40,945
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,884	82,674	124,934	124,730
Fabricated metal products manufacturing	33200	142,788	102,595	119,246	130,090	155,294 i	160,359	168,139	150,860	129,779	128,532	149,664	131,704
Agricultural machinery and equipment manufacturing	33311	27,543	25,669	29,904	29,258	35,667	45,717	36,857	32,054	30,092	38,891	37,208	36,555

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	34,984	39,464	44,655	49,639
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	33,167	39,264	53,050	60,556	46,949	43,531	37,351	21,606	31,187	46,305	41,577
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676	20,114	21,685	24,628
Industrial machinery manufacturing (except semiconductor machinery)	33322	19,452	15,372	21,762	29,736	31,127	29,265	35,077	32,599	25,317	27,103	31,884	28,420
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927 i	4,791 i	D	6,885	7,246	7,124	6,776	5,993	0 - 1,147,536	710
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	33,493	48,407	43,626	54,363	64,333	71,628	74,207	76,436	68,201	77,939	80,311
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	0 - 5,580 i	1,423	0 - 1,147,536 i	1,765
Engine, turbine, and power transmission equipment manufacturing	33360	58,560	30,093	46,693	68,243	74,148	89,526	45,367	50,302	51,113	57,548	49,399	55,906
Metalworking and other general purpose machinery manufacturing	33390	54,007	43,998	58,532	71,081	86,258	81,492	98,230	99,506	78,310	78,019	86,306	75,149
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	211,415	196,854	214,860	212,050
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	26,447	35,592	40,631	32,334	34,783	39,026	40,004	92,411 i	44,009	41,110	44,162	44,013

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Radio, television, and wireless communication equipment manufacturing	33422	46,641	46,769	61,641	55,217	82,027	94,606 i	96,564 i	D	39,938 i	31,253	0 - 1,147,536	30,687
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	11,185	8,644	8,841	12,452	13,908	16,604	12,801	14,671	0 - 229,395	11,789	14,853	14,584
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739 i	0 - 413,972	6,363	7,917
Semiconductor and other electronic components manufacturing	33440	119,612	117,302	138,124	151,590	146,764	123,263	162,118	172,062	160,152	182,769	232,283	224,875
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	28,976	18,709	19,647	25,057	27,605	31,248	28,949	29,150	31,400	24,211	31,286	31,332
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	33,348	46,237	57,639	40,372	53,425	52,990	55,142	48,787	47,874	53,371 i	63,110	62,412
Measuring and control instruments manufacturing (not listed elsewhere)	33459	37,609	42,753	50,643	49,752	58,909	52,984	55,954	61,158	62,658	60,242	52,440	55,700
Electrical equipment, appliances, and components manufacturing	33500	106,551	85,758	105,982	106,576	110,094	133,238	141,600	143,695	139,311	120,116	115,004	145,801
Motor vehicles manufacturing	33610	346,591	274,985	329,874	373,194	375,113	459,721	385,647	526,522	561,193	207,956 - 616,742	580,129	406,293
Motor vehicle body and trailer manufacturing	33620	9,363	15,184	22,168	14,423	31,982	25,726	32,146	23,083	62,848	19,322	25,616	44,214
Motor vehicle parts manufacturing	33630	97,433	77,528	146,257	125,593	130,372	155,179	244,948	192,928	148,781	185,890	202,526	182,796
Aircraft manufacturing	33641	97,973	69,001 i	81,666	111,748	91,545 i	145,641	132,472	139,909	130,676	121,866	181,703	139,088

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Aircraft engine and engine parts manufacturing	33642	35,056	24,737	25,563	27,491	26,706	46,618	41,051	D	36,861	40,556	35,583	32,679
Other aircraft parts and auxiliary equipment manufacturing	33643	21,141	26,755	31,157	43,898	34,541	47,588	68,545	77,236	68,063	83,469	56,053	47,652
Guided missiles, space vehicles, and related parts manufacturing	33644	38,114	D	25,391	35,889	14,656	14,770	27,872	29,343	30,261	35,725	46,748	32,444
Railroad rolling stock manufacturing	33651	6,354	2,763	7,095 i	7,204	11,800	10,875	16,122	16,100	11,092	8,252	8,576	8,091
Ship and boat building	33660	14,880	D	10,531	11,647	22,778 i	15,008	32,077 i	13,569	33,497 i	20,861	14,316	21,988
Motorcycle, bicycle, and parts manufacturing	33691	8,078	6,282	6,081	7,422	7,067	10,406	7,777	7,687	6,276 i	5,423	0 - 1,147,536	6,948
Military armored vehicle, tank, and tank components manufacturing	33692	13,092	9,674	9,072	5,755	4,668	4,190 i	4,895	4,304	0 - 229,395	9,662 i	15,846 i	13,848
All other transportation equipment manufacturing	33699	7,131	5,438	11,079	11,066	16,258	15,809	D	11,472	11,940	11,554	17,803	16,191
Furniture and related products manufacturing	33700	36,218	31,479	32,876	32,881	37,447 i	35,446	39,675	38,024	37,737	43,394	44,459	46,013
Medical equipment and supplies manufacturing	33910	105,647	102,585	169,760	225,177	136,664	160,263	155,890	154,650	166,341	165,204	28,416 - 271,189	200,226
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	80,689	84,846	71,000	78,674	80,879	93,078	90,517	95,353	86,197	96,947	104,968	89,861
Merchant wholesalers, durable goods	42300	238,101	196,341	206,240	171,815	221,488	353,401 i	161,500	232,112	194,976	142,659	225,389	149,138
Merchant wholesalers, nondurable goods	42400	274,190	239,385	247,311	266,388	349,833	362,965	457,745	387,489	359,871	349,751	454,966	445,786
Wholesale electronic markets and agents and brokers (business to business)	42500	2,481	D	3,331	3,008	65,076 i	33,264	65,562	21,530	59,653	49,844	0 - 1,147,536	5,089

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	195,958	70,424	214,728 i	128,479	400,192	196,896	278,755	305,293	481,549	582,203
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787 i	D	110,618	0 - 198,757	191,381 i	168,457 i
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	0 - 229,395	223,375	219,221	299,235
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429	103,001	68,939	2,014
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,358	9,877	0 - 1,147,536	8,413
Newspaper, periodical, book, and directory publishers (except Internet)	51110	12,383	16,369	18,917	22,488	26,549 i	15,003	8,481	5,743	7,263	4,383	0 - 1,147,536	5,585
Software publishers (except Internet)[e]	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,068	133,983	148,758	143,184
Motion picture and sound recording (except Internet)	51200	10,053	14,356	11,375	9,824	7,281 i	13,722	D	5,203	6,863	6,353	32,874	43,317
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,169	71,335	126,122	145,898
Wired telecommunications carriers	51710	99,917	D	209,490	261,484	216,736	181,127	227,778	213,921	179,239	220,350	127,438	137,035
Wireless telecommunications carriers (except satellite)	51720	134,162	153,937	138,473	156,525	193,254	205,148	247,714	210,820	172,357	200,979	264,216	264,971
Satellite telecommunications	51740	14,005	6,743 i	15,845	2,430	2,822	3,143	3,518	43,812	61,622	57,292	53,242	51,267
Other telecommunications (not listed elsewhere)	51790	4,374	8,108	7,222	15,929	14,610	16,325	5,973	13,669	7,684	14,142	12,552	13,883
Data processing, hosting, and related services[e]	51800	NA	29,903	31,417	51,197	82,997 i	49,201	67,167	64,916	59,491	57,183	114,191	69,214
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,759	77,556	131,826	169,605

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,332	100,436	114,010	124,726
Finance: banking and credit intermediation	52200	NA	D	992,651	601,628	631,902 i	305,994	317,147	312,954	342,319	399,822	479,807	574,882
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	113,669	117,167	88,244	83,913	54,342	60,239	55,068	83,537	0 - 1,147,536	67,833
Insurance carriers and related activities	52400	NA	282,640	265,110	265,293	349,252	363,799	347,710	398,746	353,842	294,467	0 - 1,147,536	1,031,450
Real estate	53100	6,053	D	4,615	4,727	8,069	8,227	10,128	8,449	9,235	0 - 10,116	10,982	16,881
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	0 - 14,237	13,623	0 - 1,147,536	8,259
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,484	1,702	2,350	2,125	10,764 i	1,608	1,982	1,386	2,785	0 - 1,147,536	1,614
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	14,565	7,394	9,093	11,974	18,498 i	18,538	16,708	18,581	21,142	26,427
Architectural, engineering, and related services	54130	37,749	81,565	113,603	65,209	94,868 i	80,859	85,535	90,666	76,622	65,138	84,645	110,906
Specialized design services	54140	3,325	D	3,522	2,353	3,301 i	2,714	1,487	769	638	2,356 i	7,284	3,752
Computer systems design and related services[e]	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	176,418	152,680	154,615	149,589
Management, scientific, and technical consulting services	54160	33,588	36,811	28,351	52,489	57,925	59,508	84,830	75,668	55,608	42,098	49,590	49,880

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Research and development services in social sciences and humanities	54172	NA	978	1,168	820	934	1,297	969	1,042	1,124	1,179	934	1,144
Research and development services in biotechnology[c]	54173	NA	18,691 i	7,194	7,388	9,769	10,689	15,872	9,381	6,548	6,476	0 - 1,147,536	9,066
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	16,041	15,845	19,094	27,670	32,098	27,450	30,843	30,737	28,218	31,661	38,427
Advertising and related services	54180	14,574	D	11,336 i	21,227	27,500	34,889	34,379	38,454	44,670	52,884	72,957	84,178
Professional, scientific, and technical services (not listed elsewhere)	54190	15,690	28,298	33,134	46,048	53,969	38,936	24,808	28,026	12,205	29,190	16,673	19,061
Management of companies and enterprises	55100	752	2,310	3,347	11,847	4,131	176,993	8,497	D	11,172 i	16,588	12,189	13,209
Administrative and support services	56100	NA	29,045	25,660	22,146	38,874 i	26,981	214,331	23,581	27,504	26,915	38,514	62,356
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,561	21,206	84,142	11,342
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,117	50,891	102,792
Medical and diagnostic laboratories	62150	19,930	14,359	36,288	15,778	19,655	17,027	5,024	19,415	25,614 i	27,361	35,193	34,462
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	8,333	D	3,334 i	10,919	5,274	5,651	0 - 229,395	10,363	0 - 1,147,536	22,613
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870 i	1,227	26,866	27,485	32,609	32,276	35,118	25,795
Social assistance services	62400	D	D	448	326	249	1,036	1,336	63	77	112	0 - 1,147,536	108
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248	13,180	12,903	16,137	17,510	18,945	26,563	31,887
Accommodation and food services	72000	NA	D	37,218	27,476	54,266 i	57,908	31,664	44,505	32,404	21,272	33,736	56,337

TABLE 71

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other services (not listed elsewhere)	81000	NA	9,638	35,994	118,268	44,823	120,458	60,949	51,253	173,078	0 - 413,972	0 - 1,147,536	90,936
Less: intersegment eliminations	–	219,384	110,499	132,754	117,417	136,579	136,540	160,374	126,960	129,858	131,717	152,902	117,720
Undistributed	–	756,553	1,137,705	412,892	450,613 i	108,244 i	D	1,945	D	0	0	8 i	0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

[c] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

[d] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

[e] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	3,180,177	2,773,429	3,373,035	3,814,885	3,715,718	3,615,226	3,624,553	3,116,806	3,095,167	3,294,934	3,812,880	3,716,765
Oil and gas extraction	21100	143,705	92,357	126,671	152,394	147,415	130,389	116,693	70,302	59,489	57,150	86,746	58,356
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,528	5,473	19,044	2,197
Support activities for mining, including oil and gas	21300	NA	22,162	26,223	25,878	28,461	27,621	32,686	26,711 i	18,880	24,865 i	29,837	36,989
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473	6,948	4,779	4,875
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,703	4,932	7,639	8,293
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,474	172,554	190,856	213,805
Beverage manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,029	49,885	46,313	41,260
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,782	36,346	31,938	32,447
Textile, apparel, and leather products manufacturing	31990	NA	10,239	11,625	13,883	20,542	15,193	15,014	13,065	20,278	22,083	25,521	24,172
Wood products manufacturing	32100	6,381	1,613	3,101 i	1,821	4,144	5,769	7,172	4,715	0 - 163,991	4,290	6,131	6,111
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	33,888	36,393	39,708	35,538
Printing and related support activities	32300	3,748	4,212	5,234	6,013	5,885	3,296	5,049	7,829 i	4,501	8,418	4,995	10,337 i
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110	0 - 408,784	254,128	203,584
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74 i	1,244	2,278	630	3,234	3,312	6,373	5,800
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	10,623	23,005	D	9,703	9,496	8,643	5,100	4,968	2,770	981
Basic chemicals manufacturing	32510	115,189	75,544	92,953	92,754	129,151	79,818	75,221	58,600	59,714	67,172	80,961	67,388
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	29,537	33,110	44,009	30,499	29,307	27,404	35,325	30,979	33,055	36,203	51,259	40,026
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	12,327	23,686	10,412	14,001	16,929	22,163 i	13,617	D	16,513	18,587	30,225	12,172

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,820	149,280	159,641	165,848
In vitro diagnostic substances manufacturing[c]	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	0 - 163,991	6,700	8,931 i	7,540
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	3,553	8,035	13,232	0 - 163,991	0 - 90,420	13,346	15,487
Soap, cleaning compound, and toilet preparations manufacturing	32591	72,271	80,113	86,107	99,565	84,423	98,232	95,193	86,186	81,727	85,732	84,362	79,648
Paint, adhesive, and other chemical manufacturing	32592	49,968	41,584	42,946	55,746	49,627	45,604	54,754	39,126	45,439	45,358	45,691	42,427
Plastics and rubber products manufacturing	32600	43,878	46,866	55,694	70,156	71,055	65,315	76,697	45,131	56,942	66,455	55,679	60,670
Clay and glass products manufacturing	32710	12,023	8,789	12,710	12,430	16,796	16,378	13,287	15,938	16,850	14,053	18,837	15,553 i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	5,307	3,931	7,648	8,629	6,833	9,164	9,381	7,494	6,333	4,163	5,504	5,829
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,437	17,605	33,370	27,645
Fabricated metal products manufacturing	33200	45,571	29,870	42,347	49,138	52,129	39,319	67,646	43,238	35,404	47,454	53,830	50,291
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042 i	14,152	23,984	23,076	26,760	21,505	21,684	21,146	30,017	27,817
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,283	21,099	29,451	30,626
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	35,907	36,300	48,499	49,800	37,434	32,935	36,375	26,418	34,098	40,208	27,372
Semiconductor machinery manufacturing	33321	10,928	5,740	9,670	10,941	3,134	13,613	16,266	16,438	15,074	18,206	25,323	20,690

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Industrial machinery manufacturing (except semiconductor machinery)	33322	7,532	5,996	8,961	14,930	11,492	10,092	16,537	6,590	12,341	11,149	12,740	9,702
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	0 - 163,991	857	0 - 242,771	127
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	16,053	28,404	30,270	36,451	33,652	40,045	27,712	37,396	32,672	38,473	35,361
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	0 - 5,580 i	4,524 i	0 - 242,771	1,617
Engine, turbine, and power transmission equipment manufacturing	33360	28,100	16,787	37,994	44,319	45,968	56,604	D	35,258	36,775	48,658 i	45,700	51,695
Metalworking and other general purpose machinery manufacturing	33390	36,061	22,352	36,485	41,866	39,237	23,995	51,377	41,166	38,528	39,516	38,439	26,336
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	203,226	255,629	264,980	245,866
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	22,369	30,531	46,528	32,477	29,869	36,859	32,417	109,988 i	32,209	32,943	36,643	35,490
Radio, television, and wireless communication equipment manufacturing	33422	29,526	18,039	18,034	37,667	54,443	54,074 i	72,211 i	15,183	0 - 163,991	5,839	0 - 242,771	6,439 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	6,791	4,680	4,015	8,552	2,041	6,695 i	1,747	1,326	0 - 163,991	2,019	0 - 242,771	1,476
Audio and video equipment manufacturing	33430	2,243	4,112	3,100	4,180	3,294	4,764	5,171	D	9,734	3,725	5,308	8,299
Semiconductor and other electronic components manufacturing	33440	100,661	79,098	157,934	185,199	186,007	197,516	188,661	D	163,360	191,123	232,485	240,592

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	12,419	8,728	9,394	13,503	11,985	11,882	14,588	15,589	14,752	20,106 i	22,814 i	18,014 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,126	9,629	11,268	7,329	10,300	13,337	12,013	9,882 i	11,779	12,359 i	9,889	10,658
Measuring and control instruments manufacturing (not listed elsewhere)	33459	20,381	35,476	37,663	34,616	40,865	44,169	46,955	39,940	39,568	30,855	28,163	28,662
Electrical equipment, appliances, and components manufacturing	33500	47,654	43,416	54,549	58,580	54,904	49,253	56,905	51,633	73,973	65,117	74,039	76,861
Motor vehicles manufacturing	33610	174,950	124,140	146,852	166,401	166,616	155,415	153,493	119,588	132,355	0 - 408,784	120,673	122,934
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	384	763	603	1,777
Motor vehicle parts manufacturing	33630	66,559	49,109	95,944	98,857	98,046	113,842	134,544	101,485	89,740	84,753	82,209	95,763 i
Aircraft manufacturing	33641	S	6,959	7,569	9,732 i	5,939	8,600 i	7,452	9,077	5,821	6,995	8,989	5,743
Aircraft engine and engine parts manufacturing	33642	7,773	12,349	9,361	15,023	13,670	7,406	7,083 i	D	1,316	1,784	24,974	21,585
Other aircraft parts and auxiliary equipment manufacturing	33643	9,178	9,959	10,547	12,611	10,015	12,933	16,421	19,962	17,048	20,212	11,827	10,839
Guided missiles, space vehicles, and related parts manufacturing	33644	D	D	D	D	1,899	2,431	2,366	2,434 i	339	1,480 i	4,265	2,774
Railroad rolling stock manufacturing	33651	894	875	1,980	1,666	2,455	1,764	3,557 i	3,253	3,760	5,164	5,507	5,415 i
Ship and boat building	33660	1,581	D	D	D	1,188 i	1,919 i	6,971 i	1,858	0 - 100,602 i	1,677	1,979	2,069
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231 i	3,684	4,254	4,031
Military armored vehicle, tank, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78	1,644 i	2,678	1,557

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,495	3,104	3,294	1,539
Furniture and related products manufacturing	33700	7,183	4,342	4,610	6,151	6,272	5,960	6,085	5,506	5,625	3,866	4,438	5,317
Medical equipment and supplies manufacturing	33910	58,419	57,025	73,646	79,038	80,885	77,466	78,288	81,056	78,407	85,432	0 - 242,771	100,869
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	41,981	29,242	30,526	D	37,781	47,716	43,898	D	45,531 i	38,962	65,941 i	29,501
Merchant wholesalers, durable goods	42300	174,168	116,754	127,763	42,957	25,213	25,149 i	18,514	27,926	26,876	22,686	22,567	16,817
Merchant wholesalers, nondurable goods	42400	66,765	33,733	33,672	229,921	237,186	208,777	240,437	160,432	152,996	156,369	178,950	156,286
Wholesale electronic markets and agents and brokers (business to business)	42500	119	D	16	1,714 i	50,376 i	20,233	20,653	20,376	544	312	436	251
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	27,253	34,498	42,738	28,360	42,336	13,516	17,264	16,756	55,879	80,268
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	0 - 163,991	0 - 198,757	0 - 242,771 i	0 - 164,630 i
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	0 - 163,991	54,889	58,580	88,751
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916	33,435	22,049	20
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294	5,837	0 - 242,771	7,536
Newspaper, periodical, book, and directory publishers (except Internet)	51110	4,670	8,159	7,754	8,343	7,008 i	2,953 i	2,040	1,265	1,441	1,628	0 - 242,771	1,562
Software publishers (except Internet)[e]	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,226	97,898	96,171	94,718
Motion picture and sound recording (except Internet)	51200	6,721	6,341	6,635	5,141	2,185	7,140	D	1,939	2,490	2,583	4,452	3,270
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504 i	8,215	D	10,083	14,710	16,825	25,106	39,689

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665	2,349	2,328	2,226
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154 i	D	45	D	59	84	3 i	5
Satellite telecommunications	51740	5,325	5,919 i	176	353 i	234	D	63	587	305	296	90	70
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193 i	2,179	534	893	840	1,898	0 - 242,771	5,555 i
Data processing, hosting, and related services[e]	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,853	20,676	26,815	28,822
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987 i	D	7,138	13,012	20,668	35,853	49,241
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849 i	40,718	37,792	60,390	77,032	95,082
Finance: banking and credit intermediation	52200	NA	45,027	76,052 i	29,501	41,335	41,144	47,077	64,668	58,050	72,381	56,472	54,679
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	34,345	35,268	16,671	23,114	19,687	15,087 i	17,046	18,774	20,890	30,063
Insurance carriers and related activities	52400	NA	11,594	16,234	14,985	8,907	34,172 i	32,407 i	21,780 i	19,060 i	18,456 i	0 - 242,771 i	37,830 i
Real estate	53100	D	D	D	D	D	D	D	88	57	0 - 10,116	583	223
Rental and leasing services	53200	NA	D	8,580 i	5,232 i	7,232	8,873	6,656	5,390	0 - 14,237	8,019	3,608	4,484
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82	729	0 - 80,926 i	56
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	864 i	1,623	D	2,222	2,614	3,816 i	3,720	2,818	2,755	2,902	3,139
Architectural, engineering, and related services	54130	4,931	14,969	33,706	36,917	19,373	45,064	49,007	49,180	26,789	19,248	18,151	16,502
Specialized design services	54140	D	D	454	228	345	900	678	D	68	2,229 i	18,371	8,888

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Computer systems design and related services[e]	54150	86,084	76,243	80,239	153,776 i	104,306	90,742	104,143	78,373	73,013	70,600	96,552	89,189
Management, scientific, and technical consulting services	54160	18,909	23,315	14,838	24,421	27,236	22,327	8,247	16,452	7,535	6,959	19,754	8,002 i
Research and development services in social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7	5	7	89
Research and development services in biotechnology[c]	54173	NA	3,663 i	1,299	1,269	1,547	1,701	1,671	1,581	2,478 i	2,864	3,773	4,148
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,817	2,994	4,352	5,625	4,814	5,253	5,194	7,260	9,736	10,193 i	11,054 i
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	0 - 163,991	54,756	67,297	0 - 164,630
Professional, scientific, and technical services (not listed elsewhere)	54190	3,456	2,025	2,186	4,901	9,285	8,417	8,004	2,749	0 - 163,991	2,049	4,823	3,986 i
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622	1,592	1,726	40
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,098	22,603	28,430	27,048
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,910	1,402	4,360	281
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0	1	0	0
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488 i	1,925 i	1,275	4,320 i	4,136 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0	455	177	194
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287	0	1 i	0
Social assistance services	62400	D	D	0	0	0	29	2	0	0	0	0	0
Arts, entertainment, and recreation	71000	NA	3,074	3,169	3,297	3,096	D	D	2,540	0 - 163,991	5,595	8,134	5,736

TABLE 72

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,445	4,924	20,830	27,997
Other services (not listed elsewhere)	81000	NA	5,946	7,784	10,816	12,789	21,571	17,416	19,528	64,593	0 - 408,784	0 - 242,771	18,820 i
Less: intersegment eliminations	–	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,136	64,324	102,225	65,252
Undistributed	–	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	0	0	0	0

* = amount < $500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available; S = negative value due to intersegment elimination.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

[c] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

[d] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

[e] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956
Oil and gas extraction	21100	D	D	D	1,108	D	867	0 - 11,355 i	0 - 16,964	712
Mining	21200	83	88	80	54	68	58	121	92	122
Support activities for mining, including oil and gas	21300	D	1,860	1,871	2,349	2,076	1,544	1,599 i	836 i	1,364
Utilities	22100	298	434	343	343	485	349	323 i	272	274
Construction	23000	752	756	244 i	204 i	521	258 i	507	686	886
Food manufacturing	31100	3,769	3,565	5,156	4,934 i	4,388 i	4,966	4,809	4,678	4,199 - 6,169
Beverage manufacturing	31210	D	D	628	D	664	0 - 28,354 i	734	702	653
Tobacco manufacturing	31220	D	140	163	D	153	153	175	196	189
Textile, apparel, and leather products manufacturing	31990	623	688	687	662 i	794	1,244 i	904	934	831
Wood products manufacturing	32100	202	278	234	322 i	227	238	236	261	232
Paper manufacturing	32200	755	982	1,166	1,028	D	1,165	1,411	1,302	1,478
Printing and related support activities	32300	244	305 i	389	363	287	304	265	321	447
Petroleum refineries	32401	D	596	438	D	443	441	396	491	525 - 2,495
Asphalt paving, roofing, and saturated materials manufacturing	32402	38	41	117 i	66	52 i	75	124	107	110
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	285	218	312 i	279 i	268	202	223	133	106 - 2,076
Basic chemicals manufacturing	32510	3,099	3,228	2,925	3,144	3,071	2,946	2,897	2,897	2,639
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	815	1,093	999	1,054	1,213	930	825	1,262	1,293
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	D	1,951	2,114 i	2,057 i	D	1,900 i	1,977	2,384 i	2,094
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	42,381	43,672	42,456	43,748	40,540	43,964	45,846	48,489	56,018

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011		2012		2013		2014		2015		2016		2017		2018		2019	
In vitro diagnostic substances manufacturing[c]	32542	1,110		1,044	i	831		729		801		987		1,308		1,151		1,388	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA		NA		7,118		10,337		14,071		16,440		18,629		23,591		28,850	
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,344		2,261		2,286		2,365		2,451		2,550		2,492		2,534		2,311 - 4,281	
Paint, adhesive, and other chemical manufacturing	32592	1,552		1,630		1,489		1,562	i	D		0 - 28,354		1,636		1,361		1,423	
Plastics and rubber products manufacturing	32600	2,669		3,277		3,010		3,072	i	2,910		3,396		3,264		3,128		2,997	
Clay and glass products manufacturing	32710	801	i	987	i	973	i	1,003	i	948		987		1,199		1,333		1,326	i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	303		367		458	i	564	i	393	i	374		378		331		439	
Primary metal manufacturing	33100	552		750		644		703		596	i	0 - 28,354		608		708		743	
Fabricated metal products manufacturing	33200	D		2,236		2,535	i	2,280		2,541		2,321		2,650		2,764		2,816 - 4,786	
Agricultural machinery and equipment manufacturing	33311	989		1,175		1,193		1,230		1,172		1,194		1,224		1,529		1,550	
Construction machinery manufacturing	33312	655		675		1,340		1,309		1,210		1,209		1,203		1,316	i	1,276	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,735		1,999		1,436	i	1,142		1,431		1,107		1,272		1,324		1,104	
Semiconductor machinery manufacturing	33321	2,207		1,308	i	3,146		2,979		3,218		3,374		3,707		4,131		4,396	
Industrial machinery manufacturing (except semiconductor machinery)	33322	945		850		878		1,158		1,143		900		1,049		971		1,387	
Photographic and photocopying equipment manufacturing	33331	656		23	i	458		79		133		92		61		59	i	162	

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011	2012	2013	2014	2015	2016	2017	2018	2019
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	D	1,182	1,367	1,446	1,380	0 - 28,354	1,780	1,667	1,712
Digital cameras manufacturing	33333	NA	NA	NA	25	491 i	421 i	475	230	415
Engine, turbine, and power transmission equipment manufacturing	33360	3,257	3,603	2,373	1,847	2,304	2,365	2,543	2,273	2,551
Metalworking and other general purpose machinery manufacturing	33390	1,832	1,607	1,780	2,089	2,292	2,139	2,039	2,468	2,396
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	10,311	10,893	11,162	9,651	10,997	18,321	20,751	21,765	20,122
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,006	5,101	5,534	7,734	9,529	8,182	7,789	8,550	8,495
Radio, television, and wireless communication equipment manufacturing	33422	4,182	5,851	7,664	6,325 i	3,387 i	4,108 i	3,942 i	0 - 16,964 i	2,589 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	871	1,937	1,729	1,687	1,695 i	1,798	1,536	0 - 16,964	1,781
Audio and video equipment manufacturing	33430	798	865	876	1,018	1,071 i	972	1,058	1,084	1,292
Semiconductor and other electronic components manufacturing	33440	24,580	28,983	30,792	31,986	30,805	31,428	30,858	31,240	35,730
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	2,787	2,868 i	3,178 i	3,670	3,409	3,417 i	3,094	4,079	3,982

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,666		6,403		6,550		6,234		6,503		8,275		6,538		7,819		7,870	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,191		3,465		3,901		4,045		4,201		4,222		3,885		3,888		3,855	
Electrical equipment, appliances, and components manufacturing	33500	3,007		3,391		4,208		4,461		4,378		4,805		4,512		4,362		5,229	
Motor vehicles manufacturing	33610	9,320		11,314		11,696		12,134		12,502		15,095		16,308		17,447		15,268	
Motor vehicle body and trailer manufacturing	33620	69		91	i	98	i	96		156	i	113		44		93		155	
Motor vehicle parts manufacturing	33630	3,010		D		4,554		6,022		6,158		6,401		6,946		7,800		8,030	i
Aircraft manufacturing	33641	5,853		15,380	i	16,607	i	15,632	i	14,757	i	0 - 28,354	i	9,704	i	14,488	i	10,720	i
Aircraft engine and engine parts manufacturing	33642	1,636		1,296		1,758		2,294	i	1,580		1,738		1,850		2,226		2,104	
Other aircraft parts and auxiliary equipment manufacturing	33643	1,896		2,655		3,446		4,443		4,919		3,817		4,453		1,887		1,434	
Guided missiles, space vehicles, and related parts manufacturing	33644	3,526		2,850		2,703		2,826	i	3,011		3,063	i	3,269		3,405		3,496	
Railroad rolling stock manufacturing	33651	136		177		183		295		240		187		0 - 11,355		148		210 - 2,180	i
Ship and boat building	33660	D		D		1,106		1,568	i	D		0 - 28,354	i	1,289		0 - 16,964		182 - 2,152	
Motorcycle, bicycle, and parts manufacturing	33691	212	i	176	i	214	i	251		282		286		0 - 11,355		372		367	
Military armored vehicle, tank, and tank components manufacturing	33692	D		122		215		358		335		392		653	i	664	i	541	
All other transportation equipment manufacturing	33699	415		D		362		428		D		368		564		465		465	
Furniture and related products manufacturing	33700	300		382		383		389		458		364		438		428		458	

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Medical equipment and supplies manufacturing	33910	10,141		10,703		11,797		10,987		11,336		12,024		13,299		13,211		14,759	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,593		D		2,544		2,387		2,455	i	2,597	i	2,575		2,861		2,558	
Merchant wholesalers, durable goods	42300	505		1,461	i	449	i	414	i	1,507	i	551	i	364		730	i	756	
Merchant wholesalers, nondurable goods	42400	429		651	i	272	i	D		546	i	153	i	207		273	i	945	
Wholesale electronic markets and agents and brokers (business to business)	42500	54		182	i	D		139		D		23		41	i	94	i	37	i
Retail trade (except electronic shopping and electronic auctions)	44000	52		101	i	96	i	58	i	87		149		69		190		280	
Electronic shopping and electronic auctions	45411	940	i	1,239		993		1,051		1,543	i	0 - 28,354	i	0 - 11,355		0 - 16,964	i	0 - 13,286	i
Transportation	48000	123		D		D		388		205	i	100		691		2,045	i	9,398	i
Couriers, messengers, and express delivery services	49200	D		D		D		344		D		394		421		446		290	
Warehousing and storage	49300	15		15		15		3		3		0		90		76		128	i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	345	i	229	i	316	i	89	i	99	i	80	i	83		151		84	
Software publishers (except Internet)[e]	51120	22,635		23,803		26,661		31,392		29,887	i	26,685		24,362		25,742		24,851	
Motion picture and sound recording (except Internet)	51200	61		73	i	86		71	i	10		16		27	i	148		72	
Broadcasting (except Internet)	51500	94		36		53		70	i	101	i	0 - 28,354	i	0 - 11,355		186		0 - 2,469	
Wired telecommunications carriers	51710	867		1,482	i	951	i	945	i	1,229	i	1,067	i	924		469		424	
Wireless telecommunications carriers (except satellite)	51720	391	i	739	i	1,768	i	2,481		1,176	i	1,477	i	1,920		2,147		2,306	
Satellite telecommunications	51740	D		195		106		107		681	i	699	i	593		451		475	

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other telecommunications (not listed elsewhere)	51790	495	383	322	255	459	448	413	691	492
Data processing, hosting, and related services[e]	51800	4,922	3,997	4,009	4,754	5,839	6,295	6,217	6,809	8,994
Cloud computing applications and Internet-based software services	51801	NA	NA	3,727 i	5,718	5,783	9,981	16,812	20,600	27,957
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	D	11,397	13,485	15,306	21,534	23,962	28,445	37,435	46,100 - 48,070
Finance: banking and credit intermediation	52200	1,365	1,601	1,834	2,451	2,708	4,474	4,819	4,309	4,924
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,148	893	1,153	937	1,352	1,516	1,587	1,248	1,445
Insurance carriers and related activities	52400	D	1,141	1,573	887	1,364	1,216	1,127	1,673	2,202
Real estate	53100	13	26 i	100	193	280	438	251	377	396
Rental and leasing services	53200	27	D	69	59	D	97 i	536 i	639	945
Lessors of nonfinancial intangible assets, including patent licensing	53300	319	369	74	78	79	40	58	23	59
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	578 i	417 i	514 i	826 i	1,283	892	875	1,148	1,979
Architectural, engineering, and related services	54130	2,028	4,206 i	3,398	3,392	4,143 i	3,259	2,664	4,293	4,474
Specialized design services	54140	271	207 i	101	97	83	77	198 i	0 - 16,964	163
Computer systems design and related services[e]	54150	11,129	12,390 i	11,472 i	13,216 i	13,647	14,159	12,607	16,346	19,667
Management, scientific, and technical consulting services	54160	1,745	2,280	2,030	1,958	1,761	2,137 i	1,903	2,796	2,842

TABLE 73

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Research and development services in social sciences and humanities	54172	D		601		792		745		756		0 - 28,354		1,124		674		764	
Research and development services in biotechnology[c]	54173	6,030		7,146		4,145		3,083	i	5,178	i	3,911	i	3,610		5,398		5,648	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	7,196		9,427		9,139		9,068		10,907		10,621		11,842		14,904		15,171	i
Advertising and related services	54180	80		377	i	450	i	435		424		344		381		1,032	i	1,106	i
Professional, scientific, and technical services (not listed elsewhere)	54190	1,316		2,463	i	1,786		1,020		1,228		874		1,113		1,246		1,646	
Management of companies and enterprises	55100	20		40		68		25	i	D		28		70		0 - 16,964		0 - 13,286	
Administrative and support services	56100	338		436		556	i	401	i	202	i	418		1,405		2,302		3,285	
Waste management and remediation services	56200	19	i	D		39	i	31		24	i	25		20		20		20	
Offices of physicians	62110	24		73	i	74	i	88	i	79	i	106	i	190		155		508	
Medical and diagnostic laboratories	62150	764		1,027		959		965		1,204		0 - 28,354	i	1,210		2,049		2,466	
Other ambulatory health care services (ambulance, dental, home health care)	62199	11		41	i	51	i	35	i	42	i	24	i	65		46		148	
Hospitals and nursing care facilities	62200	2		2	i	2		7	i	7		9		0 - 11,355		0 - 10,879		0 - 11,355	
Social assistance services	62400	7		36		38		16		2		2		0 - 11,355		0 - 16,964		0 - 11,353	
Arts, entertainment, and recreation	71000	105		108		31		91	i	D		44		48		44		415	
Accommodation and food services	72000	74		131	i	123	i	57		87		61		49		120		80	
Other services (not listed elsewhere)	81000	366		553		366		576		682		0 - 28,354		0 - 11,355		0 - 16,964		660	
Undistributed	–	28,583	i	1,689	i	336	i	63		0		0		0		0		0	

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

[b] Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

[c] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

[d] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

[e] Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2018 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
All industries	21–23, 31–33, 42–81	492,956		18,861		29,106		503,201		10,245		2.1	
Manufacturing industries	31–33	285,674		12,419		17,674		290,928		5,255		1.8	
Food	311	4,180		181		432		4,431		251		6.0	
Beverage and tobacco products	312	1,082		52		160		1,190	i	108	i	10.0	
Textile, apparel, and leather products	313–16	904		14		85		976		72		7.9	
Wood products	321	186		2		7		191		5		2.6	
Paper	322	1,064		8	i	65	i	1,121	i	57	i	5.3	
Printing and related support activities	323	420	i	5		11	i	425	i	6	i	1.3	
Petroleum and coal products	324	1,306		40 - 49		125		1,387 - 1,391		81 - 85		D	
Chemicals	325	97,063		3,961		5,634		98,737		1,674		1.7	
Basic chemicals	3251	2,360		167		358		2,551		191		8.1	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		73		225		1,324		152	i	13.0	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		104 - 133		57		1,761 - 1,784		-76 - -62		D	
Pharmaceuticals and medicines	3254	87,619		3,451		4,476		88,644		1,025		1.2	
Soap, cleaning compound, and toilet preparation	3256	2,760		97		170		2,833		73		2.6	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		42 - 71		347	i	1,601 - 1,623	i	296 - 306	i	D	
Plastics and rubber products	326	2,856		85		393		3,164		309		10.8	
Nonmetallic mineral products	327	1,508	i	61	i	69		1,516	i	8	i	0.5	
Primary metals	331	665		27		89		727		62		9.4	
Fabricated metal products	332	2,885		47		204		3,043		158		5.5	
Machinery	333	15,184		605		953		15,532		348		2.3	
Agricultural implement	33311	1,921		35		58		1,944		23		1.2	
Semiconductor machinery	333242	4,459		351		419		4,526		68		1.5	
Engine, turbine, and power transmission equipment	3336	1,301		50		85		1,336		35		2.7	
Other machinery	other 333	7,503		168		391		7,726		223		3.0	
Computer and electronic products	334	86,729		5,366		5,765		87,128		399	i	0.5	
Communications equipment	3342	12,595		574		780		12,802		207		1.6	
Semiconductor and other electronic components	3344	35,183	i	2,784	i	2,698	i	35,096	i	-87	i	-0.2	
Navigational, measuring, electromedical, and control instruments	3345	17,562		333		899		18,128		566	i	3.2	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		73		222	i	3,492	i	150	i	4.5	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		162		448	i	9,949		286	i	3.0	
Other measuring and controlling device	other 3345	4,558		98		228		4,688		130		2.8	
Other computer and electronic products	other 334	21,388		1,675		1,388		21,101		-287		-1.3	
Electrical equipment, appliances, and components	335	5,263		135		477		5,605		342		6.5	
Transportation equipment	336	45,375		1,153		2,066		46,287	i	913		2.0	

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
Motor vehicles, bodies, trailers, and parts	3361–63	24,117		967		1,454		24,604		488		2.0	
Aerospace products and parts	3364	18,358	i	139 - 165		486 - 495		18,706 - 18,710	i	349 - 352		D	
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i	133		438		17,195	i	305		1.8	
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467		6 - 32		48 - 57		1,511 - 1,514		44 - 46		D	
Military armored vehicle, tank, and tank component	336992	35		*		1		35		*		0.8	
Other transportation	other 336	2,865		22 - 48	i	117 - 127	i	2,936 - 2,943	i	71 - 77	i	D	
Furniture and related products	337	409		8		48		449		40		9.9	
Miscellaneous	339	18,596		666 - 674		1089		19,015 - 19,020		420 - 423		D	
Medical equipment and supplies	3391	16,014		623		954		16,345		332	i	2.1	
Other miscellaneous manufacturing	3399	2,582		43 - 52		135		2,670 - 2,674		88 - 92		D	
Nonmanufacturing industries	21–23, 42–81	207,283		6,442		11,432		212,273		4,990		2.4	
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		92		441		3,066		349	i	12.8	
Utilities	22	275		0 - 100		210	i	387 - 494		112 - 219	i	D	
Wholesale trade	42	1,191		18		66 - 155	i	1,239 - 1,330	i	48 - 139	i	D	
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	0 - 793	i	77 - 89	i	1,871 - 15,762	i	1,260 - -55	i	D	
Transportation and warehousing	48–49	9,890	i	71	i	495		10,314	i	423	i	4.3	
Information	51	110,227		3,099		5,270		112,398		2,171		2.0	
Publishing	511	33,019		382		1,166		33,803		784		2.4	
Newspaper, periodical, book, and directory publishers	5111	61		*		1		62		1		1.7	
Software publishers	5112	32,958		382		1,165		33,741		783		2.4	
Telecommunications	517	3,733		33		241	i	3,941	i	208	i	5.6	
Data processing, hosting, and related services	518	30,558		492		2,260		32,325		1,767		5.8	
Other information	other 51	42,917		2,191		1,603		42,328		-588		-1.4	
Finance and insurance	52	8,917		534	i	1,548	i	9,931	i	1,014	i	11.4	
Real estate and rental and leasing	53	1,371		2 - 258		5 - 78		1,380		9		0.7	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		3		*		42		-3		-6.4	
Other real estate and rental and leasing	other 53	1,326		0 - 255		5 - 78		1,338		12		0.9	
Professional, scientific, and technical services	54	53,233		1,801		2,371		53,804		571		1.1	
Architectural, engineering, and related services	5413	4,207		21		153		4,338		131		3.1	
Computer systems design and related services	5415	21,046		722		935		21,260		213		1.0	
Scientific research and development services	5417	21,669		838	i	944		21,774		106	i	0.5	

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
Research and development in biotechnology	541711	6,457		181		228	i	6,503		46		0.7	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	641	i	707		14,512	i	65	i	0.5	
Research and development in the social sciences and humanities	541720	766		15		9		759		-6		-0.8	
Other professional, scientific, and technical services	other 54	6,312		220		340		6,432		120		1.9	
Health care services	621–23	2,265		35		385	i	2,616		351	i	15.5	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067		0 - 794		480		1,380 - 15,265	i	0 - 1,201		D	
All companies (number of domestic employees)	–	492,956		18,861		29,106		503,201		10,245		2.1	
Small companies													
10–19[a]	–	5,501		113		610		5,999		498		9.0	
20–49	–	12,418		221		1,086		13,283		864		7.0	
Medium companies													
50–99	–	14,021		270		958		14,709		688		4.9	
100–249	–	19,793		466		1,492		20,819		1,025		5.2	
Large companies													
250–499	–	18,883		413		1,502		19,972		1,089		5.8	
500–999	–	23,969		739		1,612		24,842		874		3.6	
1,000–4,999	–	75,671		2,745		5,382		78,308		2,637		3.5	
5,000–9,999	–	50,811		2,268		3,100		51,642		832		1.6	
10,000–24,999	–	88,263		4,058		4,606		88,811	i	548	i	0.6	
25,000 or more	–	183,626		7,567		8,758		184,817		1,191		0.6	

* = 0 < amount < $500,000 or greater than 0.00% but less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 75

Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
All industries	21–23, 31–33, 42–81	428,968		17,058		29,106		441,016		12,048		2.8	
Manufacturing industries	31–33	248,109		11,368		17,674		254,415		6,306		2.5	
Food	311	3,937		169		432		4,200		263		6.7	
Beverage and tobacco products	312	971		43		160		1,088		117		12.1	
Textile, apparel, and leather products	313–16	873		14		85		945		72		8.2	
Wood products	321	180		2		7		185		5		2.8	
Paper	322	1,064		8	i	65	i	1,120	i	57	i	5.3	
Printing and related support activities	323	420	i	5		11	i	425	i	6	i	1.3	
Petroleum and coal products	324	1,203		41		125		1287		84		7.0	
Chemicals	325	87,288		3,475		5,634		89,448		2,160		2.5	
Basic chemicals	3251	2,198		152		358		2,404		207		9.4	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		62		225		1,255		163	i	15.0	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		105		57		1453		-48		-3.2	
Pharmaceuticals and medicines	3254	78,652		3,028		4,476		80,100		1,448		1.8	
Soap, cleaning compound, and toilet preparation	3256	2,596		86		170		2,681		85		3.3	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		43		347	i	1554	i	305	i	24.4	
Plastics and rubber products	326	2,770		83		393		3,080		310		11.2	
Nonmetallic mineral products	327	1,473	i	59	i	69		1,483	i	10	i	0.7	
Primary metals	331	649		27		89		711		62		9.6	
Fabricated metal products	332	2,632		40		204		2,796		165		6.3	
Machinery	333	13,930		556		953		14,327		397		2.9	
Agricultural implement	33311	1,913		35		58		1,935		23		1.2	
Semiconductor machinery	333242	3,854		308		419		3,965		111		2.9	
Engine, turbine, and power transmission equipment	3336	1,096		46		85		1,134	i	39		3.5	
Other machinery	other 333	7,067		166		391		7,292		226		3.2	
Computer and electronic products	334	75,570		5,066		5,765		76,269		699	i	0.9	
Communications equipment	3342	11,495		556		780		11,719		224		1.9	
Semiconductor and other electronic components	3344	31,975	i	2,613	i	2,698	i	32,060	i	85	i	0.3	
Navigational, measuring, electromedical, and control instruments	3345	10,912		229		899		11,582		670	i	6.1	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		68		222	i	3,271	i	154	i	5.0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		68		448	i	3,780		380	i	11.2	
Other measuring and controlling device	other 3345	4,395		93		228		4,530		135		3.1	
Other computer and electronic products	other 334	21,188		1,668		1,388		20,908		-280		-1.3	
Electrical equipment, appliances, and components	335	4,886		118		477		5,245		359		7.3	
Transportation equipment	336	31,505		990		2,066		32,581		1,076		3.4	

TABLE 75

Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		861		1,454		21,477		593		2.8	
Aerospace products and parts	3364	8,900		107		486 - 495		9,281 - 9,287		382 - 387		D	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		100		438		8,679		338		4.0	
Guided missile, space vehicle, and related parts	336414–15, 336419	559		7		48 - 57		603 - 608		44 - 48		D	
Military armored vehicle, tank, and tank component	336992	25		0		1		25		1		2.1	
Other transportation	other 336	1,697		23		117 - 127	i	1,790 - 1,799	i	93 - 101	i	D	
Furniture and related products	337	407		8		48		447		40		9.9	
Miscellaneous	339	18,352		664		1089		18777		425		2.3	
Medical equipment and supplies	3391	15,812		620		954		16,146		334	i	2.1	
Other miscellaneous manufacturing	3399	2,540		44		135		2631		91		3.6	
Nonmanufacturing industries	21–23, 42–81	180,858		5,690		11,432		186,601		5,743		3.2	
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		86		441		2,889		355		14.0	
Utilities	22	237		0 - 96		210	i	351 - 456		113 - 220	i	D	
Wholesale trade	42	1,104		16		66 - 155	i	1,153 - 1,244	i	49 - 140	i	D	
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	0 - 793	i	77 - 89	i	1,828 - 15,719	i	-1260 - -55	i	D	
Transportation and warehousing	48–49	9,504	i	71	i	495		9,928	i	424	i	4.5	
Information	51	109,062		3,075		5,270		111,257		2,195		2.0	
Publishing	511	32,447		372		1,166		33,241		794		2.4	
Newspaper, periodical, book, and directory publishers	5111	61		*		1		62		1		1.7	
Software publishers	5112	32,386		371		1,165		33,180		793		2.4	
Telecommunications	517	3,700		33		241	i	3,909	i	209	i	5.6	
Data processing, hosting, and related services	518	30,154		492		2,260		31,922		1,768		5.9	
Other information	other 51	42,761		2,179		1,603		42,185		-576		-1.3	
Finance and insurance	52	8,890		534	i	1,548	i	9,903	i	1,014	i	11.4	
Real estate and rental and leasing	53	1,371		2 - 258		5 - 78		1,380		9		0.7	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		3		*		42		-3		-6.4	
Other real estate and rental and leasing	other 53	1,326		0 - 255		5 - 78		1,338		12		0.9	
Professional, scientific, and technical services	54	29,131		1,081		2,371		30,421		1,290		4.4	
Architectural, engineering, and related services	5413	2,288		11		153		2,430		142		6.2	
Computer systems design and related services	5415	18,395		707		935		18,623		228		1.2	
Scientific research and development services	5417	3,265		161		944		4,049		783		24.0	
Research and development in biotechnology	541711	1,083		60		228	i	1,252		168	i	15.5	

TABLE 75

Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	101	707	2,761	606	28.1
Research and development in the social sciences and humanities	541720	27	*	9	36	9	33.4
Other professional, scientific, and technical services	other 54	5,182	203	340	5,319 i	137	2.6
Health care services	621–23	1,928	34	385 i	2,279	351 i	18.2
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	0 - 793	480	1,322 - 15,210 i	0 - 1,202	D
All companies (number of domestic employees)	–	428,968	17,058	29,106	441,016	12,048	2.8
Small companies							
10–19[a]	–	4,432	102	610	4,940	508	11.5
20–49	–	10,040	187	1,086	10,939	899	9.0
Medium companies							
50–99	–	11,492	221	958	12,229	737	6.4
100–249	–	16,520	397	1,492	17,615	1,095	6.6
Large companies							
250–499	–	15,356	336	1,502	16,522	1,167	7.6
500–999	–	21,549	662	1,612	22,499	950	4.4
1,000–4,999	–	64,475	2,191	5,382	67,665	3,190	4.9
5,000–9,999	–	44,728	1,969	3,100	45,859	1,131	2.5
10,000–24,999	–	74,385	3,673	4,606	75,318	932 i	1.3
25,000 or more	–	165,991	7,320	8,758	167,429	1,439	0.9

* = 0 < amount < $500,000 or greater than 0.00% but less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE 76

Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company		Depreciation		Capital expenditures related to R&D[a]		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
All industries	21–23, 31–33, 42–81	63,989		1,803		0		62,185		-1,803		-2.8	
Manufacturing industries	31–33	37,564		1,051		0		36,513		-1,051		-2.8	
Food	311	243		12		0		231		-12		-4.8	
Beverage and tobacco products	312	111	i	9	i	0		102	i	-9	i	-7.8	
Textile, apparel, and leather products	313–16	31		*		0		30		*		-0.4	
Wood products	321	6		*		0		6		*		-0.9	
Paper	322	*		0		0		*		0		0	
Printing and related support activities	323	0		0		0		0		0		NA	
Petroleum and coal products	324	103		0 - 7		0		95 - 104		-7 - 0		D	
Chemicals	325	9,775		486		0		9,289		-486		-5.0	
Basic chemicals	3251	162		15		0		147		-15		-9.4	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		11		0		69		-11		-13.9	
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		0 - 28		0		293 - 345		-28 - 0		D	
Pharmaceuticals and medicines	3254	8,966		423		0		8,544		-423		-4.7	
Soap, cleaning compound, and toilet preparation	3256	164		12		0		152		-12		-7.2	
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		0 - 28		0		30 - 84		-28 - 0		D	
Plastics and rubber products	326	85		1		0		84		-1		-1.5	
Nonmetallic mineral products	327	35		2		0		33		-2		-6.2	
Primary metals	331	16		*		0		16		*		-0.6	
Fabricated metal products	332	254		7		0		247		-7		-2.8	
Machinery	333	1,254		49		0		1,205		-49		-3.9	
Agricultural implement	33311	9		0		0		9		0		0	
Semiconductor machinery	333242	604		43		0		561		-43		-7.1	
Engine, turbine, and power transmission equipment	3336	205		3		0		202		-3		-1.6	
Other machinery	other 333	436		3		0		433		-3		-0.7	
Computer and electronic products	334	11,159		301		0		10,859		-301		-2.7	
Communications equipment	3342	1,100	i	18	i	0		1,083	i	-18	i	-1.6	
Semiconductor and other electronic components	3344	3,208		172		0		3,036		-172		-5.3	
Navigational, measuring, electromedical, and control instruments	3345	6,650		104		0		6,546		-104		-1.6	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		5		0		221		-5		-2.0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		94		0		6,168		-94		-1.5	
Other measuring and controlling device	other 3345	163		6		0		157		-6		-3.4	
Other computer and electronic products	other 334	201		7		0		193		-7		-3.7	
Electrical equipment, appliances, and components	335	377		16		0		360		-16		-4.4	
Transportation equipment	336	13,870	i	163	i	0		13,707	i	-163	i	-1.2	

TABLE 76

Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company		Depreciation		Capital expenditures related to R&D[a]		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
Motor vehicles, bodies, trailers, and parts	3361–63	3,233	i	106	i	0		3,127	i	-106	i	-3.3	
Aerospace products and parts	3364	9,458	i	32 - 58		0		9,400 - 9,426	i	-58 - -32		D	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,550	i	33		0		8,517	i	-33		-0.4	
Guided missile, space vehicle, and related parts	336414–15, 336419	908		0 - 26		0		883 - 909		-26 - 0		D	
Military armored vehicle, tank, and tank component	336992	10		*		0		10		*		-2.3	
Other transportation	other 336	1,168		0 - 26	i	0		1,142 - 1,169	i	-26 - 0	i	D	
Furniture and related products	337	2		*		0		2		*		-0.1	
Miscellaneous	339	244		2 - 10		0		234 - 242		-10 - -2		D	
Medical equipment and supplies	3391	202		3		0		199		-3		-1.4	
Other miscellaneous manufacturing	3399	42		0 - 7		0		34 - 43		-7 - 0		D	
Nonmanufacturing industries	21–23, 42–81	26,425		752	i	0		25,672		-752	i	-2.8	
Mining, quarrying, oil and gas extraction, and support activities	21	183		6		0		177		-6		-3.1	
Utilities	22	38		0 - 4		0		34 - 39		-4 - 0		D	
Wholesale trade	42	87		1		0		86		-1		-1.5	
Electronic shopping and electronic auctions	454111–12	43 - 61		0		0		43 - 61		0		0	
Transportation and warehousing	48–49	386		*		0		386		*		-0.1	
Information	51	1,165		23		0		1,141		-23		-2.0	
Publishing	511	572		10		0		562		-10		-1.8	
Newspaper, periodical, book, and directory publishers	5111	*		0		0		*		0		0	
Software publishers	5112	572		10		0		562		-10		-1.8	
Telecommunications	517	33		1		0		32		-1		-2.5	
Data processing, hosting, and related services	518	404		1		0		404		-1		-0.1	
Other information	other 51	155		12		0		144		-12		-7.7	
Finance and insurance	52	28		0		0		28		0		0	
Real estate and rental and leasing	53	0		0		0		0		0		NA	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0		0		NA	
Other real estate and rental and leasing	other 53	0		0		0		0		0		NA	
Professional, scientific, and technical services	54	24,103		719	i	0		23,384		-719	i	-3.0	
Architectural, engineering, and related services	5413	1,919		11		0		1,909		-11		-0.6	
Computer systems design and related services	5415	2,651		15		0		2,637		-15		-0.6	
Scientific research and development services	5417	18,403		677	i	0		17,726		-677	i	-3.7	
Research and development in biotechnology	541711	5,374		122		0		5,252		-122		-2.3	

TABLE 76

Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company		Depreciation		Capital expenditures related to R&D[a]		Adjusted domestic R&D paid for by the company and others		Change			
										Amount		Percent	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	540	i	0		11,751	i	-540	i	-4.4	
Research and development in the social sciences and humanities	541720	738		15		0		723		-15		-2.1	
Other professional, scientific, and technical services	other 54	1,129		17		0		1,113		-17		-1.5	
Health care services	621–23	337		1		0		337		-1		-0.2	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	34 - 58		0 - 4		0		31 - 58		-4 - 0		D	
All companies (number of domestic employees)	–	63,989		1,803		0		62,185		-1,803		-2.8	
Small companies													
10–19[b]	–	1,070		11		0		1,059		-11		-1.0	
20–49	–	2,378		35		0		2,343		-35		-1.5	
Medium companies													
50–99	–	2,529		50		0		2,480		-50		-2.0	
100–249	–	3,274		70		0		3,204		-70		-2.1	
Large companies													
250–499	–	3,527		78		0		3,449		-78		-2.2	
500–999	–	2,420		77		0		2,343		-77		-3.2	
1,000–4,999	–	11,196		553		0		10,643		-553		-4.9	
5,000–9,999	–	6,083		299		0		5,784		-299		-4.9	
10,000–24,999	–	13,878	i	385	i	0		13,493	i	-385	i	-2.8	
25,000 or more	–	17,635		247		0		17,388		-247		-1.4	

* = -$500,000 < amount < $500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

[a] Capital expenditures related to R&D are assumed to be $0 for domestic R&D paid for by others and performed by the company.
[b] The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded $50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

Technical Notes

Survey Overview

Purpose. The Business Enterprise Research and Development (BERD) Survey, successor to the Business Research and Development Survey (BRDS) (2017–18), Business R&D and Innovation Survey (BRDIS) (2008–16), and the Survey of Industrial Research and Development (SIRD) (1953–2007), is the primary source of information on research and development expenditures and the R&D workforce of businesses operating in the 50 U.S. states and the District of Columbia.

Data collection authority. The information collected by the BERD Survey is solicited under the authority of the National Science Foundation (NSF) Act of 1950, as amended, and the America COMPETES Reauthorization Act of 2010. Response to this annual survey is mandatory and confidential; the Census Bureau collects the data under the authority of Title 13, Section 8, of the United States Code. The Office of Management and Budget (OMB) control number is 0607-0912 and expires on 28 February 2022.

Survey sponsors. The BERD Survey is cosponsored by the National Center for Science and Engineering Statistics (NCSES) and the Census Bureau.

Survey collection and tabulation agent. The survey is conducted annually by the Census Bureau in accordance with an interagency agreement with NCSES within NSF.

Key Survey Information

Frequency. Annual.

Initial survey year. 2019. BRDS collected data for 2017–18, BRDIS collected data for 2008–16, and SIRD collected data for 1953–2007.

Reference period. Calendar year 2019.

Response unit. Company.

Sample or census. Sample.

Population size. 1,124,000 companies.

Sample size. 45,500 companies; the actual number of companies that remained within the scope of the survey between sample selection and tabulation was 42,500.

Survey Design

The survey is administered both to companies known to have performed R&D and to companies with no known history of R&D activity. The BERD Survey has been designed to provide detailed statistics on global and domestic R&D expenditures of companies located in the United States and on these companies' R&D employees.

The survey is sent to a single coordinator within each company, but it is organized into sections that help the coordinator collect specific types of information from different experts (human resources, accounting, R&D managers, etc.) in the company. Foreign-owned companies are instructed to report only for company operations owned by the U.S. subsidiary and, for purposes of the survey, to treat the U.S. subsidiary's foreign owners as if they were unrelated third parties.

Target Population

The target population for the BERD Survey consists of all for-profit companies that have 10 or more paid employees in the United States, that have at least one establishment that is in business during the survey year and is located in the United States, and that are classified in certain industries based on the 2012 North American Industry Classification System (NAICS), with a particular focus on those companies that perform R&D in the United States.

The Business Register, a Census Bureau compilation that contains information on more than 7.3 million establishments with paid employees, serves as the primary input to the sampling frame from which the BERD Survey sample is selected. For a given company with more than one establishment, the prior year's annual payroll and employment data for its active establishments are summed to the company level.

Sampling Frame

The scope of the 2019 BERD Survey is limited to companies that (1) are in business primarily to make a profit; (2) are classified within a specific set of NAICS industries; (3) have 10 or more paid employees in the United States, based on employment on 12 March 2018; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2019 (the time at which the Census Bureau finished the 2018 Business Register Processing); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2018 Business Register if the company had at least 10 paid employees in 2018 or, when employment information was unavailable, if the company's 2018 payroll was greater than or equal to $500,000. Companies were removed from the sampling frame if their NAICS codes were designated as Agriculture, forestry, fishing, and hunting (NAICS 11), Postal service (NAICS 491), Educational services (NAICS 61), Private households (NAICS 814), or Public administration (NAICS 92) or if they were no longer in business or were nonprofits. Companies were also removed from the sampling frame if they were not located in the 50 U.S. states or the District of Columbia.

Records for active establishments from multiunit companies were extracted from the 2018 Business Register if the given establishment's 2018 payroll was greater than zero or if the establishment employed at least one person in 2018. Prior to creating records for multiunit companies from these establishments, establishments classified as Postal service (NAICS 491), Private households (NAICS 814), or Public administration (NAICS 92) were removed, as were those that were not physically located in the 50 U.S. states or the District of Columbia. Unlike single-unit companies, establishments classified as Agriculture, forestry, fishing, and hunting (NAICS 11) or Educational services (NAICS 61) were not initially removed during the construction of multiunit company records. Establishments classified in NAICS 11 or NAICS 61 contributed to the classification of the multiunit companies, and their payroll could have been included in determining the company's measure-of-size. From the resulting set of multiunit companies, companies were removed from the sampling frame if they had fewer than 10 paid employees or if the payroll associated with their nonprofit establishments was greater than the payroll of their for-profit establishments.

For each company on the sampling frame, a measure of size was assigned. The measure of size for a given company was based on R&D, if R&D data from the last 5 years were available from (1) BRDS, (2) online financial databases, (3) the Report of Organization conducted as part of the Company Organization Survey (in years not ending in "2" or "7") or as a supplement to the Economic Census (in years ending in "2" or "7"), or (4) qualified R&D expenses from the Internal Revenue Service (IRS). For all other companies, the measure of size was based on total annual payroll for 2018 from the Business Register.

Industry Classification for Sampling

Each company was assigned to 1 of 60 industry sampling strata based on the reported business segment in which the company performed the largest amount of total domestic R&D, as reported within the previous 5 years (2014–16 BRDIS and 2017–18 BRDS), if available. If these business segment data were not reported for a given company, assignment was based on the NAICS codes of its establishments in the Business Register using the following method, with some adjustments made to account for vertical integration of related business activities within the company. The company was first assigned to the economic sector, defined by a 2-digit NAICS code that accounted for the highest percentage of its aggregated annual payroll. Then the company was assigned to a subsector, defined by a three-digit NAICS code that accounted for the highest percentage of its annual payroll within the economic sector. Next, the company was assigned a four-digit NAICS code within the subsector, again based on the highest percentage of its aggregated annual payroll within the subsector. Finally, the company was assigned a six-digit NAICS code within the four-digit NAICS code, based on the highest percentage of its aggregated annual payroll within the four-digit NAICS code. Companies with an assigned six-digit NAICS code beginning with 11 or 61 were removed from the sampling frame at this point, and their R&D and associated data are not included in the tabulations. The industry used for sampling purposes was not necessarily the same code used for publication; see section "**Postsampling Industry Classification**."

Stratification of the Sampling Frame

Each company in an industry sampling stratum was further assigned to one of three R&D groups based on information about its prior domestic R&D activity: (1) companies with a positive value for the measure of size based on R&D (*known positive R&D group*), (2) companies with a zero value for the measure of size based on R&D (*known zero R&D group*), and (3) companies with unknown R&D activity (*unknown R&D group*). For the 2019 BERD Survey, there were 32,000 companies in the first group, 37,500 companies in the second group, and 1,055,000 companies in the third group, for a total of 1,124,000 companies (**table A-1**).

Sample Selection

In the known positive R&D group, Pareto probability-proportional-to-size (PPS) sampling was used within each noncertainty industry stratum, where the probability of selection was proportional to the company's measure of size. In the unknown R&D group, Pareto PPS sampling was used within most industry strata; simple random sampling (SRS) was used instead of Pareto PPS for industries in which the number of companies in the sampling frame was high and the likelihood of R&D was low. For both the known positive and unknown groups, a separate stratum was created for companies with fewer than 25 employees, regardless of industry. Pareto PPS sampling was used within these strata. In the known zero R&D group, a single Pareto PPS sample was selected across all industry strata. Each sampling stratum had a certainty and noncertainty portion (**table A-2**). Across all three groups (known positive, known zero, and unknown), companies in select industries and companies that exhibited characteristics of having large R&D amounts, including those with the largest annual payroll, were selected for the sample with certainty (i.e., the probability of selection was equal to 1). The probability of selection for other companies in the known positive R&D and unknown R&D groups depended on their size, the number of companies selected, and the total size or number of companies in their strata. The number of companies selected was based on a coefficient of variation constraint on the estimated sample total for the stratum and was increased, if necessary, to ensure that the minimum probability of selection is 0.05 for the known positive R&D group and one of five values for the unknown R&D group: 0.004 or 0.01 for Nonmanufacturing industries (NAICS other than 31–33) and Incomplete manufacturers (incomplete NAICS beginning with 3), depending on the population size and likelihood of R&D; 0.04 for Printing and related support activities manufacturing (NAICS 323), Furniture and related product manufacturing (NAICS 337), and Computer systems design and related services (NAICS 5415); 0.02 for the remaining Manufacturing (NAICS 31–33) industries; and 0.05 for the companies with fewer than 25 employees. For companies in the known zero R&D group, the probability of selection depended on their size and the number of companies selected. The number of companies selected was based on a coefficient of variation constraint and was increased, if necessary, to ensure that the minimum probability of selection is 0.02.

Once selected, each company was assigned a sampling weight equal to the reciprocal of its probability of selection for the sample. Companies that were selected for the sample with certainty were assigned sampling weights equal to 1, and companies that were selected using SRS or Pareto PPS sampling were assigned weights ranging from 1 to 250. A complete and detailed description of the sample design and estimation methodology is given in the annual BERD Survey methodology report available from the NCSES project officer.

Sample Size

Using the sample design parameters detailed above, a total of 45,500 companies were selected, of which 20,000 companies were in the known positive R&D group, 2,300 companies were in the known zero R&D group, and 23,500 companies were in the unknown R&D group (table A-3 and table A-4). A complete and detailed description of the selection of additional sampling units is given in the annual BERD Survey methodology report available from the NCSES project officer.

During the survey's annual contact update procedures, 150 large R&D performers from the 2018 sample were found that were not included on the 2019 sampling frame. The primary reasons for this are mergers, acquisitions, or other company structure changes that cause a difference between a company's current Business Register ID and its prior year survey ID—in this case, its ID in the 2018 BRDS file. To follow up with these companies, they were added to the 2019 sample with certainty, and 150 companies were mailed a survey letter. Because it was expected that many of these records would not contribute to 2019 BERD Survey tabulations due to changes in company structure, these companies are not included in sampling frame counts or sample sizes (table A-5).

Data Collection and Processing Methods

Starting in the 2017 cycle, an initial letter was mailed to all companies instructing them to report via the Census Bureau's Centurion data collection instrument. Paper questionnaires were mailed by respondent request only and during a later nonresponse follow-up for delinquent companies. For paper versus electronic response rates, see section "Response by Mode."

Questionnaires

Beginning in the 2017 cycle, all companies completed the same questionnaire, BRD-1, which combined the standard form BRDI-1 and the abbreviated form BRDI-1(S) used in prior cycles (table A-6). Companies that reported less than $1 million in R&D paid for by the company or less than $1 million in R&D funded by others completed abbreviated worksheet(s) in lieu of more detailed questions asked of companies with $1 million or more in R&D. As was the case in previous cycles, some companies with decentralized records requested a special reporting arrangement with the Census Bureau. Under this arrangement, the survey form was mailed to multiple operating units within the same company, and each Alternate Reporting Unit (ARU) completed the survey individually. The data for these ARUs were also tabulated separately in published estimates and were not consolidated at the company level (table A-7).

Because of the potential compartmentalization of organizational knowledge within companies (particularly in larger companies), the BERD Survey questionnaire was organized into sections based on the subject matter of the questions. These sections included the following:

Section 1. Company information. Includes basic questions about company ownership, lines of business, sales, and employee data.

Section 2. R&D paid for by your company. Includes geographic location and accounting questions about the company's R&D expenses.

Section 3. Costs paid for by others. Includes accounting questions about R&D paid for by others, such as the company's customers or grant-giving organizations.

Section 4. Capital expenditures. Includes questions on capital expenditures for R&D.

Section 5. Management and strategy of R&D. Includes questions related to the characteristics and focus of the company's R&D. This section was targeted toward company employees responsible for managing R&D departments or programs.

Section 6. Human resources. Includes questions related to the human resources involved in the company's R&D activities.

Section 7. Tax topics. Includes questions on filing federal and state tax credits for research activities.

For specific differences among the BERD Survey questionnaires, see section "Data Comparability (Changes)."

Response Rates

Unit Response Rates

Of the companies surveyed for the 2019 survey, 28.0% did not submit any response, and an additional 3.0% did not provide enough information to be treated as responses. Nonresponse studies are conducted periodically to assess reasons for nonresponse and possible nonresponse bias. Three metrics used by NCSES and the Census Bureau to measure unit response to the BERD Survey were check-in rates, unit response rates, and coverage rates.

Check-in rate. The check-in rate is defined as the unweighted number of surveys that were either mailed in or submitted online by in-scope companies, divided by the unweighted total number of all in-scope companies in the sample. Response to individual questions did not factor into this metric.

Coverage rate. BERD Survey managers track a coverage rate that is a weighted measure of survey response based on the measure of size at the time of sample selection. The coverage rate measures how much of the weighted measure of size for in-scope companies in the sample is accounted for by respondents to the survey.

Unit response rate (URR). The URR is the unweighted number of responding companies with positive data for at least one of the survey's key items (i.e., worldwide R&D expenses or R&D costs funded by others, worldwide or domestic sales, or worldwide or domestic employees), divided by the unweighted total number of in-scope companies in the sample.

For the 2019 BERD Survey, the check-in rate was 72%, and the URR was 69%. The coverage rate for the 2019 BERD Survey was 92% for the known positive R&D group, 68% for the unknown R&D group, and 79% for the known zero R&D group (table A-8 and table A-9).

Item Response Rates

The BERD Survey collects data for over 500 variables, and the distribution of values reported by sample companies is highly skewed. Thus, rather than report unweighted item response rates, total quantity response rates are calculated, which are based on weighted data.

Total quantity response rate (TQRR). For a given published estimate other than count or ratio estimates, TQRR is the percentage of the weighted estimate based on data that were reported by units in the sample or on data that were obtained from other sources and were determined to be equivalent in quality to reported data. The TQRR for total R&D performed in the United States in 2019 was 73.9.

Total quantity nonresponse rate (TQNR). For a given published estimate, TQNR, defined as 100% minus TQRR, is calculated for each tabulation cell from the BERD Survey, except for cells that contain count or ratio estimates. TQNR measures the combined effect of the procedures used to handle unit and item nonresponse on the weighted BERD Survey estimate. TQNR tables giving imputation rates corresponding to each data table are available from the NCSES project officer. Also see section "Item Nonresponse."

Response by Mode

Overall, 1% of checked-in cases responded to the BERD Survey by mailing in the paper form, and 99% responded using the online version of the survey. Lastly, more than 97% of checked-in companies with account managers—that is, the top R&D companies (based on prior year reported or imputed data) that were assigned an analyst to act as a single point of contact for all communications—responded via the Internet.

Data Editing

Given the size and complexity of the BERD Survey, many survey responses included errors that required correction or had unusual patterns that required validation. Several hundred automated edit checks were programmed to improve the efficiency of analyst data review and correction (table A-10).

Approximately two-thirds of these edit checks were designed to catch arithmetic errors and logically inconsistent responses (*balance edits*). The remaining edit checks were designed to flag outliers for further analyst review (*analytical edits*). Descriptions of the data edits and edit failure rates are in annual methodology reports that are available from the NCSES project officer.

During the editing and review process, several cases were identified where companies reported zero R&D or a relatively small amount of R&D, even though subject-matter experts expected large amounts of R&D to be reported. Some of these companies were contract research organizations or federal contractors that did not account for the costs they incurred while conducting customer-sponsored research as R&D; instead, they accounted for these as the cost of sales. The largest of these companies were contacted by analysts and asked to resubmit their surveys. In rare cases, if no response could be elicited from a company and public information was available related to costs for customer-sponsored R&D, those data were used to impute an R&D estimate for that company.

Techniques for Handling Unit and Item Nonresponse

For various reasons, many firms chose to return the survey questionnaire with one or more blank items. For some firms, internal accounting systems and procedures may not have allowed quantification of specific expenditures. Others may have refused to answer any questions as a matter of company policy. Weighted estimates produced from the BERD Survey include adjustments to account for companies that did not respond to the survey (*unit nonresponse*) and for companies that did respond but left some questions blank (*item nonresponse*).

Unit Nonresponse

The BERD Survey accounts for unit nonresponse by multiplying each company's sampling weight by a nonresponse adjustment factor. To calculate the adjustment factors, each company in the sample that is eligible for tabulation is assigned to one (and only one) adjustment cell. The adjustment cells are based on the three R&D groups, which are subdivided according to R&D size and certainty status and also on the industry sampling strata described in the section "Stratification of the Sampling Frame" that are updated using information on industry classification reported in the BERD Survey. For a given adjustment cell, the nonresponse adjustment factor is the ratio of the sum of the weighted measure of size for all companies in the cell to the sum of the weighted measure of size for all companies in the cell with reported or imputed data. The measure of size used to select the sample for the 2019 BERD Survey (see section "Sampling Frame") was also used to adjust for unit nonresponse. For companies in the known positive R&D stratum, the measure of size was based on R&D in the United States. For companies in the unknown R&D stratum, the measure of size was based on total annual payroll in the United States. For companies in the known zero R&D stratum, a value of 1 was assigned as the measure of size so that a company's sample weight alone would be part of each cell's adjustment factor. Beginning in survey year 2018, this unit nonresponse was also applied to counts, patents, patent licensing agreements, and intellectual property protection (though in survey year 2019, questions on patents and intellectual property were cycled off the form). In previous survey years, no such adjustment was applied to those items.

R&D estimates for geographic areas outside the largest countries, states, and core-based statistical areas (CBSAs) that are dominated by a relatively small number of companies are particularly sensitive to changes in survey response because these areas may not be similarly represented by companies in the same adjustment cell.

Item Nonresponse

Item nonresponse for a given company is handled by item imputation. For account manager companies, large companies, and special cases, analysts impute these data using direct substitution of available company data (e.g., data from the company's website, annual Form 10-K report, or administrative sources) or other methods determined appropriate by NCSES's and the Census Bureau's subject-matter experts. For other cases, including cases where analysts were unable to provide a superior estimate, data are imputed by programmed item imputation procedures. Depending on the particular item being imputed for a company, these procedures are based on a combination of (1) direct substitution of available company data, (2) ratio imputation using the company's survey data for both the current and prior year, and (3) ratio imputation using survey data from both the company and other similar companies, which reported both the survey item being imputed for the company and the other survey item used in the ratio. Tables of imputation rates corresponding to each data table are available from the NCSES project officer.

Estimation

The general methodology used to produce estimates from the BERD Survey involves sums of weighted data (reported or imputed) in which the weights are the product of the sampling weight and the nonresponse adjustment factor. However, there are some exceptions, which are described below.

Weighting

Estimates published for the BERD Survey are computed as sums of weighted data for sample companies that reported to the survey or for sample companies for which data could be reliably imputed based on prior reports or other information. Two types of weights are used for estimates of R&D: sampling weights, and nonresponse adjustment factors. The *sampling weight* for a given company is calculated as the reciprocal of the company's probability of inclusion in the sample. *Nonresponse adjustment factors* are used to represent companies in the sample that did not provide sufficient response data to be directly tabulated and whose data could not be imputed. For information on the calculation of the nonresponse adjustment factors, see section "**Unit Nonresponse**."

Each value that contributes to a given BERD Survey estimate is multiplied by both its sampling weight and its nonresponse adjustment factor, and these weighted values are then summed to create the estimate. Beginning in survey year 2018, the nonresponse adjustment factor was also applied to estimates of counts, patents, and patent licensing agreements. In prior survey years, the adjustment was not applied to those items.

Postsampling Industry Classification

As mentioned in the section "**Industry Classification for Sampling**," the industry classification assigned to companies for sampling was based on either reported BERD Survey business segment data from prior years or annual payroll. To produce more accurate estimates for the current survey year, a company's reported business code, if available for the current survey year, was used to assign an updated industry code for tabulations. The company's response to the domestic R&D performance questions from the current survey year was used to classify each company into the business code that accounted for the largest amount of total domestic R&D performance. The business codes reported by companies with large amounts of R&D were validated, and in some cases corrected, by survey staff. If no business code data were available for a company's domestic R&D performance, the industry code used for sampling was also used for tabulations.

R&D, by Core-Based Statistical Area (CBSA) or State

CBSA-level estimates of business R&D are modeled using BERD Survey data reported by companies on the address of each of their largest R&D locations and administrative data from the Census Business Register on the payroll for each business establishment in the United States. The weighted amount of company R&D is apportioned to CBSAs within states using the same hybrid estimator method used for state estimates (below). Current BERD Survey methodology cannot attribute all R&D to a specific location. For example, R&D reported by companies that did not respond to geographic questions and for whom no method was available to impute locations is not assigned to a location. This R&D was performed in one of the 50 U.S. states or the District of Columbia, but the specific location is not estimated and is reported as “undistributed” in BERD Survey tables.

The estimation methodology for state estimates takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or raked) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a state.

R&D estimates for CBSAs and states that are dominated by a relatively small number of companies are particularly sensitive to changes in both unit and item response. Because companies rarely publish detailed information about the geographic location of their R&D operations, it is difficult to identify and correct erroneous responses to these questions. And, as noted earlier, the method used to correct for unit nonresponse relies on data from companies in the same industry or size category. These peer companies may report relatively less (or no) R&D in the geographic areas where a nonresponsive company performs R&D.

R&D, by Business Segment Code

To provide increased granularity on R&D activities, the BERD Survey includes questions asking companies to report data for business units below the company level. To support subcompany reporting, a list of business codes based on NAICS was provided in the BERD Survey for companies to use to categorize their business operations. The list of business codes for the 2019 cycle of the BERD Survey was based on the 2012 NAICS. To assist companies in selecting appropriate business codes, likely business codes were provided to respondents by printing them on the forms mailed to companies and by prepopulating them on the online version of the survey. For companies that reported to the 2017 BRDIS or 2018 BRDS, the most recent business codes reported by the company were used to provide the business codes. For companies that did not report to the 2017 BRDIS or 2018 BRDS, establishment payroll data from the Business Register were used to provide the business codes.

Company Counts

Beginning in survey year 2019, company count estimates reflect a change in rounding methodology. Beginning in survey year 2018, a weight adjustment to account for unit nonresponse was implemented for company counts; as a result, company count estimates are not comparable with survey years prior to 2018.

The company count estimates for 2017 are not comparable with those for 2016 for two reasons. First, the target population for 2017 was restricted to companies with 10 or more domestic employees, whereas the 2016 survey population included companies with 5 or more employees. Second, no adjustment is applied to count estimates to correct for unit nonresponse, and overall response to the survey declined from 2016 to 2017.

The company count estimates for 2014 and onward are not comparable with estimates published for previous years. BRDIS review and correction procedures were amended beginning in survey year 2014 to include a more systematic analysis of companies reporting small amounts of R&D (less than $10,000) and no R&D employees. Many of these responses were determined to be reporting errors (false-positive R&D), and their R&D was set to zero. These corrections had a negligible impact on BRDIS R&D estimates compared to earlier years. But because these companies tended to have high sample weights, these corrections had a large impact on the estimate of R&D-active companies compared to prior years (when many fewer such corrections were made).

Tabulation Eligibility

Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. In prior years, companies that performed or funded any amount of R&D were tabulated. This change has affected the comparability of these estimates to those published for years prior to 2018. These companies in aggregate represented a very small share of total R&D expenditures in prior years, but they accounted for a larger share of count estimates. Had the companies under this threshold been included in the 2019 estimates, they would have contributed approximately $90 million to overall R&D expenditures and would have added approximately 7,500 companies to the estimated count of U.S. companies with R&D expenditures.

Survey Quality Measures

Sampling and Nonsampling Errors

The estimates produced from the BERD Survey are subject to both sampling and nonsampling errors. Sampling error is the difference between estimates obtained from the sample and results theoretically obtainable from a comparable complete enumeration of the sampling frame. This error results because only a subset of the sampling frame is measured in a sample survey. For published estimates from the BERD Survey, standard errors are produced for estimated percentages, while relative standard errors (RSEs) are produced for all other estimates. Tables of the estimated measures of sampling variability corresponding to each data table are available from the NCSES project officer.

Standard errors may be used to define confidence intervals about the corresponding estimates with a desired level of confidence. If a confidence interval were constructed for each possible sample that could be selected using the same sample design, then it would be expected that the percentage of confidence intervals containing the result of a complete enumeration of the sampling frame would equal the percentage of the level of confidence. For example, the interval defined by a margin of error of 2 standard errors yields a confidence interval of approximately 95%.

Because relatively few companies perform R&D in the United States, and because the amount of R&D they perform is quite variable, it is difficult to achieve control over the sampling error of survey estimates produced from the BERD Survey. This depends on the correlation between the measure of size on the sampling frame that was used to assign the selection probabilities and the actual data that are collected in the BERD Survey, which cannot be predicted accurately for all companies when the sample is designed. However, the companies known to perform the greatest amounts of R&D are included in the sample with certainty so that these companies will not contribute to the sampling error of the resulting estimates produced from the BERD Survey.

The sample size is sufficiently large that estimates based on the total sample are subject to low sampling error. However, because priority in designing the sample was given to industries that were identified in previous surveys as conducting large amounts of R&D expenditures, the sampling error may be larger for estimates for the lower-priority industries. The RSE for the estimate of total domestic R&D performed by the company was 0.38% in 2019.

Potential nonsampling errors include coverage error and various response and operational errors, such as errors during data collection, reporting errors, transcription errors, and bias due to nonresponse. These are errors that could also occur if a complete enumeration of the sampling frame had been conducted under the same conditions as the sample survey. Most of the important operational errors were detected and corrected during the course of reviewing the data for reasonableness and consistency. Though nonsampling error is not measured directly, quality control procedures were employed throughout the survey process to minimize this type of error.

Measurement Error

Variations in respondent interpretations of the definitions of R&D activities and variations in accounting procedures are of particular concern—specifically, the characterization and reporting of R&D activities by large defense contractors funded by the U.S. federal government; the reporting of R&D activities by companies classified in the Scientific R&D services industry (NAICS 5417); and the method used by companies, in general, to count and report numbers of employees in various categories, such as the number of employees who work full time versus part time on R&D. The sophistication and comprehensiveness of a company's accounting and personnel tracking systems often depend on its size and activities and on its willingness to accommodate government-sponsored surveys. While no metric of measurement error is produced, ongoing efforts to minimize measurement error include questionnaire pretesting, improvement of questionnaire wording and format, inclusion of more cues and examples in the questionnaire instructions, in-person and telephone interviews and consultations with respondents, and post-survey evaluations.

Data Comparability (Changes)

The statistics resulting from this survey are intended primarily as indicators of absolute levels of R&D spending and personnel. Nevertheless, the statistics are often taken to be a continuous time series prepared using the same collection, processing, and tabulation methods. Although estimating the business portion of the nation's R&D enterprise accurately has always been the goal, such strict uniformity has not been the case. Since the survey was first fielded, improvements have been made to increase the reliability of the statistics and to make the survey results more useful. To that end, past practices have been changed and new procedures instituted. Preservation of the comparability of the statistics has, however, been an important consideration in making these improvements. Nonetheless, changes to survey coverage and definitions, the industry classification system, estimation methods, and the procedure used to assign industry codes to multi-establishment companies, which are documented in the annual reports, may have affected the comparability of the statistics. Among the most demonstrable changes are those made to the questionnaires, and those changes are summarized below.

Differences between the 2018 BRDS and 2019 BERD Survey Questionnaires

The following changes were made to the 2018 BRDS and the 2019 BERD Survey:

- Questions on patents, intellectual property, and technology transfer were removed.
- A question on filing for state tax credit for research activities in 2019 was added.

Differences between the 2017 BRDS and 2018 BRDS Questionnaires

The following changes were made to the 2018 BRDS from the 2017 BRDS:

- A question on land acquisition capital expenditures for R&D operations was added.
- Questions related to R&D on artificial intelligence (AI) were added.
- Questions asking for country and state location of employees and R&D employees were added.
- A question asking for counts of temporary and leased employees working on R&D was added.

Differences between the 2016 BRDIS and 2017 BRDS Questionnaires

The following changes were made to the 2017 BRDS from the 2016 BRDIS:

- Questions on product and process innovation were removed from the form.
- A question on whether R&D paid for by the company included customer-sponsored R&D was added.
- Questions on R&D funded by foreign governments or agencies and R&D funded by universities and colleges located outside the United States were added.
- A question on whether any capital expenditures for R&D were funded, paid for, or reimbursed by others not owned by your company was added.

Differences between the 2015 and 2016 BRDIS Questionnaires

The following changes were made to the 2016 BRDIS from the 2015 BRDIS:

- Questions on royalties and licensing fees were added to both the R&D paid for by the company and the R&D paid for by others type-of-cost sections.
- Questions on the type of worldwide R&D paid for by the company were added to Form BRDI-1(S).
- Questions on the type of worldwide R&D paid for by others were added to Form BRDI-1(S).
- A question on all other contract R&D services paid for by customers was added to Form BRDI-1(S).
- A question on R&D performed by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D performed by foreign governments was removed.
- A question on R&D funded by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D funded by foreign governments was removed.
- A question on whether utility patent sales and licensing revenues were received from companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether utility patent purchases and licensing payments were made to companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether the company filed for the tax credit for increasing research activities (IRS Form 6765) in tax year 2016 was added to Form BRDI-1.
- Questions on the importance of intellectual property protections were removed from the form.

Differences between the 2014 and 2015 BRDIS Questionnaires

The following changes were made to the 2015 BRDIS from the 2014 BRDIS:

- A question on phase IV clinical trials was added to Form BRDI-1.
- A question on R&D performed by others that was paid for by U.S. federal government agencies or laboratories was added to Form BRDI-1.
- Questions on the type of foreign R&D paid for and performed by the company were added to Form BRDI-1.
- Questions on the type of foreign R&D performed by the company but paid for by others were added to Form BRDI-1.
- A question on nonprovisional utility patents was added to Form BRDI-1.
- Questions related to R&D in photonics and optics application areas were removed from Form BRDI-1.

Differences between the 2013 and 2014 BRDIS Questionnaires

The following changes were made to the 2014 BRDIS from the 2013 BRDIS:

- A question on monetary gifts to universities or colleges restricted to supporting R&D was added to Form BRDI-1.
- A question on revenue received from patent licensing was added to Form BRDI-1.
- A question on purchasing patents from others was added to Form BRDI-1.
- A question on licensing patents from others was added to Form BRDI-1.
- One business code was added to the list of business codes collected on the survey: 33333, Digital cameras manufacturing. In prior years, this line of business was included in the business code 33412, Computers and peripheral equipment manufacturing and magnetic and optical media.
- Questions related to patenting were removed from Form BRDI-1(S).
- Questions related to innovation were added to Form BRDI-1(S).

Differences between the 2012 and 2013 BRDIS Questionnaires

The following changes were made to the 2013 BRDIS from the 2012 BRDIS:

- The list of countries for which foreign R&D performance data were collected was expanded by three: Hungary, Luxembourg, and Norway.
- A question was restored asking the amount of R&D that the company plans to recoup through indirect charges on U.S. federal government contracts (independent R&D). This question was last asked on the 2010 BRDIS.
- Questions on R&D for software products and R&D for embedded software were combined.
- A question on R&D for software products and embedded software paid for by the federal government was added.
- A question was restored related to the educational attainment of scientists and engineers. This question was last asked on the 2010 BRDIS.
- Two business codes were added to the list of business codes collected on the survey: 32542, Biotechnology-based pharmaceutical and biological products (except diagnostics), and 51801, Cloud computing applications and Internet-based software services.
- Delinquent companies in the known positive R&D stratum for the past two survey cycles were sent Form BRD-1(S) to see if they report at least the high-level numbers.

Differences between the 2011 and 2012 BRDIS Questionnaires

For 2012, a much shorter (8-page) version of the short form, BRD-1(S), was implemented. The form included 19 high-level-detail items on worldwide sales; domestic sales; R&D expenses funded both by the company and by others; employment both worldwide and domestic, including R&D employment; and patents applied for and issued. Companies that reported $1 million or more of domestic R&D performance were then sent the long form (BRDI-1) for additional details. The BRD-1(S) form was sent to companies in the unknown and known zero R&D strata. In section 2, the questionnaire collected the additional detail categories for capital expenditures. In section 3, four agencies were added to the type of agency question so as to reduce the amount reported in the All other category. In section 4, the percentage of R&D that was directed toward business areas or product lines new to the respondent's company and also the percentages that pertain to defense applications, health or medical applications, or agricultural applications were added for R&D funded by the company and R&D funded by others.

Differences between the 2010 and 2011 BRDIS Questionnaires

For the 2011 data collection, the innovation questions and instructions in section 1 were changed based on the results of the 2010 experiment. Cycling continued for data items that were not needed every year. The survey was expanded in several ways to address data gaps: the list of countries in which companies could report foreign R&D performance was expanded, a question was added to collect intracompany R&D transactions, and questions were added about companies' second-largest R&D location. In addition, questions pertaining to full-time equivalent (FTE) R&D scientists and engineers were revised to improve respondent understanding of survey concepts.

Differences between the 2009 and 2010 BRDIS Questionnaires

For the 2010 data collection, the most notable changes made to the questionnaire were the inclusion of a one-time section (section 7) on R&D time frame and R&D product life, the inclusion of an experiment testing the impact of different innovation questions and instructions, and the addition of a survey supplement to collect detailed information from companies reporting R&D paid for by others. In addition, questions and instructions about company ownership were expanded to clarify, especially for foreign-owned companies, the information that should be reported on the survey. Cycling began for data items that were not needed every year from every company. These items will be returned to the questionnaire cyclically, depending on the demand for and quality of the collected data. Finally, data items that were poorly reported during the first two cycles of BRDIS were deleted.

The section titled "R&D Time Frame and R&D Product Life" was added to the questionnaire for the 2010 cycle to aid in estimating the depreciation of R&D when it is treated as an investment in the U.S. System of National Accounts.

The experiment testing the impact of different innovation questions and instructions used two versions of the BRDIS short form. The innovation questions on the 2010 Form BRDI-1A were identical to questions used on the 2009 Form BRDI-1A, and the 2010 Form BRDI-1B altered the questions and instructions to replicate innovation questions on the European Union's Community Innovation Survey. The experiment did not produce statistically significant differences in measured rates of innovation.

Differences between the 2008 and 2009 BRDIS Questionnaires

Several changes were made to the 2009 BRDIS questionnaire—in part, to address reporting errors observed during the 2008 survey cycle. Briefly, these changes included the following:

- A screening question at the beginning of the form asking companies whether they had R&D activity during the reporting period was removed.
- Exclusion instructions in the main R&D expense question were replaced with a series of targeted questions. This approach was based on the premise that the economic concepts requested by BRDIS do not always conform to the R&D measures tracked by companies. Rather than directly ask for concepts that may diverge from respondent preconceptions about R&D, the approach in 2009 guided respondents to derive amounts that conformed to the BRDIS definition of R&D.
- Inclusion instructions in the question about main R&D paid for by others were replaced with a series of targeted questions.
- Data for R&D performed by others were derived rather than collected directly. For the 2009 cycle of BRDIS, R&D performed by others was the sum of two R&D costs known to be tracked by companies: payments to business partners for collaborative R&D and purchased R&D services.
- The order of the "Management and Strategy of R&D" and the "Financial Schedule B" (R&D paid for by others) sections was switched.

Definitions

Capital expenditure. Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year, like buildings, equipment, or software. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. Expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets would be included in its R&D expense. Data are collected in the BERD Survey for capital expenditures for R&D operations for land acquisition, structures, equipment, capitalized software, and other items.

Core-based statistical area (CBSA). A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by OMB in the Executive Office of the President.

Employment, total and R&D. Involves the number of people employed by R&D-performing or R&D-funding companies in all locations, both foreign and domestic, during the pay period that included 12 March of the survey year. (The date 12 March is what most employers use when paying first-quarter employment taxes to IRS.) R&D employees are those who provide direct support to R&D, such as researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups. Those not included are employees who provide indirect support to R&D, such as corporate personnel, security guards, and cafeteria workers. In addition to providing head counts of total and R&D employees, the BERD Survey also produces estimates of FTE domestic R&D employment. This is the number of persons employed who were assigned full time to R&D, plus a prorated number of employees who worked on R&D only part of the time.

Employment, leased and temporary. The number of people who work for R&D-performing or R&D-funding companies, but who are not considered employees of the reporting company. These workers perform tasks similar to the reporting companies' own employees but are technically employed by another company (such as a temp or staffing agency or a consulting firm) or are independent on-site consultants.

Expense and R&D expense. Involves money spent or costs incurred in an organization's efforts to generate revenue, representing the cost of doing business. Expenses may be in the form of actual cash payments (such as wages and salaries), a computed expired portion (depreciation) of an asset, or an amount taken out of earnings (such as bad debts). Expenses are summarized and charged in the income statement as deductions from the income before assessing income tax. Whereas all expenses are costs, not all costs are expenses (e.g., costs incurred in acquisition of income-generating assets—see the definition of *capital expenditure* above). R&D expense is the cost of R&D funded by the company itself and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D and business R&D. R&D is planned, creative work aimed at discovering new knowledge or devising new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (basic research), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (*applied research*), and (3) systematic use of research and practical experience and resulting in additional knowledge, which is directed to producing new or improved goods, services, or processes (*development*). R&D includes both direct costs, such as salaries of researchers, and administrative and overhead costs clearly associated with the company's R&D. However, R&D does not include expenditures for routine product testing, quality control, and technical services unless they are an integral part of an R&D project. R&D also does not include market research; efficiency surveys or management studies; literary, artistic, or historical projects, such as films, music, or books and other publications; and prospecting or exploration for natural resources.

R&D, artificial intelligence (AI). AI is a branch of computer science and engineering devoted to making machines intelligent. Intelligence is that quality that enables an entity to perceive, analyze, determine response, and act appropriately in its environment.

Systems with AI perform functions including, but not limited to, speech recognition, machine vision, or machine learning:

- Speech recognition transforms human speech into a format useful for computer applications (e.g., a digital assistant).
- Machine vision uses sensors and software that allow images to be used as an input for computer applications (e.g., systems that sort or inspect objects or support navigation in mobile equipment).
- Machine learning uses statistical software and data to "learn" and make better predictions without reprogramming (e.g., recommender systems for websites, or sales and demand forecasting).

AI technologies also include virtual agents, deep learning platforms, decision management systems, biometrics, text analytics, and natural language generation and processing.

R&D, biotechnology. Biotechnology is the application of science and technology to living organisms, as well as parts, products, and models thereof, to alter living or nonliving materials for the production of knowledge, goods, and services. The following list provides examples of areas of biotechnology in which R&D may be performed.

- DNA or RNA: genomics; pharmacogenomics; gene probes; genetic engineering; DNA or RNA sequencing, synthesis, or amplification; gene expression profiling; and use of antisense technology, large-scale DNA synthesis, genome editing and gene editing, and gene drive
- Proteins and other molecules: sequencing, synthesis, or engineering of proteins and peptides (including large-molecule hormones); improved delivery methods for large molecule drugs; proteomics; protein isolation and purification; signaling; and identification of cell receptors
- Cell and tissue culture and engineering: cell or tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine or immune stimulants, embryo manipulation, marker-assisted breeding technologies, and metabolic engineering
- Process biotechnology techniques: fermentation using bioreactors, biorefining, bioprocessing, bioleaching, biopulping, biobleaching, biodesulfurization, bioremediation, biosensing, biofiltration and phytoremediation, and molecular aquaculture
- Gene and RNA vectors: gene therapy and viral vectors
- Bioinformatics: construction of databases on genomes, protein sequences, and modeling complex biological processes, including systems biology
- Nanobiotechnology: application of the tools and processes of nano- or microfabrication to build devices for studying biosystems and applications in, for example, drug delivery or diagnostics

R&D, domestic. R&D performed in the 50 U.S. states and the District of Columbia. *Adjusted* domestic R&D is calculated in tables designed to enable comparisons between U.S. BERD Survey statistics and those of other nations (table 74 through table 76). There are three tables corresponding to the three principal measures of domestic R&D in the U.S. BERD Survey—that is, R&D paid for by the respondent company and others outside of the company and performed by the respondent company, R&D paid for and performed by the respondent company, and R&D paid for by others and performed by the company. In each table, an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D. Also shown in each table are the differences between the U.S. BERD Survey estimates in this report and the adjusted internationally comparable estimates for domestic R&D.

R&D intensity, or R&D-to-sales ratio. R&D intensity is a ratio, expressed as a percentage, calculated by dividing the cost of R&D by sales. The ratio serves as an indicator of the relative incidence of R&D among groups of companies, primarily among industries and company size classifications. In this report, R&D intensity ratios are calculated in various ways, depending on the measure of R&D (R&D paid for by the respondent company, paid for by others outside of the company, or both) and whether the respondent company performs and funds or only performs R&D.

R&D, nanotechnology. The understanding of processes and phenomena and the application of science and technology to organisms and to organic and inorganic materials—as well as parts, products, and models thereof—at the nanometer scale (but not exclusively below 100 nanometers) in one or more dimensions, where the onset of size-dependent phenomena usually enables novel applications. These applications utilize the properties of nanoscale material that differ from the properties of individual atoms, molecules, and bulk matter for the production of knowledge, goods, and services, like improved materials, devices, and systems that exploit these new properties. The following list provides examples of areas of nanotechnology in which R&D may be performed.

- Nanomaterial: material with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale
- Nanoelectronics: field of science and technology concerned with the development and production of functional electronic devices with nanoscale components
- Nanophotonics: branch of photonics concerned with interaction of photons with nanomaterials aiming to design optical or optoelectronic components
- Nanomedicine: medical application of nanotechnology (e.g., medical application of nanomaterials and biological devices, nanoelectronics biosensors, and possible future applications of molecular nanotechnology, such as biological machines)
- Nanomagnetics: the study of the magnetic response of nanomaterials to an applied magnetic field and their applications
- Nanomechanics: a branch of nanoscience studying fundamental mechanical (elastic, thermal, and kinetic) properties of physical systems at the nanometer scale
- Nanofiltration: a membrane filtration process used for the softening of water and the removal of organic matter; includes nanomembranes
- Nanotools: multicomponent tools and devices used for manipulation, nanolithography, and nanofabrication
- Nanoinstruments or nanodevices: multicomponent instruments or devices used for observation, analysis, or control of matter at the nanometer scale
- Nanomanufacturing: intentional synthesis generation of control of nanomaterials, or fabrication steps in the nanoscale, for commercial purposes

R&D paid for by others, worldwide and domestic. The cost of R&D funded by others outside of the company, including the U.S. federal government, and performed within the respondent company's facilities, both foreign and domestic.

R&D paid for by the company and others, worldwide and domestic. The cost of R&D funded by the company or by others outside of the company and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D performed by the company, worldwide and domestic. The cost of R&D performed within the respondent company's facilities, both foreign and domestic, funded by the company itself or by others outside of the company.

R&D performed by the company and others, worldwide and domestic. The cost of R&D performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D performed by others, worldwide and domestic. The cost of R&D funded by the company or by others outside of the company and performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D, software and Internet. R&D activity in software and Internet applications refers only to activities that have an element of uncertainty and that are intended to close knowledge gaps and meet scientific and technological needs. This item is reported in this survey regardless of the eventual user (internal or external). R&D activity in software includes software development or improvement activities that expand scientific or technological knowledge and construction of new theories and algorithms in the field of computer science. R&D activity in software excludes software development that does not depend on a scientific or technological advance, such as supporting or adapting existing systems, adding functionality to existing application programs, routine debugging of existing systems and software, creating new software based on known methods and applications, converting or translating existing software and software languages, and adapting a product to a specific client, unless knowledge that significantly improved the base program was added in that process.

Sales, worldwide and domestic. Dollar values for goods sold or services rendered by R&D-performing or R&D-funding companies located in the 50 U.S. states and the District of Columbia to customers outside the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent companies are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

Data Availability

Publications

The data from the BERD Survey can be found online at https://www.nsf.gov/statistics/industry/. Detailed historical statistics from the predecessor survey, SIRD, can be obtained from NCSES's Industrial Research and Development Information System at https://www.nsf.gov/statistics/iris/. Information from the BERD Survey is also included in *Science and Engineering Indicators* and in *National Patterns of R&D Resources*.

Electronic Access

BRDS contains confidential data that are protected under Title 13 and Title 26 of the United States Code. Two types of data are currently available: public-use tabular statistics, and restricted microdata. Detailed tabular statistics can be obtained by contacting the BRDS project officer. Microdata for the SIRD, BRDIS, BRDS, and BERD Survey can only be accessed at the Census Bureau's secure Research Data Centers (RDCs). To learn more about RDCs and for instructions on how to apply for data use, please visit the Center for Economic Studies page on research opportunities (https://www.census.gov/programs-surveys/ces/research.html).

Disclosure Avoidance

Disclosure is the release of data that reveals information or permits deduction of information about a particular survey unit through the release of either tables or microdata. Disclosure avoidance is the process used to protect each survey unit's identity and data from disclosure. Using disclosure avoidance procedures, the Census Bureau modifies or removes the characteristics that put information at risk of disclosure. Although it may appear that a table shows information about a specific survey unit, the Census Bureau has taken steps to disguise or suppress a unit's data that may be "at risk" of disclosure while making sure the results are still useful.

The BERD Survey uses cell suppression and rounding to avoid disclosing information about a particular company.

Cell suppression is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a symbol, usually a "D" or an estimate range. If the suppressed cell value were known, it would allow one to estimate an individual survey unit's value too closely.

The cells that must be protected are called *primary suppressions*.

To make sure the cell values of the primary suppressions cannot be closely estimated by using other published cell values, additional cells may also be suppressed. These additional suppressed cells are called *complementary suppressions*.

The process of suppression does not usually change the higher-level totals. Values for cells that are not suppressed remain unchanged. Before the Census Bureau releases data, computer programs and analysts ensure that primary and complementary suppressions have been correctly applied.

The Census Bureau has reviewed the data product for unauthorized disclosure of confidential information and has approved the disclosure avoidance practices applied. For the 2019 tabular statistics, the approval IDs are the following:

- CBDRB-FY21-110, approved on 8 February 2021
- CBDRB-FY21-132, approved on 8 March 2021
- CBDRB-FY21-214, approved on 27 May 2021
- CBDRB-FY21-ESMD006-012, approved on 10 June 2021
- CBDRB-FY21-236, approved on 21 June 2021

Technical Tables

Table	Title
A-1	Target population counts, by frame partition: 2008–19
A-2	Companies in the target population and selected for the sample, by industry and company size: 2019
A-3	Sample size, by frame partition: 2008–19
A-4	Companies sampled, by sampling stratum: 2019
A-5	Companies included in the survey that were not in the original sampling frame: 2008–19
A-6	Survey letters mailed, by sampling stratum: 2019
A-7	Survey letters mailed for companies with subcompany reporting units, by sampling stratum: 2019
A-8	Response measures: 2008–19
A-9	Unit response rates, by industry and company size: 2019
A-10	Companies that required an analyst action, by sampling stratum: 2019

TABLE A-1

Target population counts, by frame partition: 2008–19

(Number of companies)

Year	Total[a]	Known positive R&D	Known zero R&D	Unknown R&D
2008	1,926,012	16,059	75,923	1,834,030
2009	2,090,181	22,181	79,031	1,988,969
2010	2,013,399	24,723	67,281	1,921,395
2011	1,964,757	27,049	73,930	1,863,778
2012	1,971,731	29,512	73,004	1,869,215
2013	1,971,959	34,482	70,032	1,867,445
2014	1,998,858	35,532	79,343	1,883,983
2015	2,029,436	35,839	71,386	1,922,211
2016	1,485,151	34,958	11,355	1,438,838
2017	1,097,510	32,206	27,679	1,037,625
2018	1,115,834	33,215	34,158	1,048,461
2019	1,124,000	32,000	37,500	1,055,000

[a] For each year, the estimate of the number of companies in the total target population is based on the original sampling frame that was created to select the sample. The target population estimates in this table do not include R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. See table A-5 for the counts of companies that were added to each year's sample.

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available. For survey year 2016, the target population did not include companies in the Other nonmanufacturing industry with fewer than 10 domestic employees. Starting in survey year 2017, the target population no longer includes companies with fewer than 10 domestic employees.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
All industries	21–23, 31–33, 42–81	1,124,000	45,500	23,000	22,500
Manufacturing industries	31–33	97,000	18,500	8,800	9,600
Food	311	9,300	1,100	750	400
Beverages and tobacco products	312	3,300	350	250	150
Textile, apparel, and leather products	313–16	3,900	550	350	200
Wood products	321	5,000	600	400	200
Paper	322	1,500	350	150	150
Printing and related support activities	323	6,000	1,100	700	400
Petroleum and coal products[b]	324	350	150	20	150
Chemicals	325	5,100	2,000	450	1,600
Basic chemicals	3251	700	300	90	200
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	550	200	40	150
Pesticides, fertilizers, and other agricultural chemicals	3253	300	100	20	100
Pharmaceuticals and medicines	3254	1,500	850	100	750
Soap, cleaning compounds, and toilet preparations	3256	800	200	80	150
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,200	350	150	200
Plastics and rubber products	326	4,800	1,000	500	500
Nonmetallic mineral products	327	4,000	500	300	200
Primary metals	331	1,700	450	200	250
Fabricated metal products	332	20,000	2,300	1,400	900
Machinery	333	9,300	2,100	950	1,200
Agricultural implement	33311	500	150	40	100
Semiconductor machinery	333242	90	70	*N* < 15	70
Engine, turbine, and power transmission equipment	3336	400	150	40	100
Other machinery	other 333	8,300	1,700	850	850
Computer and electronic products	334	4,800	1,800	500	1,300
Communications equipment	3342	550	250	30	200
Semiconductor and other electronic components	3344	1,800	500	200	300
Navigational, measuring, electromedical, and control instruments	3345	1,800	800	250	550
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	300	200	40	150
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	250	150	*N* < 15	150
Other measuring and controlling devices	other 3345	1,300	450	200	250
Other computer and electronic products	other 334	600	250	40	200
Electrical equipment, appliances, and components	335	2,300	650	350	300
Transportation equipment	336	4,700	1,100	350	750
Motor vehicles, bodies, trailers, and parts	3361–63	3,000	600	200	400
Aerospace products and parts	3364	800	250	50	200
Aircraft, aircraft engine, and aircraft parts	336411–13	800	200	50	150
Guided missiles, space vehicles, and related parts	336414, 336415, 336419	50	40	0	40
Military armored vehicles, tanks, and tank components	336992	30	20	0	20
Other transportation equipment	other 336	900	200	90	100

TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
Furniture and related products	337	4,500	900	500	400
Miscellaneous manufacturing	339	6,500	1,300	650	650
Medical equipment and supplies	3391	2,300	600	200	350
Other miscellaneous	3399	4,200	700	400	300
Unclassified	–	50	50	0	50
Nonmanufacturing industries	21–23, 42–81	1,027,000	27,000	14,500	13,000
Mining, extraction, and support activities[b]	21	5,100	600	300	300
Utilities	22	800	200	40	150
Wholesale trade	42	68,000	5,800	4,200	1,600
Electronic shopping and electronic auctions	454111–12	3,500	350	250	100
Transportation and warehousing	48–49	34,500	550	200	350
Information	51	15,500	3,100	1,200	1,900
Publishing	511	5,000	1,200	500	700
Newspaper, periodical, book, and directory publishers	5111	2,600	450	250	150
Software publishers	5112	2,400	750	250	500
Telecommunications	517	2,500	500	300	200
Data processing, hosting, and related services	518	3,100	950	250	750
Other information	other 51	4,900	500	250	250
Finance and insurance	52	26,000	850	200	650
Real estate and rental and leasing	53	26,000	450	150	300
Lessors of nonfinancial intangible assets (except copyrighted works)	533	450	90	*N* < 15	90
Other real estate and rental and leasing	other 53	25,500	350	150	250
Professional, scientific, and technical services	54	103,000	9,800	4,200	5,500
Architectural, engineering, and related services	5413	17,500	2,700	1,700	1,000
Computer systems design and related services	5415	16,500	3,100	1,800	1,200
Scientific research and development services	5417	2,400	2,400	0	2,400
Biotechnology research and development	541711	600	600	0	600
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,600	1,600	0	1,600
Social sciences and humanities research and development	541720	150	150	0	150
Other professional, scientific, and technical services[c]	other 54	66,500	1,600	700	950
Health care services	621–23	112,000	1,400	550	850
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	633,000	4,000	2,900	1,100
Unclassified	–	350	150	*N* < 15	150
Company size (number of domestic employees)					
All companies	–	1,124,000	45,500	23,000	22,500
< 10[d]	–	8,000	450	150	300
10–19	–	557,000	10,000	7,800	2,200
20–49	–	360,000	10,500	7,300	3,300
50–99	–	108,000	7,000	3,800	3,100
100–249	–	58,000	7,400	2,800	4,600
250–499	–	17,000	3,900	750	3,100

TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2019

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
500–999	–	7,900	2,500	250	2,200
1,000–4,999	–	6,400	2,700	150	2,500
5,000–9,999	–	900	550	20	500
10,000–24,999	–	550	400	*N* < 15	400
25,000 or more	–	350	250	*N* < 15	250

NAICS = 2012 North American Industry Classification System.

[a] Estimates of the number of companies in the target population are based on the original sampling frame that was created to select the 2019 Business Enterprise Research and Development (BERD) Survey sample. These estimates do not include 150 R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. These companies were added to the 2019 sample with certainty but are not reflected in the number of certainties selected for the sample.

[b] Because of the widespread practice of the larger petroleum extraction and refining companies vertically integrating their activities, petroleum refineries (NAICS 32411) and oil and gas extraction (NAICS 211) were combined during sampling.

[c] Contains companies classified in scientific research and development services (NAICS 5417) that, as of sampling, were not fully classified to the level of detail in biotechnology research and development (NAICS 541711), physical, engineering, and life sciences research and development (NAICS 541712), or social sciences and humanities research and development (NAICS 541720).

[d] This category includes companies that are represented on the sampling frame as having missing data, but these companies are in scope to the BERD Survey because they have at least $500,000 in annual payroll.

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Certainties are companies whose probability of selection is 1 based on prior year R&D expenditures equal to or greater than $3 million as well as others included in the sample for analytical purposes (analytical certainties). Noncertainties are companies whose probability of selection is less than 1. Companies that were missing or had an incomplete NAICS code at the time of sampling were assigned to an "unclassified" industry category temporarily. If an unclassified company reported R&D expenditures, its primary industrial activity was investigated, and a NAICS code was assigned during statistical processing.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE A-3

Sample size, by frame partition: 2008–19

(Number of companies)

Year	Total	Known positive R&D	Known zero R&D	Unknown R&D
2008	39,553	11,103	3,156	25,294
2009	43,002	14,343	3,443	25,216
2010	42,965	14,399	3,150	25,416
2011	43,108	14,941	3,385	24,782
2012	43,655	16,188	3,527	23,940
2013	45,089	17,690	3,531	23,868
2014	44,162	16,959	3,861	23,342
2015	44,824	17,602	3,484	23,738
2016	44,861	18,184	1,058	25,619
2017	44,978	17,737	2,112	25,129
2018	45,690	20,115	2,265	23,310
2019	45,500	20,000	2,300	23,500

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE A-4

Companies sampled, by sampling stratum: 2019

(Number of companies)

Stratum	Total
Total	45,500
Known positive R&D	20,000
Certainties	15,500
Noncertainties	4,600
Known zero R&D	2,300
Certainties	1,600
Noncertainties	750
Unknown R&D	23,500
Certainties	5,700
Noncertainties	18,000

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE A-5

Companies included in the survey that were not in the original sampling frame: 2008–19

(Number of companies)

Year	Known positive R&D
2008	336
2009	18
2010	49
2011	42
2012	54
2013	44
2014	37
2015	52
2016	90
2017	93
2018	111
2019	150

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. This table shows the counts of companies that were found during the update procedures, were added to each year's sample, and were mailed a survey letter. These company counts are not in table A-2.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE A-6

Survey letters mailed, by sampling stratum: 2019

(Number)

Stratum	Total
Total	45,500
Known positive R&D	19,500
Certainties	15,000
Noncertainties	4,600
Known zero R&D	2,300
Certainties	1,600
Noncertainties	750
Unknown R&D	23,500
Certainties	5,500
Noncertainties	17,500
Cases not in the frame	150

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies instructing them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE A-7

Survey letters mailed for companies with subcompany reporting units, by sampling stratum: 2019

(Number of companies)

Stratum	Sent one form	Sent multiple forms[a]
Total	45,500	150
Known positive R&D	19,500	150
Certainties	15,000	150
Noncertainties	4,600	0
Known zero R&D	2,300	0
Certainties	1,600	0
Noncertainties	750	0
Unknown R&D	23,500	0
Certainties	5,500	0
Noncertainties	17,500	0
Cases not in the frame	150	0

[a] Under special arrangement with the Census Bureau, and to facilitate reporting, the Business Enterprise Research and Development Survey separately surveyed portions of some companies using multiple survey forms. This special arrangement extends to holding companies to facilitate reporting among the operating units. The number of companies does not include companies that made special reporting arrangements with the Census Bureau after the initial mailout.

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies instructing them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE A-8

Response measures: 2008–19

(Percent)

Measure	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Check-in rate[a]	79.5	74.9	75.1	73.7	78.6	74.3	73.3	80.1	80.5	75.6	74.0	72.0
Response rate (unweighted)[b]	74.2	73.1	71.4	71.1	77.1	73.6	72.5	79.6	80.2	74.5	72.8	69.0
Coverage rate for known positive sampling strata (using weighted R&D)[c]	91.4	91.5	87.7	86.0	91.4	90.4	91.0	93.0	92.6	92.4	90.5	92.0
Coverage rate for unknown sampling strata (using weighted payroll)[c]	79.9	75.0	76.2	76.7	84.2	77.7	78.1	84.3	73.4	73.6	71.6	68.0
Coverage rate for known zero sampling strata (using unweighted counts)[c]	77.2	78.7	74.5	76.0	82.7	80.7	80.4	83.4	88.0	80.0	80.3	79.0

[a] The number of survey responses from in-scope companies divided by the total number of in-scope companies in the sample.

[b] The number of responding companies with worldwide R&D expenses or costs funded by others or the number of responding companies with worldwide or domestic sales or worldwide or domestic employees (if R&D was zero) divided by the total number of in-scope companies in the sample.

[c] Based on the same numerator and denominator as the response rate, but each company's measure of size at the time of sample selection is taken into account.

Note(s):
Beginning in survey year 2019, these percentages reflect a change in rounding methodology.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

TABLE A-9

Unit response rates, by industry and company size: 2019

(Number and percent)

Industry and company size	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of $1 million or more	
			Number	Percent	Number	Percent
All industries	21–23, 31–33, 42–81	42,500	29,500	69	7,400	17
Manufacturing industries	31–33	17,500	12,500	71	4,100	23
Food	311	1,100	750	68	200	18
Beverage and tobacco products	312	350	250	71	30	9
Textile, apparel, and leather products	313–16	500	350	70	50	10
Wood products	321	600	450	75	20	3
Paper	322	350	250	71	40	11
Printing and related support activities	323	1,000	700	70	30	3
Petroleum and coal products	324	150	90	60	30	20
Chemicals	325	2,100	1,500	71	950	45
Basic chemicals	3251	300	200	67	100	33
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	200	150	75	50	25
Pesticide, fertilizer, and other agricultural chemicals	3253	100	70	70	30	30
Pharmaceuticals and medicines	3254	950	750	79	650	68
Soap, cleaning compound, and toilet preparation	3256	200	150	75	60	30
Paint, coating, adhesive, and other chemicals	3255, 3259	350	250	71	80	23
Plastics and rubber products	326	1,000	750	75	200	20
Nonmetallic mineral products	327	500	350	70	50	10
Primary metals	331	400	300	75	70	18
Fabricated metal products	332	2,200	1,600	73	300	14
Machinery	333	2,000	1,500	75	550	28
Agricultural implement	33311	150	100	67	40	27
Semiconductor machinery	333242	70	60	86	30	43
Engine, turbine, and power transmission equipment	3336	150	90	60	40	27
Other machinery	other 333	1,700	1,200	71	400	24
Computer and electronic products	334	1,700	1,100	65	650	38
Communications equipment	3342	200	150	75	90	45
Semiconductor and other electronic components	3344	500	350	70	200	40
Navigational, measuring, electromedical, and control instruments	3345	750	550	73	300	40
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	200	100	50	70	35
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	150	90	60	50	33
Other measuring and controlling devices	other 3345	450	300	67	150	33
Other computer and electronic products	other 334	200	100	50	70	35
Electrical equipment, appliances, and components	335	600	450	75	200	33
Transportation equipment	336	1,000	750	75	350	35
Motor vehicles, bodies, trailers, and parts	3361–63	600	400	67	200	33
Aerospace products and parts	3364	250	200	80	100	40
Aircraft, aircraft engine, and aircraft parts	336411–13	200	150	75	90	45

TABLE A-9

Unit response rates, by industry and company size: 2019

(Number and percent)

Industry and company size	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of $1 million or more	
			Number	Percent	Number	Percent
Guided missile, space vehicle, and related parts	336414–15, 336419	40	30	75	20	50
Military armored vehicle, tank, and tank component	336992	20	20	100	*N* < 15	*N* < 15
Other transportation equipment	other 336	200	150	75	50	25
Furniture and related products	337	850	600	71	50	6
Miscellaneous manufacturing	339	1,300	900	69	400	31
Medical equipment and supplies	3391	550	400	73	250	45
Other miscellaneous	3399	700	500	71	150	21
Nonmanufacturing industries	21–23, 42–81	25,000	17,000	68	3,300	13
Mining, extraction, and support activities	21	600	400	67	40	7
Utilities	22	150	100	67	20	13
Wholesale trade	42	5,200	3,600	69	80	2
Electronic shopping and electronic auctions	454111–12	300	200	67	20	7
Transportation and warehousing	48–49	550	350	64	30	5
Information	51	3,100	2,100	68	1,100	35
Publishing	511	1,100	650	59	300	27
Newspaper, periodical, book, and directory publishers	5111	400	250	63	*N* < 15	*N* < 15
Software publishers	5112	700	450	64	250	36
Telecommunications	517	450	300	67	60	13
Data processing, hosting, and related services	518	1,100	850	77	600	55
Other information	other 51	450	300	67	90	20
Finance and insurance	52	800	600	75	100	13
Real estate and rental and leasing	53	400	250	63	*N* < 15	*N* < 15
Lessors of nonfinancial intangible assets (except copyrighted works)	533	80	50	63	*N* < 15	*N* < 15
Other real estate and rental and leasing	other 53	350	200	57	*N* < 15	*N* < 15
Professional, scientific, and technical services	54	8,600	6,000	70	1,600	19
Architectural, engineering, and related services	5413	2,600	2,000	77	300	12
Computer systems design and related services	5415	2,700	1,700	63	450	17
Scientific research and development services	5417	1,900	1,200	63	650	34
Biotechnology research and development	541711	450	250	56	150	33
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,300	850	65	450	35
Social sciences and humanities research and development	541720	150	100	67	20	13
Other professional, scientific, and technical services	other 54	1,500	1,000	67	250	17
Health care services	621–23	1,300	900	69	70	5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,800	2,600	68	250	7
All companies (number of domestic employees)	–	42,500	29,500	69	7,400	17
Small companies						
10–19[c]	–	7,800	5,400	69	500	6

TABLE A-9

Unit response rates, by industry and company size: 2019

(Number and percent)

Industry and company size	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of $1 million or more	
			Number	Percent	Number	Percent
20–49	–	10,500	7,500	71	1,200	11
Medium companies						
50–99	–	6,800	4,900	72	1,100	16
100–249	–	7,400	5,100	69	1,600	22
Large companies						
250–499	–	3,700	2,500	68	1,000	27
500–999	–	2,400	1,600	67	700	29
1,000–4,999	–	2,600	1,800	69	900	35
5,000–9,999	–	500	400	80	200	40
10,000–24,999	–	400	300	75	150	38
25,000 or more	–	250	200	80	100	40

NAICS = 2012 North American Industry Classification System.

[a] Active reporting units are defined as reporting units of active companies that are in the scope of the survey (for-profit companies with locations in the United States, 10 or more employees, business activities in the survey year, and primary business activities in the NAICS codes listed above) after all of the data have been processed. Because of special handling requests made by company respondents, some sampled companies were mailed more than one form. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Reporting units were considered to have fulfilled the response criteria if they reported that they performed or funded R&D. If not, a reporting unit fulfilled the response criteria if it reported a value for worldwide sales or domestic sales, or if it reported a positive value for paid worldwide employees or paid domestic employees.

[c] The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):
Beginning in survey year 2019, these counts and percentages reflect a change in rounding methodology. Detail may not add to total because of rounding.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

TABLE A-10

Companies that required an analyst action, by sampling stratum: 2019

(Number)

Stratum	Total	Companies deleted[a]	Companies requiring action due to merger or acquisition[b]	Companies requiring action due to analyst review[c]
Total	3,100	3,000	100	*N < 15*
Known positive R&D	900	800	60	*N* < 15
Certainties	650	600	50	*N* < 15
Noncertainties	250	250	*N* < 15	*N* < 15
Known zero R&D	100	100	*N* < 15	0
Certainties	60	60	*N* < 15	0
Noncertainties	40	40	*N* < 15	0
Unknown R&D	2,100	2,000	50	*N* < 15
Certainties	500	450	20	*N* < 15
Noncertainties	1,600	1,600	30	*N* < 15
Cases not in the frame	30	20	*N* < 15	*N* < 15

[a] Companies are deleted when they are found to be out of business or out of scope for the survey during the reporting period.

[b] Information regarding mergers and acquisitions comes from several sources. The information is collected on the form, and there is a presurvey phone call that requests the information from top R&D-performing companies. Information may also come from the company profiles that are maintained by survey staff.

[c] These companies are added based on a review of historic R&D and reported to the Business Enterprise Research and Development Survey and public information available on the companies' R&D expenses.

Note(s):
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

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