National Center for Science and Engineering Statistics

InfoBrief

Business R&D Performance in the United States Tops $600 Billion in 2021

NSF 23-350 | September 2023

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Businesses continued to increase their research and development (R&D) performance in 2021, spending $602 billion on R&D in the United States, a 12.1% increase from 2020 (table 1). Funding from the companies' own sources accounted for $528 billion of this spending in 2021, a 13.2% increase from 2020. Funding from other sources accounted for $75 billion, a 4.5% increase from 2020. Data for this InfoBrief are from the 2021 Business Enterprise Research and Development (BERD) Survey, developed and cosponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) and by the Census Bureau, which collected and tabulated data for the survey.[1]

Table 1

Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2018–21

(Millions of dollars)

Selected characteristic and company size	2018		2019		2020		2021	
Domestic R&D performance[a]	441,036		492,956		537,619		602,499	
Type of R&D[b]								
Basic research	28,980		32,239		36,017		40,130	
Applied research	65,222		74,031		76,088		86,485	
Development	346,834		386,686		425,514		475,884	
Paid for by the company[c]	377,806		428,968		466,162		527,804	
Basic research	22,312		25,916		29,330		32,763	
Applied research	53,229		59,697		60,620		69,130	
Development	302,264		343,355		376,213		425,912	
Paid for by others	63,230		63,989		71,457		74,695	
Basic research	6,668		6,324		6,688		7,367	
Applied research	11,993		14,333		15,468		17,355	i
Development	44,570		43,332		49,301		49,972	
Source of funds								
Federal	24,685		21,941		28,905		23,582	
Other[d]	38,545		42,048		42,552		51,113	
Size of company (number of domestic employees)								
Small companies[e]								
10–19	4,390		5,501		5,047		5,477	
20–49	11,252		12,418		12,994		15,061	

Table 1

Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2018–21

(Millions of dollars)

Selected characteristic and company size	2018		2019		2020		2021	
Medium companies								
50–99	12,321		14,021		12,993		14,540	
100–249	18,547		19,793		25,411		24,023	
Large companies								
250–499	19,645		18,883		20,878		23,932	
500–999	17,657		23,969		21,264		27,432	
1,000–4,999	68,578		75,671		88,238		94,615	
5,000–9,999	45,337		50,811		48,397		62,817	
10,000–24,999	84,420		88,263		88,567		104,607	
25,000 or more	158,889		183,626		213,829		229,995	

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

[a] Domestic R&D performance is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

[b] R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge and to devise 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 work, drawing on research and practical experience and resulting in additional knowledge, which is directed to producing new processes or to improving existing products—goods or services—or processes (development).

[c] Includes foreign subsidiaries of U.S. companies.

[d] Includes companies located inside and outside the United States; U.S. state government agencies and laboratories; U.S. universities, colleges, and academic researchers; and all other organizations located inside and outside the United States.

[e] Includes only companies with 10 or more domestic employees.

Note(s):
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.

R&D Performance, by Type of R&D, Industry Sector, and Source of Funding

In 2021, of the $602 billion that companies spent on R&D, $40 billion (7%) was spent on basic research, $86 billion (14%) on applied research, and $476 billion (79%) on development (table 1). In 2021, companies in manufacturing industries performed $326 billion (54%) of domestic R&D, defined as R&D performed in the 50 states and Washington, DC (table 2). Most of the funding came from these companies' own funds (88%). Companies in nonmanufacturing industries performed $276 billion of domestic R&D (46% of total domestic R&D performance), 87% of which was paid for from companies' own funds.

The U.S. federal government was a large source of external funding for R&D *(*also referred to as R&D paid for by others*)* across all industries. Of the $75 billion paid for by others, the federal government accounted for $24 billion. Seventy-four percent of federal government funding went to three industry groups: aerospace products and parts (North American Industry Classification System [NAICS] code 3364) ($11 billion), scientific research and development services (NAICS 5417) ($4 billion), and computer and electronic products (NAICS 334) ($3 billion). Companies also received funds from other U.S. companies ($27 billion) and foreign companies—including foreign parent companies of U.S. subsidiaries ($23 billion). Eighteen billion dollars (69%) of all business R&D funded by other U.S. companies was for scientific research and development services (NAICS 5417). The distribution of foreign company R&D funding was spread more broadly across multiple industries (table 2). (See "Survey Information and Data Availability" for information on the availability of data tables with full industry detail.)

Table 2

Funds spent for business R&D performed in the United States, by source of funds, selected industry, and company size: 2021

(Millions of dollars)

Industry, NAICS code, and company size	All R&D[a]	Paid for by the company[b]	Paid for by others				
			Total	Federal	Companies		All other organizations[d]
					Domestic	Foreign[c]	
All industries, 21–23,31-33, 42–81	602,499	527,804	74,695	23,582	26,587 i	23,256	1,271
Manufacturing industries, 31–33	326,060	287,666	38,394	16,374	6,601	14,855	564
Chemicals, 325	109,490	97,097	12,393	1,223	2,654	8,418	98
Pharmaceuticals and medicines, 3254	100,220	88,524	11,697	1,194	2,631	7,777	94
Other 325	9,270	8,573	696	29	23	641	4
Machinery, 333	17,730	16,726	1,003	503	211	278	11
Computer and electronic products, 334	101,063	94,211	6,852	2,828	1,650	2,290	82
Electrical equipment, appliance, and components, 335	5,494	5,007	486	25	12	448	1
Transportation equipment, 336	50,760	34,405	16,356	11,670 i	1,534	2,870	D
Motor vehicles, bodies, trailers, and parts, 3361–63	26,391	22,754	3,637	48	808	2,713 i	D
Aerospace products and parts, 3364	21,468 i	9,900 i	11,568 i	10,527 i	724	D	D
Other 336	2,901	1,751	1,151	1,095	2	D	D
Manufacturing nec, other 31–33	41,523	40,220	1,304	125	540	551	D
Nonmanufacturing industries, 21–23, 42–81	276,439	240,138	36,300 i	7,207	19,986 i	8,400 i	707
Information, 51	147,855	146,488	1,366	377	271	694	24
Software publishers, 5112	39,049	38,441	608	13	240	336 r	18
Other 51	108,806	108,047	758	364	31	358	6
Finance and insurance, 52	20,947	20,902	45	0	45	0	0
Professional, scientific, and technical services, 54	66,496	32,083	34,413 i	6,790	19,555 i	7,470 i	598 i
Computer systems design and related services, 5415	20,409	17,188	3,221	569	553	2,043	56
Scientific research and development services, 5417	34,142 i	6,123	28,019 i	4,106	18,420 i	5,163 i	332 i
Other 54	11,945	8,772	3,173	2,115	582	264	210
Nonmanufacturing nec, Other 21–23, 42–81	41,141	40,665	476	40	115	236	85
Size of company (number of domestic employees)							
Small companies[e]							
10–19	5,477	4,258	1,219	444	D	D	D
20–49	15,061	12,626	2,434	912	792	461	268
Medium companies							
50–99	14,540	12,488	2,052	694	483	774	101
100–249	24,023	20,030	3,993	1,421	971	1,437	163
Large companies							
250–499	23,932	20,574	3,358	1,065	491	1,769	33
500–999	27,432	23,655	3,777	1,271	912	1,490	104
1,000–4,999	94,615	83,609	11,006	2,137	2,329 i	6,394	D
5,000–9,999	62,817	53,873	8,944 i	1,107	3,416	4,281 i	11
10,000–24,999	104,607	84,057	20,549	2,961	11,200 i	6,319	D
25,000 or more	229,995	212,634	17,361	11,570 i	D	D	D

D = suppressed to avoid disclosure of confidential information; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

[b] Includes foreign subsidiaries of U.S. companies ($32.1 billion).

[c] Includes foreign parent companies of U.S. subsidiaries ($20.8 billion) and unaffiliated companies ($2.5 billion). Excludes funds from foreign

subsidiaries to U.S. companies paid for through intercompany transactions ($32.1 billion).

[d] Includes U.S. state government agencies and laboratories ($0.3 billion); U.S. universities, colleges, and academic researchers (< $0.01 billion); and all other organizations located inside ($0.7 billion) and outside the United States (< $0.01 billion).

[e] Includes only companies with 10 or more domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification was 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. 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, 2021.

Sales, R&D Intensity, and Employment of Companies That Performed or Funded R&D

U.S. companies that performed or funded R&D reported domestic net sales of $13 trillion in 2021 (table 3).[2] For all industries, the R&D intensity (R&D-to-sales ratio) was 4.6%; for manufacturers, 5.0%; and for nonmanufacturers, 4.2%. Manufacturing industries with high levels of R&D intensity in 2021 were pharmaceuticals and medicines (NAICS 3254) (16.1%) and computer and electronic products (NAICS 334) (13.0%). Among the nonmanufacturing industries, industries with high levels of R&D intensity were scientific research and development services (NAICS 5417) (41.2%), software publishers (NAICS 5112) (12.9%), and computer systems design and related services (NAICS 5415) (10.2%).

Businesses that performed or funded R&D employed 23.7 million people in the United States in 2021 (table 3).[3] Approximately 2.1 million (9%) were business R&D employees.[4]

Of the 2.1 million people working on R&D in companies that performed or funded business R&D in 2021, 1.5 million were men and 0.6 million were women; 48% of the men and 45% of the women worked in manufacturing industries (table 4). Researchers—that is, scientists, engineers, and their managers—accounted for 1.4 million of the 2.1 million R&D workers (67%). Of the R&D workers, 130,000 (9%) held PhD degrees. R&D technicians numbered 501,000, and 205,000 were grouped as other supporting staff.

Table 3

Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2021

(Millions of dollars, percent R&D intensity, and thousands of employees)

Industry, NAICS code, and company size	Domestic net sales ($millions)[a]	All R&D ($millions)[b]		R&D intensity (%)[c]	Domestic employment (headcounts in thousands)[d]		
					Total		R&D[e]
All industries, 21–33, 42–81	13,097,756	602,499		4.6	23,654		2,132
Manufacturing industries, 31–33	6,550,600	326,060		5.0	10,334		1,015
Chemicals, 325	1,309,684	109,490		8.4	1,392		201
Pharmaceuticals and medicines, 3254	624,341	100,220		16.1	638		157
Other 325	685,343	9,270		1.4	754		44
Machinery, 333	427,096	17,730		4.2	932		100
Computer and electronic products, 334	778,262	101,063		13.0	1,058		256
Electrical equipment, appliance, and components, 335	156,050	5,494		3.5	271		26
Transportation equipment, 336	1,014,159	50,760		5.0	1,863		196
Motor vehicles, bodies, trailers, and parts, 3361–63	623,254	26,391		4.2	889		108
Aerospace products and parts, 3364	311,988	21,468	i	6.9	794		75
Other 336	78,917	2,901		3.7	180		13
Manufacturing nec, other 31–33	2,865,349	41,523		1.4	4,818		236
Nonmanufacturing industries, 21–23, 42–81	6,547,157	276,439		4.2	13,320		1,117
Information, 51	1,703,835	147,855		8.7	2,186		449

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Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2021

(Millions of dollars, percent R&D intensity, and thousands of employees)

Industry, NAICS code, and company size	Domestic net sales ($millions)[a]	All R&D ($millions)[b]		R&D intensity (%)[c]	Domestic employment (headcounts in thousands)[d]		
					Total		R&D[e]
Software publishers, 5112	303,134	39,049		12.9	454		125
Other 51	1,400,701	108,806		7.8	1,732		324
Finance and insurance, 52	1,537,769	20,947		1.4	1,729		87
Professional, scientific, and technical services, 54	483,784	66,496		13.7	1,530		343
Computer systems design and related services, 5415	199,429	20,409		10.2	540		102
Scientific research and development services, 5417	82,907	34,142	i	41.2	277		130
Other 54	201,448	11,945		5.9	713		111
Nonmanufacturing nec, other 21–23, 42–81	2,821,769	41,141		1.5	7,875		238
Size of company (number of domestic employees)							
Small companies[f]							
10–19	35,815	5,477		15.3	85		36
20–49	104,550	15,061		14.4	298		99
Medium companies							
50–99	146,296	14,540		9.9	418		92
100–249	381,256	24,023		6.3	886		157
Large companies							
250–499	371,747	23,932		6.4	741		110
500–999	499,161	27,432		5.5	926		110
1,000–4,999	2,000,807	94,615		4.7	3,148		340
5,000–9,999	1,536,766	62,817		4.1	1,933		211
10,000–24,999	2,240,551	104,607		4.7	3,260		309
25,000 or more	5,780,807	229,995		4.0	11,959		668

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

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] Dollar values are for goods sold or services rendered by R&D-performing or R&D-funding companies located in the United States to customers outside of 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 company are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

[b] All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

[c] R&D intensity is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company divided by domestic net sales of companies that performed or funded R&D.

[d] Data recorded on 12 March represent employment figures for the year.

[e] Headcounts of researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups.

[f] Includes only companies with 10 or more domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification was 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.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

Table 4

Domestic employment, R&D employment by sex and work activity, R&D researchers by level of education, and full-time equivalent researcher employment for companies that performed or funded business R&D in the United States, by industrial sector: 2021

(Thousands of employees)

Industry and NAICS code	Domestic employment[a]	R&D employment									
		Total	Male	Female	Researchers[b]		Technicians and equivalent staff	Other supporting staff[c]	Full-time equivalent[d]	
					Total	With PhD			Total	Researchers[b]
All industries, 21–33, 42–81	23,654	2,132	1,536	596	1,426	130	501	205	1,941	1,311
Manufacturing industries, 31–33	10,334	1,015	744	270	680	78	215	120	923	622
Nonmanufacturing industries, 21–23, 42–81	13,320	1,117	791	326	747	52 i	286	84	1,017	689

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

NAICS = North American Industry Classification System.

[a] Data recorded on 12 March represent employment figures for the year.
[b] Includes R&D scientists and engineers and their managers.
[c] Includes clerical staff and others assigned to R&D groups.
[d] 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.

Note(s):
Detail may not add to total because of rounding. Industry classification was 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. Excludes data for federally funded research and development centers. Also available in the full set of data tables are statistics on domestic R&D employment, by state; foreign R&D personnel headcounts, by country; and headcounts of leased (i.e., external) R&D personnel, by function.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

R&D Performance, by Company Size

Small- and medium-sized companies (10–249 domestic employees) performed 9.8% of the nation's total business R&D in 2021 (table 3).[5] For these companies as a group, the R&D intensity was 8.8%. These companies accounted for 5% of sales and employed 7% of the 23.7 million employees who worked for R&D-performing or R&D-funding companies. They employed 18% of the 2.1 million employees engaged in business R&D in the United States.

Large companies with 250–24,999 domestic employees performed 52% of the nation's total business R&D in 2021, and their R&D intensity was 4.7%. They accounted for 51% of sales, employed 42% of those who worked for R&D-performing or R&D-funding companies, and employed 51% of R&D employees in the United States.

The largest companies (25,000 or more domestic employees) performed 38% of the nation's total business R&D in 2021, and their R&D intensity was 4.0%. They accounted for 44% of sales, employed 51% of those who worked for R&D-performing or R&D-funding companies, and employed 31% of business R&D employees in the United States.

R&D Performance, by State

In 2021, of the $602 billion of R&D performed in the United States, businesses in California alone accounted for 35.1% (table 5). Other states with large amounts of business R&D were Washington (8.1% of the national total in 2021), Massachusetts (6.6%), Texas (4.7%), New York (4.4%), and New Jersey (4.2%).[6]

Table 5

Funds spent for business R&D performed in the United States, by state and source of funds: 2021

(Millions of dollars)

State	All R&D[a]		Paid for by the company		Paid for by others	
United States	602,499		527,804		74,695	
Alabama	2,910		1,383		1,528	i
Alaska	207	i	188	i	18	
Arizona	9,386		6,947		2,440	i
Arkansas	497		452		45	
California	211,615		199,157		12,458	
Colorado	8,098		7,213		886	
Connecticut	8,429		6,887		1,543	
Delaware	3,592		2,137		1,455	
District of Columbia	744		652		92	
Florida	9,688		7,545		2,143	
Georgia	6,448		5,249		1,199	i
Hawaii	409		372	i	38	
Idaho	2,258		2,203		54	
Illinois	16,485		15,398		1,087	
Indiana	9,514	i	7,888	i	1,627	
Iowa	3,045		2,338		707	i
Kansas	2,748		1,960		788	i
Kentucky	1,486		897		590	
Louisiana	530		444		86	
Maine	499		444		55	
Maryland	6,432		4,550		1,882	
Massachusetts	39,749		33,937		5,812	
Michigan	22,381		19,420		2,962	
Minnesota	8,248		7,754		494	
Mississippi	343		307		36	
Missouri	7,060		4,927		2,133	i
Montana	261		237		24	
Nebraska	1,067		1,004		62	
Nevada	1,033		757		276	
New Hampshire	3,183		1,461		1,723	
New Jersey	25,049		20,091		4,958	
New Mexico	1,693		1,351		342	
New York	26,319		23,939		2,379	
North Carolina	15,490		9,812		5,678	i
North Dakota	343		330		12	
Ohio	11,545		7,814		3,730	
Oklahoma	1,056		969		87	
Oregon	11,292		10,954		338	
Pennsylvania	17,555		14,541		3,014	i
Rhode Island	837		689		149	i
South Carolina	1,857		1,601		256	
South Dakota	221		213		8	
Tennessee	2,776	i	1,802		974	i
Texas	28,264		24,495		3,770	i
Utah	3,962		3,730		232	
Vermont	456		434		22	
Virginia	8,179		6,330		1,849	
Washington	49,083		47,644		1,440	

Table 5

Funds spent for business R&D performed in the United States, by state and source of funds: 2021

(Millions of dollars)

State	All R&D[a]		Paid for by the company		Paid for by others	
West Virginia	522	i	435	i	86	
Wisconsin	6,781		5,723		1,058	
Wyoming	93		88		5	i
Undistributed funds[b]	780		712		67	

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

[a] All R&D is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the respondent company.

[b] 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.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

Capital Expenditures

Companies that performed or funded R&D in the United States in 2021 spent $793 billion on capital, that is, assets with expected useful lives of more than 1 year (table 6). Of this amount, $53 billion (7%) was for assets used for domestic R&D operations (i.e., land acquisitions, buildings and land improvement, equipment, capitalized software, and other assets). Companies in manufacturing industries spent $28 billion on capital for domestic R&D, and companies in nonmanufacturing industries spent $24 billion. Industries with high levels of capital expenditures on assets used for domestic R&D in 2021 were pharmaceuticals and medicines (NAICS 3254) ($7.5 billion, or 14% of national capital expenditures on assets used for R&D) and semiconductor and other electronic products (NAICS 3344) ($5 billion, or 9%). Among all types of capital assets, manufacturing industries spent the most on equipment ($15 billion, or 53% of total capital assets used for domestic R&D), and nonmanufacturing industries disbursed the most on capitalized software ($13.7 billion, or 56%).

Table 6

Capital expenditures in the United States, total and used for domestic R&D, by type of expenditure, industry, and company size: 2021

(Millions of U.S. dollars)

Selected industry, NAICS code, and company size	Total[b]		Used for domestic R&D[a]													
			Total[b,c]		Land acquisition		Buildings and land improvement[d]		Equipment		Capitalized software		Other intellectual property		All other and undistributed[e]	
All industries, 21–33, 42–81	793,263		52,844		584	i	5,220		19,665		16,247	i	5,711		5,417	i
Manufacturing industries, 31–33	304,707		28,450		243		3,877		15,169		2,596		3,654		2,910	
Chemicals, 325	64,081		8,291		16	i	1,968		3,346		535		1,190		1,236	
Pharmaceuticals and medicines, 3254	28,013		7,504		14	i	1,840		2,885		406		1,179		1,180	
Other 325	36,068		787		2	i	128		461		129		11		56	
Machinery, 333	17,941		1,295		*		122		783		140		11		238	
Computer and electronic products, 334	53,170		9,468		122		792		5,312		1,064	i	1,691		487	i
Communication equipment, 3342	4,222		731		44		0 - 102		459		128	i	0 - 102	i	0 - 102	

Table 6

Capital expenditures in the United States, total and used for domestic R&D, by type of expenditure, industry, and company size: 2021

(Millions of U.S. dollars)

Selected industry, NAICS code, and company size	Total[b]	Used for domestic R&D[a]													
		Total[b,c]		Land acquisition		Buildings and land improvement[d]		Equipment		Capitalized software		Other intellectual property		All other and undistributed[e]	
Semiconductor and other electronic products, 3344	32,074	5,014	i	37	i	286	i	3,218		731	i	444	i	299	i
Other 334	16,874	3,723		41		*		1,635		205		*		*	
Electrical equipment, appliance, and components, 335	4,119	389		*		42		190		58		5		94	
Transportation equipment, 336	53,820	3,652		81	i	431		2,156		502	i	263		218	
Motor vehicles, bodies, trailers, and parts, 3361–63	42,528	2,813	i	68	i	308		1,654	i	475	i	98 - 263		42 - 208	i
Aerospace products and parts, 3364	8,998	704		0 - 14		113		401		25		0 - 150		1 - 167	
Other 336	2,294	135		*		10		101		2		*		*	
Manufacturing nec, other 31–33	111,576	5,355		*		522		3,382		297		494		637	
Nonmanufacturing industries, 21–23, 42–81	488,556	24,394	i	341	r	1,342	i	4,496		13,651	i	2,056	i	2,507	i
Information, 51	188,156	10,768		5		608	i	1,661		6,744	i	1,282	i	469	
Software publishers, 5112	30,445	2,877		5		131		570		1,525		521	i	125	
Telecommunications, 517	80,916	239	i	0		*		26	i	173	i	*		40	i
Other 51	76,795	7,652		0		*		1,065		5,046		*		304	
Finance and insurance, 52	29,975	3,491		0		10	i	104	i	3,256		16	i	105	
Professional, scientific, and technical services, 54	23,487	5,028		324	r	592		1,797		1,676	i	345		295	
Computer systems design and related services, 5415	13,041	2,367		0		82		922		1,171	i	65		126	
Scientific research and development services, 5417	3,934	1,467		24		435		669		147		57	i	135	
Other 54	6,512	1,194		300		75		206		358		223		34	
Nonmanufacturing nec, other 21–23, 42–81	246,938	5,107		12		132		934		1,975		413		1,638	
Size of company (number of domestic employees)															
Small companies[f]															
10–19	4,398	474		7	i	33	i	207	i	121		71		35	i
20–49	6,962	1,719		211	r	205		700		247	i	154	i	202	
Medium companies															
50–99	7,708	1,733		13	i	322		816		302		63		217	
100–249	21,307	3,102		34	i	260		983		1,004	i	586		236	
Large companies															
250–499	18,528	2,835		31	i	309		805		985		373		331	
500–999	22,388	3,012		49	i	320		1,099		1,113		162		269	
1,000–4,999	94,802	8,427		79		983		2,893		2,707		797		967	
5,000–9,999	90,879	5,864		22		297		2,046		2,716		154		628	
10,000–24,999	151,918	7,891		64	i	818		4,108		1,371		566		963	i
25,000 or more	374,373	17,787	i	74	i	1,672	i	6,008	i	5,682	i	2,784		1,567	i

* = amount < $500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] Domestic R&D is the R&D paid for by the respondent company and others outside of the company and performed by the company.

[b] Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. BERD Survey statistics exclude the cost of assets acquired through mergers and acquisitions.

[c] Capital 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 is included in its R&D expense. For 2021, depreciation associated with domestic R&D paid for and performed by the company was $18.4 billion and with domestic R&D performed by the company and paid for by others was $2.7 billion.

[d] Includes the cost of purchased or improved buildings and other facilities that are fixed to the land.

[e] Includes the cost of other capital expenditures, including purchased patents and other intangible assets, and expenditures not distributed among the categories shown.

[f] Includes only companies with 10 or more domestic employees.

Note(s):
Detail may not add to total because of rounding. Industry classification was based on 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. 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 U.S. Census Bureau, Business Enterprise Research and Development Survey, 2021.

Survey Information and Data Availability

The sample for the BERD Survey was selected to represent all for-profit, nonfarm companies that were publicly or privately held, had 10 or more employees in the United States, and performed or funded R&D either domestically or abroad. The estimates in this InfoBrief are based on responses from a sample of the population and may differ from actual values because of sampling variability or other factors. As a result, apparent differences between the estimates for two or more groups may not be statistically significant. All comparative statements in this InfoBrief have undergone statistical testing and are significant at the 90% confidence level unless otherwise noted. The variances of estimates in this report were calculated using design-based formulas. Also, because the statistics from the survey are based on a sample, they are subject to both sampling and nonsampling errors. (See the 2021 "Technical Notes" at https://ncses.nsf.gov/surveys/business-enterprise-research-development/.)[7]

Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation.

In this InfoBrief, money amounts are expressed in current U.S. dollars and are not adjusted for inflation. A company is defined as a business organization located in the United States, either U.S. owned or a U.S. affiliate of a foreign parent company, of one or more establishments under common ownership or control.

For 2020, a total of 47,500 companies were sampled to represent the population of 1,140,000 companies; for 2021, a total of 47,500 companies were sampled, representing 1,137,000 companies. The actual numbers of reporting units in the sample that remained within the scope of the survey between sample selection and tabulation were 44,500 for 2020 and 44,000 for 2021. These lower counts represent the number of reporting units that were determined to be within the scope of the survey after all data collected were processed. Reasons for the reduced counts include mergers, acquisitions, and instances where companies had fewer than 10 employees in the United States or had gone out of business in the interim. Of these in-scope reporting units, 67% were considered to have met the criteria for a complete response to the 2020 survey; 69% fulfilled the 2021 complete response criteria. Coverage of the previous year's known positive R&D stratum for 2020 was 92%; the coverage rate for 2021 was also 92%. Industry classification was based on the dominant business activity for domestic R&D performance, where available. For reporting units that did not report business activity codes for R&D, the classification used for sampling was assigned.

The estimation methodology for state estimates in the BERD Survey 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. Table 5 shows the adjusted state estimates after this estimation methodology was applied.

The full set of data tables from the 2021 survey will be available at the BERD Survey page. Individual data tables and tables with relative standard errors and imputation rates from the 2021 survey are available from the author in advance of the full release. To minimize reporting burden, survey items are rotated on and off the survey on an odd- and even-numbered year schedule. Statistics on patents, intellectual property, and technology transfer activities were rotated off the survey for 2021. Items rotated on the survey for 2021 include questions on R&D performed by others by type of performer, federal R&D by government agency, and R&D by application area.

The BERD Survey contains confidential data that are protected under Title 13 and Title 26 of the U.S. Code. Restricted microdata can be accessed at the secure Federal Statistical Research Data Centers (FSRDCs) administered by the Census Bureau. FSRDCs are partnerships between federal statistical agencies and leading research institutions. FSRDCs provide secure environments supporting qualified researchers using restricted-access data while protecting respondent confidentiality. Researchers interested in using the microdata can submit a proposal to the Census Bureau, which evaluates proposals based on their benefit to the Census Bureau, scientific merit, feasibility, and risk of disclosure. To learn more about the FSRDCs and how to apply, please visit https://www.census.gov/about/adrm/fsrdc.html.

Suggested Citation

Britt R; National Center for Science and Engineering Statistics (NCSES). 2023. *Business R&D Performance in the United States Tops $600 Billion in 2021*. NSF 23-350. Alexandria, VA: National Science Foundation. Available at http://ncses.nsf.gov/pubs/nsf23350.

Notes

1 NSF 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 (ABS), another survey cosponsored with the Census Bureau, and BRDIS became the Business Research and Development Survey (BRDS). Beginning with 2019, the business R&D data collection reported here was renamed the Business Enterprise Research and Development (BERD) Survey for international comparability.

2 Determining the amount of domestic net sales and operating revenues was left to the reporting company. However, guidance was given to include revenues from foreign operations and subsidiaries and from discontinued operations and to exclude intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

3 Employment statistics in this InfoBrief are headcounts unless they are designated as full-time equivalent (FTE) estimates. R&D employees include researchers (defined as R&D scientists and engineers and their managers) and the technicians, technologists, and support staff members who work on R&D or who provide direct support to R&D activities.

4 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 was 1.9 million FTEs, of which 1.3 million FTEs were R&D researchers.

5 Company size classifications changed for 2017 and subsequent years in response to the revised *Frascati Manual*; see Organisation for Economic Co-operation and Development (OECD). 2015. *Frascati Manual: Guidelines for Collecting and Reporting Data on Research and Experimental Development. The Measurement of Scientific, Technological, and Innovation Activities*. Paris: OECD Publishing. Available at https://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en. Anderson and Kindlon (2019) provide estimates of R&D performance and employment using these new classifications over 2008–15. The authors also compare the trends to those observed in SIRD for the time prior to 2008. The ABS, also cosponsored by NCSES and the Census Bureau, collects R&D data from companies with fewer than 10 employees for 2017 and beyond. See Anderson G, Kindlon A; NCSES. 2019. *Indicators of R&D in Small Businesses: Data from the 2009–15 Business R&D and Innovation Survey*. InfoBrief NSF 19-316. Alexandria, VA: National Science Foundation. Available at https://www.nsf.gov/statistics/2019/nsf19316/.

6 In addition to statistics for all states and for all states by industry, below-state level statistics are available in the full set of data tables and in other InfoBriefs; see Shackelford B, Wolfe R; NCSES. 2019. *Over Half of U.S. Business R&D Performed in 10 Metropolitan Areas in 2015*. InfoBrief NSF 19-322. Alexandria, VA: National Science Foundation. Available at https://www.nsf.gov/statistics/2019/nsf19322/. Also see Shackelford B, Wolfe R; NCSES. 2020. *Businesses Performed 60% of Their U.S. R&D in 10 Metropolitan Areas in 2018*. InfoBrief NSF 21-331. Alexandria, VA: National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf21331. Information and statistics on U.S. state trends in R&D, science and engineering education, workforce, patents and publications, and knowledge-intensive industries is also available in the Science and Engineering State Indicators data tool at https://ncses.nsf.gov/indicators/states.

7 The Census Bureau reviewed the information in this InfoBrief for unauthorized disclosure of confidential information and approved the disclosure avoidance practices applied (Project No. P-7504682, Disclosure Review Board (DRB) approval number: CBDRB-FY23-0161).

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