National Center for Science and Engineering Statistics

InfoBrief

Microbusinesses Performed $4.5 Billion of R&D in the United States in 2018

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Businesses with one to nine domestic employees (termed here as microbusinesses) spent $6.5 billion on research and development costs in the United States (**table 1**),[1] of which $4.5 billion was R&D performed by the microbusinesses themselves (amount includes both R&D performed and funded by the business and R&D performed by the business and funded by others). This amount is in addition to the $441 billion spent on domestic R&D performance in 2018 by businesses with 10 or more employees.[2] Data for this InfoBrief are from the 2019 Annual Business Survey (ABS) (data year 2018), developed and cosponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation and by the Census Bureau. The ABS is the primary source of information on R&D expenditures for microbusinesses. The ABS also collects data related to innovation, intellectual property, technology use, and business-owner characteristics from those businesses with one or more employees. Data from selected industries are highlighted in this InfoBrief.

Table 1

Annual business survey aggregate R&D estimates, by employment size, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Company and financial information	All companies	1–4 employees	5–9 employees
Number of companies	12,975	7,843	5,133
Total R&D cost	6,467,338	2,644,204	3,823,134
Foreign R&D cost	700,609	326,353	374,256
Domestic R&D cost	5,766,729	2,317,852	3,448,877
Domestic R&D cost for salaries, wages, and fringe benefits	2,818,156	1,122,207	1,695,949
Domestic R&D cost for expensed machinery and equipment (not capitalized)	163,888	86,736	77,152
Domestic R&D cost for materials and supplies	425,260	187,470	237,790
Domestic R&D cost for payments to others for R&D	1,239,892	427,124	812,768
Domestic R&D cost for depreciation on R&D property and equipment	60,036	26,662	33,374
Domestic R&D cost for other costs	1,059,498	467,652	591,846
Domestic R&D performance	4,526,838	1,890,728	2,636,110

Table 1

Annual business survey aggregate R&D estimates, by employment size, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Company and financial information	All companies		1–4 employees		5–9 employees	
Domestic R&D performance paid for by company	3,570,660		1,408,768		2,161,892	
Domestic R&D performance paid for by foreign owner	175,207		65,659		109,548	
Domestic R&D performance paid for by another U.S. business	196,003		109,838		86,165	
Domestic R&D performance paid for other businesses located outside the United States	34,019		18,875		15,144	
Domestic R&D performance paid for by U.S. university or college	10,459		3,956		6,503	
Domestic R&D performance paid for by U.S. nonprofit organization	13,871		7,552		6,319	
Domestic R&D performance paid for by U.S. federal government	506,856		263,610		243,246	
Domestic R&D performance paid for by U.S. state or local government	17,078		11,321		5,757	
Domestic R&D performance paid for by all other organizations outside the United States	2,685	r	1,149	r	1,536	r
Domestic R&D performance for basic research	224,480		93,473		131,007	
Domestic R&D performance for applied research	1,365,493		635,779		729,714	
Domestic R&D performance for development	2,936,865		1,161,476		1,775,389	

r = relative standard error > 50%.

Note(s):
Detail may not add to total because of rounding. Statistics are representative of companies located in the United States.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

Characteristics of Microbusiness R&D Performance

By Industry

As was the case in 2017, microbusiness R&D is highly concentrated within a few industries.[3] In 2018, R&D costs by microbusinesses in the United States were approximately $6.5 billion (table 1) of which $4.5 billion or (70%) were performed by the microbusinesses themselves. Of this performance total, nonmanufacturing industries accounted for $4.0 billion (88%) (table 2).

In 2018, the ABS found that nearly three-quarters (72%) of all microbusiness R&D performance was undertaken by microbusinesses classified as professional, scientific, and technical services (North American Industry Classification System [NAICS] 54). NAICS 54 includes, among others, three R&D-intensive industry groups: architectural, engineering, and related services (NAICS 5413), computer systems design and related services (NAICS 5415), and scientific research and development services (NAICS 5417).

By Type of R&D

There are three types of R&D: basic research, applied research, and experimental development.[4] Almost two-thirds (65%) of microbusiness R&D performance in 2018 was spent on development, 30% on applied research, and 5% on basic research (table 2). Microbusiness manufacturers spent 9% of their R&D on basic research, compared with the 4% of R&D total that microbusinesses in nonmanufacturing industries spent on basic research.

Table 2

Domestic R&D performed by the company, by selected industry and type of R&D, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Industry	NAICS code	Total		Basic research		Applied research		Development	
All selected industries	31–33, 42, 51, 5413, 5415, 5417	4,526,838		224,480		1,365,493		2,936,865	
Manufacturing industries	31–33	555,676		49,533		180,583		325,559	
Food, beverage, and tobacco products	311–12	D		0		D		0	
Textile, apparel, and leather products	313–16	859	r	0		859	r	0	
Wood products	321	0		0		0		0	
Paper	322	0		0		0		0	
Printing and related support activities	323	D		0		D		D	
Petroleum and coal products	324	D		D		D		D	
Chemicals	325	86,272		4,385		33,276		48,611	
Pharmaceuticals and medicines	3254	54,581		2,801		26,337		25,443	
Chemicals, excluding pharmaceuticals	other 325	31,691		1,583		6,939		23,169	r
Plastics and rubber products	326	0		0		0		0	
Nonmetallic mineral products	327	5,159	r	162	r	1,084	r	3,913	r
Primary metals	331	0		0		0		0	
Fabricated metal products	332	2,465	r	D		D		918	
Machinery	333	42,431		6,448	r	20,151		15,832	
Computer and electronic products	334	303,711		26,553		93,347		183,811	
Semiconductor and other electronic components	3344	56,813		1,943	r	18,177		36,692	
Navigational, measuring, electromedical, and control instruments	3345	200,704		21,524	r	61,629		117,551	
Other computer and electronic products	other 334	46,194		3,086		13,541		29,567	
Electrical equipment, appliances, and components	335	27,954		2,031	r	7,613		18,310	
Transportation equipment	336	12,979		256	r	3,591		9,132	
Aerospace products and parts	3364	10,181		256	r	1,964		7,962	
Other transportation equipment	other 336	D		0		D		D	
Furniture and related products	337	0		0		0		0	
Miscellaneous manufacturing	339	69,921		9,062		17,024	r	43,835	
Selected nonmanufacturing industries	42, 51, 5413, 5415, 5417	3,971,162		174,947		1,184,910		2,611,305	
Wholesale trade	42	183,533		6,546		31,199	r	145,788	
Information	51	518,090		25,486		105,320		387,284	
Software publishers	5112	368,288		16,822		77,207		274,260	
Information, excluding software publishers	51 excluding 5112	149,801		8,664		28,113		113,025	
Architectural, engineering, and related services	5413	411,987		15,960		119,239		276,788	
Computer systems design and related services	5415	1,037,581		57,312		237,917		742,352	
Scientific research and development services	5417	1,819,972		69,643		691,236		1,059,093	
Research and development in nanotechnology	541713	292,766		9,149		111,002		172,615	
Research and development in biotechnology (except nanobiotechnology)	541714	656,579		22,146		227,757		406,676	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	841,697		36,854		337,943		466,900	
Social sciences and humanities research and development	541720	12,008		D		6,631		4,149	

D = withheld to avoid disclosing data for individual companies; data are included in higher level totals. r = relative standard error > 50%.

NAICS = 2017 North American Industry Classification System.

Note(s):
Detail may not add to total because of rounding or unavailable NAICS detail for select records beyond the four-digit industry classification. Industry classification is based on the dominant establishment payroll. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

By Source of Funding

In 2018, four-fifths (79%) of microbusiness R&D performance were funded from companies' own sources, 12% was from federal, state, or local governments combined, and 4% each came from another U.S. company or the microbusinesses' foreign owner (if it had one) (table 3). Manufacturing microbusinesses have a greater proportion of R&D performance funded by the company (87%) than do nonmanufacturing microbusinesses (78%). In scientific research and development services (NAICS 5417), 68% of microbusiness R&D was self-funded, and 19% was funded by government sources. Two-thirds (66%) of all government funding ($524 million) spent on microbusiness R&D went to companies in scientific research and development services (NAICS 5417).

Table 3

Domestic R&D performed by the company, by selected industry and source of funds, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Industry	NAICS code	Total	Paid for by the company	Foreign owner	Another U.S. company	Other businesses outside the United States	U.S. university or college	U.S. nonprofit organization	U.S. federal government	U.S. state or local government	All other organizations outside the United States
All selected industries	31–33, 42, 51, 5413, 5415, 5417	4,526,838	3,570,660	175,207	196,003	34,019	10,459	13,871	506,856	17,078	2,685 r
Manufacturing industries	31–33	555,676	485,450	16,203 r	9,378	1,325	168	3,459	36,435	2,515	744 r
Food, beverage, and tobacco products	311–12	D	0	0	0	0	0	0	D	0	0
Textile, apparel, and leather products	313–16	859 r	859 r	0	0	0	0	0	0	0	0
Wood products	321	0	0	0	0	0	0	0	0	0	0
Paper	322	0	0	0	0	0	0	0	0	0	0
Printing and related support activities	323	D	D	0	0	0	0	0	0	0	0
Petroleum and coal products	324	D	D	0	0	0	D	0	0	0	0
Chemicals	325	86,272	70,652	9,990 r	734	902	D	D	2,273	D	D
Pharmaceuticals and medicines	3254	54,581	41,432	D	734	D	D	D	1,173 r	0	0
Chemicals, excluding pharmaceuticals	other 325	31,691	29,220	D	0	D	D	0	1,100	D	D
Plastics and rubber products	326	0	0	0	0	0	0	0	0	0	0
Nonmetallic mineral products	327	5,159 r	4,981 r	0	D	0	0	0	0	0	0
Primary metals	331	0	0	0	0	0	0	0	0	0	0
Fabricated metal products	332	2,465 r	D	0	0	0	0	0	D	0	0
Machinery	333	42,431	30,360 r	D	D	0	0	0	8,259 r	D	D
Computer and electronic products	334	303,711	280,244	5,693	3,018	266 r	116 r	2,083 r	11,562	626	D
Semiconductor and other electronic components	3344	56,813	50,819	D	D	0	D	D	2,627	D	0
Navigational, measuring, electromedical, and control instruments	3345	200,704	186,974	D	2,251	D	D	D	6,067	459	D
Other computer and electronic products	other 334	46,194	42,451	0	732	D	0	0	D	0	D
Electrical equipment, appliances, and components	335	27,954	22,791	0	D	D	0	0	D	0	0
Transportation equipment	336	12,979	11,581	0	D	0	0	0	D	0	0
Aerospace products and parts	3364	10,181	8,783	0	D	0	0	0	D	0	0
Other transportation equipment	other 336	D	D	0	0	0	0	0	0	0	0
Furniture and related products	337	0	0	0	0	0	0	0	0	0	0
Miscellaneous manufacturing	339	69,921	58,982	D	D	0	0	D	9,197 r	D	0
Selected nonmanufacturing industries	42, 51, 5413, 5415, 5417	3,971,162	3,085,210	159,004	186,625	32,694	10,291	10,412	470,422	14,563	1,941 r
Wholesale trade	42	183,533	153,989	D	0	0	0	0	D	0	0
Information	51	518,090	496,623	3,445	4,943	D	D	D	10,530	D	D
Software publishers	5112	368,288	354,181	2,574	2,702	D	D	0	7,327	D	D

Table 3

Domestic R&D performed by the company, by selected industry and source of funds, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Industry	NAICS code	Total	Paid for by the company	Foreign owner	Another U.S. company	Other businesses outside the United States	U.S. university or college	U.S. nonprofit organization	U.S. federal government	U.S. state or local government	All other organizations outside the United States
Information, excluding software publishers	51 excluding 5112	149,801	142,442	D	2,241 r	0	D	D	3,203	0	0
Architectural, engineering, and related services	5413	411,987	290,228	0	71,069 r	12,688 r	3,523 r	D	33,196	615 r	D
Computer systems design and related services	5415	1,037,581	899,993	11,450 r	58,946	D	D	D	65,678	D	0
Scientific research and development services	5417	1,819,972	1,244,377	140,577	51,667	19,315	5,622	8,657	335,006	13,190	1,562 r
Research and development in nanotechnology	541713	292,766	207,792	10,015 r	16,536	1,247 r	1,812 r	D	53,413	1,886 r	D
Research and development in biotechnology (except nanobiotechnology)	541714	656,579	471,921	61,395	9,869	10,268	1,218	385 r	95,997	4,116	D
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	841,697	546,569	67,492 r	25,262	7,167	2,592	4,171 r	181,144	7,188	D
Social sciences and humanities research and development	541720	12,008	8,585	0	0	0	0	0	3,424	0	0

D = withheld to avoid disclosing data for individual companies; data are included in higher level totals. r = relative standard error > 50%.

NAICS = 2017 North American Industry Classification System.

Note(s):
Detail may not add to total because of rounding or unavailable NAICS detail for select records beyond the four-digit industry classification. Industry classification is based on the dominant establishment payroll. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

By State Location

Microbusiness R&D performance is concentrated within a small number of states. Five states (California, Massachusetts, Texas, Washington, and Pennsylvania) accounted for 55% of all microbusiness R&D in 2018 (table 4). California led all states in microbusiness R&D activity, accounting for 33% ($1.5 billion) of the U.S. microbusiness R&D performance total. Massachusetts was second, with $356 million in R&D performance.

Table 4

Domestic R&D performed by the company, by state and employment size, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

State	All companies		1–4 employees		5–9 employees	
	Companies (number)	Amount	Companies (number)	Amount	Companies (number)	Amount
All states	12,541	4,526,838	7,545	1,890,728	4,997	2,636,110
Alabama	89 r	27,715	D	D	D	D
Alaska	D	D	D	D	D	D
Arizona	241	83,639	121	20,760	118	62,879
Arkansas	62	18,212	D	D	D	D
California	3,405	1,506,256	1,853	453,196	1,551	1,053,060
Colorado	401	106,763	327	64,383	73	42,380
Connecticut	119	44,829	73	23,798	45	21,030
Delaware	96	48,667	69	24,376	D	D
District of Columbia	36	8,648	D	D	D	D
Florida	649	150,234	466	107,406	184	42,828
Georgia	437	123,209	259	68,783	179	54,426
Hawaii	D	D	D	D	D	D
Idaho	53	14,089	D	D	D	D
Illinois	347	112,326	235	70,686 r	113	41,639
Indiana	68	30,283	43	15,714	D	D
Iowa	46	11,383	D	D	D	D
Kansas	47	16,029	31	6,789	D	D
Kentucky	127	33,781	100	26,115	D	D
Louisiana	24	6,581	D	D	D	D
Maine	D	D	D	D	D	D
Maryland	340	132,147	232	66,752	110	65,395
Massachusetts	548	356,022	309	161,539	240	194,483
Michigan	279	88,106	163	53,733	117	34,374
Minnesota	213	50,762	120	26,734	92 r	24,028
Mississippi	19	3,905	D	D	D	D
Missouri	120	36,821	67	18,229	D	D
Montana	D	D	D	D	D	D
Nebraska	48	12,892	D	D	D	D
Nevada	91	27,720	63	9,625	29	18,095 r
New Hampshire	80 r	35,638 r	D	D	D	D
New Jersey	232	62,644	131	27,549	99	35,094
New Mexico	71	23,945	24	4,078	48	19,868
New York	523	154,737	369	84,091	152	70,646
North Carolina	382	106,708	277	50,856	105	55,852 r
North Dakota	D	D	D	D	D	D
Ohio	201	57,088	160	40,652	42	16,436
Oklahoma	39	17,412	29	6,840	D	D
Oregon	199	63,553	104	19,256	96	44,297
Pennsylvania	378	157,350	217	71,745	162	85,606
Rhode Island	D	D	D	D	D	D

Table 4

Domestic R&D performed by the company, by state and employment size, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

State	All companies		1–4 employees		5–9 employees	
	Companies (number)	Amount	Companies (number)	Amount	Companies (number)	Amount
South Carolina	61	26,743	38	9,934	D	D
South Dakota	31	9,195	D	D	D	D
Tennessee	84	19,054	72	17,026	D	D
Texas	957	265,339	493	99,009	464	166,330
Undistributed	D	D	D	D	D	D
Utah	124	41,705 r	47	7,668	76 r	34,037 r
Vermont	33	10,559	D	D	D	D
Virginia	271	82,654	189	30,418	83	52,236
Washington	582	221,251	340	67,453	243	153,798
West Virginia	D	D	D	D	D	D
Wisconsin	133	41,172	70	17,756	62	23,416
Wyoming	D	D	D	D	D	D

D = withheld to avoid disclosing data for individual companies; data are included in higher level totals. r = relative standard error > 50%.

Note(s):
Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

Business Ownership Demographics

Of the microbusinesses performing R&D in the United States, three-quarters (75%) were male majority owned (figure 1), 11% were female majority owned, and 9% were equally owned by men and women. More than two-thirds (67%) of R&D-performing microbusinesses were primarily owned by nonminority owners (figure 2), and a quarter (25%) were primarily owned by minority owners, of which 17% were underrepresented minorities (or 4% of all R&D performing microbusinesses).

Figure 1

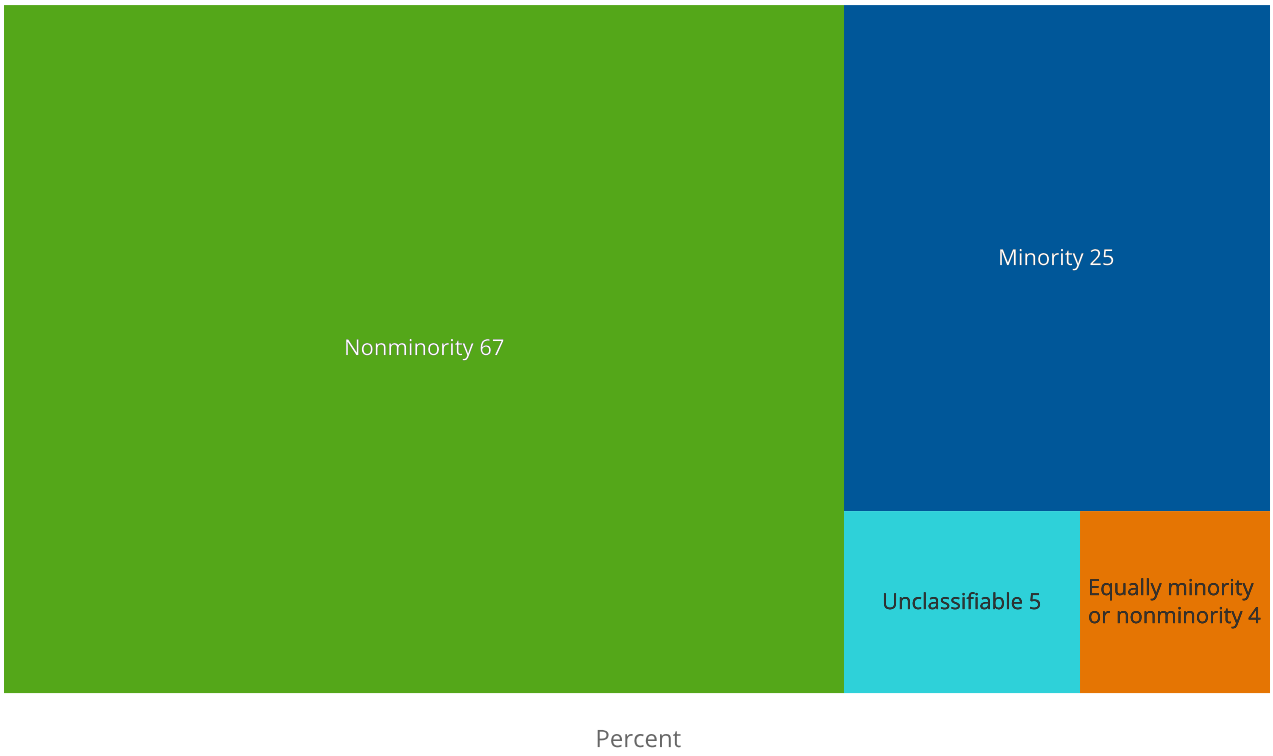
Distribution of companies with 1–9 employees that perform domestic R&D, by sex of primary owners: 2018

Note(s):
Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

Figure 2

Distribution of companies with 1–9 employees that perform domestic R&D, by race or ethnicity of primary owner: 2018



Note(s):
Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

R&D, by Type of Costs

Almost half (49%) of microbusiness R&D costs were for salaries, wages, and benefits; 22% for payments to others for R&D, including purchasing R&D services; 7% for materials and supplies; 3% for machinery and equipment; and 1% for depreciation on R&D property and equipment (table 5). An additional 18% of microbusiness R&D costs were for other expenses such as consultants, contractors, travel, or rent. Among the individual NAICS industries surveyed, software publishers (NAICS 5112) spent a large proportion (82%) of their R&D expenses on salaries, wages, and benefits, reflecting the labor-intensive nature of R&D activities in this industry.

Microbusinesses in pharmaceuticals and medicines (NAICS 3254) spent 32% of their R&D performance dollars on salaries, wages, and benefits and 41% on payments to others for R&D including purchasing R&D services (e.g., clinical trial results performed by contract research organizations). Scientific research and development services (NAICS 5417) companies spent 35% of their R&D dollars on salaries, wages, and benefits and 34% on payments to others for R&D, including purchasing R&D services.

Table 5

Domestic R&D costs, by selected industry and type of cost, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Industry	NAICS code	Total		Salaries, wages, and fringe benefits		Expensed machinery and equipment		Materials and supplies		Payments to others for R&D		Depreciation on R&D property and equipment		All other costs	
All selected industries	31–33, 42, 51, 5413, 5415, 5417	5,766,729		2,818,156		163,888		425,260		1,239,892		60,036		1,059,498	
Manufacturing industries	31–33	655,018		325,923		47,471		74,693		99,342		8,733		98,855	
Food, beverage, and tobacco products	311–12	D		D		0		D		D		0		D	
Textile, apparel, and leather products	313–16	1,025	r	770	r	D		D		D		0		0	
Wood products	321	0		0		0		0		0		0		0	
Paper	322	0		0		0		0		0		0		0	
Printing and related support activities	323	D		D		D		D		D		0		D	
Petroleum and coal products	324	D		D		D		D		D		0		D	
Chemicals	325	125,099		46,701		11,377	r	11,951		38,827		962		15,280	
Pharmaceuticals and medicines	3254	92,531		29,778		3,233		9,798		37,950		709		11,063	
Chemicals, excluding pharmaceuticals	other 325	32,568		16,923		8,144	r	2,153		877	r	254		4,217	
Plastics and rubber products	326	0		0		0		0		0		0		0	
Nonmetallic mineral products	327	5,500	r	3,170	r	436	r	683	r	341	r	D		445	
Primary metals	331	0		0		0		0		0		0		0	
Fabricated metal products	332	2,929		D		D		D		D		D		D	
Machinery	333	49,419		25,497		2,247	r	11,493	r	6,987	r	D		2,748	
Computer and electronic products	334	331,600		190,494		27,263		33,353		27,889		5,647		46,954	
Semiconductor and other electronic components	3344	59,688		43,243		1,665		3,073		2,875		574	r	8,259	
Navigational, measuring, electromedical, and control instruments	3345	223,576		116,839		24,572		24,959		22,872		4,598		29,736	
Other computer and electronic products	other 334	48,336		30,412		1,026		5,321		2,142		476		8,959	
Electrical equipment, appliances, and components	335	30,428		18,784		1,251	r	3,645		2,473	r	447	r	3,828	
Transportation equipment	336	14,405		7,118		1,384		2,071		1,426		335		2,071	
Aerospace products and parts	3364	11,150		5,152		1,233		1,558		969		275		1,963	
Other transportation equipment	other 336	D		D		D		D		D		D		D	
Furniture and related products	337	0		0		0		0		0		0		0	
Miscellaneous manufacturing	339	90,544		30,247		2,397		10,432		20,624		434	r	26,410	
Selected nonmanufacturing industries	42, 51, 5413, 5415, 5417	5,111,711		2,492,233		116,416		350,567		1,140,549		51,303		960,643	
Wholesale trade	42	227,178		119,051		4,840	r	8,892		43,646	r	D		50,052	
Information	51	538,573		431,564		9,725		10,431		20,483		1,932		64,438	
Software publishers	5112	382,680		314,643		6,801		5,029		14,391		1,276		40,539	

Table 5

Domestic R&D costs, by selected industry and type of cost, for companies with 1–9 employees: 2018

(Thousands of U.S. dollars)

Industry	NAICS code	Total	Salaries, wages, and fringe benefits	Expensed machinery and equipment	Materials and supplies	Payments to others for R&D	Depreciation on R&D property and equipment	All other costs
Information, excluding software publishers	51 excluding 5112	155,893	116,921	2,923	5,402	6,092	655 r	23,899
Architectural, engineering, and related services	5413	446,173	229,675	14,068	58,120	34,186	6,525	103,598
Computer systems design and related services	5415	1,122,849	733,908	31,402	46,745	85,268	11,068	214,458
Scientific research and development services	5417	2,776,938	978,035	56,382	226,379	956,966	31,081	528,095
Research and development in nanotechnology	541713	331,590	175,622	11,052	31,125	38,824	6,154	68,812
Research and development in biotechnology (except nanobiotechnology)	541714	1,307,901	318,847	11,996	86,881	651,322	9,217	229,638
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	1,102,490	466,911	32,562	105,618	260,793	15,139	221,466
Social sciences and humanities research and development	541720	14,839	8,282	250 r	541	D	D	2,877

D = withheld to avoid disclosing data for individual companies; data are included in higher level totals. r = relative standard error > 50%.

NAICS = 2017 North American Industry Classification System.

Note(s):
Detail may not add to total because of rounding or unavailable NAICS detail for select records beyond the four-digit industry classification. Industry classification is based on the dominant establishment payroll. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

Total Employment and R&D Employees

There were almost 31,000 domestic R&D employees (79% male, 21% female) working for microbusinesses in 2018 (table 6), and 86% of those domestic R&D employees were in nonmanufacturing microbusinesses. Among all domestic R&D employees, 31% worked in the computer systems design and related services (NAICS 5415) industry, and 28% worked in the scientific research and development services (NAICS 5417) industry.

R&D employee occupations include researchers (e.g., R&D scientists, engineers, and their managers); R&D technicians and equivalent staff; and R&D support staff (clerical and other). Among domestic R&D employees, 70% were researchers, 22% were R&D technicians, and the remaining 8% were R&D support staff. Almost one-third (30%) of the domestic researchers have doctoral degrees.

Table 6

Domestic R&D employees, by selected industry, sex, and R&D occupation and education, for companies with 1–9 employees: 2018

(Number)

Industry	NAICS code	All R&D employees		Sex				R&D occupation and education							
				Male		Female		Researchers (including R&D scientists, engineers, and their managers)		Researchers with PhD (excluding MD, JD, and EdD)		R&D technicians and equivalent staff		R&D support staff (clerical and other)	
All selected industries	31–33, 42, 51, 5413, 5415, 5417	30,951		24,353		6,598		21,526		6,454		6,954		2,471	
Manufacturing industries	31–33	4,306		3,718		589		3,179		922		832		295	
Food, beverage, and tobacco products	311–12	D		D		0		D		D		0		0	
Textile, apparel, and leather products	313–16	13		10		D		10		0		D		0	
Wood products	321	0		0		0		0		0		0		0	
Paper	322	0		0		0		0		0		0		0	
Printing and related support activities	323	D		D		0		D		D		0		0	
Petroleum and coal products	324	D		D		D		D		0		D		0	
Chemicals	325	602		407		195		390		212		148		64	
Pharmaceuticals and medicines	3254	357		233		124		242		148		90		25	
Chemicals, excluding pharmaceuticals	other 325	245		174		72		148		64		58		39	
Plastics and rubber products	326	0		0		0		0		0		0		0	
Nonmetallic mineral products	327	66	r	51	r	16	r	D		D		D		D	
Primary metals	331	0		0		0		0		0		0		0	
Fabricated metal products	332	47	r	36	r	D		D		0		D		D	
Machinery	333	462		410		D		452		233	r	9		0	
Computer and electronic products	334	2,330		2,093		237		1,727		355		477		126	
Semiconductor and other electronic components	3344	535		481		53		397		98		126		11	
Navigational, measuring, electromedical, and control instruments	3345	1,247		1,096		150		1,001		225		176		69	r
Other computer and electronic products	other 334	549		515		34		329		32		175		45	
Electrical equipment, appliances, and components	335	291		276		14		233		34	r	39		19	
Transportation equipment	336	110		100		10		84		12	r	15		11	r
Aerospace products and parts	3364	97		87		10		71		D		15		11	r
Other transportation equipment	other 336	D		D		0		D		D		0		0	
Furniture and related products	337	0		0		0		0		0		0		0	
Miscellaneous manufacturing	339	348		301		47		212		58		88		49	
Selected nonmanufacturing industries	42, 51, 5413, 5415, 5417	26,645		20,636		6,010		18,347		5,532		6,122		2,176	
Wholesale trade	42	1,198		813		385		469		185		429		299	
Information	51	4,576		3,913		663		2,966		394		1,108		502	
Software publishers	5112	3,321		2,853		468		2,251		270		770		300	
Information, excluding software publishers	51 excluding 5112	1,255		1,061		195		716		124		338		202	
Architectural, engineering, and related services	5413	2,472		1,995		476		1,828		314		527		117	
Computer systems design and related services	5415	9,658		7,928		1,730		6,414		726		2,515		730	

Table 6

Domestic R&D employees, by selected industry, sex, and R&D occupation and education, for companies with 1–9 employees: 2018

(Number)

Industry	NAICS code	All R&D employees	Sex		R&D occupation and education			
			Male	Female	Researchers (including R&D scientists, engineers, and their managers)	Researchers with PhD (excluding MD, JD, and EdD)	R&D technicians and equivalent staff	R&D support staff (clerical and other)
Scientific research and development services	5417	8,741	5,986	2,755	6,670	3,913	1,543	528
Research and development in nanotechnology	541713	1,705	1,273	432	1,356	722	251	98
Research and development in biotechnology (except nanobiotechnology)	541714	2,475	1,534	941	1,809	1,257	483	183
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,359	3,042	1,317	3,367	1,852	764	228
Social sciences and humanities research and development	541720	97	70	28	68	47	24	D

D = withheld to avoid disclosing data for individual companies; data are included in higher level totals. r = relative standard error > 50%.

NAICS = 2017 North American Industry Classification System.

Note(s):
Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s):
National Center for Science and Engineering Statistics and Census Bureau, 2019 Annual Business Survey: Data Year 2018.

Survey Information and Data Availability

The ABS is a single platform for combining multiple previously individual business surveys—the Survey of Business Owners, the Annual Survey of Entrepreneurs, the 2016 Microbusiness R&D and Innovation Survey (BRDI-M), and an innovation survey modeled on Eurostat's Community Innovation Survey.

In this InfoBrief, R&D costs are expressed in current U.S. dollars and are not adjusted for inflation. For the ABS, a microbusiness 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, with one to nine domestic employees.

The survey was administered to companies whether or not they were known to have R&D activity. The ABS collected detailed statistics from microbusinesses located in the United States on R&D expenditures, R&D employees, intellectual property, company and primary owner characteristics, and innovation activities. R&D questions only were asked of manufacturers and certain selected nonmanufacturing industries that in previous NCSES surveys (ABS 2017, BRDI-M, and the Business R&D Innovation Survey) represented almost all R&D of microbusinesses in the United States.

The statistics from the survey are based on a sample—and, as such, they are subject to both sampling and nonsampling errors (see "Technical Notes" in the data tables reports at https://www.nsf.gov/statistics/srvyabs/). Microbusinesses with less than $50,000 in R&D are excluded from the ABS estimates and this InfoBrief.

For the microbusiness population, approximately 206,000 microbusinesses with one to nine domestic employees were sampled to represent the population of 3.5 million microbusinesses with one to nine domestic employees. The unit response rate for businesses eligible to report the R&D module was 73.4%. For the full 2019 ABS (data year 2018), a total of 299,976 companies were sampled to represent the population of 5.3 million companies. For the full 2019 ABS, the unit response rate was 71.8%.

The full set of data tables on R&D, company demographics, innovation, technology, and patent and intellectual property protection from this survey will be available in the report *Annual Business Survey: 2019* (https://www.nsf.gov/statistics/srvyabs/). Individual data tables and tables with relative standard errors and imputation rates from the 2018 survey are available in advance of the full report.

Notes

1 Employees are individuals who worked for the business and received a W-2 issued by the business for salary or wages.

2 Wolfe R; National Center for Science and Engineering Statistics (NCSES). 2020. *U.S. Businesses Reported $441 Billion for R&D Performance in the United States During 2018, a 10.2% Increase from 2017*. NSF 20-316. Alexandria, VA: National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf20316.

3 Kindlon A; National Center for Science and Engineering Statistics (NCSES). 2020. *Microbusinesses Had More Than $6.7 Billion in R&D Costs in the United States in 2017, According to New Annual Business Survey.* NSF 21-302. Alexandria, VA: National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf21302/.

4 As defined by the *Frascati Manual* (OECD 2015), *basic research* is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. *Applied research* is original investigation undertaken to acquire new knowledge. It is, however, directed primarily toward a specific, practical aim or objective. *Experimental development* is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes. See Organisation for Economic Co-operation and Development (OECD). 2015. *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development.* OECD Publishing, 7th ed. Paris.

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