

TABLE 45-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: 2021 (part A)**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the United States	Puerto Rico <sup>a</sup>	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	135,412	743 i	9,283	563	3,033	654	951	646	4,165	10,450	366	5,704	1,927	506	4,086	434	1,232	669	2,179 i	1,730	5,700	314	16,229	3,458
Manufacturing industries	31-33	78,389	733 i	4,149	415	2,616	290	684	423	2,284	7,546	131	2,849	1,493	378	2,415	333	710	381	982	761	3,413	123	6,345	1,525
Food	311	1,190	0-278	66	3	13	0-7	3	*	74	62	4	0-33	15	0	36	0-24	9	11	16	1	37	4	95	49
Beverage and tobacco products	312	893	0	0-52	0	20	0	9	0	0	*	0	0-33	53	0	0-10	0	1	0-13	2	0	451	*	68	5
Textile, apparel, and leather products	313-16	169	0	3	2	5	0-7	0	4	20	6	0	0	4	0	4	0	0-8	0	1	3	43	0	4	1
Wood products	321	4	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	322	67	0	45	0	0	0	0	0-6	1	4	0	0	0	0	1	0	1	0	0	0-7	1	*	2	0
Printing and related support activities	323	27	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	175	0	46	*	26	0	4	0	5	9	0	0	1	0	4	0-8	0	0	*	*	0	*	43	0-8
Chemicals	325	23,741	158	865	165	2,237	49	227	56	724	1,879	38	925	538	168	1,605	51	126	171	443	193	2,070	102	2,855	722
Basic chemicals	3251	997	0	0-40	3	47	1	0-51	13	73	86	*	0-4	84	*	108	2	1	3	20	43	30	8	111	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	580 i	0	5	0	29	0	0	0	9	61	0	0	16	168	58	0	*	1	14	0	23	*	8	4 i
Pesticide, fertilizer, and other agricultural chemicals	3253	123	0-40	2	*	*	*	0-51	0	0-21	5	*	0	1	0	1	0	*	0	1	0	1	0	4	0-10
Pharmaceuticals and medicines	3254	20,936	117-130	820	160	2,040	47	177	42	603	1,470	37	922	432	0	1,407	49	117	166	405	151	2,004	93	2,587	704
Soap, cleaning compound, and toilet preparations	3256	871	0-41	0-40 i	1	113	*	0	*	21	226	1	*	4	0	6	0	3	2	2	0	9	1	124	5
Paint, coating, adhesive, and other chemicals	3255, 3259	234	0	0-40	1	7	*	0	0	0-21	31	*	0-4	2	*	25	*	4	*	1	*	3	*	22	0-10
Plastics and rubber products	326	607	0	6 i	0	6	1	0	0	70	144 i	*	1	32	5	2	0	*	1	4	4	7	*	87	47
Nonmetallic mineral products	327	198	0	12	0	4	*	*	0	19	22	0	0	0	0	0	0	5	6	0	0	0	0	1	3
Primary metals	331	50 i	0	0-15 i	0	0	0	0	0	0	4	0	0-15	0	0	0	0-15 i	1	0	3 i	0-15	0	0	4	9
Fabricated metal products	332	378	0	15	5	3	33	2	1	16	41	*	*	5	0	5	5	*	*	3	*	38	0	31	*
Machinery	333	5,343	10	222	27 i	36	7 i	83	92	370	915	10	14	235	*	110	55	19	2	128	92	75	*	365	28
Agricultural implement	33311	907	0	10	1	0-17	0	12	0-93	0-247	0-814	1	0	14	0	24	0	*	*	0-46	*	0-52	*	2	3
Semiconductor machinery	333242	1,299	10	0	24 i	20	0	0	0	3	43 i	0	4	7 i	0	0	0	0	0	0	0	7	0	4	14
Engine, turbine, and power transmission equipment	3336	546	0	24	0	*	*	50	0	122	60	3	*	19	0	6	0	*	0	83	*	18	*	54	2
Other machinery	other 333	2,591	0	188	2	0-17	7 i	21	0-93	0-247	0-814	7	10	194	*	80	55	19	2	0-46	92	0-52	*	305	9
Computer and electronic products	334	31,535	135-473 i	2,038	160	131	164	278	230	583	1,959	29	1,474	245	3	271	161	319	109	266 i	266	407	10	1,614	378
Communications equipment	3342	3,411	*	507	*	32	0-31 i	26	20	115	119	0-20	118	74	*	28	0-115	88	3	13	44	39	2	233	73
Semiconductor and other electronic components	3344	16,521	2	1,060	93	51	79	150	87	258	539	0-20	425	103	0	65	44	186-212	98	47	26	66	8	632	101
Navigational, measuring, electromedical, and control instruments	3345	3,576	0	216	0-68	36	56	52	117	126	663	10	27	45	3	133	3-118	0-25	4	31	167	223	*	441	98
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	467	0	18	0	9	*	*	4	24	28	0	1	4	0	7	0	*	0	*	11	58	*	180	14
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	594	0	0-199	0	*	4	*	0	9	0-572	0	0-27	6	0	0-127	4	0	0	1	0-157	0-166	0	0-262	0-85

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(Millions of U.S. dollars)

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Other measuring and controlling devices	other 3345	2,516	0	0 - 199	0 - 68	26	51	51	113	93	62 - 636	10	0 - 27	35	3	0 - 127	0 - 115	0 - 25	4	31	0 - 157	0 - 166	0	0 - 262	0 - 85	
Other computer and electronic products	other 334	8,027	132 - 471 i	256	0 - 68	12	31	50	6	84	638	20	904	24	0	44	*	21	4	175 i	30	79	*	308	105	
Electrical equipment, appliances, and components	335	1,880	*	121	9	12	1	1	1	52	251	1	18	103	0	18	6	45	1	2	0	52	*	102	31	
Transportation equipment	336	7,663	0 - 101 i	543	2	75 i	28	0 - 7 i	0 - 6	106	1,573 i	32	1 - 34	209	202	216	0 - 19	177 i	0 - 14	92	114	12	3	847	170	
Motor vehicles, bodies, trailers, and parts	3361-63	6,720	0	363	0 - 3	75 i	29	0	0 - 6	56	1,453 i	32	2	16 - 178	202	213	0	137 i	1	57	113	1	0 - 4	715	166	
Aerospace products and parts	3364	711	0 - 101 i	134 i	0	0	29	0 - 7 i	0	20	92	0	0 - 33	30 - 193	*	3	0 - 19	37	0 - 13 i	1	*	3	0 - 4	114	3	
Aircraft, aircraft engine, and aircraft parts	336411-13	693	0 - 101 i	115 - 135 i	0	0	29	0 - 7 i	0	1 - 21 i	73 - 93	0	0 - 33	30 - 193	*	3	0	37	0 - 13 i	1	*	3	0 - 4	114	3	
Guided missile, space vehicle, and related parts	336414-15, 336419	18	0	0 - 19	0	0	0	0	0	0 - 19	0 - 19	0	0	0	0	*	0 - 19	0	0	0	0	0	0	*	0	
Military armored vehicle, tank, and tank components	336992	0 - 3	0	0	0 - 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other transportation	other 336	228 - 233	0	46 i	0	0	11 i	0	0	30 i	28	0	0	0	0	1	0	3	0	34	1 i	8	0	18 i	1	
Furniture and related products	337	37	0	0	0	0	0	12	0	9	4	0	0	0	0	0	0	0	0	0	0	0	0	8	0	
Miscellaneous	339	4,431	51	111 - 171	42	48	5	63 - 70 i	36 - 43	236	667	16	386	51	0	138 - 149	35	4 - 13	71	22	72 - 91	219	3	219	68 - 88	
Medical equipment and supplies	3391	4,007	50	112	32	48	5	64 i	37	229	650	16	386	39	0	139	35	5	71	22	73	219	3	200	68	
Other miscellaneous manufacturing	3399	424	1 i	0 - 59	10 i	0	*	0 - 7	0 - 6	7 i	16	0	*	12	0	0 - 10	0	0 - 8	0	0	0 - 18	*	*	19 i	0 - 21 i	
Nonmanufacturing industries	21-23, 42-81	57,024	10	5,134	148 i	417	364	267	223	1,881	2,904	235	2,856	434 i	128 i	1,672 i	101	522	288	1,198 i	970	2,287	191	9,884	1,932	
Mining, quarrying, oil and gas extraction, and support activities	21	5 - 79	0	0 - 79	0	0 - 42 i	0	0	0	0 - 79	0	0	0	0	0	0 - 30	0	0	0	0	0	0	0	0 - 79 i	0	
Utilities	22	0 - 1,129	0	1	*	0	*	0	0	*	0	0	0	0	0	0	0	0 - 36	*	*	0	0	0	0 - 504	0	
Wholesale trade	42	0 - 109 i	0	1	0	0 - 42	0	0	0	0 - 109	0 - 109 i	0	0	0 - 71	0	*	0	0	0	0	0	0	0	0 - 109	0	
Electronic shopping and electronic auctions	454111-12	4,330 - 6,357	i	0	0 - 478 i	5 i	1 i	3 i	0 - 8 i	2 i	0 - 152 i	0 - 530 i	*	1,182 i	0 - 71 i	56 - 107 i	0 - 30 i	0 - 4 i	0 - 36 i	0	0 - 56 i	0 - 137 i	9	0 - 23	0 - 504 i	60 i
Transportation and warehousing	48-49	73	0	0 - 70	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	
Information	51	29,258	2	3,088	73	167	288	222	174	716	992	93	1,258	74 - 98	22 - 46	598	92	277	120	355	670	1,506	138	5,076	1,349	
Publishing	511	9,933	1	1,554	0 - 24	44	93	136	69	242	274	18	265	37	4	0 - 257	62	0 - 149	32	138	536	0 - 294	139	979	550	
Newspaper, periodical, book, and directory publishers	5111	*	i	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	9,933	1	1,554	0 - 24	44	93	136	69	242	274	18	265	37	4	0 - 257	62	0 - 149	32	138	536	0 - 294	139	979	550	
Telecommunications	517	77	i	0	0 - 60	0	0 - 70	0	0	0	*	0	3	0	0	0 - 70	0	0	0	6	0	*	*	0 - 70	0 - 70	

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Data processing, hosting, and related services	518	9,881	0 - 2	1,099	50	0 - 124	191	0 - 87	0 - 106	339	377	70	670	38	19	342	26	129	86	136	0 - 135	0 - 431	0 - 139	1,103	474
Other information	other 51	9,367	i 0 - 2	374 - 437	0 - 24	0 - 124	5	0 - 87	0 - 106	135	341	4	320	0 - 24	0 - 24	0 - 257	4	0 - 149	2	75	0 - 135	781 - 1,507	0 - 139	2,923 - 2,996	254 - 327
Finance and insurance	52	2,461	0	191	*	0 - 42	7	0	0	0 - 152	26	29	1,182	0 - 71	*	0 - 30	0	0 - 36	12	0 - 56	137	16	0	668	38
Real estate and rental and leasing	53	103	0	0 - 91	0	*	*	0	0	8	0 - 91	0	0 - 91	0 - 71	0	*	0	0	0 - 56	*	0	0	0 - 91	6	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0 - 2	0	0 - 2	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	100 - 104	0	0 - 91	0	*	*	0	0	8	0 - 91	0	0 - 91	0 - 71	0	*	0	0	0 - 56	*	0	0	0 - 91	6	
Professional, scientific, and technical services	54	18,763	i 8	1,378	70	i 209	i 66	i 38 - 46	i 46	1,007	i 1,358	i 113	i 417	i 290	i 0 - 25	i 1,042	i 6 - 10	i 210 - 233	i 156	i 788	i 164	i 757	i 31 - 54	i 3,638	i 477
Architectural, engineering, and related services	5413	39	r 0	4	0	0	0	*	0	0	*	0	0	*	0	2	i 0	0	0	0	0	0	*	2	0
Computer systems design and related services	5415	4,632	5	458	6	i 16	i 6	0 - 8	1	135	608	0 - 7	213	45	0 - 25	15	0 - 4	55	12	30	18	115	0 - 23	407	56
Scientific research and development services	5417	13,630	i 2	723	64	i 193	i 60	i 39	i 45	828	i 736	i 107	i 201	i 235	i *	i 1,003	i 7	i 156	i 144	i 755	i 144	i 640	i 31	i 3,193	i 405
Research and development in nanotechnology	541713	16	0	*	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	*	0	0	0	*
Research and development in biotechnology (except nanobiotechnology)	541714	4,402	0	214	6	36	17	11	7	143	219	19	6	77	0	32	7	54	31	103	18	592	10	1,333	118
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	9,207	i *	509	58	i 157	i 43	i 28	i 38	685	i 515	i 88	i 195	i 157	i *	i 971	i *	i 101	i 112	i 652	i 125	i 48	i 22	i 1,860	i 287
Research and development in the social sciences and humanities	541720	5	2	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	463	*	193	*	*	0	0	0	43	14	0 - 7	3	11	0	21	0	0 - 21	0	4	2	1	0 - 21	35	16
Health care services	621-23	2 - 81	0	0 - 80	0	0	0	0	0	0	*	0	0	0	0	0 - 30	0	0	0	0	0 - 80	0	0	0 - 80	1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1 - 637	*	0 - 478	0	0	0	0	0	*	0 - 530	0	0 - 635	0 - 71	0	*	0	0	1	0 - 56	0	0	*	0 - 504	1
All companies (number of domestic employees)	-	135,412	743	9,283	563	3,033	654	951	646	4,165	10,450	366	5,704	1,927	506	4,086	434	1,232	669	2,179	1,730	5,700	314	16,229	3,458
Small companies																									
10-19 <sup>b</sup>	-	359	0	14	59 - 86	1	*	24	0 - 6	2	9	0	*	*	0	*	0	*	1	9	*	15	0	15	2
20-49	-	909	0 - 44	65	0 - 26	4	*	0 - 32	*	14	30	0	4	12	2	9	3	21	15	12	1	9	2	76	39
Medium companies																									
50-99	-	866	0	139	6	20	3	7 - 39	0 - 6	15	88	r *	20	r 5	0	3	*	3	10	7	9	12	2	106	22
100-249	-	2,382	0 - 48	223	13	i 25	i 14	35	2	33	105	15	44	100	20	28	*	18	19	13	21	457	1	293	113
Large companies																									
250-499	-	3,660	* r	312	22	4	3	69	i 5	140	114	15	62	38	2	42	i 3	44	4	44	39	148	*	454	117
500-999	-	4,528	0	358	5	30	6	29	38	54	272	58	218	57	5	77	34	30	62	70	98	82	114	796	396
1,000-4,999	-	20,663	45	2,289	58	201	110	234	137	844	1,762	76	994	212	11	300	44	225	119	250	479	i 525	39	2,328	799
5,000-9,999	-	15,571	13	1,795	40	176	19	200	136	830	1,036	62	548	253	202	585	59	142	36	244	347	326	28	1,578	427

TABLE 45-A

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10,000–24,999	–	28,481	639 i	1,110	162	419	186	125	70	1,194	2,273	86 i	698	731	*	1,240 i	85	282 i	151 i	1,079 i	310	621	45 i	3,321 i	710
25,000 or more	–	57,992	0 - 48	2,977	176	2,153	314	201	256	1,038	4,762	53	3,115	517	263	1,802	205	465	252	452	427	3,506	84	7,262	833

\* = amount &lt; \$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 = 2017 North American Industry Classification System.

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.<sup>b</sup> 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&amp;D paid for by the company or reporting less than \$1 million of R&amp;D paid for by others. Industry classification is based on the dominant business code for domestic R&amp;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&amp;D and are not comparable 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, 2021.