

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 (part A): 2022

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the 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	149,584	271	11,083	629	3,502	970	974	774	4,413	10,326	435	5,596	1,944	427	3,872	453	1,484	870	i 1,932	1,527	6,471	357	i 17,335	4,453	
Manufacturing industries	31-33	84,419	257	5,054	429	3,020	282	662	463	2,423	7,365	173	2,562	1,429	319	2,731	335	792	575	998	742	3,941	155	6,305	2,003	
Food	311	1,463	D	61	7	18	3	5	D	59	47	D	4	23	0	27	16	7	17	28	4	39	7	154	68	
Beverage and tobacco products	312	630	0	*	D	20	0	D	0	*	*	0	*	48	0	0	0	D	0	0	5	389	D	33	0	
Textile, apparel, and leather products	313-16	113	0	D	1	D	2	0	5	14	6	*	0	8	0	4	0	D	0	1	0	*	0	2	D	
Wood products	321	4	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Paper	322	81	0	33	0	0	0	0	1	1	5	0	0	0	0	*	0	0	1	0	0	*	1	0	1	0
Printing and related support activities	323	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	
Petroleum and coal products	324	247	0	D	*	D	*	*	*	D	3	D	0	3	0	*	*	0	0	*	*	0	0	94	*	
Chemicals	325	25,061	114	1,043	139	2,601	76	i 200	83	833	1,811	53	i 710	474	139	2,021	53	183	320	i 424	189	2,582	104	i 2,313	1,002	
Basic chemicals	3251	956	0	8	3	i 42	2	D	12	77	i 92	D	1	74	0	125	D	1	D	21	40	i 30	8	109	10	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	539	0	9	0	30	0	0	0	10	i 60	0	0	15	D	58	0	D	1	15	*	4	D	7	2	
Pesticide, fertilizer, and other agricultural chemicals	3253	151	D	D	*	D	*	D	0	8	10	D	0	1	0	D	0	*	*	2	0	2	D	1	1	
Pharmaceuticals and medicines	3254	22,266	D	983	133	2,420	73	i 149	67	681	1,414	51	i 706	378	D	1,789	D	175	317	i 383	148	2,513	94	i 2,069	980	
Soap, cleaning compound, and toilet preparations	3256	917	D	23	1	102	*	0	*	49	213	1	*	5	0	19	*	3	2	3	0	28	1	107	3	
Paint, coating, adhesive, and other chemicals	3255, 3259	232	0	D	3	D	0	0	3	8	23	D	2	1	0	D	0	D	D	1	*	6	D	20	7	
Plastics and rubber products	326	682	0	12	0	7	2	D	D	78	157	*	D	39	D	8	0	2	D	15	3	13	D	67	22	
Nonmetallic mineral products	327	159	0	17	0	0	*	0	0	11	25	0	0	0	0	0	0	6	2	0	0	1	*	1	5	
Primary metals	331	19	0	*	0	0	0	0	0	0	3	0	*	0	0	0	3	*	i 0	0	*	0	0	3	3	
Fabricated metal products	332	231	0	18	i 1	3	6	i 1	*	14	34	*	0	7	0	6	1	*	*	2	*	29	i 0	5	3	
Machinery	333	5,914	1	r 205	28	64	i 8	138	106	345	874	7	7	248	0	86	65	29	7	125	105	118	4	433	45	
Agricultural implement	33311	990	0	22	8	2	0	D	85	63	439	D	0	14	0	28	D	*	*	12	0	5	0	2	4	
Semiconductor machinery	333242	1,636	0	0	12	47	i 0	*	0	7	48	i 0	*	9	i 0	0	0	0	0	0	*	23	i 0	27	16	
Engine, turbine, and power transmission equipment	3336	1,071	D	42	2	4	*	D	1	105	82	1	D	29	0	5	1	1	1	71	11	39	4	170	D	
Other machinery	other 333	2,217	D	141	6	10	7	28	20	170	304	D	D	196	0	54	D	28	6	41	94	52	*	234	D	
Computer and electronic products	334	35,536	D	2,209	172	133	155	287	201	623	2,236	34	1,453	231	*	227	146	381	172	269	259	424	18	i 1,888	400	
Communications equipment	3342	3,509	0	478	1	D	D	22	7	75	162	D	172	68	0	46	D	99	3	16	44	40	6	186	74	
Semiconductor and other electronic components	3344	21,784	D	1,303	99	53	29	151	126	347	i 867	12	485	95	0	96	52	251	153	58	i 85	113	11	i 861	i 231	

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Navigational, measuring, electromedical, and control instruments	3345	2,668	*	106	D	31	D	49	63	105	517	8	34	42	*	35	D	D	13	28	92	182	*	408	69					
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	429	*	7	*	7	*	*	*	18	31	*	*	6	*	7	*	1	*	*	13	53	*	147	16					
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	327	0	31	0	0	1	0	26	25	58	*	3	*	0	21	5	*	0	0	19	0	0	40	5					
Other measuring and controlling devices	other 3345	1,912	0	68	D	24	D	49	37	i	61	427	8	31	36	0	7	D	D	13	28	60	128	0	221	48				
Other computer and electronic products	other 334	7,575	D	322	D	D	D	65	5	96	690	D	762	27	0	51	*	D	2	166	38	90	*	432	25					
Electrical equipment, appliances, and components	335	1,575	0	333	31	7	1	1	6	54	124	D	6	116	0	29	1	30	D	3	1	50	1	127	47					
Transportation equipment	336	8,035	0	941	D	57	i	25	1	0	126	1,482	i	25	D	176	D	188	0	144	D	101	86	34	D	922	266			
Motor vehicles, bodies, trailers, and parts	3361-63	6,035	0	349	D	57	i	D	0	0	38	1,211	i	25	D	67	D	181	0	115	D	67	83	D	D	577	259			
Aerospace products and parts	3364	1,819	0	552	0	D	D	D	0	0	86	247	0	4	97	D	5	0	25	D	D	2	31	D	322	2				
Aircraft, aircraft engine, and aircraft parts	336411-13	653	0	59	0	*	D	0	0	0	26	147	0	0	91	D	2	0	25	D	D	2	5	D	117	D				
Guided missile, space vehicle, and related parts	336414-15, 336419	1,166	0	493	0	D	8	D	0	0	60	100	0	4	6	0	3	0	0	0	*	0	26	0	206	D				
Military armored vehicle, tank, and tank components	336992	1	0	0	1	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	181	0	40	i	0	D	1	D	0	3	24	0	0	12	0	1	0	4	0	D	*	D	D	23	5				
Furniture and related products	337	36	0	3	0	0	0	0	0	0	8	4	0	0	0	0	0	0	0	0	0	0	0	0	6	13				
Miscellaneous	339	4,631	52	D	D	64	i	5	D	D	D	555	24	372	56	0	134	49	8	55	30	89	261	D	256	D				
Medical equipment and supplies	3391	4,234	52	101	40	64	i	5	5	59	245	517	24	372	47	i	0	133	49	8	55	30	79	259	3	i	215	109		
Other miscellaneous manufacturing	3399	397	0	D	D	0	*	D	D	D	38	0	0	9	0	1	0	*	0	0	10	2	D	41	D					
Nonmanufacturing industries	21-23, 42-81	65,165	14	i	6,029	201	482	687	312	312	1,991	2,961	263	3,034	515	i	108	i	1,141	119	692	295	i	934	785	2,530	201	i	11,030	2,450
Mining, quarrying, oil and gas extraction, and support activities	21	D	0	D	0	D	0	0	0	0	D	0	0	0	0	0	D	0	0	0	0	0	0	0	0	D	0			
Utilities	22	D	0	D	*	0	*	0	0	0	*	0	0	0	0	0	0	0	*	0	*	0	0	0	0	D	0			
Wholesale trade	42	D	0	D	0	0	0	0	0	0	*	18	i	0	0	0	0	*	i	0	0	0	0	0	0	1	0			
Electronic shopping and electronic auctions	454111-12	D	0	D	D	1	i	D	2	i	2	i	D	D	*	i	D	D	D	D	0	D	D	D	D	D	D			

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Transportation and warehousing	48-49	121	0	87	0	0	0	0	0	0	0	0	0	0	0	D	0	0	0	0	0	0	0	*	1																			
Information	51	36,948	1	3,735	84	229	426	256	187	944	1,336	118	1,584	100	9	606	81	378	114	521	498	1,756	143	6,284	1,543																			
Publishing	511	12,330	*	1,562	39	56	222	152	83	238	438	24	315	D	4	123	57	D	65	193	364	D	D	1,269	516																			
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	0																			
Software publishers	5112	12,330	*	1,562	39	56	222	152	83	238	438	24	315	D	4	123	57	D	65	193	364	D	D	1,269	516																			
Telecommunications	517	201	0	D	0	D	*	0	0	0	38	i	0	6	0	0	1	*	0	0	D	D	1	0	12	D																		
Data processing, hosting, and related services	518	12,242	*	1,442	D	37	196	D	D	516	418	84	858	44	2	156	21	175	48	217	D	D	D	1,160	662																			
Other information	other 51	12,176	*	D	D	D	8	D	D	190	442	10	404	D	4	327	2	D	1	D	D	D	D	3,842	D																			
Finance and insurance	52	2,612	*	375	*	D	D	*	*	20	D	18	D	D	D	D	0	D	D	D	D	D	D	596	48																			
Real estate and rental and leasing	53	102	i	0	D	*	* i	* i	* i	0	6	i	D	0	D	D	0	*	0	1	0	* i	* i	0	0	D	* i																	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	i	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	i	0	D	*	* i	* i	* i	0	6	i	D	0	D	D	0	*	0	1	0	* i	* i	0	0	D	* i																	
Professional, scientific, and technical services	54	19,028	i	12	i	1,427	108	i	233	i	255	55	i	122	890	i	1,100	126	i	272	i	357	i	D	490	D	282	i	178	i	355	i	171	i	746	D	3,601	i	793	i				
Architectural, engineering, and related services	5413	36	4	r	3	*	0	0	*	0	0	0	0	*	0	1	i	0	0	0	0	2	0	*	5	0																		
Computer systems design and related services	5415	4,575	4	i	514	4	21	79	8	18	125	350	D	78	57	D	33	D	62	7	i	61	14	138	D	409	126																	
Scientific research and development services	5417	13,571	i	4	i	788	i	103	i	212	i	176	i	46	i	104	685	i	695	i	113	i	192	i	288	i	4	428	34	216	i	171	i	285	i	142	i	606	37	i	2,904	i	647	i
Research and development in nanotechnology	541713	30	0	* i	0	0	0	0	0	0	0	* i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*																	
Research and development in biotechnology (except nanobiotechnology)	541714	4,073	i	0	201	i	5	37	i	14	i	10	6	121	i	201	i	16	i	5	64	i	0	37	i	5	43	i	30	i	92	i	14	i	537	8	1,163	i	104	i				
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	9,466	i	2	i	586	97	i	175	i	162	i	36	i	98	565	i	495	i	97	i	188	i	224	i	4	391	30	173	i	141	i	193	i	129	i	69	i	29	i	1,741	i	543	i
Research and development in the social sciences and humanities	541720	2	2	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 professional, scientific, and technical services	other 54	847	0	122	1	*	*	1	1	80	53	D	2	11	0	28	1	4	*	9	13	1	D	283	20	i																		

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Health care services	621-23	93	0	D	0	0	0	0	0	D	0	*	0	0	0	6	0	0	0	D	2	D	0	33	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	146	1	D	D	D	0	0	0	D	D	0	D	D	0	D	0	0	D	D	0	0	D	D	D
All companies (number of domestic employees)	-	149,584	271	11,083	629	3,502	970	974	774	4,413	10,326	435	5,596	1,944	427	3,872	453	1,484	870 i	1,932	1,527	6,471	357 i	17,335	4,453
Small companies																									
10-19 ^b	-	260	0	54 i	*	9	D	D	0	2	4	*	*	* r	*	1	0	2	23 r	5	2	18	0	21	1
20-49	-	941	1 r	89	D	*	D	3	3 r	3	32	D	8	6	*	5	3	18 r	2 r	5	1	38	0	53	29
Medium companies																									
50-99	-	962	4 r	49	D	18	D	D	3	12	57	D	19	10	D	6	D	6	6	6	20	14	D	106	76 r
100-249	-	2,017	2	241	16	19	13	D	2	50	107	10	64	22	D	35	0	15	15	52	27	27	3	235	132
Large companies																									
250-499	-	4,240	0	271	20	21 r	2	25	4	109	142	21	63	95	0	87	D	40	4	55	42	610	D	324	263
500-999	-	4,657	D	446	35	29	28	17	31	54	329	88	197	56	D	114	27	39	52 i	69	86	163	D	501	242
1,000-4,999	-	24,407	D	2,613	46	237	233	257	185	1,000	1,896	59 i	1,083	209	D	439	D	282	111	328	311	722	135 i	3,021	940
5,000-9,999	-	13,616	11	1,513	29	162	D	248	63	401	963	19	203	255	D	268	65	151	2	268	258	282	26	931	367
10,000-24,999	-	32,036	108	1,624	153	627	146	122	172	1,457	1,983	140	894 i	703	1	656	102	262	185 i	593	290	723	61	4,319 i	875 i
25,000 or more	-	66,448	D	4,182	280	2,381	528	274	312	1,326	4,810	97 i	3,066	587	232	2,261	219	671	470 i	550	490	3,876	115 i	7,824	1,527

* = amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; 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.

^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. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable 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, 2022.