

Research and Development as a National Priority

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Summary

- Research and Development is scientific and engineering work directed toward the increase of the stock of knowledge.
- U.S. spending on total R&D broke \$10 billion in 1958 and doubled by 1965.
- Average R&D spending in the 1980s was \$127 billion but jumped to \$214 billion in the 1990s.
- R&D is important to the American economy because it supports long-term economic growth.
- R&D accounted for about 6.3% of average annual growth in real GDP—that is, GDP adjusted for inflation—between 1998 and 2007, and 6.6% between 2002 and 2007.

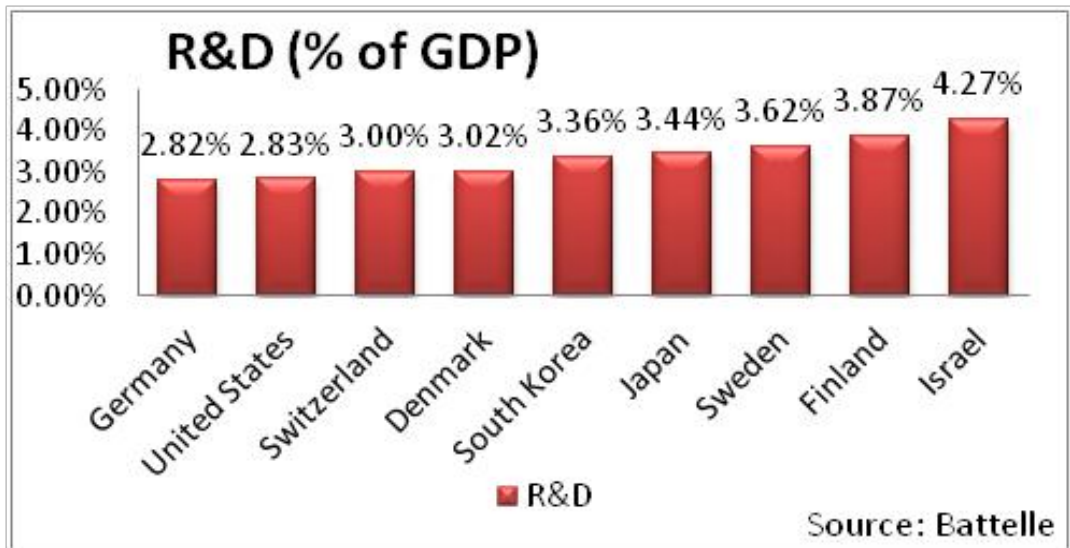


IMAGE CREDIT: SANDIA NATIONAL LABORATORY

Recent Trends

- Total R&D spending (both public and private) is today about 2.6% of GDP (about \$380 billion).
- Since 1975, U.S. government R&D spending has gone down as a share of GDP, while the share of R&D done by the private sector has increased.

- The share of R&D spending targeted to basic research, as opposed to applied R&D, has been declining.



Applied R&D vs. Basic Science R&D

- Applied R&D is research towards a commercial goal. Most private R&D is applied R&D.
- Basic science R&D is focused on long term scientific problems, but it has a history of jump-starting new technologies.
- The declining emphasis on basic research is concerning because fundamental research is ultimately the source of most innovation over the long-term.
- The lag from basic research to commercial application to the ultimate economic benefits can be very long, but it has proved its importance.
 - o For example, the Internet revolution of the 1990s was based on scientific investments made in the 1970s and 1980s.
 - o The commercialization of biotechnology was based on research developed in the 1950s.
- Because of the high social return to basic research, expanded government support for R&D significantly boosts long-term economic growth.

Examples of New Technologies Emerging from Federal R&D

- Genetic Engineering
- Hybrid Seed Corn
- Lithium-Ion Batteries
- Cancer Treatments

International Comparisons

- The United States is currently behind many other countries in total R&D (see chart below).
- Asian R&D, particularly China and Korea, is advancing very quickly.

		Global Forecast Gross Expenditures on R&D					
		2010		2011		2012	
		GDP (billions)	R&D (% of GDP)	GDP (billions)	R&D (% of GDP)	GDP (billions)	R&D (% of GDP)
1	United States	\$14,660	2.83%	\$15,203	2.81%	\$15,305	2.85%
2	China	\$10,090	1.48%	\$11,283	1.55%	\$12,434	1.60%
3	Japan	\$4,310	3.44%	\$4,382	3.47%	\$4,530	3.48%
4	Germany	\$2,940	2.82%	\$3,085	2.85%	\$3,158	2.87%
5	South Korea	\$1,459	3.36%	\$1,549	3.40%	\$1,634	3.45%
6	France	\$2,145	2.21%	\$2,227	2.21%	\$2,282	2.24%
7	United Kingdom	\$2,173	1.81%	\$2,246	1.81%	\$2,305	1.84%
8	India	\$4,060	0.80%	\$4,472	0.85%	\$4,859	0.85%
9	Brazil	\$2,172	1.10%	\$2,294	1.20%	\$2,402	1.25%
10	Canada	\$1,330	1.95%	\$1,387	1.95%	\$1,429	2.00%
11	Russia	\$2,223	1.03%	\$2,367	1.05%	\$2,491	1.08%
12	Italy	\$1,774	1.27%	\$1,824	1.30%	\$1,849	1.32%
13	Taiwan	\$822	2.30%	\$883	2.35%	\$938	2.38%
14	Australia	\$882	2.21%	\$917	2.25%	\$958	2.28%
15	Spain	\$1,369	1.38%	\$1,409	1.40%	\$1,440	1.42%
16	Sweden	\$355	3.62%	\$379	3.62%	\$398	3.62%
17	Netherlands	\$677	1.84%	\$703	1.87%	\$720	1.90%
18	Switzerland	\$324	3.00%	\$338	3.00%	\$346	3.00%
19	Israel	\$219	4.27%	\$234	4.20%	\$246	4.20%
20	Austria	\$332	2.75%	\$350	2.75%	\$359	2.75%
21	Turkey	\$960	0.85%	\$1,045	0.90%	\$1,080	0.90%
22	Singapore	\$292	2.52%	\$314	2.60%	\$331	2.65%
23	Belgium	\$394	1.96%	\$412	2.00%	\$423	2.03%
24	Finland	\$186	3.87%	\$196	3.83%	\$203	3.80%
25	Mexico	\$1,567	0.37%	\$1,663	0.38%	\$1,741	0.39%

Source: Battelle and R&D Magazine

Sources:

1. National Science Foundation: <<http://www.nsf.gov/statistics/nsf10314/pdf/nsf10314.pdf>>
2. National Science Foundation: <<http://www.nsf.gov/statistics/nsf10314/pdf/nsf10314.pdf>>
3. Bureau of Economic Analysis: <<http://www.bea.gov/newsreleases/general/rd/2010/rdspend10.htm>>

Further Reading

ASP Major Reports:

- Climate and Energy Security** America's Energy Choices
- Climate and Energy Security** Fusion Energy: An Opportunity for American Leadership and Security
- Climate and Energy Security** Fusion Fact Sheet
- American Competitiveness** CRADA's - Cooperative Research Development Agreements

Sources on Research and Development

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Building a New American Arsenal

The American Security Project (ASP) is a non-partisan initiative to educate the American public about the changing nature of national security in the 21st century.

Gone are the days when a nation's strength could be measured by bombers and battleships. Security in this new era requires a New American Arsenal harnessing all of America's strengths: the force of our diplomacy; the might of our military; the vigor of our economy; and the power of our ideals.

We believe that America must lead other nations in the pursuit of our common goals and shared security. We must confront international challenges with all the tools at our disposal. We must address emerging problems before they become security crises. And to do this, we must forge a new bipartisan consensus at home.

ASP brings together prominent American leaders, current and former members of Congress, retired military officers, and former government officials. Staff direct research on a broad range of issues and engages and empowers the American public by taking its findings directly to them.

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ASP exists to promote that dialogue, to forge consensus, and to spur constructive action so that America meets the challenges to its security while seizing the opportunities the new century offers.



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