

Indicator 9.5.1

Indicator Name, Target and Goal

Indicator 9.5.1 Research and development expenditure as a proportion of GDP

Target 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Definition and Rationale

○ Definition

Percentage of Intramural expenditure on R&D used by business enterprises, non-profit institutions and public organizations, as well as universities and colleges in the given period as a percentage of national gross domestic product (GDP).

○ Concepts

The business enterprises are those prescribed in the Companies Act (Act No.86 of 2005) with capital of ten million yen or more, mainly operating in the following industries defined in the "Japan Standard Industrial Classification (Revision November of 2007)": "Agriculture and Forestry", "Fisheries", "Mining and quarrying of stone and gravel", "Construction", "Manufacturing", "Electricity, gas, heat supply and water", "Information and communications", "Transport and postal activities", "Wholesale and retail trade - general merchandise wholesale trade, textile and apparel wholesale trade, food and beverages wholesale trade, building materials wholesale trade, minerals and metals wholesale trade, machinery and equipment wholesale trade and other wholesale trade", "Finance and insurance - banking, non-deposit money corporations, including lending and credit card business (excluding Government-related financial institutions), financial products transaction dealers and futures commodity transaction dealers, financial auxiliaries, insurance institutions, including insurance agents, brokers and services",

“Scientific research, professional and technical services – scientific and development research institutes, professional services, n.e.c, technical services, n.e.c” and “Services, n.e.c. – employment and worker dispatching services, miscellaneous business services”

“Non-profit institutions and public organizations” are research institutions, special corporations and incorporated administrative agencies (excluding those which are included in universities and colleges) established by the central or local governments that conduct R&D in the fields of social sciences and humanities, or natural sciences and engineering.

“Universities and colleges” include: faculties of universities and facilities (including postgraduate courses), junior colleges, technical colleges, and research institutes attached to universities, all of which are prescribed in the “School Education Act” (Act No. 26 of 1947); Inter-university Research Institute prescribed in the “National University Corporation Act” (Act No. 112 of 2003) and the National Institute of Technology prescribed in the “Act on the Institute of National Colleges of Technology, Independent Administrative Agency” (Act No. 113 of 2003).

“R&D” refers to systematic studies and creative efforts in science and technology which are undertaken for the acquisition of new knowledge of materials, functions, natural phenomena, etc., and for new application of the storage of knowledge.

Development and technical improvements on a product or production process as part of R&D activities in the business enterprises and the non-profit institutions and public organizations are also included in the category of R&D. The distinction between R&D activities and non-R&D activities is as follows:

<R&D Activities>

- ① Essential activities conducted in research units, i.e., planning designing, data collection, experiments, tests, inspection, analysis, reporting, etc. are required for R&D performance. Such activities for R&D as construction of machinery and instruments and equipment, rearing of animals and plants, and study of reference documents are included.
- ② Above-mentioned activities as well as designing, construction of pilot

plants and prototype models and experiments by using them undertaken in non-research units such as factories.

③ Clerical and financial work related to R&D performance.

Research units may pay their own-funds outside the organization for above-mentioned R&D activities to be conducted.

<Non-R&D Activities>

The following activities undertaken at research units or production units are not considered as R&D activities.

- ① Quality control and routine examination for the standardization of production processes; tests, experiments, measurements and analyses on products and half-finished products, soil, atmosphere, etc.
- ② Designing of machinery and facilities for commercial production purposes, beyond the process of R&D activities using pilot plants or prototype models.
- ③ Routine topographical mapping, exploration of underground resources.
- ④ General data collection on geological and oceanographic surveys and astronomical observations.
- ⑤ Patent and litigation work.
- ⑥ Seminars and training for general workers.

Intramural expenditure on R&D refers to the total of expenses spent for R&D activities within the statistical units (business enterprise, non-profit institution and public organization, university and college). This consists of labour costs, cost of materials, expenditures on (or depreciation of) tangible fixed assets, expenditures on intangible fixed assets, lease fees, and other expenses.

By source of funds, this category includes money received from other organizations and spent intramurally for R&D purposes. However, R&D funds paid outside for the sake of entrusted research or joint research - either from own-funds or received-funds - are excluded.

○ Rationale and Interpretation:

This indicator is a direct measure of the R&D spending, which is to be increased as per target 9.5.

Data Sources and Collection Method

- Survey of Research and Development
(Ministry of Internal Affairs and Communications)
- Annual Estimates of GDP
(Cabinet Office)
- Survey on Full-Time Equivalent Data for Research Staff Members in Higher Education Organization
(Ministry of Education, Culture, Sports, Science and Technology)

Method of Computation and Other Methodological Considerations

○ Computation Method

Full-time conversion is performed on “labour cost” of the intramural expenditure on R&D of universities among the research expenditures obtained by the Survey of Research and Development, using full-time converted values obtained from the “Survey on Full-Time Equivalent Data for Research Staff Members in Higher Education Organization” of Ministry of Education, Culture, Sports, Science and Technology

Research and development expenditure as a proportion of GDP

$$= \frac{\text{Intramural expenditure on R\&D(FTE)}}{\text{GDP}} \times 100$$

○ Comments and limitations

Since “Survey on Full-Time Equivalent Data for Research Staff Members in Higher Education Organization” is carried out in cycles of about 5 years, pay attention to the fact that the full-time conversion value used for full-time conversion was changed in FY2013 and FY2018.

Data Disaggregation

N/A

References

Result of the Survey of Research and Development

<https://www.stat.go.jp/english/data/kagaku/index.html>

Custodian Ministries of Data

Ministry of Internal Affairs and Communications

Custodian Ministries of Related Policies

Cabinet Office

Economic and Social Research Institute, Cabinet Office

Ministry of Education, Culture, Sports, Science and Technology

International Organizations

United Nations Educational, Scientific and Cultural Organization (UNESCO)