

Indicator 9.5.2

Indicator Name, Target and Goal

Indicator 9.5.2 Researchers (in full-time equivalent) per million inhabitants

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

The number of researchers (full-time or equivalent) per million population in business enterprises, non-profit institutions and public organizations, as well as universities and colleges at a specific point in time.

○ 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.

Researchers: Persons who hold a university degree or its equivalent, and perform research activities in their own specific area of study.

- A. Business enterprises and non-profit institutions and public organizations
 - Persons solely engaged in R&D activities
Within "Researchers," persons engaged in R&D activities all the time.
 - Persons partly engaged in R&D activities
Within "Researchers," persons engaged in R&D activities, but not all the time.
- B. Universities and colleges
 - Regular researchers
Persons who are mainly engaged in R&D activities within the organization; teachers, graduate students for doctoral course, medical staff members, and others.

- External non-regular researchers
Researchers who have regular work outside of the organization.

○ Rationale and Interpretation

This indicator is a direct measure of the number of R&D workers per million people, 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)
- Survey on Full-Time Equivalent Data for Research Staff Members in Higher Education Organization
(Ministry of Education, Culture, Sports, Science and Technology)
- Population Estimates
(Ministry of Internal Affairs and Communications)

Method of Computation and Other Methodological Considerations

○ Computation Method

Full-time conversion is performed for researchers of universities among researchers 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

$$\text{The number of researchers per million population} = \frac{\text{Researchers(FTE)}}{\text{Population}} \times 1000000$$

○ Comments and limitations

Since “Survey on Full-Time Equivalent Data for Research Staff Members in Higher Education Organization” is carried out in about 5 years cycle, pay attention to the fact that the full-time conversion value used for full-time conversion differs between before 2012 and after 2013.

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

Ministry of Education, Culture, Sports, Science and Technology

International Organizations

United Nations Educational, Scientific and Cultural Organization (UNESCO)