

Explanatory Notes

National Survey of RESEARCH, INNOVATION AND ENTERPRISE IN SINGAPORE

PURPOSE OF SURVEY

The Agency for Science, Technology and Research (A*STAR) conduct the National Survey of Research, Innovation and Enterprise (RIE) in Singapore, and publishes the survey results annually. The National Survey of RIE in Singapore collects comprehensive data on Innovation and Research and Development (R&D) activities in whole of Singapore. Data in the survey have been collected and presented in line with the standard OECD methodology for R&D statistics as prescribed in the Frascati Manual, and innovation statistics as prescribed in the Oslo Manual.

The purpose of this survey is to collect data which are useful measures of the scale and directions of innovation and R&D in Singapore. Information from the survey is useful to the Government and the private sector for policy formulation or corporate decision-making.

These notes will clarify the questions and terms used and will facilitate completion of the questionnaire. If you are unable to provide an exact response to a question, please provide your best estimate to each question. You are encouraged to call our hotline at **6826 6177** or email us at A-STAR_RIESurvey@a-star.gov.sg if further clarification is required.

Definition of Innovation and R&D activities

Definition of Innovation

An innovation is a new or improved product or process (or combination thereof) that differs significantly from the organisation's previous products or processes and that has been made available to potential users (product) or brought into use by the organisation (process).

- A **product innovation** is a new or improved good or service that differs significantly from the organisation's previous goods or services and that has been introduced on the market. It excludes the simple re-sale of new goods and changes of a solely aesthetic nature.
- A **process innovation** is a new or improved process for one or more functions that differs significantly from the organisation's previous processes and that has been brought into use by the organisation.

Innovation activities include all developmental, financial and commercial activities undertaken by an organisation that are intended to result in an innovation for the organisation, such as:

- R&D activities
- Engineering, design and other creative work activities
- Marketing and brand equity activities
- IP-related activities
- Employee training activities for purpose of developing innovation
- Software development and database activities
- Activities related to the acquisition or lease of tangible assets
- Innovation management activities such as crowdsourcing of ideas and Innovation Challenges

Definition of R&D

Research and development (R&D) comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this stock of knowledge to devise new applications. This is based on the definition published by OECD in the Frascati Manual (2015). R&D covers the following activities: basic research, strategic basic research, applied research and experimental development.

R&D is related to a number of other activities with a scientific and technological basis, which are often very closely linked to R&D through flows of information or in terms of operations, institutions and personnel. The basic criterion for distinguishing R&D from related activities is the presence in R&D of an appreciable element of novelty and resolution of scientific and/or technological uncertainty, i.e. when the solution to a problem is not readily apparent to someone familiar with the basic stock of common knowledge and techniques for the area concerned.

Scope of R&D

Intramural R&D

- R&D carried out by your organisation on its own behalf or on behalf of others.

Extramural R&D

- R&D funded by your organisation but carried out by others using their own facilities.

R&D includes

- Construction/operation of pilot plants not operated as (or intended as) commercial units
- Research into and original development (or substantial modification) of computer software such as application software, programming languages and operating systems
- Feedback R&D directed at solving problems occurring beyond the R&D phase, for example technical problems arising during initial production runs
- Design, construction and operation of prototypes where the main objective is technical testing or to make further improvements
- Research leading into the discovery and production of improved or new chemical, pharmaceutical or food products, or special investigation to establish new medical treatments and the side effects of medical treatments/products

R&D excludes (except where used primarily for the support of, or as part of R&D projects)

- Scientific and technical information services, routine quality control and testing
- Policy-related studies, programmatic evaluations, management studies and efficiency studies
- General purpose or routine data collection, consumer surveys and market research
- Pre-production testing for commercial viability, tooling up and trial production runs
- Prospecting, exploring or drilling for minerals, petroleum or natural gas
- Cosmetic modifications or style changes to existing products
- Routine computer programming, systems maintenance or software application
- Mathematical or statistical analysis
- Commercial, legal and administrative aspects of patenting, copyrighting or licensing
- Activities associated with standards compliance

R&D ends when ...

the work is no longer experimental, and pre-production begins. This is when the material or product is substantially developed and the primary objective of the work is to develop markets, do pre-production planning or get production or control systems to work smoothly, then such work is no longer R&D and should not be included. However, if the primary objective is to make further technical improvements, then the work comes within the definition of R&D and should be included.

REPORTING UNIT

The reporting unit should be an establishment, defined as a business unit in one location under a single ownership. Please submit separate return for the following scenarios:

- Head office and branches of the same enterprise that perform innovation and/or R&D
- Multi-activity enterprise, business units engaging in separate activities in the same premises.
- Subsidiaries or associated companies that perform innovation and/or R&D.

REPORTING PERIOD (Reporting Start date and Reporting end date)

- The preferred reporting period for this questionnaire is 1 Jan 2024 to 31 Dec 2024.
- If your reporting period is not from 1 Jan to 31 Dec 2024, please specify a reporting period of 12 months applicable to your organisation.
- If organisation's reporting period is not for a period of 12 months, please indicate the reason under:

Q: Reporting period is more than or less than 12 months:

The same reporting period should be used throughout the survey.

SECTION I: GENERAL INFORMATION

R&D MANPOWER

R&D manpower comprises all persons directly employed on R&D and those providing direct services. It includes persons who are mainly or partially engaged in R&D.

MANPOWER EXPENDITURE

Expenditure on total manpower of your organisation, not only those involved in R&D.

- This includes annual wages and salaries and all associated expenditures for manpower. It should include gross payments before taxation and other deductions, CPF contributions, overtime payments, shift allowances, bonuses, annual wage supplements, welfare expenditure, and payments to contract staff on your payroll.
- Manpower expenditure should not net off Special Employment Credit.

SALES REVENUE

Total gross sales revenue of your organisation for the reporting year.

SECTION II: INNOVATION ACTIVITIES PERFORMED BY ORGANISATION

PRODUCT INNOVATION

- Product Innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and which has been implemented on the market.
 - A good is usually a tangible object such as a smartphone, furniture, or packaged software, but downloadable software, music and film are also goods
 - A service is usually intangible, such as retailing, insurance, educational courses, air travel, consulting, etc.
- Product innovations (new or improved) must be new to your organisation, but they do not need to be new to your market.
- It can be originally developed by your organisation or by other organisations.

SALES ATTRIBUTABLE TO NEW OR IMPROVED GOODS/SERVICES

Indicate the breakdown (in percentage) of your organisation's total sales accordingly to the different product innovations that were introduced in the reporting period. Total contributions should tally up to 100%. Please indicate '0' if there are no sales yet.

PROCESS INNOVATION

- Process innovation is a new or improved process for one or more functions that differs significantly from the organisation's previous processes and that has been brought into use by the organisation.
 - These processes can include production processes, distribution methods, or support activities for your goods or services.
- Process innovations (new or improved) must be new to your organisation, but they do not need to be new to your market.
- Process innovations could have been originally developed by your organisation or by other organisations.

INNOVATION EXPENDITURE (EXCLUDING R&D EXPENDITURE)

Indicate the breakdown of the amount spent on innovation activities in the reporting period. If innovation and R&D expenditures cannot be reported separately, please check the relevant box and report total R&D and innovation expenditures under (Section III).

All expenditures associated with innovation activities (exclude R&D) includes:

- Acquisition of machinery equipment, software, Intellectual Property Rights (IPRs) or buildings for innovation activities other than R&D
- Acquisition of external knowledge for innovation activities other than R&D (e.g. patents, licenses, trademarks)
- Product design, service design, preparation of production / distribution for innovation activities other than R&D
- Training and professional development for innovation activities other than R&D (e.g. employee training or continued education)

- Marketing of innovations (marketing activities directly related to innovations, including market research)

Indicate the breakdown of the amount spent on innovation activities by the types of expenditure

- Manpower Expenditure (Own personnel working on innovation)
- Purchase Expenditure (Services, materials, supplies used for innovation)
- Capital Goods (Acquisition of machinery, equipment, software, IPRs, buildings, furniture and fittings etc.)

Please indicate a '0' in the relevant category if there are no innovation expenditure.

SECTION III: EXPENDITURES ON R&D PERFORMED WITHIN ORGANISATION

TYPES OF R&D EXPENDITURE

Capital Expenditure

- Annual gross expenditures on fixed assets used in the R&D programmes of the organisation, i.e. on land, buildings and other structures, and on vehicles, plants, machinery and equipment.
- The acquisition of new and second-hand fixed tangible assets either on your own account or under a finance lease with an expected life of greater than one year.
- Include major alterations to R&D facilities/environment.
- Exclude depreciation provisions, repairs and maintenance.

Manpower Expenditure

- Annual wages and salaries and all associated expenditures for R&D Manpower. Any personnel engaging in R&D activities will be considered R&D manpower.
- Manpower expenditure should not net off Special Employment Credit. It should include gross payments before taxation and other deductions, CPF contributions, overtime payments, shift allowances, bonuses, annual wage supplements, welfare expenditure, and payments to contract staff on your payroll.
- All reported figures on Manpower Expenditures should be on a full-time-equivalent (FTE) basis. A person who normally spends 30% of his/her time on R&D and the rest on other activities should be considered as 0.3 FTE. If employees are not engaging in the R&D activities full-time, you may proportion their annual salary according to the time spent on R&D activities.

Other Operating Expenditure

- Include materials, fuels, rent and hiring expenses; data processing; payments to external organisations for use of specialised testing facilities; commission work/sub-contract work expenses (but excluding labour costs for sub-contractors on your payroll).
- Include activities which are not themselves R&D but which provide support for R&D (e.g. storage, transportation, cleaning, repair, maintenance and security activities, administration and clerical activities undertaken exclusively for R&D, such as activities of central finance and personnel departments).
- Include the payments for the current purchase of books, periodicals, and annuals for R&D related purposes.
- Expenditure on personnel who provide an indirect service to R&D.

All purchases should be valued at delivered cost to your establishment regardless of whether full payments have been made. They should include import and excise duties and should be net of rebates and discounts.

Sources of R&D Funds

Indicate the breakdown of how your Total R&D Expenditure was funded.

Note that sources should be the original sources providing funds, such as grants, contracts, etc. for R&D activities. Funding on project basis should be declared according to how much has been spent for the reporting period only. Funds that are not utilised for the reporting period should not be included.

SECTION IV: R&D MANPOWER

Indicate your R&D Manpower headcount as at the end of the reporting period, according to their Sex, Citizenship and Qualification Level. Please indicate a '0' in the relevant category if there is no R&D headcount.

R&D manpower comprises all persons directly employed on R&D and those providing direct services. It includes persons who are mainly or partially engaged in R&D. The following occupational groups are considered as R&D manpower: researchers, technicians and other support staff.

TYPES OF R&D MANPOWER

Researchers: R&D personnel principally engaged in research (as opposed to purely technical support work). They include:

- Professionals engaged in the conception and/or creation of new knowledge, products, processes, methods and systems, or in the management of the projects concerned.
- Managers and administrators engaged in the planning or management of scientific and technical aspects of R&D projects or a researcher's work.
- Software developers/programmers involved in R&D projects.

Technicians: Persons doing technical work in support of R&D, normally under the direction and supervision of a researcher.

- Typical activities of technicians include preparation for experiments, taking records, preparation of charts and graphs and coding data.

Other support staff: Other staff who participate in or are directly associated with R&D projects. Includes managers and administrators dealing mainly with financial and personnel matters and general administration, skilled and unskilled craftsmen, secretarial and clerical staff, insofar as their activities are a direct service to R&D.

SECTION V: TECHNOLOGY INDICATORS

INTELLECTUAL PROPERTY PRODUCTS

Intellectual property products are the result of research, development, investigation, or innovation leading to knowledge that the developers can market or use to their own benefit in production. Use of the knowledge is restricted by means of legal or other protection (e.g. patents, copyrights, designs, trademarks, plant variety rights, trade secrets).

Intangible Asset	Definition
Trademarks and Brands	A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. It can be represented graphically in the form of the company's name or logo. Brands are wider in scope than trademarks. They are corporate images built over time, and can consist of several elements including identity, image, personality, culture and reputation.
Registered designs	Registered design provides owner with rights over the external appearance of an article or non-physical product (i.e. the external features of shape, configuration, colour, pattern or ornament applied to an article or non-physical product).
Patents	Ownership rights for intellectual property such as patents, industrial design, and industrial expertise. It could be in a form of a new product, process, or technical improvement to existing technology.

Primary patent applications: The applicant of the patent can be your organisation or an overseas headquarter/affiliate. Note that only first filings of patent applications are counted, and patent applications for the same invention in numerous countries should be entered as one.

Patents awarded (first grants): The awardee of the patent can be your organisation or an overseas headquarter/affiliate. Note that patent awards for the same invention in numerous countries should be counted as one.

Sales revenue generated from commercialised products/processes attributable to any R&D performed in Singapore (no limitation on time frame). Please input the sales revenue relative to the share of R&D done in Singapore according to one of the scenarios described:

- Regardless of the size of R&D contribution from Singapore: Applicable if the R&D of your products are done partially in Singapore and partially overseas and you are unable to report the sales revenue of product based on R&D done only in Singapore. As such, sales revenue refers to the full revenue of products regardless of the size of R&D done in Singapore.
- Pro-rated for the size of R&D contribution from Singapore: Applicable if the R&D of your products done partially in Singapore and partially overseas and you are able to pro-rate the sales revenue according to the size of the R&D done in Singapore.
- R&D wholly conducted in Singapore: Applicable if the R&D of your products are done only in Singapore.

SECTION VI: EXPENDITURES ON R&D PERFORMED BY OTHER ORGANISATIONS

Extramural R&D funded by your organization

- Funds that are paid to other organisation (including subsidiaries) for R&D activities. Subcontractors working on R&D projects carried out by your organisation should be excluded as they are already captured under Other Operating Expenditure in (Section III).

- Funds should be declared according to how much has been given or paid to the other organisations for the reporting period. Funds that have been agreed on but not given or paid during the reporting period should not be included.

If your organisation had funded R&D activities to other organisation(s) within Singapore, please provide the name of the organisation(s) and select their corresponding Nature of Entity.

CREATING GROWTH, ENHANCING LIVES

Mission | We advance science and develop innovative technology to further economic growth and improve lives.

Vision | A global leader in science, technology and open innovation.