

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
- Software development and database activities
- Activities related to the acquisition or lease of tangible assets
- Innovation management activities

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. The scope of the definition of R&D for this Survey extends to R&D in science and technology only and excludes the social sciences, humanities and the arts.

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
- Research in social sciences, humanities and the arts.

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.

Should you need any clarification or assistance, please do not hesitate to call the RIE Survey hotline at **6826 6177** or email A-STAR_RIESURVEY@a-star.edu.sg.

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