Statistical Standard for Research

Rationale

The Australian and New Zealand Standard Research Classification (ANZSRC) has been developed for use in the collection, analysis, and dissemination of research and experimental development statistics in Australia and New Zealand.

ANZSRC is the collective name for a set of three related classifications. The three constituent classifications included in ANZSRC are: type of activity (TOA), fields of research (FOR), and socio-economic objective (SEO).

The use of the three constituent classifications ensures information collected on research and development (R&D) statistics is useful to governments; educational institutions; international organisations; scientific, professional, or business organisations; business enterprises; community groups; and private individuals in Australia and New Zealand. ANZSRC is widely accepted as the national standard classification in Australia and New Zealand, not only in the compilation of R&D statistics but also in the study of research in these countries generally.

Definition

Research and development (R&D) is defined according to the OECD Frascati Manual (2002) as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications."

A R&D activity is characterised by originality. It has investigation as a primary objective, the outcome of which is new knowledge, with or without a specific practical application, or new or improved materials, products, devices, processes, or services. R&D ends when work is no longer primarily investigative.

Operational issues

As indicated in the Frascati Manual, and as experience has shown, there are difficulties in delineating the point which clearly separates the culmination of R&D investigative work and the beginning of the implementation phase of the innovations or recommendations resulting from R&D. Errors at this point are particularly significant because, although R&D programmes require large outlays of resources, the costs of implementing innovations or recommendations resulting from R&D may also be as high, or higher in many instances.

There is also a wide range of scientific and related activities that are not R&D, but that are closely linked to R&D in terms of organisation, resource allocation, institutional affiliation, and the use or flow of information. However, activities conducted solely or primarily for the purposes of R&D support are included in R&D.

The activities which do not have clear boundaries with R&D are listed below.

(a) Education and training of personnel and students

Postgraduate research, including supervision of the research, is considered to be R&D. The development of new teaching methods is also regarded as R&D. However, teaching and training students using established methods and subject knowledge is excluded.

(b) Specialised scientific and technical information services

Specialised scientific and technical information services which are undertaken solely in support of R&D are regarded as R&D. Examples of these are scientific data collection, coding, recording, classification, dissemination, translation, analysis, and bibliographic services.

These specialised services are excluded if they are undertaken independently and not solely in support of R&D.

(c) General purpose or routine data collection

Collecting data in support of R&D work is included in R&D.

However, data collection of a general nature is excluded. This is normally carried out by government agencies to record natural, biological, economic, or social phenomena of general public or government interest. Examples are national population censuses, surveys of unemployment, topographical mapping, and routine geographical or environmental surveys.

(d) Maintenance of national and international standards

Routine testing and analysis of, for example, materials, components, products, processes, soils, and atmospheres, etc. for standard compliance is excluded from R&D.

(e) Feasibility studies

Feasibility studies undertaken in support of R&D are included. However, a feasibility study that involves gathering information about existing conditions, for use in deciding whether or not to implement a project is excluded – for example, a study to determine the viability of a petrochemical complex in a particular location.

(f) Specialised medical care

R&D includes the development of new treatments and procedures, including such developments in conjunction with advanced medical care and examinations usually carried out by university hospitals.

However, routine investigations or normal application of specialised medical knowledge, techniques, or equipment are excluded from R&D. Examples of these are pathology, forensic, and post-mortem procedures.

(g) Clinical trials

Phase 1, 2, and 3 clinical trials are included in R&D. Phase 4 clinical trials are excluded from R&D, unless they bring about further scientific or technological advance.

(h) Patent and licence work

Patent work connected directly with R&D projects is included in R&D. However, commercial, administrative, and legal work associated with patenting, copywriting, and licensing, is excluded.

(i) Policy related studies

The boundary between certain policy-related studies, as described in the Frascati Manual and R&D, is complex. In the Frascati Manual, policy-related studies cover, activities such as the “analysis and assessment of existing programmes, continued analysis and monitoring of external phenomena (e.g. defence and security analysis), legislative inquiry concerned with general government departmental policy or operations”. Rigour is required to separate policy-related studies that are not R&D from true R&D policy work.

Studies to determine the effects of a specific national policy to a particular economic or social condition or social group may have elements of R&D. Routine management studies or efficiency studies are excluded.

(j) Routine software development

Software development is an integral part of many projects which in themselves may have no element of R&D. The software development component of such projects, however, may be classified as R&D if it leads to an advance in the area of computer software.

For a software development to be considered as R&D, its completion must be dependent on a scientific or technological advance, and the aim of the project must be the systematic resolution of a scientific and/or technological uncertainty.

The following are examples of software development which are considered to be R&D:

- development of internet technology
- research into methods of designing, developing, deploying, or maintaining software
- R&D on software tools or technologies in specialised areas of computing (e.g. image processing, artificial intelligence, character recognition)
- R&D producing new theorems and algorithms in the field of theoretical computer science.

The following are examples of software developments which are not considered to be R&D:

- routine computer and software maintenance
- business application software and information system development using known methods and existing software
- adding user functionality to application languages
- adaptation of or support for existing software.

(k) Marketing and market studies

Market research and opinion polls are excluded from R&D.

(l) Mineral exploration

The development of new or vastly improved methods of data acquisition, processing, and interpretation of data is included as R&D. Surveying undertaken as an integral part of an R&D project to observe geological phenomena is also regarded as R&D. However, the search for minerals using existing methods is excluded from R&D.

(m) Prototypes and pilot plants

The design, construction, and testing of prototypes generally falls within the scope of R&D. However, trial production and copying of prototypes are excluded from R&D.

The construction and operation of pilot plants is part of R&D provided that these are used to obtain experience or new data for evaluating hypotheses.

Pilot plants are excluded from R&D as soon as the experimental phase is over, or as soon as they are used as normal commercial production units, even if they continue to be described as 'pilot plants'.

If a pilot plant is used for combined operations, the component used for R&D is to be estimated.

(n) Other activities

All other activities that are ancillary or consequential to R&D are excluded. Examples of these are interpretative commentary using existing data, forecasting, operations research as contributing to decision making, and the use of standard techniques in applied psychology to classify or diagnose human characteristics

Classification criteria

ANZSRC – Type of activity classification

Four types of activities applicable to R&D are recognised in this classification:

- pure basic research
- strategic basic research
- applied research
- experimental development.

Where possible, a research project should be allocated to a single type of activity. If the project is large and involves multiple types of activity, then each relevant activity category should be attributed a proportion of resources relative to the project's total R&D expenditure.

ANZSRC – Fields of research classification

The ANZSRC FOR allows R&D activity to be categorised according to the methodology used in the R&D, rather than the activity of the unit performing the R&D or the purpose of the R&D.

The categories in the classification include major fields and related sub-fields of research, and emerging areas of study, investigated by businesses, universities, tertiary institutions, national research institutions, and other organisations. This classification allows the categorisation of fields of research activity within Australia and New Zealand.

ANZSRC – Socio-economic objective classification

The ANZSRC SEO classification allows R&D activity in Australia and New Zealand to be categorised according to the intended purpose or outcome of the research, rather than the processes or techniques used in order to achieve this objective.

The purpose categories include processes, products, health, education, and other social and environmental aspects in Australia and New Zealand that R&D activity aims to improve.

Classification

ANZSRC is the collective name for a set of three related classifications. The three classifications included in ANZSRC are:

- type of activity (TOA)
- fields of research (FOR)
- socio-economic objective (SEO).

1. TOA is a flat classification with four categories. Excluding residual categories:

Classification	Australian and New Zealand Standard Research Classification - Type of Activity
Abbreviation	ANZSRC.TOA
Version	V1.0
Effective date	31-03-2008

Australian and New Zealand Standard Research Classification – Type of Activity

ANZSRC.TOA V1.0
1 Pure Basic Research
2 Strategic Basic Research
3 Applied Research
4 Experimental Development

2. FOR is a hierarchic classification of three levels. Level 1 of the classification has 22 divisions, level 2 has 157 groups, and level 3 has 1,238 fields. Excluding residual categories:

Classification	Australian and New Zealand Standard Research Classification - Fields of Research
Abbreviation	ANZSRC.FOR
Version	V1.0
Effective date	31-03-2008

Australian and New Zealand Standard Research Classification – Fields of Research

ANZSRC.FOR V1.0
- 01 Mathematical Sciences
- 02 Physical Sciences
- 03 Chemical Sciences
- 04 Earth Sciences
- 05 Environmental Sciences
- 06 Biological Sciences
- 07 Agricultural and Veterinary Sciences
- 08 Information and Computing Sciences
- 09 Engineering
- 10 Technology
- 11 Medical and Health Sciences
- 12 Built Environment and Design
- 13 Education
- 14 Economics
- 15 Commerce, Management, Tourism and Services
- 16 Studies in Human Society
- 17 Psychology and Cognitive Sciences
- 18 Law and Legal Studies
- 19 Studies in the Creative Arts and Writing
- 20 Language, Communication and Culture
- 21 History and Archaeology
- 22 Philosophy and Religious Studies

The above classification only displays the classification at its highest level. The full classification can be downloaded from www.stats.govt.nz.

3. SEO is a hierarchic classification of four levels. Level 1 of the classification has 5 sectors, level 2 has 17 divisions, level 3 has 119 groups, and level 4 has 847 objectives. Excluding residual categories

Classification	Australian and New Zealand Standard Research Classification - Socio-Economic Objective
Abbreviation	ANZSRC.SEO
Version	V1.0
Effective date	31-03-2008

Australian and New Zealand Standard Research Classification – Socio-Economic Objective

ANZSRC.SEO V1.0
- A Defence
- B Economic Development
- C Society
- D Environment
- E Expanding Knowledge

The above classification only displays the classification at its highest level. The full classification can be downloaded from www.stats.govt.nz.

Questionnaire module

Requirements

There is no standard question for determining R&D statistics. They are derived from the responses to questions on occupation, qualification, current and capital expenditure, source of funds, purpose of research, biotechnology, type of research carried out, R&D funded externally, reporting activities, and other details.

The requirements for the questions on occupation and qualifications are specified in the classifications and related statistical standards for occupation and qualification.

The requirements for the questions on current and capital expenditure, source of funds, purpose of research, biotechnology, type of research carried out, and R&D funded externally are listed below:

Current and capital expenditure

The questionnaire module must determine the total expenditure on R&D by the organisation during the financial year.

Source of funds

The questionnaire module must determine what were the sources of funds for the R&D expenditure reported in current and capital expenditure.

Purpose of research

The questionnaire module must determine which sectors benefit from the R&D projects being carried out.

Biotechnology

The questionnaire module must determine if current and capital expenditure included any biotechnology.

Type of research carried out

The questionnaire module must determine what types of research were carried out.

R&D funded externally

The questionnaire module must determine if the organisation funded any R&D carried out at other organisations.

Example

The questionnaire modules below are examples that meet the requirements documented in this statistical standard. Other questionnaire modules may vary in format but should conform to the requirements contained in this statistical standard.

Research and Development Survey 2008 (Government questionnaire)
Research and Development Survey 2008 (Business questionnaire)
Research and Development Survey 2008 (CRI questionnaire)

These questionnaire modules can be downloaded from www.stats.govt.nz

Standard output

The standard output classification is restricted to the top-level for 'type of activity', 'fields of research', and 'socio-economic objective'.

Related classifications and standards

International

ANZSRC is based upon the Australian standard research classification (ARSC 1998). The Organisation for Economic Co-operation and Development (OECD) *Proposed Standard Practice for Surveys on Research and Experimental Development, ("Frascati manual"), Sixth Revision (2002)*, and the Central product classification (CPC) have a direct relationship with ANZSRC.

Glossary

Applied research

Original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.

Experimental development

Systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products, devices, policies, behaviours, or outlooks; to installing new processes, systems, and services; or to improving substantially those already produced or installed.

Fields of research classification

This classification allows R&D activity to be categorised according to the field of research. In this respect it is the methodology used in the R&D that is being considered.

Pure basic research

Experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge.

Research and development

R&D is defined according to the OECD Frascati Manual (2002) as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications."

Socio-economic objective classification

This classification allows R&D activity to be categorised according to the purpose or outcome of the R&D, as perceived by the data provider (researcher).

Strategic basic research

Experimental and theoretical work undertaken to acquire new knowledge, directed into specified broad areas in the expectation of practical discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems.

Type of activity classification

This classification allows R&D activity to be categorised according to the type of research effort, namely, pure basic research, strategic basic research, applied research, and experimental development.

Residual categories

Don't know

Use of this category is discretionary. The use of a category capturing don't know responses is most applicable to household surveys where don't know may be a legitimate response to certain questions.

Refused to answer

This category is **only** used when it is known that the respondent has purposefully chosen not to respond to the question. Use of this residual category in processing is optional. Its use is most applicable in face-to-face or telephone interviews, but may be used in self-completed questionnaires if the respondent has clearly indicated they refuse or object to answering the question.

Response unidentifiable

This category is used when there is a response given, but:

- the response is illegible
- it is unclear what the meaning or intent of the response is – this most commonly occurs when the response being classified contains insufficient detail, is ambiguous or is vague
- the response is contradictory; for example, both the yes and no tick boxes have been ticked, or
- the response is clear and seemingly within the scope of the classification, but cannot be coded because no suitable option (particularly other residual category options such as 'not elsewhere classified' or 'not further defined') exists in the classification or codefile.

Response outside scope

This category is used for responses that are positively identified (i.e., the meaning and the intent are clear) but which clearly fall outside the scope of the classification/topic as defined in the standard.

Not stated

This category is only used where a respondent has not given any response to the question asked; that is, it is solely for non-response.

References

Australian Bureau of Statistics (1998). *Australian Standard Research Classification (ASRC),*Canberra.

Australian Bureau of Statistics (2008). *Australian and New Zealand Standard Research Classification*, Canberra.

Australian Bureau of Statistics (2008). *Australian and New Zealand Standard Research Classification (ANZSRC)*. Available from www.abs.gov.au.