Research and Development in Canadian Industry, 2003

INSTRUCTION GUIDE
RESEARCH AND DEVELOPMENT IN CANADIAN INDUSTRY

1. This survey has been carried out since 1955; you may have file copies of your returns for earlier years (e.g. 2002) which will help you now. If you are filing a consolidated return for two or more related companies please ensure that consolidated figures are used for all questions (e.g. revenues, employment, R&D expenditures, technology payments). "This reporting unit", as used in the questionnaire, covers groups of related companies when a consolidated return is filed.

2. Please answer all questions. Your best estimates are satisfactory when precise figures are not available. Your estimates will be better than ours.

3. **Please return the completed questionnaire within 30 days of receipt.** If you are unable to do so, please inform us of the expected completion date. If you receive more than one copy of this survey questionnaire for the same business, please complete one and attach and return the duplicate(s). If you require assistance in the completion of this questionnaire or have any questions regarding the survey please address all enquiries to:

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Science, Innovation and Electronic Information Division
Statistics Canada
Ottawa, Ontario
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Telephone (613) 951-9662 (call collect)
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R&D Definition (equivalent to Canada Customs and Revenue Agency - see information Circular 86-4R3)

Research and development (R&D) is systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis to achieve a scientific or technological advance.

Research is original investigation undertaken on a systematic basis to gain new knowledge.

Development is the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes. If successful, development will usually result in devices or processes which represent an improvement in the "state of the art" and are likely to be patentable.

Research and development should be considered to be "Scientific Research and Experimental Development" as defined in Section 37, Regulation 2900 of the Income Tax Act; this section specifically excluded the following:

(i) market research, sales promotion,

(ii) quality control or routine analysis and testing of materials, devices or products,

(iii) research in the social sciences or the humanities,

(iv) prospecting, exploring or drilling for or producing minerals, petroleum or natural gas,

(v) the commercial production of a new or improved material, device or product or the commercial use of a new or improved process,

(vi) style changes, or routine data collection.

Example:

The investigation of electrical conduction in crystals was research. The application of this knowledge to the creation of a new amplifying device - the transistor - was development. The application of the device to the construction of new electrical circuits for television receivers was development. The formulation of new plastic cases for a television receiver is design, not development.

Research and development may be carried out either by a permanent R&D unit (e.g., R&D division) or by a unit generally engaged in any non-R&D activity such as engineering or production. In the first case, the R&D unit may spend part of its time on routine testing or trouble shooting or on some other activities which should not be included in R&D. In the second, only the R&D portion of such units' total activity should be considered.

Note:

Although the definition of "Scientific Research and Experimental Development" is considered to be the same as R&D, certain expenditures for scientific research and experimental development cannot be claimed for income tax purposes (e.g., land and buildings). All expenditures attributable to R&D are included in this report.

Interpretation

Generally speaking, industrial R&D is intended to result in an invention which may subsequently become a technological innovation. An essential requirement is that the outcome of the work is uncertain, i.e., that the possibility of obtaining a given technical objective cannot be known in advance on the basis of current knowledge or experience. Hence much of the work done by scientists and engineers is not R&D, since they are primarily engaged in "routine" production, engineering, quality control or testing. Although they apply scientific or engineering principles their work is not directed towards the discovery of new knowledge or the development of new products and processes. However, work elements which are not considered R&D by themselves but which directly support R&D projects, should be included with R&D in these cases. Examples of such work elements are design and engineering, shop work, computer programming, and secretarial work.

If the primary objective is to make further technical improvements to the product or process, then the work comes within the definition of R&D. If however, the product, process or approach is substantially set and the primary objective is to develop markets, to do pre-production planning or to get a production, or control system working smoothly, then the activity can no longer be considered as part of R&D even though it could be regarded as an important part of the total innovation process. Thus, the design, construction and testing of prototypes, models and pilot plants are part of R&D. But when necessary modifications have been made and testing has been satisfactorily completed, the boundary of R&D has been reached. Hence, the costs of tooling (design and try-out), construction drawings and manufacturing blueprints, and production start-up are not included in development costs.

Pilot plants may be included in development only if the main purpose is to acquire experience and compile data. As soon as they begin operating as normal production units, their costs can no longer be attributed to R&D. Similarly, once the original prototype has been found satisfactory, the costs of other "prototypes" built to meet a special need or fill a very small order are not to be considered as part of R&D.

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ITEM	TREATMENT	REMARKS
Economic research, market research, management studies	**Exclude**	**All activities in the social sciences.**
Quality control, routine testing, style changes, minor adaptation of a product to meet a customer's specific requirements	**Exclude**	**Even if carried out by staff normally engaged in R&D**
Prospecting, exploratory drilling, development of mines, oil or gas wells	**Exclude**	**Except for R&D projects concerned with new equipment or techniques in these activities, such as in-situ and tertiary recovery research.**
Engineering	**Exclude**	**Engineering unless it is in direct support of R&D**
Design and drawing	**Exclude**	**Design and drawing unless it is in direct support of R&D.**
Prototypes, pilot plants	**Include**	**As long as the primary objective is to make further improvements.**
Contracts (questions 8(c)(ii) and 8(e))	**Include**	**All contracts which require R&D. For contracts which include other work, report only the R&D costs.**
Tooling up, trial production, trouble shooting	**Exclude**	**Although R&D may be required as a result of these steps.**
Patent and licence work	**Exclude**	**All administrative and legal work connected with patents and licences.**

Question 3 - Revenues in Canada - Represents the amount of revenues (in Canada) resulting from the sale of products and services (after deducting sales and excise taxes), and other revenues such as those generated from investment and rental. All goods sold include consignments shipped outside Canada. Revenues should be reported in Canadian currency.

Question 5 - Full-time Equivalent (FTE) - R&D may be carried out by persons who work solely on R&D projects or by persons who devote only part of their time to R&D, and the balance to other activities such as testing, quality control and production engineering. To arrive at the total effort devoted to R&D in terms of manpower, it is necessary to estimate the full-time equivalent of these persons working only part-time in R&D.

FTE = Number of persons who work solely on R&D projects + the estimate of time of persons working only part of their time on R&D.

Example calculation: If out of five scientists engaged in R&D work, one works solely on R&D projects and the remaining four devote only one quarter of their working time to R&D, then: FTE = 1 + 1/4 + 1/4 + 1/4 + 1/4 = 2 scientists.

Question 5 - Supporting Staff

Technicians and technologists - Technically trained personnel who assist scientists and engineers in R&D, e.g. chemical technicians, draftspersons. They may be certified by either provincial educational authorities or by provincial or national scientific or engineering associations.

Others - Personnel directly engaged in the R&D program, e.g. machinists and electricians in construction of prototypes, or clerks, typists, accountants and storekeepers engaged in the administration or clerical support of R&D units.

Question 6 (e) - Software Development - Software refers to the encoded instructions executed by electronic devices including computers for performing operations and functions. See **CCRA's Information Circular 97-1** "Administrative Guidelines for Software Development".

Question 6 (f) - Biotechnology - Biotechnology is defined as "The application of S&T to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services." Eg. DNA genomics, pharmaco-genetics gene probes, DNA sequencing/synthesis/amplification, genetic engineering. Protein/peptide sequencing/synthesis, lipid/protein engineering, proteomics, hormones and growth factors, cell receptors/signalling/pheromones. Cell & tissue culture, tissue engineering, hybridisation, cellular fusion, vaccine/immune stimulants, embryo manipulation, bioreactors, fermentation, bioprocessing, bioleaching, biopulping, bio-bleaching, biodesulphurization, bioremediation, and biofiltration, gene therapy, viral vectors, bioinformatics.

Question 6 (g) - Environmental Protection - Environmental protection is defined as the field of work devoted to the reduction or elimination of pollutants and wastes (including prevention, treatment and reuse of pollutants and wastes, and reduction of material and energy use). Expenditures made in order to improve employee health and workplace safety are excluded.

Question 6 (h) - Environmental benefits - Environmental benefits include potential energy savings and the reduction in raw materials use or waste generation either from increased efficiency, recycling or closed-loop systems. They can also include design changes resulting in products that are less damaging to the environment in their use or disposal.

Question 6 (i) - R&D in advanced materials - R&D in advanced materials is defined as the systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis in order to gain new knowledge and create new or significantly improved products or processes which use advanced materials such as metals (including superalloys or high purity metals), ceramics and carbon (including optoelectronics such as optical fibres and carbon and graphite products) and polymers (including high performance reinforced plastics and other high performance polymers).

Question 7 - Areas covered in the National Capital Region

Alcove (QC)
Almonte (ON)
Angers (QC)
Antrim (ON)
Appleton (ON)
Ashton (ON)
Aylmer (QC)
Barrhaven (ON)
Baxters Corner (ON)
Bearbrook (ON)
Beech Grove (QC)
Bells Corners (ON)
Blackburn Hamlet (ON)
Blakeney (ON)
Breckenridge (QC)
Brisson (ON)
Buckingham (QC)
Burnet (QC)
Cantley (QC)
Carlsbad Springs (ON)
Carp (ON)
Carsonby (ON)
Cascades (QC)
Chelsea (QC)
Constance Bay (ON)
Corkery (ON)
Cousineau (QC)
Cumberland (ON)
Dalmeny (ON)
Davidson Corner (QC)
Deschênes (QC)
Dirleton (ON)
Duclos (QC)
Dunrobin (ON)
Dwyer Hill (ON)
Eardley (QC)
Edwards (ON)
Elm (ON)
Embrun (ON)
Fallowfield (ON)
Farm Point (QC)
Fitzroy Harbour (ON)
French Hill (ON)
Galetta (ON)
Gatineau (QC)
Glen Almond (QC)
Glencairn (ON)
Gleneagle (QC)
Gloucester (ON)
Greely (ON)
Halverson (QC)
Harwood Plains (ON)
Hazeldean (ON)
Herbert Corners (ON)
Heyworth (QC)
Holland Mills (QC)
Hull (QC)
Huntley (ON)
Ironside (QC)
Jeanne-d'Arc (QC)
Jockvale (ON)
Johnston Corners (ON)
Kanata (ON)
Kars (ON)
Kenmore (ON)
Kilmaurs (ON)
Kinburn (ON)
Kirks Ferry (QC)
La Pêche (QC)
Lac-des-Loups (QC)
Lac-McGregor (QC)
Lascelles (QC)
Larrimac (QC)
Leitrim (ON)
Leonard (ON)
Limbour (QC)
Lucerne (QC)
Luskville (QC)
MacLarens Landing (ON)
Malwood (ON)
Manion Corners (ON)
Manotick (ON)
Mansfield (ON)
Marathon (ON)
Marchhurst (ON)
Marvelville (ON)
Masson (QC)
Merivale (ON)
Metcalfe (ON)
Mohr Corners (ON)
Munster (ON)
Navan (ON)
Nepean (ON)
North Gower (ON)
North Onslow (QC)
Old Chelsea (QC)
Onslow Corners (QC)
Orleans (ON)
Osgoode (ON)
Ottawa (ON)
Pakenham (ON)
Pamure (ON)
Patterson (QC)
Perkins (ON)
Pointe-Gatineau (QC)
Poltimore (QC)
Poupore (QC)
Quinnville (QC)
Quyon (QC)
Ramsayville (ON)
Reevecraig (ON)
Ribot (QC)
Richmond (ON)
Rideau (ON)
Rupert (QC)
Russell (ON)
Ruthledge (QC)
St-François-de-Masham (QC)
St-Louis-de-Masham (QC)
St-Onge (ON)
St-Pierre-De-Wakefield (QC)
Ste-Cécile-de-Masham (QC)
Sarsfield (ON)
Shirley's Bay (ON)
South Gloucester (ON)
South March (ON)
Spring Hill (ON)
Stapledon (ON)
Stanley Corners (ON)
Steel (QC)
Stittsville (ON)
Strathearn (ON)
Tenaga (QC)
Twin Elm (ON)
Val-des-Monts (QC)
Val-du-Lac (QC)
Val-Paquin (QC)
Vanier (ON)
Vars (ON)
Wakefield (QC)
Watterson Corners (ON)
Wilson's-Corners (QC)
Woodlawn (ON)
Woodridge (ON)
Wyman (QC)

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