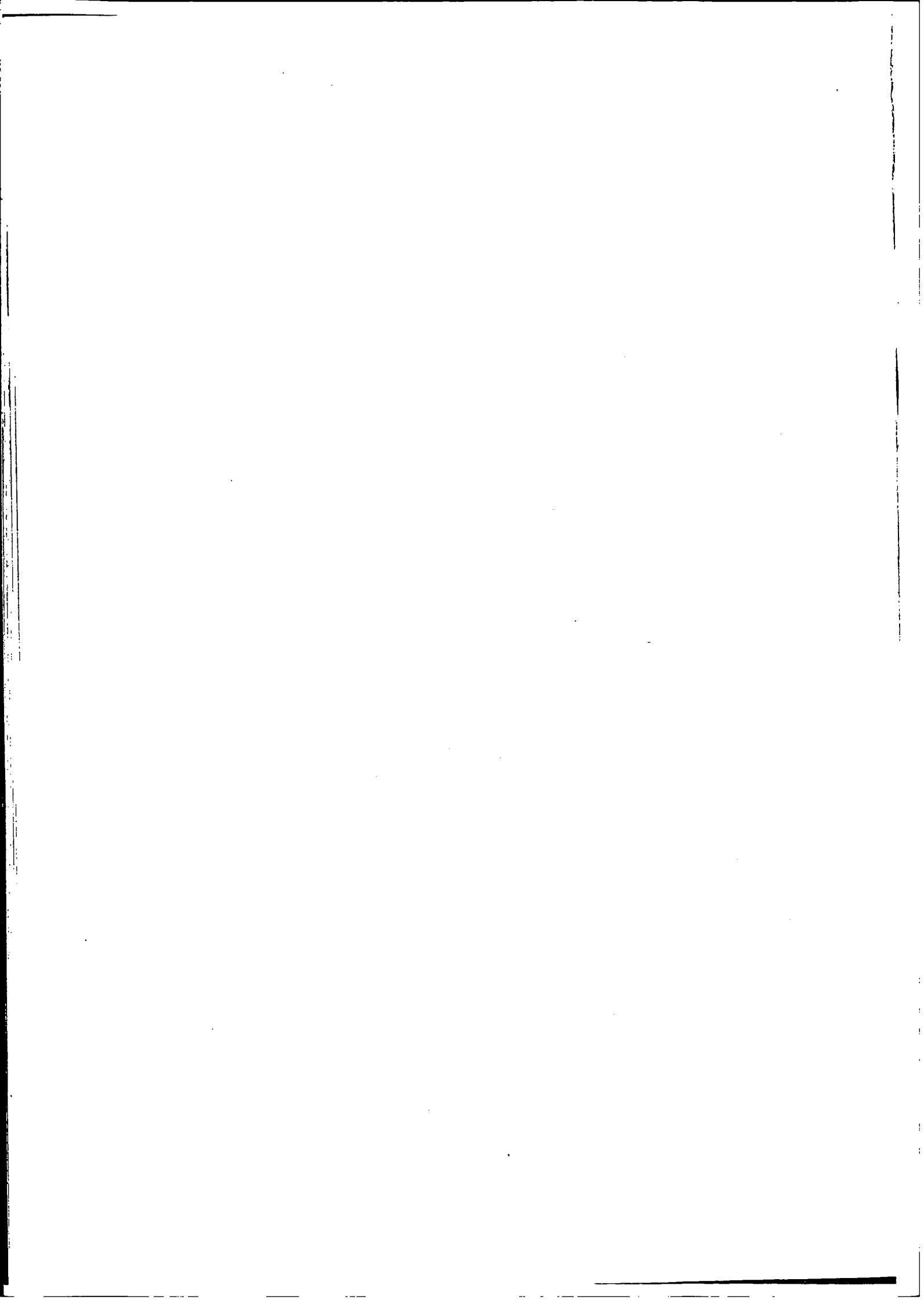


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**RESEARCH AND EXPERIMENTAL
DEVELOPMENT**

**BUSINESS ENTERPRISES
AUSTRALIA
1978-79**

R. J. CAMERON
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PREFACE

This publication presents statistics on research and experimental development (R & D) compiled from data collected from a survey of business enterprises in Australia in respect of 1978-79. The survey was conducted by the ABS and forms part of the Department of Science and Technology's Project SCORE (Survey and Comparisons of Research Expenditures). The main purpose of Project SCORE is to measure the financial and manpower resources devoted to Australian R & D.

Comparable information is collected and compiled by the ABS for the General Government, Private Non-profit and Higher Education Sectors. The ABS expects to publish later this year preliminary results for the General Government Sector in respect of 1978-79 as well as comprehensive results for the General Government, Private Non-profit and Higher Education Sectors (in respect of calendar year 1978) and an All Sector Summary.

Previous Project SCORE surveys were conducted for 1968-69, 1973-74 and 1976-77.

The ABS invites comments on the usefulness and appropriateness of these statistics. Such comments would be of assistance in planning future surveys.

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MAIN FEATURES

Note: Research and experimental development (R & D) is defined in paragraph 7 below.

The estimate of expenditure on R & D carried out in Australia by business enterprises during 1978-79 was \$246m at *current* prices. This represents a 21% increase in expenditure compared with 1976-77. The 1978-79 estimate of R & D at *constant* (average 1974-75) prices represents no change over that for 1976-77.

Expenditure by private enterprises was \$206m and by public sector business enterprises was \$40m at *current* prices. At *constant* (average 1974-75) prices this represents a 5% increase in R & D expenditure by private enterprises and a 20% decrease by public sector business enterprises.

The manpower effort devoted to R & D carried out by business enterprises in Australia during 1978-79 was 8,626 man years. This represents a decrease of 8% compared with 1976-77.

Payments for technical know-how by business enterprises in Australia in 1978-79 were \$130m (an increase of 46% at *current* prices, compared with 1976-77). Receipts for technical know-how by business enterprises in Australia in 1978-79 were \$15m (an increase of 67% at *current* prices compared with 1976-77).

EXPLANATORY NOTES

Introduction

The primary aim of this publication is to provide statistics on the level and distribution of resources devoted to R & D activity carried out by business enterprises in Australia. Such statistics are contained in Tables 1 to 13. These statistics do not measure directly the amount of R & D activity *funded* by business enterprises, nor the amount of R & D activity carried out on account of business enterprises. An approximate indication of these two measures can however be derived from the statistics of source of funds for R & D activities carried out by business enterprises (Tables 4 and 9) and the statistics of payments by business enterprises for R & D carried out by others on their behalf (Tables 14 and 15).

2. Statistics of payments and receipts by business enterprises for technical know-how are shown in Tables 16 to 20. They can be considered as providing an indication of the value of purchases and sales of knowledge arising from previous R & D activity.

3. Statistics of patent applications by, and patents granted to, business enterprises with R & D activity are shown in Table 21. These figures might be regarded as providing an imperfect indication of the volume of output of the R & D process.

Data sources

4. Most of the statistics presented in this publication were derived from data collected from business enterprises in the Survey of Research and Experimental Development in respect of the year ended 30 June 1979. This survey was conducted by the ABS, by means of mailed questionnaires, and a 99% response was obtained.

5. The 1973-74 statistics shown in Table 1 and 1976-77 statistics shown in Tables 1, 2 and 16 were derived from similar surveys conducted by the ABS in 1975 and 1978. A number of revisions have been made to the 1973-74 and 1976-77 statistics since they were first published (by the Department of Science and Technology and ABS respectively).

6. The statistics of value added and turnover shown in Tables 3 and 6 to 8 were obtained from the ABS Mining and Manufacturing Censuses for 1978-79. These censuses were also the source of the majority of data on the number of enterprises and persons employed relating to the whole industry (as opposed to R & D performers only) used in the calculation of the two R & D intensity measures shown in the last two columns of Table 3. The data used to calculate the intensities for enterprises other than mining and manufacturing were obtained within the ABS from a variety of sources.

Definition of research and experimental development

7. *Research and experimental development* is defined in accordance with the Organisation for Economic Co-operation and Development (OECD) standard as comprising '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'.

8. To be classified as R & D, an activity should contain an appreciable amount of novelty or innovation, should have investigation as a primary objective, and should have a potential to produce results that recognisably increase mankind's stock of knowledge. The concept of novelty is not associated with the actual creation of something which, although new, is made by artistry or by application of techniques that have already been established for that class of object. R & D ceases and pre-production begins when work is no longer experimental.

9. R & D activity extends to substantial modifications to existing products or processes. However, the following activities, sometimes regarded as R & D, are *excluded* (except where they are used primarily for the support of specific R & D programmes or to develop new techniques):

- (a) market research or sales promotion;
- (b) operations research;
- (c) quality control or routine testing of materials, products or processes;
- (d) prospecting, exploring or drilling for, or producing, minerals, petroleum or natural gas;
- (e) development work on style changes or minor modifications to existing products or processes;

- (f) computer programming or systems work;
- (g) routine data collection;
- (h) the commercial, legal and administrative aspects of patent or licence activity;
- (i) scientific and technical information services;
- (j) demonstration projects.

Sector classifications used in R & D studies

10. The sector classifications used in the compilation of these statistics is adapted from the guidelines specified by the OECD for use in the conduct of R & D studies. Four institutional sectors are recognised:

- (a) Business enterprise
- (b) General government
- (c) Private non-profit
- (d) Higher education.

11. This OECD institutional sector classification basically follows the recommendations specified by the United Nations in its *System of National Accounts* (SNA). However, two major differences should be noted:

- (a) For purposes of the R & D Surveys, the OECD separately identifies a *Higher Education* sector that includes units which according to the SNA would be incorporated in either the General Government or Private Non-profit sectors.
- (b) The OECD *Private Non-profit* sector merges together the SNA's *Household and Private Non-profit organisations serving households* sectors (except for the Higher Education units mentioned above).

Scope and units

12. The statistics in this publication relate, in principal, to all business enterprises within the scope of the Business Enterprise Sector in Australia. For the purposes of Australian R & D surveys of this Sector the organisational unit for the collection of statistics is the enterprise. An *enterprise* is defined broadly as the unit comprising all the operations in Australia of a single operating legal entity (e.g. company, partnership or sole proprietor).

13. The *Business Enterprise Sector* is defined (in accordance with the OECD guidelines mentioned above) as including:

- (1) all firms, organisations and institutions whose primary activity is the production of goods or services for sale to the general public at a price intended approximately to cover at least the cost of production, and
- (2) the private non-profit institutes mainly serving them.

14. The vast majority of enterprises in this Sector are private businesses. The remainder are principally public sector enterprises mainly engaged in trading or financial activities.

15. In the case of the patent applications statistics, shown in Table 21, the scope is restricted to those enterprises that carried out R & D or made payment for R & D carried out on their behalf, in 1978-79.

Coverage and survey methodology

16. Previous R & D Surveys conducted by the Department of Science and Technology included public sector trading and financial enterprises (i.e. those public sector enterprises which attempt to cover their costs of production by sales of goods and services) in the General Government Sector. In the 1978-79 survey however, in accordance with the OECD guidelines, such enterprises have been included in the Business Enterprise Sector and excluded from the General Government Sector. For purposes of comparability, data relating to public sector trading and financial enterprises have been included in the 1976-77 statistics shown in this publication.

17. Statistics relating to enterprises mainly engaged in agriculture, forestry, fishing and hunting (i.e. industries in Division A of the *Australian Standard Industrial Classification* (ASIC), 1978 edition) are excluded from this publication, partly because of the collection difficulties which would have been involved in including them in the Survey of R & D and partly because such enterprises are believed to have very low R & D activity (agricultural R & D is carried out predominantly in specialised research institutes not included in ASIC Division A).

18. For similar reasons, statistics relating to individual inventors working in their own time and with their own facilities are not, in general, included in the publication.

19. The 1978-79 Survey of R & D comprised a complete enumeration of business enterprises identified by the ABS as likely during 1978-79 to have:

- (a) carried out R & D (Tables 1 to 13 and 21), or
- (b) made payments to other organisations for R & D work carried out on their behalf (Tables 14, 15 and 21), or
- (c) had receipts or payments for patent rights or other technical know-how (Tables 16 to 20).

20. Within the scope and coverage of the survey, described in paragraphs 12 to 19 above, enterprises were included in the collection if they satisfied any of the following criteria:

- (a) Enterprises recorded in the ABS's central register of economic units as:
 - (i) public sector trading and financial enterprises
 - (ii) employing 140 persons or more, or
 - (iii) mainly engaged in providing consultant engineering or technical services (ASIC Class 6336), or with establishments thus engaged, or
 - (iv) mainly engaged in scientific research (ASIC Class 8461), or with establishments thus engaged, or
 - (v) having locations predominantly engaged in laboratory or testing work on behalf of establishments of the enterprise.
- (b) Enterprises which were members of major industrial research associations.

- (c) Enterprises which had applied for grants from the Australian Industrial Research and Development Incentives Board (AIRDIB) between 1972 and January 1979.
- (d) Enterprises responding to the 1973-74 and 1976-77 Surveys of R & D that reported R & D activity.
- (e) Enterprises identified from reports in newspapers, industrial journals, etc. as likely to have R & D activity.

21. However, some enterprises were excluded from the collection if information was available to indicate that no R & D was carried out, even though they satisfied one or more of the inclusion criteria listed above.

22. To provide a coverage check of the enterprises included in the main 1978-79 survey collection, a separate sample survey of the remaining private enterprises on the central register was conducted. Data obtained from the returns of these 5,500 sample informants indicate that the main collection accounts for 98% of the total expenditure on R & D activity carried out by enterprises. Since this coverage percentage is an estimate derived from the returns of sample informants, it is subject to sampling variability. Measurement of the sampling variability indicates that there are 19 chances in 20 that the coverage in fact exceeds 95%. Coverage has not been estimated for individual industries or individual component items of total R & D expenditure, but for some of these more disaggregated statistics it may be considerably lower than 98%. Coverage of the number of enterprises with R & D activity is much lower than the coverage of expenditure; the main collection is estimated to have covered 79% of enterprises (19 chances in 20 that it exceeds 69%).

23. It is estimated that the main collection accounts for 99% of payments by enterprises for R & D carried out by others on their behalf (19 chances in 20 that it exceeds 98%), 99% of payments for technical know-how (19 chances in 20 that it exceeds 97%) and 99% of receipts for technical know-how (19 chances in 20 that it exceeds 99%).

24. *The R & D statistics for 1978-79 contained in this publication relate only to the enterprises included in the main collection* (as described above in paragraphs 19 and 20). They do not include estimates based on the results obtained from the sample survey conducted for coverage checking purposes.

Classification

25. Most of the statistical information in this publication is classified by industry of enterprise in accordance with the 1978 edition of the Australian Standard Industrial Classification (ASIC). The 1978 edition of the ASIC replaces the 1969 preliminary edition which has been in use since 1968-69 and which was used to classify the 1973-74 and 1976-77 R & D statistics of private business enterprises (see paragraph 38). Each enterprise is classified to the industry in which it mainly operates even though one or more of its component establishments (factories, shops, etc.) may be classified to other industries.

The industry classification of an enterprise is determined on the basis of the industry classifications of the establishments of the enterprise weighted by the value added by these establishments or by some substitute weight such as total employment. For further comment see the *Australian Standard Industrial Classification, 1978, Volume 1* (1201.0).

26. Tables 12 and 13 contain a supplementary classification of R & D expenditure by the industry of the product (or process) field towards which the R & D effort was directed. This involved asking each respondent to list the broad categories of product towards which his R & D was directed, and to apportion his expenditure on R & D to these categories. Each of these categories was then keyed to the ASIC industry by which it is mainly produced. For example, an enterprise (itself classified to the mining industry) may have performed R & D to develop a more efficient ore crusher. As manufacturing of ore crushers is an activity primary to ASIC Class 3369, manufacturing of 'Industrial machinery and equipment n.e.c.', in the 1978 edition of the ASIC, R & D expenditure directed towards this product would therefore have been classified to ASIC Class 3369 in Tables 12 and 13. Because of the way in which products were described by the respondent, there were some instances where it was difficult to classify products (and particularly processes) to an ASIC industry; a degree of subjectivity is associated with the classification in these cases.

27. It was not possible in every instance to provide a full industry description in the tables. The full ASIC classification is shown in the publication referred to in paragraph 25.

Data definitions

28. The definitions of data items used in the 1978-79 survey are provided in the survey questionnaire, a copy of which is shown as the appendix. A slightly modified questionnaire was used to collect data from public sector business enterprises. A copy of this questionnaire is available upon request. The definitions of items not collected directly as part of the survey are shown below.

29. *Turnover* is defined as sales of goods, commission revenue, repair and service revenue, rent, leasing and hiring revenue, government bounties and subsidies and all other operating revenue except interest, royalties and dividends. Also included is the value of capital work done by the enterprise for itself and the value of equipment withdrawn from stock for own use or for rental or lease outside the enterprise. Rent, leasing and hiring revenue reported by the enterprise has, where possible, been allocated to component establishments of the enterprise. That part which is unallocated is excluded from turnover and the calculation of value added.

30. *Value added* is defined as turnover, plus increase (or less decrease) in the value of stocks, less purchases and selected expenses. It may be regarded as a basic measure of an enterprise's unduplicated contribution to total economic activity. For a fuller definition, and the relationship of value added to gross product at factor cost, see *Integrated Economic Censuses: 1978-79 Enterprise Statistics (Preliminary)* (8107.0).

31. *R & D intensity of enterprises that carried out R & D* is shown in this publication in two forms:

- (a) *R & D intensity (expenditure)* is defined as expenditure on R & D carried out within the enterprise as a percentage of the turnover of those enterprises that carried out R & D.
- (b) *R & D intensity (manpower)* is defined as man years of effort expended on R & D as a percentage of the number of persons employed by those enterprises that carried out R & D.

32. *R & D intensity of all enterprises in industry* is also shown in two forms:

- (a) *R & D intensity (enterprises)* is defined as the number of enterprises that carried out R & D as a percentage of the total number of enterprises in the industry.
- (b) *R & D intensity (manpower)* is defined as the number of man years of effort expended on R & D as a percentage of the number of persons employed by all enterprises in the industry. *Persons employed* comprises employees (including part-time and casual employees) on the payroll, working proprietors and working partners.

Constant price estimates

33. Estimates of total R & D expenditure for three years are shown at both current and constant (average 1974-75) prices in Table 1. In concept, constant price estimates are measures from which the direct effects of price change have been eliminated. Although expressed in monetary terms, the constant price measures shown in this publication vary only with changes in the underlying quantities of *inputs* purchased (including labour). In effect, quantities of broadly defined categories of inputs are weighted by their prices in the base year (1974-75). Because the measures relate to input quantities, they do not reflect changes in the efficiency with which labour, capital and other inputs are used.

34. The estimates of the wages, salaries and other labour cost components of these constant price estimates were obtained by multiplying, for each broad category of labour, the quantity (man years) of labour used in each period by the relevant average labour cost in the base period. The non-labour cost components were estimated by deflating each current price value by a composite price index of relevant materials or capital expenditure items. In revaluing R & D expenditure, extensive use has been made of price series used in deriving constant price national accounts estimates.

35. For a more comprehensive description of constant price concepts and estimation procedures see *Australian National Accounts, Gross Product by Industry at Current and Constant Prices, 1977-78* (5211.0), Section C, page 4.

Accruals basis

36. Respondents were asked to report all expenditure data on an accruals, rather than cash, basis of accounting; that is, to report data relating to income earned during the year, whether received or not, and to expenditure incurred during the year, whether paid or not.

Reliability of statistics

37. The statistics contained in this publication should be interpreted with caution for the following reasons:

- (a) Many respondents do not record data on R & D activity and on receipts and payments for technical know-how separately in their accounts, and as a result needed to make estimates when completing the survey questionnaire. The OECD standard definition of research and experimental development (R & D) used for the survey differs in some respects from what particular businesses may regard as research and development, particularly since grants by the Australian Industrial Research and Development Incentives Board are not available in respect of all the types of R & D that come within the survey definition.
- (b) The 1973-74 statistics shown in Table 1 are considered to be of lower reliability than those for 1976-77 and 1978-79 because of indications that the 1973-74 survey questionnaire may have been misinterpreted by some informants, with the result that the 1973-74 statistics, despite revisions referred to in paragraph 5, may be slight over-estimates.

Additionally, the 1973-74 statistics are less accurate at the industry level as a result of the different survey methodology employed for that year. The 1973-74 survey was based on a sample of private enterprises and thus the estimates may differ from the figures that would have been obtained by a collection of all private enterprises. A measure of the likely difference is given by the standard error of the estimate. There are 2 chances in 3 that the sample estimate will differ from results which would be obtained from a comparable complete collection by less than 1 standard error and 19 chances in 20 that the difference would be less than 2 standard errors. The estimates and their associated standard errors are shown in Table 1.

Comparability of the statistics

38. In comparing the statistics in this publication with statistics published for 1973-74 and 1976-77 the following changes affecting comparability should be noted:

- (a) Commencing with this publication the classification of enterprises, as mentioned in paragraph 25, is based on the 1978 edition of the ASIC, while the statistics published for 1973-74 and 1976-77 were classified according to the 1969 edition of the ASIC. In general the impact of the change in industrial classification is minimal at the ASIC division and subdivision levels. However, in order to provide a link between the 1978-79 R & D statistics and those for earlier years Tables 2 and 16 show selected R & D indicators for 1976-77 and 1978-79 classified according to the 1969 preliminary edition of ASIC. A document fully describing the differences between the 1969 and 1978 editions of the ASIC has been prepared. (See *Key Between the 1978 and 1969 Editions of ASIC* (1209.0)).

- (b) Also, commencing with this publication, data relating to public sector trading and financial enterprises have been included (see paragraph 16). For the purposes of comparability some tables show data at the 'Total all industries level' separately for private business enterprises.

Related publications

39. Users may also wish to refer to the following publications:

Research and Experimental Development, Business Enterprises, Australia, 1978-79 (Preliminary) (8105.0)

Research and Experimental Development, Private Enterprises, Australia, 1976-77 (8104.0)

Project SCORE, Research and Development in Australia, 1976-77 (Department of Science and the Environment, Canberra, Australia, 1980), presents statistics relating to all sectors.

Project SCORE, Research and Development in Australia, 1973-74, Volumes 1 and 2 (Department of Science, Canberra, Australia, 1976), presents statistics relating to all sectors.

Project SCORE, Research and Development in Australia, 1968-69 (Department of Science, Canberra, Australia, 1973), contains statistics relating to sectors other than the private enterprise sector, and to all sectors combined.

R & D in Manufacturing Industry, 1971-72 (Department of Manufacturing Industry, Canberra, Australia, 1974), contains statistics relating to the manufacturing sector only. It should be noted that the 1971-72 survey had an unknown coverage (considered to be approximately 95%), and collected data of the expenditure on R & D activity performed within the firm combined with, but not separately from, payments for R & D work performed outside the firm.

Survey of Industry Research and Development Expenditure in Australia, 1968-69 (Department of Trade and Industry, Canberra, Australia, 1972), contains statistics relating to the mining and manufacturing sectors. Note, however, that the 1968-69 survey had an unknown coverage (considered to be about 90%).

Foreign Control in Research and Experimental Development, Private Enterprises, 1976-77 (5330.0) (Foreign control data in respect of the 1978-79 R & D survey is not available.)

Trends in Industrial R & D in Selected OECD Member Countries, 1967-75 (OECD, Paris 1978 (SPT (78) 20)) contains statistics from other OECD countries which are broadly comparable with those in this publication.

Science and Technology Statement 1980-81 (Department of Science and Technology, Canberra, Australia, 1981).

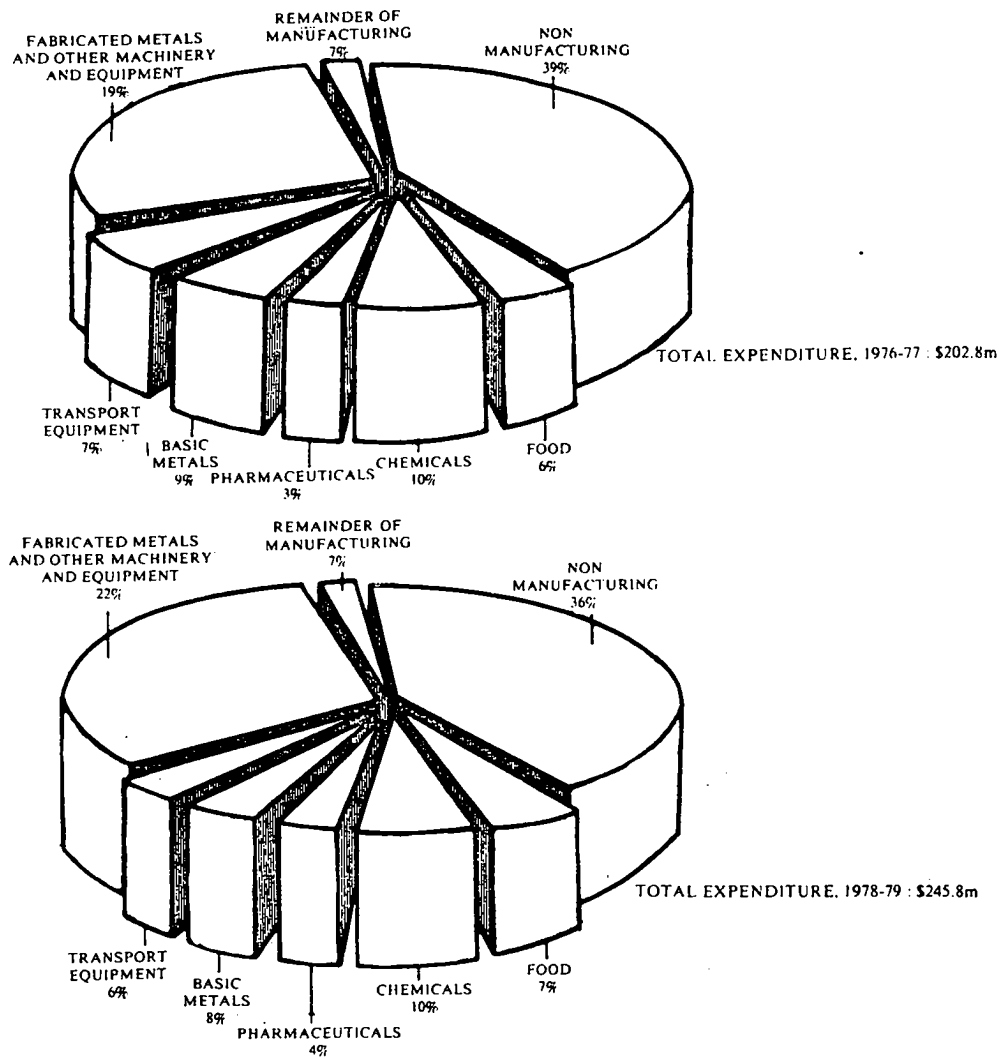
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Symbols and other usages

- r figure or series revised since previous issue
- n.a. not available
- n.e.c. not elsewhere classified
- n.p. not available for separate publication
(but included in totals where applicable)
- nil or less than half the final digit shown

41. Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

**RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY BUSINESS ENTERPRISES—AUSTRALIA, 1976-77 AND 1978-79
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE(a)**



(a) 1969 edition of ASIC

**TABLE 1. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a)
EXPENDITURE AT CURRENT AND CONSTANT PRICES
(\$m)**

	1973-74	1976-77	1978-79
AT CURRENT PRICES			
Private enterprises	(b)190.4	160.4	205.8
Public sector business enterprises	n.a.	42.4	40.0
Total business enterprises	n.a.	202.8	245.8
AT CONSTANT (AVERAGE 1974-75) PRICES			
Private enterprises	(b)236.3	124.3	130.6
Public sector business enterprises	n.a.	33.2	26.7
Total business enterprises	n.a.	157.5	157.3

(a) Excludes enterprises in ASIC Division A. (b) Sample survey; the standard error expressed in \$m is \$16.0m. See also paragraph 37(b) in the Explanatory notes.

TABLE 2. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA 1976-77 AND 1978-79
R & D EXPENDITURE AND R & D MANPOWER BY INDUSTRY OF ENTERPRISE (1969 EDITION OF ASIC)

Industry of enterprise (1969 edition of ASIC)		Resources expended on R & D							
		Expenditure (\$m)		Manpower				Number of enterprises	
				Researcher effort (man-years)		Total R & D effort (man-years)			
ASIC code	Description	1976-77	1978-79	1976-77	1978-79	1976-77	1978-79	1976-77	1978-79
11-15	Mining (excluding services to mining)	r7.0	9.6	r137.8	104.3	r445.9	311.0	22	17
	Manufacturing—								
21, 22	Food, beverages and tobacco	11.6	16.1	291.5	302.3	550.9	545.4	69	84
23, 24	Textiles, clothing and footwear	2.1	1.4	48.6	15.6	106.4	42.0	27	22
25	Wood, wood products and furniture	0.9	1.6	22.0	28.0	49.6	54.8	22	25
26	Paper, paper products, printing and publishing	3.3	4.1	71.9	64.9	149.2	144.1	16	14
2723	Pharmaceuticals and veterinary products	7.4	9.8	137.1	148.8	287.7	357.9	22	26
(a)	Chemicals, petroleum and coal products	19.7	25.8	556.2	563.7	1,047.0	1,036.6	93	93
28	Non-metallic mineral products	3.8	4.1	81.1	73.1	169.1	153.8	32	26
29	Basic metal products	19.0	20.8	385.6	286.8	902.9	767.3	36	36
31	Fabricated metal products	4.0	4.8	85.9	75.2	228.1	205.0	74	84
32	Transport equipment	14.6	15.6	156.1	162.0	760.9	601.0	44	47
331	Photographic, professional and scientific equipment	4.6	6.7	98.1	90.8	231.5	228.8	20	15
332	Appliances and electrical equipment	21.1	32.8	538.9	466.7	1,209.2	1,211.9	129	121
333	Industrial machinery and equipment	8.2	9.0	188.2	124.3	425.4	397.4	141	119
33	Total other machinery and equipment	33.9	48.4	825.2	681.8	1,866.1	1,838.1	290	255
34	Leather, rubber and plastic products and manufacturing n.e.c.	3.5	5.6	96.1	106.3	184.7	209.6	57	58
C	Total manufacturing	123.9	158.1	2,757.3	2,508.5	6,302.6	5,955.6	782	770
	Other industries—								
F	Wholesale and retail trade	9.2	11.6	199.4	188.2	380.7	399.1	90	109
63	Real estate and business services	r11.2	14.7	r218.3	225.1	r532.3	493.8	r182	179
8411	Research and scientific institutions	11.7	13.1	201.2	180.8	503.8	453.1	30	28
(b)	Other n.e.c.	39.8	38.6	565.7	442.1	1,177.4	1,013.8	62	83
16, D-L	Total other industries	r71.9	78.1	r1,184.6	1,036.2	r2,594.2	2,359.8	r364	399
	Total all industries(c)	r202.8	245.8	r4,079.7	3,649.0	r9,342.7	8,626.4	r1,168	1,186
	Private business enterprise contribution to 'Total all industries'	r160.4	205.8	r3,497.1	3,186.4	r8,099.5	7,546.1	r1,139	1,144

(a) ASIC Sub-division 27 excluding ASIC Class 2723. (b) ASIC codes 16, D-E, G-H, 61-62, J, 8111-8303, 8412-9334. (c) Excludes ASIC Division A.

TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE

Industry of enterprise (1978 edition of ASIC)		Resources expended on R & D			Enterprises that carried out R & D				All enterprises in industry		
		Expenditure	Man-power		Enterprises	Turn-over (a)	Value added (a)	R & D intensity		R & D intensity	
			Re-searcher effort	Total R & D effort				Expenditure (b)	Man-power (c)	Enterprises (d)	Man-power (e)
ASIC code	Description	\$' 000	man-years	man-years	number	\$m	\$m	%	%	%	%
11	Mining—										
	Metallic minerals	7,656	n.p.	n.p.	9	n.p.	n.p.	0.5	n.p.	3.7	0.9
12-15	Non-metallic minerals	2,076	n.p.	n.p.	8	n.p.	n.p.	0.1	n.p.	0.7	0.1
11-15	Total mining (excl. services to mining)	9,732	104.8	314.7	17	2,915	2,183	0.3	1.4	1.3	0.5
	Manufacturing—										
211	Meat products	951	17.9	27.6	8	351	154	0.3	0.4	1.2	—
212	Milk products	1,709	47.8	79.1	10	688	252	0.2	0.8	5.3	0.4
213	Fruit and vegetable products	1,390	34.1	60.0	11	649	247	0.2	0.5	7.6	0.5
215-216	Flour and cereal products, bread, cakes and biscuits	3,837	55.6	117.9	13	891	334	0.4	0.7	0.9	0.3
214, 217	Margarine, oils, fats and other food products	6,811	118.4	204.1	30	1,179	410	0.5	1.2	5.3	0.5
218-219	Beverages, malt and tobacco products	1,383	28.3	56.5	12	788	330	0.2	0.6	2.2	0.2
21	Total food, beverages and tobacco	16,082	302.1	545.2	84	4,545	1,728	0.3	0.8	2.4	0.3
234	Textile fibres, yarns and woven fabrics	517	4.5	14.7	9	128	64	0.4	0.4	3.6	0.1
235, 24	Other textile products and clothing and footwear	842	11.1	27.3	13	200	83	0.4	0.6	0.4	—
23-24	Total textiles, clothing and footwear	1,359	15.6	42.0	22	328	147	0.4	0.5	0.6	—
25	Wood, wood products and furniture	1,592	27.9	54.7	24	243	110	0.7	1.0	0.3	0.1
263	Paper and paper products	3,341	50.5	121.9	9	855	374	0.4	0.9	3.8	0.5
264	Printing and allied industries	776	14.4	22.2	5	115	55	0.7	0.9	0.1	—
26	Total paper, paper products, printing and publishing	4,117	64.9	144.1	14	971	430	0.4	0.9	0.4	0.1
2753	Synthetic resins and rubber	1,839	35.1	72.6	11	196	65	0.9	3.1	26.2	2.3
2754-2755	Organic and inorganic industrial chemicals n.e.c.	13,196	271.0	474.1	15	802	316	1.6	4.9	14.0	4.0
2762	Paints	3,837	85.9	193.4	15	312	137	1.2	3.4	10.5	2.3
2763	Pharmaceutical and veterinary products	9,792	153.1	362.5	27	407	205	2.4	4.9	21.8	3.2
(f)	Other chemical, petroleum and coal products	6,568	156.5	278.3	50	1,136	541	0.6	1.7	10.0	0.9
27	Total chemical, petroleum and coal products	35,231	701.6	1,380.9	118	2,854	1,264	1.2	3.4	12.7	2.1
287	Cement and concrete products	1,965	35.0	64.4	10	531	239	0.4	0.7	1.3	0.3
285-286, 288	Glass, clay and other non-metallic mineral products	2,197	38.8	90.1	17	468	265	0.5	0.9	2.3	0.3
28	Total non-metallic mineral products	4,162	73.8	154.5	27	998	504	0.4	0.8	1.8	0.3
294	Basic iron and steel	17,196	232.6	675.9	20	3,263	1,741	0.5	1.0	6.6	0.9
295-296	Basic non-ferrous metals	3,704	63.4	99.6	15	1,655	791	0.2	0.5	6.6	0.4
29	Total basic metal products	20,899	296.0	775.5	35	4,919	2,533	0.4	0.9	6.6	0.8

For footnotes see end of table.

TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE—continued

Industry of enterprise (1978 edition of ASIC)	Description	Resources expended on R & D			Enterprises that carried out R & D					All enterprises in industry	
		Expenditure	Man-power		Enterprises	Turn-over (a)	Value added (a)	R & D intensity		R & D intensity	
			Re-searcher effort	Total R & D effort				Expenditure (b)	Man-power (c)	Enterprises (d)	Man-power (e)
ASIC code		\$' 000	man-years	man-years	number	\$m	\$m	%	%	%	%
314	Structural metal products	974	11.0	33.8	18	105	35	0.9	1.9	0.9	0.1
315	Sheet metal products	1,194	13.4	55.3	17	182	86	0.6	1.1	1.4	0.2
316	Other fabricated metal products	2,362	45.5	108.4	46	440	229	0.5	0.8	1.6	0.2
31	Total fabricated metal products	4,530	69.9	197.5	81	727	349	0.6	1.0	1.3	0.2
323	Motor vehicles and parts	14,016	138.0	553.4	33	1,769	793	0.8	1.3	3.0	0.7
324	Other transport equipment	1,613	24.0	50.4	14	134	88	1.1	0.9	1.8	0.3
32	Total transport equipment	15,629	162.0	603.8	47	1,902	881	0.8	1.3	2.5	0.6
334	Photographic, professional and scientific equipment	6,667	91.8	229.8	16	187	102	3.5	5.0	3.9	2.0
3351-3352	Radio and T.V. receivers; audio equipment and electronic equipment n.e.c.	23,062	297.6	772.9	48	761	389	2.5	n.a.	13.7	3.1
3353	Refrigerators and household appliances	5,938	93.0	276.2	17	594	249	1.0	1.8	4.9	1.0
3354	Water heating systems	386	6.0	17.7	6	49	24	0.8	1.5	10.9	1.1
3355-3357	Other electrical machinery and equipment	3,733	77.3	167.1	49	727	284	0.5	1.1	5.9	0.5
335	Total appliances and electrical equipment	33,118	473.9	1,233.9	120	2,132	945	1.5	2.4	8.0	1.4
3361	Agricultural machinery	3,405	48.0	166.7	19	488	172	0.7	1.5	7.2	1.2
3362	Construction machinery	162	3.4	6.2	5	11	4	1.1	2.1	6.5	0.2
3363	Materials handling equipment	1,333	13.3	50.0	13	92	37	1.5	2.7	6.2	0.9
3364-3369	Other industrial machinery and equipment n.e.c.	3,907	61.3	164.6	91	454	215	0.8	1.3	3.2	0.3
336	Total industrial machinery and equipment	8,808	126.0	387.5	128	1,045	427	0.8	1.5	7.7	0.5
33	Total other machinery and equipment	48,594	691.7	1,851.2	264	3,363	1,474	1.4	n.a.	5.0	1.1
346	Rubber products	2,786	45.0	81.7	11	778	308	0.4	0.4	6.4	0.3
347	Plastic and related products	2,394	42.7	94.0	31	186	88	1.3	2.1	2.9	0.3
345, 348	Leather, leather products and other manufacturing	712	18.0	34.5	16	131	60	0.5	1.0	0.6	0.1
34	Total miscellaneous manufacturing	5,893	105.7	210.2	58	1,095	456	0.5	0.8	1.5	0.2
C	Total manufacturing	158,087	2,511.2	5,959.6	774	21,945	9,875	0.7	1.4	2.1	0.5
	Other industries—										
E	Construction	2,664	29.0	74.7	30	n.a.	n.a.	n.a.	0.4	—	—
47	Wholesale trade	11,230	181.2	381.1	105	n.a.	n.a.	n.a.	0.8	0.3	0.1
48	Retail trade	147	3.2	9.0	7	n.a.	n.a.	n.a.	0.9	—	—
F	Total wholesale and retail trade	11,377	184.4	390.1	112	n.a.	n.a.	n.a.	0.8	0.1	—
63	Property and business services	14,241	217.2	471.7	169	n.a.	n.a.	n.a.	4.9	0.5	0.1
8461	Research and scientific institutions	13,289	184.8	460.1	29	n.a.	n.a.	n.a.	24.0	24.0	4.7
(g)	Other n.e.c.	36,451	417.6	955.5	55	n.a.	n.a.	n.a.	0.4	0.1	—
16, D-L	Total other industries	78,022	1,033.0	2,352.1	395	n.a.	n.a.	n.a.	0.7	0.1	0.1
	Total all industries(h)	245,841	3,649.0	8,626.4	1,186	n.a.	n.a.	n.a.	1.1	0.3	0.2
	Private business enterprise contribution to "Total all industries"—										
	1978-79	205,814	3,186.4	7,546.1	1,144	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	1976-77r	160,375	3,497.1	8,099.5	1,139	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) Excludes data in respect of single establishment manufacturing enterprises with fewer than four persons employed at end of year. (b) Expenditure on R & D expressed as a percentage of the turnover of those enterprises that carried out R & D. (c) Man-years of effort expended on R & D as a percentage of the number of persons employed by those enterprises that carried out R & D. (d) Number of enterprises that carried out R & D expressed as a percentage of the total number of enterprises in the industry. (e) Man-years of effort expended on R & D as a percentage of the number of persons employed by all enterprises in the industry. (f) ASIC Classes 2751-2752, 2761, 2764-2780. (g) ASIC codes 16, D, 61-62, 8141-8306, 8462-9364. (h) Excludes ASIC Division A.

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
 DETAILS OF R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE
 (\$' 000)

Industry of enterprise (1978 edition of ASIC)	Description	Type of expenditure				Type of activity(a)			Source of funds(a)			
		Total expenditure	Capital expenditure	Wages and salaries	Other current expenditure	Basic research	Applied research	Experimental development	Own funds	Other private enterprises in Australia	Government funds(b)	Other Australian and overseas
Mining—												
11	Metallic minerals	7,656	85	4,808	2,763	n.p.	n.p.	2,661	6,986	—	n.p.	—
12-15	Non-metallic minerals	2,076	763	672	641	n.p.	n.p.	1,440	1,874	n.p.	n.p.	n.p.
11-15	Total mining (excl. services to mining)	9,732	848	5,479	3,404	1,230	4,400	4,102	8,860	n.p.	n.p.	n.p.
Manufacturing—												
211	Meat products	951	270	404	277	n.p.	n.p.	524	782	—	169	—
212	Milk products	1,709	99	1,051	559	—	1,370	339	1,568	—	141	—
213	Fruit and vegetable products	1,390	77	1,001	312	n.p.	n.p.	833	n.p.	—	n.p.	—
215-216	Flour and cereal products, bread, cakes and biscuits	3,837	1,283	1,739	815	n.p.	n.p.	1,896	n.p.	n.p.	339	—
214, 217	Margarine, oils, fats and other food products	6,811	1,319	3,864	1,627	36	2,084	4,691	5,811	—	1,000	—
218-219	Beverages, malt and tobacco products	1,383	210	773	401	n.p.	n.p.	438	1,146	—	237	—
21	Total food, beverages and tobacco	16,082	3,258	8,832	3,992	521	6,840	8,721	14,132	n.p.	n.p.	—
234	Textile fibres, yarns and woven fabrics	517	213	210	95	n.p.	n.p.	367	420	—	97	—
235, 24	Other textile products and clothing and footwear	842	203	478	160	n.p.	n.p.	574	700	—	142	—
23-24	Total textiles, clothing and footwear	1,359	416	687	255	100	317	941	1,120	—	239	—
25	Wood, wood products and furniture	1,592	255	811	526	n.p.	n.p.	1,101	n.p.	n.p.	n.p.	—
263	Paper and paper products	3,341	n.p.	2,291	n.p.	—	n.p.	n.p.	n.p.	—	n.p.	—
264	Printing and allied industries	776	n.p.	450	n.p.	—	n.p.	n.p.	776	—	—	—
26	Total paper, paper products, printing and publishing	4,117	409	2,742	966	—	1,092	3,025	n.p.	—	n.p.	—
2753	Synthetic resins and rubber	1,839	140	1,270	429	—	252	1,587	1,686	—	152	—
2754-2755	Organic and inorganic industrial chemicals n.e.c.	13,196	204	9,577	3,415	264	4,464	8,468	11,874	n.p.	n.p.	n.p.
2762	Paints	3,837	107	2,973	756	n.p.	n.p.	1,446	3,570	n.p.	n.p.	—
2763	Pharmaceutical and veterinary products	9,792	630	5,773	3,389	n.p.	n.p.	6,071	7,262	—	1,972	558
(c)	Other chemical, petroleum and coal products	6,568	595	4,747	1,226	575	2,577	3,416	5,854	n.p.	335	n.p.
27	Total chemical, petroleum and coal products	35,231	1,677	24,339	9,215	1,479	12,764	20,988	30,247	380	3,373	1,232
287	Cement and concrete products	1,965	160	919	886	n.p.	n.p.	1,201	1,677	n.p.	n.p.	n.p.
285-286, 288	Glass, clay and other non-metallic mineral products	2,197	244	1,362	590	n.p.	n.p.	1,303	2,154	—	43	—
28	Total non-metallic mineral products	4,162	404	2,281	1,477	138	1,520	2,504	3,830	n.p.	n.p.	n.p.
294	Basic iron and steel	17,196	1,364	11,214	4,618	n.p.	n.p.	13,312	14,811	n.p.	n.p.	n.p.
295-296	Basic non-ferrous metals	3,704	1,042	2,071	591	n.p.	n.p.	1,704	3,442	n.p.	n.p.	—
29	Total basic metal products	20,899	2,405	13,285	5,210	202	5,682	15,015	18,253	n.p.	1,389	n.p.

For footnotes see end of table.

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
 DETAILS OF R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE—continued
 (\$' 000)

Industry of enterprise (1978 edition of ASIC)		Type of expenditure				Type of activity(a)			Source of funds(a)			
		Total expenditure	Capital expenditure	Wages and salaries	Other current expenditure	Basic research	Applied research	Experimental development	Own funds	Other private enterprises in Australia	Government funds(b)	Other Australian and overseas
ASIC code	Description											
314	Structural metal products	974	270	507	197	n.p.	n.p.	724	762	—	212	—
315	Sheet metal products	1,194	44	803	348	n.p.	n.p.	855	1,072	n.p.	n.p.	—
316	Other fabricated metal products	2,362	159	1,735	469	n.p.	n.p.	2,045	2,009	n.p.	n.p.	—
31	Total fabricated metal products	4,530	472	3,044	1,014	139	769	3,623	3,843	80	607	—
323	Motor vehicles and parts	14,016	1,185	9,074	3,757	n.p.	n.p.	12,383	13,814	—	202	—
324	Other transport equipment	1,613	84	828	702	n.p.	n.p.	1,351	828	n.p.	750	n.p.
32	Total transport equipment	15,629	1,268	9,902	4,459	99	1,797	13,734	14,642	n.p.	952	n.p.
334	Photographic, professional and scientific equipment	6,667	304	3,834	2,529	144	1,073	5,451	5,462	n.p.	n.p.	n.p.
3351-3352	Radio and T.V. receivers; audio equipment and electronic equipment n.e.c.	23,062	1,672	15,310	6,081	373	3,052	19,637	15,261	n.p.	5,371	n.p.
3353	Refrigerators and household appliances	5,938	513	4,322	1,103	249	1,719	3,970	5,782	—	156	—
3354	Water heating systems	386	11	266	109	n.p.	n.p.	198	247	—	139	—
3355-3357	Other electrical machinery and equipment	3,733	242	2,669	822	n.p.	n.p.	2,929	3,197	—	535	—
335	Total appliances and electrical equipment	33,118	2,438	22,567	8,114	712	5,673	26,734	24,487	n.p.	6,201	n.p.
3361	Agricultural machinery	3,405	349	2,383	673	n.p.	n.p.	2,951	3,175	—	230	—
3362	Construction machinery	162	n.p.	109	n.p.	—	n.p.	n.p.	n.p.	—	n.p.	—
3363	Materials handling equipment	1,333	n.p.	749	n.p.	n.p.	188	n.p.	n.p.	n.p.	210	—
3364-3369	Other industrial machinery and equipment n.e.c.	3,907	359	2,559	990	70	781	3,056	2,861	n.p.	926	n.p.
336	Total industrial machinery and equipment	8,808	831	5,800	2,177	166	1,344	7,298	7,171	169	n.p.	n.p.
33	Total other machinery and equipment	48,593	3,573	32,201	12,820	1,022	8,090	39,483	37,120	272	8,072	3,130
346	Rubber products	2,786	689	1,603	495	n.p.	n.p.	1,870	2,352	—	434	—
347	Plastic and related products	2,394	622	1,280	492	n.p.	n.p.	1,792	2,195	n.p.	n.p.	—
345, 348	Leather, leather products and other manufacturing	712	46	556	110	n.p.	n.p.	617	537	—	175	—
34	Total miscellaneous manufacturing	5,893	1,357	3,438	1,097	81	1,533	4,279	5,084	n.p.	n.p.	—
C	Total manufacturing	158,087	15,495	101,561	41,032	3,878	40,795	113,414	133,510	2,025	17,985	4,567
E	Other industries—											
47	Construction	2,664	732	1,250	682	45	297	2,323	2,479	n.p.	n.p.	—
48	Wholesale trade	11,230	n.p.	6,144	n.p.	n.p.	n.p.	n.p.	n.p.	438	n.p.	3,183
48	Retail trade	147	n.p.	130	n.p.	n.p.	n.p.	n.p.	n.p.	—	n.p.	—
F	Total wholesale and retail trade	11,377	1,412	6,274	3,691	2,195	3,907	5,275	7,033	438	723	3,183
63	Property and business services	14,241	2,457	7,617	4,166	286	5,874	8,081	5,946	4,065	4,058	172
8461	Research and scientific institutions	13,289	1,530	7,632	4,126	378	7,551	5,359	2,665	7,190	n.p.	n.p.
(d)	Other n.e.c.	36,451	3,610	23,433	9,408	2,773	18,540	15,138	35,118	n.p.	781	n.p.
16, D-L	Total other industries	78,022	9,741	46,206	22,075	5,677	36,169	36,176	53,241	n.p.	n.p.	n.p.
	Total all industries(e)	245,841	26,084	153,246	66,510	10,786	81,364	153,692	195,611	13,875	26,703	9,652
	Private business enterprise contribution to 'Total all industries'—											
	1978-79	205,814	21,856	127,387	56,470	7,667	61,721	136,428	161,237	13,870	21,266	9,440
	1976-77r	160,375	11,619	110,272	38,484	59,499	—	100,876	134,611	12,497	9,051	4,217

(a) For further information see also Table 9. (b) Includes Higher Education Sector. (c) ASIC Classes 2751-2752, 2761, 2764-2780. (d) ASIC codes 16, D, G-H, 61-62, J, 8141-8306, 8462-9364. (e) Excludes ASIC Division A.

TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
DETAILS OF R & D MANPOWER BY INDUSTRY OF ENTERPRISE
 (man-years)

Industry of enterprise (1978 edition of ASIC)	Description	Manpower by type of employee				Manpower by enterprise employment size(a)		Researcher effort by location(b)					
		Total man-years	Re-searchers	Tech-nicians	Other support-ing staff	Less than 200	200 or more	N.S.W.	Vic.	Qld	S.A.	Other Aus-tralian and overseas	
	Mining—												
11	Metallic minerals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
12-15	Non-metallic minerals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
11-15	Total mining (excl. services to mining)	314.7	104.8	93.0	116.9	6.2	308.5	5.2	7.7	n.p.	n.p.	n.p.	n.p.
	Manufacturing—												
211	Meat products	27.6	17.9	8.7	1.0	n.p.	n.p.	n.p.	6.5	n.p.	—	—	—
212	Milk products	79.1	47.8	20.9	10.4	n.p.	n.p.	6.1	n.p.	4.0	n.p.	n.p.	n.p.
213	Fruit and vegetable products	60.0	34.1	17.2	8.7	—	60.0	n.p.	20.1	n.p.	3.9	n.p.	n.p.
215-216	Flour and cereal products, bread, cakes and biscuits	117.9	55.6	35.9	26.4	8.5	109.4	40.6	n.p.	9.2	n.p.	—	—
214, 217	Margarine, oils, fats and other food products	204.1	118.4	47.3	38.4	46.0	158.1	78.7	15.4	n.p.	—	n.p.	n.p.
218-219	Beverages, malt and tobacco products	56.5	28.3	25.5	2.7	6.0	50.5	4.0	16.7	n.p.	n.p.	—	—
21	Total food, beverages and tobacco	545.2	302.1	155.5	87.6	69.5	475.7	148.7	100.1	42.1	9.0	—	2.2
234	Textile fibres, yarns and woven fabrics	14.7	4.5	8.2	2.0	6.6	8.1	n.p.	2.3	n.p.	—	n.p.	n.p.
235, 24	Other textile products and clothing and footwear	27.3	11.1	8.6	7.6	3.9	23.4	3.7	7.4	—	—	—	—
23-24	Total textiles, clothing and footwear	42.0	15.6	16.8	9.6	10.5	31.5	n.p.	9.7	n.p.	—	—	n.p.
25	Wood, wood products and furniture	54.7	27.9	18.2	8.6	n.p.	n.p.	10.9	4.9	9.0	3.1	—	—
263	Paper and paper products	121.9	50.5	n.p.	n.p.	—	121.9	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
264	Printing and allied industries	22.2	14.4	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Total paper, paper products, printing and publishing	144.1	64.9	48.8	30.4	n.p.	n.p.	n.p.	24.7	n.p.	n.p.	n.p.	n.p.
2753	Synthetic resins and rubber	72.6	35.1	26.0	11.5	20.6	52.0	10.2	24.9	—	—	—	—
2754-2755	Organic and inorganic industrial chemicals n.e.c.	474.1	271.0	154.9	48.2	26.0	448.1	31.0	227.5	n.p.	n.p.	n.p.	n.p.
2762	Paints	193.4	85.9	86.2	21.3	31.6	161.8	44.3	n.p.	—	—	n.p.	n.p.
2763	Pharmaceutical and veterinary products	362.5	153.1	152.9	56.5	35.7	326.8	59.3	85.2	3.5	n.p.	n.p.	n.p.
(c)	Other chemical, petroleum and coal products	278.3	156.5	77.9	43.9	105.4	172.9	86.2	55.4	n.p.	n.p.	n.p.	n.p.
27	Total chemical, petroleum and coal products	1,380.9	701.6	497.9	181.4	219.3	1,161.6	231.0	432.4	8.6	14.5	—	15.2
287	Cement and concrete products	64.4	35.0	15.0	14.4	10.0	54.4	n.p.	18.2	n.p.	n.p.	n.p.	n.p.
285-286, 288	Glass, clay and other non-metallic mineral products	90.1	38.8	30.3	21.0	8.9	81.2	n.p.	15.4	—	n.p.	—	—
28	Total non-metallic mineral products	154.5	73.8	45.3	35.4	18.9	135.6	28.4	33.6	n.p.	n.p.	n.p.	n.p.
294	Basic iron and steel	675.9	232.6	179.8	263.5	11.8	664.1	150.6	n.p.	n.p.	n.p.	n.p.	n.p.
295-296	Basic non-ferrous metals	99.6	63.4	21.1	15.1	4.5	95.1	11.5	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	775.5	296.0	200.9	278.6	16.3	759.2	162.1	70.0	9.7	26.2	—	28.0

For footnotes see end of table.

TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
 DETAILS OF R & D MANPOWER BY INDUSTRY OF ENTERPRISE—continued
 (man-years)

Industry of enterprise (1978 edition of ASIC)	Description	Manpower by type of employee				Manpower by enterprise employment size(a)		Researcher effort by location(b)				
		Total man-years	Re-searchers	Tech-nicians	Other support-ing staff	Less than 200	200 or more	N.S.W.	Vic.	Qld	S.A.	Other Aus-tralian and overseas
314	Structural metal products	33.8	11.0	12.7	10.1	25.1	8.7	3.3	n.p.	n.p.	—	—
315	Sheet metal products	55.3	13.4	15.5	26.4	19.1	36.2	6.5	2.4	n.p.	n.p.	n.p.
316	Other fabricated metal products	108.4	45.5	40.3	22.6	32.3	76.1	16.2	n.p.	10.7	—	n.p.
31	Total fabricated metal products	197.5	69.9	68.5	59.1	76.5	121.0	26.0	20.2	18.0	n.p.	n.p.
323	Motor vehicles and parts	553.4	138.0	323.2	92.2	28.9	524.5	n.p.	90.5	n.p.	n.p.	n.p.
324	Other transport equipment	50.4	24.0	10.7	15.7	14.2	36.2	n.p.	7.1	n.p.	—	—
32	Total transport equipment	603.8	162.0	333.9	107.9	43.1	560.7	34.5	97.6	3.8	n.p.	n.p.
334	Photographic, professional and scientific equipment	229.8	91.8	87.8	50.2	51.3	178.5	11.5	61.5	n.p.	n.p.	n.p.
3351-3352	Radio and T.V. receivers; audio equipment and electronic equipment n.e.c.	772.9	297.6	303.1	172.2	150.1	622.8	141.2	110.4	3.3	n.p.	n.p.
3353	Refrigerators and household appliances	276.2	93.0	134.3	48.9	n.p.	n.p.	n.p.	n.p.	5.2	6.8	—
3354	Water heating systems	17.7	6.0	8.2	3.5	n.p.	n.p.	n.p.	n.p.	—	n.p.	n.p.
3355-3357	Other electrical machinery and equipment	167.1	77.3	56.2	33.6	86.4	80.7	30.6	37.4	4.3	n.p.	n.p.
335	Total appliances and electrical equipment	1,233.9	473.9	501.8	258.2	260.2	973.7	218.0	186.6	12.8	36.5	20.0
3361	Agricultural machinery	166.7	48.0	79.3	39.4	14.9	151.8	n.p.	20.8	n.p.	n.p.	n.p.
3362	Construction machinery	6.2	3.4	n.p.	n.p.	6.2	—	—	n.p.	n.p.	n.p.	—
3363	Materials handling equipment	50.0	13.3	n.p.	n.p.	26.9	23.1	n.p.	n.p.	—	—	n.p.
3364-3369	Other industrial machinery and equipment n.e.c.	164.6	61.3	69.1	34.2	108.7	55.9	27.4	21.1	8.4	n.p.	n.p.
336	Total industrial machinery and equipment	387.5	126.0	155.2	106.3	156.7	230.8	33.5	50.4	n.p.	n.p.	n.p.
33	Total other machinery and equipment	1,851.2	691.7	744.8	414.7	468.2	1,383.0	263.0	298.5	34.3	65.1	30.8
346	Rubber products	81.7	45.0	30.1	6.6	11.0	70.7	n.p.	34.7	n.p.	n.p.	—
347	Plastic and related products	94.0	42.7	35.5	15.8	41.1	52.9	25.1	13.7	n.p.	n.p.	n.p.
345, 348	Leather, leather products and other manufacturing	34.5	18.0	10.6	5.9	18.1	16.4	n.p.	6.2	n.p.	8.7	—
34	Total miscellaneous manufacturing	210.2	105.7	76.2	28.3	70.2	140.0	28.9	54.6	n.p.	15.5	n.p.
C	Total manufacturing	5,959.6	2,511.2	2,206.8	1,241.6	1,016.7	4,942.9	945.6	1,146.3	139.3	175.7	104.3
E	Other industries—											
	Construction	74.7	29.0	27.9	17.8	28.4	46.3	14.8	9.3	—	n.p.	n.p.
47	Wholesale trade	381.1	181.2	122.0	77.9	n.p.	n.p.	73.7	n.p.	24.8	14.6	n.p.
48	Retail trade	9.0	3.2	4.6	1.2	n.p.	n.p.	1.7	n.p.	—	—	n.p.
F	Total wholesale and retail trade	390.1	184.4	126.6	79.1	154.8	235.3	75.4	68.4	24.8	14.6	1.2
63	Property and business services	471.7	217.2	173.3	81.2	343.5	128.2	88.0	45.5	29.9	25.3	28.5
8461	Research and scientific institutions	460.1	184.8	160.3	115.0	n.p.	n.p.	97.9	27.8	n.p.	n.p.	n.p.
(d)	Other n.e.c.	955.5	417.6	383.2	154.7	n.p.	n.p.	42.1	330.9	24.7	10.9	9.0
16, D-L	Total other industries	2,352.1	1,033.0	871.3	447.8	1,016.4	1,335.7	318.2	481.9	n.p.	n.p.	n.p.
	Total all industries(e)	8,626.4	3,649.0	3,171.1	1,806.3	2,039.3	6,587.1	1,269.0	1,635.9	345.1	243.8	155.2
	Private business enterprise contribution to 'Total all industries'—											
	1978-79	7,546.1	3,186.4	2,729.3	1,630.4	n.a.	n.a.	1,233.2	1,265.5	318.3	227.2	142.2
	1976-77r	8,099.5	3,497.1	3,291.1	1,311.3	n.a.	n.a.	1,542.2	1,259.0	346.2	223.8	125.9

(a) For further information see also Table 10. (b) For further information see also Table 11. (c) ASIC Classes 2751-2752, 2761, 2764-2780. (d) ASIC codes 16, D, G-H, 61-62, J, 8141-8306, 8462-9364. (e) Excludes ASIC Division A.

TABLE 6. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY INDUSTRY OF ENTERPRISE BY BROAD ENTERPRISE TURNOVER SIZE(b)
(\$' 000)

Industry of enterprise (1978 edition of ASIC)		Enterprise turnover size (\$m)				Total
		Less than 5.0	5.0-19.9	20.0-49.9	50.0 or more	
11-15	Mining (excl. services to mining)	n.a.	n.a.	539	8,672	9,732
	Manufacturing—					
21	Food, beverages and tobacco					
23-24	Textiles, clothing and footwear	559	1,895	3,946	9,682	16,082
25	Wood, wood products and furniture	280	643	n.a.	n.a.	1,359
26	Paper, paper products, printing and publishing	n.a.	n.a.	831	—	1,592
2763	Pharmaceuticals and veterinary products	n.a.	n.a.	n.a.	2,940	4,117
(c)	Chemicals, petroleum and coal products	294	2,604	n.a.	n.a.	9,792
28	Non-metallic mineral products	1,704	3,025	2,314	18,394	25,439
29	Basic metal products	136	603	1,004	2,420	4,162
31	Fabricated metal products	465	578	277	19,579	20,899
32	Transport equipment	1,753	1,291	n.a.	n.a.	4,530
334-335	Photographic, professional and scientific equipment and appliances and electrical equipment	1,054	1,197	1,438	11,941	15,629
336	Industrial machinery and equipment	7,140	6,535	8,628	17,483	39,785
33	Total other machinery and equipment	3,303	2,103	1,884	1,519	8,808
		10,442	8,638	10,511	19,002	48,593
34	Miscellaneous manufacturing	1,575	1,497	370	2,451	5,893
C	Total manufacturing	n.a.	n.a.	28,860	88,149	158,087

(a) Excludes ASIC Sub-division 16. (b) For further information see also Table 7. (c) ASIC Sub-division 27 excluding ASIC Class 2763.

**TABLE 7. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY DETAILED ENTERPRISE TURNOVER SIZE(b)
(\$' 000)**

Enterprise turnover size (\$m)	Less than 1.0	1.0-4.9	5.0-9.9	10.0-19.9	20.0-29.9	30.0-39.9	40.0-49.9	50.0-74.9	75.0-99.9	100.0-149.9	150.0-199.9	200.0 or more	Total
	7,417	11,665	7,381	15,137	13,311	7,794	8,294	7,892	8,739	14,348	10,640	55,202	167,819

(a) Excludes ASIC Sub-division 16. (b) For further information see also Table 6.

**TABLE 8. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY DETAILED ENTERPRISE VALUE ADDED SIZE
(\$' 000)**

Enterprise value added size (\$m)	Less than 1.0	1.0-1.9	2.0-4.9	5.0-9.9	10.0-19.9	20.0-29.9	30.0-39.9	40.0-49.9	50.0-74.9	75.0-99.9	100.0 or more	Total
	12,506	5,448	9,695	16,416	24,699	11,106	7,244	4,349	11,292	13,793	51,271	167,819

(a) Excludes ASIC Sub-division 16.

**TABLE 9. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY SOURCE OF FUNDS AND BY TYPE OF R & D ACTIVITY
(\$' 000)**

Industry of enterprise (1978 edition of ASIC)		Source of funds(a)							Type of activity(a)				
		Total expenditure	Own funds	AIRDIB (b) grants	Other Commonwealth Government	State and local government (c)	Other private enterprises in Australia	Private non-profit Australian sources	Over-seas	Pure basic research	Strategic basic research	Applied research	Experimental development
C	Manufacturing	158,087	133,510	10,171	7,421	393	2,025	n.p.	n.p.	1,048	2,831	40,795	113,414
B, D-L	Mining and other industries	87,754	62,101	2,807	4,909	1,002	11,850	n.p.	n.p.	2,733	4,174	40,569	40,277
Total all industries(d)		245,841	195,611	12,978	12,330	1,395	13,875	1,037	8,616	3,781	7,005	81,364	153,692
Private business enterprise contribution to 'Total all industries'—													
	1978-79	205,814	161,237	12,953	7,513	800	13,870	825	8,616	3,443	4,224	61,721	136,428
	1976-77r	160,375	134,611	3,472	4,925	651	12,497	—	4,217	5,950	—	53,549	100,876

(a) For further information see also Table 4. (b) Australian Industrial Research and Development Incentives Board. (c) State and local government authorities and Higher Education Sector. (d) Excludes ASIC Division A.

TABLE 10. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
R & D MANPOWER BY INDUSTRY OF ENTERPRISE BY DETAILED ENTERPRISE EMPLOYMENT SIZE^(a)
(man-years)

Industry of enterprise (1978 edition of ASIC)		Enterprise employment size (persons)										Total	
		Less than 10	10-19	20-49	50-99	100-199	200-499	500-999	1,000-1,999	2,000-4,999	5,000-9,999		10,000 or more
ASIC code	Description												
C	Manufacturing	76.9	103.8	253.0	268.6	314.4	828.2	507.5	918.7	1,079.5	846.2	762.8	5,959.6
B, D-L	Mining and other industries	180.7	121.8	234.4	253.5	232.2	188.9	111.1	124.8	457.8	21.1	740.5	2,666.8
	Total all industries(b)	257.6	225.6	487.4	522.1	546.6	1,017.1	618.6	1,043.5	1,537.3	867.3	1,503.3	8,626.4

(a) For further information see also Table 5. (b) Excludes ASIC Division A.

TABLE 11. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1978-79
RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY LOCATION^(a)
(man-years)

Industry of enterprise (1978 edition of ASIC)		Location of researcher effort									Total
		N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Overseas	
ASIC code	Description										
C	Manufacturing	945.6	1,146.3	139.3	175.7	29.2	54.9	—	n.p.	n.p.	2,511.2
B, D-L	Mining and other industries	323.4	489.6	205.8	68.1	40.8	5.9	n.p.	n.p.	2.9	1,137.8
	Total all industries(b)	1,269.0	1,635.9	345.1	243.8	70.0	60.8	n.p.	9.3	n.p.	3,649.0

(a) For further information see also Table 5. (b) Excludes ASIC Division A.

TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,
AUSTRALIA, 1978-79
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a)

<i>Industry of product field (1978 edition of ASIC)</i>			<i>R & D</i>
<i>ASIC code</i>	<i>Description</i>	<i>Enterprises(b)</i>	<i>expenditure</i>
		number	\$' 000
Agriculture, forestry, fishing and hunting—			
012,018	Sheep, grain, cattle, pigs and poultry	8	755
013-014,019-04	Other agriculture, forestry, fishing and hunting	15	1,623
A	<i>Total agriculture, forestry, fishing and hunting</i>	23	2,378
Mining—			
11	Metallic minerals	14	5,201
12-15	Non-metallic minerals	24	6,849
11-15	<i>Total mining (excl. services to mining)</i>	36	12,050
Manufacturing—			
211	Meat products	15	1,070
212	Milk products	15	1,497
213	Fruit and vegetable products	18	1,287
215-216	Flour and cereal products, bread, cakes and biscuits	20	3,042
214,217	Margarines, oils, fats and other food products	61	8,546
218-219	Beverages, malt and tobacco products	21	2,035
21	<i>Total food, beverages and tobacco</i>	109	17,477
234	Textile fibres, yarns and woven fabrics	12	1,039
235,24	Other textile products, clothing and footwear	16	778
23-24	<i>Total textiles, clothing and footwear</i>	27	1,817
25	Wood, wood products and furniture	35	1,866
263	Paper and paper products	15	2,750
264	Printing and allied industries	9	1,190
26	<i>Total paper, paper products, printing and publishing</i>	24	3,940
2751	Chemical fertilizers	6	981
2753	Synthetic resins and rubber	27	4,674
2754	Organic industrial chemicals n.e.c.	31	3,874
2755	Inorganic industrial chemicals n.e.c.	21	3,779
2762	Paints	32	4,534
2763	{ Veterinary products	17	5,941
	{ Pharmaceutical products	28	7,361
2764	Pesticides	19	4,626
2765	Soap and other detergents	28	1,667
2766	Cosmetics and toilet preparations	14	817
2767	Inks	5	726
2752,2761,2768	Industrial gases, ammunition and other chemical products	39	2,843
275-276	<i>Total basic chemicals and other chemical products</i>	212	41,823
277-278	Petroleum refining, petroleum and coal products n.e.c.	22	2,904
27	<i>Total chemicals, petroleum and coal products</i>	220	44,727
285	Glass and glass products	9	937
286	Clay products and refractories	15	781
287	Cement and concrete products	16	1,325
288	Other non-metallic mineral products	15	1,952
28	<i>Total non-metallic mineral products</i>	49	4,995
294	Basic iron and steel	43	8,798
295-296	Basic non-ferrous metals	29	4,409
29	<i>Total basic metal products</i>	71	13,207

For footnotes see end of table.

TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,
AUSTRALIA, 1978-79
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a)—continued

<i>Industry of product field (1978 edition of ASIC)</i>		<i>Enterprises(b)</i>	<i>R & D expenditure</i>
<i>ASIC code</i>	<i>Description</i>	<i>number</i>	<i>\$' 000</i>
314	Structural metal products	37	2,337
315	Sheet metal products	21	717
316	Other fabricated metal products	84	4,675
31	Total fabricated metal products	126	7,729
323	Motor vehicles and parts	69	17,411
3241-3242	Ships and boats	9	256
3243	Railway rolling stock and locomotives	6	1,249
3244	Aircraft	3	216
3245	Transport equipment n.e.c.	8	205
324	Total other transport equipment	26	1,927
32	Total transport equipment	93	19,337
334	Photographic, professional and scientific equipment	64	9,102
3351	Radio and T. V. receivers; audio equipment	12	1,513
3352	Automatic data processing equipment	41	5,214
	Telecommunications and broadcasting equipment	37	25,136
	Other electronic equipment	58	3,124
3353	Refrigerators and household appliances	48	4,646
3354	Water heating systems	31	1,867
3355-3357	Cables, batteries, and other electrical machinery and equipment	78	6,582
335	Total appliances and electrical equipment	254	48,082
3361	Agricultural machinery	44	4,998
3362	Construction machinery	18	958
3363	Materials handling equipment	44	2,312
3364	Wood and metal machinery	30	1,568
3365	Pumps and compressors	30	1,638
3366	Commercial space heating and cooling equipment	21	582
3367	Dies, blades and machine tool accessories	7	127
3368	Food processing machinery	21	818
3369	Industrial machinery and equipment n.e.c.	175	9,008
336	Total industrial machinery and equipment	327	22,009
33	Total other machinery and equipment	571	79,193
345	Leather and leather products	7	105
346	Rubber products	18	1,679
347	Plastic and related products	59	3,148
348	Other manufacturing	18	2,453
34	Total miscellaneous manufacturing	99	7,384
C	Total manufacturing	1,097	201,672
	Other industries—		
16	Services to mining n.e.c.	13	4,184
E	Construction	20	709
D, F-L	Other n.e.c.	74	24,847
16, D-L	Total other industries	95	29,740
	Total all industries(c)	1,186	245,841

(a) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 26 in the Explanatory notes.
(b) Where the R & D performed by an enterprise was directed to more than one product, that enterprise is counted in each of the industries to which its products are keyed.
Therefore, the enterprise counts shown in this table can not be summed to aggregates for combinations of industries. (c) ASIC Divisions A-L.

TABLE 13. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,
AUSTRALIA, 1978-79
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a) BY LOCATION OF
R & D ACTIVITY
(\$' 000)

<i>Industry of product field (1978 edition of ASIC)</i>								<i>Tas., N.T. and A.C.T.</i>	
<i>ASIC code</i>	<i>Description</i>	<i>N.S.W.</i>	<i>Vic.</i>	<i>Qld</i>	<i>S.A.</i>	<i>W.A.</i>		<i>Total</i>	
11-15	<i>Mining (excl. services to mining)</i>	5,531	845	4,715	169	635	155	12,050	
	Manufacturing—								
21	Food, beverages and tobacco	8,978	3,617	4,025	709	n.p.	n.p.	17,477	
23-24	Textiles, clothing and footwear	632	965	n.p.	—	—	n.p.	1,817	
25	Wood, wood products and furniture	948	626	183	61	—	49	1,866	
26	Paper, paper products, printing and publishing	508	1,631	74	n.p.	—	n.p.	3,940	
2763	Pharmaceutical and veterinary products	7,359	5,618	3,037	902	387	681	44,727	
(b)	Chemicals, petroleum and coal products	10,487	16,257						
28	Non-metallic mineral products	3,312	1,404	n.p.	n.p.	n.p.	n.p.	4,995	
29	Basic metal products	8,311	1,464	1,052	1,013	n.p.	n.p.	13,207	
31	Fabricated metal products	3,652	2,399	874	633	n.p.	n.p.	7,729	
32	Transport equipment	3,590	11,051	471	n.p.	n.p.	—	19,337	
334	Photographic, professional and scientific equipment	2,236	3,881	230	2,064	n.p.	n.p.	9,102	
335	Appliances and electrical equipment	19,659	24,747	1,072	1,733	n.p.	n.p.	48,082	
336	Industrial machinery and equipment	8,740	7,548	2,061	2,066	1,365	229	22,009	
33	Total other machinery and equipment	30,635	36,176	3,363	5,863	1,944	1,214	79,193	
34	Miscellaneous manufacturing	2,153	3,181	n.p.	1,827	n.p.	—	7,384	
C	<i>Total manufacturing</i>	80,565	84,389	13,563	14,815	3,913	4,430	201,672	
A, 16, D-L	<i>Agriculture and other industries</i>	4,528	21,008	2,414	542	1,338	2,288	32,118	
	Total all industries(c)	90,624	106,242	20,690	15,527	5,887	6,871	245,841	

(a) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 26 in the Explanatory notes.
(b) ASIC Sub-division 27 excluding ASIC Class 2763. (c) ASIC Divisions A-L.

**TABLE 14. PAYMENTS BY BUSINESS ENTERPRISES FOR RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY OTHERS ON THEIR BEHALF, AUSTRALIA, 1978-79
PAYMENTS BY INDUSTRY OF ENTERPRISE MAKING PAYMENT BY LOCATION OF RECIPIENT**

Industry of enterprise making payment (1978 edition on ASIC)	Description	Location of recipient					
		Australia		Overseas		Total	
		Enter-prises	Pay-ments	Enter-prises	Pay-ments	Enter-prises	Pa-mer
ASIC code		number	\$' 000	number	\$' 000	number	\$' 000
11-15	Mining (excl. services to mining)	n.p.	n.p.	n.p.	n.p.	18	2,450
	Manufacturing—						
21	Food, beverages and tobacco	n.p.	n.p.	n.p.	n.p.	21	4,510
23-24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	8	147	5	63	9	210
2763	Pharmaceutical and veterinary products	n.p.	n.p.	n.p.	n.p.	8	340
(a)	Chemicals, petroleum and coal products	24	606	7	474	26	1,080
28	Non-metallic mineral products	n.p.	n.p.	n.p.	n.p.	10	110
29	Basic metal products	11	268	5	208	13	470
31	Fabricated metal products	8	679	—	—	8	670
32	Transport equipment	n.p.	n.p.	n.p.	n.p.	12	640
334-335	Photographic, professional and scientific equipment and appliances and electrical equipment	n.p.	n.p.	n.p.	n.p.	18	600
336	Industrial machinery and equipment	n.p.	n.p.	n.p.	n.p.	14	130
33	Total other machinery and equipment	30	664	4	76	32	740
34	Miscellaneous manufacturing	9	190	—	—	9	190
C	Total manufacturing	150	5,363	27	4,013	160	9,373
	Other industries—						
F	Wholesale and retail trade	n.p.	n.p.	n.p.	n.p.	39	6,004
63	Property and business services	n.p.	n.p.	n.p.	n.p.	24	1,290
(b)	Other n.e.c.	32	1,892	6	240	34	2,132
16, D-I, K-L	Total other industries	n.p.	n.p.	n.p.	n.p.	97	9,426
	Total all industries(c)	262	16,826	38	4,466	275	21,292
	Private business enterprise contribution to 'Total all industries'—						
	1978-79	234	12,676	36	4,286	247	16,962
	1976-77	245	10,853	47	4,800	272	15,653

(a) ASIC Sub-division 27 excluding ASIC Class 2763. (b) ASIC codes 16, D-E, G-H, 61-62, J-L. (c) Excludes ASIC Division A.

**TABLE 15. PAYMENTS BY BUSINESS ENTERPRISES FOR RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY OTHERS ON THEIR BEHALF, AUSTRALIA, 1978-79
PAYMENTS BY COUNTRY OF RECIPIENT BY RELATIONSHIP OF RECIPIENT TO ENTERPRISE MAKING
PAYMENT
(\$' 000)**

Country of recipient	Relationship of recipient to enterprise making payment	Industry of enterprise making payment (1978 edition of ASIC)		
		Manufacturing(a)	Mining and other industries(b)	Total all industries(c)
U.K.	Related enterprises	n.p.	n.p.	49
	Unrelated organisations	n.p.	n.p.	843
	Total	726	165	892
U.S.A.	Related enterprises	n.p.	n.p.	217
	Unrelated organisations	n.p.	n.p.	344
	Total	350	210	561
Other overseas	Related enterprises	51	78	129
	Unrelated organisations	2,885	—	2,885
	Total	2,936	78	3,014
Total overseas	Related enterprises	n.p.	n.p.	394
	Unrelated organisations	n.p.	n.p.	4,072
	Total	4,013	453	4,466
Australia	Related enterprises	n.a.	n.a.	n.a.
	Unrelated organisations	n.a.	n.a.	n.a.
	Total	5,363	11,464	16,826
Total	Related enterprises	n.a.	n.a.	n.a.
	Unrelated organisations	n.a.	n.a.	n.a.
	Total	9,375	11,917	21,292
	Private business enterprise contribution to 'Total all industries'—			
	1978-79	9,354	7,608	16,962
	1976-77	10,963	4,690	15,653

(a) ASIC Division C. (b) ASIC Divisions B, D-L. (c) Excludes ASIC Division A.

TABLE 16. PAYMENTS AND RECEIPTS FOR TECHNICAL KNOW-HOW BY BUSINESS ENTERPRISES, AUSTRALIA 1976-77 AND 1978-79
PAYMENTS BY INDUSTRY OF ENTERPRISE (1969 EDITION OF ASIC)

Industry of enterprise (1969 edition of ASIC)		Payments for technical know-how				Receipts for technical know-how			
		Enterprises making payments (number)		Total payments (\$m)		Recipient enterprises (number)		Total receipts (\$m)	
ASIC code	Description	1976-77	1978-79	1976-77	1978-79	1976-77	1978-79	1976-77	1978-79
	Manufacturing—								
21,22	Food, beverages and tobacco	16	17	2.9	4.0	4	5	0.3	0.4
23,24	Textiles, clothing and footwear	14	14	1.4	1.2	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	6	n.p.	0.1	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	7	n.p.	0.5	n.p.	n.p.	5	n.p.	0.1
27,23	Pharmaceuticals and veterinary products	9	13	5.0	5.6				
(a)	Chemicals, petroleum and coal products	48	53	11.1	22.0	21	19	2.4	3.2
28	Non-metallic mineral products	11	11	4.0	4.4	4	4	0.7	0.9
29	Basic metal products	16	11	3.1	3.8	7	5	1.2	0.6
31	Fabricated metal products	21	21	1.4	4.4	7	14	0.8	1.3
32	Transport equipment	16	19	7.1	10.1	7	8	0.3	0.5
331-332	Photographic, professional and scientific equipment and appliances and electrical equipment	47	45	12.4	18.3	18	5	0.6	0.9
333	Industrial machinery and equipment	44	26	3.8	3.4	15	14	0.6	0.2
33	Total other machinery and equipment	91	71	16.2	21.7	33	29	1.2	1.1
34	Leather, rubber and plastic products and manufacturing n.e.c.	20	19	3.1	3.9	8	11	0.5	0.5
C	Total manufacturing	275	262	55.8	82.0	97	107	7.5	8.8
	Other industries—								
F	Wholesale and retail trade	27	42	29.2	36.4	6	13	0.3	1.3
B,D-E,G-L	Mining and other industries n.e.c.	21	48	3.9	11.7	21	31	1.4	5.3
B, D-L	Total mining and other industries	48	90	33.1	48.2	27	44	1.7	6.6
	Total all industries(b)	323	352	88.9	130.2	124	150	9.2	15.4
	Private business enterprise contribution to 'Total all industries'	321	347	66.8	129.9	124	148	10.6	13.9

(a) ASIC Sub-division 27 excluding ASIC Class 2723. (b) Excludes ASIC Division A.

TABLE 17. PAYMENTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1978-79
PAYMENTS BY INDUSTRY OF ENTERPRISE

Industry of enterprise making payment (1978 edition of ASIC)		Enterprises making payments	Type of technical know-how			Payments within Australia	Payments made overseas			Country to which payment made(a)		
			Total payments	Patent licence fees and royalties	Other technical know-how		Total payments made overseas	Relationship of recipient to enterprise making payment		U.K.	U.S.A.	Other overseas
ASIC code	Description	number	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000	\$' 000
Manufacturing--												
21	Food, beverages and tobacco	17	4,024	953	3,071	n.p.	n.p.	3,165	799	251	3,280	433
23-24	Textiles, clothing and footwear	14	1,179	702	476	n.p.	n.p.	937	238	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
2763	Pharmaceutical and veterinary products	12	5,607	3,313	2,294	n.p.	n.p.	5,264	311	n.p.	n.p.	1,404
(b)	Chemicals, petroleum and coal products	53	21,790	15,740	6,050	309	21,481	16,788	4,694	5,595	13,213	2,673
28	Non-metallic mineral products	11	4,391	3,806	584	68	4,322	4,181	142	3,400	402	520
29	Basic metal products	12	3,975	3,030	945	67	3,909	443	3,465	21	2,428	1,460
31	Fabricated metal products	21	1,438	879	560	156	1,282	421	862	62	775	445
32	Transport equipment	19	10,129	1,643	8,487	133	9,996	9,450	546	339	1,496	8,161
334,335	Photographic, professional and scientific equipment and appliances and electrical equipment	46	18,623	4,922	13,703	367	18,257	11,778	6,480	3,246	11,900	3,111
336	Industrial machinery and equipment	25	3,325	1,566	1,759	25	3,300	1,986	1,313	71	2,978	251
33	Total other machinery and equipment	71	21,948	6,487	15,461	391	21,557	13,764	7,792	3,317	14,877	3,363
34	Miscellaneous manufacturing	20	3,949	1,448	2,500	64	3,885	3,198	687	736	2,756	393
C	<i>Total manufacturing</i>	263	79,452	38,654	40,798	1,308	78,144	58,296	19,848	13,767	45,363	19,014
Mining and other industries--												
F	Wholesale and retail trade	42	35,993	28,678	7,315	325	35,668	33,168	2,500	2,671	28,350	4,647
(c)	Mining and other n.e.c.	47	14,733	3,675	11,057	180	14,553	9,128	5,425	868	7,106	6,579
B.D-L	<i>Total mining and other industries</i>	89	50,726	32,354	18,372	505	50,221	42,296	7,925	3,539	35,455	11,227
Total all industries(d)		352	130,178	71,008	59,170	1,813	128,365	100,592	27,773	17,306	80,818	30,241
Private business enterprise contribution to 'Total all industries'--												
1978-79		347	129,927	71,002	58,925	1,766	128,161	100,592	27,569	17,206	80,714	30,241
1976-77		321	66,774	37,363	29,411	1,682	65,092	48,842	16,250	13,636	35,361	16,095

(a) For further information see also Table 18. (b) ASIC Sub-division 27 excluding ASIC Class 2763. (c) ASIC Divisions B, D-E, G-L. (d) Excludes ASIC Division A.

TABLE 18. PAYMENTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1978-79
PAYMENTS BY COUNTRY OF RECIPIENT(a)
(\$' 000)

	Australia	Canada	Federal Republic of Germany	France	Japan	U.K.	U.S.A.	Other countries	Total
Total all industries(b)	1,813	1,330	10,514	2,958	3,542	17,306	80,818	11,897	130,178
Private business enterprise contribution to 'Total all industries'—									
1978-79	1,766	1,330	10,514	2,958	3,542	17,206	80,714	11,897	129,927
1976-77	1,682	1,169	4,854	2,800	2,045	13,636	35,361	5,227	66,774

(a) For further information see also Table 17. (b) Excludes ASIC Division A.

TABLE 19. RECEIPTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1978-79
RECEIPTS BY INDUSTRY OF ENTERPRISE

Industry of recipient enterprise (1978 edition of ASIC)		Receipts from overseas										
		Recipient enterprises	Total receipts	Type of technical know-how		Receipts from within Australia	Total receipts from overseas	Relationship of organisation making payments to recipient enterprise		Country from which payment received(a)		
ASIC code	Description			number	\$' 000			Patent licence fees and royalties	Other technical know-how	\$' 000	\$' 000	Related enterprise organisation
C	Manufacturing	107	8,813	4,399	4,415	1,009	7,804	3,849	3,955	996	2,546	4,262
B,D-L	Mining and other industries	43	6,586	923	5,663	2,797	3,789	2,018	1,771	393	82	3,314
	Total all industries(b)	150	15,399	5,322	10,078	3,806	11,593	5,867	5,726	1,389	2,628	7,576
	Private business enterprise contribution to 'Total all industries'—											
	1978-79	148	13,878	5,322	8,557	2,305	11,573	5,867	5,706	1,389	2,628	7,556
	1976-77	124	10,623	4,599	6,024	3,519	7,103	3,177	3,926	1,157	2,005	3,941

(a) For further information see also Table 20. (b) Excludes ASIC Division A.

TABLE 20. RECEIPTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1978-79
RECEIPTS BY COUNTRY FROM WHICH PAYMENT WAS RECEIVED(a)
(\$' 000)

	Australia	Canada	Federal Republic of Germany	France	Japan	New Zealand	U.K.	U.S.A.	Other countries	Total
Total all industries(b)	3,806	208	211		477	2,062	1,389	2,628	4,618	15,399
Private business enterprise contribution to 'Total all industries'—										
1978-79	2,305	208	211		477	2,062	1,389	2,628	4,598	13,878
1976-77	3,519	246	123		358	1,471	1,157	2,005	1,743	10,623

(a) For further information see also Table 19. (b) Excludes ASIC Division A.

TABLE 21. PATENT ACTIVITY BY BUSINESS ENTERPRISES WITH RESEARCH AND EXPERIMENTAL DEVELOPMENT ACTIVITY IN 1978-79, AUSTRALIA, JULY 1977-JUNE 1979
DETAILS BY INDUSTRY OF ENTERPRISE

Industry of enterprise with patent activity (1978 edition of ASIC)		Number of enterprises with patent activity during the period July 1977-June 1979				Patent activity during the period July 1977-June 1979			
		Enterprises lodging patent applications in Australia	Enterprises with patents granted in Australia	Enterprises lodging patent applications overseas	Enterprises with patents granted overseas	Patent applications lodged in Australia	Patents granted in Australia	Patent applications lodged overseas	Patents granted overseas
ASIC code	Description								
Manufacturing—									
21	Food, beverages and tobacco	8	n.p.	5	4	12	n.p.	35	12
23-24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	5	n.p.	n.p.	—	12	n.p.	n.p.	—
26	Paper, paper products, printing and publishing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
2763	Pharmaceutical and veterinary products	5	n.p.	n.p.	n.p.	12	n.p.	n.p.	n.p.
(a)	Chemicals, petroleum and coal products	17	8	9	6	92	46	549	72
28	Non-metallic mineral products	5	n.p.	5	6	19	n.p.	36	34
29	Basic metal products	13	12	9	9	86	67	161	93
31	Fabricated metal products	35	20	18	11	142	67	289	233
32	Transport equipment	13	9	6	5	30	14	57	13
334-335	Photographic, professional and scientific equipment and appliances and electrical equipment	52	33	29	19	218	124	299	162
336	Industrial machinery and equipment	27	17	13	11	82	26	126	49
33	Total other machinery and equipment	79	50	42	30	300	150	425	211
34	Miscellaneous manufacturing n.e.c.	15	7	9	6	40	15	76	48
C	Total manufacturing	200	119	112	84	761	387	1,796	787
Mining and other industries—									
F	Wholesale and retail trade	24	10	14	7	64	21	257	70
63	Property and business services	28	18	16	13	73	39	179	141
(b)	Mining and other n.e.c.	25	18	17	18	87	50	304	222
B,D-L	Total mining and other industries	77	46	47	38	224	110	740	433
Total all industries(c)		277	165	159	122	985	497	2,536	1,220

(a) ASIC Sub-division 27 excluding ASIC Class 2763. (b) ASIC codes B, D-E, G-H, 61-62, K-L. (c) Excludes ASIC Division A.

APPENDIX

PLEASE RETAIN ONE COPY FOR YOUR OWN RECORDS

FORM RD 1



AUSTRALIAN BUREAU OF STATISTICS

All communications should be directed to: The Australian Bureau of Statistics in your State or Territory (For the address and telephone number see back page of form)

In communications quote this number

Large empty rectangular box for quoting a number.

Please correct any inaccuracies in this address

SURVEY OF RESEARCH AND EXPERIMENTAL DEVELOPMENT 1978-79 BUSINESS ENTERPRISE RETURN

This return is required under authority of the Census and Statistics Act 1905. Under the provisions of this Act, the contents of individual returns are CONFIDENTIAL. They will be used only for statistical purposes and will not be disclosed to anyone except authorised officers of the Australian Bureau of Statistics.

All figures in this return should relate to the enterprise named on the address label above. For statistical purposes, an ENTERPRISE normally comprises ALL THE OPERATIONS IN AUSTRALIA OF A SINGLE LEGAL ENTITY (e.g. company, partnership, sole proprietor). Overseas branches of Australian companies are excluded.

If actual figures are not available from your accounts, please supply careful estimates.

Explanatory notes are provided on pages 6-8 of this form for your assistance. If you encounter any difficulty in interpreting the instructions or definitions on this form (e.g. which of your enterprise's activities are R & D according to the definition on page 2), please contact 'Business Surveys' at the address, telephone number or telex number shown on the back page for your State or Territory.

PLEASE FORWARD YOUR COMPLETED RETURN FOR THIS ENTERPRISE in the enclosed reply-paid envelope to reach the Australian Bureau of Statistics NOT LATER THAN 21 SEPTEMBER 1979.

AUSTRALIAN BUREAU OF STATISTICS

TOTAL ENTERPRISE EMPLOYMENT, at the last pay period in June 1979.

1. Report the number of employees of your enterprise on the payroll for the last pay period in June 1979 and working proprietors and working partners at the end of June 1979. Include part-time and casual employees. (NUMBER OF PERSONS)

PARTICIPATION IN RESEARCH AND EXPERIMENTAL DEVELOPMENT Answer each of the following three questions by ticking the appropriate box.

2. In the year ended 30 June 1979, did your enterprise carry out any research and experimental development (as defined on page 2)? Yes/No
3. In the year ended 30 June 1979, did your enterprise incur expenditure for research and experimental development projects undertaken by other organisations? Yes/No
4. In the year ended 30 June 1979, did your enterprise make any payments for the purchase of, or have any receipts from the sale of, patent rights or other technical know-how? Yes/No
If you answered 'no' to all three questions (2-4), ensure that you have completed all the required details on this page, then forward this return in the enclosed reply-paid envelope.

Representative of your enterprise who should be contacted if any queries arise regarding this return:

Name of Representative (BLOCK LETTERS) Telephone No. (STD code)

Signature Date

INTERPRETATION OF THE DEFINITION OF RESEARCH AND EXPERIMENTAL DEVELOPMENT

This survey conforms to the standards for research and experimental development (R & D) statistics formulated by the Organisation for Economic Co-operation and Development (OECD). The OECD defines R & D as follows:

"Research and experimental development comprises 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".

Any activity classified as R & D should contain an appreciable amount of NOVELTY, it should have INVESTIGATION as a primary objective, and should have a potential to produce results that are sufficiently GENERAL for mankind's stock of knowledge (theoretical and/or practical) to be recognisably increased. The concept of novelty is not associated with the actual creation of something which, although new, is made by artistry or by application of techniques that have already been established for that class of object. For example, the design and testing of a new type of amplifier is R & D, whereas the design and construction of an amplifier of an established type is not R & D.

R & D ceases and pre-production begins when work is no longer experimental. Once the primary objective is no longer investigation but rather production or preparation for production, 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 innovative process.

Note that R & D extends to substantial modifications to existing products and processes.

THE FOLLOWING ACTIVITIES, often regarded as research or development, are to be EXCLUDED, EXCEPT where they are used primarily for the support of specific R & D programmes or to develop new techniques.

- . market research or sales promotion
- . operations research
- . quality control or routine testing of materials, products or processes
- . prospecting, exploring or drilling for, or producing, minerals, petroleum or natural gas
- . development work on style changes or minor modifications to existing products and processes
- . computer programming or systems work
- . routine data collection
- . the commercial, legal and administrative aspects of patent and licence activity
- . scientific and technical information services

DIVERGENCE FROM THE AUSTRALIAN INDUSTRIAL RESEARCH AND DEVELOPMENT INCENTIVES BOARD'S DEFINITION OF R & D

The definition of R & D applied by the Board is similar to that outlined above, except in two areas:

- . To be accepted as R & D by the Board, work need only be directed towards products and processes new to the enterprise. The present survey seeks information on R & D activities that could increase mankind's stock of knowledge. R & D directed towards attaining a product or process that has already been developed elsewhere should not be included unless it is not possible to gain access to this new knowledge.
- . This questionnaire covers the complete range of R & D activities, not just those directed towards new products and processes. It includes R & D in the social sciences and humanities, and basic research that is undertaken to increase the stock of knowledge but which has no particular application or use in view.

A. R & D PROJECTS UNDERTAKEN BY EMPLOYEES OF YOUR ENTERPRISE, YEAR ENDED 30 JUNE 1979
(QUESTIONS 5-12)

Exclude R & D projects undertaken on your behalf by other enterprises, institutions or individuals (report this expenditure in Q.13), but include work done by others where it is in the form of a specialised service provided in support of an R & D project undertaken by employees of your enterprise (report this expenditure in 'other current expenditure' in Q.7).

Include R & D projects undertaken by your enterprise on behalf of other enterprises, institutions or individuals.

Figures reported should only relate to activities defined as R & D on page 2.

5. MAN YEARS OF EFFORT ON R & D BY EMPLOYEES OF YOUR ENTERPRISE DURING THE YEAR ENDED 30 JUNE 1979
(see explanatory notes, page 6)

TYPE OF EMPLOYEE	Man years of effort attributable to R & D (report to one decimal place)
Researchers	
Technicians	
Other staff directly supporting R & D	
Overhead staff providing indirect services to R & D	
TOTAL	

6. LOCATION OF EFFORT BY RESEARCHERS

Allocate the man years of effort spent on R & D by researchers employed by your enterprise during the year ended 30 June 1979 according to the location of their effort.

LOCATION	Man years of effort by researchers (report to one decimal place)
New South Wales	
Victoria	
Queensland	
South Australia	
Western Australia	
Tasmania	
Northern Territory	
Australian Capital Territory	
Overseas	
TOTAL (to agree with Researchers category in Q.5)	

7. TYPE OF EXPENDITURE (see explanatory notes, page 6)

Report the expenditure incurred on R & D projects undertaken by employees of your enterprise during the year ended 30 June 1979.

Where significant expenditure is shared by R & D and non R & D activities (e.g. central administration costs, fuel, rates, computing expenses, etc.), the R & D proportion should be estimated and included in the relevant figure.

TYPE OF EXPENDITURE		Expenditure \$	Office use only
CAPITAL EXPENDITURE on new and second hand fixed tangible assets, less value of disposals	Land, buildings, and other structures		
	Vehicles, plant, machinery and equipment		
CURRENT EXPENDITURE	Wages, salaries and other labour costs (including superannuation, holiday pay, etc.)		
	Other current expenditure (exclude depreciation provisions)		
TOTAL			

8. SOURCE OF FUNDS

Report the direct source of all funds receivable for R & D projects undertaken by employees of your enterprise during the year ended 30 June 1979. Include funding from grants, contracts, commissions etc.

SOURCE	Funds \$
Own funds	
Other Australian private business enterprises	
Australian Industrial Research and Development Incentives Board grant (expected)	
Other Commonwealth Government	
State and local government	
Australian universities and colleges	
Australian private non profit organisations	
Other Australian source (specify)	
Overseas sources	
TOTAL (to agree with Total Expenditure in Q.7)	

9. PRODUCT OR PROCESS FIELD (see explanatory notes, page 7)

- List the products or processes towards which the R & D projects undertaken by employees of your enterprise were specifically directed. Identify separately products or processes towards which significant amounts of your enterprises R & D activities were directed and combine the remainder into groups of similar products or processes.
- Allocate the total expenditure on R & D projects undertaken by employees of your enterprise according to these products or processes.
- Enter beside each product or process the State in which most of the R & D activities associated with that product or process were undertaken.

PRODUCT OR PROCESS (<i>specify</i>)	Expenditure \$	State	Office use only		
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
TOTAL (to agree with Total Expenditure in Q.7)					

10. TYPE OF ACTIVITY (see explanatory notes, page 7)

Allocate the total expenditure on R & D projects undertaken by employees of your enterprise according to the type(s) of activity undertaken.

TYPE OF ACTIVITY	Expenditure \$
Basic research – Pure	
– Strategic	
Applied research	
Experimental development	
TOTAL (to agree with Total Expenditure in Q.7)	

11. TYPE OF INNOVATION

Allocate the total expenditure on R & D projects undertaken by employees of your enterprise according to the type(s) of innovation towards which the R & D was directed.

TYPE OF INNOVATION	Expenditure \$
Products for Sale by Enterprise	
– Development of product(s) new to enterprise	
– Substantial modification to existing product(s)	
Processes and Products for Consumption by this Enterprise	
– R & D primarily aimed at reducing operating costs	
– Other R & D	
TOTAL (to agree with Total Expenditure in Q.7)	

12. SELECTED NATIONAL OBJECTIVES (see explanatory notes, page 7)

If any of the R & D projects undertaken by employees of your enterprise were directed towards one or more of the objectives listed below, allocate a proportion of your R & D expenditure to the appropriate objective(s).

SELECTED OBJECTIVE	Expenditure \$
Energy*	
a. production and utilisation of energy from	
1 oil, gas and oil shale *	
2 coal* (excl. b.1)	
3 solar	
4 nuclear*	
5 other primary sources (excl. b.2)	
b. production and utilisation of synthetic fuels from	
1 coal	
2 biomass	
c. conservation of energy	
d. other energy R & D (eg supporting technologies)	
Occupational health and safety	
Defence	
Environmental protection	
– protection and rehabilitation of natural environment	
– protection of man-made environment	
TOTAL SELECTED OBJECTIVES	

* excludes R & D on exploration for, and mining and transport of fuel minerals.

B. PAYMENTS BY YOUR ENTERPRISE FOR R & D PROJECTS UNDERTAKEN ON BEHALF OF YOUR ENTERPRISE BY OTHERS, YEAR ENDED 30 JUNE 1979

13. Report amounts payable by your enterprise specifically for R & D projects undertaken on your behalf during the year ended 30 June 1979 by other enterprises, institutions or individuals, either in Australia or overseas. Include payments made in the form of grants (e.g. to industrial research associations) as well as contract or commission payments.
Exclude payments for work done by others where it is in the form of a specialised service provided in support of an R & D project undertaken by employees of your enterprise (this expenditure should have been included in Q.7).

UNDERTAKEN BY	Country (specify)	Amounts payable \$	Office use only
Enterprises, institutions or individuals located in Australia	Australia		
Related enterprises located abroad (for definition of a 'related enterprise', see explanatory notes, page 7)	1. _____		
	2. _____		
	3. _____		
	4. _____		
Unrelated enterprises, institutions or individuals located abroad	1. _____		
	2. _____		
	3. _____		
	4. _____		
TOTAL			

C. NUMBER OF PATENT APPLICATIONS LODGED AND PATENTS GRANTED DURING TWO YEARS, 1 JULY 1977 TO 30 JUNE 1979

14. Report patenting activity resulting from R & D projects undertaken by employees of your enterprise (see explanatory notes, page 8)

COUNTRY	Patent applications lodged during 2 years		Patents granted during 2 years	
	Number of inventions, devices or innovations involved	Gross number of applications	Number of inventions, devices or innovations involved	Gross number of applications
Australia				
Abroad				
For office use only				

D. RECEIPTS AND PAYMENTS FOR LICENCES, PATENT RIGHTS OR OTHER TECHNICAL KNOW-HOW, YEAR ENDED 30 JUNE 1979

15. LOCATION OF ORGANISATION RECEIVING OR MAKING PAYMENTS (see explanatory notes, page 8)

COUNTRY	Amounts payable by your enterprise for purchases of technical know-how		Amounts receivable by your enterprise from sales of technical know-how	
	Patent licence fees & patent royalties \$	Other technical know-how \$	Patent licence fees & patent royalties \$	Other technical know-how \$
Canada				
Federal Republic of Germany				
France				
Japan				
New Zealand				
U.K.				
U.S.A.				
Other (specify) _____				
TOTAL OVERSEAS				
Australia				
TOTAL				

16. TYPE OF OVERSEAS ORGANISATION RECEIVING OR MAKING PAYMENTS (see explanatory notes page 8)

Allocate the total overseas amounts payable for, and amounts receivable from, the purchases and sales of technical know-how according to the types of organisations they were payable to or receivable from.

TYPE OF ORGANISATION	Amounts payable by your enterprise for purchases of technical know-how		Amounts receivable by your enterprise from sales of technical know-how	
	Patent licence fees & patent royalties \$	Other technical know-how \$	Patent licence fees & patent royalties \$	Other technical know-how \$
Related enterprises located abroad				
Unrelated enterprises, institutions and individuals located abroad				
TOTAL (to agree with Total Overseas category in Q.15)				

Question 9. PRODUCT OR PROCESS FIELD

The products or processes listed should be those towards which the R & D activities were specifically directed, regardless of the end product(s) which may be affected and regardless of the main products produced by your enterprise. Be as specific as possible. For example, R & D work on developing a new type of a car head lamp should be classified as "motor vehicle electrical equipment" or "passenger car headlight", but not as "motor vehicles", "road transport services" or "electrical equipment".

Examples of the detail required in the description of the products, or processes, towards which the R & D activities were directed:

leather working machinery	ceramic paints	aerosol containers
linoleum floor coverings	abrasive cleaners	lighting dimmers
industrial fans	iron ore beneficiation	computer hardware
photographic light bulbs	control of waste material disposal	extraction techniques — metallic
household dish washing machines	surface active organic chemicals	minerals
sheet metal tags	for pollution control	solar water heaters
motor vehicle brake components	coal liquefaction	plastic gas taps

Question 10. TYPE OF ACTIVITY

Basic research:

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

Pure basic research is research which is carried out without looking for long term economic or social benefits other than advancement of knowledge.

Strategic basic research is research directed into specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems.

Applied Research also refers to original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective. Applied research is undertaken either to determine possible uses for the findings of basic research or to determine new methods or ways of achieving some specific and pre-determined objectives.

Experimental development refers to systematic work, drawing on existing knowledge gained from research and/or practical experience, that is directed to producing new materials, products and devices, to installing new processes, systems and services, and to improving substantially those already produced or installed.

Question 12. SELECTED NATIONAL OBJECTIVES

The term "objective" refers to the ultimate national needs rather than to the immediate objectives of the researcher or enterprise.

Energy refers to the objectives of producing, storing, transmitting, utilising and conserving energy. *Exclude* R & D directed towards mineral or petroleum exploration, mining techniques, or the extraction of chemical or other non-energy products from energy sources (e.g. production of bitumen from coal).

'nuclear' includes non-breeder, breeder and fusion R & D

'other primary sources' include wind, ocean, geothermal sources etc.

'conservation of energy' relates to efforts to use less energy by improving building design, engine efficiency, industrial process design etc. — show only a proportion of the R & D expenditure if these efforts are to serve other objectives in addition to conserving energy.

'other energy R & D' includes supporting technologies such as electricity transmission and distribution, energy storage, energy systems analysis etc.

Occupational health and safety refers to the health and safety of people at their place of work. Report R & D directed towards improving the health and safety of employees of your enterprise or of any other enterprise.

Defence refers only to R & D performed specifically for defence purposes. Provision of this information is unlikely to contravene national security legislation. However, if you are in doubt, please contact the organisation on whose behalf you are performing the R & D.

Environmental protection. *Exclude* R & D directed towards sewerage disposal and recycling. *Include* under the appropriate category R & D directed towards treatment of industrial wastes for pollution control purposes, air, water and noise pollution, conservation of flora or fauna, soil conservation, and restoration of natural environments.

Question 13. PAYMENTS FOR R & D PROJECTS UNDERTAKEN ON BEHALF OF YOUR ENTERPRISE BY OTHERS

A related enterprise located abroad refers to an enterprise:

- (i) which, either singly or in conjunction with a group of related enterprises located overseas, holds 25 per cent or more of the ordinary shares or voting stock of your enterprise; or
- (ii) which, either singly or in conjunction with a group of related enterprises located overseas, holds 25 per cent or more of the ordinary shares or voting stock of your parent company in Australia (where your company is a subsidiary as defined in Section 6 of The Companies Act); or
- (iii) which is the foreign head office of your enterprise (where your enterprise is a branch of an enterprise incorporated in a foreign country); or
- (iv) which holds directly or indirectly, more than 50 per cent of the ordinary shares or voting stock of the related foreign enterprises in (i), (ii), or (iii) above; or
- (v) in which the related foreign enterprises in (i), (ii), (iii) or (iv) above hold, directly or indirectly, more than 50 per cent of the ordinary shares or voting stock; or
- (vi) which is a branch of your enterprise; or
- (vii) in which your Australian enterprise group (i.e. your enterprise and enterprises related to your enterprise in terms of Section 6 of the Companies Act) holds 25 per cent or more of the ordinary shares or voting stock; or
- (viii) in which the foreign enterprises identified in (vi) or (vii) hold more than 50 per cent of the ordinary shares or voting stock.

Question 14. PATENT APPLICATIONS LODGED AND PATENTS GRANTED

Patent applications lodged. *Exclude* applications for which only provisional specifications were provided.

Patents granted. Report the number of patents granted between 1 July 1977 and 30 June 1979, regardless of when the applications for those patents were lodged.

Number of inventions etc. Report the number of inventions, devices or innovations involved, irrespective of the number of countries in which applications were lodged or patents granted.

Gross number abroad. Report the total number of applications lodged or patents granted abroad. For example, if your enterprise lodged applications for one invention in Canada, New Zealand and France and for a second invention in France and Spain, report "5" for Gross Number of Patent Applications Lodged Abroad.

Questions 15 and 16. RECEIPTS AND PAYMENTS FOR TECHNICAL KNOW-HOW

Technical know-how is the specialised technical knowledge required to successfully implement a process or produce a product e.g. patent licences; technical data and information; scientific, technical, or engineering assistance that increases technical knowledge and understanding in your enterprise.

Payments

Include only expenditure made directly to the holders of the technical know-how

Exclude other costs incurred by your enterprise to obtain know-how e.g. overseas travel, subscriptions for periodicals.

Exclude cost of computer software and scientific, technical, or engineering services that are not aimed primarily at increasing the technical knowledge of your enterprise. *Exclude* payments for specific R & D projects undertaken by others on your behalf and reported in Question 13.

Receipts

Exclude receipts for contract or commission work undertaken by your enterprise on behalf of others.

A Related Enterprise abroad

For a definition of a related enterprise located abroad see explanatory notes to Question 13.

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