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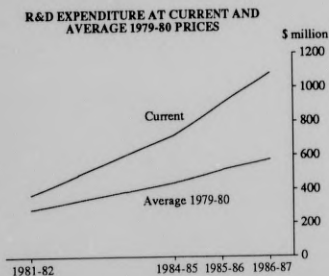
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RESEARCH AND EXPERIMENTAL DEVELOPMENT, BUSINESS ENTERPRISES, AUSTRALIA, 1986-87, PRELIMINARY

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MAIN FEATURES

The preliminary estimate of expenditure on Research and Experimental Development (R & D) carried out in Australia by business enterprises during 1986-87 is \$1082m at *current prices*. This represents a 20% increase in expenditure compared with 1985-86. At *average 1979-80 prices* R & D expenditure is estimated to have increased by 12% over this period.



Expenditure by private business enterprises was \$976m and by public sector business enterprises was \$106m at *current prices*. At *average 1979-80 prices*, compared with 1985-86 this represents a 13% increase in R & D expenditure by private business enterprises and a 5% increase by public sector business enterprises.

Human resources devoted to R & D carried out in Australia by business enterprises during 1986-87 were 15,449 person years. This represents a 10% increase compared with 1985-86.

Payments for technical know-how by business enterprises in Australia in 1986-87 were \$260m (a 62% increase at current prices, compared with 1984-85). Receipts for technical know-how by business enterprises in Australia in 1986-87 were \$87m (a 141% increase at current prices compared with 1984-85).

EXPLANATORY NOTES

Introduction

This publication presents preliminary estimates of expenditure and human resources devoted to R & D carried out in Australia by private and public business enterprises during 1986-87. Statistics on payments and receipts for technical know-how by business enterprises are shown in Table 3. Statistics on R & D intensity are shown in Table 4.

2. These preliminary estimates are based on a 79% response, with the majority of returns not yet received expected to report NIL R & D activity. Revised estimates and more detailed tables, will be published later this year in *Research and Experimental Development, Business Enterprises, Australia, 1986-87* (8104.0).

3. The 1984-85 and 1985-86 data presented in this publication have been revised. Improved coverage has resulted in the ABS obtaining retrospective data from respondents who were not previously included in these R & D surveys.

Related publications

4. Users may wish to refer to the following publications regarding definitions and further explanations.

Research and Experimental Development, Business Enterprises, Australia, 1984-85 (8104.0).

Research and Experimental Development, All Sector Summary (Inter Year Survey), Australia, 1985-86 (8122.0).

Research and Experimental Development, All Sector Summary, Australia, 1984-85 (8112.0).

The Measurement of Scientific and Technical Activities ('Frascati Manual' 1980) OECD, Paris 1981.

5. Current publications produced by the ABS are listed in the *Catalogue of Publications, Australia* (1101.0).

Symbols and other usages

- r figure or series revised
- n.p. not available for separate publication (but included in totals where applicable)
- n.a. not available
- nil or rounded to zero

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TABLE 1. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA
R & D EXPENDITURE AT CURRENT AND AVERAGE 1979-80 PRICES
(\$m)

	1981-82	1984-85	1985-86	1986-87
	f	f	f	f
AT CURRENT PRICES				
PRIVATE SECTOR	318.9	644.9	810.9	976.3
PUBLIC SECTOR	54.8	75.8	93.9	105.9
TOTAL BUSINESS ENTERPRISES	373.7	720.8	904.8	1,082.3
AT AVERAGE 1979-80 PRICES				
PRIVATE SECTOR	239.9	392.0	459.1	516.5
PUBLIC SECTOR	45.4	49.1	56.3	59.1
TOTAL BUSINESS ENTERPRISES	285.3	441.1	515.4	575.6

(a) Excludes enterprises in ASIC Division 'A'.

TABLE 2. DETAILS OF RESOURCES DEVOTED TO R&D BY BUSINESS ENTERPRISES (a), AUSTRALIA

Industry of enterprise	Number of enterprises performing R&D (b)			Expenditure on R&D (\$m)				Person years of effort on R&D			
	1981-82	1984-85	1986-87	1981-82	1984-85	1985-86	1986-87	1981-82	1984-85	1985-86	1986-87
	(r)	(r)	(r)	(r)	(r)	(b)	(r)	(r)	(r)	(b)	(r)
MINING (EXCLUDING SERVICES TO MINING)	23	31	33	22.6	29.2	n.a.	38.9	381	289	n.a.	309
Manufacturing -											
Food, beverages and tobacco	72	92	92	14.1	30.9	n.a.	43.5	390	657	n.a.	732
Textiles, clothing and footwear	16	26	32	0.8	3.8	n.a.	10.3	24	43	n.a.	96
Wood, wood products and furniture	19	29	45	1.7	3.4	n.a.	6.1	43	68	n.a.	112
Paper, paper products, printing and publishing	12	22	27	5.3	6.4	n.a.	9.4	125	139	n.a.	159
Chemical, petroleum and coal products	128	180	251	57.3	92.1	96.8	112.9	1,307	1,576	1,596	1,795
Non-metallic mineral products	22	33	38	5.8	12.9	n.a.	14.6	126	223	n.a.	169
Basic metal products	27	32	45	27.1	46.1	66.7	64.8	672	681	889	869
Fabricated metal products	83	92	114	7.1	15.6	n.a.	18.3	170	309	n.a.	331
Transport equipment	54	65	87	48.1	90.1	124.1	111.2	1,087	1,476	1,700	1,445
Photographic, professional and scientific equipment	26	30	55	6.3	16.5	n.a.	24.2	183	283	n.a.	412
Appliances and electrical equipment	159	285	515	41.4	84.2	112.3	152.8	1,029	1,606	1,965	2,496
Industrial machinery and equipment	156	177	234	15.7	28.5	n.a.	40.1	443	566	n.a.	663
Miscellaneous manufacturing	66	78	93	7.6	11.4	n.a.	19.0	186	233	n.a.	309
TOTAL MANUFACTURING	840	1,141	1,628	238.3	441.9	547.6	627.0	5,784	7,859	8,760	9,585
Other industries -											
Wholesale and retail trade	106	193	261	12.5	36.0	n.a.	65.1	296	627	n.a.	981
Property and business services	206	450	527	20.2	82.0	n.a.	145.9	499	1,328	n.a.	1,943
Research and scientific institutions	31	42	75	23.0	27.8	n.a.	41.4	485	489	n.a.	609
Other n.e.c.	72	123	173	57.1	104.0	n.a.	163.9	1,042	1,672	n.a.	2,022
TOTAL OTHER INDUSTRIES	415	808	1,036	112.9	249.7	n.a.	416.3	2,324	4,115	n.a.	5,555
TOTAL ALL INDUSTRIES (c)	1,278	1,980	2,697	373.7	720.8	904.8	1,082.3	8,489	12,263	13,996	15,449
Private sector contribution	1,212	1,934	2,643	318.9	644.9	810.9	976.3	7,478	11,041	12,657	14,162
Public sector contribution	66	46	54	54.8	75.8	93.9	105.9	1,010	1,222	1,339	1,288

(a) Excludes enterprises in ASIC Division 'A'.

(b) Represents the most detailed data available for 1985-86. Manufacturing total not equal to sum of components presented. Number of enterprise details are not available for 1985-86.

(c) Of the 2,697 enterprises performing R&D in 1986-87, 284 reported Energy R&D activity. The value of this activity was \$82.7m, involving 1,138 persons.

TABLE 3. PAYMENTS AND RECEIPTS FOR TECHNICAL KNOW-HOW BY BUSINESS ENTERPRISES (a), AUSTRALIA
(\$'m)

Industry of enterprise	Payments for technical know-how			Receipts for technical know-how		
	1981-82	1984-85	1986-87	1981-82	1984-85	1986-87
Manufacturing -						
Food, beverages and tobacco	14.9	16.8	21.7	-	1.1	2.6
Textiles, clothing and footwear	1.4	8.9	n.p.	-	n.p.	n.p.
Wood, wood products and furniture	) 2.9	0.1	n.p.	-	n.p.	0.6
Paper, paper products, printing and publishing	) 2.9	4.1	4.3	n.p.	n.p.	n.p.
Chemical, petroleum and coal products	34.3	37.7	50.4	3.6	6.6	6.2
Non-metallic mineral products	5.6	7.8	1.4	n.p.	n.p.	n.p.
Basic metal products	7.6	4.7	9.7	2.0	6.1	n.p.
Fabricated metal products	3.3	2.3	3.7	0.7	1.1	1.0
Transport equipment	13.8	13.3	29.2	2.0	n.p.	1.2
Photographic, professional and scientific equipment	)	)	)	)	)	)
Appliances and electrical equipment (b)	) 16.9	) 40.5	) 64.1	) 1.5	) 4.8	) 19.9
Industrial machinery and equipment	3.2	)	)	)	)	)
Miscellaneous manufacturing	3.3	4.9	7.9	0.9	n.p.	n.p.
TOTAL MANUFACTURING	107.2	141.1	217.3	11.5	23.8	47.4
Other industries -						
Wholesale and retail trade	)	n.p.	11.8	)	0.5	6.1
Property and business services	) 28.9	8.0	n.p.	) 5.9	6.2	26.0
Research and scientific institutions	)	n.p.	n.p.	)	n.p.	3.0
Other n.e.c.	)	7.1	18.6	)	n.p.	4.3
TOTAL OTHER INDUSTRIES	28.9	18.9	42.4	5.9	12.3	39.5
TOTAL ALL INDUSTRIES	136.0	160.1	259.7	17.4	36.1	86.9

(a) Excludes enterprises in ASIC Division 'A'.

(b) Payments for TRH for this industry in 1984/85 and 1986/87 are \$28.3m and \$44.4m respectively.

TABLE 4. R&D INTENSITY INDICATORS FOR BUSINESS ENTERPRISES (a), AUSTRALIA

Industry of enterprise	Enterprises that carried out R & D (b)				All enterprises in industry (b)					
	Expenditure (c)		Human Resources (d)		Enterprises (e)		Expenditure (f)		Human Resources (g)	
	1981-82	1984-85	1981-82	1984-85	1981-82	1984-85	1981-82	1984-85	1981-82	1984-85
	f	f	f	f	f	f	f	f	f	f
MINING (EXCLUDING SERVICES TO MINING)	0.5	0.5	1.3	0.7	2.9	3.4	0.2	0.2	0.5	0.4
Manufacturing -										
Food, beverages and tobacco	0.3	0.3	0.9	0.9	2.7	3.6	0.1	0.1	0.2	0.3
Textiles, clothing and footwear	0.2	0.5	0.4	0.3	0.7	1.1	-	0.1	-	-
Wood, wood products and furniture	0.6	0.5	1.2	0.7	0.5	0.8	-	0.1	0.1	0.1
Paper, paper products, printing and publishing	0.4	0.3	1.0	0.8	0.5	0.8	0.1	0.1	0.1	0.1
Chemical, petroleum and coal products	1.2	1.5	3.1	3.7	19.2	29.0	0.6	0.9	1.8	2.6
Non-metallic mineral products	0.5	0.2	0.8	0.5	2.6	4.2	0.2	0.3	0.3	0.5
Basic metal products	0.5	0.6	1.0	0.9	7.3	9.4	0.3	0.4	0.7	0.9
Fabricated metal products	0.6	0.9	0.9	1.2	2.1	2.5	0.1	0.3	0.2	0.4
Transport equipment	1.1	1.2	1.8	2.1	4.5	5.9	0.7	0.9	1.0	1.5
Photographic, professional and scientific equipment	5.4	4.0	7.8	6.8	9.4	8.9	0.9	2.0	1.8	2.7
Appliances and electrical equipment	1.6	2.3	2.3	3.1	15.9	29.2	0.8	1.5	1.3	2.2
Industrial machinery and equipment	0.9	1.5	1.6	2.1	7.3	9.0	0.4	0.7	0.6	1.1
Miscellaneous manufacturing	0.4	0.4	0.7	1.1	3.4	4.0	0.2	0.2	0.3	0.3
TOTAL MANUFACTURING	0.8	0.8	1.5	1.6	3.5	4.9	0.3	0.4	0.5	0.8
Other industries -										
Wholesale and retail trade	n.a.	n.a.	0.9	1.4	0.2	0.4	n.a.	n.a.	-	0.1
Property and business services	n.a.	n.a.	2.1	2.5	1.4	2.8	n.a.	n.a.	0.2	0.5
Research and scientific institutions	n.a.	n.a.	n.a.	61.0	38.8	48.3	n.a.	n.a.	5.7	2.6
Other n.e.c.	n.a.	n.a.	-	0.4	0.1	0.2	n.a.	n.a.	-	0.1
TOTAL OTHER INDUSTRIES	n.a.	n.a.	0.7	0.8	0.4	0.7	n.a.	n.a.	0.1	0.1
TOTAL ALL INDUSTRIES	n.a.	n.a.	1.2	1.0	1.4	n.a.	n.a.	0.2	0.2	

(a) Excludes enterprises in ASIC Division 'A'.

(b) R&D Intensity indicators for 1986/87 not yet available.

(c) Expenditure on R&D expressed as a percentage of the turnover of those enterprises that carried out R&D.

(d) Person years of effort expended on R&D as a percentage of the number of persons employed by those enterprises that carried out R&D.

(e) Number of enterprises that carried out R&D as a percentage of the total number of enterprises in the industry (excluding single establishment enterprises employing less than 4 persons).

(f) Expenditure on R&D as a percentage of the turnover of all enterprises in the industry (excluding single establishment enterprises employing less than 4 persons).

(g) Persons years of effort expended on R&D as a percentage of the number of persons employed by all enterprises in the industry (excluding single establishment enterprises employing less than 4 persons).