

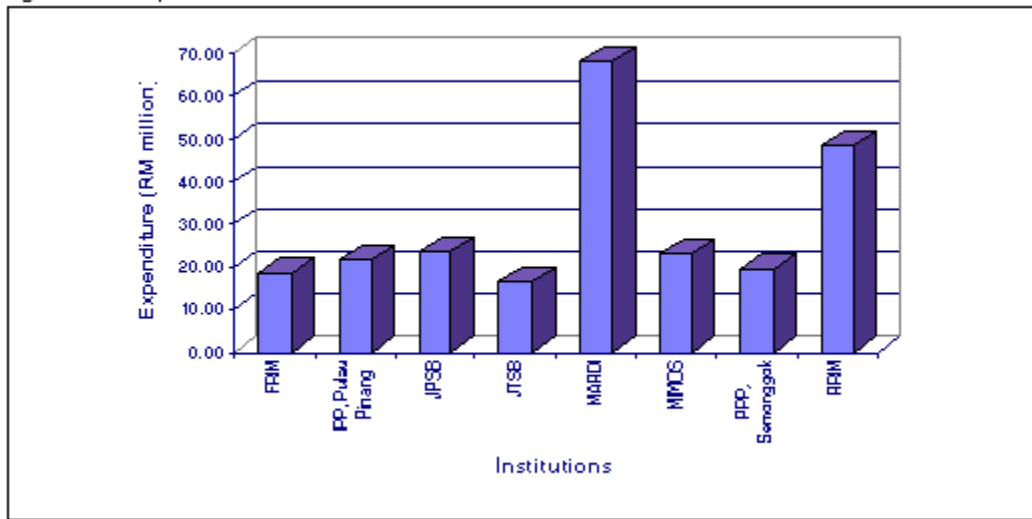
CHAPTER 4 - GOVERNMENT R&D ACTIVITIES

4.1 Government Sector Expenditure on R&D.

Thirty-four government agencies and public research institutions (GRIs) reported intramural R&D expenditure in 1994 as shown by Table 2.1. The total expenditure on R&D by the GRIs was RM164.9 million. This represent a fairly significant reduction from the 1992 GRIs expenditure of RM253.7 million. The most significant reduction occurred in the capital expenditure category which was reduced by nearly RM40 million.

Of the 21 institutes that spent more than RM1 million each in 1994, most were from the primary sector. As in 1992, the two largest spenders on R&D were MARDI and RRIM. Together they contributed 25% of the total government sector expenditure on R&D (See Fig. 4.1).
Fig 4.1 R&D Expenditure of Selected Government Research Institutions
Source : Table 4.1

Fig 4.1 R&D Expenditure of Selected Government Research Institutions



Source: Table 2.1

Table 4.1 Government Sector R&D Expenditure (RM) by Type of Cost

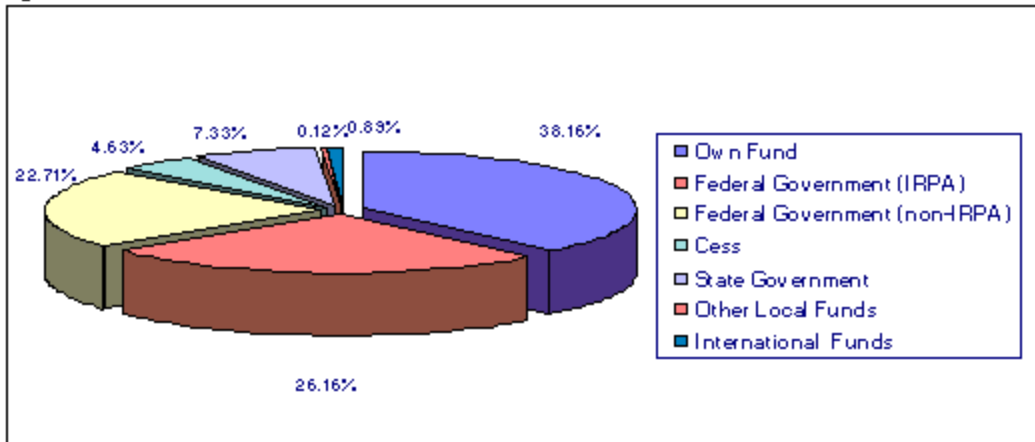
No.	Government Agencies and Research Institutes	Current Expenditure (RM)			Capital Expenditure (RM)			Total (RM)
		Labour Cost	Operating Cost	Total	Land & Building	Machinery & Equip	Total	
1	Agricultural Research Centre of Selangor	4,489,000	4,028,000	8,517,000	886,000	1,613,895	2,463,895	10,986,895
2	Angkutan Zaman Mersing (AZAM) Sarawak	48,000	14,000	62,000	-	-	-	62,000
3	Department of Irrigation and Drainage of Malaysia (DID)	601,483	10,000	611,483	26,900	235,746	262,246	873,729
4	Department of Veterinary Services and Animal Industry Sabah	15,423	73,838	89,261	3,000	11,814	14,814	104,074
5	Department of Wildlife and National Parks (REHILITAM)	744,040	128,300	872,340	10,000	182,800	192,800	1,065,140
6	Fisheries Research Institute, Penang Branch (IFP)	2,761,290	7,045,201	9,806,491	1,039,777	854,413	1,954,190	11,760,681
7	Fisheries Research Institute, Sarawak Branch (JISK)	808,335	243,045	1,057,380	-	313,754	313,754	1,371,134
8	Fisheries Research Institute, Terengganu Branch	722,604	243,000	965,604	-	204,000	204,000	1,169,604
9	Forest Research Institute of Malaysia (FRIM)	5,913,370	2,132,343	8,045,713	47,028	2,269,610	2,316,638	10,421,357
10	Forestry Department of the Malaysian Peninsular (Headquarters)	655,050	440,670	1,095,720	-	35,280	35,280	1,131,000
11	Geological Survey Department of Malaysia (Headquarters)	51,800	5,800	57,600	-	-	-	57,600
12	Institute For Medical Research (IMR)	1,382,700	1,115,377	2,508,678	-	334,230	334,230	2,842,908
13	Malaysian Agricultural Research Institute (MARDI)	24,073,581	8,953,537	33,027,118	161,332	1,816,607	1,977,939	35,005,057
14	Malaysian Archaeological Project	48,600	38,800	87,400	-	-	-	87,400
15	Malaysian Centre for Remote Sensing (MACRES)	35,911	18,752	54,663	-	-	-	54,663
16	Malaysian Cocoa Board (MCEB)	1,689,663	1,757,888	3,447,551	570,176	2,084,146	2,594,322	6,041,873
17	Malaysian Department of Geological Research, Sarawak	478,394	-	478,394	-	-	-	478,394
18	Malaysian Department of Statistics (JPM)	4,451,176	2,768,673	7,219,849	-	8,478,710	8,478,710	15,698,559
19	Malaysian Institute For Microelectronic Systems (MIMOS)	55,200	25,000	80,200	8,400	261,000	269,400	349,600
20	Malaysian Institute For Nuclear Technology Research (MINT)	1,300,866	325,638	1,626,504	203,424	1,263,464	1,466,888	3,093,392
21	Malaysian Meteorological Services (MMS)	10,928,630	242,700	11,171,330	628,530	100,000	728,530	11,900,000
22	Malaysian Ministry of Defence (Mindaf)	80,000	166,000	246,000	30,000	100,000	130,000	376,000
23	Malaysian Ministry of Information	240,000	-	240,000	-	-	-	240,000
24	Miners Research Institute (PEGAM)	315,000	516,000	831,000	-	270,000	270,000	1,101,000
25	National Prawn Fry Production and Research Centre, Kedah (FPF)	563,820	365,301	929,121	-	-	-	929,121
26	Palm Oil Research Institute of Malaysia (PORIM)	166,184	154,583	320,767	-	277,104	277,104	597,871
27	Public Works Institute of Malaysia (IKRAM)	303,090	352,305	655,395	5,000	82,500	87,500	742,895
28	Rubber Research Institute of Malaysia (RRIM)	1,883,331	1,411,463	3,294,794	30,000	441,000	471,000	3,765,794
29	Sabah Agricultural Department (JASB)	88,679	47,309	136,388	-	41,315	41,315	178,303
30	Sabah Fisheries Department (JASB)	12,988,312	3,398,718	16,387,030	587,137	3,007,033	3,594,170	20,000,000
31	Sabah Forest Industries (SFI)	4,537,314	3,370,522	7,907,836	273,651	334,212	607,863	8,515,699
32	Sabah Forestry Department (JPSB)	1,007,018	405,200	1,412,218	51,386	35,250	147,248	1,559,466
33	Standards and Industrial Research Institute of Malaysia (SIRIM)	1,034,378	1,235,315	2,269,693	153,921	1,307,371	1,461,292	3,730,985
34	Veterinary Research Institute (IRI)	553,327	235,368	788,695	221,500	14,800	236,300	1,025,000
Total		85,646,370	47,997,813	133,644,183	5,173,974	26,035,154	31,209,128	164,853,011

The only agency outside the primary sector which spent more than RM10 million was MIMOS which spent RM15.7 million making it the third largest spender in 1994 (in 1992, MIMOS spent only RM0.24 million). However in view of the tremendously high cost of research in the field of microelectronics, in reality the amount was actually still relatively small.

SIRIM, one of the main government agencies involved in industrial research spent RM3.7 million on R&D in 1994. This amount is not significant because it contributed only 2.3% to total expenditure of all the GRIs. As stated in the 1992 report, one of the main possible explanation is that most of SIRIM's activities fall outside the internationally accepted definition of R&D.

Sources of fund obtained by the GRIs can be seen illustrated in Fig. 4.2. Fig. 4.2 Government Sector R&D Sources of Fund Source : Table 4.11

Fig. 4.2 Government Sector R&D Sources of Fund



Source: Table 2.13

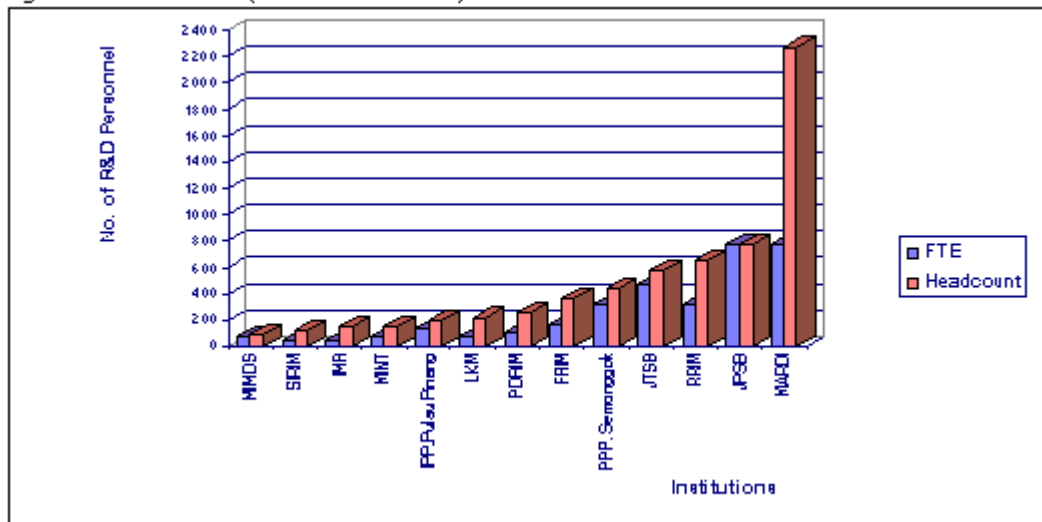
38% of the R&D funds came from the institutions themselves where a large portion of it is actually R&D labour cost.

4.2 Government Sector Human Resources for R&D

Thirty four institutions reported employing R&D personnel in 1994. A total research effort (FTE) of 3,660.5 was reported and this accounted for only 54% of the government sector R&D individuals (where a total of 6,867 personnel (headcount) was reported in 1994). Fig 4.2 R&D Personnel (FTE and Headcount) of Selected Government Research Institutes

Source : Table 4.2 and Table 4.3

Fig 4.2 R&D Personnel (FTE and Headcount) of Selected Government Research Institutes



Source: Tables 2.2 and 2.3

Table 4.2 Government Sector R&D Personnel (FTE) by Category and Nationality

No.	Government Agencies and Research Institutes	Researchers		Technicians		Others		Total	% of Total
		Malaysians	Foreigners	Malaysians	Foreigners	Malaysians	Foreigners		
1	Agricultural Research Centre of Semonggok	24.26	-	7.10	-	266.25	-	317.61	8.7
2	Angkutan Zaman Masang (AZAM) Sarawak	0.64	-	-	-	-	-	0.64	0.0
3	Department of Irrigation and Drainage of Malaysia (DID)	13.10	0.40	5.60	-	1.00	-	20.10	0.5
4	Department of Veterinary Services and Animal Industry Sabah	2.00	-	0.04	-	2.70	-	4.74	0.1
5	Department of Wildlife and National Parks (PERHILITAM)	8.50	1.00	12.00	-	21.00	-	42.50	1.2
6	Fisheries Research Institute, Penang Branch (IFP)	44.63	0.20	16.16	-	75.50	-	136.49	3.7
7	Fisheries Research Institute, Sarawak Branch (JISK)	2.84	-	-	-	12.00	-	14.84	0.4
8	Fisheries Research Institute, Terengganu Branch	3.00	-	0.66	-	0.67	-	4.33	0.1
9	Forest Research Institute of Malaysia (FRIM)	71.05	0.80	28.45	-	67.85	-	168.15	4.6
10	Forestry Department of the Malaysian Peninsular (Headquarters)	2.00	4.00	1.50	-	20.00	-	27.50	0.8
11	Geological Survey Department of Malaysia (Headquarters)	1.11	-	-	-	0.64	-	1.75	0.0
12	Institute For Medical Research (IMR)	34.07	0.50	13.03	-	4.46	-	52.06	1.4
13	Malaysian Agricultural Research Institute (MARDI)	184.20	0.30	184.48	-	400.08	-	769.06	21.0
14	Malaysian Archeological Project	1.16	-	-	-	0.83	-	1.99	0.1
15	Malaysian Centre for Remote Sensing (MACRES)	2.04	-	-	-	-	-	2.04	0.1
16	Malaysian Cocoa Board (MCEB)	20.68	-	16.00	-	37.56	-	74.24	2.0
17	Malaysian Department of Geological Research, Sarawak	2.00	-	-	-	-	-	2.00	0.1
18	Malaysian Department of Statistics (JPM)	56.30	-	3.00	-	2.00	-	61.30	1.8
19	Malaysian Institute for Microelectronic Systems (MIMCS)	0.80	-	-	-	1.60	-	2.40	0.1
20	Malaysian Institute for Nuclear Technology Research (MINT)	40.36	-	12.86	-	23.36	-	77.18	2.1
21	Malaysian Meteorological Services (MMS)	44.00	2.00	11.00	-	721.00	-	778.00	21.2
22	Malaysian Ministry of Defence (Minda)	2.00	-	1.50	-	5.50	-	9.00	0.2
23	Malaysian Ministry of Information	3.00	-	2.00	-	6.00	-	11.00	0.3
24	Mines Research Institute (PEGAMA)	8.30	-	1.30	-	2.30	-	11.90	0.3
25	National Prawn Fry Production and Research Centre, Kedah (PPF)	4.00	-	-	-	30.00	-	34.00	0.9
26	Palm Oil Research Institute of Malaysia (PORIM)	2.68	-	0.20	-	5.85	-	8.73	0.2
27	Public Works Institute of Malaysia (IKRAM)	7.35	-	0.30	-	15.40	-	23.05	0.6
28	Rubber Research Institute of Malaysia (RRIM)	26.39	-	10.85	-	69.36	-	107.20	2.9
29	Sabah Agricultural Department (JASE)	2.53	-	1.13	-	0.60	-	4.25	0.1
30	Sabah Fisheries Department (JSB)	82.54	0.70	40.85	-	195.76	-	319.85	8.7
31	Sabah Forest Industries (SFI)	20.85	-	16.65	-	423.59	-	461.09	12.6
32	Sabah Forestry Department (JPSE)	7.22	0.59	10.00	-	42.08	-	59.89	1.6
33	Standards and Industrial Research Institute of Malaysia (SIRIM)	24.89	1.36	6.38	-	2.84	-	35.67	1.0
34	Veterinary Research Institute (IRH)	2.45	0.20	1.79	-	3.24	-	7.68	0.2
Total		754.72	13.25	411.42	-	2,481.02	-	3,660.41	100.0

Table 4.3 Government Sector R&D Personnel (Headcount) by Nationality

No.	Government Agencies & Research Institutes	Researchers		Technicians		Others		Total	% of Total
		Malaysians	Foreigners	Malaysians	Foreigners	Malaysians	Foreigners		
1	Agricultural Research Centre of Semonggok	71	-	10	-	360	-	441	6.4
2	Angkutan Zaman Masang (AZAM) Sarawak	4	-	-	-	-	-	4	0.1
3	Department of Irrigation and Drainage of Malaysia (DID)	39	2	10	1	10	-	62	0.9
4	Department of Veterinary Services and Animal Industry Sabah	4	-	1	-	7	-	12	0.2
5	Department of Wildlife and National Parks (PERHILITAM)	9	1	12	-	21	-	43	0.6
6	Fisheries Research Institute, Penang Branch (IFP)	63	1	19	-	121	-	204	3.0
7	Fisheries Research Institute, Sarawak Branch (JISK)	7	-	-	-	35	-	43	0.6
8	Fisheries Research Institute, Terengganu Branch	6	-	2	-	4	-	12	0.2
9	Forest Research Institute of Malaysia (FRIM)	155	6	68	-	139	-	368	5.4
10	Forestry Department of the Malaysian Peninsular (Headquarters)	11	5	6	-	40	-	62	0.9
11	Geological Survey Department of Malaysia (Headquarters)	7	-	-	-	3	-	10	0.1
12	Institute For Medical Research (IMR)	89	2	43	-	13	-	147	2.1
13	Malaysian Agricultural Research Institute (MARDI)	778	1	569	-	325	-	2,365	33.1
14	Malaysian Archeological Project	3	-	-	-	1	-	4	0.1
15	Malaysian Centre for Remote Sensing (MACRES)	5	-	-	-	-	-	5	0.1
16	Malaysian Cocoa Board (MCEB)	57	-	37	-	123	-	217	3.2
17	Malaysian Department of Geological Research, Sarawak	2	-	-	-	-	-	2	0.0
18	Malaysian Department of Statistics (JPM)	1	-	-	-	2	-	3	0.0
19	Malaysian Institute for Microelectronic Systems (MIMCS)	78	-	12	-	3	-	93	1.4
20	Malaysian Institute for Nuclear Technology Research (MINT)	75	-	20	-	55	-	150	2.2
21	Malaysian Meteorological Services (MMS)	3	-	2	-	6	-	11	0.2
22	Malaysian Ministry of Defence (Minda)	43	-	6	-	11	-	60	0.9
23	Malaysian Ministry of Information	4	-	-	-	30	-	34	0.5
24	Mines Research Institute (PEGAMA)	7	-	2	-	15	-	24	0.4
25	National Prawn Fry Production and Research Centre, Kedah (PPF)	14	-	1	-	40	-	55	0.8
26	Palm Oil Research Institute of Malaysia (PORIM)	30	-	66	-	100	-	256	3.7
27	Public Works Institute of Malaysia (IKRAM)	4	-	3	-	4	-	11	0.2
28	Rubber Research Institute of Malaysia (RRIM)	137	5	76	-	380	-	688	9.6
29	Sabah Agricultural Department (JASE)	27	-	25	-	528	-	580	8.5
30	Sabah Fisheries Department (JSB)	3	-	3	-	11	-	17	0.2
31	Sabah Forest Industries (SFI)	3	4	10	-	45	-	68	1.0
32	Sabah Forestry Department (JPSE)	44	2	11	-	721	-	778	11.4
33	Standards and Industrial Research Institute of Malaysia (SIRIM)	65	4	23	-	18	-	111	1.6
34	Veterinary Research Institute (IRH)	13	2	3	-	11	-	35	0.5
Total		1,365	35	1,046	1	3,783	-	6,850	100.0

Figure 4.2 illustrates the breakdown of 3,660.5 R&D personnel (FTE) or research effort contributed by the government sector which was made up of 767.9 researchers, 411.5 technicians and 2,1481.0 other support staff.

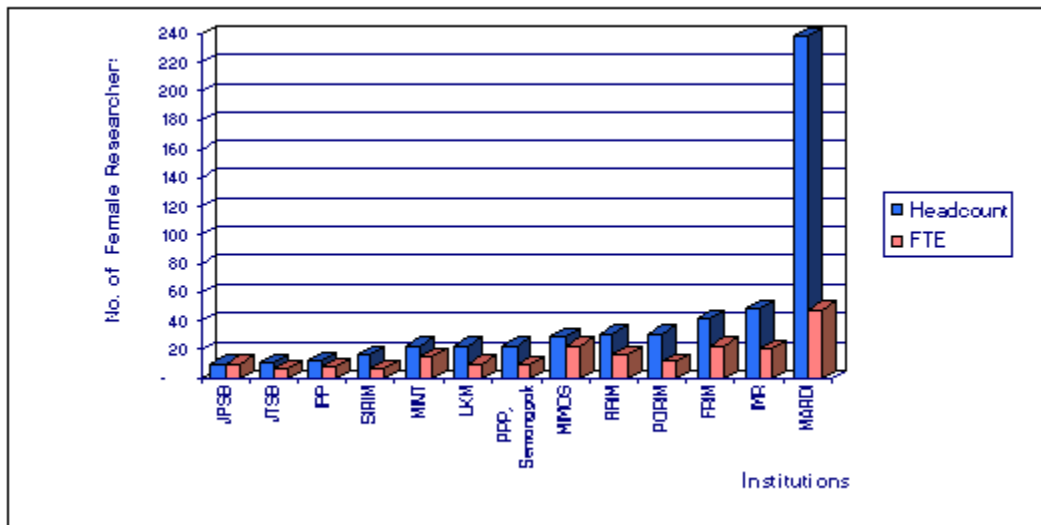
Figure 4.2 also illustrates the distribution of R&D individuals (headcount) across all three categories of research personnel. The biggest employers were MARDI, JPSB, JTSB, Semonggok Agricultural Research Centre and RRIM. The primary industry institutions as a group employ a higher number of R&D support staff. As an example, the ratio of the support staff to researchers was 2.2 as in the case of MARDI but only 0.6 in the case of MIMOS.

Focussing on the R&D researchers (FTE) only, about 21% of their efforts were actually focused into performing R&D activities. The government sector does not seem to be employing many foreign researchers in their R&D institutes (i.e. only 1.7% of total researchers [FTE] in 1994).

Referring to Table 2.5a a total of 2,019 government researchers (99%) held degree qualifications or above. Ph.D. holders constituted 23% of the total. The largest number of Ph.D. holders were from MARDI.

Fig. 4.3 shows that there were only 255 female government researchers (FTE) in Malaysia in 1994. This constitute 30% of total government researchers (FTE). The largest group of female researchers (FTE) worked in MARDI as did the largest group of male researchers (FTE).
 Fig. 4.3 Number of Female Researchers (FTE and headcount) for Selected Government research institutions
 Source : Table 4.4 and Table 4.5

Fig. 4.3 Number of Female Researchers (FTE and headcount) for Selected Government research institutions



Source: Tables 2.4 and 2.5

Table 4.4 Government Sector R & D Personnel (FTE) by Nationality, Category and Gender

No.	Government Agencies and Research Institutes	Malaysians						Foreigners						Total
		Researchers		Technicians		Others		Researchers		Technicians		Others		
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
1	Agricultural Research Centre of Serempong	14.60	3.66	3.20	3.30	263.90	22.35	-	-	-	-	-	-	317.61
2	Angkutan Zaman Melayang(AZAM) Sarawak	0.24	0.40	-	-	-	-	-	-	-	-	-	-	0.64
3	Department of Irrigation and Drainage of Malaysia(DID)	11.30	1.20	3.60	2.00	0.80	0.20	0.40	-	0.10	-	-	-	20.20
4	Department of Veterinary Services and Animal Industry Sabah	2.00	-	0.04	-	2.70	-	-	-	-	-	-	-	4.74
5	Department of Wildlife and National Parks(PEPHILITAN)	4.50	4.00	12.00	-	21.00	-	-	1.00	-	-	-	-	42.50
6	Fisheries Research Institute, Penang Branch (IFP)	36.53	8.10	12.06	4.10	71.10	4.40	0.20	-	-	-	-	-	136.43
7	Fisheries Research Institute, Sarawak Branch (JISK)	2.15	0.69	-	-	10.85	1.15	-	-	-	-	-	-	14.84
8	Fisheries Research Institute, Terengganu Branch	3.00	-	0.33	0.33	0.67	-	-	-	-	-	-	-	4.33
9	Forest Research Institute of Malaysia(FRIM)	48.42	22.63	22.05	6.40	51.10	16.75	0.80	-	-	-	-	-	168.15
10	Forestry Department of the Malaysian Peninsular (Headquarters)	2.00	-	1.50	-	20.00	-	4.00	-	-	-	-	-	27.50
11	Geological Survey Department of Malaysia(Headquarters)	0.88	0.23	-	-	0.47	0.17	-	-	-	-	-	-	1.75
12	Institute For Medical Research(IMR)	13.66	20.41	4.80	8.23	2.96	1.30	0.50	-	-	-	-	-	52.06
13	Malaysian Agricultural Research Institute(MARDI)	136.18	48.02	123.26	55.22	277.55	122.53	0.90	-	-	-	-	-	763.66
14	Malaysian Archaeological Project	0.83	0.33	-	-	-	0.83	-	-	-	-	-	-	1.39
15	Malaysian Centre for Remote Sensing(MACRES)	2.04	-	-	-	-	-	-	-	-	-	-	-	2.04
16	Malaysian Coops Board(MCB)	10.63	10.05	12.00	4.00	17.30	20.26	-	-	-	-	-	-	74.24
17	Malaysian Department of Geological Research, Sarawak	1.00	1.00	-	-	-	-	-	-	-	-	-	-	2.00
18	Malaysian Department of Statistics(JPM)	0.80	-	-	-	1.60	-	-	-	-	-	-	-	2.40
19	Malaysian Institute for Microelectronic Systems (MIMOS)	33.70	22.60	3.60	5.40	-	2.00	-	-	-	-	-	-	67.30
20	Malaysian Institute for Nuclear Technology Research(MINT)	25.75	15.18	8.65	4.18	14.33	8.43	-	-	-	-	-	-	77.18
21	Malaysian Meteorological Services(MMS)	3.00	-	-	2.00	3.00	3.00	-	-	-	-	-	-	11.00
22	Malaysian Ministry of Defence(Mindf)	7.80	0.50	1.20	0.10	2.20	0.10	-	-	-	-	-	-	11.30
23	Malaysian Ministry of Information	1.00	3.00	-	-	16.00	14.00	-	-	-	-	-	-	34.00
24	Mines Research Institute(PEGAMA)	2.55	0.10	0.20	-	4.30	1.55	-	-	-	-	-	-	8.73
25	National Prawn Fry Production and Research Centre, Kedah(FPR)	6.35	1.00	0.30	-	14.30	0.50	-	-	-	-	-	-	23.65
26	Palm Oil Research Institute of Malaysia(PCRIIM)	15.34	11.65	6.30	3.35	45.03	24.27	-	-	-	-	-	-	107.20
27	Public Works Institute of Malaysia(KRAM)	2.53	-	1.13	-	0.40	0.20	-	-	-	-	-	-	4.25
28	Rubber Research Institute of Malaysia(RRIM)	66.11	16.43	34.35	5.30	172.69	23.07	0.45	0.25	-	-	-	-	313.85
29	Sabah Agricultural Department (JASB)	14.00	6.85	11.07	5.58	350.80	72.79	-	-	-	-	-	-	461.03
30	Sabah Fisheries Department (JASB)	1.00	1.00	1.50	-	5.00	0.50	-	-	-	-	-	-	3.00
31	Sabah Forest Industries (SFI)	4.80	2.42	8.00	2.00	41.37	0.71	0.53	-	-	-	-	-	53.83
32	Sabah Forestry Department (FSB)	34.00	10.00	11.00	-	553.00	158.00	2.00	-	-	-	-	-	778.00
33	Standards and Industrial Research Institute of Malaysia(SIRIM)	17.71	7.18	6.58	0.40	1.10	1.74	1.56	0.40	-	-	-	-	36.67
34	Veterinary Research Institute(IRI)	1.81	0.64	0.80	0.39	3.24	-	0.20	-	-	-	-	-	7.68
	Total	523.46	225.26	296.74	114.68	1,973.62	501.40	11.60	1.65	0.10	-	-	-	3,660.51

Table 4.5 Government Sector R & D Personnel (Headcount) by Nationality, Category and Gender

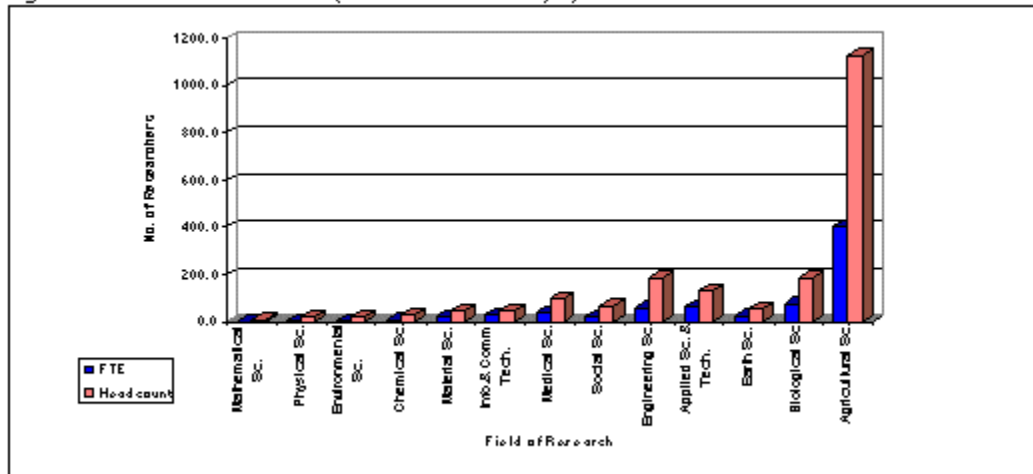
No.	Government and Research Institutes	Malaysians						Foreigners						Total
		Researchers		Technicians		Others		Researchers		Technicians		Others		
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
1	Agricultural Research Centre of Serempong	46	23	5	5	321	39	-	-	-	-	-	-	441
2	Angkutan Zaman Melayang(AZAM) Sarawak	3	1	-	-	-	-	-	-	-	-	-	-	4
3	Department of Irrigation and Drainage of Malaysia(DID)	35	4	8	2	8	2	2	-	1	-	-	-	62
4	Department of Veterinary Services and Animal Industry Sabah	4	-	1	-	7	-	-	-	-	-	-	-	12
5	Department of Wildlife and National Parks(PEPHILITAN)	5	4	12	-	21	-	-	1	-	-	-	-	43
6	Fisheries Research Institute, Penang Branch (IFP)	51	12	14	5	112	3	1	-	-	-	-	-	204
7	Fisheries Research Institute, Sarawak Branch (JISK)	6	1	-	-	34	2	-	-	-	-	-	-	43
8	Fisheries Research Institute, Terengganu Branch	6	-	1	1	4	-	-	-	-	-	-	-	12
9	Forest Research Institute of Malaysia(FRIM)	114	42	54	14	114	25	6	-	-	-	-	-	369
10	Forestry Department of the Malaysian Peninsular (Headquarters)	11	-	6	-	40	-	5	-	-	-	-	-	62
11	Geological Survey Department of Malaysia(Headquarters)	5	2	-	-	2	1	-	-	-	-	-	-	10
12	Institute For Medical Research(IMR)	40	49	21	22	10	3	2	-	-	-	-	-	147
13	Malaysian Agricultural Research Institute(MARDI)	535	233	359	210	684	241	1	-	-	-	-	-	2,269
14	Malaysian Archaeological Project	2	1	-	-	-	1	-	-	-	-	-	-	4
15	Malaysian Centre for Remote Sensing(MACRES)	5	-	-	-	-	-	-	-	-	-	-	-	5
16	Malaysian Coops Board(MCB)	34	23	31	6	55	67	-	-	-	-	-	-	217
17	Malaysian Department of Geological Research, Sarawak	1	1	-	-	-	-	-	-	-	-	-	-	2
18	Malaysian Department of Statistics(JPM)	1	-	-	-	2	-	-	-	-	-	-	-	3
19	Malaysian Institute for Microelectronic Systems (MIMOS)	49	29	5	7	-	3	-	-	-	-	-	-	93
20	Malaysian Institute for Nuclear Technology Research(MINT)	52	23	14	6	42	13	-	-	-	-	-	-	150
21	Malaysian Meteorological Services(MMS)	3	-	-	2	3	3	-	-	-	-	-	-	11
22	Malaysian Ministry of Defence(Mindf)	40	3	5	1	10	1	-	-	-	-	-	-	60
23	Malaysian Ministry of Information	1	3	-	-	16	14	-	-	-	-	-	-	34
24	Mines Research Institute(PEGAMA)	6	1	2	-	3	6	-	-	-	-	-	-	24
25	National Prawn Fry Production and Research Centre, Kedah(FPR)	12	2	1	-	39	1	-	-	-	-	-	-	55
26	Palm Oil Research Institute of Malaysia(PCRIIM)	59	31	46	20	68	32	-	-	-	-	-	-	255
27	Public Works Institute of Malaysia(KRAM)	4	-	3	-	3	1	-	-	-	-	-	-	11
28	Rubber Research Institute of Malaysia(RRIM)	166	31	65	11	319	61	3	2	-	-	-	-	658
29	Sabah Agricultural Department (JASB)	16	11	18	7	434	94	-	-	-	-	-	-	560
30	Sabah Fisheries Department (JASB)	1	2	3	-	10	1	-	-	-	-	-	-	17
31	Sabah Forest Industries(SFI)	6	3	8	2	44	1	4	-	-	-	-	-	63
32	Sabah Forestry Department (FSB)	34	10	11	-	563	158	2	-	-	-	-	-	778
33	Standards and Industrial Research Institute of Malaysia(SIRIM)	45	17	21	2	12	6	2	2	-	-	-	-	111
34	Veterinary Research Institute(IRI)	6	5	5	4	11	-	2	-	-	-	-	-	35
	Total	1,413	572	719	327	2,986	785	30	5	1	-	-	-	6,860

4.3 Government Sector R&D Priorities

Government researchers were overwhelmingly concentrated in the field of Agricultural Sciences (see Fig. 4.4). With about 400 researchers (FTE) this constituted about 51% of total government researchers. The second largest field was Applied Science and Technology which contributes 8.4% of total government researchers. What is more interesting to note is that only 30.7 researchers (FTE) or only 4% of public sector research efforts was in the field of Information, Computer and Communication Technologies despite the government's pronouncements of the sector's importance. However the government's recent efforts to upgrade this field will probably result in a significant rise in the number of researchers in this field in the next few years. Fig. 4.4 Number of Researchers (FTE and Headcount) by Selected Field of Research

Source : Table 4.6 and Table 4.7

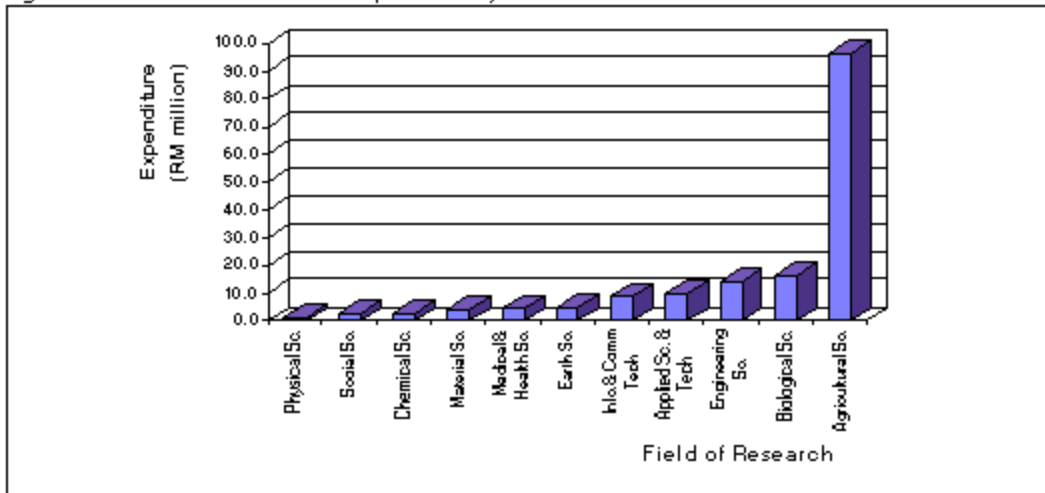
Fig. 4.4 Number of Researchers (FTE and Headcount) by Selected Field of Research



Source: Tables 2.6 and 2.7

In terms of government research institutions' expenditure for R&D, more than half (i.e 58%) was spent in the field of Agricultural Sciences; about 10% was in Biological Sciences and 9% in Engineering Sciences. The field of Applied Sciences and Information and Computer both had almost the same distribution of R&D importance overall (see Fig. 4.5). Fig. 4.5 Government Sector R&D Expenditure by Field of Research Source : Table 4.6

Fig. 4.5 Government Sector R&D Expenditure by Field of Research



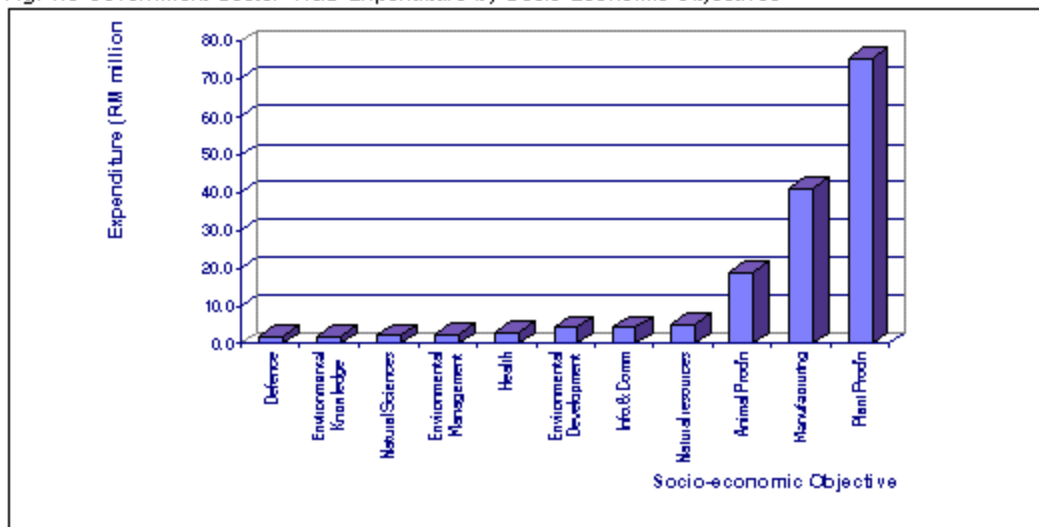
Source: Table 2.6

4.4 Government Sector Socio-Economic Objectives of R&D

Plant Production and Plant Primary Products emerged as the top socio-economic objective of R&D in the public sector contributing 45.9% of all expenditures (see Fig. 4.6). Manufacturing was second (25.0%) followed by Animal Production and animal primary products (11.3%). Together they accounted for approximately 82% of total government research institutions expenditures. Environmental Knowledge and Development (combined) contributed a minor of only 5%; as was Social Science and Humanities (0.7%).

Fig. 4.6 Government Sector R&D Expenditure by Socio-Economic Objectives
Source : Table 4.8

Fig. 4.6 Government Sector R&D Expenditure by Socio-Economic Objectives

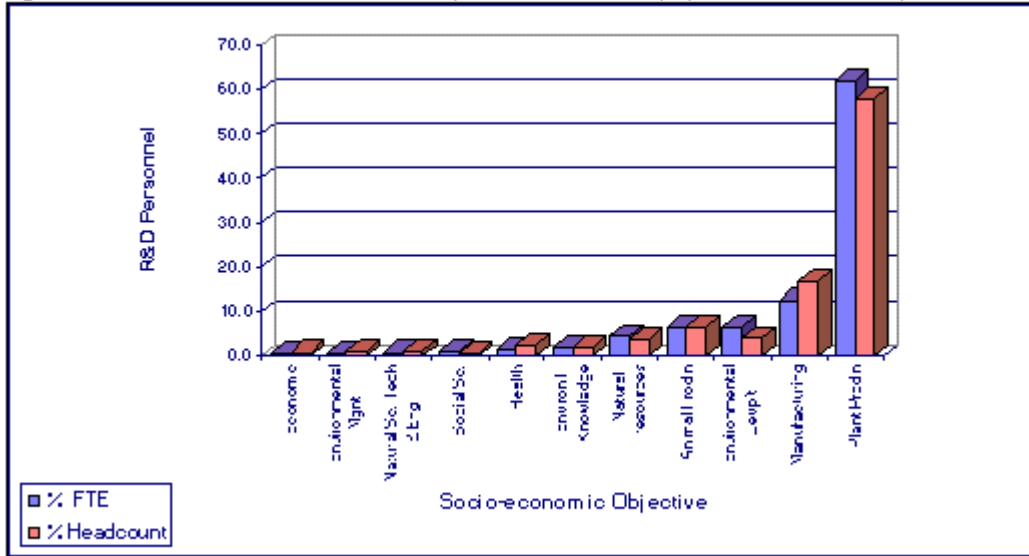


Source: Table 2.8

An almost similar pattern of socio-economic objective's distribution can be seen in terms of R&D personnel (both FTE and headcount) as illustrated in Fig. 4.7. Fig 4.7 Government Sector R&D Personnel (FTE and Headcount) by Socio-economic Objective

Source : Table 4.8 and Table 4.9

Fig 4.7 Government Sector R&D Personnel (FTE and Headcount) by Socio-economic Objective



Source: Tables 2.8 and 2.9

4.5 R&D Labour Cost per Researcher

Table 4.10 shows labour cost per researcher at government research institutions. In general, the government sector spent around RM42,378 per researcher in 994. The highest was Malaysian Department of Geological Research, Sarawak costing at about RM239,000 per researcher, followed closely JPSB at RM237,600 per researcher. Interestingly, cost per researcher at MIMOS which conducts research in the field of microelectronics (a field in which R&D activities are known to be costly) was only RM57,066 per researcher.

Table 4.10 Government Sector R&D Expenditure (RM) Per Researcher

No.	Government Agency & Research Institute	No. of Researcher	Expenditure (RM)					Total Cost per researcher (RM)	Labour Cost per researcher (RM)
			Labour Cost	Operating Cost	Land & Building	Machinery & Equip	* Total		
1	Agricultural Research Centre of Sarawak	71	4,49,000	4,02,000	95,000	1,61,295	10,120,995	142,690	63,225
2	Angkutan Zaman Melayu (AZAM) Sarawak	4	48,000	14,000	-	-	62,000	15,500	12,000
3	Department of Irrigation and Drainage of Malaysia (DID)	4	15,423	73,838	3,000	11,814	1,01,074	25,28.9	3,896
4	Department of Veterinary Service and Animal Industry Sabah	3	80,000	166,000	-	-	346,000	115,333	26,667
5	Department of Wildlife and National Park (PERHILIT AN)	10	744,040	128,900	10,000	-	1,882,940	185,574	74,404
6	Fisheries Research Institute, Penang Branch (FPI)	64	2,761,250	7,045,200	1,099,777	-	10,906,227	166,577	43,145
7	Fisheries Research Institute, Sarawak Branch (ASK)	7	60,235	249,045	-	-	309,280	19,722	115,408
8	Fisheries Research Institute, Terengganu Branch	6	722,604	245,000	-	-	967,604	164,604	120,464
9	Forest Research Institute of Malaysia (FRIM)	162	5,913,370	2,192,949	47,028	-	8,153,347	64,043	36,502
10	Forest Department of the Malayan Peninsula (Headquarters)	15	658,800	440,670	-	-	1,099,470	79,400	43,670
11	Geological Survey Department of Malaya (Headquarters)	7	51,800	5,000	-	-	56,800	8,229	7,400
12	Institute For Medical Research (IMR)	91	1,392,700	1,115,977	-	-	2,508,677	31,241	15,304
13	Malaysian Agricultural Research Institute (MARI)	4	93,579	47,209	-	-	140,788	44,874	22,439
14	Malaysian Archaeological Project	3	48,600	38,800	-	-	87,400	29,133	16,200
15	Malaysian Centre for Remote Sensing (MACRES)	5	35,911	1,152	-	-	37,063	10,603	7,182
16	Malaysian Cocoa Board (MCB)	57	1,689,663	1,371,888	570,176	-	3,631,727	63,785	29,643
17	Malaysian Department of Geological Research, Sarawak	2	478,994	-	-	-	478,994	239,497	239,497
18	Malaysian Department of Statistics (PSM)	42	691,463	10,600	26,500	-	728,563	17,347	14,321
19	Malaysian Institute for Microelectronic System (MIMOS)	78	4,451,176	2,764,673	-	-	7,215,849	92,640	57,864
20	Malaysian Institute for Nuclear Technology Research (MINT)	75	1,908,866	925,686	205,464	-	2,840,016	37,880	25,345
21	Malaysian Meteorological Service (MMS)	3	240,000	-	-	-	240,000	80,000	80,000
22	Malaysian Ministry of Defence (MinDef)	48	315,000	516,000	-	-	831,000	17,313	7,326
23	Malaysian Ministry of Information	4	569,820	345,201	-	-	915,021	229,755	142,485
24	Miner Research Institute (PEGAM)	715	2,409,581	8,953,537	161,932	-	11,325,050	15,840	31,070
25	National Prawn Fry Production and Research Centre, Kudat (NPFRC)	14	309,000	252,205	5,000	-	566,205	40,443	22,078
26	Palm Oil Research Institute of Malaysia (PORIM)	90	1,883,931	1,411,463	30,000	-	3,325,394	37,182	20,903
27	Public Works Institute of Malaysia (IPKRAM)	7	166,194	154,583	-	-	320,777	45,826	23,741
28	Rubber Research Institute of Malaysia (RRIM)	202	12,988,912	9,398,719	597,137	-	22,984,768	113,785	64,302
29	Sabah Agricultural Department (SAB)	27	4,571,214	3,370,522	275,651	-	8,217,387	304,347	168,048
30	Sabah Fisheries Department (SBS)	46	10,925,620	242,700	820,250	-	12,008,570	263,143	227,579
31	Sabah Forest Industries (SFI)	13	1,007,018	405,200	51,998	-	1,464,216	111,632	77,453
32	Sabah Forestry Department (SBS)	1	55,200	26,000	8,400	-	89,600	34,200	55,200
33	Standard and Industrial Research Institute of Malaysia (SIRIM)	70	1,034,378	1,235,319	199,921	-	2,469,618	35,137	14,777
34	Veterinary Research Institute (VRI)	15	552,327	296,368	221,500	-	1,070,195	70,679	36,888
Total		2,020	85,646,370	47,997,913	5,173,974	26,035,154	159,679,017	79,049	42,399

* including land & building expenditure

4.6 R&D Contracted out by Government Sector

It is interesting to note here that only one institution in the government sector, that is the Malaysian Rubber Process Research Association (MRPRA), contracted out its R&D requirements overseas (see Table 4.12) amounting to RM10.4 million in 1994.