

目次

I 海外及び日本の科学技術活動の概要

i 研究費

1. 研究費総額	2
1-1 主要国等の研究費の推移	2
1-1-1 主要国等の研究費の推移 (IMF 為替レート換算)	2
1-1-2 主要国等の研究費の推移 (OECD 購買力平価換算)	3
1-2 主要国等の研究費対国内総生産 (GDP) 比の推移	4
2. 研究費の負担及び使用	5
2-1 主要国等の研究費の負担	5
2-1-1 主要国等の組織別研究費負担割合	5
2-1-2 主要国等の政府負担研究費の推移 (IMF 為替レート換算)	6
2-1-3 主要国等の政府負担研究費の推移 (OECD 購買力平価換算)	7
2-1-4 主要国等の政府負担研究費割合の推移 (国防研究費を含む)	8
2-1-5 主要国等の政府負担研究費割合の推移 (国防研究費を除く)	9
2-1-6 主要国等の政府負担研究費対国内総生産 (GDP) 比の推移	10
2-2 主要国等の研究費の使用	11
2-2-1 主要国等の組織別研究費使用割合	11
2-2-2 主要国等の組織別実質研究費の推移	12
2-3 主要国等の研究費の流れ	14
2-3-1 日本	14
2-3-2 米国	15
2-3-3 ドイツ	16
2-3-4 フランス	17
2-3-5 英国	18
2-3-6 中国	19
2-3-7 韓国	20
2-3-8 ロシア	21
3. 研究者1人当たり研究費	22
3-1 主要国等の研究者1人当たり研究費	22
3-2 日本の研究者1人当たり研究費	23
3-2-1 日本の研究者1人当たり研究費の推移 (組織別)	23
3-2-2 日本の企業の研究者1人当たり研究費 (産業別 (上位5業種))	24
3-2-3 日本の大学等の教員1人当たり研究費 (組織別・学問別 (自然科学系))	25

4. 性格別研究費	26
4-1 主要国等の性格別研究費	26
4-1-1 主要国等の性格別研究費割合	26
4-1-2 主要国等の基礎研究費割合の推移	27
4-2 日本の性格別研究費	28
4-2-1 日本の性格別研究費割合（組織別）	28
4-2-2 日本の性格別研究費割合の推移（組織別）	29
5. 産業別研究費	31
5-1 主要国等の製造業の業種別研究費割合	31
5-2 主要国等の研究費総額（産業）に占めるサービス業の割合の推移	33
6. 日本の組織別研究費	34
6-1 日本の組織別使用研究費の推移	34
6-2 日本の負担源別研究費の推移	35
6-3 日本の企業の研究費の推移（産業別）	36
6-4 日本の非営利団体・公的機関の研究費の推移（組織別）	37
6-5 日本の大学等の研究費の推移	38
6-5-1 日本の大学等の研究費の推移（組織別）	38
6-5-2 日本の大学等の研究費の推移（学問別（自然科学））	39
7. 日本の費目別研究費	40
7-1 日本の費目別研究費の推移	40
7-2 日本の企業の費目別研究費割合（（産業別）主要製造業）	41
7-3 日本の非営利団体・公的機関の費目別研究費割合（組織別）	42
7-4 日本の大学等の費目別研究費割合（組織別・学問別（自然科学系））	43
8. 主要国等の科学技術関係予算の推移	44
ii 研究人材	
9. 研究者数	46
9-1 主要国等の研究者数の推移	46
9-2 主要国等の人口及び労働力人口1万人当たりの研究者数の推移	47
9-2-1 主要国等の人口1万人当たりの研究者数	47
9-2-2 主要国等の労働力人口1万人当たりの研究者数	48
9-3 主要国等の研究者数の組織別割合	49
9-4 日本の研究者数の推移（組織別）	50
9-5 日本の女性研究者数と研究者総数に占める女性研究者数の割合の推移 （実数）	51
9-6 日本の博士号保有研究者数（組織別）と研究者総数に占める 博士号保有者割合の推移（実数）	52
9-7 日本の企業の研究者数	53

9-7-1	日本の企業の産業別研究者数割合	53
9-7-2	日本の企業の専門別研究者数割合	54
9-7-3	日本の企業における従業者1万人当たりの研究者数 (産業別(上位5業種))	55
9-8	日本の非営利団体・公的機関の研究者数	56
9-8-1	日本の非営利団体・公的機関の研究者数の推移(組織別)	56
9-8-2	日本の非営利団体・公的機関の専門別研究者数割合 (組織別)(実数)	57
9-9	日本の大学等の研究者数	58
9-9-1	日本の大学等の研究者数の推移(組織別)	58
9-9-2	日本の大学等の専門別研究本務者数の推移	59
9-9-3	日本の大学等の専門別研究本務者数の推移(自然科学)	60
9-9-4	日本の大学等の職種別研究本務者数割合(組織別)	61
9-9-5	日本の大学等の学問別研究本務者数割合(自然科学)	62
10.	研究関係従業者数	63
10-1	主要国等の研究者1人当たりの研究支援者数	63
10-2	日本の研究関係従業者数の推移	64
10-3	日本の研究者1人当たりの研究支援者数の推移(組織別)	65
10-4	日本の研究関係従業者数割合(組織別)	66
11.	研究人材の輩出と雇用	67
11-1	研究人材の輩出	67
11-1-1	主要国の学部・大学院に在籍する全学生数に占める 大学院学生数割合	67
11-1-2	主要国の学位取得者数(自然科学系)(全体(大学院段階))	68
11-1-3	主要国の学位取得者数(自然科学系)(博士)	69
11-1-4	日本の学位取得者数の推移(自然科学系)(修士)	70
11-1-5	日本の学位取得者数の推移(自然科学系)(博士)	71
11-2	研究人材の雇用	72
11-2-1	日本の大学の学位別進路動向(大学卒業時)	72
11-2-2	日本の大学の学位別進路動向(修士課程修了時)	73
11-2-3	日本の大学の学位別進路動向(博士課程修了時)	74
11-2-4	日本の主要産業における専門別採用状況	75
11-2-5	日本の主要産業における学位別採用状況	76
iii	研究成果	
12.	論文	78
12-1	論文数シェアと被引用数シェア	78
12-1-1	主要国等の論文数シェアと被引用数シェアの推移(単年)	78

12-1-2 主要国等の論文数シェアと被引用数シェアの推移（5年累積）	79
12-2 論文の相対被引用度	80
12-2-1 主要国等の論文の相対被引用度の推移	80
12-2-2 日本の分野別相対被引用度	81
12-3 分野別論文数	82
12-3-1 主要国等の分野別論文数割合	82
12-3-2 日本の分野別論文数シェア	83
12-4 日本の分野別論文相対比較優位の推移	84
13. 特許	85
13-1 主要国等の特許出願・登録動向	85
13-1-1 主要国等の特許出願件数の推移	85
13-1-2 主要国等の特許登録件数の推移	86
13-2 日本人の外国への特許出願・登録件数	87
13-2-1 日本人の外国への特許出願件数の推移	87
13-2-2 日本人の外国での特許登録件数の推移	88
13-3 日本における特許出願・登録動向	89
13-3-1 日本における特許出願件数の推移	89
13-3-2 日本における特許登録件数の推移	90
13-4 日本での外国人による特許出願・登録件数	91
13-4-1 日本での外国人による特許出願件数の推移	91
13-4-2 日本での外国人による特許登録件数の推移	92
14. 技術貿易	93
14-1 主要国における技術貿易額の推移	93
14-2 主要国における技術貿易収支比の推移	94
14-3 日本と各国（地域）との技術貿易動向	95
14-3-1 日本と主要国との技術貿易収支比の推移	95
14-3-2 日本の技術貿易における国（地域）別構成比	96
14-3-3 日本の地域別技術貿易額	97
14-4 日本の産業別技術貿易動向	98
14-4-1 日本の主要産業別技術貿易額の推移	98
14-4-2 日本の主要産業別技術貿易収支比の推移	99
15. ハイテク産業	100
15-1 主要国等のハイテク産業の輸出額占有率動向	100
15-1-1 主要国等におけるハイテク産業輸出額国別占有率の推移	100
15-1-2 主要国等におけるハイテク産業別輸出額占有率	101
15-2 日本の全製造業・ハイテク産業の輸出入額の推移	102
15-3 主要国等のハイテク産業貿易収支比の推移	103
15-4 日本のハイテク産業の産業別貿易収支	104

II 日本の科学技術

16. 総括	106
16-1 研究費等の推移	106
16-2 組織別研究実施機関数の推移	108
16-3 組織別研究費の推移	110
16-4 負担源別研究費の推移	112
16-5 性格別研究費の推移	114
16-6 費目別研究費の推移	116
16-7 特定目的別研究費の推移	118
16-8 研究関係従業者数の推移	120
16-9 組織別研究者数の推移	122
16-10 学問・専門・組織別研究者数（実数）	124
16-11 組織別研究者1人当たりの研究費の推移	125
16-12 学位授与数	126
16-13 学生数及び卒業生数	127
16-13-1 大学	127
16-13-2 大学院修士課程・博士課程	127
16-14 卒業生の進路	128
16-14-1 大学卒業生	128
16-14-2 大学院修了者	129
16-15 技術士	130
16-15-1 技術士の第二次試験合格者及び登録者数の推移（技術士）	130
16-15-2 技術士の第一次試験合格者及び登録者数の推移（技術士補）	131
17. 企業	132
17-1 産業・資本金規模別研究費	132
17-2 産業・資本金規模・性格別研究費	134
17-3 産業・資本金規模・費目別研究費	136
17-4 産業別研究費の対売上高比率	138
17-5 産業・資本金規模別研究関係従業者数	139
17-6 産業・資本金規模別研究者数の推移	140
17-7 産業・学問別研究者数（実数）	141
18. 非営利団体・公的機関	143
18-1 組織・学問別研究費の推移	143
18-2 組織・学問・費目別研究費	144
18-3 組織・学問別研究関係従業者数	146
18-4 組織・学問別研究者数の推移	147
18-5 組織・学問別研究者数（実数）	148
19. 大学等	151

19-1 組織・学問別研究費の推移	151
19-2 組織・学問・費目別研究費	152
19-3 組織・学問別研究関係従業者数	154
19-4 組織・学問別研究者数の推移	155
19-5 組織・学問・職種別研究者数	156
19-6 組織・学問別研究者数（実数）	157
20. 技術貿易	158
20-1 技術貿易額の推移	158
20-2 産業別技術貿易額の推移	160
20-2-1 対価受取額	160
20-2-2 対価支払額	162
20-3 地域別・国別技術貿易額の推移	164
20-3-1 対価受取額	164
20-3-2 対価支払額	166
20-4 産業・地域別技術貿易額	168
20-5 日本の主要業種における技術貿易の国（地域）別収支	170
21. 特許	172
21-1 日本人・外国人別特許件数の推移	172
21-1-1 出願	172
21-1-2 登録	173
21-2 部門別特許件数の推移	174
21-2-1 出願	174
21-2-2 登録	174
21-3 日本における国籍別特許件数の推移	176
21-3-1 出願	176
21-3-2 登録	176
21-4 日本人の外国への特許件数の推移	178
21-4-1 出願	178
21-4-2 登録	179
21-5 日本人の外国・自国別特許件数の推移	180
21-5-1 出願	180
21-5-2 登録	180
22. 産学連携	181
22-1 国立大学等と民間等との共同研究実施件数の推移	181
23. 国際交流	182
23-1 地域別交流者数（派遣）	182
23-2 地域別交流者数（受入）	182
23-3 国別（上位10か国）交流者数（派遣）	183

23-4 国別（上位10か国）交流者数（受入）	183
23-5 研究者交流の推移	184
24. 科学技術関係経費	185
24-1 科学技術関係経費の推移	185
24-1-1 項目別	185
24-1-2 府省庁別	186
24-1-3 組織別	187
24-2 政府関係試験研究機関等における科学技術関係経費の推移	188
24-3 宇宙関係予算の推移	190
24-4 原子力関係予算の推移	191
24-5 海洋科学技術関連経費の推移	192
24-6 地震調査研究関係予算の推移	193
24-7 競争的資金	194
25. 科学技術行政機構図	196
Ⅲ 各国の科学技術	
26. 各国の科学技術の概要	202
26-1 米国	202
26-1-1 米国 総括	202
26-1-2 米国 組織別研究費の推移	204
26-1-3 米国 負担源別研究費割合の推移	205
26-1-4 米国 性格別研究費の推移	206
26-1-5 米国 組織別研究者数の推移	207
26-1-6 米国 科学技術行政機構図	208
26-2 欧州連合	214
26-2-1 欧州連合（EU-15）総括	214
26-2-2 欧州連合（EU-28）総括	216
26-2-3 欧州連合 組織別研究費の推移	218
26-2-4 欧州連合 負担源別研究費割合の推移	219
26-2-5 欧州連合 組織別研究者数の推移	220
26-2-6 欧州連合 科学技術行政機構図	222
26-3 ドイツ	224
26-3-1 ドイツ 総括	224
26-3-2 ドイツ 組織別研究費の推移	226
26-3-3 ドイツ 負担源別研究費割合の推移	227
26-3-4 ドイツ 性格別研究費の推移	228
26-3-5 ドイツ 組織別研究者数の推移	229
26-3-6 ドイツ 科学技術行政機構図	230

26-4 フランス	232
26-4-1 フランス 総括	232
26-4-2 フランス 組織別研究費の推移	234
26-4-3 フランス 負担源別研究費割合の推移	235
26-4-4 フランス 性格別研究費の推移	236
26-4-5 フランス 組織別研究者数の推移	237
26-4-6 フランス 科学技術行政機構図	238
26-5 英国	240
26-5-1 英国 総括	240
26-5-2 英国 組織別研究費の推移	242
26-5-3 英国 負担源別研究費割合の推移	243
26-5-4 英国 性格別研究費の推移	244
26-5-5 英国 組織別研究者数の推移	245
26-5-6 英国 科学技術行政機構図	246
26-6 中国	248
26-6-1 中国 総括	248
26-6-2 中国 組織別研究費の推移	250
26-6-3 中国 負担源別研究費割合の推移	251
26-6-4 中国 性格別研究費の推移	252
26-6-5 中国 組織別研究者数の推移	253
26-6-6 中国 科学技術行政機構図	254
26-7 韓国	256
26-7-1 韓国 総括	256
26-7-2 韓国 組織別研究費の推移	258
26-7-3 韓国 負担源別研究費割合の推移	259
26-7-4 韓国 性格別研究費の推移	260
26-7-5 韓国 組織別研究者数の推移	261
26-7-6 韓国 科学技術行政機構図	262
26-8 ロシア	264
26-8-1 ロシア 総括	264
26-8-2 ロシア 組織別研究費の推移	266
26-8-3 ロシア 負担源別研究費割合の推移	267
26-8-4 ロシア 性格別研究費の推移	268
26-8-5 ロシア 組織別研究者数の推移	269
26-8-6 ロシア 科学技術行政機構図	270
26-9 カナダ	271
26-9-1 カナダ 組織別研究費の推移	271
26-9-2 カナダ 負担源別研究費割合の推移	272

26-9-3 カナダ 組織別研究者数の推移	273
26-9-4 カナダ 科学技術行政機構図	274
26-10 その他の国/地域	276
27. 科学技術関係予算	282
28. 研究費	284
28-1 組織別研究費の推移	284
28-2 性格別研究費割合	286
29. 研究人材	288
29-1 組織別研究者数の推移	288
29-2 研究関係従業者数	290
29-3 専攻分野別学位取得者数の推移	291
30. ノーベル賞及びフィールズ賞の各国別受賞者数	292
31. 技術貿易額	294
32. 特許	296
32-1 特許件数の推移	296
32-1-1 出願	296
32-1-2 登録	297
32-2 国籍別特許件数	298
32-2-1 出願	298
32-2-2 登録	299

附属資料

33. 日本の財政	302
33-1 一般会計、特別会計、政府関係機関及び財政投融资の推移	302
33-2 一般会計歳出予算の推移	302
34. 日本の研究費デフレータ	304
35. 主要国等のGDP（国内総生産）デフレータ	306
36. 主要国等の通貨の円換算率	307
36-1 IMF 為替レート	307
36-2 購買力平価による円換算率	308

CONTENTS

I	Current status of S&T in Japan and other selected countries	
i	R&D expenditures	
1.	Total R&D expenditures	2
1-1	Trends in R&D expenditures in selected countries	2
1-1-1	Trends in R&D expenditures in selected countries (IMF exchange rate conversion)	2
1-1-2	Trends in R&D expenditures in selected countries (OECD purchasing power parity conversion)	3
1-2	Trends in R&D expenditures as a percentage of GDP in selected countries	4
2.	R&D expenditures by source of funds and sector of performance	5
2-1	R&D expenditures by source of funds in selected countries	5
2-1-1	Composition of R&D expenditures by source of funds in selected countries	5
2-1-2	Trends in government-financed R&D expenditures in selected countries (IMF exchange rate conversion)	6
2-1-3	Trends in government-financed R&D expenditures in selected countries (OECD purchasing power parity conversion)	7
2-1-4	Trends in government-financed R&D expenditures in selected countries - Percentage of R&D expenditures financed by government	8
2-1-5	Trends in government-financed R&D expenditures in selected countries - Percentage of R&D expenditures financed by government exclusive of defence R&D budget	9
2-1-6	Trends in government-financed R&D expenditures as a percentage of GDP in selected countries	10
2-2	R&D expenditures by sector of performance in selected countries	11
2-2-1	Composition of R&D expenditures by sector of performance in selected countries	11
2-2-2	R&D expenditures growth (in real terms) by sector of performance in selected countries	12
2-3	R&D expense flows in selected countries	14
2-3-1	Japan	14

2-3-2	United States	15
2-3-3	Germany	16
2-3-4	France	17
2-3-5	United Kingdom	18
2-3-6	China	19
2-3-7	Rep. of Korea	20
2-3-8	Russian Federation	21
3.	R&D expenditures per researcher	22
3-1	R&D expenditures per researcher in selected countries	22
3-2	R&D expenditures per researcher in Japan	23
3-2-1	Trends in R&D expenditures per researcher by research sector in Japan	23
3-2-2	R&D expenditures per researcher by industry (top five industrial categories) in Japan	24
3-2-3	R&D expenditures per teacher at universities and colleges by kind of organization and field of science (natural sciences and engineering only) in Japan	25
4.	R&D expenditures by type of activity	26
4-1	R&D expenditures by type of activity in selected countries	26
4-1-1	Composition of R&D expenditures by type of activity in selected countries	26
4-1-2	Trends in the percentage of basic research expenditures in selected countries	27
4-2	R&D expenditures by type of activity in Japan	28
4-2-1	Composition of R&D expenditures by research sector and type of activity in Japan	28
4-2-2	Trends in the composition of R&D expenditures by research sector and type of activity in Japan	29
5.	R&D expenditures by industry	31
5-1	Composition of manufacturing industry research expenditures by industry in selected countries	31
5-2	Trends in the percentage of business enterprise expenditure on R&D performed in service industries	33
6.	R&D expenditures by research sector in Japan	34
6-1	Trends in R&D expenditures by sector of performance in Japan	34
6-2	Trends in R&D expenditures by source of funds in Japan	35
6-3	Trends in business enterprise expenditure on R&D by industry in Japan	36

6-4	Trends in non-profit institutions and public organizations expenditure on R&D by research sector in Japan	37
6-5	Trends in universities and colleges expenditure on R&D in Japan	38
6-5-1	Trends in universities and colleges expenditure on R&D by kind of organization in Japan	38
6-5-2	Trends in universities and colleges expenditure on R&D by field of science (natural sciences and engineering only) in Japan	39
7.	R&D expenditures by sector of type of cost in Japan	40
7-1	Trends in R&D expenditures by sector of type of cost in Japan	40
7-2	Composition of business enterprise expenditure on R&D by industry (major industries) and sector of type of cost in Japan	41
7-3	Composition of non-profit institutions and public organizations expenditure on R&D by sector of type of cost and research sector in Japan	42
7-4	Composition of universities and colleges expenditure on R&D by kind of organization, field of science (natural sciences and engineering only) and sector of type of cost in Japan	43
8.	Trends in S&T budget in selected countries	44
ii	R&D personnel	
9.	Researchers	46
9-1	Trends in the number of researchers in selected countries	46
9-2	Trends in the number of researchers per 10,000 people and per 10,000 labour force in selected countries	47
9-2-1	Trends in the number of researchers per 10,000 people in selected countries	47
9-2-2	Trends in the number of researchers per 10,000 labour force in selected countries	48
9-3	Composition of the number of researchers by research sector in selected countries	49
9-4	Trends in the number of researchers by research sector in Japan	50
9-5	Trends in the number of female researchers and female researchers as a percentage of total researchers in Japan (head-counts)	51

9-6	Trends in the number of doctoral researchers by kind of organization and doctoral researchers as a percentage of total researchers in Japan (head-counts)	52
9-7	Business enterprise researchers in Japan	53
9-7-1	Composition of the number of business enterprises researchers by industry in Japan	53
9-7-2	Composition of the number of business enterprises researchers by field of science and specialty in Japan	54
9-7-3	Number of business enterprises researchers per 10,000 employees by industry (top five industrial categories) in Japan	55
9-8	Non-profit institutions and public organizations researchers in Japan	56
9-8-1	Trends in the number of non-profit institutions and public organizations researchers by kind of organization in Japan	56
9-8-2	Composition of the number of non-profit institutions and public organizations researchers by kind of organization and field of science in Japan (head-counts)	57
9-9	Universities and colleges researchers in Japan	58
9-9-1	Trends in the numbers of universities and colleges researchers by kind of organization	58
9-9-2	Trends in the number of regular researchers at universities and colleges by field of science	59
9-9-3	Trends in the number of regular researchers at universities and colleges by field of specialty (Natural sciences and engineering only)	60
9-9-4	Composition of regular researchers at universities and colleges by kind of organization and kind of occupation in Japan	61
9-9-5	Composition of regular researchers in natural sciences and engineering at universities and colleges by kind of occupation and field of specialty in Japan	62
10.	Persons employed in R&D	63
10-1	Number of research assistants per researcher in selected countries	63
10-2	Trends in the number of Persons employed in R&D by kind of occupation in Japan	64

10-3 Trends in the number of research assistants per researcher by research sector in Japan	65
10-4 Composition of the number of Persons employed in R&D by research sector, kind of organization and kind of occupation in Japan	66
11. Production and employment of R&D personnel	67
11-1 Production of R&D personnel	67
11-1-1 Graduate students as a percentage of total students in selected countries	67
11-1-2 Number of awarded degrees by field of science in selected countries (Natural sciences and engineering) (Master's and doctoral degrees)	68
11-1-3 Number of awarded degrees by field of science in selected countries (Natural sciences and engineering) (Doctoral degrees)	69
11-1-4 Trends in the number of awarded degrees by field of science in Japan (Natural sciences and engineering) (Master's degrees)	70
11-1-5 Trends in the number of awarded degrees by field of science in Japan (Natural sciences and engineering) (Doctoral degrees)	71
11-2 Employment of R&D personnel	72
11-2-1 Composition of the number of graduates by field of study and career choice in Japan (Upon completion of bachelor's degree)	72
11-2-2 Composition of the number of graduates by field of study and career choice in Japan (Upon completion of master's degree)	73
11-2-3 Composition of the number of graduates by field of study and career choice in Japan (Upon completion of doctoral degree)	74
11-2-4 Employment situation in major industries by field of science in Japan	75
11-2-5 Employment situation in major industries by academic degree in Japan	76
iii R&D performance	
12. Scientific papers	78

12-1 Trends in production share and citation share in selected countries	78
12-1-1 Trends in production share and citation share in selected countries (1 year period)	78
12-1-2 Trends in production share and citation share in selected countries (5 year overlapping period)	79
12-2 Relative citation impact for scientific papers	80
12-2-1 Trends in the relative citation impact for scientific papers in selected countries	80
12-2-2 Relative citation impact by research field in Japan	81
12-3 Number of scientific papers by research field	82
12-3-1 Composition of the number of scientific papers by research field in selected countries	82
12-3-2 Japan's share of scientific papers by research field	83
12-4 Trends in relative comparative advantage of scientific papers by research field in Japan	84
13. Patents	85
13-1 Patent applications and grants by country of origin	85
13-1-1 Trends in number of patent applications by country of origin	85
13-1-2 Trends in number of patent grants by country of origin	86
13-2 Number of Japanese-oriented overseas patent applications and grants	87
13-2-1 Trends in number of Japanese-oriented overseas patent applications	87
13-2-2 Trends in number of Japanese-oriented overseas patent grants	88
13-3 Patent applications and grants at the Japan Patent Office	89
13-3-1 Trends in number of patent applications at the Japan Patent Office	89
13-3-2 Trends in number of patent grants at the Japan Patent Office	90
13-4 Number of foreign-oriented patent applications and grants at the Japan Patent Office	91
13-4-1 Trends in number of foreign-oriented patent applications at the Japan Patent Office	91
13-4-2 Trends in number of foreign-oriented patent grants at the Japan Patent Office	92

14. Technology Trade	93
14-1 Trends in technology trade value in selected countries	93
14-2 Trends in technology trade balance in selected countries	94
14-3 Technology trade of Japan with selected countries/regions	95
14-3-1 Trends in Japan's Technology trade balance with selected countries	95
14-3-2 Ratio of Japan's technology trade vis-à-vis selected countries/ regions	96
14-3-3 Japan's technology trade value flows by geographic area	97
14-4 Technology trade by industry sector in Japan	98
14-4-1 Technology trade value in Japan's major industrial sectors	98
14-4-2 Trends in technology trade balance in Japan's major industrial sectors	99
15. High-Tech industries	100
15-1 Export market shares for high-tech products in selected countries	100
15-1-1 Export market shares for high-tech products by country in selected countries	100
15-1-2 Share of high-tech products by country manufactured in selected countries	101
15-2 Trends in imports and exports, by value, for Japan's general manufacturing industry, and the high-tech industry	102
15-3 Trends in high-tech balance of payment ratios for selected countries	103
15-4 Balance of payments for Japan's high-tech trade by industry	104
II Indicators of S&T in Japan	
16. Summary	106
16-1 R&D expenditures and the number of researchers	106
16-2 Number of R&D performing institutions by research sector and kind of organization	108
16-3 R&D expenditures by research sector and kind of organization ..	110
16-4 R&D expenditures by source of funds	112
16-5 R&D expenditures by type of activity (Natural sciences and engineering only)	114
16-6 R&D expenditures by sector of type of cost	116

16-7 R&D expenditures by selected objective	118
16-8 Number of R&D personnel by kind of occupation	120
16-9 Number of researchers by research sector and kind of organization	122
16-10 Number of researchers by research sector, field of science and specialty (head-counts)	124
16-11 R&D expenditures per researcher by research sector	125
16-12 Number of degrees granted	126
16-13 Number of students enrolled and graduates	127
16-13-1 Number of students enrolled and graduates of universities and colleges	127
16-13-2 Number of students enrolled and graduates of graduate schools	127
16-14 Destination of graduates	128
16-14-1 Number of graduates of universities and colleges by field of study and industry	128
16-14-2 Number of graduates of graduate schools by field of study and industry	129
16-15 Professional engineer	130
16-15-1 Number of passed registered professional engineer	130
16-15-2 Number of passed registered of associate professional engineer	131
17. Business enterprises	132
17-1 R&D expenditures by size of capital and industry	132
17-2 R&D expenditures by type of activity, size of capital and industry	134
17-3 R&D expenditures by sector of type of cost, size of capital and industry	136
17-4 Ratio of R&D expenditures to net sales by industry	138
17-5 Number of R&D personnel by kind of occupation, size of capital and industry	139
17-6 Number of researchers by size of capital and industry	140
17-7 Number of researchers by field of science and industry (head-counts)	141
18. Non-profit institutions and public organizations	143

18-1 R&D expenditures by kind of organization and field of science ..	143
18-2 R&D expenditures by sector of type of cost, kind of organization and field of science	144
18-3 Number of R&D personnel by kind of occupation, kind of organization and field of science	146
18-4 Number of researchers by kind of organization and field of science	147
18-5 Number of researchers by kind of organization and field of science (head-counts)	148
19. Universities and colleges	151
19-1 R&D expenditures by kind of organization and field of science ..	151
19-2 R&D expenditures by sector of type of cost, kind of organization and field of science	152
19-3 Number of R&D personnel by kind of occupation, kind of organization and field of science	154
19-4 Number of regular researchers by kind of organization and field of science	155
19-5 Number of regular researchers by kind of occupation, kind of organization and field of science	156
19-6 Number of regular researchers by field of science and kind of Organization (head-counts)	157
20. Technology trade	158
20-1 Technology trade value	158
20-2 Technology trade value by industry	160
20-2-1 Technology receipts by industry	160
20-2-2 Technology payments by industry	162
20-3 Technology trade value by country and geographic area	164
20-3-1 Technology receipts by country and geographic area	164
20-3-2 Technology payments by country and geographic area	166
20-4 Technology trade value by geographic area and industry	168
20-5 Technology trade balance in Japan's major industrial sectors by country and region	170
21. Patents	172
21-1 Number of patent applications and grants by Japanese and foreign nationals	172
21-1-1 Patent applications	172
21-1-2 Patent grants	173

21-2 Number of patents by field	174
21-2-1 Patent applications	174
21-2-2 Patent grants	174
21-3 Number of patents in Japan by applicants' nationality	176
21-3-1 Patent applications	176
21-3-2 Patent grants	176
21-4 Number of Japanese-oriented overseas patents	178
21-4-1 Patent applications	178
21-4-2 Patent grants	179
21-5 Number of overseas and Japanese patents by Japanese applicants	180
21-5-1 Patent applications	180
21-5-2 Patent grants	180
22. Industry-academy cooperation	181
22-1 Trend in the number of joint research projects between national universities and the private sector	181
23. International researchers exchange	182
23-1 Number of Japanese researchers dispatched abroad by geographic area	182
23-2 Number of foreign researchers invited to Japan by geographic area	182
23-3 Number of Japanese researchers dispatched abroad by top 10 countries	183
23-4 Number of foreign researchers invited to Japan by top 10 countries	183
23-5 Progress of researchers exchange	184
24. S&T budget	185
24-1 Budget appropriations for S&T	185
24-1-1 Budget appropriations for S&T by item	185
24-1-2 Budget appropriations for S&T by ministry and agency	186
24-1-3 Budget appropriations for S&T by kind of organization	187
24-2 Budget appropriations for government research institutes	188
24-3 Budget appropriations for space development by ministry/ agency	190
24-4 Budget appropriations for nuclear development by ministry/ agency	191
24-5 Budget appropriations for ocean development by ministry/ agency	192

24-6 Budget appropriations for earthquake research by ministry/ agency	193
24-7 Competitive funding by ministry/agency	194
25. S&T administrative organization charts	196

III Indicators of S&T in selected countries

26. Outline of R&D activities in selected countries	202
26-1 United States	202
26-1-1 United States summary	202
26-1-2 R&D expenditures by performance sector in the US	204
26-1-3 R&D expenditures by source of funds in the US	205
26-1-4 R&D expenditures by type of activity in the US	206
26-1-5 Number of researchers by research sector in the US	207
26-1-6 S&T administrative organizational charts in the US	208
26-2 European Union	214
26-2-1 EU-15 summary	214
26-2-2 EU-28 summary	216
26-2-3 R&D expenditures by performance sector in EU	218
26-2-4 R&D expenditures by source of funds in EU	219
26-2-5 Number of researchers by research sector in EU	220
26-2-6 S&T administrative organizational charts in EU	222
26-3 Germany	224
26-3-1 Germany summary	224
26-3-2 R&D expenditures by performance sector in Germany	226
26-3-3 R&D expenditures by source of funds in Germany	227
26-3-4 R&D expenditures by type of activity in Germany	228
26-3-5 Number of researchers by research sector in Germany	229
26-3-6 S&T administrative organizational charts in Germany	230
26-4 France	232
26-4-1 France summary	232
26-4-2 R&D expenditures by performance sector in France	234
26-4-3 R&D expenditures by source of funds in France	235
26-4-4 R&D expenditures by type of activity in France	236
26-4-5 Number of researchers by research sector in France	237
26-4-6 S&T administrative organizational charts in France	238
26-5 United Kingdom	240
26-5-1 United Kingdom summary	240
26-5-2 R&D expenditures by performance sector in the UK	242

26-5-3 R&D expenditures by source of funds in the UK	243
26-5-4 R&D expenditures by type of activity in the UK	244
26-5-5 Number of researchers by research sector in the UK	245
26-5-6 S&T administrative organizational charts in the UK	246
26-6 China	248
26-6-1 China summary	248
26-6-2 R&D expenditures by performance sector in China	250
26-6-3 R&D expenditures by source of funds in China	251
26-6-4 R&D expenditures by type of activity in China	252
26-6-5 Number of researchers by research sector in China	253
26-6-6 S&T administrative organizational charts in China	254
26-7 Rep. of Korea	256
26-7-1 Republic of Korea summary	256
26-7-2 R&D expenditures by performance sector in Republic of Korea	258
26-7-3 R&D expenditures by source of funds in Republic of Korea ·	259
26-7-4 R&D expenditures by type of activity in Republic of Korea ·	260
26-7-5 Number of researchers by research sector in Republic of Korea	261
26-7-6 S&T administrative organizational charts in Republic of Korea	262
26-8 Russian Federation	264
26-8-1 Russian Federation summary	264
26-8-2 R&D expenditures by performance sector in Russian Federation	266
26-8-3 R&D expenditures by source of funds in Russian Federation	267
26-8-4 R&D expenditures by type of activity in Russian Federation	268
26-8-5 Number of researchers by research sector in Russian Federation	269
26-8-6 S&T administrative organizational charts in Russian Federation	270
26-9 Canada	271
26-9-1 R&D expenditures by performance sector in Canada	271
26-9-2 R&D expenditures by source of funds in Canada	272
26-9-3 Number of researchers by research sector in Canada	273
26-9-4 S&T administrative organizational charts in Canada	274

26-10 Other countries/regions	276
27. S&T budget	282
28. R&D expenditures	284
28-1 R&D expenditures by research sector	284
28-2 R&D expenditures by research sector and type of activity	286
29. R&D personnel	288
29-1 Number of researchers by research sector	288
29-2 Number of R&D personnel by kind of occupation	290
29-3 Number of degrees granted by field of science	291
30. Number of Nobel Prize and Fields Prize winners by country	292
31. Technology trade value	294
32. Patents	296
32-1 Number of patents by country	296
32-1-1 Patent applications	296
32-1-2 Patent grants	297
32-2 Number of patents by applicant's nationality	298
32-2-1 Patent applications	298
32-2-2 Patent grants	299

Appendix

33. Central government finance in Japan	302
33-1 Budget by type of account in Japan	302
33-2 General accounts in Japan	302
34. R&D deflators in Japan	304
35. GDP deflators in selected countries	306
36. Exchange rates for selected countries	307
36-1 IMF exchange rates to Yen for selected countries	307
36-2 Purchasing power parities to Yen for selected countries	308