

# SCIENTISTS AND ENGINEERS IN JAPAN: 1990

by

David Zaslow



International Programs Center  
Population Division  
U.S. Bureau of the Census  
Washington, D.C. 20233-8860

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## EXECUTIVE SUMMARY

The typical member of the group "Scientists and Engineers (S/E)" in Japan is male, fairly young, an employee, and likely to be engaged in engineering within the services, manufacturing or construction branches of the economy (which collectively employ 89 percent of scientists and engineers). There are exceptions to this characterization, since females, who account for a small share of S/E, are more likely to work in the sciences, particularly computer processing. In addition, female S/E have not yet attained positions of authority to a degree proportionate to their share of the S/E workforce. Females account for just 1 percent of directors among S/E, compared to 6.5 percent of the S/E workforce. Females' low share of leadership positions most likely is due, at least in part, to the fact that female scientists and engineers are generally younger than their male colleagues, suggesting that females' numbers in the overall scientist and engineer workforce and among leadership positions will increase in the future.

Japan has more scientists and engineers, relative to its labor force, than do other leading industrial countries for which we have information. In 1990, Japan had 36 scientists and engineers per 1,000 members of its labor force, compared to 32.8 for Great Britain and 29.3 for the United States (Figure 1).

This thumbnail description of scientists and engineers in Japan, as well as the graphic presentation and appendix tables to follow, is based upon information from the 13 percent sample of the 1990 Japanese Population Census.



## PREFACE

The International Programs Center conducts economic and demographic studies, some of which are issued as Staff Papers. A complete list is included at the end of this report. The use of data not generated by the U.S. Bureau of the Census precludes performing the same statistical reviews the Bureau does on its own data.

We are grateful to the Japanese Statistics Bureau, Management and Coordination Agency, for their assistance in providing data from the 1990 census upon which the tables and charts in this report are based. Within the International Programs Center, thanks are due to Lois Darmohray and Beverly Mathis for secretarial support. Any shortcomings in the report are the responsibility of the author.

Comments and questions regarding this study should be addressed to David Zaslow, Eurasia Branch, International Programs Center, U.S. Bureau of the Census, Washington, D.C. 20233-8860; telephone (301) 457-1362.



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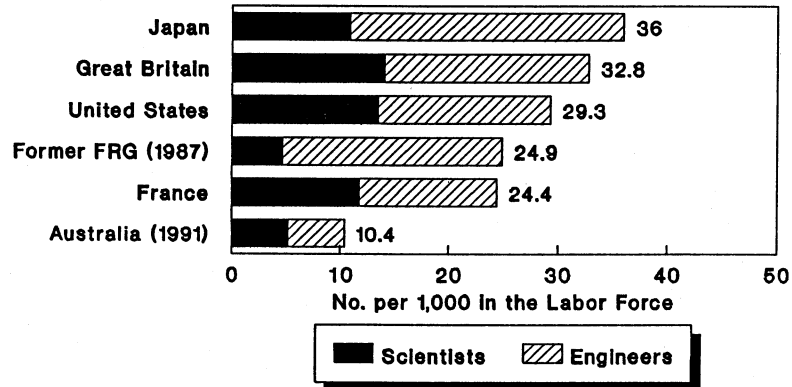
## INTRODUCTION

This report presents statistics on scientists and engineers<sup>1</sup> for Japan, based on data derived from the 1990 census. It begins with a graphic comparison among countries, including the United States. This is followed by sections describing new data for Japan. In the appendix, data tables provide detailed information upon which the graphic presentation is based. Users who wish to more closely compare data presented in this report with those of other countries should consult the list of IPC and CIR Staff Papers, in the back of this report.

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<sup>1</sup> All data in this report refer to non-academic scientists and engineers.

Figure 1. Scientists and Engineers per 1,000 Members of the Labor Force, for Selected Countries: 1990



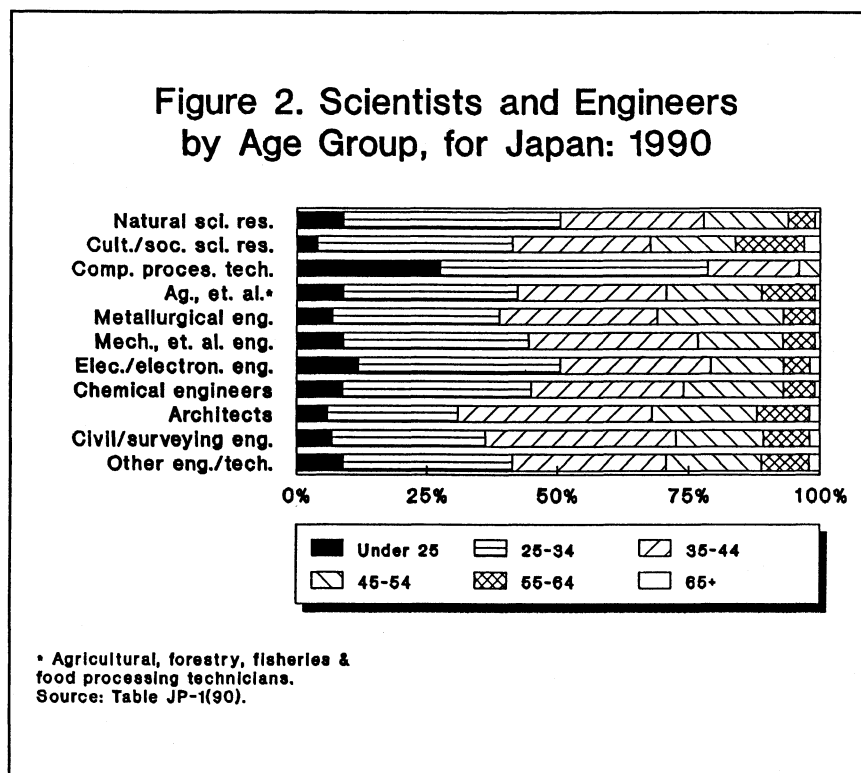
Source: Zaslow, 1995, p. 2; Japan Stat. Yearbook 1995, p. 82; Table JP-2(90); 1990 Pop. Census of Japan, Vol. 5, p. 2.

*Scientists and engineers are concentrated at younger ages.*

Most scientists and engineers are in their mid-40's or younger. Nearly four-fifths (79 percent) of scientists and engineers are in this age group (Table JP-1(90)). As such, scientists and engineers collectively are younger than the economically active work force in Japan (International Database).

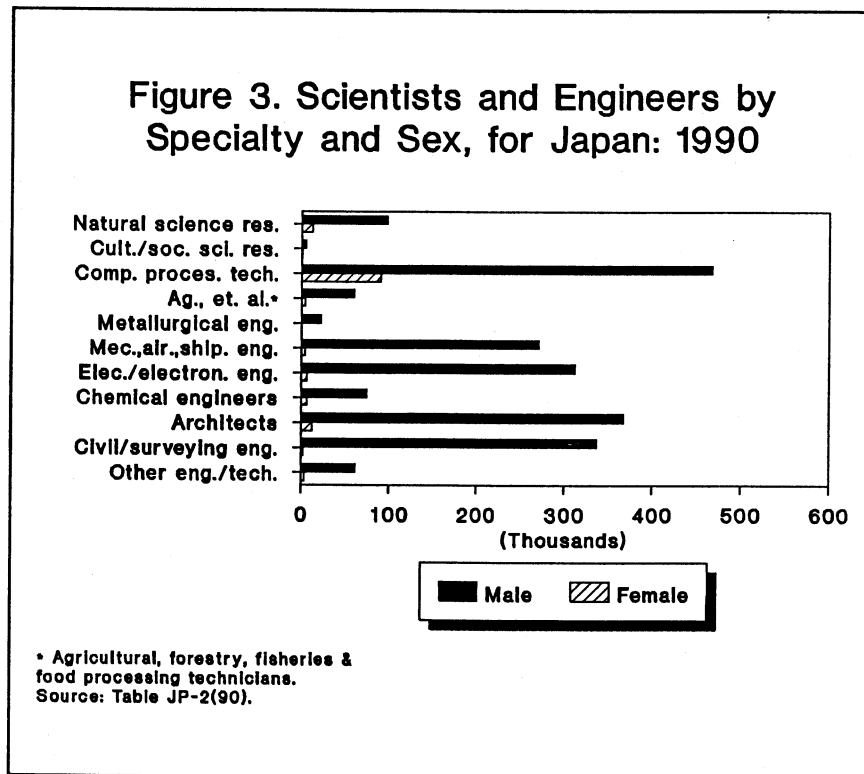
Computer processing technicians, 96 percent of whom are no more than 44 years old, are the most heavily concentrated among the youngest age cohorts (Figure 2). Architects and mechanical, aircraft and shipbuilding engineers have the smallest share among the younger age cohorts, (68 percent and 69 percent, respectively) (Table JP-1(90)).

Males are far more evenly distributed among the five year age cohorts than are females. Due to their numerical preponderance, males distribution largely mirrors that for both sexes, while 78 percent of female scientists and engineers are age 29 or less (Table JP-1(90)). Presumably, this is due to the recent entry of women into the scientist and engineer workforce, rather than the effects of childbearing, as female labor force participation rates for Japan recover from the low levels of the peak child-bearing years (ages 25-34), a pattern not seen among female scientists and engineers (Japan Statistical Yearbook 1995, p. 61; Economic Survey of Japan 1990-1991, p. 177; and Table JP-1(90)).



*Computer processing is the largest of the scientist and engineer fields.*

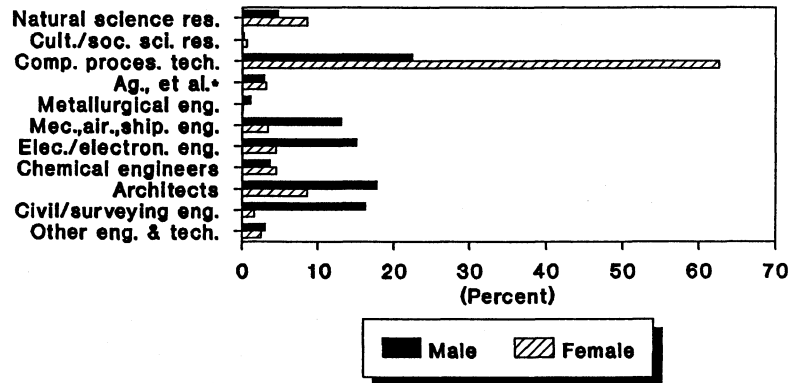
Within the employment category "Scientists and Engineers (S/E)," employment is concentrated in five categories, with those engaged in computer processing predominating (Figure 3).<sup>2</sup> Over 467,000 males and 90,000 females, accounting for 25 percent of the employed scientists and engineers, work in computer processing. The other fields which have substantial shares of scientists and engineers are: architecture, civil and surveying engineering, electric and electronic engineering, and mechanical, aircraft and shipbuilding engineering. Each of these accounts for at least 12 percent of all scientists and engineers, so that, all told, the five employment categories embrace 84 percent of all S/E or 1,872,086 engineers (Table JP-1(90)). Since males comprise 93 percent of all Japanese scientists and engineers (Table JP-2(90)), the male distribution by specialty is virtually identical to the combined sex distribution. Among females, there is a much greater concentration in computer processing than among males, since 63 percent of female S/E work in this field (Figure 4). Even so, females account for only 16 percent of all scientists and engineers in the field (Table JP-2(90)).



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Computer science related professions (no actual "computer scientist" job classification exists in U.S. data) also are the leading scientist and engineer field in the U.S. (Jamison, 1992, p. 69; and Dictionary, 1991).

Figure 4. Percent Distribution of Scientists and Engineers by Specialty, for Japan: 1990

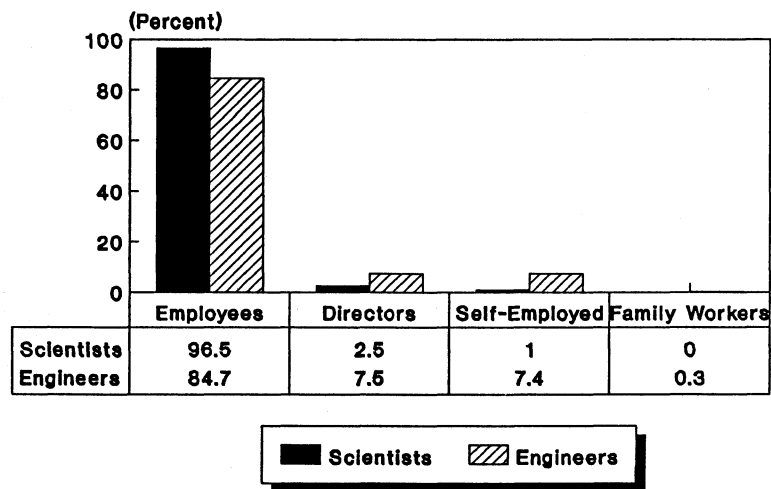


\* Agricultural, forestry, fisheries & food processing technicians.  
Source: Table JP-2(90).

*The vast majority of scientists and engineers are employees.*

Overall, 88 percent of scientists and engineers are employees: specifically, 96.5 percent of scientists and 84.7 percent of engineers (Figure 5). The remaining S/E are split almost evenly between directors<sup>3</sup> and the self-employed, particularly among engineers (Table JP-2(90)). In addition, a small share of engineers consists of unpaid family workers. The share of employees among females is appreciably higher than for males (97 percent versus 88 percent).

**Figure 5. Scientists and Engineers by Status of Employment, for Japan: 1990**



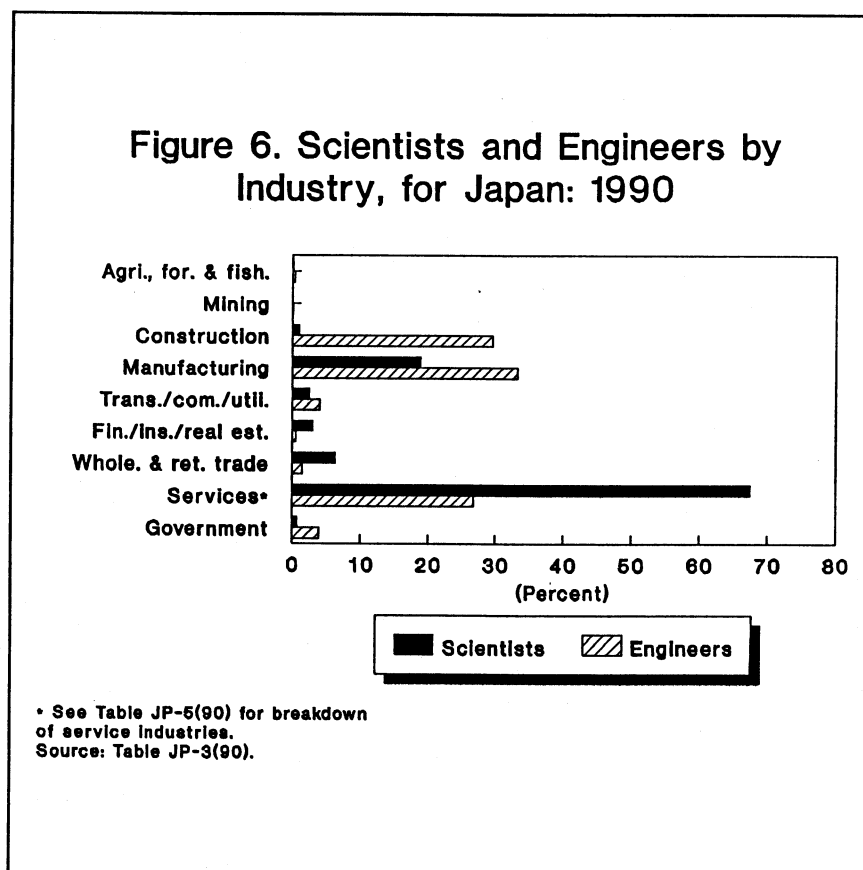
Source: Table JP-2(90).

<sup>3</sup>

These are scientists and engineers who are directors of a company or corporation, including managing directors.

*Services, manufacturing and construction dominate employment of scientists and engineers.*

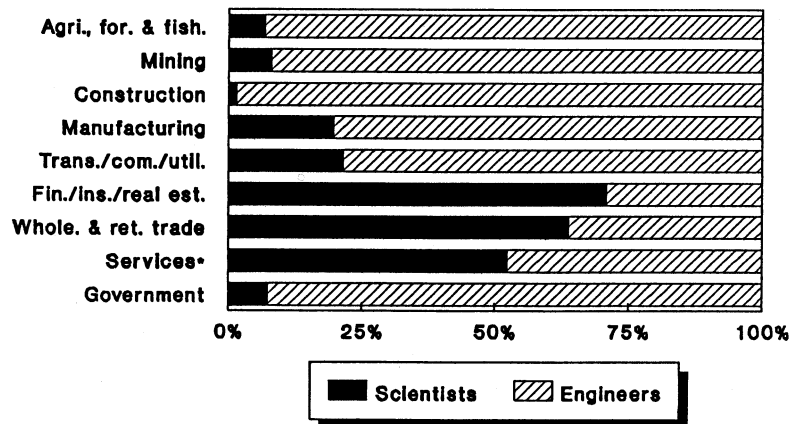
The vast majority (89 percent) of scientists and engineers work in the services, manufacturing and construction industries (Table JP-3(90)). More specifically, the service industries are the largest employers of scientists and engineers (39 percent), followed by manufacturing (29 percent), and construction (21 percent) (Table JP-3(90)). Scientists are concentrated primarily among the service industries, and to a lesser extent in manufacturing, while engineers are more evenly distributed among services, manufacturing, and construction (Figure 6). Other industries employ minor shares of scientists and engineers. This pattern of scientist and engineer employment being concentrated among a few industries is also seen in the United States, where services, manufacturing, and government employed 90 percent of all scientists and engineers in 1992 (National Science Board, 1993, p. 326).



*Japanese industries primarily employ engineers.*

In their employment of scientists and engineers, most industries favor the latter (Figure 7). The fact that Japanese industries overwhelmingly hire engineers reflects the types of skills that each industry considers most relevant to improving its production processes or provision of services. The largest exceptions (in terms of their proportions of scientists and engineers) are the finance, insurance, and real estate sector, wholesale and retail trade, and services, each of which employs considerable numbers of computer processing technicians (Table JP-3(90)).

**Figure 7. Scientists and Engineers  
Within Industry Groups, for Japan: 1990**

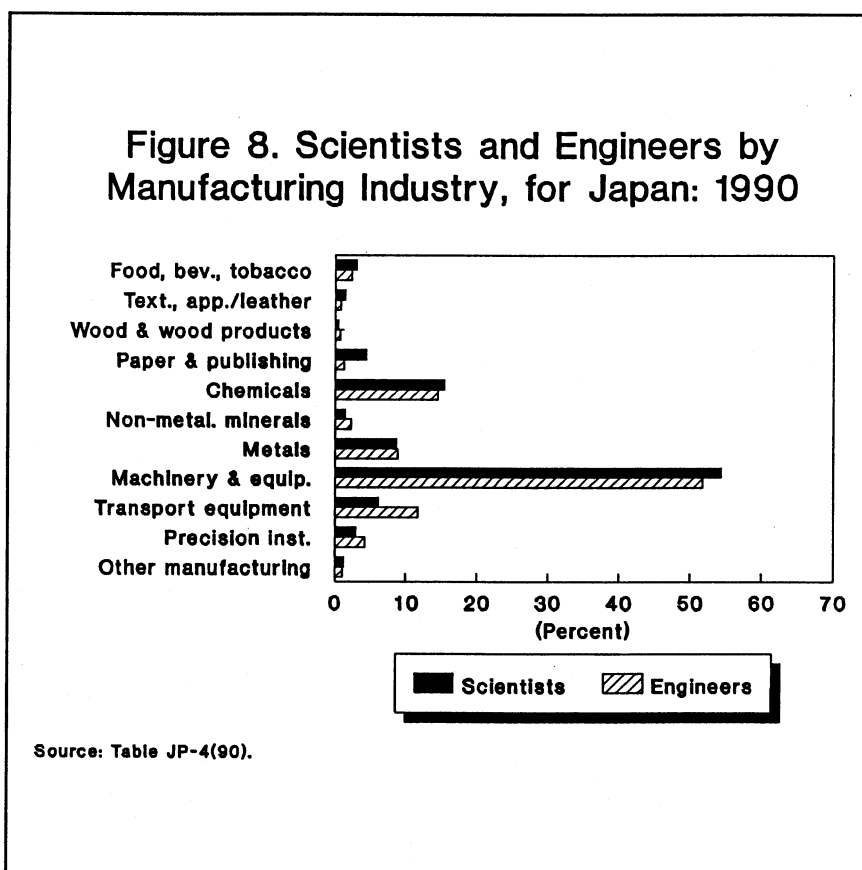


• See Table JP-5(90) for breakdown of services industry.  
Source: Table JP-3(90).



*Machinery and equipment, and chemicals are the largest employers of scientists and engineers in manufacturing.*

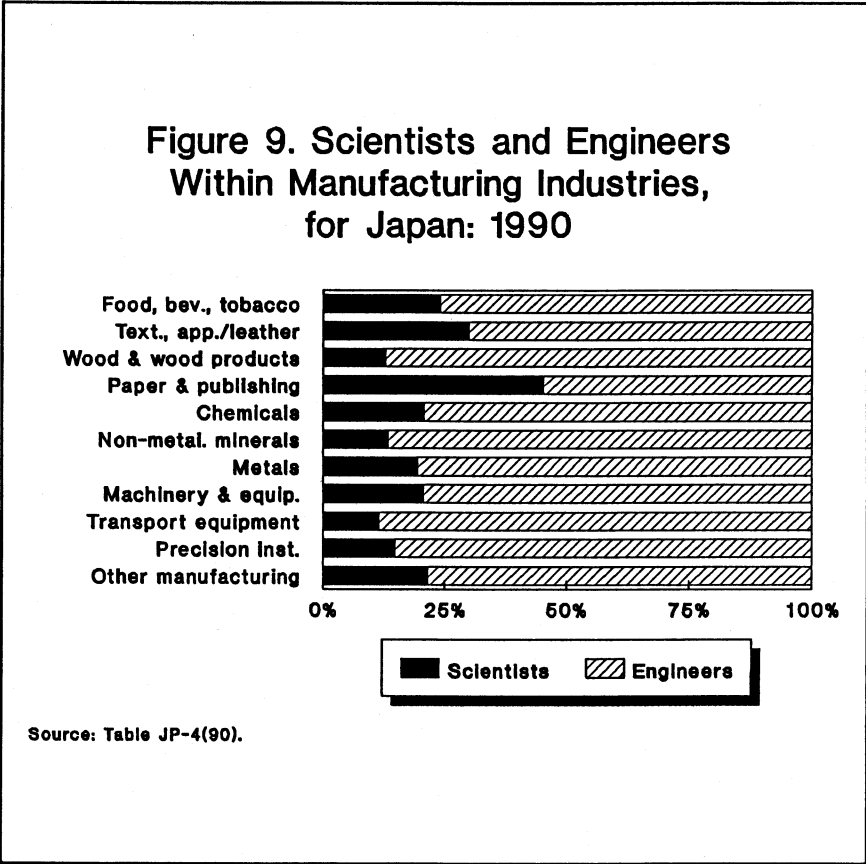
Employment of scientists and engineers in manufacturing is concentrated within a few industries. Over one-half (52 percent) of scientists and engineers engaged in manufacturing work in the general and electric machinery and equipment industry, while another 15 percent work in the chemicals and related products industry (Table JP-4(90)). The general and electric machinery and equipment industry accounts for nearly identical shares of manufacturing sector scientists (54 percent) and engineers (52 percent), as does the chemicals industry (15 percent of scientists and 14 percent of engineers) (Table JP-4(90)). Besides these two manufacturing industries, the remaining manufacturing industries employ only minor smaller shares of either scientists or engineers (Figure 8).<sup>4</sup>



<sup>4</sup> Of scientists and engineers working in manufacturing, Figure 8 shows the percent in each industrial classification.

*Manufacturing industries favor employment of engineers.*

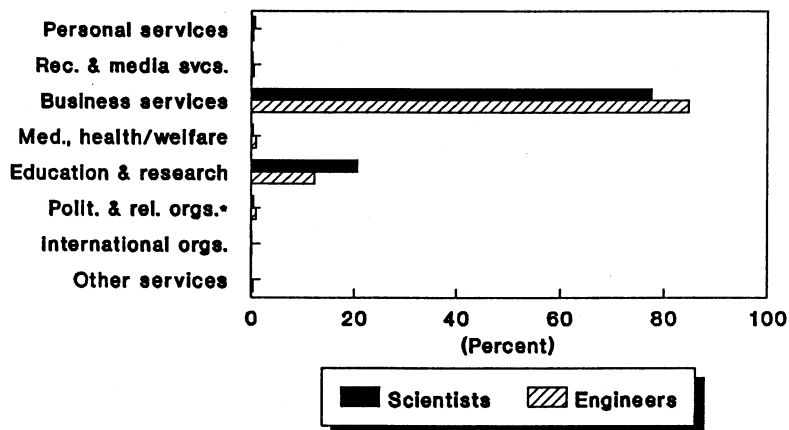
Within the manufacturing sector, all branches hire more engineers than scientists (Figure 9). Engineers' share of scientist and engineer employment ranges from 55 percent in the paper, printing and publishing industry, to 88 percent in the transport equipment industry.



*Within the service sector, two industries account for virtually all employment of scientists and engineers.*

Nearly all scientists and engineers in the service industries (98 percent) work in two sectors: business services, and education and research (Table JP-5(90)). Engineers are somewhat more heavily concentrated in the business services sector than are scientists (85 percent compared to 78 percent) (Figure 10).

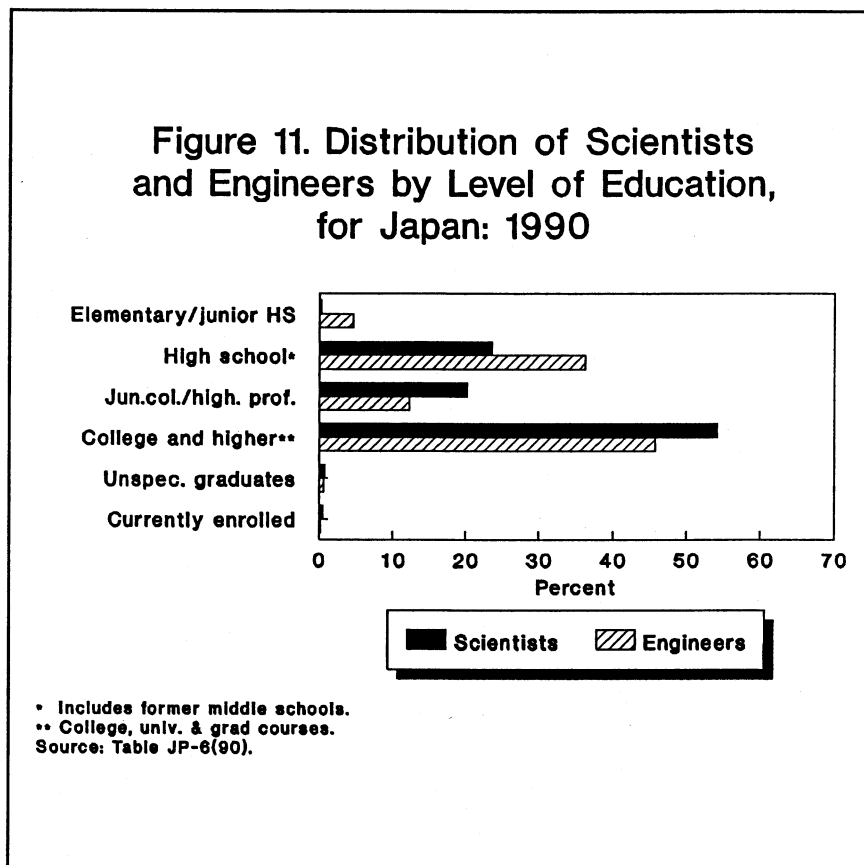
**Figure 10. Scientists and Engineers by Service Industry, for Japan: 1990**



• Includes Political, Trade and Cultural Organizations.  
Source: Table JP-5(90).

*Nearly half of S/E completed at least a college degree.*

The largest number of scientists and engineers leave school after earning either a college or university degree, or after having completed graduate courses (without earning an advanced degree). In 1990, 48.3 percent of scientists and engineers reported that a college degree or higher was their highest level of educational attainment (Table JP-6(90)). A slightly higher share of scientists than engineers had completed at least a college degree, 54.2 percent of scientists compared to 45.8 percent of engineers (Table JP-6(90)). Almost no scientists and engineers were currently enrolled in formal education in 1990 (Figure 11).<sup>5</sup>



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Since data on currently enrolled scientists and engineers have not previously been collected for this series, we can not consider the Japanese situation in an international context.

## *CONCLUSIONS*

Japan has a higher concentration of scientists and engineers among its workforce than do other leading industrial countries (Figure 1). Japan's scientists and engineers are young, and concentrated in key industries, such as services, manufacturing, and construction (Figure 6). However, as of 1990, slightly less than half of Japan's scientists and engineers had earned at least a college degree. This may suggest that Japanese firms place greater emphasis on in-house training that is specific to each company's specific assignments than on formal education, or it may imply that the most challenging work is reserved for the more educated scientists and engineers. Males strongly predominate among scientists and engineers, accounting for 93 percent of all S/E (Table JP-1). Females are younger, and unlike males, are concentrated in the sciences (particularly computer processing).

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Table JP-1(90)

## Employed Scientists and Engineers, by Age and Sex, for Japan: 1990

Occupation	Total	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Both Sexes	
											65+	65+
TOTAL SCIENTISTS & ENGINEERS	2,224,347	293,994	464,130	361,309	331,234	312,767	189,067	118,554	83,636	43,886	25,770	
SCIENTISTS	674,571	162,593	213,132	115,765	73,626	57,628	26,815	13,262	7,517	3,017	1,216	
Natural science researchers	110,364	9,411	26,598	19,118	14,825	15,592	11,253	7,088	4,387	1,489	603	
Cultural/social science researchers	5,744	231	1,054	1,083	832	708	516	428	401	334	157	
Computer proc. tech.	558,463	152,951	185,480	95,564	57,969	41,328	15,046	5,746	2,729	1,194	456	
ENGINEERS	1,549,776	131,401	250,998	245,544	257,608	255,139	162,252	105,292	76,119	40,869	24,554	
Agri., forestry, fisheries & food processing tech.	65,626	5,931	11,236	10,700	9,474	8,879	6,424	5,285	4,725	2,273	699	
Metallurgical engineers	23,038	1,517	3,936	3,503	3,341	3,475	3,252	2,286	1,030	370	328	
Mechanical, aircraft & shipbuilding engineers	276,179	25,982	53,026	44,800	43,422	45,167	28,615	17,233	9,830	4,672	3,432	
Electrical/electronic eng.	318,277	37,568	69,574	53,958	46,779	43,977	28,448	15,798	10,456	6,850	4,869	
Chemical engineers	81,775	7,315	17,028	12,513	11,060	12,564	10,162	6,094	3,176	1,229	634	
Architects	380,098	24,360	43,060	52,724	69,478	71,178	43,883	29,616	24,102	13,665	8,032	
Civil & surveying eng.	339,069	22,634	42,586	57,129	64,539	59,774	34,934	23,523	18,728	9,742	5,480	
Other engineers & tech.	65,714	6,094	10,552	10,217	9,515	10,125	6,534	5,457	4,072	2,068	1,080	

Table JP-1(90)  
Employed Scientists and Engineers, by Age and Sex, for Japan: 1990--Continued

Occupation	Total	Male									
		Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	2,079,527	229,223	416,316	347,773	323,889	306,736	186,353	116,901	82,843	43,723	25,770
<b>SCIENTISTS</b>	570,724	111,990	177,244	107,076	69,853	54,846	25,698	12,609	7,302	2,890	1,216
Natural science researchers	98,023	5,533	21,935	17,712	14,009	14,910	10,910	6,709	4,266	1,436	603
Cultural/social science researchers	4,940	155	845	920	683	636	454	414	390	286	157
Computer proc. tech.	467,761	106,302	154,464	88,444	55,161	39,300	14,334	5,486	2,646	1,168	456
<b>ENGINEERS</b>	1,508,803	117,233	239,072	240,697	254,036	251,890	160,655	104,292	75,541	40,833	24,554
Agri., forestry, fisheries & food processing tech.	61,121	4,237	10,029	10,336	9,251	8,421	6,149	5,099	4,631	2,269	699
Metallurgical engineers	22,832	1,413	3,876	3,487	3,336	3,471	3,235	2,286	1,030	370	328
Mechanical, aircraft & shipbuilding engineers	271,303	24,163	51,600	44,252	43,015	44,835	28,396	17,153	9,791	4,666	3,432
Electrical/electronic eng.	311,776	34,775	67,233	53,332	46,494	43,780	28,317	15,725	10,401	6,850	4,869
Chemical engineers	75,255	4,863	14,835	11,769	10,642	12,227	10,031	5,969	3,065	1,220	634
Architects	367,754	21,366	39,707	50,833	67,822	69,679	43,414	29,312	23,924	13,665	8,032
Civil & surveying eng.	336,695	21,829	42,156	56,804	64,272	59,557	34,748	23,420	18,692	9,737	5,480
Other engineers & tech.	62,067	4,587	9,636	9,884	9,204	9,920	6,365	5,328	4,007	2,056	1,080



Table JP-1(90)

## Employed Scientists and Engineers, by Age and Sex, for Japan: 1990--Continued

Female

Occupation	Total	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	144,820	64,771	47,814	13,536	7,345	6,031	2,714	1,653	793	163	0
<b>SCIENTISTS</b>	103,847	50,603	35,888	8,689	3,773	2,782	1,117	653	215	127	0
Natural science researchers	12,341	3,878	4,663	1,406	816	682	343	379	121	53	0
Cultural/social science researchers	804	76	209	163	149	72	62	14	11	48	0
Computer proc. tech.	90,702	46,649	31,016	7,120	2,808	2,028	712	260	83	26	0
<b>ENGINEERS</b>	40,973	14,168	11,926	4,847	3,572	3,249	1,597	1,000	578	36	0
Agri., forestry, fisheries & food processing tech.	4,505	1,694	1,207	364	223	458	275	186	94	4	0
Metallurgical engineers	206	104	60	16	5	4	17	0	0	0	0
Mechanical, aircraft & shipbuilding engineers	4,876	1,819	1,426	548	407	332	219	80	39	6	0
Electrical/electronic eng.	6,501	2,793	2,341	626	285	197	131	73	55	0	0
Chemical engineers	6,520	2,452	2,193	744	418	337	131	125	111	9	0
Architects	12,344	2,994	3,353	1,891	1,656	1,499	469	304	178	0	0
Civil & surveying eng.	2,374	805	430	325	267	217	186	103	36	5	0
Other engineers & tech.	3,647	1,507	916	333	311	205	169	129	65	12	0

Source: The 1990 Population Census of Japan, Vol. 5, (Results of the 13 Percent Sample Tabulation), Tab. 7.

Table JP-2(90)  
 Employed Scientists and Engineers, by Employment Status and Sex,  
 for Japan: 1990

Occupation	Total	Employees	Directors	Both Sexes	
				Self-employed w/empl.	Family workers
TOTAL SCIENTISTS & ENGINEERS	2,224,347	1,963,933	133,370	53,257	5,572
SCIENTISTS	674,571	650,862	16,683	1,245	150
Natural science researchers	110,364	108,922	1,317	53	0
Cultural/social science res.	5,744	5,412	289	16	0
Computer processing tech.	558,463	536,528	15,077	1,176	150
ENGINEERS	1,549,776	1,313,071	116,687	52,012	5,422
Agricultural, forestry, fisheries & food proc. tech.	65,626	64,127	869	18	11
Metallurgical engineers	23,038	22,052	926	13	8
Mechanical, aircraft & shipbuilding engineers	276,179	250,557	12,092	2,663	105
Electrical/electronic eng.	318,277	297,592	10,694	2,630	167
Chemical engineers	81,775	79,863	1,774	48	9
Architects	380,098	253,921	54,954	31,959	3,533
Civil & surveying engineers	339,069	284,597	32,394	13,769	1,546
Other engineers & tech.	65,714	60,362	2,984	912	43

Table JP-2(90)  
 Employed Scientists and Engineers, by Employment Status and Sex, for Japan: 1990--  
 Continued

Occupation	Total	Employees	Directors	Male	
				Self-employed w/empl.	Family workers
TOTAL SCIENTISTS & ENGINEERS	2,079,527	1,823,527	131,903	53,051	66,232
SCIENTISTS	570,724	548,820	15,796	1,222	4,848
Natural science researchers	98,023	96,675	1,244	53	0
Cultural/social science res.	4,940	4,617	289	16	0
Computer processing tech.	467,761	447,528	14,263	1,153	4,779
ENGINEERS	1,508,803	1,274,707	116,107	51,829	61,384
Agricultural, forestry, fisheries & food proc. tech.	61,121	59,622	869	18	601
Metallurgical engineers	22,832	21,846	926	13	39
Mechanical, aircraft & shipbuilding engineers	271,303	245,681	12,092	2,663	10,762
Electrical/electronic eng.	311,776	291,091	10,694	2,630	7,194
Chemical engineers	75,255	73,343	1,774	48	81
Architects	367,754	244,156	54,374	31,776	34,561
Civil & surveying engineers	336,695	282,223	32,394	13,769	6,763
Other engineers & tech.	62,067	56,745	2,984	912	1,383

Table JP-2(90)  
Employed Scientists and Engineers, by Employment Status and Sex, for Japan: 1990--  
Continued

Occupation						Female	
	Total	Employees	Directors	Self-employed w/empl. w/o empl.	Family workers		
TOTAL SCIENTISTS & ENGINEERS	144,820	140,406	1,467	206	1,983	758	
SCIENTISTS	103,847	102,042	887	23	783	112	
Natural science researchers	12,341	12,247	73	0	21	0	
Cultural/social science res.	804	795	0	0	9	0	
Computer processing tech.	90,702	89,000	814	23	753	112	
ENGINEERS	40,973	38,364	580	183	1,200	646	
Agricultural, forestry, fisheries & food proc. tech.	4,505	4,505	0	0	0	0	
Metallurgical engineers	206	206	0	0	0	0	
Mechanical, aircraft & shipbuilding engineers	4,876	4,876	0	0	0	0	
Electrical/electronic eng.	6,501	6,501	0	0	0	0	
Chemical engineers	6,520	6,520	0	0	0	0	
Architects	12,344	9,765	580	183	1,170	646	
Civil & surveying engineers	2,374	2,374	0	0	0	0	
Other engineers & tech.	3,647	3,617	0	0	30	0	

Source: Japan Statistics Bureau, 1995, The 1990 Population Census of Japan Volume 5, Results of the Detailed Sample Tabulation, Part 1. Japan (Results of the 13 Percent Sample Tabulation), Table 8.

Table JP-3(90)

## Employed Scientists and Engineers, by Industry Group and Sex, for Japan: 1990

Occupation	Total	Both Sexes										Inadeq. descr.
		Agriculture, forestry and fishing	Mining	Construction	Manufacturing	Transport, communication, public utilities	Finance, insurance, real estate	Wholesale and retail trade	Services	Government		
TOTAL SCIENTISTS & ENGINEERS	2,224,347	5,435	2,123	465,237	643,056	79,081	28,503	66,273	868,477	66,073	89	
SCIENTISTS	674,571	373	171	6,855	127,408	17,049	20,224	42,325	455,216	4,924	26	
Natural science researchers	110,364	261	57	386	21,980	579	9	601	85,096	1,395	0	
Cultural/social science researchers	5,744	0	0	0	0	0	0	0	5,587	157	0	
Computer proc. tech.	558,463	112	114	6,469	105,428	16,470	20,215	41,724	364,533	3,372	26	
ENGINEERS	1,549,776	5,062	1,952	458,382	515,648	62,032	8,279	23,948	413,261	61,149	63	
Agri., forestry, fisheries & food processing tech.	65,626	3,279	5	49	10,098	35	256	1,349	39,615	10,940	0	
Metallurgical engineers	23,038	0	64	181	20,542	76	41	271	1,850	13	0	
Mechanical, aircraft & shipbuilding engineers	276,179	14	64	12,101	191,521	3,742	59	5,838	62,278	553	9	
Electrical/electronic eng.	318,277	9	96	40,590	185,346	25,521	782	7,599	56,814	1,520	0	
Chemical engineers	81,775	25	133	172	66,429	1,334	40	1,850	11,549	243	0	
Architects	380,098	20	46	231,982	5,864	3,375	4,717	3,285	119,225	11,584	0	
Civil & surveying eng.	339,069	1,693	209	170,616	3,009	23,171	2,158	954	102,663	34,596	0	
Other engineers & tech.	65,714	22	1,335	2,691	32,839	4,778	226	2,802	19,267	1,700	54	

Table JP-3(90)  
Employed Scientists and Engineers, by Industry Group and Sex, for Japan: 1990--Continued

Occupation	Total	Male										Inadeq. descr.
		Agriculture, forestry and fishing	Mining	Construction	Manufacturing	Transport communication, public utilities	Finance, insurance, real estate	Wholesale and retail trade	Services	Government		
TOTAL SCIENTISTS & ENGINEERS	2,079,527	5,224	2,102	459,389	610,813	77,855	24,880	58,880	775,018	65,306		60
SCIENTISTS	570,724	326	150	6,049	110,773	16,064	16,784	36,076	379,802	4,683		17
Natural science researchers	98,023	226	57	377	18,775	555	9	443	76,199	1,382		0
Cultural/social science res.	4,940	0	0	0	0	0	0	0	4,783	157		0
Computer processing tech.	467,761	100	93	5,672	91,998	15,509	16,775	35,633	298,820	3,144		17
ENGINEERS	1,508,803	4,898	1,952	453,340	500,040	61,791	8,096	22,804	395,216	60,623		43
Agric., forestry, fisheries & food processing tech.	61,121	3,132	5	49	8,064	31	256	1,182	37,627	10,775		0
Metallurgical engineers	22,832	0	64	181	20,386	76	36	271	1,805	13		0
Mechanical, aircraft & shipbuilding engineers	271,303	14	64	11,994	189,023	3,736	59	5,645	60,206	553		9
Electrical/electronic eng.	311,776	9	96	40,456	180,911	25,413	782	7,405	55,184	1,520		0
Chemical engineers	75,255	22	133	166	61,679	1,328	40	1,618	10,067	202		0
Architects	367,754	20	46	227,923	5,810	3,355	4,545	3,161	111,424	11,470		0
Civil & surveying eng.	336,695	1,679	209	169,959	3,009	23,135	2,152	916	101,144	34,492		0
Other engineers and tech.	62,067	22	1,335	2,612	31,158	4,717	226	2,606	17,759	1,598		34

Table JP-3(90)

## Employed Scientists and Engineers, by Industry Group and Sex, for Japan: 1990--Continued

Occupation	Total	Agriculture, forestry and fishing	Mining	Construction	Manufacturing	Transport, communication, public utilities	Finance, insurance, real estate	Wholesale and retail trade	Services	Government	Female
											Inadeq. descr.
TOTAL SCIENTISTS & ENGINEERS	144,820	211	21	5,848	32,243	1,226	3,623	7,393	93,459	767	29
SCIENTISTS	103,847	47	21	806	16,635	985	3,440	6,249	75,414	241	9
Natural science researchers	12,341	35	0	9	3,205	24	0	158	8,897	13	0
Cultural/social science res.	804	0	0	0	0	0	0	0	804	0	0
Computer processing tech.	90,702	12	21	797	13,430	961	3,440	6,091	65,713	228	9
ENGINEERS	40,973	164	0	5,042	15,608	241	183	1,144	18,045	526	20
Agric., forestry, fisheries & food Processing tech.	4,505	147	0	0	2,034	4	0	167	1,988	165	0
Metallurgical engineers	206	0	0	0	156	0	5	0	45	0	0
Mechanical, aircraft & shipbuilding engineers	4,876	0	0	107	2,498	6	0	193	2,072	0	0
Electrical/electronic eng.	6,501	0	0	134	4,435	108	0	194	1,630	0	0
Chemical engineers	6,520	3	0	6	4,750	6	0	232	1,482	41	0
Architects	12,344	0	0	4,059	54	20	172	124	7,801	114	0
Civil & surveying eng.	2,374	14	0	657	0	36	6	38	1,519	104	0
Other engineers & tech.	3,647	0	0	79	1,681	61	0	196	1,508	102	20

Source: The 1990 Population Census of Japan, Vol. 5, Results of the Detailed Sample Tab., Part 1. Japan (Results of the 13 Percent Sample Tabulation), Tab. 8.

Table JP-4(90)  
Employed Scientists and Engineers, by Manufacturing Industry and Sex, for Japan: 1990

Occupation	Total	Food, beverages and tobacco	Textiles, apparel and leather	Wood and wood products	Paper, printing and publishing	Chemicals and related products	Non-metal mineral products	Metals and metal products	General and electric machinery and equipment	Transport equipment	Precision instruments	Both Sexes:	
												Other manufacturing	
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	643,056	16,186	6,286	4,769	12,727	94,344	13,798	56,753	336,728	68,193	25,838	7,434	
<b>SCIENTISTS</b>	127,408	3,898	1,884	612	5,779	19,592	1,854	11,049	69,370	7,915	3,853	1,602	
Natural science researchers	21,980	1,583	254	23	918	12,349	681	1,951	2,936	823	335	127	
Cultural/social science researchers	0	0	0	0	0	0	0	0	0	0	0	0	
Computer proces. tech.	105,428	2,315	1,630	589	4,861	7,243	1,173	9,098	66,434	7,092	3,518	1,475	
<b>ENGINEERS</b>	515,648	12,288	4,402	4,157	6,948	74,752	11,944	45,704	267,358	60,278	21,985	5,832	
Agric., forestry, fish. & food proces. tech.	10,098	9,453	61	5	20	457	17	3	50	24	0	8	
Metallurgical engineers	20,542	0	3	21	3	102	27	18,791	993	483	43	76	
Mechanical, aircraft & shipbuilding engineers	191,521	766	262	364	940	6,315	1,227	12,084	96,572	54,418	17,763	810	
Electrical/electronic engineers	185,346	623	326	149	988	2,859	961	6,366	165,214	3,686	3,213	961	
Chemical engineers	66,429	660	362	48	487	62,122	348	755	788	285	242	332	
Architects	5,864	220	58	519	190	856	356	2,063	1,018	413	15	156	
Civil & surveying engineers	3,009	25	8	66	37	205	383	1,501	442	301	25	16	
Other engineers & tech.	32,839	541	3,322	2,985	4,283	1,836	8,625	4,141	2,281	668	684	3,473	



Table JP-4(90)

## Employed Scientists and Engineers, by Manufacturing Industry and Sex, for Japan: 1990--Continued

Male

Occupation	Total	Food, beverages and tobacco	Textiles, apparel and leather	Wood and wood products	Paper, printing and publishing	Chemicals and related products	Non-metal mineral products	Metals and metal products	General and electric machinery and equipment	Transport equipment	Precision instruments	Other manufacturing
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	610,813	13,431	5,443	4,549	11,608	86,759	13,124	54,848	322,700	66,655	24,758	6,938
<b>SCIENTISTS</b>	110,773	3,279	1,396	566	4,945	16,677	1,536	9,640	60,988	7,042	3,308	1,396
Natural science researchers	18,775	1,148	135	23	835	10,238	607	1,811	2,719	823	309	127
Cultural/social science researchers	0	0	0	0	0	0	0	0	0	0	0	0
Computer proces. tech.	91,998	2,131	1,261	543	4,110	6,439	929	7,829	58,269	6,219	2,999	1,269
<b>ENGINEERS</b>	500,040	10,152	4,047	3,983	6,663	70,082	11,588	45,208	261,712	59,613	21,450	5,542
Agric., forestry, fish. & food proces. tech.	8,064	7,501	61	5	20	407	17	3	38	12	0	0
Metallurgical engineers	20,386	0	3	21	3	102	27	18,660	968	483	43	76
Mechanical, aircraft & shipbuilding engineers	189,023	762	258	352	940	6,235	1,227	11,919	95,269	53,891	17,380	790
Electrical/electronic engineers	180,911	619	326	149	975	2,838	952	6,332	161,075	3,572	3,121	952
Chemical engineers	61,679	544	341	48	469	57,689	340	737	703	285	217	306
Architects	5,810	220	58	510	184	856	344	2,044	1,010	413	15	156
Civil & surveying engineers	3,009	25	8	66	37	205	383	1,501	442	301	25	16
Other engineers & tech.	31,158	481	2,992	2,832	4,035	1,750	8,298	4,012	2,207	656	649	3,246

Table JP-4(90)  
Employed Scientists and Engineers, by Manufacturing Industry and Sex, for Japan: 1990--Continued

Occupation	Total	Food, beverages and tobacco	Textiles, apparel and leather	Wood and wood products	Paper, printing and publishing	Chemicals and related products	Non-metal mineral products	Metals and metal products	General and electric machinery and equipment	Transport equipment	Precision instruments	Other manufacturing
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	32,243	2,755	843	220	1,119	7,585	674	1,905	14,028	1,538	1,080	496
<b>SCIENTISTS</b>	16,635	619	488	46	834	2,915	318	1,409	8,382	873	545	206
Natural science researchers	3,205	435	119	0	83	2,111	74	140	217	0	26	0
Cultural/social science researchers	0	0	0	0	0	0	0	0	0	0	0	0
Computer proces. tech.	13,430	184	369	46	751	804	244	1,269	8,165	873	519	206
<b>ENGINEERS</b>	15,608	2,136	355	174	285	4,670	356	496	5,646	665	535	290
Agric., forestry, fish. & food proces. tech.	2,034	1,952	0	0	0	50	0	0	12	12	0	8
Metallurgical engineers	156	0	0	0	0	0	0	131	25	0	0	0
Mechanical, aircraft & shipbuilding engineers	2,498	4	4	12	0	80	0	165	1,303	527	383	20
Electrical/electronic engineers	4,435	4	0	0	13	21	9	34	4,139	114	92	9
Chemical engineers	4,750	116	21	0	18	4,433	8	18	85	0	25	26
Architects	54	0	0	9	6	0	12	19	8	0	0	0
Civil & surveying engineers	0	0	0	0	0	0	0	0	0	0	0	0
Other engineers & tech.	1,681	60	330	153	248	86	327	129	74	12	35	227

Source: Japan Statistics Bureau, 1995, The 1990 Population Census of Japan, Vol. 5, Results of the Detailed Sample Tabulation, Part 1, (Results of the 13 Percent Sample Tabulation), Table 8.

Table JP-5(90)

## Employed Scientists and Engineers, by Service Industry and Sex, for Japan: 1990

Both Sexes

Occupation	Total	Personal services	Recreation and media services	Business services	Medicine, health and welfare	Education and research	Political, trade and cultural organizations	International organizations	Other services
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	868,477	4,155	2,671	703,656	5,646	144,692	5,643	809	1,205
<b>SCIENTISTS</b>	455,216	3,050	726	353,716	1,508	93,995	1,841	321	59
Natural science researchers	85,096	39	30	1,535	653	82,022	711	69	37
Cultural/social science researchers	5,587	0	0	0	0	5,290	297	0	0
Computer proces. tech.	364,533	3,011	696	352,181	855	6,683	833	252	22
<b>ENGINEERS</b>	413,261	1,105	1,945	349,940	4,138	50,697	3,802	488	1,146
Agric., forestry, fish & food proces. tech.	39,615	0	50	31,747	189	5,984	835	0	810
Metallurgical engineers	1,850	0	0	305	0	1,509	9	27	0
Mechanical, aircraft & shipbuilding engineers	62,278	214	110	48,704	257	12,733	134	107	19
Electrical/electronic engineers	56,814	311	1,229	40,543	1,046	13,120	246	109	210
Chemical engineers	11,549	25	0	906	225	10,289	91	4	9
Architects	119,225	250	103	116,886	229	1,319	234	114	90
Civil & surveying engineers	102,663	174	332	99,455	252	626	1,779	45	0
Other engineers & tech.	19,267	131	121	11,394	1,940	5,117	474	82	8

Table JP-5(90)  
Employed Scientists and Engineers, by Service Industry and Sex, for Japan: 1990--Continued

Occupation	Total	Personal services	Recreation and media services	Business services	Medicine, health and welfare	Education and research	Political, trade and cultural organizations	International organizations	Male
									Other services
TOTAL SCIENTISTS & ENGINEERS	775,018	3,537	2,524	625,000	4,817	131,919	5,336	736	1,149
SCIENTISTS	379,802	2,490	615	289,519	1,092	84,146	1,636	257	47
Natural science researchers	76,199	18	7	1,302	361	73,795	619	60	37
Cultural/social science researchers	4,783	0	0	0	0	4,515	268	0	0
Computer proces. tech.	298,820	2,472	608	288,217	731	5,836	749	197	10
ENGINEERS	395,216	1,047	1,909	335,481	3,725	47,773	3,700	479	1,102
Agric., forestry, fish. & food proces. tech.	37,627	0	50	30,311	166	5,524	802	0	774
Metallurgical engineers	1,805	0	0	305	0	1,464	9	27	0
Mechanical, aircraft & shipbuilding engineers	60,206	214	110	46,920	249	12,453	134	107	19
Electrical/electronic engineers	55,184	291	1,216	39,424	1,046	12,656	232	109	210
Chemical engineers	10,067	16	0	745	154	9,054	85	4	9
Architects	111,424	237	103	109,134	229	1,283	234	114	90
Civil & surveying engineers	101,144	158	332	98,063	184	626	1,736	45	0
Other engineers & tech.	17,759	131	98	10,579	1,697	4,713	468	73	0

Table JP-5(90)

## Employed Scientists and Engineers, by Service Industry and Sex, for Japan: 1990--Continued

Female

Occupation	Total	Personal services	Recreation and media services	Business services	Medicine, health and welfare	Education and research	Political, trade and cultural organizations	International organizations	Other services
<b>TOTAL SCIENTISTS &amp; ENGINEERS</b>	93,459	618	147	78,656	829	12,773	307	73	56
<b>SCIENTISTS</b>	75,414	560	111	64,197	416	9,849	205	64	12
Natural science researchers	8,897	21	23	233	292	8,227	92	9	0
Cultural/social science researchers	804	0	0	0	0	775	29	0	0
Computer Proces. tech.	65,713	539	88	63,964	124	847	84	55	12
<b>ENGINEERS</b>	18,045	58	36	14,459	413	2,924	102	9	44
Agric., forestry, fish. & food proces. tech.	1,988	0	0	1,436	23	460	33	0	36
Metallurgical engineers	45	0	0	0	0	45	0	0	0
Mechanical, aircraft & shipbuilding engineers	2,072	0	0	1,784	8	280	0	0	0
Electrical/electronic engineers	1,630	20	13	1,119	0	464	14	0	0
Chemical Engineers	1,482	9	0	161	71	1,235	6	0	0
Architects	7,801	13	0	7,752	0	36	0	0	0
Civil & surveying engineers	1,519	16	0	1,392	68	0	43	0	0
Other engineers & tech.	1,508	0	23	815	243	404	6	9	8

Source: Japan Statistics Bureau, 1995, The 1990 Population Census of Japan, Volume 5, Results of the 13 Percent Sample Tabulation), Table 8.

Table JP-6(90)  
Employed Scientists and Engineers, by Educational Attainment and Sex,  
for Japan: 1990

Occupation	Total	Total graduates	Elementary/ junior HS	High/former middle school	Junior college, higher profes. school	College, university, grad. courses	Unspecified graduates	Both Sexes	
								Currently enrolled	
TOTAL SCIENTISTS AND ENGINEERS	2,224,347	2,217,368	75,580	723,315	327,462	1,074,801	16,210	6,979	
SCIENTISTS	674,571	670,335	2,008	160,199	137,199	365,439	5,490	4,236	
Natural science researchers	110,364	109,749	0	13,923	6,630	88,636	560	615	
Cultural/social science researchers	5,744	5,669	0	135	219	5,205	110	75	
Computer processing technicians	558,463	554,917	2,008	146,141	130,350	271,598	4,820	3,546	
ENGINEERS	1,549,776	1,547,033	73,572	563,116	190,263	709,362	10,720	2,743	
Agricultural, forestry, fisheries & food processing technicians	65,626	65,555	1,596	20,227	15,035	28,367	330	71	
Metallurgical engineers	23,038	22,986	0	6,753	2,179	13,893	161	52	
Mechanical, aircraft & shipbuilding engineers	276,179	275,850	4,860	91,785	31,742	145,778	1,685	329	
Electrical/electronic engineers	318,277	317,699	7,167	105,882	37,411	165,287	1,952	578	
Chemical engineers	81,775	81,680	796	16,690	5,714	57,998	482	95	
Architects	380,098	379,399	32,172	148,441	49,484	145,983	3,319	699	
Civil & surveying engineers	339,069	338,318	24,593	153,916	41,861	115,663	2,285	751	
Other engineers & technicians	65,714	65,546	2,388	19,422	6,837	36,393	506	168	

Table JP-6(90)

Employed Scientists and Engineers, by Educational Attainment and Sex,  
for Japan: 1990--Continued

Male

Occupation	Total	Total graduates	Elementary/ junior HS	High/former middle school	Junior college, higher profes. school	College, university, grad. courses	Unspecified graduates	Currently enrolled
<b>TOTAL SCIENTISTS AND ENGINEERS</b>	2,079,527	2,073,619	75,580	688,910	280,137	1,014,038	14,954	5,908
<b>SCIENTISTS</b>	570,724	567,284	2,008	137,121	102,203	321,394	4,558	3,440
Natural science researchers	98,023	97,501	0	12,668	4,606	79,716	511	522
Cultural/social science researchers	4,940	4,897	0	118	146	4,543	90	43
Computer processing technicians	467,761	464,886	2,008	124,335	97,451	237,135	3,957	2,875
<b>ENGINEERS</b>	1,508,803	1,506,335	73,572	551,789	177,934	692,644	10,396	2,468
Agricultural, forestry, fisheries & food processing technicians	61,121	61,071	1,596	19,451	13,383	26,337	304	50
Metallurgical engineers	22,832	22,796	0	6,694	2,157	13,784	161	36
Mechanical, aircraft & shipbuilding engineers	271,303	270,995	4,860	89,490	30,237	144,729	1,679	308
Electrical/electronic engineers	311,776	311,207	7,167	104,099	35,849	162,223	1,869	569
Chemical engineers	75,255	75,200	796	15,397	4,622	53,959	426	55
Architects	367,754	367,136	32,172	145,295	44,937	141,548	3,184	618
Civil & surveying engineers	336,695	335,989	24,593	152,894	41,065	115,156	2,281	706
Other engineers & technicians	62,067	61,941	2,388	18,469	5,684	34,908	492	126

Table JP-6(90)  
Employed Scientists and Engineers, by Educational Attainment and Sex,  
for Japan: 1990--Continued

Occupation	Total	Total graduates	Elementary/ junior HS	High/former middle school	Junior college, higher profes. school	College, university, grad. courses	Unspecified graduates	Female	
								Currently enrolled	Female
<b>TOTAL SCIENTISTS AND ENGINEERS</b>	144,820	143,749	0	34,405	47,325	60,763	1,256	1,071	
<b>SCIENTISTS</b>	103,847	103,051	0	23,078	34,996	44,045	932	796	
Natural science researchers	12,341	12,248	0	1,255	2,024	8,920	49	93	
Cultural/social science researchers	804	772	0	17	73	662	20	32	
Computer processing technicians	90,702	90,031	0	21,806	32,899	34,463	863	671	
<b>ENGINEERS</b>	40,973	40,698	0	11,327	12,329	16,718	324	275	
Agricultural, forestry, fisheries & food processing technicians	4,505	4,484	0	776	1,652	2,030	26	21	
Metallurgical engineers	206	190	0	59	22	109	0	16	
Mechanical, aircraft & shipbuilding engineers	4,876	4,855	0	2,295	1,505	1,049	6	21	
Electrical/electronic engineers	6,501	6,492	0	1,783	1,562	3,064	83	9	
Chemical engineers	6,520	6,480	0	1,293	1,092	4,039	56	40	
Architects	12,344	12,263	0	3,146	4,547	4,435	135	81	
Civil & surveying engineers	2,374	2,329	0	1,022	796	507	4	45	
Other engineers & technicians	3,647	3,605	0	953	1,153	1,485	14	42	

Source: Japan Statistics Bureau, 1995, The 1990 Population Census of Japan, Volume 5,  
Results of the Detailed Sample Tabulation, Part 1. Japan (Results of the 13 Percent Sample Tabulation),  
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