37	What do you look for when recruiting new graduates? (check **ONE**)	**ENGINEERS** a.☐ Quality of school b.☐ Good recommendation c.☐ Attitude d.☐ Knowledge e.☐ Work experience f.☐ Low Wage g.☐ Other (specify)	**TECHNICIANS** a.☐ Quality of school b.☐ Good recommendation c.☐ Attitude d.☐ Knowledge e.☐ Work experience f.☐ Low Wage g.☐ Other (specify)	**SKILLED WORKERS** a.☐ Quality of school b.☐ Good recommendation c.☐ Attitude d.☐ Knowledge e.☐ Work experience f.☐ Low Wage g.☐ Other (specify) .....
		If you answered **a. (quality of school)** *above, check one main reason* ↓	*If you answered* **a. (quality of school)** *above, check one main reason* ↓	*If you answered* **a. (quality of school)** *above, check one main reason* ↓
		ENGINEERS g.☐ High student quality h.☐ Good work attitude i.☐ Good knowledge j.☐ Good teachers k.☐ Good school facilities l.☐ Other (specify)	**TECHNICIANS** g.☐ High student quality h.☐ Good work attitude i.☐ Good knowledge j.☐ Good teachers k.☐ Good school facilities l.☐ Other (specify)	**SKILLED WORKERS** g.☐ High student quality h.☐ Good work attitude i.☐ Good knowledge j.☐ Good teachers k.☐ Good school facilities l.☐ Other (specify) .....
38	What is the average age of recruits?	**ENGINEERS** ..... Years	**TECHNICIANS** ..... Years	**SKILLED WORKERS** ..... Years
39	Write how many total permanent employees recruited in: a. 4/93 - 3/94 b. 4/92 - 3/93 c. 4/91 - 3/92 d. 4/90 - 3/91 e. 4/89 - 3/90	**ENGINEERS** a. .....Persons b. .....Persons c. .....Persons d. .....Persons e. .....Persons	**TECHNICIANS** a. .....Persons b. .....Persons c. .....Persons d. .....Persons e. .....Persons	**SKILLED WORKERS** a. .....Persons b. .....Persons c. .....Persons d. .....Persons e. .....Persons

40	How many employees were recruited from other enterprises or government?	ENGINEERS a. ☐ Yes b.☐ No	TECHNICIANS a. ☐ Yes b. ☐ No	SKILLED WORKERS a. ☐ Yes b.☐ No
		If you answer a. (Yes) above, please answer below:	*If you answer a. (Yes) above, please answer below:*	*If you answer a. (Yes) above, please answer below:*
		ENGINEERS	TECHNICIANS	SKILLED WORKERS
	a. 4/93 - 3/94	a. .....Persons	a. .....Persons	a. .....Persons
	b. 4/92 - 3/93	b. .....Persons	b. .....Persons	b. .....Persons
	c. 4/91 - 3/92	c. .....Persons	c. .....Persons	c. .....Persons
	d. 4/90 - 3/91	d. .....Persons	d. .....Persons	d. .....Persons
	e. 4/89 - 3/90	e. .....Persons	e. .....Persons	e. .....Persons

41	If you recruit employees from other enterprises, where do they mostly come from? (check ONE)	ENGINEERS a.☐ Agriculture b.☐ Mining & oil c.☐ Manufacturing d.☐ Electricity, gas, & water e.☐ Construction f.☐ Hotel, restaurant, wholesale, retail g.☐ Transport & communications h.☐ Banks i. ☐ Government & military j. ☐ Services	TECHNICIANS a.☐ Agriculture b.☐ Mining & oil c.☐ Manufacturing d.☐ Electricity, gas, & water e.☐ Construction f.☐ Hotel, restaurant, wholesale, retail g.☐ Transport & communications h.☐ Banks i. ☐ Government & military j. ☐ Services	SKILLED WORKERS a.☐ Agriculture b.☐ Mining & oil c.☐ Manufacturing d.☐ Electricity, gas, & water e.☐ Construction f.☐ Hotel, restaurant, wholesale, retail g.☐ Transport & communications h.☐ Banks i. ☐ Government & military j. ☐ Services

42	Does your enterprise have a recruiting plan? (check one)	a. ☐Yes	b. ☐No

43	If you answered YES above, write your new employee recruiting plans for 1995	ENGINEERS ..... Persons	TECHNICIANS ..... Persons	SKILLED WORKERS ..... Persons
44	Do you have a recruiting plan for 1996 or after?	a. ☐Yes		b. ☐No

SECTION 4. TRAINING

		ENGINEERS (university graduates with technical engineering degree)	TECHNICIANS (polytechnic graduates D1, D2, D3)	SKILLED WORKERS (SLTA graduates working with machines or computers OR SLTP + 10 years technical experience)
45	What qualities do you most want from employees? (check **TWO** boxes for each)	ENGINEERS a. ☐ Practical sense b. ☐ Technical knowledge c. ☐ Challenging attitude d. ☐ Initiative e. ☐ Diligence f. ☐ Steadily develop skills g. ☐ Leadership	TECHNICIANS a. ☐ Practical sense b. ☐ Technical knowledge c. ☐ Challenging attitude d. ☐ Initiative e. ☐ Diligence f. ☐ Steadily develop skills g. ☐ Leadership	SKILLED WORKERS a. ☐ Practical sense b. ☐ Technical knowledge c. ☐ Challenging attitude d. ☐ Initiative e. ☐ Diligence f. ☐ Steadily develop skills g. ☐ Leadership
46	Do you have a training program for employees? (excluding new employee training, like orientation)	ENGINEERS a. ☐ Yes b. ☐ No	TECHNICIANS a. ☐ Yes b. ☐ No	SKILLED WORKERS a. ☐Yes b. ☐No

If you answered YES to any of question 46, please answer the following questions.
If you answered NO to all of question 46, skip to section 5, page 12.

47	Who mostly gives the training? (Check ONE or TWO)	ENGINEERS a. ☐ Enterprise staff b. ☐ Instructor comes to enterprise. c. ☐ School or College d. ☐ Other public training center e. ☐ Government training institution f. ☐ Overseas training g. ☐ Other (specify)	TECHNICIANS a. ☐ Enterprise staff b. ☐ Instructor comes to enterprise. c. ☐ School or College d. ☐ Other public training center e. ☐ Government training institution f. ☐ Overseas training g. ☐ Other (specify)	SKILLED WORKERS a. ☐ Enterprise staff b. ☐ Instructor comes to enterprise. c. ☐ School or College d. ☐ Other public training center e. ☐ Government training institution f. ☐ Overseas training g. ☐ Other (specify) .....

48	What kind of training? (check all that are done)	ENGINEERS a. ☐ Lecture or conference b. ☐ On-the-job practice c. ☐ Off-the-job practice d. ☐ Other (specify)	TECHNICIANS a. ☐ Lecture or conference b. ☐ On-the-job practice c. ☐ Off-the-job practice d. ☐ Other (specify)	SKILLED WORKERS a. ☐ Lecture or conference b. ☐ On-the-job practice c. ☐ Off-the-job practice d. ☐ Other (specify) .....

49	What is the main training topic? (check all correct answers)	ENGINEERS a. ☐ Technical skills for current job b. ☐ New advanced technology c. ☐ quality control d. ☐ Production management skills e. ☐ Business management skills f. ☐ Other (specify)	TECHNICIANS a. ☐ Technical skills for current job b. ☐ New advanced technology c. ☐ quality control d. ☐ Production management skills e. ☐ Business management skills f. ☐ Other (specify)	SKILLED WORKERS a. ☐ Technical skills for current job b. ☐ New advanced technology c. ☐ quality control d. ☐ Production management skills e. ☐ Business management skills f. ☐ Other (specify) .....

50	How much total training per year? (days/person)	ENGINEERS a. Fresh graduates ..... Days b. Other employees ..... Days	TECHNICIANS a. Fresh graduates ..... Days b. Other employees ..... Days	SKILLED WORKERS a. Fresh graduates ..... Days b. Other employees ..... Days

51	Is training important for employee promotions ? (Check ONE)	ENGINEERS a. ☐ Very much b. ☐ Important c. ☐ Useful d. ☐ A little e. ☐ No	TECHNICIANS a. ☐ Very much b. ☐ Important c. ☐ Useful d. ☐ A little e. ☐ No	SKILLED WORKERS a. ☐ Very much b. ☐ Important c. ☐ Useful d. ☐ A little e. ☐ No

SECTION 5. JOB SITUATION

52	Are you satisfied with employee technical skill levels? (check one)	ENGINEERS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low	TECHNICIANS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low	SKILLED WORKERS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low

53	Are you satisfied with employee work motivation? (check one)	ENGINEERS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low	TECHNICIANS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low	SKILLED WORKERS a. ☐ Very high b. ☐ High c. ☐ O.K. d. ☐ A little low e. ☐ Mostly low

54	University engineer graduates often do engineering work, polytechnic graduates do technician work, and high school/vocational graduates often become skilled workers. But some employees do jobs which are more or less advanced than their education. Please describe the situation in your enterprise: Write the number of employees doing each level of job by level of education

	EDUCATION BACKGROUND			
	University	Polytechnic	High School	Other
Engineering jobs				
Technician jobs				
Skilled worker jobs				

EXAMPLE: How to fill out questions 55, 56, 57

- Each row describes jobs description. And column is the faculty.

- For instance, this enterprise has 4 engineers related to electricity. From those 4 engineers:

2 electrical engineer studied computers at his university (*write 1 under COMPUTER*).

1 electrical engineer studied electrical

1 electrical engineer in electronics

1 engineer studied physics

When this company does not hire people from electronics or telecommunication, please write 0 in total column.

	UNIVERSITY ENGINEERING EDUCATION														
	TOTAL ENGINEERS	BIO & AGRONOMY	CHEMICAL	ARCHITECTURE	CIVIL	ELECTRICAL	ELECTRONICS	COMPUTER	MACHINERY	METALLURGY	MINING & OIL	AERONAUTICAL	PRODUCTION	NUCLEAR	OTHER
Electrical engineers	4						2	1							1
Electronics & telecommunications	0														

55. NUMBER OF ENGINEERS
(university engineering graduates)

1) In first column, write the total number of engineers for each type of job.
2) Write the number of engineers doing each job, according to their educational background.

		UNIVERSITY ENGINEERING EDUCATION														
		TOTAL ENGINEERS	BIO & AGRONOMY	CHEMICAL	ARCHITECTURE	CIVIL	ELECTRICAL	ELECTRONICS	COMPUTER	MACHINERY	METALLURGY	MINING & OIL	AERONAUTICAL	PRODUCTION	NUCLEAR	OTHER
TYPE OR FIELD OF DUTIES	Electrical engineers															
	Electronics & telecommunications															
	Computing professionals															
	Mechanical engineers															
	Metallurgists															
	Chemical engineers															
	Mining engineers															
	Civil engineers															
	Cartographers & surveyors															
	Architects, town, & traffic planners															
	Biologists, agronomists, etc.															
	Science researchers															
	Production & operations managers															
	Department managers (non-production)															
	Company president or directors															
	Others (Mostly:)															
	TOTAL ENGINEERING GRADUATES															

56. NUMBER OF TECHNICIANS (D1, D2, or D3 polytechnic graduates)

1) In first column, write the total number of technicians for each type of job.
2) Write the number of technicians doing each job, according to their educational background.

		POLYTECHNIC D1, D2, or D3 EDUCATION															
		TOTAL TECHNICIANS	BIO & AGRONOMY	CHEMICAL	ARCHITECTURE	CIVIL	ELECTRICAL	ELECTRONICS	COMPUTER	MACHINERY	METALLURGY	MINING & OIL	AERONAUTICAL	PRODUCTION	NUCLEAR	OTHER
TYPE OF FIELD OF DUTIES	Chemical technicians															
	Civil engineering technicians															
	Electrical technicians															
	Optical & electronic equipment operators															
	Mechanical technicians															
	Metallurgy technicians															
	Mining technicians															
	Electronics & telecommunications															
	Science research support technicians															
	Draftsmen															
	Computer technicians															
	Ship & aircraft technicians															
	Safety & quality inspectors															
	Agronomy, biology, & medical tech.															
	Production & operations managers															
	Department managers (non-production)															
	Company president or directors															
	Others (Mostly:)															
	TOTAL D1, D2, D3 POLYTECHNIC GRADUATES															

57. NUMBER OF SKILLED WORKERS

(high school graduates working with machines or computers
OR
junior high education + 10 years technical experience)

1) In first column, write the total number of skilled workers for each type of job.
2) Write the number of skilled workers doing each job, according to their educational background.

		EDUCATION			
		High school	Vocational school	Junior high school + 10 years technical experience	Other
TYPE OF FIELD OF DUTIES	Agricultural skilled workers				
	Mining & stone skilled workers				
	Construction skilled workers				
	Metal skilled workers				
	Machinery mechanics				
	Computer operator				
	Electric & electronic equipment mechanics				
	Traditional glass, pottery, & metal workers				
	Production & operations managers				
	Department managers (non-production)				
	Company president or directors				
	Others (Mostly:)				
	TOTAL TECHNICAL SKILLED WORKERS				

Thank you very much for your work on this survey.
Your contribution is very important for Indonesia's manpower planning.
Please submit us your comments / suggestions related to the planning and development for engineers, technicians, and skilled workers in Indonesia.

This questionnaire answered by enterprise representative named:	Full name : ..... Signature :	Enterprise stamp :

Appendix 7.2

ESTABLISHMENT SURVEY QUESTIONNAIRES

DEPARTEMEN TENAGA KERJA REPUBLIK INDONESIA
BADAN PERENCANAAN DAN PENGEMBANGAN

No. O

bekerja sama dengan:

KLUI

ID

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

KUESIONER

STUDI PERENCANAAN DAN PENGEMBANGAN TENAGA KERJA ENGINEERING (INSINYUR, TEKNISI, DAN PEKERJA TERAMPIL) DI INDONESIA

PENGANTAR:

Studi ini meneliti kebutuhan dan kualitas kerja para Insinyur, Teknisi dan Pekerja Terampil di Indonesia. Hasil studi ini diharapkan dapat menjadi pedoman untuk mendeteksi kebutuhan tenaga kerja tersebut di masa yang akan datang serta upaya pemenuhannya. Studi ini menggunakan sampel 3.000 perusahaan di seluruh Indonesia. Perusahaan Saudara telah terpilih sebagai salah satu sampel. Untuk itu, mohon kesediaannya untuk mengisi kuesioner ini dan memberikan informasi lain yang dibutuhkan. Seluruh jawaban dan informasi yang Saudara berikan akan sangat bermanfaat bagi perencanaan dan pengembangan tenaga kerja insinyur, teknisi serta pekerja terampil. Seluruh jawaban dan informasi yang Saudara berikan bersifat rahasia.

Apabila Saudara membutuhkan, silahkan menghubungi Depnaker:

1. Nama pewawancara : _____
2. Alamat kantor Depnaker : _____
3. No. telepon Depnaker : _____

NAMA PERUSAHAAN	ALAMAT PERUSAHAAN
	Kabupaten/Kotamadya Propinsi

Mohon tuliskan pula jawaban Saudara untuk kolom 6, 7, 8:

6. KONTAK PERSON PERUSAHAAN	7. NO. TELEPON PERUSAHAAN	8. NO. FAX PERUSAHAAN

BAGIAN I. KARAKTERISTIK PERUSAHAAN

9.	Bentuk perusahaan *(pilih salah satu)*	a. ☐ BUMN b. ☐ Perusahaan Terbatas (PT) c. ☐ Koperasi d. ☐ CV e. ☐ Firma/Perusahaan Perorangan
10.	Status permodalan *(pilih salah satu)*	a. ☐ PMDN b. ☐ PMA c. ☐ Usaha Patungan d. ☐ BUMN e. ☐ Lain–lain (selain a–d)
11.	Jenis industri	a. ☐ Pertanian b. ☐ Pertambangan dan perminyakan c. ☐ Industri pengolahan d. ☐ Listrik, gas dan air e. ☐ Konstruksi f. ☐ Hotel, restaurant, perdagangan besar dan eceran g. ☐ Transportasi dan komunikasi h. ☐ Perbankan dan keuangan i. ☐ Jasa
12.	Produk utama	_____ _____
13.	Apakah perusahaan Saudara menggunakan teknologi dari mitra kerja asing ? *(pilih salah satu)*	a. ☐ Ya b ☐ Tidak
14.	Apakah perusahaan Saudara mengembangkan: a. produk–produk baru b. riset dan pengembangan *(pilih salah satu)*	a. ☐ Ya b ☐ Tidak a. ☐ Ya b. ☐ Tidak

15.	Apakah perusahaan Saudara menjalin kerjasama dengan lembaga–lembaga pendidikan untuk menerapkan teknologi baru ? *(pilih salah satu)*	a. ☐ Ya b. ☐ Tidak
16.	Pertama kali perusahaan atau pabrik beroperasi/berproduksi:	Tahun: _____
17.	Jumlah karyawan pada 1 April 1994:	Jumlah karyawan yang dibayar berdasarkan: a. Gaji bulanan _____ orang. b. Upah harian tetap _____ orang. c. Borongan _____ orang. d. Harian tidak tetap _____ orang.

	Mohon berikan informasi keuangan perusahaan	Tahun Anggaran 1992 (dalam 000 rupiah)	Tahun Anggaran 1993 (dalam 000 rupiah)
18.	Penjualan	Rp. _____	Rp. _____
19.	Laba (sebelum pajak)	Rp. _____	Rp. _____
20.	Total biaya gaji	Rp. _____	Rp. _____
21.	Total biaya tunjangan (misalnya: perumahan, transportasi)	Rp. _____	Rp. _____
22.	Total asset	Rp. _____	Rp. _____

BAGIAN II. DATA KARYAWAN

		INSINYUR	TEKNISI	PEKERJA TERAMPIL
	Untuk pertanyaan No. 23 sampai 53, lihat penjelasan tentang insinyur, teknisi dan pekerja terampil; pada kotak di sebelah kanan berikut:	*(Lulusan perguruan tinggi di bidang teknik/ engineering)*	*(Lulusan D1, D2, D3 Politeknik dibidang teknik/ engineering*	*(Lulusan SLTA yang bekerja dengan mesin atau komputer) ATAU lulusan SLTP dengan 10 tahun pengalaman di bidang teknik)*
23	Tuliskan jumlah karyawan yang menerima gaji bulanan, sesuai dengan kelompok umurnya:	INSINYUR	TEKNISI	PEKERJA TERAMPIL
	a. 18 – 24	..... Orang	..... Orang	..... Orang
	b. 25 – 34	..... Orang	..... Orang	..... Orang
	c. 35 – 44	..... Orang	..... Orang	..... Orang
	d. 45 – 54	..... Orang	..... Orang	..... Orang
	e. di atas 55 tahun	..... Orang	..... Orang	..... Orang
	f. TOTAL	..... Orang	..... Orang	..... Orang
24	Berapa jumlah insinyur dan teknisi di masing–masing departemen ?	INSINYUR	TEKNISI	
	a. Perencanaan/ Design	..... Orang	..... Orang	
	b. Produksi	..... Orang	..... Orang	
	c. Pembelian	..... Orang	..... Orang	
	d. Pemasaran	..... Orang	..... Orang	
	e. Lainnya	..... Orang	..... Orang	

25	Tuliskan jumlah karyawan pada tahun–tahun berikut: a. 1 April 1994 b. 1 April 1993 c. 1 April 1992 d. 1 April 1991 e. 1 April 1990	INSINYUR a. ..... orang b. ..... orang c. ..... orang d. ..... orang e. ..... orang	TEKNISI a. ..... orang b. ..... orang c. ..... orang d. ..... orang e. ..... orang	PEKERJA TERAMPIL a. ..... orang b. ..... orang c. ..... orang d. ..... orang e. ..... orang
26	Tuliskan kira–kira jam kerja aktual + lembur per minggu a. Total jam kerja utama: b. Total jam kerja lembur:	INSINYUR .....jam/minggu .....jam/minggu	TEKNISI .....jam/minggu .....jam/minggu	PEKERJA TERAMPIL .....jam/minggu .....jam/minggu
27	Tuliskan jumlah rata–rata hari kerja kerja dalam 1 tahun terakhir.	INSINYUR ..... hari/tahun	TEKNISI ..... hari/tahun	PEKERJA TERAMPIL ..... hari/tahun
28	Rata–rata penghasilan perbulan karyawan baru yang baru lulus dan telah melewati masa percobaan: (tanpa bonus/tunjangan)	INSINYUR Rp	TEKNISI Rp	PEKERJA TERAMPIL Rp .....
29	Rata–rata bonus/tunjangan perbulan karyawan yang baru lulus dan telah melewati masa percobaan (termasuk dana pensiun, perumahan, transportasi)	INSINYUR Rp	TEKNISI Rp	PEKERJA TERAMPIL Rp .....
30	Karyawan berusia 35 tahun: Tuliskan rata–rata penghasilan bulanan per–orang (Tanpa bonus/dana tunjangan lainnya)	INSINYUR Rp	TEKNISI Rp	PEKERJA TERAMPIL Rp .....
31	Karyawan berusia 35 tahun: Tuliskan rata–rata bonus/tunjangan bulanan per orang (Dana pensiun, tunjangan perumahan, transportasi, dll) (Perkiraan kasar)	INSINYUR Rp	TEKNISI Rp	PEKERJA TERAMPIL Rp .....

BAGIAN III. REKRUTMEN

		INSINYUR *(Lulusan perguruan tinggi di bidang teknik/ engineering*	TEKNISI *(Lulusan D1, D2, D3, politeknik di bidang teknik/ engineering)*	PEKERJA TERAMPIL *(Lulusan SLTA yang bekerja dengan mesin atau komputer) ATAU lulusan SLTP dengan 10 tahun pengalaman di bidang teknik)*
32	Pilih metoda utama yang digunakan perusahaan untuk merekrut karyawan ? *(Pilih satu jawaban)*	INSINYUR a. ☐ Melalui DEPNAKER b. ☐ Langsung dari sekolah c. ☐ Iklan d. ☐ Perantara/jasa rekruitmen e. ☐ Dari perusahaan lain f. ☐ Kenalan g. ☐ Lain–lain:	TEKNISI a. ☐ Melalui DEPNAKER b. ☐ Langsung dari sekolah c. ☐ Iklan d. ☐ Perantara/jasa rekruitmen e. ☐ Dari perusahaan lain f. ☐ Kenalan g. ☐ Lain–lain:	PEKERJA TERAMPIL a. ☐ Melalui DEPNAKER b. ☐ Iklan c. ☐ Perantara/jasa rekruitmen d. ☐ Dari perusahaan lain e. ☐ Kenalan f. ☐ Lain–lain: .....
33	Berdasarkan latar belakang pendidikan, apakah karyawan yang baru lulus cukup siap bekerja ?	INSINYUR a. ☐ Sangat siap b. ☐ Siap c. ☐ Lumayan d. ☐ Kurang siap e. ☐ Tidak siap	TEKNISI a. ☐ Sangat siap b. ☐ Siap c. ☐ Lumayan d. ☐ Kurang siap e. ☐ Tidak siap	PEKERJA TERAMPIL a. ☐ Sangat siap b. ☐ Siap c. ☐ Lumayan d. ☐ Kurang siap e. ☐ Tidak siap
34	Faktor penting apa yang paling Saudara inginkan untuk meningkatkan kualitas karyawan yang baru lulus ? *(Pilih satu jawaban)*	INSINYUR a. ☐ Pengetahuan teknis b. ☐ Pengetahuan praktis c. ☐ Ketekunan d. ☐ Inisiatip e. ☐ Tidak perlu perbaikan f. ☐ Lain–lain: sebutkan	TEKNISI a. ☐ Pengetahuan teknis b. ☐ Pengetahuan praktis c. ☐ Ketekunan d. ☐ Inisiatip e. ☐ Tidak perlu perbaikan f. ☐ Lain–lain: sebutkan	PEKERJA TERAMPIL a. ☐ Pengetahuan teknis b. ☐ Pengetahuan praktis c. ☐ Ketekunan d. ☐ Inisiatip e. ☐ Tidak perlu perbaikan f. ☐ Lain–lain: sebutkan .....

		INSINYUR	TEKNISI	PEKERJA TERAMPIL
35	Tingkat kesulitan perusahaan untuk memperoleh pegawai sesuai dengan kuantitas (jumlah) yang dibutuhkan:	a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit	a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit	a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit
		Jika jawabannya (d) Sulit atau (e) Sangat Sulit, tandai salah satu alasan utamanya:	*Jika jawabannya (d) Sulit atau (e) Sangat Sulit, tandai salah satu alasan utamanya:*	*Jika jawabannya (d) Sulit atau (e) Sangat Sulit, tandai salah satu alasan utamanya:*
		f. ☐ Pelamar sedikit g. ☐ Gaji rendah h. ☐ Jenis pekerjaan kurang diminati pelamar i. ☐ Sedikit sekali pelamar yang kualitasnya baik j. ☐ Tidak tahu k. ☐ Lain–lain sebutkan:	f. ☐ Pelamar sedikit g. ☐ Gaji rendah h. ☐ Jenis pekerjaan kurang diminati pelamar i. ☐ Sedikit sekali pelamar yang kualitasnya baik j. ☐ Tidak tahu k. ☐ Lain–lain sebutkan:	f. ☐ Pelamar sedikit g. ☐ Gaji rendah h. ☐ Jenis pekerjaan kurang diminati pelamar i. ☐ Sedikit sekali pelamar yang kualitasnya baik j. ☐ Tidak tahu k. ☐ Lain–lain sebutkan: .....
36	Tingkat kesulitan perusahaan untuk merekrut karyawan sesuai dengan kualitas yang dikehendaki: *(pilih satu jawaban)*	INSINYUR a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit	TEKNISI a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit	PEKERJA TERAMPIL a. ☐ Sangat mudah b. ☐ Mudah c. ☐ Tidak sulit d. ☐ Sulit e. ☐ Sangat sulit
		Jika Saudara menjawab d (Sulit) atau e (Sangat Sulit), pilihlah satu alasan utamanya:	*Jika Saudara menjawab d (Sulit) atau e (Sangat Sulit), pilihlah satu alasan utamanya:*	*Jika Saudara menjawab d (Sulit) atau e (Sangat Sulit), pilihlah satu alasan utamanya:*
		INSINYUR f. ☐ Keterampilan teknis rendah g. ☐ Pendidikan umum rendah h. ☐ Masalah kepribadian i. ☐ Sikap kerja yang kurang baik j. ☐ Lain–lain	TEKNISI f. ☐ Keterampilan teknis rendah g. ☐ Pendidikan umum rendah h. ☐ Masalah kepribadian i. ☐ Sikap kerja yang kurang baik j. ☐ Lain–lain	PEKERJA TERAMPIL f. ☐ Keterampilan teknis rendah g. ☐ Pendidikan umum rendah h. ☐ Masalah kepribadian i. ☐ Sikap kerja yang kurang baik j. ☐ Lain–lain .....

		INSINYUR	TEKNISI	PEKERJA TERAMPIL
37	Kriteria apa yang Saudara anggap penting untuk merekrut lulusan baru ? *(pilih satu jawaban)*	a. ☐ Kualitas perguruan tinggi b. ☐ Rekomendasi yang baik c. ☐ Sikap d. ☐ Pengetahuan e. ☐ Pengalaman kerja f. ☐ Gaji rendah g. ☐ Lain-lain: (sebutkan:)	a. ☐ Kualitas perguruan tinggi b. ☐ Rekomendasi yang baik c. ☐ Sikap d. ☐ Pengetahuan e. ☐ Pengalaman kerja f. ☐ Gaji rendah g. ☐ Lain-lain: (sebutkan:)	a. ☐ Kualitas sekolah b. ☐ Rekomendasi yang baik c. ☐ Sikap d. ☐ Pengetahuan e. ☐ Pengalaman kerja f. ☐ Gaji rendah g. ☐ Lain-lain: (sebutkan:) ....
		Apabila Saudara menjawab a. (kualitas perguruan tinggi), pilih satu atau dua alasan utamanya di bawah ini:	*Apabila Saudara menjawab a. (kualitas perguruan tinggi), pilih satu atau dua alasan utamanya di bawah ini:*	*Apabila Saudara menjawab a. (kualitas perguruan tinggi), pilih satu atau dua alasan utamanya di bawah ini:*
		INSINYUR	TEKNISI	PEKERJA TERAMPIL
		g. ☐ Kualitas mahasiswa h. ☐ Sikap kerja yang baik i. ☐ Pengetahuan yang baik j. ☐ Pengajar yang baik k. ☐ Fasilitas perguruan tinggi baik l. ☐ Lain-lain: (sebutkan:)	g. ☐ Kualitas mahasiswa h. ☐ Sikap kerja yang baik i. ☐ Pengetahuan yang baik j. ☐ Pengajar yang baik k. ☐ Fasilitas perguruan tinggi baik l. ☐ Lain-lain: (sebutkan:)	g. ☐ Kualitas siswa h. ☐ Sikap kerja yang baik i. ☐ Pengetahuan yang baik j. ☐ Pengajar yang baik k. ☐ Fasilitas sekolah baik l. ☐ Lain-lain: (sebutkan:)
38	*Berapa biasanya usia karyawan yang baru direkrut ?*	INSINYUR ..... tahun	TEKNISI ..... tahun	PEKERJA TERAMPIL ..... tahun
39	Sebutkan jumlah karyawan tetap yang direkrut pada:	INSINYUR	TEKNISI	PEKERJA TERAMPIL
	a. April '93 – Maret '94	a. .....Orang	a. .....Orang	a. .....Orang
	b. April '92 – Maret '93	b. .....Orang	b. .....Orang	b. .....Orang
	c. April '91 – Maret '92	c. .....Orang	c. .....Orang	c. .....Orang
	d. April '90 – Maret '91	d. .....Orang	d. .....Orang	d. .....Orang
	e. April '89 – Maret '90	e. .....Orang	e. .....Orang	e. .....Orang

40	Apakah perusahaan Saudara pernah merekrut karyawan dari perusahaan lain atau instansi pemerintah?	INSINYUR a. ☐ Ya b. ☐ Tidak	TEKNISI a. ☐ Ya b. ☐ Tidak	PEKERJA TERAMPIL a. ☐ Ya b. ☐ Tidak
		Apabila Saudara menjawab a. (Ya) sebutkan jumlah yang direkrut	*Apabila Saudara menjawab a. (Ya) sebutkan jumlah yang direkrut*	*Apabila Saudara menjawab a. (Ya) sebutkan jumlah yang direkrut*
		INSINYUR	TEKNISI	PEKERJA TERAMPIL
	a. April '93 – Maret '94	c. .....Orang	e. .....Orang	e. .....Orang
	b. April '92 – Maret '93	d. .....Orang	d. .....Orang	d. .....Orang
	c. April '91 – Maret '92	e. .....Orang	c. .....Orang	c. .....Orang
	d. April '90 – Maret '91	f. .....Orang	b. .....Orang	b. .....Orang
	e. April '89 – Maret '90	g. .....Orang	a. .....Orang	a. .....Orang
41	Jika Saudara merekrut karyawan dari perusahaan lain, dari sektor ekonomi mana mereka umumnya berasal ? *(pilih satu jawaban)*	INSINYUR a. ☐ Pertanian b. ☐ Pertambangan dan minyak c. ☐ Industri Pengolahan d. ☐ Listrik, gas dan air e. ☐ Konstruksi f. ☐ Hotel, restaurant, perdagangan besar, eceran g. ☐ Transportasi dan komunikasi h. ☐ Perbankan dan keuangan i. ☐ Pemerintahan dan militer j. ☐ Jasa	TEKNISI a. ☐ Pertanian b. ☐ Pertambangan dan minyak c. ☐ Industri Pengolahan d. ☐ Listrik, gas dan air e. ☐ Konstruksi f. ☐ Hotel, restaurant, perdagangan besar, eceran g. ☐ Transportasi dan komunikasi h. ☐ Perbankan dan keuangan i. ☐ Pemerintahan dan militer j. ☐ Jasa	PEKERJA TERAMPIL a. ☐ Pertanian b. ☐ Pertambangan dan minyak c. ☐ Industri Pengolahan d. ☐ Listrik, gas dan air e. ☐ Konstruksi f. ☐ Hotel, restaurant, perdagangan besar, eceran g. ☐ Transportasi dan komunikasi h. ☐ Perbankan dan keuangan i. ☐ Pemerintahan dan militer j. ☐ Jasa
42	Apakah perusahaan Saudara mempunyai rencana untuk merekrut karyawan ? *(pilih satu jawaban)*	a. ☐ Ya		b. ☐ Tidak

43	Apabila Ya, sebutkan rencana jumlah karyawan yang akan direkrut tahun 1995:	INSINYUR ..... orang	TEKNISI ..... orang	PEKERJA TERAMPIL ..... orang
44	Apakah Saudara memiliki rencana perekrutan untuk tahun 1996 atau sesudahnya ?	a. ☐ Ya		b. ☐ Tidak

BAGIAN IV. PELATIHAN

		INSINYUR *(lulusan perguruan tinggi dalam bidang teknik/engineering)*	TEKNISI *(lulusan D1, D2, D3 politeknik di bidang teknik/engineering)*	PEKERJA TERAMPIL *(lulusan SLTA yang bekerja dengan mesin atau komputer ATAU lulusan SLTP dengan pengalaman kerja selama 10 tahun di bidang teknik)*
45	Kualitas utama apa yang Saudara inginkan dari karyawan ? *(pilih dua jawaban untuk masing-masing kolom)*	INSINYUR a. ☐ Keterampilan praktis b. ☐ Pengetahuan teknis khusus c. ☐ Senang pada tantangan d. ☐ Inisiatip e. ☐ Ketekunan f. ☐ Kemampuan untuk mengembangkan keterampilan g. ☐ Kepemimpinan	TEKNISI a. ☐ Keterampilan praktis b. ☐ Pengetahuan teknis khusus c. ☐ Senang pada tantangan d. ☐ Inisiatip e. ☐ Ketekunan f. ☐ Kemampuan untuk mengembangkan keterampilan g. ☐ Kepemimpinan	PEKERJA TERAMPIL a. ☐ Keterampilan praktis b. ☐ Pengetahuan teknis khusus c. ☐ Senang pada tantangan d. ☐ Inisiatip e. ☐ Ketekunan f. ☐ Kemampuan untuk mengembangkan keterampilan g. ☐ Kepemimpinan
46	Apakah Saudara memiliki program pelatihan untuk para karyawan ? (tidak termasuk pelatihan untuk karyawan baru, seperti masa orientasi)	INSINYUR a. ☐ Ya b. ☐ Tidak	TEKNISI a. ☐ Ya b. ☐ Tidak	PEKERJA TERAMPIL a. ☐ Ya b. ☐ Tidak

Jika Saudara menjawab YA pada pertanyaan No. 46 di atas, silahkan menjawab pertanyaan berikut ini.
Jika Saudara menjawab TIDAK pada pertanyaan No. 46 di atas, lanjutkan ke bagian V hal 12.

		INSINYUR	TEKNISI	PEKERJA TERAMPIL
47	Siapakah yang paling sering memberikan pelatihan ? *(pilih satu atau dua jawaban)*	a. ☐ Staff perusahaan b. ☐ Instruktur yang datang ke perusahaan c. ☐ Sekolah atau perguruan tinggi d. ☐ Lembaga pelatihan swasta e. ☐ Lembaga pelatihan pemerintah f. ☐ Pelatihan di negara lain g. ☐ Lainnya: (sebutkan:)	a. ☐ Staff perusahaan b. ☐ Instruktur yang datang ke perusahaan c. ☐ Sekolah atau perguruan tinggi d. ☐ Lembaga pelatihan swasta e. ☐ Lembaga pelatihan pemerintah f. ☐ Pelatihan di negara lain g. ☐ Lainnya: (sebutkan.)	a. ☐ Staff perusahaan b. ☐ Instruktur yang datang ke perusahaan c. ☐ Sekolah atau perguruan tinggi d. ☐ Lembaga pelatihan swasta e. ☐ Lembaga pelatihan pemerintah f. ☐ Pelatihan di negara lain g. ☐ Lainnya: (sebutkan:)
48	Bentuk pelatihan yang paling sering dilakukan: *(pilih jawaban sesuai yang telah dilakukan)*	a. ☐ Ceramah atau konperensi b. ☐ Praktek kerja c. ☐ Praktek di luar kerja d. ☐ Lainnya sebutkan:	a. ☐ Ceramah atau konperensi b. ☐ Praktek kerja c. ☐ Praktek di luar kerja d. ☐ Lainnya sebutkan:	a. ☐ Ceramah atau konperensi b. ☐ Praktek kerja c. ☐ Praktek di luar kerja d. ☐ Lainnya sebutkan:
49	Topik apa yang paling sering diberikan dalam pelatihan ? *(pilih jawaban yang benar)*	a. ☐ Keterampilan teknik yang diperlukan langsung untuk pekerjaan b. ☐ Teknologi baru yang lebih maju c. ☐ Pengawasan mutu/ quality control d. ☐ Keahlian dalam manajemen produksi e. ☐ Keahlian dalam manajemen usaha/bisnis f. ☐ Lainnya: (sebutkan: .....)	a. ☐ Keterampilan teknik yang diperlukan langsung untuk pekerjaan b. ☐ Teknologi baru yang lebih maju c. ☐ Pengawasan mutu/ quality control d. ☐ Keahlian dalam manajemen produksi e. ☐ Keahlian dalam manajemen usaha/bisnis f. ☐ Lainnya: (sebutkan. .....)	a. ☐ Keterampilan teknik yang diperlukan langsung untuk pekerjaan b. ☐ Teknologi baru yang lebih maju c. ☐ Pengawasan mutu/ quality control d. ☐ Keahlian dalam manajemen produksi e. ☐ Keahlian dalam manajemen usaha/bisnis f. ☐ Lainnya: (sebutkan: .....)

50	Berapa kira - kira jumlah hari pelatihan per orang yang diberikan dalam setiap tahunnya ?	INSINYUR a. lulusan baru ..... hari b. karyawan lama; > 2 tahun lamanya (bukan lulusan baru) ..... hari	TEKNISI a. lulusan baru ..... hari b. karyawan lama; > 2 tahun lamanya (bukan lulusan baru) ..... hari	PEKERJA TERAMPIL a. lulusan baru ..... hari b. karyawan lama; > 2 tahun lamanya (bukan lulusan baru) ..... hari
51	Manfaat pelatihan untuk promosi karyawan *(pilih satu jawaban)*	INSINYUR a. ☐ Sangat penting b. ☐ Penting c. ☐ Bermanfaat d. ☐ Sedikit bermanfaat e. ☐ Tidak	TEKNISI a. ☐ Sangat penting b. ☐ Penting c. ☐ Bermanfaat d. ☐ Sedikit bermanfaat e. ☐ Tidak	PEKERJA TERAMPIL a. ☐ Sangat penting b. ☐ Penting c. ☐ Bermanfaat d. ☐ Sedikit bermanfaat e. ☐ Tidak
	V. KONDISI PEKERJAAN			
52	Apakah Saudara puas dengan tingkat keterampilan teknis karyawan ? *(pilih satu jawaban)*	INSINYUR a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas	TEKNISI a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas	PEKERJA TERAMPIL a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas
53	Apakah Saudara puas dengan motivasi kerja karyawan ? *(pilih satu jawaban)*	INSINYUR a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas	TEKNISI a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas	PEKERJA TERAMPIL a. ☐ Sangat puas c. ☐ Cukup puas c. ☐ Puas d. ☐ Kurang puas e. ☐ Tidak puas

54	Pada umumnya Insinyur melakukan pekerjaan di bidang rekayasa atau engineering, lulusan politeknik (D1, D2, D3) melakukan pekerjaan yang lebih bersifat teknis, dan lulusan sekolah menengah kejuruan menjadi pekerja terampil. Namun, kadangkala sejumlah karyawan melakukan pekerjaan yang lebih tinggi atau lebih rendah dari pendidikan mereka. Sebutkan jumlah karyawan yang bekerja pada jenjang pekerjaan yang ada, menurut tingkat pendidikan mereka:				
	Jenis pekerjaan yang berkaitan dengan	LATAR BELAKANG PENDIDIKAN			
		Perguruan Tinggi	Politeknik	SLTA	Lainnya
	Pekerjaan rekayasa/engineering				
	Pekerjaan bersifat teknis				
	Pekerjaan terampil				

CONTOH DAN CARA MENJAWAB PERTANYAAN NO. 55, 56, 57

- Setiap baris merupakan jenjang pekerjaan. Dan tiap kolom menjelaskan bidang studi.
- Misalnya perusahaan ini memiliki 4 insinyur yang bidang pekerjaannya berkaitan dengan listrik. Dari 4 insinyur tersebut:
  2 insinyur tamatan teknik listrik arus kuat
  1 insinyur tamatan teknik elektro
  1 insinyur tamatan teknik fisika

Apabila perusahaan ini tidak memiliki insinyur yang bekerja di bidang elektronika atau telekomunikasi, maka tulis 0 pada kolom total.

	LATAR BELAKANG PENDIDIKAN PARA INSINYUR														
	TOTAL INSINYUR	BIOLOGI & AGRONOMI	KIMIA	ARSITEKTUR	SIPIL	LISTRIK ARUS KUAT	LISTRIK ELEKTRONIK	KOMPUTER	MESIN	METALURGI	PERTAMBANGAN&MINYAK	PENERBANGAN	INDUSTRI	NUKLIR	LAIN-LAIN
Insinyur Listrik Arus Kuat	4					2	1								1
Insinyur Elektronik dan Telekomunikasi	0														

55

JUMLAH INSINYUR
(lulusan perguruan tinggi bidang teknik/rekayasa)

1) Pada kolom pertama, sebutkan jumlah insinyur untuk setiap jenis pekerjaan.
2) Pada kolom kedua, sebutkan pula jumlah insinyur yang melakukan pekerjaan sesuai dengan latar belakang pendidikan mereka.

JENIS ATAU BIDANG PEKERJAAN	LATAR BELAKANG PENDIDIKAN PARA INSINYUR														
	TOTAL INSINYUR	BIOLOGI & AGRONOMI	KIMIA	ARSITEKTUR	SIPIL	LISTRIK ARUS KUAT	LISTRIK ELEKTRONIK	KOMPUTER	MESIN	METALURGI	PERTAMBANGAN & MINYA	PENERBANGAN	INDUSTRI	NUKLIR	LAIN LAIN
Listrik Arus Kuat															
Elektronik dan Telekomunikasi															
Ahli Komputer Profesional															
Insinyur Mekanik															
Ahli Metalurgi															
Insinyur Kimia															
Insinyur Pertambangan															
Insinyur Sipil															
Ahli pembuat peta dan surveyor															
Arsitek, perencanaan kota dan lalu lintas															
Ahli biologi dan Agronomi															
Peneliti ilmiah															
Manajer Operasi & Operasi															
Manajer departemen (non produksi)															
Presiden direktur atau direktur perusahaan															
Lain-Lain (Sebutkan yang terbanyak:)															
TOTAL INSINYUR															

56

JUMLAH TEKNISI
(LULUSAN D1, D2, D3 POLITEKNIK)

1) Pada kolom pertama, sebutkan jumlah teknisi untuk setiap jenis pekerjaan.
2) Pada kolom kedua, sebutkan jumlah teknisi yang melakukan pekerjaan sesuai dengan latar belakang pendidikan mereka.

JENIS PEKERJAAN ATAU BIDANG	LATAR BELAKANG PENDIDIKAN PARA TEKNISI															
	TOTAL TEKNISI	BIOLOGI & AGRONOMI	KIMIA	ARSITEKTUR	SIPIL	LISTRIK ARUS KUAT	LISTRIK ELEKTRONIK	KOMPUTER	MESIN	METALURGI	PERTAMBANGAN&MINYA	PENERBANGAN	INDUSTRI	NUKLIR	LAIN LAIN
Teknisi Kimia															
Teknisi Sipil															
Teknisi Listik Arus Kuat															
Operator Perlengkapan Listrik dan Optik															
Teknisi mekanik															
Teknisi Metalurgi															
Teknisi Pertambangan															
Teknisi Telekomunikasi dan Komunikasi															
Teknisi Pendukung Penelitian Ilmiah															
Teknisi/Ahli Madya Gambar															
Teknisi Komputer															
Teknisi Perkapalan dan Pesawat Terbang															
Pengawas dan Keamanan Kerja															
Teknisi Pertanian, Biologi dan Kesehatan															
Manajer Operasi & Produksi															
Manajer Departemen (non-produksi)															
Presiden Direktur atau Direktur Perusahaan															
Lain-lain (Sebutkan yang terbanyak:)															
TOTAL LULUSAN D1, D2, D3 POLITEKNIK															

57

JUMLAH PEKERJA TERAMPIL
(lulusan sekolah menengah atas yang bekerja dengan mesin atau komputer
ATAU
lulusan sekolah menengah pertama dengan pengalaman bekerja 10 tahun di bidang teknik)

1) Pada kolom pertama, sebutkan jumlah pekerja terampil untuk setiap jenis pekerjaan
2) Pada kolom kedua, sebutkan jumlah teknisi yang melakukan pekerjaan sesuai dengan latar belakang pendidikan mereka.

		LATAR BELAKANG PENDIDIKAN PEKERJA TERAMPIL			
		Sekolah Menengah Atas	Sekolah Kejuruan	Sekolah Menengah Pertama dengan Pengalaman 10 tahun Di Bidang Teknik	Lain–lain
JENIS ATAU BIDANG PEKERJAAN	Pekerja Terampil Pertanian				
	Pekerja Terampil Pertambangan dan Penggalian				
	Pekerja Terampil Konstruksi				
	Pekerja Terampil Logam				
	Mekanik Mesin				
	Operator Komputer				
	Mekanik Perlengkapan Listrik Arus Kuat dan Lemah				
	Pekerja Terampil Pengolahan Tanah Liat, Kaca dan Logam				
	Manajer Operasi dan Produksi				
	Manajer Departemen non produksi)				
	Presiden Direktur atau direktur Perusahaan				
	Lain–lain (sebutkan yang terbanyak)				
	TOTAL PEKERJA TERAMPIL DI BIDANG TEKNIK				

Terimakasih kami ucapkan atas partisipasi Saudara dalam survei ini. Kontribusi Saudara sangat bermanfaat bagi perencanaan tenaga kerja di Indonesia. Komentar/saran Saudara yang berkaitan dengan perencanaan dan pengembangan tenaga kerja insinyur, teknisi dan pekerja terampil di Indonesia

Kuesioner ini diisi dan diketahui oleh wakil perusahaan, yakni:	Nama lengkap: ..... Tanda tangan:	Stempel/cap Perusahaan:

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Q55, Q56 % OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES

THEIR EDUCATION SPECIALIZATION (LARGE ESTABLISHMENTS).....58

Q56 % OF TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION.....59

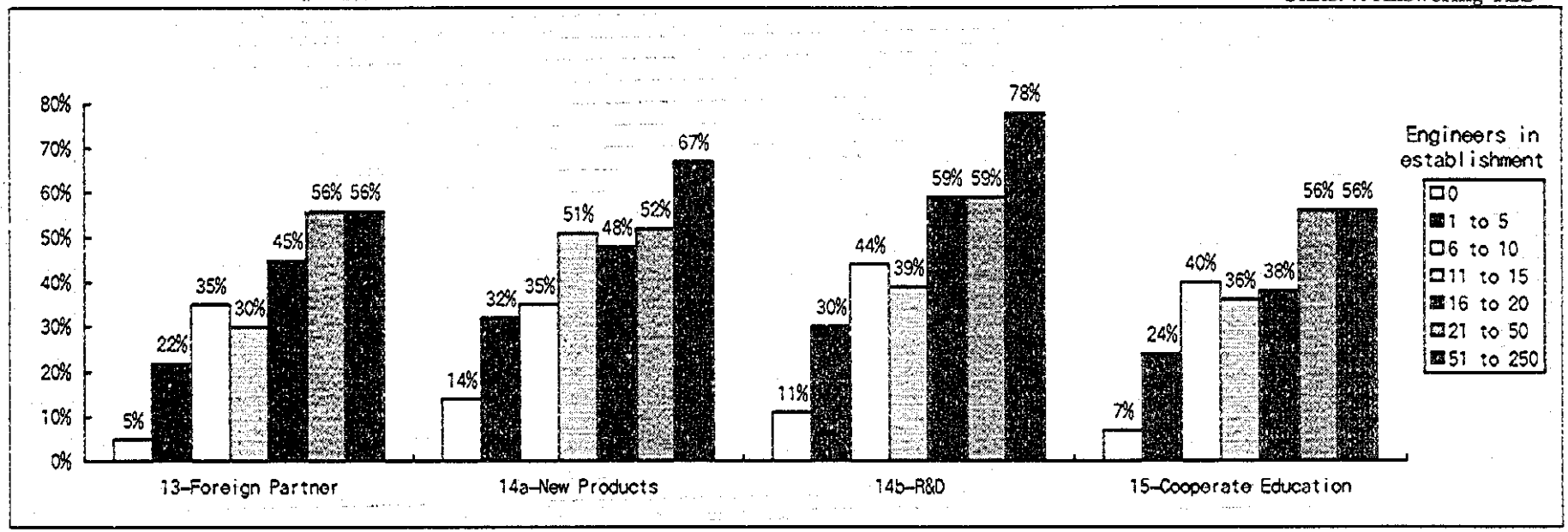
Q55, Q56 % OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES

THEIR EDUCATION SPECIALIZATION (Medium Enterprises).....60

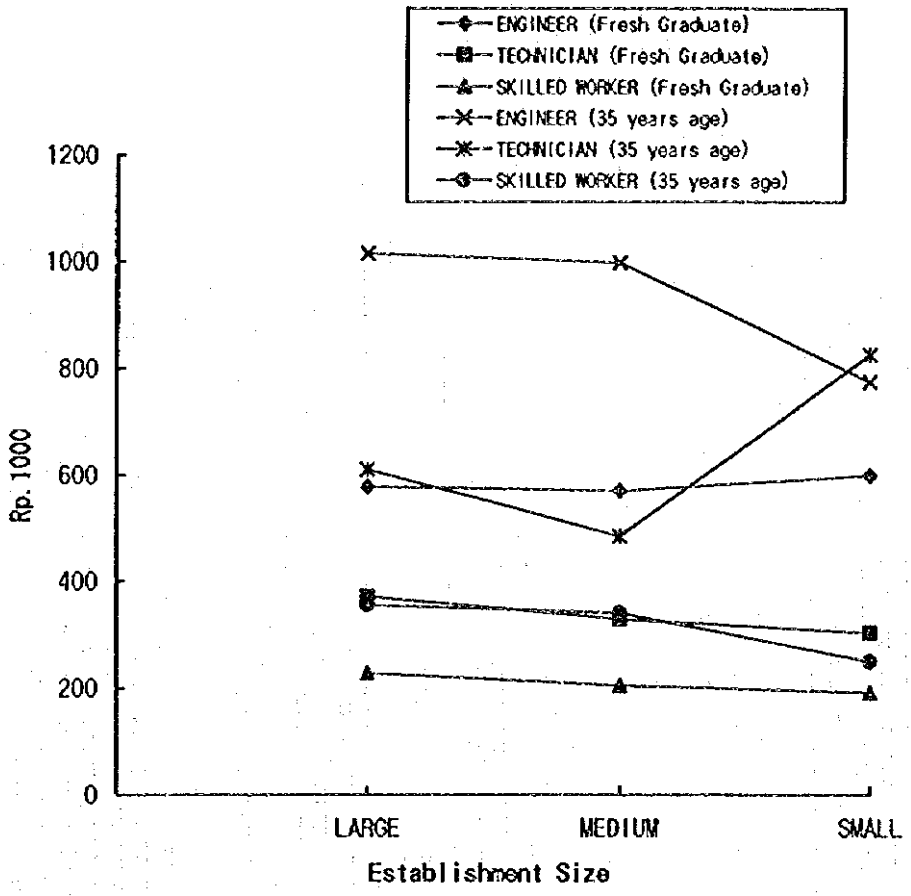
Q13, Q14, Q15 (RESEARCH & DEVELOPMENT)

13: Does your enterprise use technology from a foreign partner?
14a: Does your enterprise develop new products?
14b: Does your enterprise do R&D?
15: Does your enterprise cooperate with educational institutions to introduce advanced technology?

Units: % Answering YES



Q28-31 AVERAGE SALARY + BENEFITS PER MONTH (Fresh Graduates & 35 Years of Age)

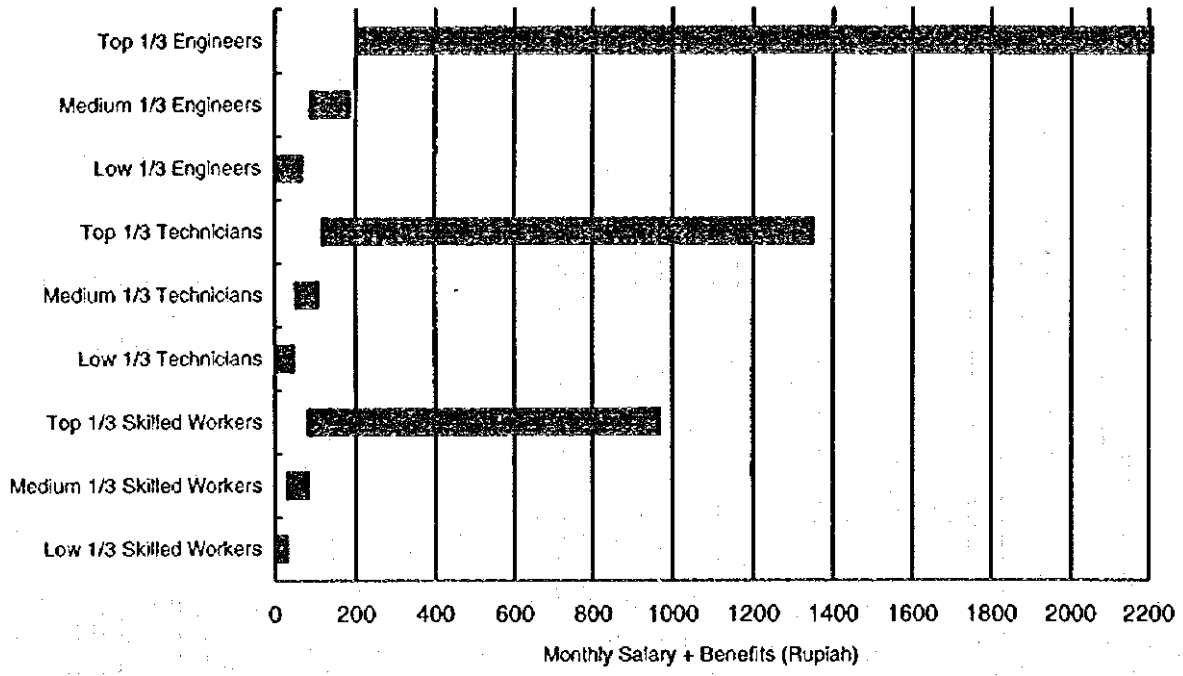


SALARY + BENEFITS (Units: Rp. 1000 / Month)

	LARGE	MEDIUM	SMALL
ENGINEER (Fresh Graduate)	578	569	598
TECHNICIAN (Fresh Graduate)	371	328	303
SKILLED WORKER (Fresh Graduate)	227	204	192
ENGINEER (35 years age)	1,015	998	775
TECHNICIAN (35 years age)	610	484	826
SKILLED WORKER (35 years age)	354	340	249

Q28-29 SALARY + BENEFITS (Fresh Graduates)

(Units: Rp. 1000 / Month)



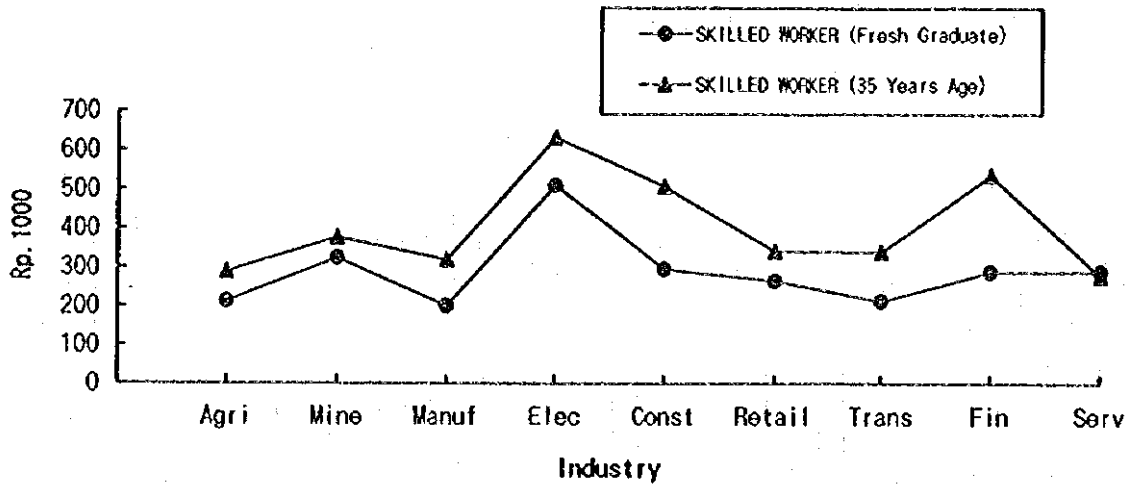
SALARY + BENEFITS (Fresh Graduates)

(Units: Rp. 1000 / Month)

Salary Group	Lowest	Highest
Top 1/3 Engineers	200	2,200
Medium 1/3 Engineers	86	194
Low 1/3 Engineers	0	85
Top 1/3 Technicians	125	1,375
Medium 1/3 Technicians	50	122
Low 1/3 Technicians	0	46
Low 1/3 Skilled Workers	0	29
Medium 1/3 Skilled Workers	29	78
Top 1/3 Skilled Workers	80	980

Q28-31 AVERAGE SALARY + BENEFITS (Skilled Workers - Large Enterprises)

(Units: Rp. 1000 / Month)



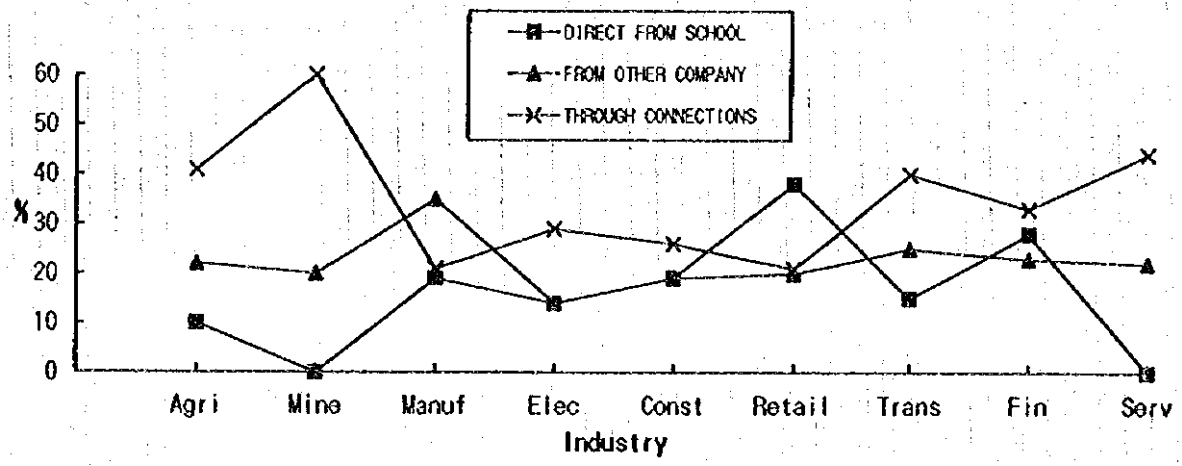
LARGE ESTABLISHMENT - SKILLED WORKERS SALARY + BENEFITS

(Units: Rp. 1000 / Month)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
SKILLED WORKER (Fresh Graduate)	213	324	201	510	295	265	213	288	289
SKILLED WORKER (35 Years Age)	289	376	319	632	507	340	339	536	277

Q32 RECRUITING METHODS (Skilled Workers in Large Establishments)

(Units: % recruited by each method)



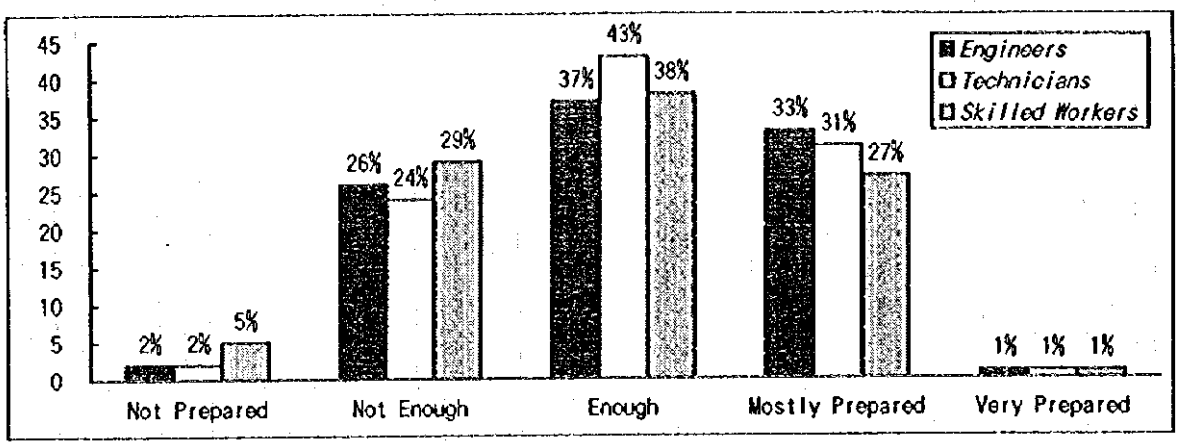
RECRUITING METHODS (Skilled Workers in Large Establishments)

(Units: %)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
DIRECT FROM SCHOOL	10	0	19	14	19	38	15	28	0
FROM OTHER COMPANY	22	20	35	14	19	20	25	23	22
THROUGH CONNECTIONS	41	60	21	29	26	21	40	33	44

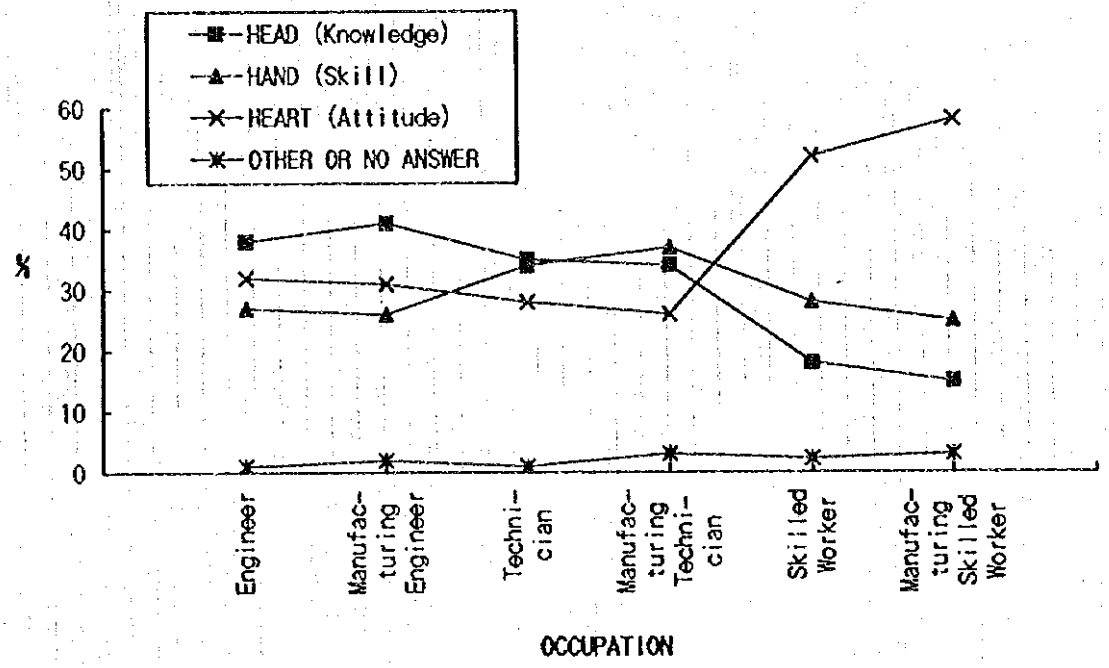
Q33 ARE EMPLOYEES PREPARED FOR WORK BY THEIR EDUCATION?

(Units: % of enterprises giving this response)



Q34 NECESSARY IMPROVEMENTS FOR NEW GRADUATES

(Units: % of enterprises giving this response)



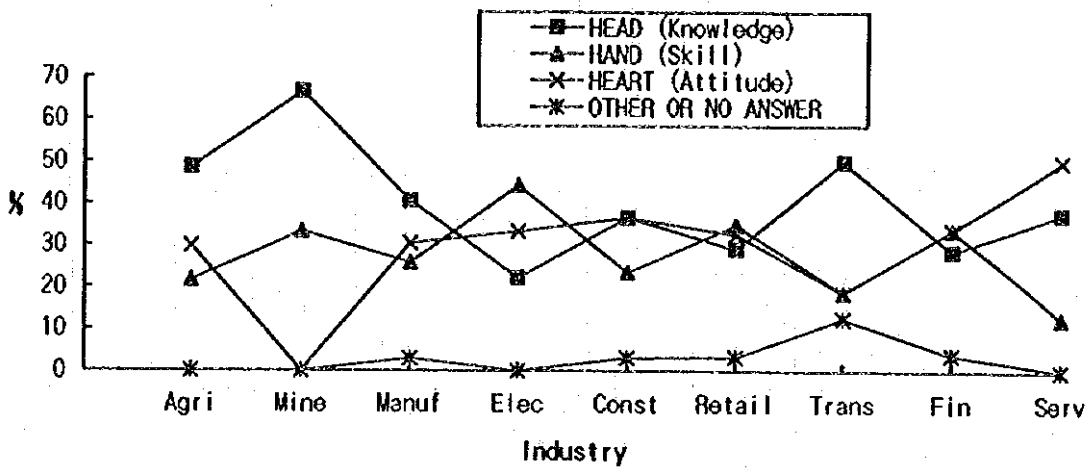
NECESSARY IMPROVEMENT FOR GRADUATES

(Units: %)

	Engineer	Manufacturing Engineer	Technician	Manufacturing Technician	Skilled Worker	Manufacturing Skilled Worker
HEAD (Knowledge)	38	41	35	34	18	15
HAND (Skill)	27	26	34	37	28	25
HEART (Attitude)	32	31	28	26	52	58
OTHER OR NO ANSWER	1	2	1	3	2	3

Q34 NECESSARY IMPROVEMENTS FOR GRADUATES (ENGINEERS)

(Units: % of enterprises giving this response)



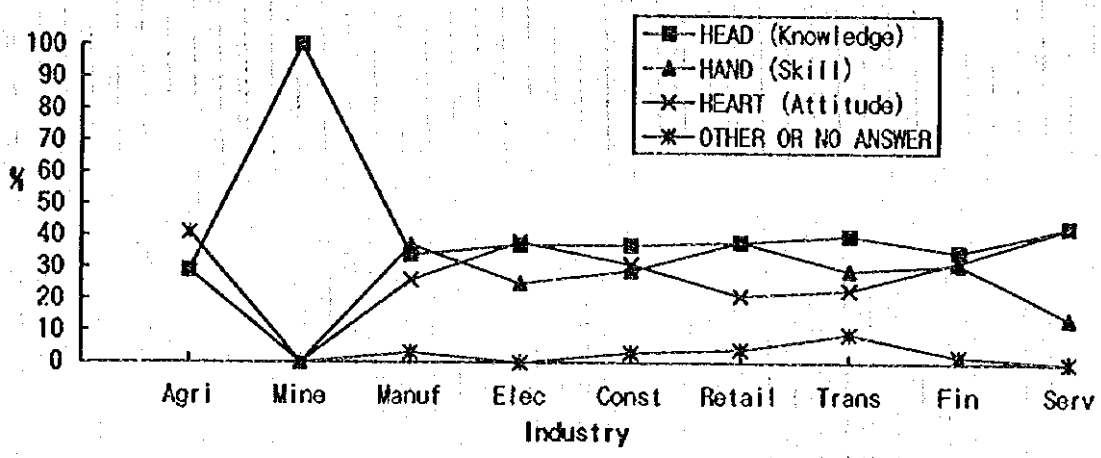
NECESSARY IMPROVEMENT FOR GRADUATES (ENGINEERS)

(Units: %)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
HEAD (Knowledge)	49	67	41	22	37	29	50	29	38
HAND (Skill)	22	33	26	44	24	35	19	34	13
HEART (Attitude)	30	0	31	33	37	33	19	34	50
OTHER OR NO ANSWER	0	0	3	0	3	3	13	4	0

Q34 NECESSARY IMPROVEMENTS FOR GRADUATES (TECHNICIANS)

(Units: % of enterprises giving this response)



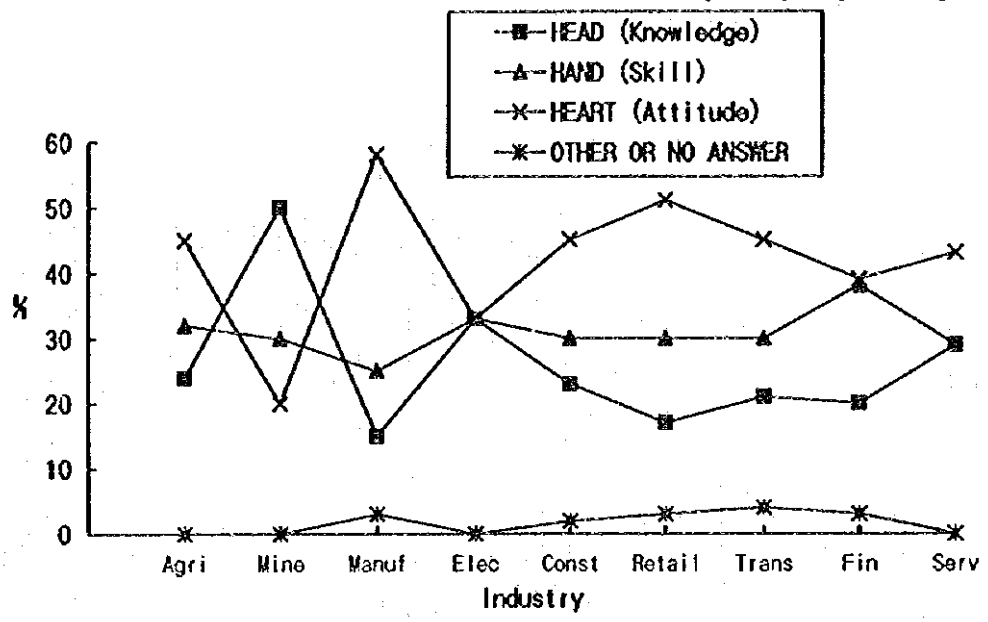
NECESSARY IMPROVEMENTS FOR GRADUATES (TECHNICIANS)

(Units: %)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
HEAD (Knowledge)	29	100	34	37	37	38	40	35	43
HAND (Skill)	29	0	37	25	29	38	29	31	14
HEART (Attitude)	41	0	26	38	31	21	23	32	43
OTHER OR NO ANSWER	41	0	3	0	3	4	9	2	0

Q34 NECESSARY IMPROVEMENTS FOR GRADUATES (SKILLED WORKERS)

(Units: % of enterprises giving this response)



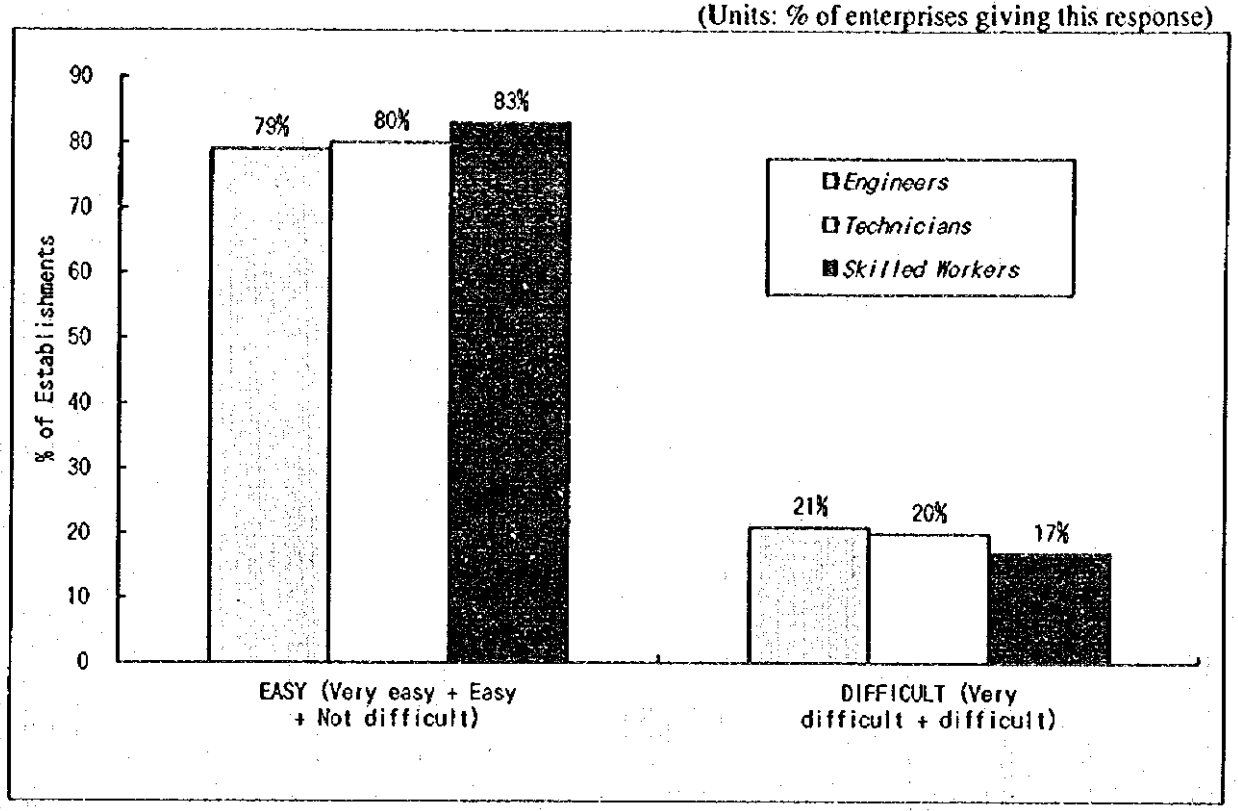
NECESSARY IMPROVEMENTS FOR GRADUATES (SKILLED WORKERS)

(Units: %)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
HEAD (Knowledge)	24	50	15	33	23	17	21	20	29
HAND (Skill)	32	30	25	33	30	30	30	38	29
HEART (Attitude)	45	20	58	33	45	51	45	39	43
OTHER OR NO ANSWER	0	0	3	0	2	3	4	3	0

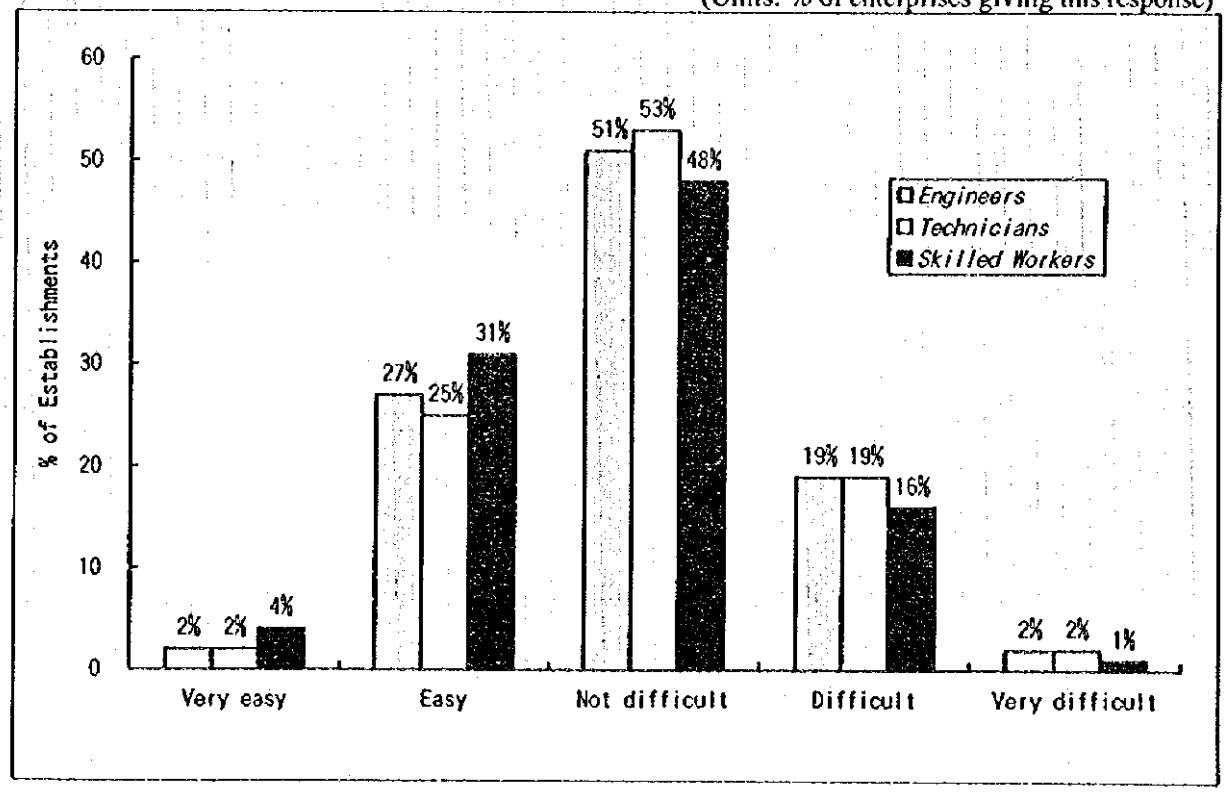
Q35 Is it easy for your enterprise to recruit employees in sufficient QUANTITY?

(Units: % of enterprises giving this response)



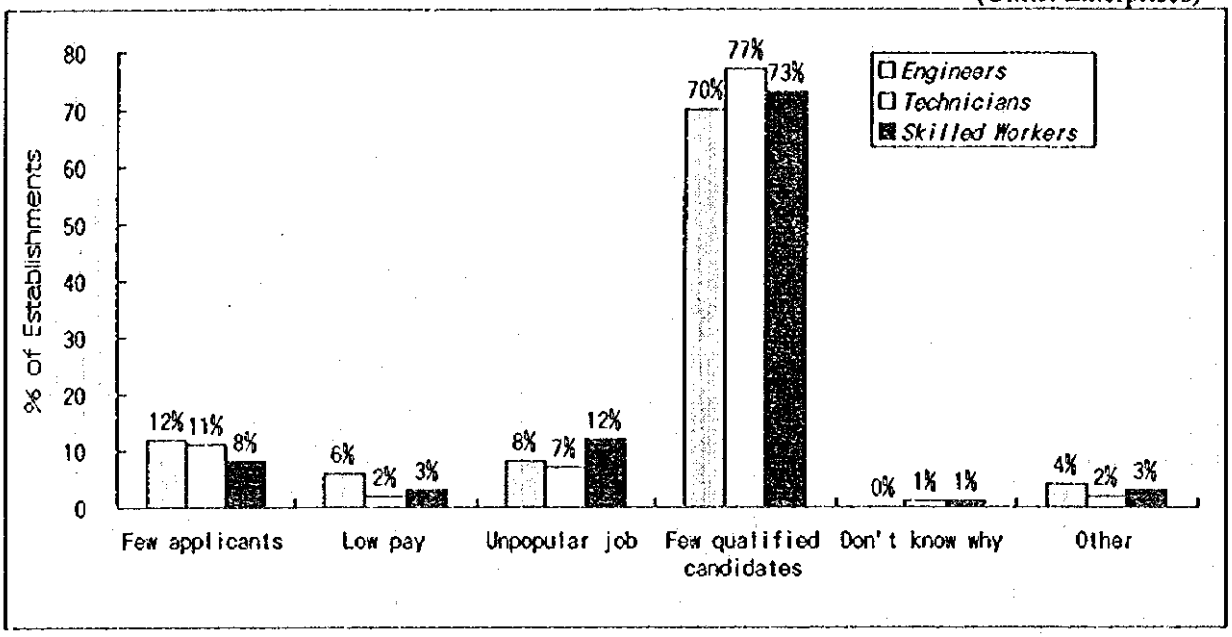
Q35 Is it easy for your enterprise to recruit employees in sufficient QUANTITY?

(Units: % of enterprises giving this response)



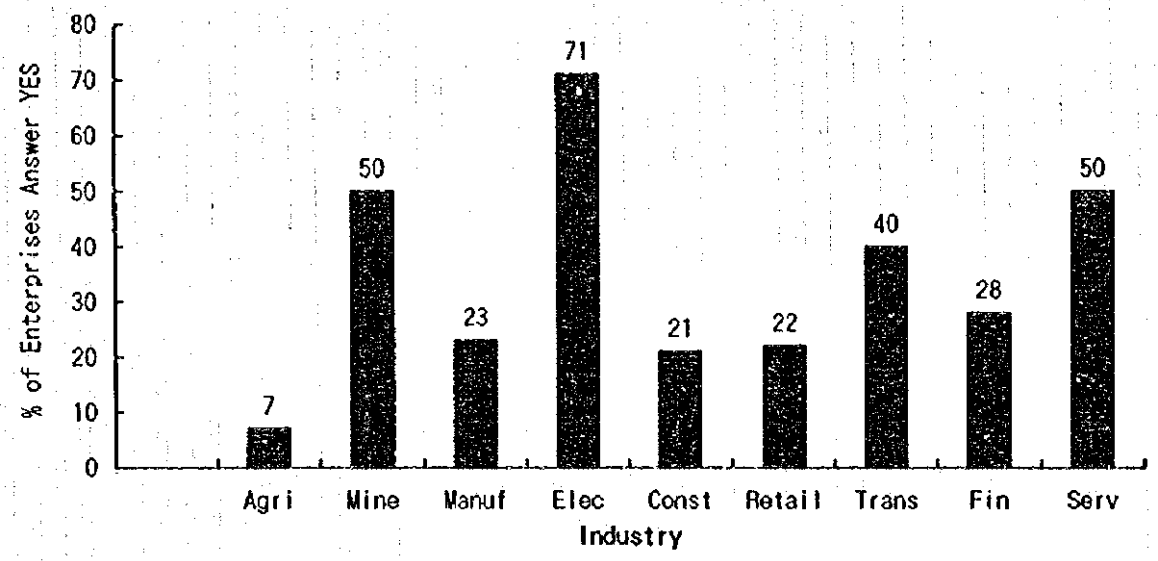
Q35: REASON it is difficult to recruit employees in sufficient QUANTITY?

(Units: Enterprises)



Q35 Is it difficult for your enterprise to recruit employees in sufficient QUANTITY?

(Large Enterprises Only) (Units: % of Enterprises answering YES)

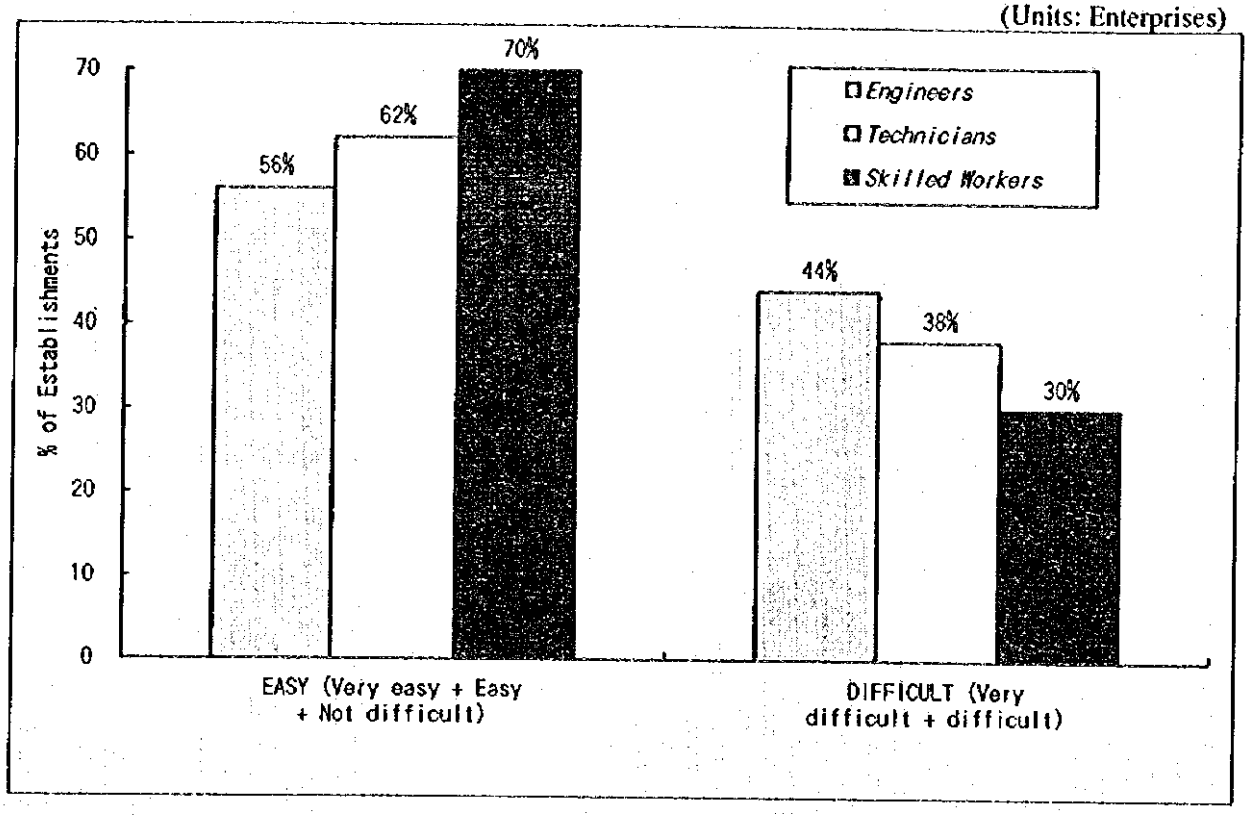


% of Enterprises Which Say it is Difficult to Recruit Employees in Sufficient Quantity

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	7	50	23	71	21	22	40	28	50

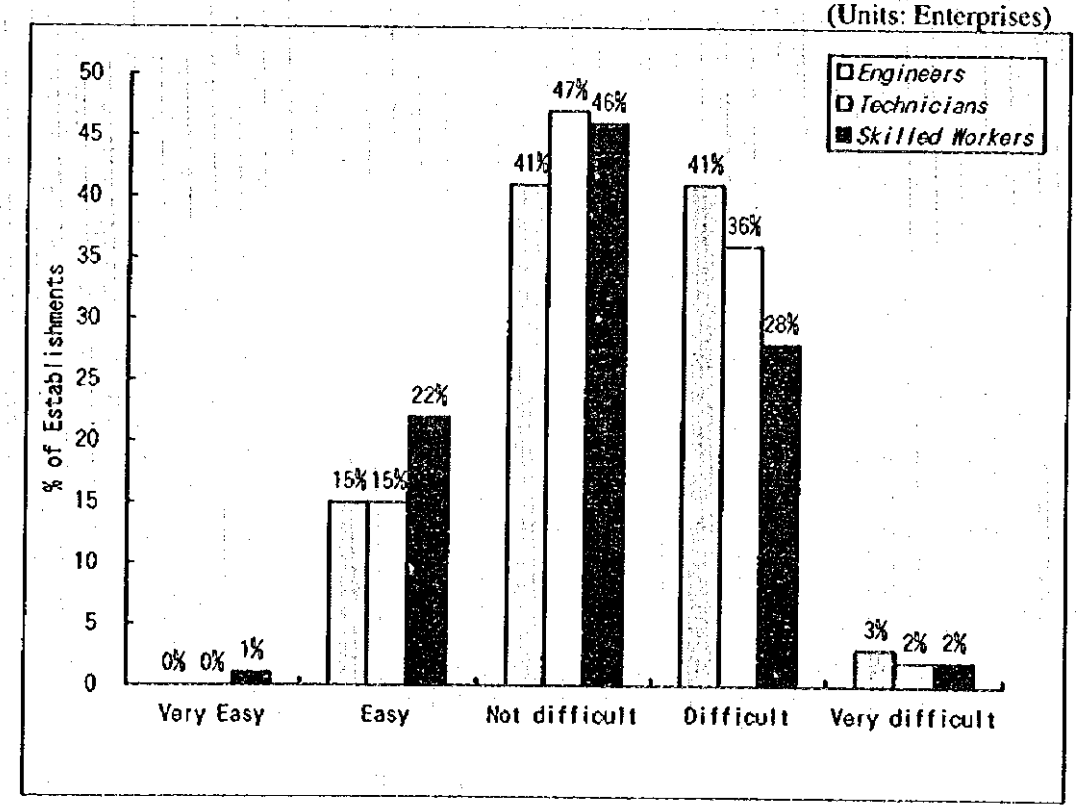
Q36: Is it easy for your enterprise to recruit employees in sufficient QUALITY?

(Units: Enterprises)



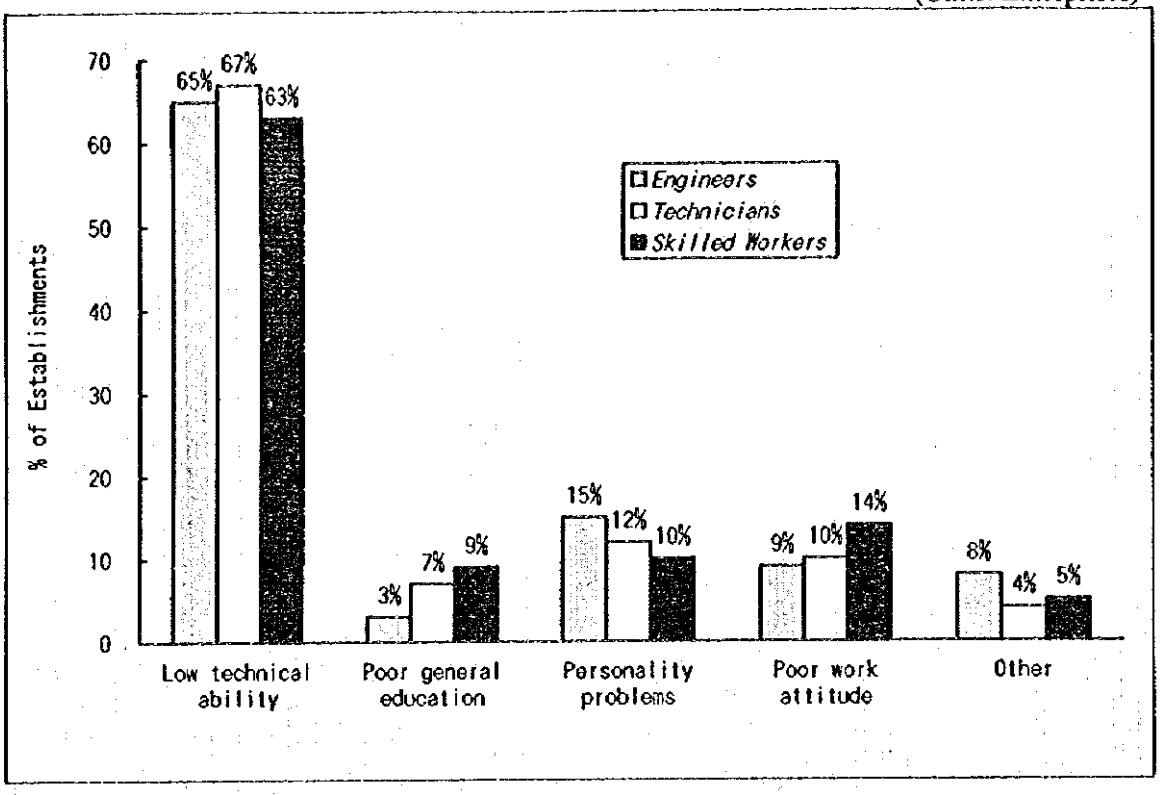
Q36: Is it easy for your enterprise to recruit employees in sufficient QUALITY?

(Units: Enterprises)



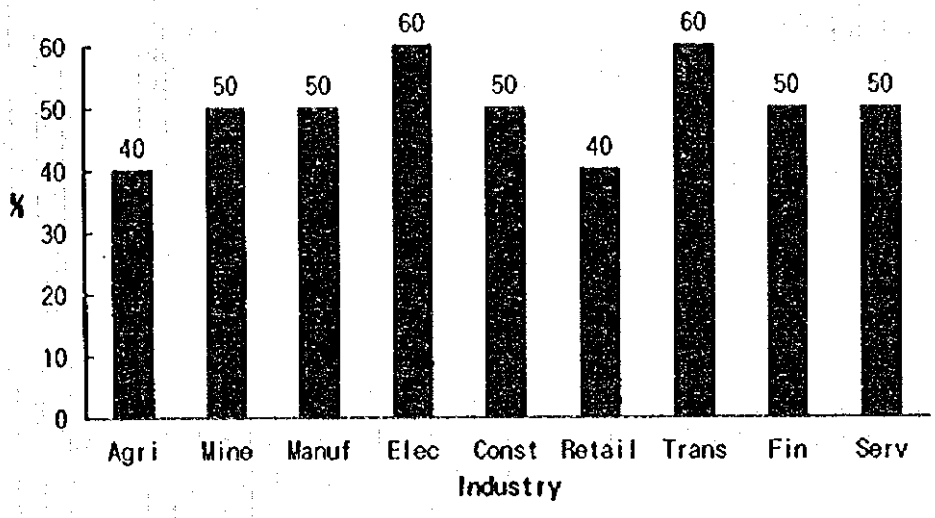
Q36: REASON it is difficult to recruit employees in sufficient QUALITY?

(Units: Enterprises)



Q36: Is it easy for your enterprise to recruit ENGINEERS in sufficient QUALITY?

(Units: % of large enterprises answering "very easy", "easy", or "not difficult")



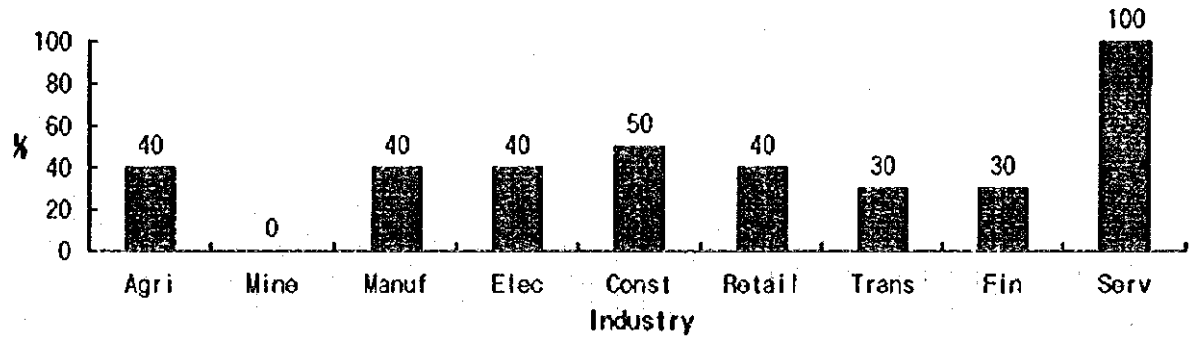
EASY TO RECRUIT QUALITY ENGINEERS (Large enterprises)

(Units: % of Enterprises answering "very easy", "easy", or "not difficult")

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	40	50	50	60	50	40	60	50	50

Q36: Is it easy for your enterprise to recruit TECHNICIANS in sufficient QUALITY?

(Units: % of large enterprises answering "very easy", "easy", or "not difficult")



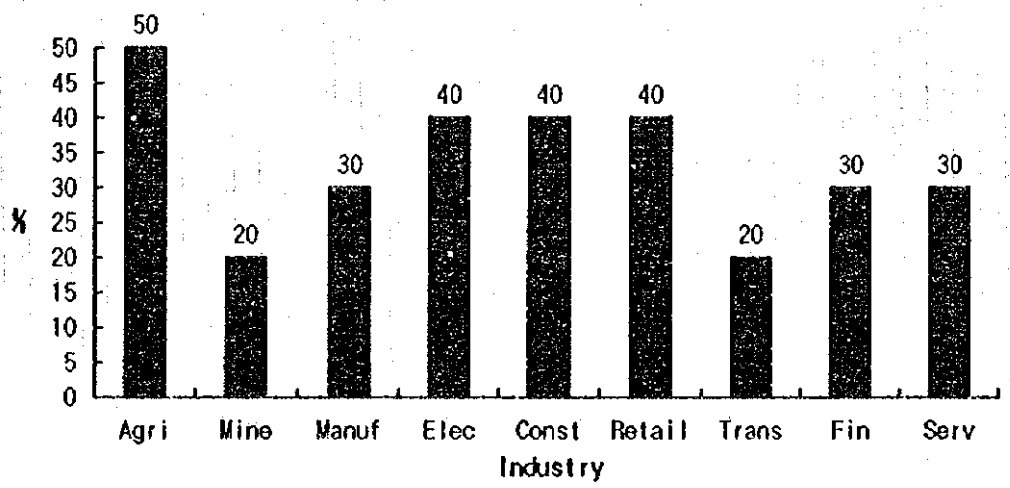
EASY TO RECRUIT QUALITY TECHNICIANS

(Units: % of large enterprises answering "very easy", "easy", or "not difficult")

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	40	0	40	40	50	40	30	30	100

Q36: Is it easy for your enterprise to recruit SKILLED WORKERS in sufficient QUALITY?

(Units: % of large enterprises answering "very easy", "easy", or "not difficult")



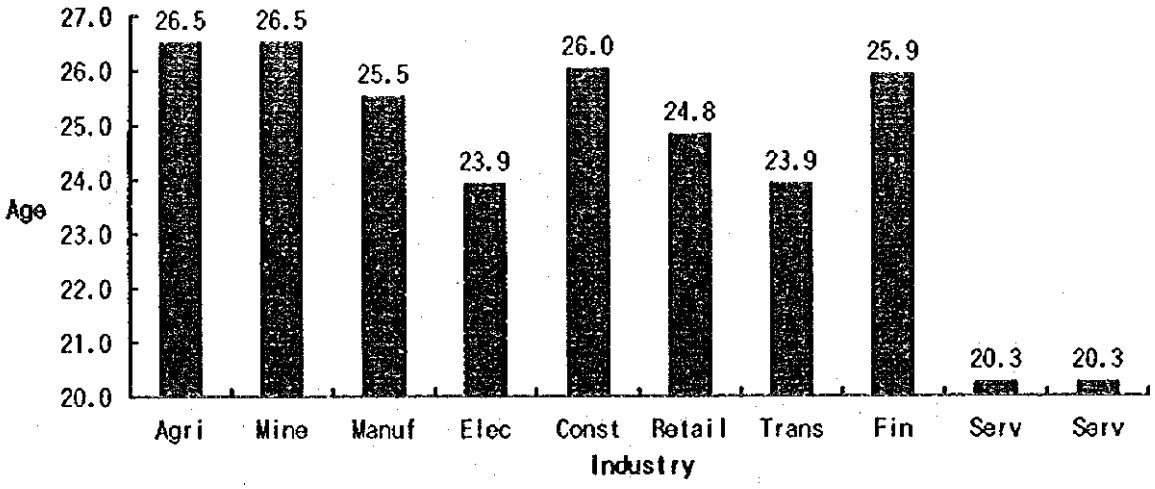
RECRUIT QUALITY SKILLED WORKERS

(Units: % of large enterprises answering "very easy", "easy", or "not difficult")

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	50	20	30	40	40	40	20	30	30

Q38 Average Age of Engineer Recruits in Large Establishments

(Units: Years)



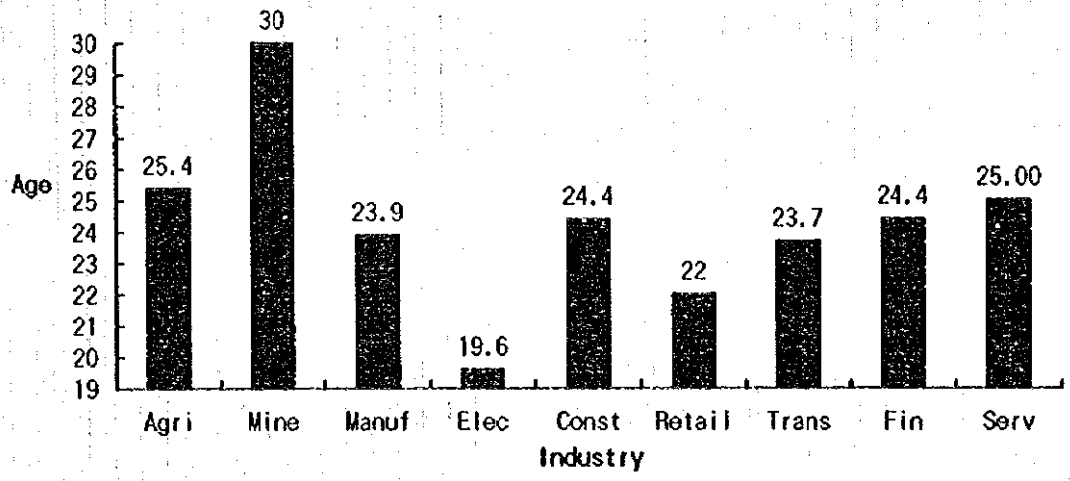
Average Age of Engineer Recruits in Large Establishments

(Units: Years)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	26.5	26.5	25.5	23.9	26.0	24.8	23.9	25.9	20.3

Q38 Average Age of Technician Recruits in Large Establishments

(Units: Years)



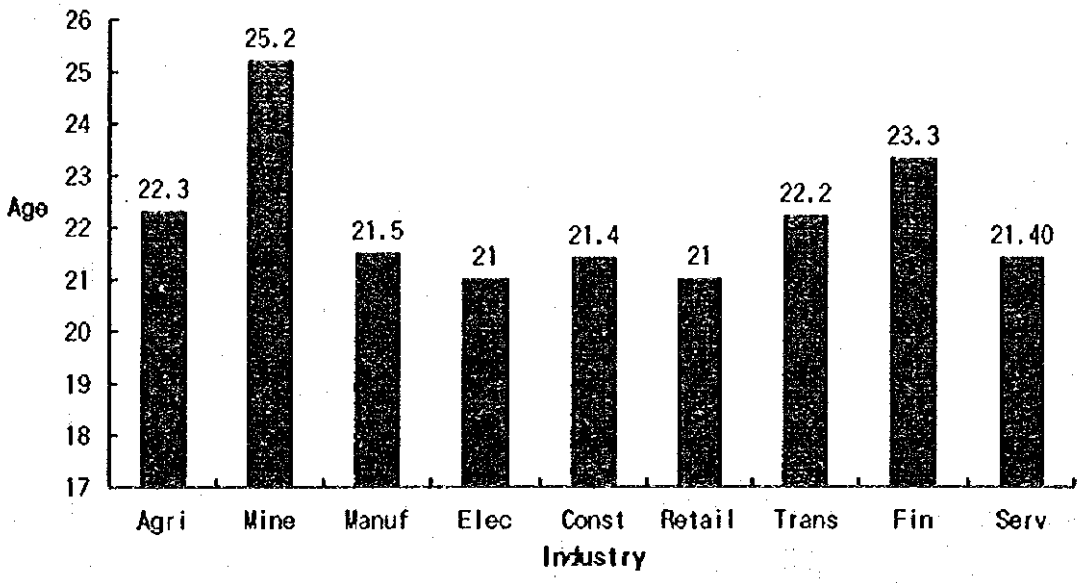
Average Age of Technician Recruits in Large Establishments

(Units: Years)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	25.4	30.0	23.9	19.6	24.4	22.0	23.7	24.4	25.0

Q38 Average Age of Skilled Worker Recruits in Large Establishments

(Units: Years)

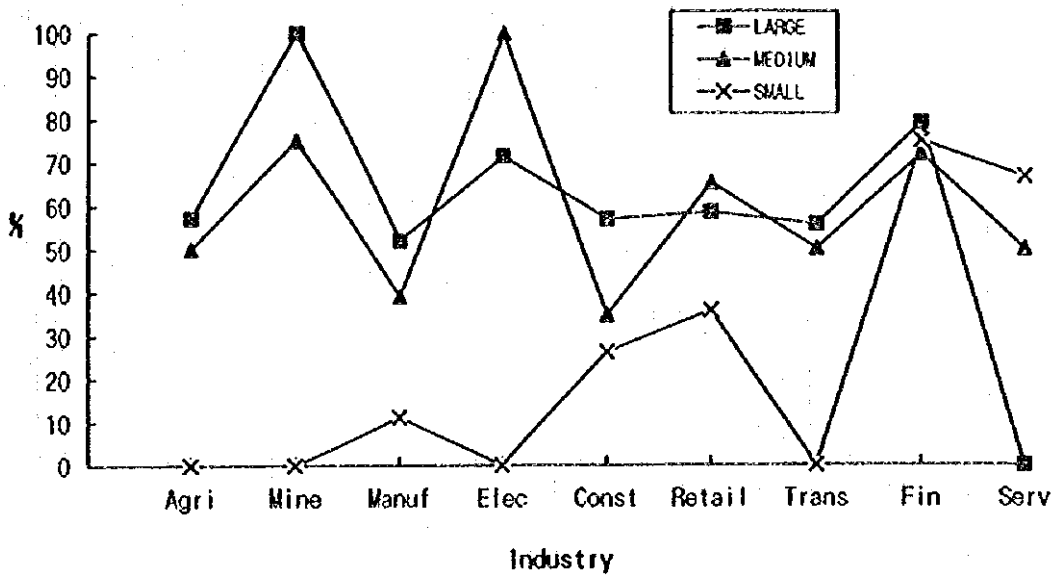


Average Age of Skilled Worker Recruits in Large Establishments

(Units: Years)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	22.3	25.2	21.5	21.0	21.4	21.0	22.2	23.3	21.4

Q46 % of Establishments with a Training Program for ENGINEERS

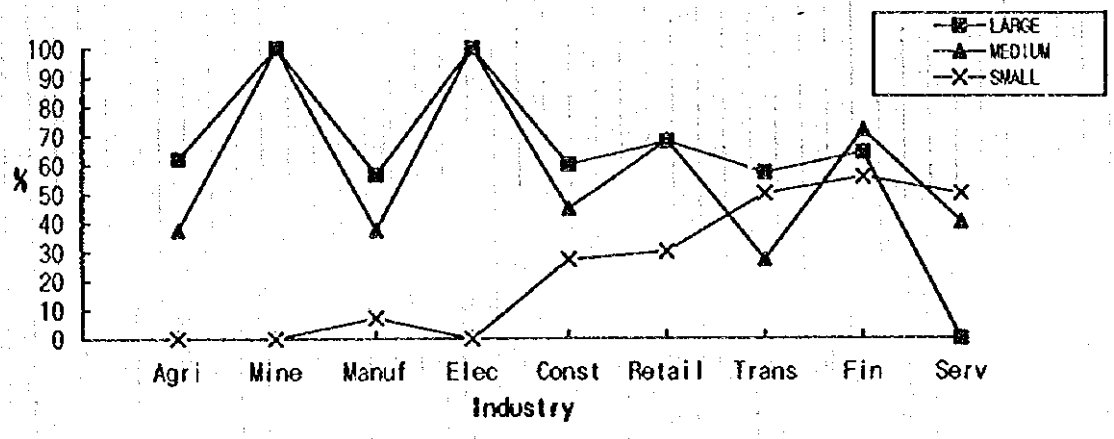


Training Program for ENGINEERS

(Units: % of Enterprises)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	57	100	52	71	57	59	56	79	0
MEDIUM	50	75	39	100	35	65	50	72	50
SMALL	0	0	11	0	26	36	0	75	67

Q46 % of Establishments with a Training Program for TECHNICIANS

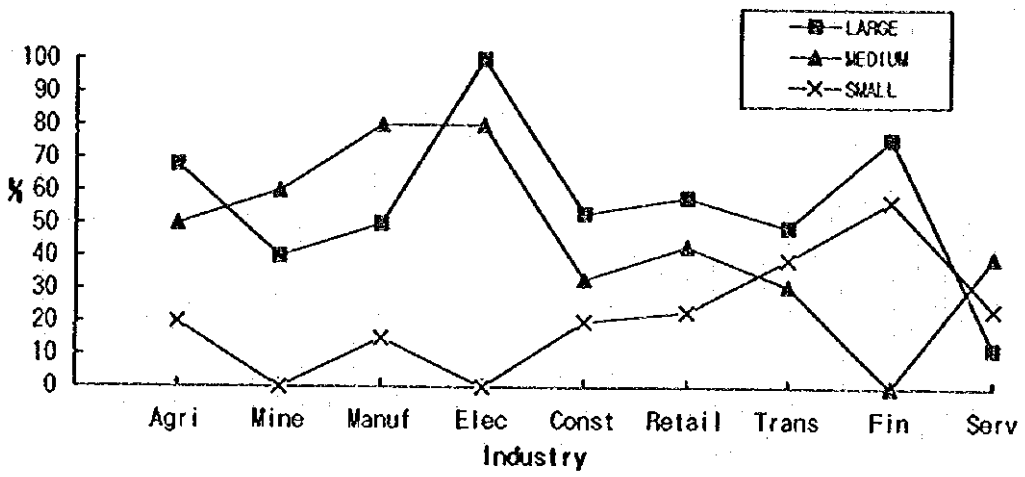


Training Program for TECHNICIANS

(Units: % of Enterprises)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	62	100	57	100	60	68	57	64	0
MEDIUM	38	100	38	100	45	68	27	72	40
SMALL	0	0	7	0	27	30	50	56	50

Q46 % of Establishments with a Training Program for SKILLED WORKERS

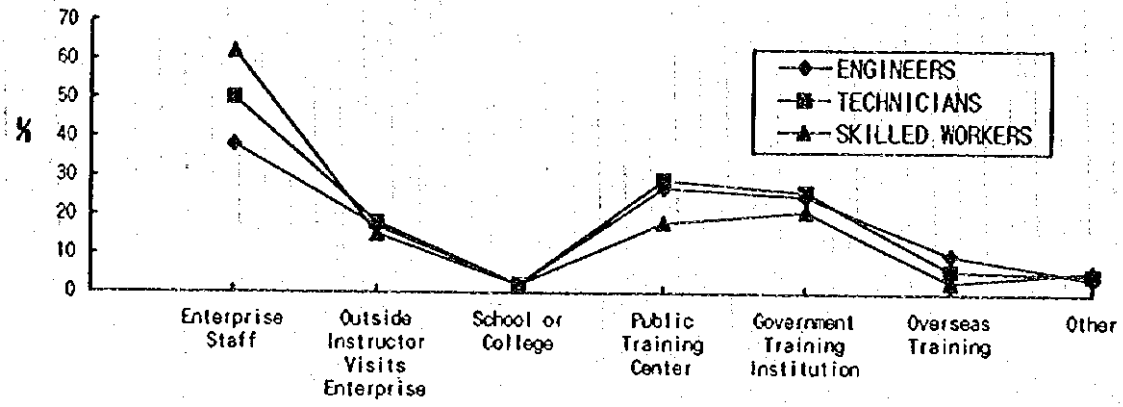


Training Program for SKILLED WORKERS

(Units: % of Enterprises)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	68	40	50	100	53	58	49	76	12
MEDIUM	50	60	80	80	33	43	31	0	40
SMALL	20	0	15	0	20	23	39	57	24

Q47 WHO PROVIDES TRAINING IN ESTABLISHMENT?

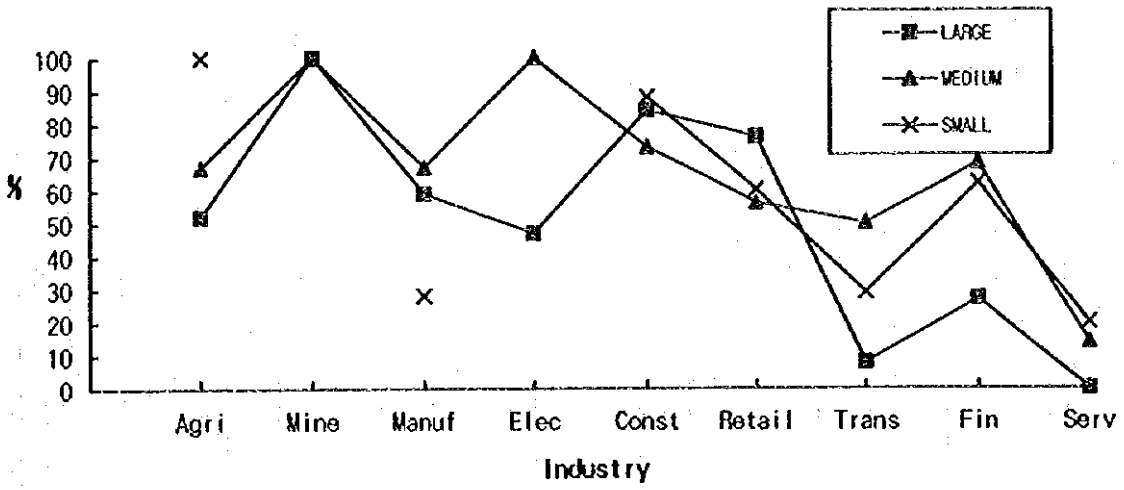


WHO PROVIDES TRAINING?

(Units: % of enterprises giving this response)

	ENGINEERS	TECHNICIANS	SKILLED WORKERS
Enterprise Staff	38	50	62
Outside Instructor Visits Enterprise	17	18	15
School or College	2	2	2
Public Training Center	27	29	18
Government Training Institution	25	26	21
Overseas Training	10	6	3
Other	4	5	6

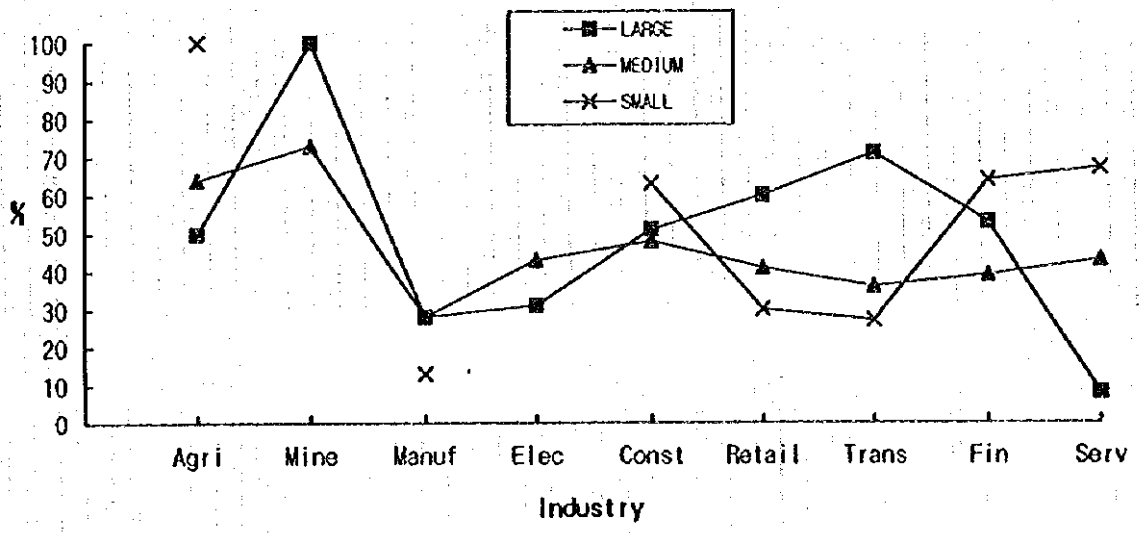
Q54 % OF UNIVERSITY ENGINEER GRADUATES WORKING AS ENGINEERS



% OF UNIVERSITY ENGINEER GRADUATES WORKING AS ENGINEERS

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	52	100	59	47	84	76	8	27	0
MEDIUM	67	100	67	100	73	56	50	68	14
SMALL	100	-	28	-	88	60	29	62	20

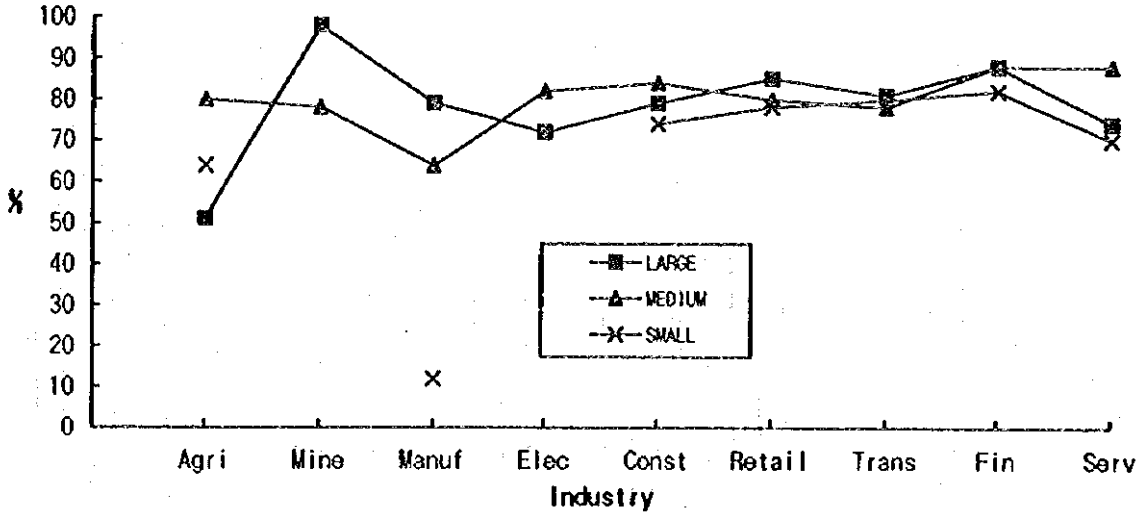
Q54 % OF POLYTECHNIC GRADUATES WORKING AS TECHNICIANS



% OF POLYTECHNIC GRADUATES WORKING AS TECHNICIANS

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	50	100	28	31	51	60	71	53	8
MEDIUM	64	73	28	43	48	41	36	39	43
SMALL	100	-	13	-	63	30	27	64	67

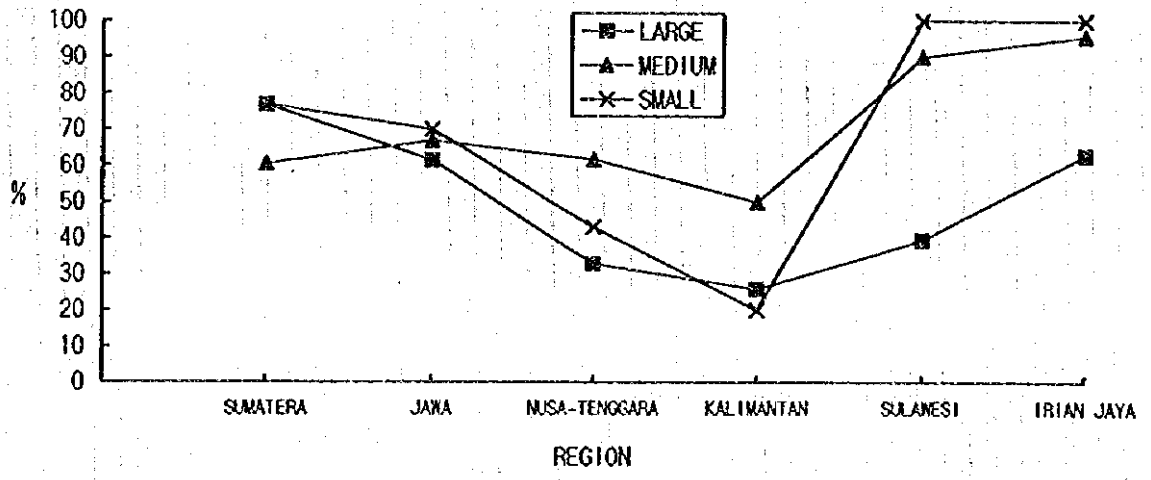
Q54 % OF HIGH SCHOOL GRADUATES WORKING AS SKILLED WORKERS



% OF HIGH SCHOOL GRADUATES WORKING AS SKILLED WORKERS

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	51	98	79	72	79	85	81	88	74
MEDIUM	80	78	64	82	84	80	78	88	88
SMALL	64	-	12	-	74	78	80	82	70

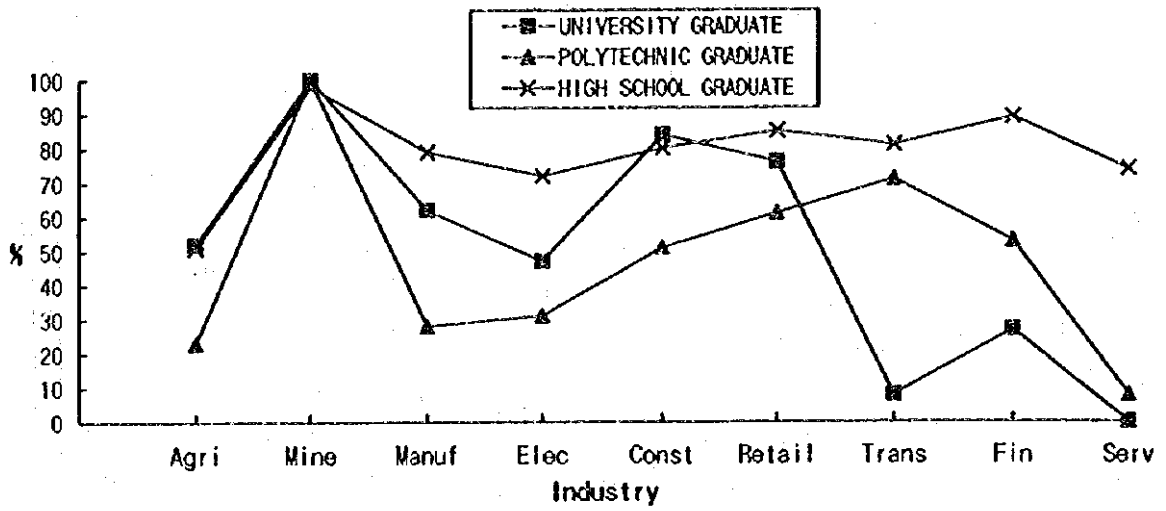
Q54 % OF UNIVERSITY ENGINEER GRADUATES WORKING AS ENGINEERS (By Region)



% OF UNIVERSITY ENGINEER GRADUATES WORKING AS ENGINEERS (By Region)

	LARGE	MEDIUM	SMALL
SUMATERA	77	60	77
JAWA	61	67	70
NUSA-TENGGARA	33	62	43
KALIMANTAN	26	50	20
SULAWESI	39	90	100
IRIAN JAYA	63	96	100

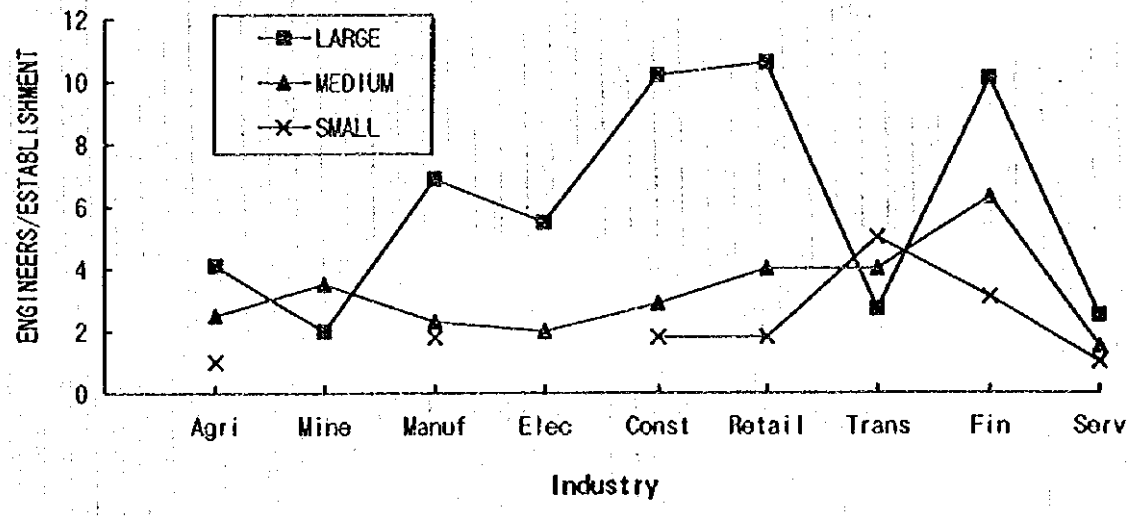
Q54 % OF EMPLOYEES WHOSE EDUCATION LEVEL MATCHES THEIR WORK LEVEL



% OF EMPLOYEES WHOSE EDUCATION LEVEL MATCHES THEIR WORK LEVEL

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
UNIVERSITY GRADUATE	52	100	62	47	84	76	8	27	0
POLYTECHNIC GRADUATE	23	100	28	31	51	61	71	53	8
HIGH SCHOOL GRADUATE	51	98	79	72	80	85	81	89	74

Q55 AVERAGE NUMBER OF ENGINEERS IN EACH ESTABLISHMENT

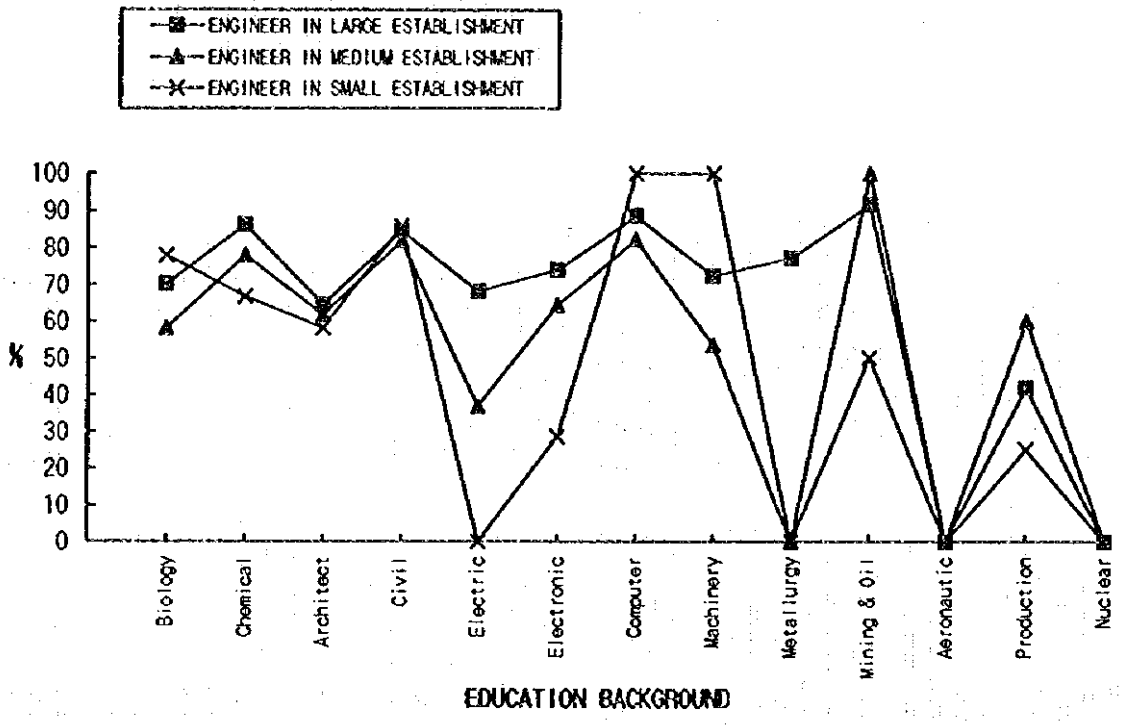


Q55 AVERAGE NUMBER OF ENGINEERS IN EACH ESTABLISHMENT

(Units: Engineers)

	Agri	Mine	Manuf	Elec	Const	Retail	Trans	Fin	Serv
LARGE	4.1	2.0	6.9	5.5	10.2	10.6	3.0	10.1	2.5
MEDIUM	2.5	3.5	2.3	2.0	2.9	4.0	4.0	6.3	1.5
SMALL	1.0	-	1.8	-	1.8	1.8	5.0	3.1	1.0

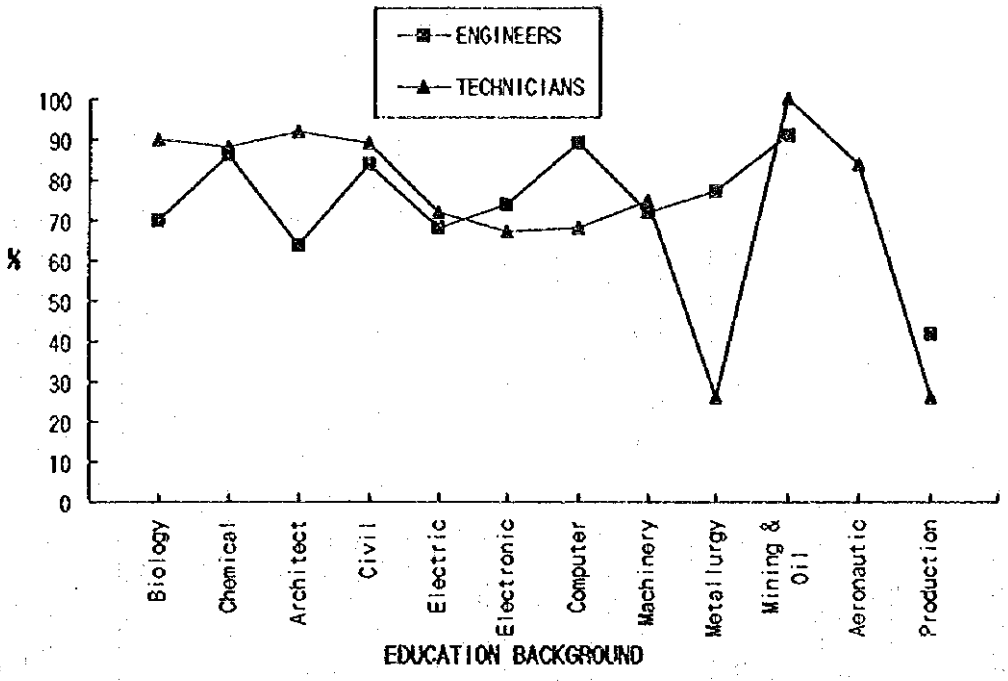
Q55 % OF ENGINEERS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION



% OF ENGINEERS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION

	Biology	Chemical	Architect	Civil	Electric	Electronic	Computer	Machinery	Metallurgy	Mining & Oil	Aeronautic	Production	Nuclear
LARGE	70	86	64	84	68	74	89	72	77	92	0	42	0
MEDIUM	58	78	62	82	37	64	82	53	0	100	0	60	0
SMALL	78	67	58	86	0	29	100	100	0	50	0	25	0

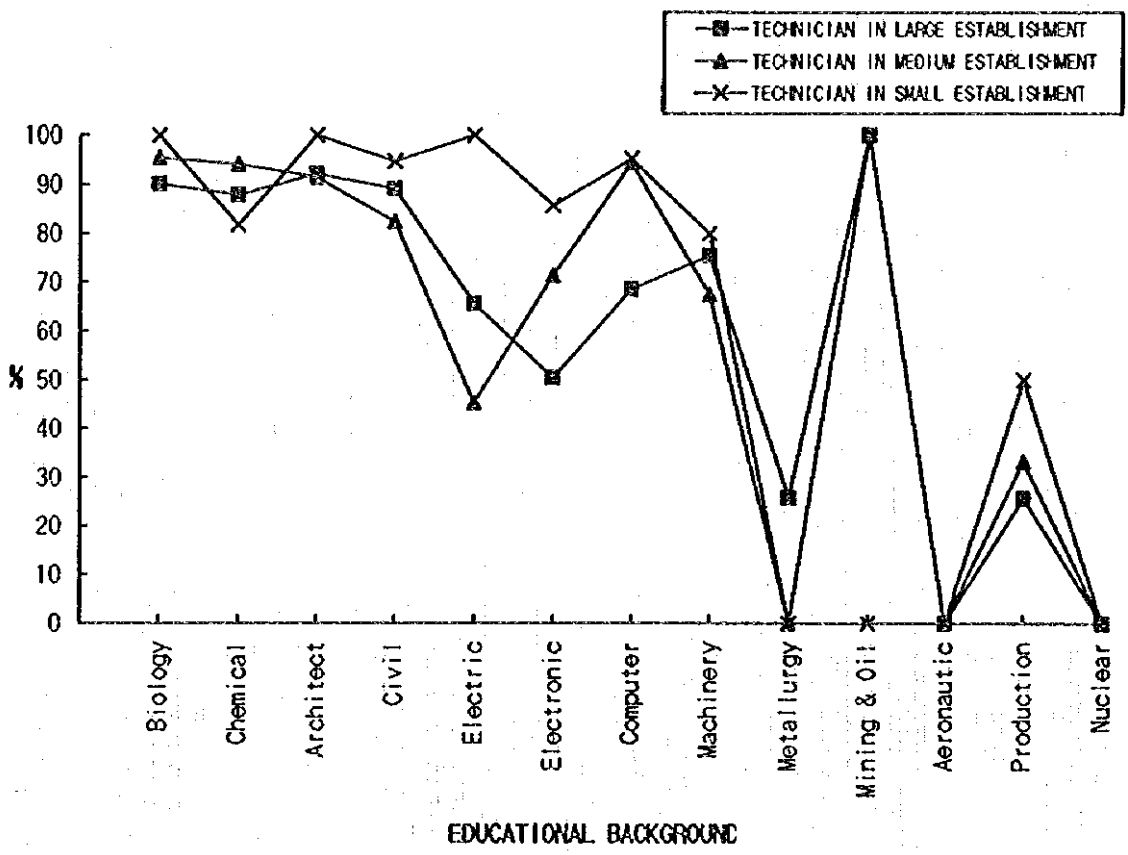
Q55, Q56 % OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION (LARGE ESTABLISHMENTS)



% OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION (LARGE ESTABLISHMENTS)

	Biology	Chemical	Architect	Civil	Electric	Electronic	Computer	Machinery	Metallurgy	Mining & Oil	Aeronautic	Production
ENGINEERS	70	86	64	84	68	74	89	72	77	91		42
TECHNICIANS	90	88	92	89	72	67	68	75	26	100	84	26

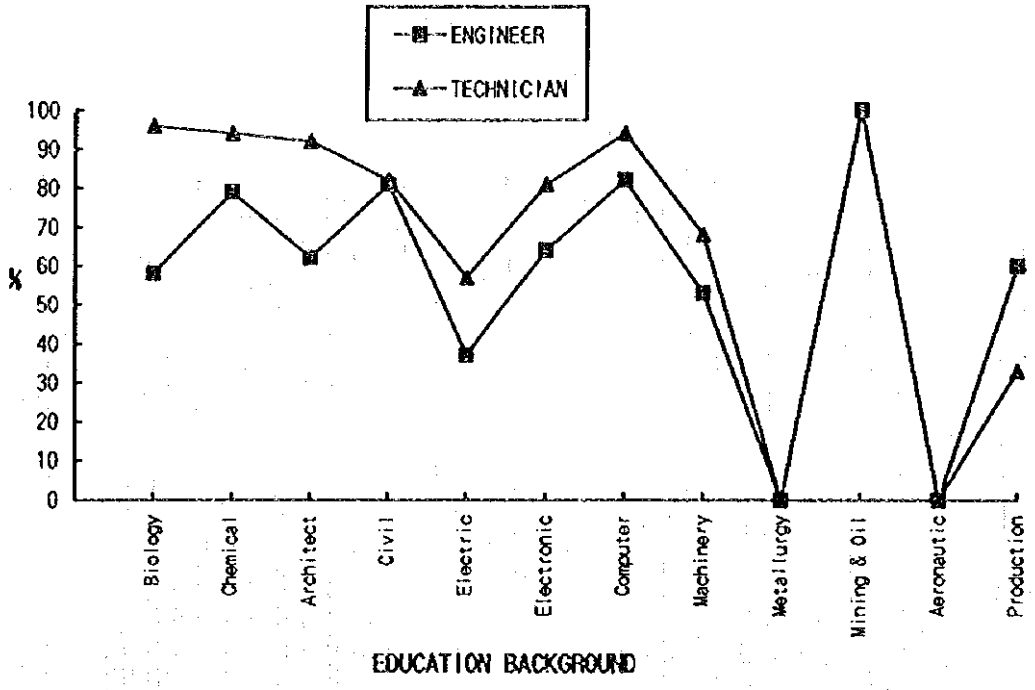
Q56 % OF TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION



% OF TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION

	Biology	Chemical	Architect	Civil	Electric	Electronic	Computer	Machinery	Metallurgy	Mining & Oil	Aeronautic	Production	Nuclear
LARGE	90	83	92	89	66	51	69	75	26	100	0	26	0
MEDIUM	96	94	92	82	45	71	94	68	0	100	0	33	0
SMALL	100	82	100	95	100	86	95	80	0	0	0	50	0

Q55, Q56 % OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION (Medium Enterprises)



% OF ENGINEERS & TECHNICIANS WHOSE CURRENT JOB MATCHES THEIR EDUCATION SPECIALIZATION (Medium Enterprises)

	Biology	Chemical	Architect	Civil	Electric	Electronic	Computer	Machinery	Metallurgy	Mining & Oil	Aeronautic	Production
ENGINEER	58	79	62	81	37	64	82	53	0	100	0	60
TECHNICIAN	96	94	92	82	57	81	94	68	0	100	0	33

Appendix 8

1. Estimation of Labor Productivity

(1) Macroscopic Approach

It is necessary to estimate future labor productivities endogenously in EM demand forecasting scheme of the Study. While average labor productivities (value added production per an employee) have been increasing constantly during the past decades in Indonesia, simple projection of the trend over future 25 years has no reason to guarantee consistency with macroeconomic assumptions on Indonesian development during the period.

Labor productivity, or labor demand per a unit of production if it is inversed, is often explained with following Cobb-Douglas type production function.

$$Q = AK^{\alpha}L^{\beta}$$

or

$$ln\,Q = ln\,A + \alpha ln\,K + \beta ln\,L$$

(Q: value added production, A: constant, K: capital, L: labor; sometimes $\beta=1-\alpha$)

When one tries to use the above model in Indonesia, lack of reliable capital stock data becomes a bottleneck among all other difficulties. Here, the Study Team tries to use capital stock data experimentally prepared by BPS for the Study who estimated it for every sectors at points of 1980, 1985 and 1990 in 1983 constant price. Production data is taken from I/O Tables and labor data from I/O base Employment Tables for the same year. Since only three points of data are available and there are three unknowns (A, α, β), result of estimation using these data (Table-1) is decisive not allowing variations (it means, they are not assured with accumulation of data).

Table-1: Estimated coefficients of production function (1)

Sector (KLUI#)	A	α	β	(R^2)
10	80.502917	0.915071	-4.102724	-
20	2.530427	-1.25527	2.060226	-
.....				
31	15.184187	4.057418	-1.763206	-
32	0.252157	0.637886	0.735882	-
33	-178.184069	-3.769738	14.869476	-
34	8.495419	1.173004	-0.111419	-
35	1.543925	2.358721	-0.241292	-
36	11.519904	1.898919	-0.525658	-
37	-5.461845	-	1.716743	-
38	-0.106777	1.018333	0.605738	-
39	9.887785	0.245539	0.123407	-
(30	6.779337	0.740862	0.256992	0.89806)
.....				
40	14.423447	2.193822	-1.725233	-
50	-5.932448	-0.393493	1.735605	-
60	11.524451	0.480531	0.065072	-

70	18.966099	0.666252	-0.664730	-
80	12.167081	0.818358	-0.144911	-
90	-2.960986	0.075242	1.177677	-
(A11	7.450472	0.426269	0.339340	0.76811)

Most figures in the above table are not reasonable except for two aggregated ones, average manufacturing industries (Sector 30) and average all sectors (A11). Many coefficients for capital and labor are negative and sums of these two are far from 1 (if complete substitution between K and L is assumed as $\beta=1-\alpha$). However, estimated coefficients of the two aggregated sectors tell that a unit of capital (1 million Rp. here) tends to contribute to production more than a unit of labor (1 person here) in the past Indonesia. PJP-II and the Study Team's macroeconomic assumptions for the future Indonesian development include increase of capital formation more than GDP growth. Then, it would be reasonable to estimate that employment will increase less than GDP growth and labor productivity will be drastically improved in future.

(2) Microscopic Approach

Establishment Survey conducted in the Study includes microscopic data at respondents' employment, production and assets. In order to estimate coefficients of microeconomic production function, following variables in the survey data are used:

- Production value: sum of profit of respondent establishment – before tax (Q19) and total salaries paid at the establishment (Q20)
- Capital stock value: total assets (Q22)
- Labor: sum of employees paid by monthly salary, permanent daily, piece works, and casual daily (Q17)

The above production value is expected to be approximate to value added at the establishment. And value of assets was answered by respondent. Therefore, these data may include some sorts of errors. The estimated coefficients using these data are in Table-2 below.

Table-2: Estimated coefficients of production function (2)

Sector (KLUI#)	A	α	β	(R^2)
10	1.161023	0.868283	-0.04004	0.79404
*20	-	-	-	-
.....				
31	-0.299898	0.895702	0.052357	0.81710
32	1.382957	0.791014	0.042185	0.79200
33	0.570339	0.829728	0.081906	0.85489
34	1.176508	0.736688	0.201774	0.80728
35	0.287159	0.828717	0.129488	0.84551
36	0.701584	0.811214	0.105142	0.82288
37	3.450834	0.452674	0.570969	0.78362
38	0.819724	0.844179	-0.010479	0.82853
39	2.941188	0.426489	0.660249	0.87371
(30	0.584020	0.820066	0.096998	0.82629)
.....				
40	-0.307664	1.243465	-1.069383	0.99746

50	2.353868	0.627886	0.368002	0.60573
60	1.630346	0.698798	0.368002	0.73456
70	0.074717	0.875479	0.007544	0.79605
80	3.274159	0.577224	0.303367	0.63719
90	-0.118631	0.872313	0.272999	0.58169
(All	1.208964	0.751996	0.178881	0.77347)

* Coefficients could not be estimated for Sector 20 (mining) because there were too few valid sample for this estimation.

Most figures in the above table seem reasonable – a few capital and labor coefficients are negative and sum of α and β is approximate to 1 at many sectors. On this approach, too, most α's is bigger than β's and elasticity of production to capital is assumed to be bigger than one to labor. Therefore, the same estimation at the end of above 1. can be applied with these figures.

(3) Conclusion – Future Labor Productivity

Unfortunately, it was impossible to estimate coefficients of production functions using numbers of engineer, technician and skilled worker according to the Establishment Survey. They were too small compared to total employees and lead to too unreliable correspondences (R^2 are less than 0.1). Macroeconomic approach using the numbers in Employment Tables lead to less unreliable result than above Table-1.

Therefore, for estimating future labor productivities of engineers, technicians and skilled workers (EM demand per a unit of production) in this Study, following approach was applied:

- Estimate future capital stocks for every sector (ΔKi) in proportion to assumed total capital formation growth in macroeconomic schenario
- Estimate future employment for every sector (ΔLi) using value added production estimated by I/O model (ΔQi) and coefficients in above Table-2
- Adjust the total employment (ΣLi) to be equal to the one in macroeconomic schenario (L) with factors ($m=L/\Sigma Li$)
- Numbers of engineers, technicians and skilled workers in the future are calculated in proportion to ΔLi to be multiplied by m.

Table-3: Estimated future labor productivities for EM

The above estimation of labor productivities is simple and just tentative, including following difficulties:

- Theoretically, microeconomic parameters will not be applicable to macroeconomic I/O model as they are.
- The estimated microeconomic parameters do not take details into account – such as transitions of establishment sizes and other characteristics.
- Explicit contribution of EM to production is neglected.

These difficulties due to lack of reliable data are hoped to be resolved as intensive researchs and surveys are accumulated in future.

Table-3

(Million Rp. value added per one person)

	2003/4			2018/9		
	Engineer	Technician	Skilled worker	Engineer	Technician	Skilled worker
KLUI10	1,752	83	260	2,033	84	289
20	1,175	410	233	1,696	592	337
31	2,829	289	8	3,427	354	10
32	1,833	207	5	3,773	437	11
33	11,474	637	8	41,217	2,287	27
34	1,409	322	23	3,324	759	55
35	2,361	783	99	7,715	2,559	320
36	916	160	2	975	170	2
37	2,372	413	30	3,596	627	46
38	686	139	32	1,962	399	91
39	30	6	1	22	4	0
40	405	42	168	816	86	339
50	281	2,165	4	186	1,435	2
60	7,071	863	225	13,218	1,978	234
70	333	200	361	633	337	577
80	7,051	229	1,539	23,316	335	5,672
90	200	31	17	154	26	19

2. Estimation of In-house Promotion

(1) Explaining correspondence between occupations and academic careers

As shown in Figure 2.5 of Part-II, academic careers do not correspond to occupations of EM completely. These "vertical gaps" in the future are preferably estimated in consistency to other parameters in forecast model, since employment of EM in view of occupation will realize as explicit demand to each supply source after adjusted by these "vertical gaps."

Establishment Survey conducted in this Study may provide several data to explain the "vertical gap." To examine correlations to these correspondencies between occupation and academic careers at the Establishment Survey data, it is found that value of profit and salaries has more significances than number of employees at establishment. It may imply that the more profitable companies can recruit EM more easily and keep this correspondence in their career path at present.

Second, it is reasonable to estimate the longer establishments operate, the more employees can be promoted to other occupations, in circumstances that not so much "job hopping" or manpower "hunting" are conducted (actually, the Establishment Survey shows these phenomena are not so widely spread in Indonesea). So history of establishment is assumed to function negatively to the correspondence between occupations and academic careers.

Above two explanations seem to be generally effective, however, if divided into every sectors, statistically there are only a few significant cases and correlations are generally weak (Table-4).

Table-4: Significant correlations* between EM correspondences** and explaining factors

Sector (KLUI*)	*ln*VA***			Year****		
	Engineer	Technician	Skilled	Engineer	Technician	Skilled
10			0.5707			
31	0.3489		0.2793			
32			0.1649		-0.2973	
33			0.2367			
35			0.2617			
36			0.3181			
37			0.5021			
(30		0.1364	0.2708)			
40					-0.9210	-
0.9897						
60			0.1326			-
0.1688						
70	0.7719					
90			0.5997			
(All			0.2360			-
0.0542)						

* Listed figures in the table represent correlation coefficient (multiple R). Only statistically significant (less than 10% error) figures are listed.

** EM correspondences (explained value) are percentages of university graduates in engineers, polytechnic graduates in technicians, and high school graduates in skilled workers.

*** As profitability (an explaining value) of establishments, natural logarithm of sum of profit before tax (Q19) and paid salaries (Q20) (approximate to value added) is adopted.

**** Another explaining value, length of operation, is calculated to reduce year of starting operation of the establishment (Q16) from 1994.

Although there are not many cases, all significant cases have positive correlations to establishment profitability (*ln*VA) and negative correlations to length of operation (Year).

(2) Conclusion – Future In-house Promotion

Following macroeconomic scenario of this Study, it will be reasonable to estimate overall profitability of Indonesian establishmens will be increased and successful ones will operate their business longer in accordance with macroeconomic growth. Then, there will be two conflicting drives for "vertical gaps" – improve of profitability will tend to increase the correspondence between EM occupation and academic careers, whereas long operation will allow to decrease the correspondence. Since the Establishment Survey does not provide statistically strong correspondences, it is difficult to tell which drive supersedes the

other. Therefore, at this moment, the Study Team cannot help assuming that present "vertical gaps" will be kept in the future.

Estimating in-house promotion requests for more microscopic analyses than productivity study. It is expected that intensive researches and surveys will be continued on this topic, too.

Appendix 9

MANUFACTURING INDUSTRY IN INDONESIA AND EDUCATION SYSTEM IN OTHER COUNTRIES IN ASIA

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9-1 Manufacturing Industries in Indonesia

1. A General Outline of Industrialization

The following general outline of the industrialization of Indonesia details the nation's 5-Year Program in three blocs of time, the period up to and including the 1960s, the 1970s and the 1980s to the present.

1.1 Up to 1960's.

(1) Development of basic industrial capacity in Indonesia began with the establishment of the Foreign Investment Law in 1967. This legislation provided incentives to attract foreign capital, such as a 30-year guarantee of investor rights.

(2) Efforts to promote industrialization were highly concentrated on the area of consumer goods during this early period. Domestic production started to replace imports of various everyday consumer goods, such as detergent and clothing, along with textiles, fertilizer and cement.

1.2 1970's.

(1) The goal of the first 5-Year Program (1969-1973) was to achieve "Recovery and Stability" with an emphasis on the following areas:

- Attaining self-sufficiency in food production, expanding the country's agricultural base and cultivating agriculture-related industries.
- Economic growth and a linkage of trade with investment.

(2) The second 5-Year Program (1974-1978) set a goal of achieving well-balanced economic development. During this period, the Foreign Investment law was revised by raising the minimum domestification of capital requirement ratio to 51%.

(3) Policies to grow strategic industries and promote import substitute industries, such as plans to build 52 heavy chemical plants and to obligate use of domestic auto-parts for commercial automobiles and motorcycles, were an-

nounced. (note: plans to construct the aforementioned 52 plants were later shelved.)

1.3 1980s through early 1990s.

(1) The contents and results of the third through 5-Year Program are shown in Table 1.1.

(2) Investment activity is expected to accelerate due to large-scale deregulation of restrictions on foreign investment as of June, 1994 (e.g., promoting projects funded with 100% foreign capital, no longer mandating the establishment of joint-ventures with local companies and abolishing requirements to transfer management rights to local partners within twenty years).

Table 1.1 The Outline of Five-Year Plans (1979-1994)

5-Year Program	Goals of Development	Priorities	Annual Average Growth Rate	
			Target	Results
The Third (1979-83)	Development and its well-balanced distribution of the results	- Promotion of replacing imported basic materials and assembled capital goods - Promotion of strategic industries (iron, petro-chemical, etc.)	6.9%	6.1%
The Fourth (1984-89)	Social justice and vital stability of rapidly growing society	- Protection of export-oriented companies (bonded area for processing) - Establishment of BPIS - Primary importance on machinery, steel and chemistry	5.0%	5.2%
The Fifth (1990-94)	Preoperation for the Sixth 5-Year Program which plans for economic independence	- Establishment of national infrastructure to prepare for economic independence - Turning toward the private-sector initiatives	5.0%	6.6%

Source : White Paper of World Economy (Economic Planning Agency).
Industrialization of Indonesia - Toward the full-set industrialization (Asian Research Institute)

2. Transition in the Manufacturing Sector

2.1 Output and Employees at Manufacturing Industries

Table 2.1 is an index of production rates and the number of employees (the year 1987 = 100), and shows the growth of manufacturing industries in Indonesia. Especially there is a significant increase between 1987 and 1990, both in terms of production rates and number of employees.

Table 2.1 Production rate and Number of Employees in Manufacturing Industry

[1987 = 100]

	1971	1975	1980	1985	1987	1991
Production Rate	13.5	28.7	66.8	88.6	100.0	137.9
Number of Employees	28.4	39.9	54.2	94.1	100.0	136.9

Source : World Tables 1993 (World Bank)

2.2 Shift to the Manufacturing Industries

Indonesia, dependent on its abundant natural resources such as oil since independence, has aimed for full-scale industrialization. Throughout the 1980s, its oil-centered industry has evolved into a broader range of sectors, so much so that the bulk of economic activity estimates from light industries' production of consumer goods (e.g., textiles/clothing, wood products such as plywood and leather goods) with a lesser, but still important component from heavy chemical industry and high technology products. Advanced industrial skills are, for most of the part, monopolized by ten strategic state industries - the heavy mechanical engineering sector forms the crux of these along with other national enterprises controlling basic materials such as textiles, paper, oil, chemical fertilizer as well as iron and steel. Also included in this group are modern consumer durable-oriented businesses capitalized by foreign corporations or financial cliques (automobiles, electric household appliances and so on). There are numerous medium, small and residence-based companies which manufacture consumer goods apart from large-scale enterprises. Though the government has sought to bridge the gap between big business and small manufactures, the formers' links with the latter - especially in terms of technological cooperation - have been judged to be quite weak.

3. Differences in Scale within the Manufacturing Sector

3.1 Changes in the Scale of Manufacturing Establishment and Number of Employees

Table 3.1 shows the transition of employee numbers and scale of manufactures.

Table 3.1 Change of Number of Establishments and Employees by Scale

Scale of Companies	A. Number of Establishments			B. Number of Employees			C. Number of employees per establishment		
	1979	1986	1991	1979	1986	1991	1979	1986	1991
Large	7,960	12,765	16,494	870,000	1,691,435	2,993,967	109	133	182
(%)	(0.5)	(0.8)	(0.7)	(19.4)	(32.7)	(38.6)	-	-	-
Medium	11,024	94,534	122,681	827,100	770,144	978,506	7	8	8
(%)	(7.3)	(6.2)	(4.9)	(18.4)	(14.9)	(12.6)	-	-	-
Household	1,417,803	1,416,636	2,350,984	2,794,800	2,714,264	3,786,326	2	2	2
(%)	(92.2)	(93.0)	(94.4)	(62.2)	(52.4)	(48.8)	-	-	-
Total	1,538,787	1,523,935	2,490,159	4,491,900	5,175,843	7,758,799	3	3	3
(%)	(100)	(100)	(100)	(100)	(100)	(100)	-	-	-

Source : Statistical Yearbook of Indonesia 1980, 1988, 1993 (BPS)

(1) As of 1991, the number of manufacturers numbered approximately 2.5 million - about a million more than in 1986. This growth is attributed to the expanding Indonesian economy. However, 95% of these companies are considered household industries with fewer than four employees each and less than 1% of the total are qualified as large or medium scale companies, that is, those with more than twenty employees. Needless to say, this indicates that the Indonesian economy is heavily weighted toward small scale companies.

(2) Meanwhile, 39% of all employees in 1991 worked for large or medium scale companies. Moreover, bigger companies' share of the work force increased year after year. Indeed, the number of employees per company is increasing rapidly for large and medium scale businesses, but has remained static for small and residence-based, household manufacturers.

3.2 Production Rate by Scale of Establishment

Table 3.2 shows the value of output for residence-based, small and larger scale manufacturers in terms of aggregate production, output per company and output per employee.

(1) Overall production in 1991 increased to 3.1 times that of 1986. Production growth for larger and medium-scale companies was 3.3 times, which was a little higher than the average growth rate.

(2) Production per company and employee for large and medium-scale businesses is far greater than that for small manufacturers.

Table 3.2 Total Production by Scale and Production per Company and Employee

Scale of Companies	D. Total Production (billion rupiah)		E. Production per Company (million rupiah)		F. Production per Employee (thousand rupiah)	
	1986	1991	1986	1991	1986	1991
Large	25,877	86,251	2,027	5,229	15,299	28,808
(%)	(82.0)	(89.5)	-	-	-	-
Medium	2,183	4,193	23.09	34.18	2,834	4,285
(%)	(6.9)	(4.3)	-	-	-	-
Household	3,516	5,893	2.48	2.51	1,295	1,556
(%)	(11.1)	(6.2)	-	-	-	-
Total	31,576	96,337	20.72	38.69	6,101	12,416
(%)	(100)	(100)	-	-	-	-

Source : Calculated based on Statistical Yearbook

(Note) E = D / A, F = D / B

3.3 Intermediate Input Amount by Scale and Value-Added Totals

Table 3.3 compares the value of intermediate inputs and the amount of value-added (at market prices) by scale in 1986 and 1991.

Table 3.3 Intermediate Input Amount and Value-Added Amount by Scale (Market Price)

[1 billion rupiah]

Scale of Companies	G. Intermediate Input Amount		H. Value-Added Amount (per Employee) [1 thousand rupiah]	
	1986	1991	1986	1991
Large	16,529	56,325	9,349 [5,527]	29,926 [9,995]
(%)	(81.9)	(90.3)	(82.2)	(88.2)
Medium	1,407	2,586	775 [1,006]	1,608 [1,643]
(%)	(7.0)	(4.1)	(6.8)	(4.7)
Household	2,257	3,490	1,254 [462]	2,404 [635]
(%)	(11.1)	(5.6)	(11.0)	(7.1)
Total	20,193	62,401	11,378 [2,198]	33,938 [4,374]
(%)	(100)	(100)	(100)	(100)

Source : Calculated based on Statistical Yearbook (BPS)

(Note) I = H / B

(1) About 90% of total intermediate inputs and the amount of value-added emanated from large and medium-scale companies in 1991.
In 1986, these companies accounted for 80% of the total in each of the two categories.

(2) Value-added amount per employee for large and medium-scale companies is far greater (from as little as a few to more than ten times greater) than that for small and household manufacturers. Thus, the role played by large and medium scale companies in the overall economy is much more pronounced than that of smaller manufacturers.

3.4 Labor Costs by Scale

Labor costs by scale of company and per employee in 1986 and 1991 are shown in Table 3.4.

(1) Labor costs in 1991 grew to 3.1 times those in 1986, as is evidenced in the chart. For large and medium-scale companies, the increase in labor costs over the period was 3.3 times.

(2) Labor costs per employee at large and medium-scale companies is about four times higher than that at small companies and about 20 times labor costs

at residence based companies. Hence, on the basis of labor costs, smaller firms have quite big difference vis a vis larger manufacturers.

Table 3.4 Labor Cost by Scale and per Employee

[1 billion rupiah]

Scale of Companies	J. Labor Cost		K. Labor Cost per Employee [1 thousand rupiah]	
	1986	1991	1986	1991
Large	1,888	6,213	1,116	2,075
(%)	(82.1)	(86.6)	-	-
Medium	230	538	299	550
(%)	(10.0)	(7.5)	-	-
Household	181	427	67	113
(%)	(7.9)	(5.9)	-	-
Total	2,299	7,178	444	925
(%)	(100)	(100)	-	-

Source : Calculated based on Statistical Yearbook (BPS)

(Note) K = J / B

4. The Composition of Large-Scale and Medium-Scale Manufacturing Companies by Sector

4.1 Number of Establishment, Employees and Value-Added Amount by Sector

Table 4.1 shows the number of establishment and employees and value-added amount by sector in 1986 and 1991.

Table 4.1 Number of Large and Medium Scale Establishment, Number of Employees and Value-Added Amount

	A. Establishment [Number]		B. Employees [Number]		C. Value-Added Amount [1 billion rupiah]		D. Value-Added per Employee [1 thousand rupiah]	
	1979	1991	1986	1991	1986	1991	1986	1991
Food, Beverages and Tobacco	3,875	4,459	520,069 (30.7)	643,021 (21.5)	2,764 (29.6)	7,773 (26.0)	5,315	12,088
Textiles, Clothing, Leather (%)	2,852	3,935	389,072 (23.0)	907,161 (30.3)	1,340 (14.3)	4,482 (15.0)	3,444	4,941
Wood and Wood Products, printing and publishing (%)	1,160	1,948	181,452 (10.7)	445,209 (14.9)	958 (10.2)	3,484 (11.6)	5,280	7,826
Paper and Paper Products, printing and publishing (%)	602	703	62,531 (3.7)	102,429 (3.4)	307 (3.3)	1,650 (5.5)	4,910	16,109
Chemicals, Petroleum, Coal, Rubber and Plastic Products	1,591	1,993	245,419 (14.5)	377,775 (12.6)	1,381 (14.8)	4,843 (16.2)	5,627	12,820
Non Metallic Mineral Products, except Products of Petroleum and Coal (%)	1,208	1,393	80,980 (4.8)	129,919 (4.3)	482 (5.2)	1,361 (4.5)	5,952	10,476
Basic Metals (%)	30	116	16894 (1.0)	37520 (1.3)	787 (8.4)	1,707 (5.7)	46,585	45,500
Fabricated Metal Products, Machinery and Equipment (%)	1,272	1,658	181,641 (10.7)	305,179 (10.2)	1,290 (13.8)	4,457 (14.9)	7,102	14,605
Other Manufacturing Industries (%)	175	289	13,377 (0.9)	45754 (1.5)	39 (0.4)	168 (0.6)	2,915	3,672
Total (%)	12,765	16,494	1,691,435 (100.0)	2,993,967 (100.0)	9,348 (100.0)	29,925 (100.0)	5,527	9,995

Source : Calculated based on Statistical Yearbook (BPS)

(Note) D = C / B

(1) **Table 4.2** ranks five industries by sector from the top according to the number of employees, value-added amount and value-added amount per employee in 1991.

Table 4.2 Ranking of Number of Employees, Value-Added Amount and Value-Added Amount per Employee

Ranking	Number of Employees	Value-Added Amount	Value-Added Amount per Employment
1	Textiles, Clothing and Leather	Food, Beverages and Tobacco	Basic Metals
2	Food, Beverages and Tobacco	Chemicals , Petroleum, Coal	Paper and Paper Products, Printing and Publishing
3	Wood Products	Textiles, Clothing and Leather	Fabricated Metal Products, Machinery and Equipment
4	Chemicals , Petroleum, Coal	Fabricated Metal Products, Machinery and Equipment	Chemicals , Petroleum, Coal
5	Fabricated Metal Products, Machinery and Equipment	Wood Products	Food, Beverages and Tobacco

(2) The table above shows that three sectors of traditional product manufacturing industries, that is (a) textiles, clothing and leather, (b) food, beverages and tobacco, and (c) wood and wood products, account for 65% of total employment and more than 55% of total value-added. These three industries make up the backbone of Indonesia's manufacturing industries.

(3) In terms of value-added amount per employee in 1991, two of these three sectors rank lower than an economy wide average ten million rupiah (except the food, beverages and tobacco sector). The sectors ranked highest were modern industries such as basic metal production, paper and paper products, printing and publishing, fabricated metal products, machinery and equipment, chemicals, petroleum, coal. This indicates a shift toward industrialization.

4.2 Production and Labor Costs by Sector

Production and labor costs by sector in 1991 are shown in Table 4.3.

Table 4.3 Production and Labor Cost by Sector in 1991

[Unit: 1 billion rupiah]

	D. Production	J. Labor Cost	K. Labor Cost per Employee [1 thousand rupiah]
Food, Beverages and Tobacco	18430 (21.4)	988 (15.9)	1536
Textiles, Clothing, Leather (%)	15044 (17.4)	1349 (21.7)	1487
Wood and Wood Products, printing and publishing (%)	10249 (11.9)	780 (12.6)	1752
Paper and Paper Products, printing and publishing (%)	4425 (5.1)	288 (4.6)	2812
Chemicals, Petroleum, Coal, Rubber and Plastic Products	14611 (16.9)	1023 (16.5)	2708
Non Metallic Mineral Products, except Products of Petroleum and Coal (%)	3337 (3.9)	256 (4.1)	1970
Basic Metals (%)	5647 (6.5)	169 (2.7)	4504
Fabricated Metal Products, Machinery and Equipment (%)	14053 (16.3)	1301 (20.9)	4263
Other Manufacturing Industries (%)	456 (0.6)	60 (1.0)	1311
Total (%)	86252 (100.0)	6214 (100.0)	2075

Source : Calculated based on Statistical Yearbook (BPS)

(Note) K = J / B

(1) Table 4.4 ranks the top five sectors in Table 4.3.

Table 4.4 Ranking of Production, Labor Cost and Labor Cost per Employee

Ranking	Production	Labor Cost	Labor Cost per Employee
1	Food, Beverages and Tobacco	Textiles, Clothing and Leather	Basic Metals
2	Textiles, Clothing and Leather	Metal Processing, Machinery and Equipment	Metal Processing, Machinery and Equipment
3	Chemicals, Petroleum, Coal	Chemicals, Petroleum, Coal	Paper and Paper Products, Printing and Publishing
4	Metal Processing, Machinery and Equipment	Food, Beverages and Tobacco	Chemicals , Petroleum, Coal, Rubber and Plastic Products
5	Wood and Wood Products, including Furniture	Wood and Wood Products, including Furniture	Non Metallic Mineral Products, except Products of Petroleum and Coal

(2) In terms of total output, the food/beverages and tobacco, textiles/clothing and leather industries rank highest. The chemicals/petroleum/coal and metal processing/machinery and equipment sectors occupy the mid ranks, all ahead of the wood products sector.

(3) As for aggregate labor costs, the composition of the top five mirrors that for output, but metal processing, machinery and equipment rank higher than that for output.

(4) As for cost per employee, traditional articles have disappeared and metals/chemicals/paper rank high. This trend shows the Indonesia's progress for industrialization

5. Characteristics of Major Manufacturing Industries

5.1 Traditional Product Manufacturing Industries

(1) Manufactures of food/beverages/tobacco, textiles/clothing/leather, and wood/wood products (lumbering, plywood, bamboo and so on) are generally labor intensive industries and are comprised many small scale businesses. **Table 5.1** shows the numbers of companies and their employees, production totals and export value by scale of business.

Table 5.1 General Outline of Traditional Manufacturing Industries in 1991

	Scale of Companies	Food, Beverages and Tobacco	Textile, Clothing and Leather	Wood and Wood Products, including Furniture
No. of Companies	Large & Medium	4,456	3,935	1,948
	Small	38,271	19,788	27,277
	Household	833,228	298,761	1,009,670
	Total	875,958	322,484	1,038,895
	(%)	(35.2)	(13.0)	(41.7)
No. of Employees	Large & Medium	643,021	907,161	445,209
	Small	309,603	174,734	216,185
	Household	1,483,593	431,497	1,460,646
	Total	2,436,217	1,513,392	2,122,040
	(%)	(31.4)	(19.5)	(27.4)
Production Amount [1 billion rupiah]	Large & Medium	18,430	15,044	10,249
	Small	1,491	1,121	820
	Household	2,709	1,125	1,273
	Total	22,630	17,290	12,342
	(%)	(23.5)	(18.9)	(12.8)
Export Amount FOB 1 million US dollar		2,116	2,990	3,121
(%)		(14.5)	(20.5)	(21.4)

Source : Calculated based on Statistical Yearbook (BPS)

(2) It can accurately be stated that traditional manufacturing still plays a significant role within the Indonesian manufacturing sector. Fully 90% of all manufacturer (total 2,490,159 spots), and about 80% of manufacturing personnel (total 7,758,799) fall within the boundaries of these three sectors. And they account for 55% of total output (337 billion rupees) and 56% of all non-oil/gas exports (14.64 billion rupees).

(3) The Indonesian government has great expectations for the nation's food processing industries. Thus, the government is attempting to expand its distribution channels both domestically and internationally. At one time, Indonesia boasted of extremely internationally competitive labor costs in its textile and clothing industries. It will not, however, be an easy task to maintain this cost advantage with the emergence of China and Vietnam as economic rivals. It will also be difficult to expect significant growth in wood product manufacturing due to a government policy of preserving natural resources.

5.2 Electrical Household Appliance Manufacturing Industries

(1) There is great latent demand for electrical household appliances in Indonesia as can be seen in **Table 5.1**. However, exploiting this potential is not likely to lead to tremendous gains in value-added output since most manufacturing in this sector is confined to operations whereby low wage workers assemble imported components. Domestic demand for televisions, refrigerators, washing machines and audio-stereo products will, in all likelihood, grow by leaps and bounds. In order to maintain economic competitiveness, Indonesia must domesticate production of more materials and parts. Should Indonesia fail to do, it will remain dependent on business derived from its low cost labor and with low-value added character. As alluded to above, over reliance of cheap labor could retard development and loose competitiveness in ASEAN region.

Table 5.1 Change of Production on Major Electric Household Appliances

[Unit: 1,000]

	1989	1990	1991	1992	1993*
Television	522	797	1082	1581	1797
Refrigerator	104	138	159	213	230
Air-Conditioner	67	79	99	N.A.	N.A.

Source : BPS

(Note) *Assumption

(2) Manufacturing of electric household appliances will be the most promising sector in the future since it is not as costly as automobile production. Also, sales will expand in tandem with increases in GNP per person. Table 5.2 shows the growth plan forecast of an electric household appliances company (company A), which the Team visited.

Table 5.2 Production and Forecast of the Electric Household Appliances Company (Company A)

[Unit: 1,000]

	1990	1993	1998
Television	20	14	70
Refrigerator	30	41	120
Air-Conditioner	18	19	50

Source : Calculated based on materials of Company A

5.3 Oil Refining Sector

(1) Change in Oil Production and Export Amounts

Since 1985, oil production and export in Indonesia has been either static or in decline (Table 5.3).

Table 5.3 Change of Oil Production and its Export

[Unit :1 million barrel]

Year	Production Amount			Exporting Amount (Condensate included)
	Crude Oil	Condensate	Total	
1980	548	29	577	379
1983	483	35	490	336
1985	438	52	490	295
1988	431	60	492	277
1990	468	66	534	288

Source :MIGAS

(2) Pertamina

Pertamina, the state monopoly petroleum refinery, has eight refineries with a production capacity of 830,000 barrels a day. This includes both old and new plants. However, Pertamina's oil refining and related technologies are up to world standards so there is little concern that it will be unable to upgrade or restructure its facilities. Since Indonesia's oil reserves are limited, Pertamina will strive to diversify its output and bolster production of value-added refined product. Pertamina will be aided on this account by taking advantage of its well-trained human resources.

(3) Expansion of Oil Refining Capacity

Pertamina's Oil refining facilities have been able to produce 830 thousand barrel a day since 1990. The expansion of this capacity has become an important issue. Of four export-oriented refinery expansion plans (each with a 120,000 barrel per day capacity) drafted by Pertamina, only one was approved for the necessary financing from overseas lenders. Thus, the so-called EXOR1-4(Export Oriented Refinery) project has been scaled down drastically.

5.4 Petrochemical Industry

(1) While Indonesia is blessed with plentiful natural resources such as oil and natural gas, it has long been dependent on the import of upstream petrochemical industry of raw materials for the petrochemical industry due to slow development. Development plans were eagerly pursued in the 1980s, but much of this development has been waylaid by the deterioration in world oil prices. Still, the domestic market offers great potential and therefore, investment in production of some basic petrochemical materials has increased in recent years. In 1995, the first Indonesian ethylene plant, Chandra Asri, will begin production at a rate of 450,000 tons per annum. Investment in high-purity terephthalic acid (PTA) is also on the rise. Downstream petrochemical industry operations started much earlier than upstream production. More than 1,000 downstream companies are already in business. There are many plans ahead for expanding facilities to boost output of resins such as ehylbenzene, methyl alcohol and PET. The future prospects for this section of the industry looks promising since there should be few problems accessing manufacturing process equipment and technology. There is enormous potential for development with the background of huge domestic market.

(2) The main problem in this sector remains its dependency on foreign capital because massive investment is necessary to achieve sufficient economics of scale in production. According to 1990 data, the petrochemical accounts for an sector above average share of value-added production and employment among all manufacturing industries. It is unlikely, however, production growth in this sector will further result in employment gains since there is already a surplus of highly educated employees.

5.5 Fertilizer Manufacturing Industry

(1) Indonesia's fertilizer manufacturing industry (mainly nitrogenous fertilizer) is monopolized by six state corporations. Among these corporations, PUSRI in Palembang of Sumatra dominates production of such natural gas-based products as synthetic ammonia and fertilizer. It also has exclusive rights to market products manufactured by the other state fertilizer corporations. It is difficult to outline the future prospects for this sector since the

concepts of cost management and marketing have not been fully developed under the strong governmental protection afforded to the industry. On the other hand, there are a large number of experienced plant engineers and operators which can give the industry a firm base from the perspective of human resources. Therefore, there seem to be few obstacles to rapid expansion if privatization and expansion of production for export are pursued.

(2) Significant market expansion in this sector does not seem likely as import substitution has run its course and the country is approaching self-sufficiency for food such as rice. Yet some growth can be expected as demand for fertilizer will increase with a population expected to reach about 230 million over the next 25 years.

5.6 Transportation Machinery Manufacturing Industry

(1) The Automobile Manufacturing Industry

1) Production and Consumption

a. Change in the amount of production

Table 5.4 shows the change in automobile and motorcycle production. Business vehicles account for 80% of total production (both nationally popular cars such as the "Kijan" and small trucks), and private cars for 20%.

Table 5.4 Production of Automobiles and Motorcycles

[Unit: 1,000 cars]

	1989	1990	1991	1992	1993
Automobiles	167	175	271	261	196
Motorcycles	260	281	410	436	457

Source: BPS

Table 5.5 depicts car ownership per 1,000 people and annual sales of automobiles.

Table 5.5 Automobile Holdings per 1,000 people and Annual Automobile Sales in 1991

	Automobile Holdings [per 1,000 people]	Annual Automobile Sales [Number]
Indonesia	15.6	263.1
Malaysia	136.9	201.5
South Korea	98.5	1,104.2
Japan	483.1	7,524.8

Source : Japan Automobile Manufacturers Association

2) While import substitute programs have met with remarkable success under strong government policy, value-added production has not proceeded apace since much local manufacturing is of the "knock-down" assembly variety. Problems such as dependence on imported materials, expensive parts production costs, limited purchasing power in the domestic market and high household production rates due to a lack of dependable supporting industries continue to plague the industry. There are no doubts that the domestic market will expand. So it will be crucial to develop appropriate supporting industries and reduce productions cost in order to maintain international competitiveness in light of the rapid growth of free trade zones in the ASEAN region, where horizontal international specialization is being evolved. However, the fact that this sector is completely privatized promises growth in the context of competition.

3) The present production line technology level is almost at parity with international standards. Domestic production of metal molds has already been achieved by some companies, many of which have automated production line complete with welding robots and a paint coating system. As production lines do not operate to its full, and the number of employees is more than necessary, production expansion in this sector will not necessarily result in employment gains.

(2) The Aerospace Industry

IPTN, the 20,000 employee strong national strategic enterprise established in 1976 monopolizes this sector. IPTN boasts latest equipment in all areas of production such as metal processing, electronics, reparation/maintenance and testing facilities. The company manufactures helicopters and small propeller planes. It also exports parts produced under license-production. The N-250,

a short distance propeller 50-passenger plane which was developed domestically, was debuted for a test flight at the APEC Bandung Conference in November 1994. Commercial flights are planned for 1998. Assembly and sales agreements with the United States companies are under discussion. In addition, IPTN manufactures engines for use in heavy industry. With the most advanced aerospace program of any ASEAN member nation, Indonesia stands to benefit from tapping into foreign markets and enjoying a proliferation of spin-off technology transfers among domestic industries. The export of airplane-related parts amounted to US$13.6 million in 1992, namely 58% up from the previous year. What's more, IPTN concluded a barter agreement with Malaysia's nationally population car "Proten" last year to trade planes for cars.

(3) The Shipbuilding Industry

Various national corporations and private companies co-exist in this sector. Several thousand-ton bulk carriers and LPG carrierships are being built in governmental dockyards. Seemingly without regard to profitability, everything from steel-hull tankers to wooden yachts are built in these state dockyards. Private dockyards, on the other hand, tend to specialize in a certain types of ship, but their facilities tend to be older in comparison to the facilities at the national dockyards. In an effort to efficiently utilize limited technical resources, PAL, the strategic enterprise in Surabaya with 6,000 employees, designed a proto-type bulk carrier and worked jointly to produce it with other dockyards. This likely typifies the future direction of Indonesia's shipbuilding industry. As the world's largest island country, the market for small and medium-scale vessels can safely be assumed to expand with the development of economy. PAL, the company with largest dockyard, built about fifty vessels between 1981 and 1992.

5.7 Capital Goods Manufacturing Industries

(1) Machine tools manufacturing industries remain largely undeveloped. Assembly and sales of ordinary lathes and boring machines is still small scale. PT-Pindad, a designated strategic corporation, is engaged in licensed production of CNC drilling machines, though its products are not price-competitive with imports. The Forging/Casting business, an important foundation for

wider production of machine tools, has not yet developed into an independent specialty in Indonesia. These businesses are located as incidental facilities in the heavy machines and automobiles factories.

(2) As Indonesia's heavy chemical industry develops, it is presumed that the demand for pressure containers and towers/vessels will increase. There are also a handful of domestic can manufacturing operations attached to the factories of strategic corporations and dockyards. However, the standards of these facilities' automatic welding machines, automatic cutting machines, large scale metal processing machines, annealing furnace and so on are considered to be fairly advanced. Most materials used in the manufacturing process are imported as they cannot be acquired domestically. Most of end plate preparation, edge preparation of plates and bending work is also imported from abroad. The remaining manufacturing process which is conducted domestically can thus be considered labor intensive. It will still take some time yet to acquire trust in terms of quality control from end-users in the equipment industry.

5.8 Iron and Steel Manufacturing Industries

(1) A General Outline of Indonesia's Iron and Steel Manufacturing Industries

At the core of Indonesia's iron and steel industry is Krakatau Steel, the state's comprehensive ironworks with the largest direct reduction manufacturing facilities in South-East Asia. Krakatau's general facilities are:

- Four HYL1 type direct reduction steel-making process facilities (DR) (500 thousand tons/year)
- Sponge iron production facility (2 million tons/year)
- Billet continuous casting facilities (540,000 tons/year)
- Slab continuous casting facilities (1.1 million tons/year)
- A hot rolling mill (1.05 million tons/year)
- A cold rolling mill (850 thousand tons/year)
- A wire rod mill (220 thousand tons/year)
- A bar mill (150 thousand tons/year)

In 1992, Krakatau Steel produced 1.6 million tons of sponge iron, 1 million

tons of slab, and 0.56 million tons of billet. The company's production plans are shown in Table 5.6.

Table 5.6 Production Increasing Plans at KRKATAU Steel

[Unit: ton]

	1994	1999	Increasing Rate (%)
Billet	600,000	1,000,000	66
Slab	2,000,000	2,400,000	20
Total	2,600,000	3,400,000	31

Source : Calculated based on materials of KRKATAU Steel

On the other hand, private electric furnace makers are upgrading their facilities in preparation for meeting a demand for some five million tons of iron and steel in 1995.

Presently, these private companies manufacture sheet, lightweight angle steel and wire rod. Since high tensile strength steel and heavyweight angle steel are not produced domestically, local automobile makers, dockyards, can manufacturing factories and construction companies must depend on foreign suppliers. Import substitution by having own domestic mills is not feasible as yet. However, demand for domestic steel material is steadily increasing, so investment in additional capacity and diversification of the products is likely to pay off in the long-run.

(2) Demand and Consumption of Steel

Table 5.7 shows demand and consumption of steel in Indonesia and other Asian countries in 1991.

Table 5.7 Demand and Supply of Iron and Steel in Indonesia and Other Related Countries in 1991

[Unit: 10,000 tons]

	Production	Import	Export	Apparent Consumption	Apparent Consumption per person [kg]
Indonesia	318	135	47	406	22
Malaysia	132	259	40	352	192
South Korea	2629	630	701	2557	586
Japan	10479	755	1740	9495	763

Source : Calculated based on the material of "Japan Iron and Steel Federation"

(Note) Apparent Consumption = Production + Import - Export

5.9 Other Industries

(1) Atomic Power Generation

1) Total capacity at Indonesia's state electric power company (PLN) was 9.275 million kW in 1991, while actual electric power generation that year was 34 billion kWh. Total capacity on Java island (via the Java-Bali power system), which accounts for 80% of the nation's electric power consumption, was 6.363 million kW. Consumption on Java has risen 17% per annum for the past three years. In order to ensure an adequate supply, the Indonesian government is looking to atomic power. It has done so to preserve oil reserve and avoid environmental degradation problems associated with coal fired power generation facilities. The government's general outline on atomic power generation calls for building two 900,000 kW plants, or three 600,000 kW plants in Java island at a cost of US$ 7-9 billion. These plants are to begin operations in 2004. By 2019, approximately 10% of total electric power generation is to be supplied by atomic power.

(2) Bio-Technology Industries

Being relatively new to Indonesia, the country has just begun to foster a biotechnology industry. A general outline of this sector follows.

1) Bio©technology projects and related problems

a. According to BKPM, the projects listed in the chart below are underway. Some 57 companies (including foreign companies) are involved in the projects, which have combined investments worth US$1.5 billion (**Table 5.8**).

Table 5.8 Bio Technology-Related Projects

Products	Number of Companies	Investment Amount [1 million dollars]
Glutamic Soda	130	914.9
Ethylene Glycol / Acetic Acid	8	323.0
Glycerin	6	163.9
High Franktose Syrup	11	48.3
Citric Acid	7	25.5
Ethanol	7	15.7
Antibiotics, Vaccine for Animal	5	10.6
Total	57	1,501.9

Source : BKPM

b. Problems in the bio-technology sector

- Few companies utilize new bio-technological processes. Domestic companies, in particular, still employ traditional germ maintenance and improvement techniques.
- Since most production is done under license contract, Indonesian partners must expect high user fees without much return in terms of technology transfer.
- Research facilities and funding for bio-tech projects are both in short supply - as there are highly skilled researchers in this field.

2) Some Examples of Successful Research

a. The hybridization of palm trees resulted in reducing the harvesting period from three years to one, thereby doubling the crop.

b. In order to counter surpluses which drive down prices during the traditional harvesting period, a new species of bananas has been developed which can be harvested at any time of the year.

c. Development of a strain of high©production soy beans, which can be grown on acidic soil.

(3) Data Processing/Computer Industries

Though Indonesia manufactures a part of peripheral equipments of computer hardwares, almost all the machines depends on imported components. On the other hand, the software industry started back in the 1970s. The establishment of a domestic software industries association in 1990, accelerated developmental gains. Sales figures and forecasts for Indonesian hardware, software and related services are shown in Table 5.9. Software sales are almost certain to overtake hardware sales in the near future.

Table 5.9 Results and Future Prospects of the Hardware / Software Sales

[US$ 1 million]

	1988	1989	1990	1991	1992	1993	1994	1995
Hardware	186	262	373	396	400	400	375	350
Software	30	42	61	86	100	150	250	350
Service	34	46	66	68	75	125	200	275
Total	250	350	550	550	575	675	825	975

Source : Software Association of Indonesia

6. Evaluation of Industrial Technology in Indonesia

6.1 The Present Standard

(1) Industrial Technology

In line with government policy, the sectors of heavy and chemical industries which have received state funding are graced by new production facilities and high-skilled engineers and technicians. These are the aerospace, shipbuilding, and basic material industries. In manufacturing industries which produce modern consumer durables such as automobiles and electrical household appliances, the active role played by foreign capital based on market principles has boosted Indonesia to technical standards approaching international levels.

Fairly high production technology standards in manufacturing industries such as the plywood, spinning and processed food which draw upon Indonesia's unskilled labor force and abundant natural resources have been maintained thanks to investment in facilities. However, the number of manufacturing companies maintaining such standards is extremely small accounting for less than 20% of total value-added production. On the other hand, there is an enormous number of small and household companies producing traditional consumer goods such as food, clothing and wood products. These companies employ labor intensive manufacturing processes with low-level production skills. Most manufacturing facilities rely on imports from developed countries. The lack of capital goods manufacturing industries such as machine tool/tool manufacturing and metal processing industries stands out as a defect in the industrial structure.

(2) Labor Productivity

According to a fact-finding survey, wages levels are low in sectors which account for most output, including the automobile, oil, chemical and other heavy industries. This indicates that there may be insufficient incentives to increase the labor productivity of management. Poor relations between labor and management has made it difficult to adjust employment to meet corporate needs. Chronic overstaffing in most businesses has also kept productivity low. Management harbors a relatively indifferent attitude toward productivity. As a result, there is precious little data on labor productivity, which makes

quantitative analysis rather difficult. Many industries will increase production as the market for their products expands. In the intermediate to long-term period though, companies are expected to increase output through gains in productivity. This can be achieved by utilizing surplus employees, improving the efficiency of operations and introducing machinery to cut labor costs. A model for this is the introduction of automation into the assembly process at semi-conductor and electrical household appliance factories (much as Malaysia has done). There is also plenty of opportunity to automate such labor intensive, yet overstaffed sectors as food processing, wood products, leather, and the apparel manufacturing industry. Such modernization is inextricably intertwined with the government's labor policy, so there are obvious problems with execution of this strategy.

6.2 Incentives and Limitations to Industrial Development

(1) Preservation of Natural Resources

Indonesian oil reserves, about 2% of total world oil reserves, are expected to last for some 20 or more years, barring any new discoveries. With the possibility of exhausting its oil in early part of the twenty-first century, there are severe limits on the utilization of these reserves. As for natural gas, at one time these deposits were also considered vulnerable to exhaustion. However, declining gas reserves in Sumatra will be offset by increased production at gas deposits in Kalimantan. Long-term stable production can also be expected once the development of the Natuna Islands gas deposit in South China Sea is completed sometime in twenty-first century. The Natuna Island fields are considered to be among the world's largest deposits of natural gas. The global leader in plywood exports, Indonesia has taken care to assure sustainable production from its forests. It is becoming increasingly difficult to obtain government authorization for log cutting operations. For example, the authorized amount of forest tracks available to wood-cutters in 1994 was about 73% of the previous year. Restrictions on the use of natural resources will become even stricter in the future.

(2) Market Trends and the Structure of the Manufacturing Sector

1) Market Trends

There can be no doubt that with a population of 190 million people, the Indonesian market has great potential for expansion. At present, gross national product per capital is approximately US$680. Still, purchasing power for general consumer durables is limited. However demand for higher quality everyday products such as food and clothing is expected to grow rapidly. Sales of electrical household appliances, in particular, should continue to increase. Over the long term, demand for premium consumer durables such as automobiles will rise, though any increases will be moderate for some time to come. Motorcycle sales should outpace sales of autos in the near term. Improving the quality of output is key factor to maintaining position in the highly competitive markets of advanced industrial powers. Expanding Indonesian industry's share of these markets may be problematic however, due to inflexible pricing characteristic of the primary and processed goods at the heart of the nation's export base. An exponential increase in exports of industrial products will also be a difficult task, with the possible exception of products utilizing domestic natural resources such as wood, oil and natural gas.

2) The Structure of the Manufacturing Sector

There is a dichotomy in Indonesia's manufacturing sector between a few large, high-tech corporations which were cultivated by government mandate or foreign capital, and a substrate of numerous household industries producing consumable goods in an isolated fashion. Government policies clearly aim at establishing a full range of manufacturing industries. But these policies will have to be modified in order to provide for a more balanced and efficient distribution of natural resources which will enhance the economic development of Indonesia. Manufacturers of capital and intermediate goods, which are structurally weak at this point, can be expected to develop further in accordance with such modifications.

(3) Access to Advanced Technologies and Introducing of Foreign Technology

1) Access to advanced industrial technology

The companies in designated strategic industries, state corporations, affiliates of conglomerates and multinationals are usually big and rich enough to tap into the technology stream of advanced countries and thereby gain insight on the latest innovations. However, such information is not, of course, readily available for a lot of medium, small and household companies with limited financial resources and untested management skills. As a result, efforts to streamline or upgrade operations take place in an environment of less than perfect knowledge of costs and opportunities. Establishing channels for transferring advanced technologies from abroad and then transmitting information between both large and small companies would remedy this imbalance.

2) The Introduction of Foreign Technology

Both Japan (during the 1950's and 1960's) and Korea (from the 1970's through the 1980's) strove to catch up with advanced countries by productively introducing foreign technologies. One of the methods employed to promote industrialization was research and development (R & D). Such is, however, a high risk and time consuming endeavor when a nation has an underdeveloped technological base. Although R&D is a significant factor in long-term development, a non-industrialized nation will benefit most from adopting established foreign technology. As is indicated by PJP2, which sets a goal of increasing GNP per capita by four times in 25 years, it will take time for Indonesia to develop. For example, in order to make the most of foreign technology, Indonesia must first face the problem of increasing the stock of trained engineers. It is of utmost importance for industry, government and the academic world to cooperate in increasing the number of college graduates majoring in so-called hard science and technology.

(4) Industrial Policies

Industrial policy in Indonesia, crystallized in the form of public corporations and strategic industries, also actively guides private companies through systematic intervention to support export promotion and expedite import substi-

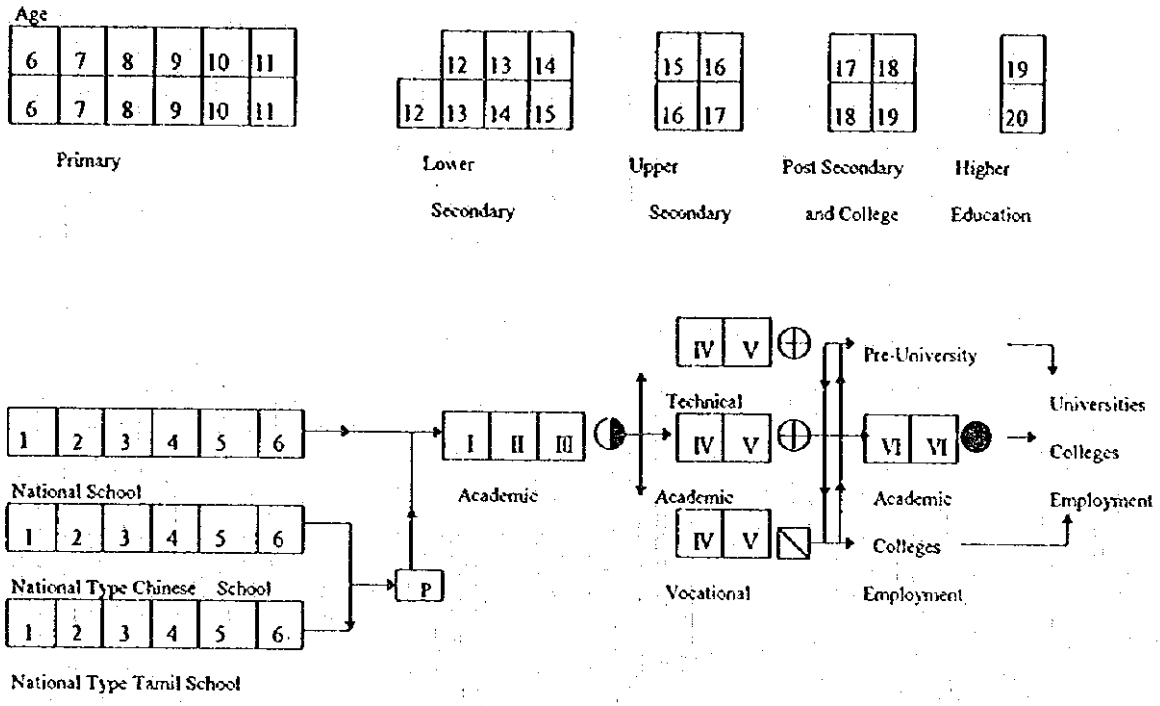
tution. However, strategic industries and national corporations tend to erode the government's financial strength because they seldom earn enough to cover costs. Therefore, these corporations are expected to be privatized and reigned in the law of the survival of the fittest. Various governmental efforts to foster development, as seen in the APEC Bandung Conference, will still have a role in the stream of greater market liberalization. In accordance with industrial policy, Indonesian industry will undergo an inevitable restructuring in order to fit the domestic and foreign market.

(5) Corporate Management and Administrative Ability

To the extent that surveys have shed light on the subject, the executive ranks of companies in Indonesia are well acquainted with market fundamentals and principles. They are also fully aware of means in which to develop their companies and the importance of training of human resources and investing in R&D. Yet implementation of concrete measures within these companies is not always satisfactory. The depth of this problem is attested to in interviews with various managers and administrative officials, who appeared conscious of this problem only in rare instances.

9-2 Education System in the Related Countries

9.2.1 EDUCATION SYSTEM IN MALAYSIA



Notes:

P

Remove Class

Lower Certificate of Education (LCE)

Malaysian Certificate of Education (MCE)

Malaysian Certificate of Vocational Education (MCVE)

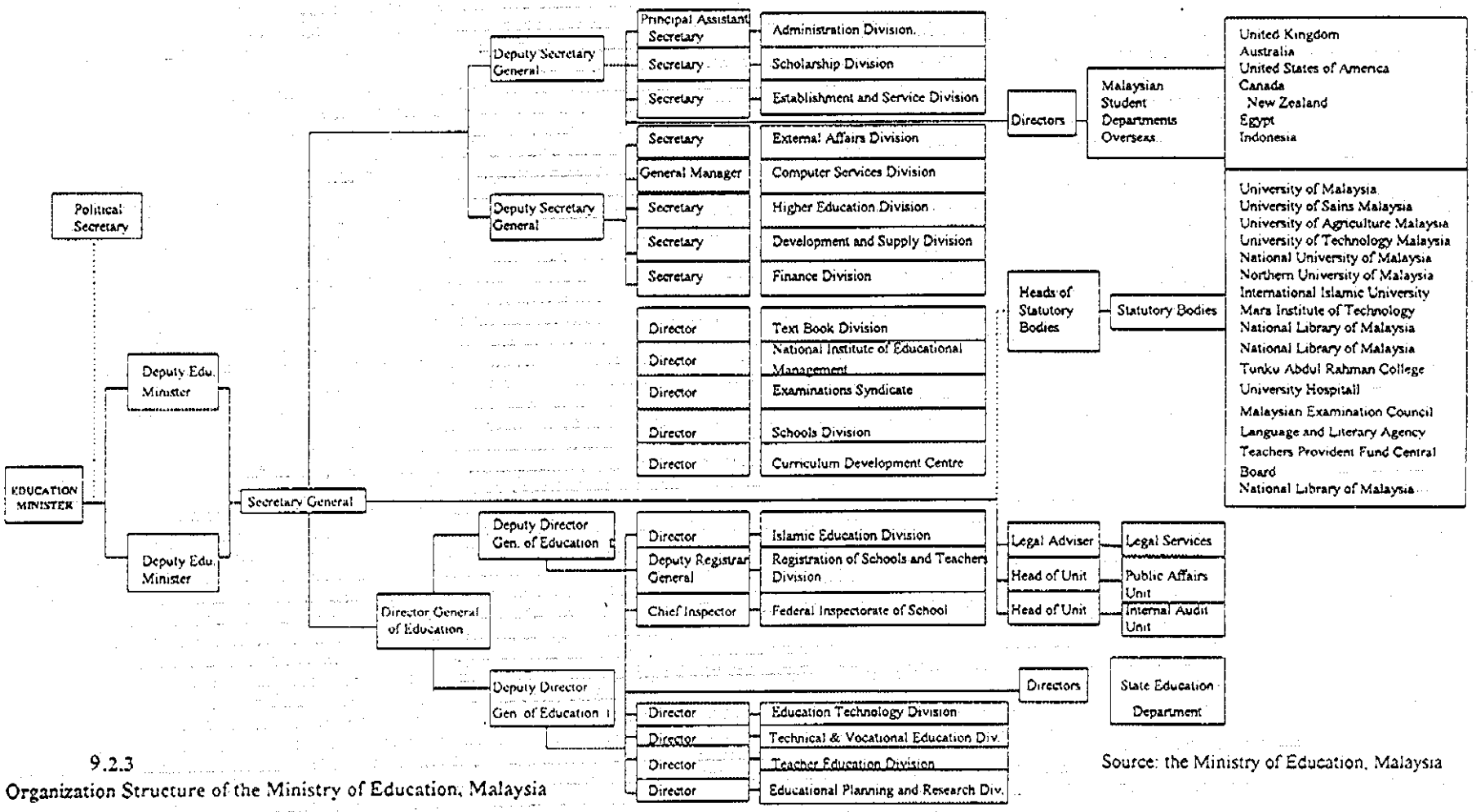
Malaysia Higher School Certificate (HSC)

Source: *Educational Statistics of Malaysia* 1991

9.2.2 Changes in By-School Enrollment Percentage in Malaysia as of 1991

	No. of Students Enrolled	School Age Population	Enrollment Percentage (%)
Primary Schools	2,530,815	2,584,700	97.92
Middle Schools	953,145	1,142,500	83.43
High Schools	363,305	748,100	48.56
Academic High Schools	331,339	n.a.	-
Vocational High Schools	26,700	n.a.	-
Technical High Schools	5,266	n.a.	-
Colleges/Politekniks	143,977	729,800	19.73
Post Secondary	71,205	n.a.	-
Politekniks	12,134	n.a.	-
Teacher Education Colleges	25,676	n.a.	-
ITM	28,496	n.a.	-
TARC	6,466	n.a.	-
Universities	62,113	2,076,100	2.99
TOTAL	4,053,355	7,281,200	55.67

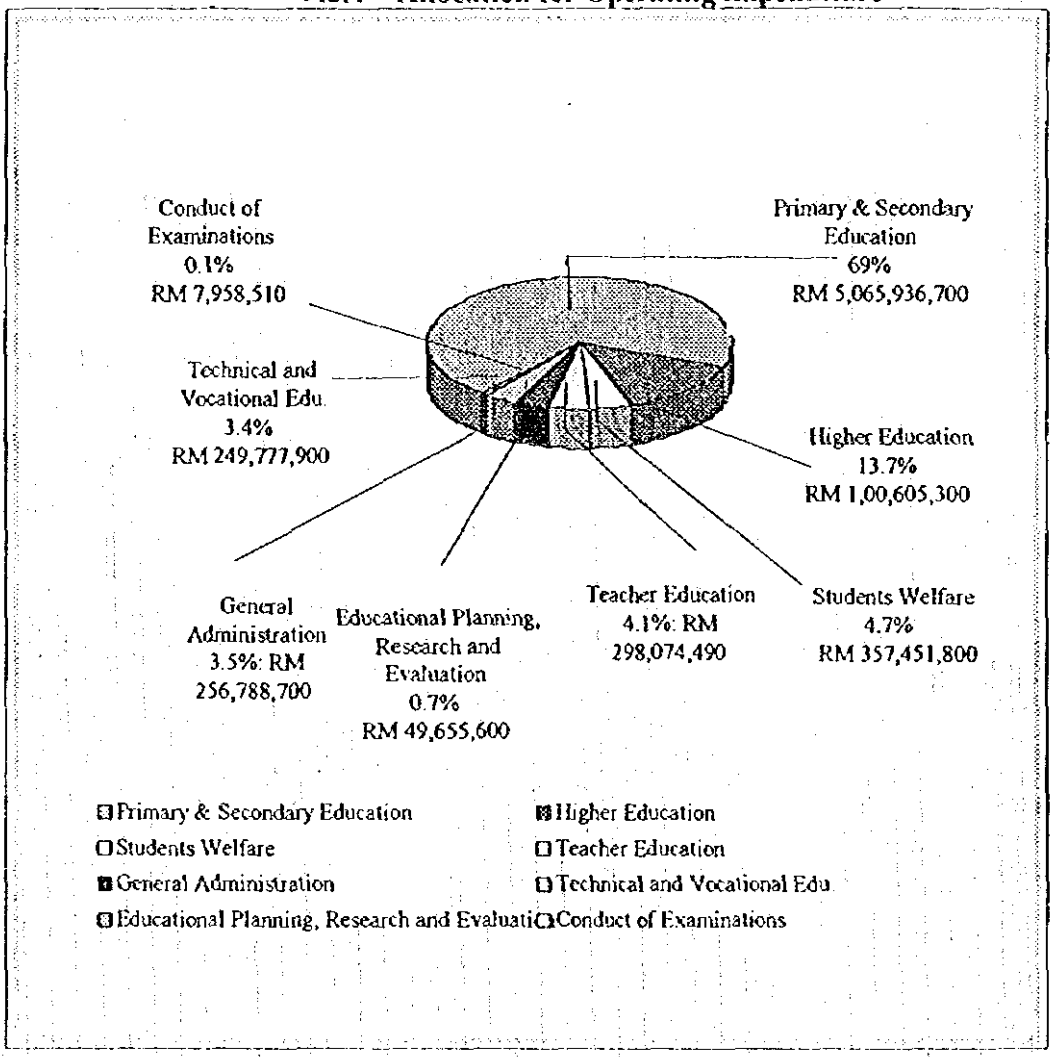
Source: the Ministry of Education, Malaysia



9.2.3
Organization Structure of the Ministry of Education, Malaysia

Source: the Ministry of Education, Malaysia

9.2.4 Allocation for Operating Expenditure



Allocation for Operating Expenditure: RM 7,286,249,000

Allocation for Development Expenditure: RM 1,199,184,800

Total Allocation: RM 8,485,433,800

Source: the Ministry of Education Malaysia

9.2.5

Changes in Number/Percentage of Students in Science & Technology Departments in Degree Courses of Universities in Malaysia

[Unit: people, %]

	1986	1987	1988	1989	1990	1991	1992	1993
Total No. of Students	30,943	33,158	35,455	37,616	39,177	41,328	43,598	43,926
Science & Technology Students	14,421	15,062	15,740	16,703	17,341	18,329	19,554	19,476
(Science)	10,166	10,489	10,359	10,920	11,242	11,633	12,019	12,323
(Technology)	4,255	4,573	5,381	5,783	6,099	6,696	7,535	7,153
Percentage of Science & Technology Students (%)	46.6	45.4	44.4	44.4	44.3	44.4	44.9	44.3
(Science(%))	32.9	31.6	29.2	29.0	28.7	28.1	27.6	28.1
(Technology(%))	13.7	13.8	15.2	15.4	15.6	16.3	17.3	16.2

Notes: Five Universities with science & technology departments; UM, UKM, USM, UPM, and UTM

Source: Enrolmen Pelajar Mengikut Kursus Dan Peringkat Pengajian
Di Institusi Pendidikan Tinggi Tempatan Sesi 1985/86 Hingga 1992/93
Unit Maklumat Pendidikan Tinggi Bahagian Pendidikan Tinggi,
Kementerian Pendidikan Malaysia

9.2.6 Student Intake, Enrolment, and Graduates of All Politechnics in Malaysia 1993

	Intake	%	Enrolment	%	Graduate	%
[CERTIFICATE]						
Civil Engineering	1,285	29.5	3,177	27.4	819	24.6
Electrical Engineering	1,364	31.3	3,545	30.5	953	28.6
Mechanical Engineering	1,207	27.7	3,162	27.2	921	27.7
Commercial Studies	358	8.2	1,364	11.7	522	15.7
Food Processing Technology	88	2.0	230	2.0	73	2.2
Agricultural Engineering	54	1.2	138	1.2	39	1.2
Sub-total	4,356	100.0	11,616	100.0	3,327	100.0
[DIPLOMA]						
Marine Engineering	102	4.5	253	5.4	55	4.2
Accoutancy	377	16.6	1,400	30.0	389	29.4
Electro-Mechanical Engineering	144	6.3	559	12.0	131	9.9
Marketing	198	8.7	276	5.9	80	6.1
Banking and Finance	27	1.2	27	0.6	0	0.0
Stenography	113	5.0	300	6.4	88	6.7
Business Studies	135	5.9	199	4.3	77	5.8
Food Processing Technology	58	2.6	104	2.2	43	3.3
Electrical Eng.(communication)	160	7.0	232	5.0	72	5.5
Computer Engineering	57	2.5	145	3.1	88	6.7
Electronic Engineering	122	5.4	118	2.5	0	0.0
Electrical Eng.(power)	48	2.1	48	1.0	0	0.0
Civil Engineering	258	11.3	397	8.5	162	12.3
Land Survey	31	1.4	49	1.1	22	1.7
Building Services	0	0.0	25	0.5	24	1.8
Mechanical Engineering	213	9.4	213	4.6	0	0.0
Manufacturing Technology	85	3.7	129	2.8	44	3.3
Automotive Engineering	60	2.6	103	2.2	46	3.5
Agricultural Engineering	27	1.2	26	0.6	0	0.0
Air Condition Engineering	59	2.6	59	1.3	0	0.0
Sub-total	2,274	100.0	4,662	100.0	1,321	100.0
Grand-total	6,630	-	16,278	-	4,648	-

Source: Ministry of Education Malaysia

.9.2.7 Student Intake, Enrolment and Output of Secondary Vocational Schools

[Unit: Number of Person]

	Intake	Enrollment	Output
1970*	1,860	3,388	1,528
1975*	4,081	8,139	4,058
1980*	5,950	11,483	5,533
1985*	5,190	10,468	5,278
1990	13,988	25,263	11,821
1993	22,730	36,202	14,096

Note: * Peninsular Malaysia Only

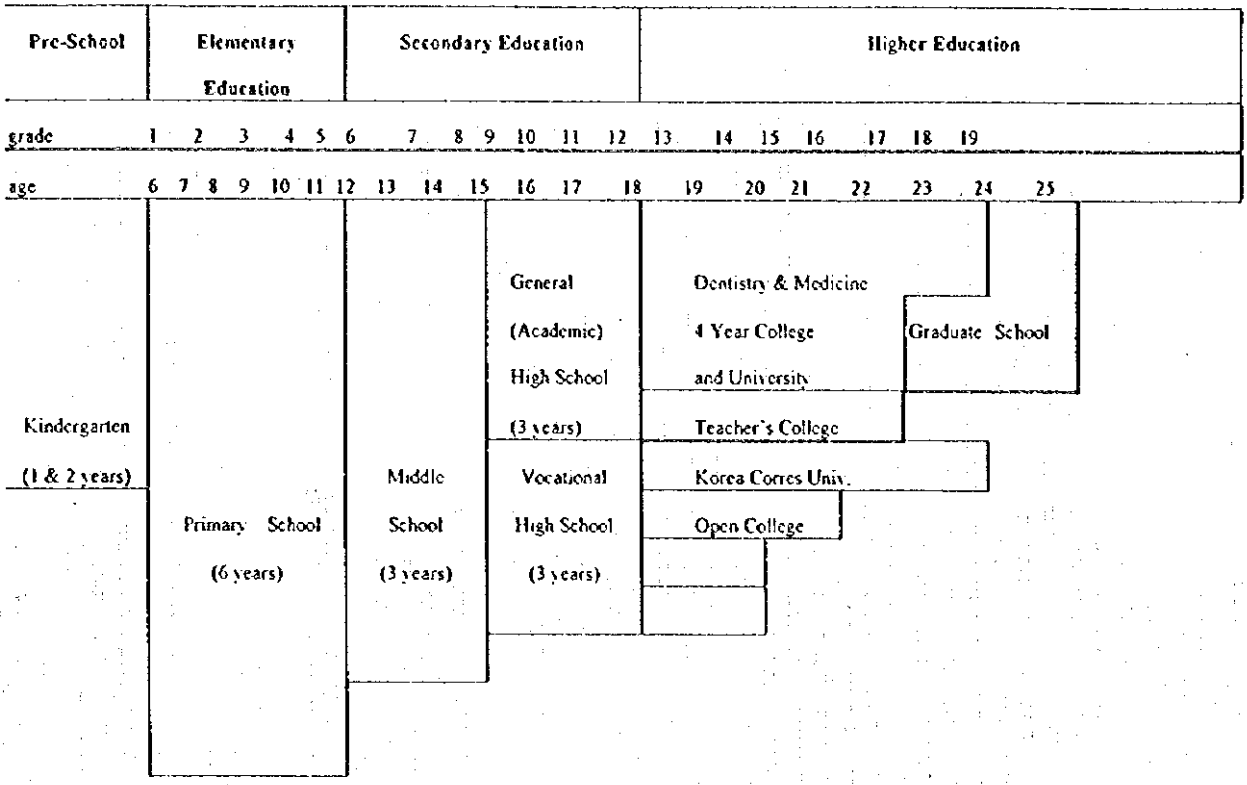
Source: Ministry of Education Malaysia

9.2.8 Vocational Training at Major ITIs

		1991			1992			1993		
		I	E	O	I	E	O	I	E	O
1	**MANUFACTURING/AUTOMATED MANUFACTURING**									
	1.1 General Machinist	146	497	90	144	549	140	115	536	117
	1.2 Engineering Draughtsman	22	90	11	34	108	27	29	130	26
	1.3 Foundry and Pattern Maker	25	59	4	28	96	19	13	82	24
	1.4 Wood Working Machinist	21	65	15	29	66	16	33	71	11
	1.5 Carpenter and Jointer	91	274	45	59	286	131	72	252	68
	1.6 Tool and Die Maker	23	51		23	85	18	16	76	18
	1.7 Mould Maker	13	36		20	64	7	15	76	23
	1.8 Plastic Technician	17	33		17	66	16	25	74	16
	1.9 Furniture Maker	64	185	31	47	183	37	82	237	55
	1.10 Architectural Draughtsman	33	109	22	30	122	31	42	130	28
	Sub-Total	455	1399	218	431	1625	442	442	1664	386
2	**CONSTRUCTION AND INSTALLATION**									
	2.1 Welder	259	727	119	244	918	188	151	394	264
	2.2 Structural Metal Preparer and Erector	104	292		102	324	69	74	381	99
	2.3 Sheet Metal Fabricater	44	83		54	196	38	14	131	43
	2.4 Wireman	411	1503	302	407	1573	393	422	1623	374
	2.5 Plumber	104	359	60	94	371	98	103	371	80
	2.6 Bricklayer and Tile Setter	66	137	5	54	215	44	83	254	54
	Sub-Total	988	3101	486	955	3597	830	847	3154	914
3	**SCIENTIFIC AND MATHMATICAL MEASUREMENT, SERVICES AND APPLICATION**									
	3.1 Industrial Instrument Mechanic				25	44		14	60	14
	3.2 Engineering Inspection	11	10	10	18	28	15	34	32	15
	3.3 Industrial Electronics Technician	47	177	42	37	157	42	91	210	33
	3.4 Telecommunication Technician				8	20		33	73	12
	Sub-Total	58	187	52	88	249	57	172	375	74
4	**ELECTROMECHANICAL SERVICES**									
	4.1 General Mechanic	347	1095	203	367	1343	280	217	1297	346
	4.2 Motor Vehicle Mechanic	189	665	108	175	724	189	160	704	180
	4.3 Earth Moving Equip. & Construction Mech.	82	222	21	80	313	71	31	263	81
	4.4 Heavy Commercial Vehicle Mech	39	49		53	122	9	35	144	36
	4.5 Radio and TV Servicing Technician	64	248	50	71	257	61	81	290	62
	4.6 Refrigeration and Air-Conditioning Mech	129	445	64	135	507	132	104	479	121
	4.7 Electrical Chargemen	40	40	40	37	37		46	60	14
	Sub-Total	890	2764	486	918	3303	742	674	3237	840
5	**PRINTING**									
	5.1 Printing Technician	32	107	22	46	138	28	42	169	34
	Sub-Total	32	107	22	46	138	28	42	169	34
	TOTAL	2423	7558	1264	2438	8912	2097	2176	8589	2248

Notes; I = Input, E = Enrollment, O = Output

9.3.1 Education System in Korea



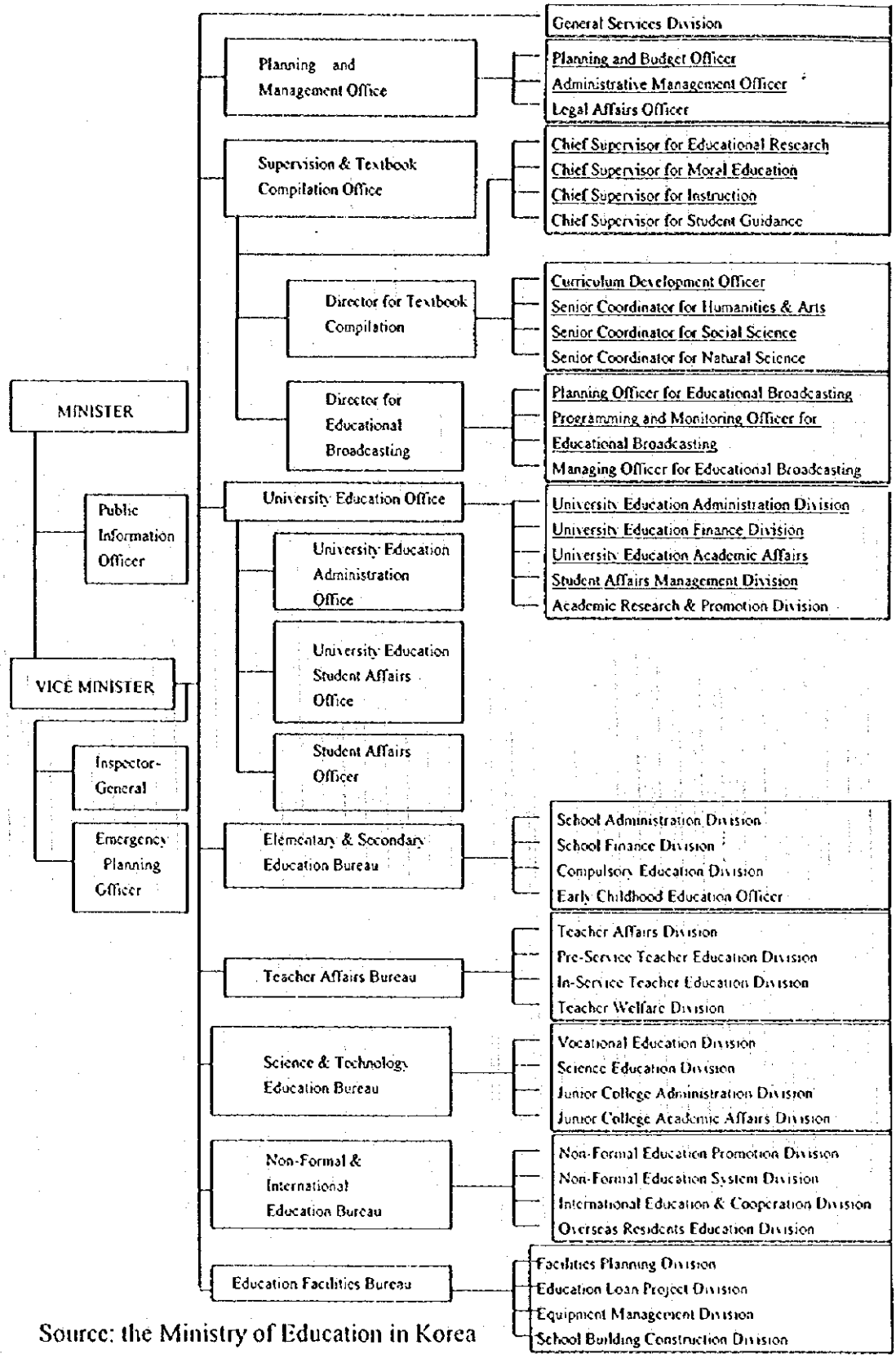
Source: "Education in Korea 1993-1994" Ministry of Education

9.3.2 Number of Higher Education Institutions, Number of Enrollment, and Enrollment percentage (1994)

			No. of universities	No. of Enrollment in 1994	Percentage of enrollment in higher education (%)
4-yr Course	Legal Classification (Under the Education Law)	Universities	131	232,555	33.6
		Educational Universities	11	4,980	0.7
		Miscellaneous Schools	18	2,455	0.4
		Open Universities	14	20,990	3
		Air and Correspondence Universities	1	69,000	10
		Sub-Total	175	329,980	47.7
	Legal Classification(Under the Special Law)	Science and Technology	1	600	
		Policy Academy	1	120	
		Military Academy	3	750	
		Sub-Total	5	1,470	0.2
	Sub-Total		180	331,450	47.9
2-year Universities	Legal Classification (Under the Education Law)	Technical Colleges	135	193,070	27.9
		Miscellaneous Schools	4	1,880	
	Legal Classification(Under the Special Law)	Tax Colleges	1	250	
	Sub-Total		140	195,200	28.2
	TOTAL		320	526,650	76.1

Note: Percentage of entrance is calculated based on 692,458 high school graduates.
Source: the Ministry of Education in Korea

9.3.3 Organization of the Ministry of Education



Source: the Ministry of Education in Korea

9.3.4 Percentage of Budget For Education (Fiscal 1993)

(Unit: billion won)

Item	Amount	Percentage (%)
Education	9,831	23.40
National defense	9,572	22.80
Economic Development	7,715	18.40
Subsidiary Grants	5,884	14.00
Social Development	3,455	8.30
Judicial Police	2,728	6.50
General Administration	1,620	3.90
The Others	1,131	2.70
Total	41,936	100.00

Source: Education in Korea 1993~1994, the Ministry of Education in Korea

9.3.5 Enrollment Quorum for Universities in Korea

	Total		University		Technical College		Others	
	No. of Institutes	Quorum	No. of Institutes	Quorum	No. of Institutes	Quorum	No. of Institutes	Quorum
1980	224	205,835	85	116,700	128	84,455	11	4,680
1981	233	277,610	89	144,020	132	98,070	12	35,520
1982	238	305,070	97	151,720	128	105,830	13	47,520
1983	239	298,480	98	155,840	128	104,570	13	38,070
1984	237	299,790	99	159,900	122	99,330	16	40,560
1985	238	305,430	100	165,780	120	97,070	18	42,580
1986	238	305,410	100	165,780	120	97,050	18	42,580
1987	240	306,590	103	166,540	119	96,930	18	43,120
1988	241	337,880	104	186,590	119	107,010	18	44,280
1989	239	352,390	104	192,340	117	114,700	18	45,350
1990	242	388,510	107	196,550	117	130,520	18	61,440
1991	253	422,520	115	202,070	118	141,090	20	79,360
1992	266	456,330	121	211,740	125	158,930	20	85,660
1993	279	484,300	127	219,890	128	174,490	24	89,920
1994	292	520,595	131	232,555	135	193,070	26	94,970

Source: the Ministry of Education in Korea

9.3.6 No. of New Students, Enrolled Students, Graduates, and Employed Graduates of Universities in Korea (1994)

	No. of Subject	New Students	Enrolled Students	Graduates	Graduates who are employed
Science and Technology Majors	1,895	101,948	493,046	69,788	35,985
Science	583	28,477	134,086	20,488	8,808
Computer Statistics	5	230	764	66	16
International Resources Development	2	80	317	17	10
Science Atmosphere	5	163	677	100	26
Physics	80	3,791	19,623	2,777	994
Microbiology	20	845	4,140	578	195
Genetics Science	7	302	1,343	172	40
Fodder Production Engineering	1	30	164	7	4
Life Science	3	114	377	50	17
Life Resources	1	40	226	-	-
Biological Science	1	79	321	73	16
Biology	65	3,019	14,080	2,648	993
Biochemistry	12	448	2,221	360	143
Mathematics	80	3,836	18,620	3,183	1,447
Cosmic Science	1	50	285	39	6
Genetic Engineering	12	571	2,812	410	163
Applied Animal Science	1	40	218	42	33
Applied Physics	2	70	102	-	-
Applied Microbiology	2	119	289	41	10
Applied Mathematics	7	280	1,248	104	49
Applied Geology	1	40	188	43	13
Applied Statistics	14	630	3,299	487	260
Applied Chemistry	3	110	190	-	-
Natural Science Fields	1	-	2	-	-
Computer Science	4	216	858	139	98
Computerized Statistics	25	1,299	4,800	626	329
Computer Science	11	745	3,377	562	274
Computer Science	57	3,706	17,029	2,375	1,273
Precision Chemistry	1	50	279	33	14
Information Science	1	50	174	-	-
Information Processing	6	280	951	18	12
Earth Science	1	40	197	37	22
Geophysics	1	30	149	16	9
Earth & Marine Science	1	30	165	26	10
Geology	3	80	358	42	14
Geology	10	439	2,150	392	172
Geological Oceanography	1	50	50	-	-

To be continued