
**THAILAND:
HUMAN RESOURCES
DEVELOPMENT PROJECT**

**Final Report
(Appendices)**

United States Agency for International Development

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Prepared by

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APPENDIX I

RESPONDENTS FROM THE ROYAL THAI GOVERNMENT, RESEARCH AND PROFESSIONAL ORGANIZATIONS

| No | NAME OF AGENCY/INSTITUTION | CONTACT PERSON | POSITION | TELEPHONE |
|----|---|--|---|------------|
| 1 | Tourism Authority of Thailand | Pradech Prayakvichien | Director, Investment Planning Coordination Division | 281-9796 |
| 2 | Ministry of Industry | Sivavong Changkasiri | Permanent Secretary for Industry | 245-9866 |
| 3 | Ministry of University Affairs Foreign Relation Division | Chantavit Sujatanond | - | 245-8268 |
| 4 | Science & Technology Development Board | Wirojana Tantraporn, Ph D | Deputy Director & Technical Advisor | 276-1314-7 |
| 5 | Science & Technology Development Board | Professor Montrı Chulavatnatol Ph D | Deputy Director | 276-1314-7 |
| 6 | Ministry of University Affairs Foreign Relation Division | Dr Chantavit Sujatanond | - | 245-8268 |
| 7 | Institute for the Promotion of Teaching | Thongchai Cheuprecha Ph D | Deputy Director | 392-4021 |
| 8 | Ministry of Science, Technology and Energy | Rasada Inthasaen | - | 245-3690 |
| 9 | Ministry of Science, Technology and Energy | Piroj Wongsiripatanakul | - | 245-3690 |
| 10 | Ministry of Industry | Siwawong Chankhasiri | Permanent Secretary of Ministry of Industry | 245-9866 |
| 11 | National Institute for Skill Development | Nitasna Theeravit | Director | 245-1821 |
| 12 | Ministry of Education | Dr Suwat Ngercham | Director of Planning Division Department of General Education | 282-2899 |
| 13 | Office of the National Education Commission | Chirasakdi Poonpol | Deputy Secretary-General | 243-0083-4 |
| 14 | Ministry of University Affairs Planning Division | Suchart Muangkeow | - | 245-8922 |

RESPONDENTS FROM THE ROYAL THAI GOVERNMENT, RESEARCH AND PROFESSIONAL ORGANIZATIONS (Continued)

| No | NAME OF AGENCY/INSTITUTION | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|-----------------------------|--------------------|----------------------|
| 15 | Thailand-U S Educational Foundation | Doris Wibunsin | Executive Director | 286-4783 |
| 16 | Petroleum Institute of Thailand | Khunying Thongtip Ratanarat | Executive Director | 537-3592-5 |
| 17 | Thailand Management Association | Somburana S Supandit Ph D | Executive Director | 233-0233 234-2624 |
| 18 | Seamico | Peter Brimble | Director | 213-1254/5 |
| 19 | Thai-American Technical Co-Operation Association | Ramyong Sakornpan | - | 282-0756 |
| 20 | Technological Promotion Association (Thai-Japan) | Prayoon Shiowattana | General Manager | 258-0320 |

APPENDIX II

RESPONDENT COMPANIES AND CONTACT PERSONS

A IN-DEPTH INTERVIEWS (FACE-TO-FACE)

| COMPANY NAME | CONTACT PERSON | POSITION |
|---------------------------------------|---------------------------|------------------------------------|
| AJINOMOTO CO , (THAILAND) LTD | Suchart Narksavaek | Personnel Manager |
| AT & T DIRECTORIES (THAILAND) LTD | Boonsong Srimongkon | Personnel Manager |
| BANGKOK INDUSTRIAL GAS CO , LTD | Teerapong Kampeeraneta | Plant Manager |
| BANGKOK LIVESTOCK PROCESSING CO , LTD | Niyom Pagamas | Personnel Manager & Admin Officer |
| BANGKOK UNION INSURANCE CO , LTD | Sawan U-Kongsak | Personnel Officer |
| BANK OF TOKYO CO , LTD | Somchit Pentananunt | Clerk in Personnel Department |
| BOEHRINGER INGELHEIM (THAI) LTD | Sothaya Srisukho | Personnel & Administration Manager |
| CALTEX OIL (THAILAND) LTD | G Toby Marion | General Manager and Director |
| CENTRAL PLAZA BANGKOK HOTEL | Nidda Prakobpanich | Assistant Personnel Manager |
| CHAIYAPHUM PLANT PRODUCTS LTD | Ronachai Srirattanakorn | Asst Personnel & General Manager |
| CONIMEX CO , LTD | Apichai Jurngthavornkij | Personnel Manager |
| DIGITAL EQUIPMENT (THAILAND) LTD | Philip J Curran | Managing Director |
| EKAPAN ENGINEERING CO LTD | Somkiat Sirtonchai | Personnel Manager |
| FAMILY GLOVE CO LTD | Surachai Pornphattarayuth | Head of Production Department |
| FISH SAUCE CO , LTD | Jirawat Wattanarong | Accounting Officer |
| FRIENDSHIP CO , LTD | Thira Napapruekchart | General Manager |
| GOODYEAR (THAILAND) LTD | John T Brayton | Managing Director |
| HEWLETT-PACKARD (THAILAND) LTD | Desmond Thornton | Finance, Admin & Personnel Manager |
| HMC POLYMERS CO LTD | Pichit Lerttamras | Controller |
| IBM THAILAND CO LTD | Chanond Silpi | Personnel Manager |
| INDO-THAI SYNTHETIC CO LTD | Siripongse Srichairomrat | Vice President (Personnel & P R) |
| KANA THAI INDUSTRIAL CO , LTD | Liu Cheng - Se | Managing Director |
| KAO YAI MARBLE CO , LTD | Nanthana Suebsiri | Managing Director |
| KIMTEX (THAILAND) CO LTD | Nongkran Nuansaeng | Receptionist Department |
| LION CORPORATION (THAILAND) LTD | Kaewjai Thamrajitt | Personnel Manager |
| MCTHAI CO LTD | Somchai Cherdchaitamrong | Training Manager |
| MICHELIN SIAM CO LTD | Somkiat Krisdatikarn | Personnel Officer |
| MOBIL OIL THAILAND LTD | Prasit Boonyavanich | Relations Advisor |
| NATIONAL ADHESIVES | Ongart Charoenpong | Managing Director |
| NATIONAL PETROCHEMICAL CORP , LTD | Songpol Ratanasuwan | Plant Admin Division Manager |
| NESTLE (THAILAND) CO LTD | Chailai Jirapakkana | Group Personnel Manager |
| NIC STARCH PRODUCTS LTD | Chaiya Meechai | Factory Manager |
| PAKCHONG PLASTIC LTD PART | Aimorn Indrakamhaeng | General Affair |
| PARKCHONG JUTE MILL CO , LTD | Viroj Wongsawad | Deputy Mill Manager |
| PARKCHONG TAPELENE INDUSTRY CO LTD | Suchart Sirishodpakorn | Admin Manager |
| PEROXYTHAI CO , LTD | Patrick Arbean | Plant Manager |
| PORNPAT CHEMICALS CO LTD | Aran Pongsomboon | Asst Plant Manager |
| PREMIER FROZEN PRODUCTS CO LTD | Surapon Dharmasucharit | Asst Plant Manager |
| P PATTANACHAN CONSTRUCTION LTD PART | Boonnarong Dhammawuttikul | Manager |
| P P GROUP CO LTD | Pichit Jeerawattana | Head of Personnel of P P Group |

A IN-DEPTH INTERVIEWS (FACE-TO-FACE) [Continued]

| COMPANY NAME | CONTACT PERSON | POSITION |
|---------------------------------------|---------------------------|---|
| SAK CHANISIDHI CO LTD | Pensiri Kunavarant | Admin. & Personnel Manager |
| SHARP APPLIANCES (THAILAND) LTD | Chitchai Suwapap | Section Chief, Gen Affairs & Personnel |
| SIAM FOOD PRODUCTS CO , LTD | Wanpen Choldhichanand | Personnel Officer |
| SIAM STEEL SYNDICATE CO LTD | Visuth Jirathiyut | Managmg Director |
| SIAM TYRE CO , LTD | Chalaluck Bunnag | Managmg Director |
| SUTECH CO LTD | Pornsuda Handamrongkul | Accountant |
| TEAM CONSULTING ENGINEERS CO , LTD | Sanit Rattanopas | Personnel Administration Manager |
| THAI ACRYLIC FIBRE CO , LTD | Siripongse Srichairomrat | Vice President (Personnel & P R) |
| THAI CARBON BLACK CO , LTD | Siriponse Srchairomrat | Vice President (Personnel & P R) |
| THAI CHANATHORN INDUSTRY CO LTD | Niwat Rungmanochai | Personnel & Administrative Manager |
| THAI FERMENTATION INDUSTRY CO , LTD | Saiyai Limassarawut | Personnel Department |
| THAI LEAD METAL CO , LTD | Chatree Narktrakulbhand | Production Manager |
| THAI OLEFINS CO LTD | Sahas Bunditkul | Asst Project Director/Senior Engineer |
| THAI PEROXIDE CO LTD | Siripongse Srichairomrat | Vice President (Personnel & P R) |
| THAI PETROCHEMICAL INDUSTRY CO , LTD | Preecha Woodtikarn | Vice President |
| THAI PLASTIC & CHEMICAL CO , LTD | Chalearmchai Tuntaranont | Emp Res. & Payroll Personnel Supervisor |
| THAI POLYETHYLENE CO , LTD | Bandit H | Personnel Manager |
| THAI POLYPHOSPHATE & CHEMICALS CO LTD | Siripongse Srichairomrat | Vice President (Personnel & P R) |
| THAI PRESIDENT FOODS CO LTD | Pipat Ramangvait | President |
| THAI RAYON CO , LTD | Siriponse Srchairomrat | Vice President (Personnel & P R) |
| THAI SILK PRODUCTS CO , LTD | Suttipun Kornpinoyopap | Plant Manager |
| THAI SOLUBLE COFFEE CO , LTD | Chailai Jirapakkana | Group Personnel Manager |
| THAI SPECIAL WIRE CO LTD | Jirote Sirimangkala | Administrative Manager |
| THAI SUMICON CO LTD | Yutaka Herie | General Affairs Manager |
| THAI TABUCHI ELECTRIC CO , LTD | Siriporn Karakarn | Sr Chief Personnel & Admin |
| THAI TAKEDA LACE CO LTD | Apichart Sutharoy | Chief Personnel Development Dept |
| THAI THANA INDUSTRIES CO LTD | Boonwilai Charoensanttham | General Manager |
| THAI TOHMADO CO , LTD | Chamchai Turapatanan | Factory Manager |
| THAI WACOAL CO , LTD | Arunee Sahakjpinyo | Assistant Manager |
| THAI WATANA PANICH PRESS CO LTD | Anant Ratanajindaval | Assistant Manager |
| THAI-ASAHI GLASS CO LTD | Boonrat Toncharoen | Chief Personnel & Legal Section |
| THAI-HITACHI ENAMEL WIRE CO LTD | Paisarn Paisarnsilpchai | Personnel Manager |
| THAI-OVERSEA TRUST CO , LTD | Wanida Tikawan | Personnel Officer |
| THE MALL GROUP CO , LTD | Sithakorn Aksornnitikul | Policies and Planning Manager |
| THE SIAM COMMERCIAL BANK LTD | Oracha Yhookase | Assistant Personnel Manager |
| TUNTEX (THAILAND) CO LTD | Vinai Pitahpilampai | Section Chief |
| UNION SHOES CO LTD | Methee Chanachai | Personnel Section Head |
| UNITED MACHINERY CO , LTD | Apinan Hosupa | Personnel Manager |
| VENUS THREAD CO LTD | Kraisaeng Sintupinyo | Personnel Manager |

B TELEPHONE INTERVIEWS

| COMPANY NAME | CONTACT PERSON | POSITION |
|--|----------------------------|--------------------------------------|
| ATLANTIC LABORATORIES CORP LTD | Phisit Wathanaroom | Personnel Manager |
| BIG STAR CO , LTD | Prasit Jaturutphansaeng | Personnel Manager |
| CHAROONG THAI WIRE AND CABLE CO , LTD | Vira Piyawatanakul | Chief of Personnel Division |
| CHIDLOM DEPARTMENT STORE | Boonserm Wongchaowart | Personnel Manager |
| CM INDUSTRY CO LTD | Satitphorn Suakasem | Managing Director |
| COMPUNET CORP , LTD | Udomdej Burapark | Personnel Manager |
| COMPUTER SOFTPHISTIC AIDS CO LTD | Supoj Giranaiprepame | Personnel Manager |
| DEE ENGINEERING CO , LTD | Ditdi Puttornkul | Managing Director |
| DHANA SIAM FINANCE & SECURITIES CO , LTD | Wanchai Ajamalwara | Head of Planning and Budget Division |
| DODWELL THAILAND LTD | Khammatat Chandarakarn | Personnel Manager |
| DOW CHEMICAL THAILAND LTD | Nantana | Sec to Human Resources Manager |
| JONG PATTANA CO , LTD | Thosapol Chuecharoenchai | Sales Manager |
| KAY THAI CO , LTD | Anant Phungphol | Coordinator |
| KIMBERLY-CLARK (THAILAND) CO , LTD | Chirmsak Saicharoen | Engineering Manager |
| KITAMURA (CONSTRUCTION) CO LTD | Surapol Phadungkiati | Managing Director |
| MUANGTHAI LIFE INSURANCE CO , LTD | Wirat Chudintra | Asst Vice President Personnel Dep t |
| NIPPONDENSO (THAILAND) CO LTD | Somporn Ketaamornwattana | Asst Personnel Manager |
| NSK BEARING (THAILAND) CO , LTD | Sirilar Prasertwit | Asst General & Admin Manager |
| ORIENTAL GARMENT CO , LTD | Chuvalit Nmla-or | Deputy Managing Director |
| ORIENTAL HOTEL | Nigorn Buddhafri | Personnel Manager |
| PHATRA THANAKIT CO LTD | Matoon Thummanond | Personnel Manager |
| PHILIPS ELECTRICAL CO OF THAILAND LTD | Kittiya Limumethee | Personnel Manager |
| PHOENIX PULP & PAPER CO , LTD | Jirasak Patharavanakul | Deputy General Manager Head Office |
| RANGSIT FOOTWEAR CO LTD | Prasit Sriprathet | Personnel Manager |
| RAYLAM BATTERY CO , LTD | Suchada Suwattanakul | Personnel Staff |
| SAHAVIRIYA INFORTECT COMPUTER CO LTD | Staporn Hutakosit | Personnel Manager |
| SAMPANTHAMITR CO , LTD | Sujin Jityanyong | General Manager |
| SGS ENVIRONMENTAL SERVICES CO LTD | Shusee Ridmai | Personnel Manager |
| SHANGRI-LA HOTEL | Owasa Benjapattaporn | Admin Personnel Manager |
| SHINAWATRA COMPUTER CO LTD | Yanyong Akrajundanon | Manager of Policy & Planning Dep t |
| SIAM ELECTRICAL PARTS CO , LTD | Nibondh Chaisuk | Administrative Manager |
| SINO-THAI CREDIT AGRICOLE INV & SEC | Amornyook Panwiset | Manager |
| SIPHYA CONSTRUCTION CO LTD | Kittipong Luangyudhapakarn | Personnel Manager |
| SPORT EXPRESS LTD | Thipawan | Production Manager |
| SRITHAI SUPERWARE CO , LTD | Prayoon Kajit | Factory Manager |
| SUM ENGINEERING CO LTD | Somnuk Boonyasartpun | Engineering Manager |
| SUPERIOR COMPUTER CO , LTD | Udomsri Pleum-arom | Personnel Manager |
| S K GARMENT CO , LTD | Woranuch Saengchattrakorn | Personnel Department |
| THAI AGRI FOODS CO , LTD | Kittipong Leelayouva | Personnel Manager |
| THAI ELECTRONIC INDUSTRY CO , LTD | Narong Phacadaet | Personnel Manager |
| THAI MAXWELL ELECTRIC CO LTD | Pakamas Chanlaor | Chief Personnel Department |
| THE JAWARAD CO LTD | Narong Chivakul | Sec to Asst Managing Director |
| THE REGENT OF BANGKOK | Preecha Jantranusorn | Personnel Manager |
| TRI PETCH ISUZU SALES CO LTD | Shutima Sopotpongstorn | Asst General Manager |
| UNION CARBIDE THAILAND LTD | Viroj Daomance | Personnel Manager |
| WIRE MASTER INDUSTRIES CO LTD | Peera Temanont | Assistant Managing Director |
| YONTRAKIT CO LTD | Vimonsri Leangcheep | Personnel Manager |

C FAXES/LETTERS

| COMPANY NAME | CONTACT PERSON | POSITION |
|--|-------------------------|------------------------------------|
| AIG/NEW HAMPSHIRE INSURANCE | J D Musin | General Manager |
| BANGKOK FOAM CO LTD | Mana Niran | Personnel Manager |
| BANGKOK GLASS INDUSTRY CO LTD | Supachai Manuspaibool | Corporate Consultant |
| BANGKOK METROPOLITAN BANK | Kobsak Ponaponrat | Senior Vice President |
| BANK OF AYUDHYA LTD | Mitraparp Jalanugraha | Executive Vice President |
| BOON RAWD BREWERY CO , LTD | Vimla Tritasavit | Manager Office of Director |
| CHRISTIANI & NIELSEN (THAI) LTD | Thirawat Preuksarity | Personnel Manager |
| C P POLY-INDUSTRY CO , LTD | Chavengsak Srisahaburi | Factory Manager |
| DE-STA-CO (ASIA) CO , LTD | R Stampfle | Managing Director |
| DUSIT THANI HOTEL | Pakpum | Personnel Division |
| JALAPRATHAN CEMENT CO , LTD | Somchat Intharapathom | Personnel Manager |
| KRASNA & ASSOCIATES CO , LTD | Beth Krasna Casella | |
| NAKORNTHON BANK | Tasane Lohachala | Assistant Personnel Manager |
| PAE (THAILAND) CO LTD | Narong Yamprasert | Managing Director |
| PAN ASIA FOOTWEAR CO , LTD | Warith Chunasai | Personnel Manager |
| PHAN FAH ENGINEERING LTD PART | Chumpon Somprakit | General Manager |
| RAJA UCHINO CO , LTD | Pennapa Chadsiriwattana | Asst Chief, Personnel Division |
| RUNGCHAROEN KOLKARN MOTOR SALES CO LTD | Wisit Sawangsr | Factory Manager |
| SAHCHOL FOOD SUPPLIES CO LTD | Surach Patanawong | Managing Director |
| SERM SUK CO LTD | Poomuntr Plungsombat | Personnel Officer |
| SIAM AUTO PART CO LTD | Petcharaporn Boonark | Personnel Manager |
| SIAM CEMENT COMPANY | Utai Kantasewi | Central Personnel Division Manager |
| SIAM CHEMICAL INDUSTRY CO LTD | Chuchat A thipitsakul | Assistant Personnel Manager |
| SIAM MOTORS CO LTD | Kavee Vasuvat | Executive Vice President |
| SIAM PLATE GLASS INDUSTRY CO , LTD | Sahn Namyuyen | Deputy Managing Director |
| SILOM MEDICAL CO , LTD | Preeya Sibunruang | Deputy Managing Director |
| SOGO (THAILAND) CO , LTD | Ratchnee Ariyapongsa | Personnel Manager |
| SOUTHEAST ASIA & U S MFG SERVICES | Ron Hensley | |
| SRIRACHA LION INDUSTRY CO , LTD | Somsak Chakranon | Office Manager |
| THAI AGENCY ENGINEERING CO LTD | Thavee Inthorn | Marketing Manager |
| THAI ARROW PRODUCTS CO , LTD | Bussara Ditsated | Section Chief |
| THAI KODAMA CO , LTD | Wichien Sungkrid | Personnel Manager |
| THAI NAM PLASTIC INDUSTRY CO , LTD | Mayuree Deeraksa | Assistant Personnel Manager |
| THAI OIL CO , LTD | Chulachit Boonyaket | Assistant Managing Director |
| THAI PRECISION MANUFACTURING CO LTD | Chalee Rungruang | General Manager |
| TOP TREND MANUFACTURING CO LTD | Pratya Watnangkura | Factory Manager |
| TOSHIBA THAILAND LTD | Niramol Surriyasat | Advisory Vice President |
| UNOCAL THAILAND, LTD | Somnuk Reantragoon | Personnel Manager |
| VIVAT CONSTRUCTION LTD ,PART | Tosaporn Onbvasith | Personnel Manager |

APPENDIX III-A

SAMPLING PROCEDURE IN THE SELECTION OF RESPONDENTS FOR THE SURVEY OF HUMAN RESOURCE NEEDS IN THE PRIVATE SECTOR

1. Sampling Procedure

Three criteria were used in the selection of the sample geographical location, type of business and type of ownership.

1.1 Geographical Location

Although a great majority of business activities are concentrated in the Bangkok Metropolitan Region (which includes Bangkok, Samut Prakan, Samut Sakhon, Nonthaburi and Pathum Thani), it was deemed appropriate to include establishments in other provinces especially those located along the Eastern Seaboard (Chachoengsao, Choburi, Rayong and Nakhon Ratchasima) to develop an overall understanding of human resource needs in Thailand

1.2 Sector

The major sectors included are manufacturing, services, trading/distribution, and computers. Each sector was further subdivided into sub-sectors.

Manufacturing

- Automotive/Auto Parts
- Chemicals
- Electrical and Electronics
- Food Processing
- Pharmaceuticals
- Petroleum/Petrochemicals
- Textiles/Garments
- Industrial Machinery
- Cement
- Plastics
- Printing
- Pulp and Paper
- Rubber-based Products
- Footwear

- Iron and Steel/Metal Related
- Glass and Other Construction Materials

Services

- Construction
- Commercial banks
- Finance
- Hotel and Tourism
- Insurance

Trading

- Retail Trade and Department Stores
- Wholesalers/Importers
- Exporters

Computers

1.3 Ownership

The Ernst and Young report focused on American owned companies. This study endeavored to gain an understanding of the human resource development issues facing the overall business community, including companies that are wholly Thai owned. Respondent companies had the following ownership profiles:

- Thai (100%)
- Thai JV's with
 - * USA
 - * Japan
 - * Taiwan
 - * Europe
 - * Other Asians
 - * Others (Australia, New Zealand, etc.)
- Non Thai (100%)

Since manufacturing is the largest of the four surveyed sectors and has been identified in previous studies to have acute needs for engineers and other technical personnel, the sample selection included 105 firms from this sector (70% of the total).

Firms in service industries comprise 35 respondents or about 23.3% of the total.

Five (5) companies were selected from the trading sector and 5 companies from the computer industry.

2 A breakdown of respondent firms by sub-sector is shown below:

| | |
|--|-------|
| Manufacturing | 105 |
| | ----- |
| - Automotive/Auto Parts | 13 |
| - Chemicals | 10 |
| - Electrical and Electronics | 12 |
| - Food Processing | 12 |
| - Pharmaceuticals | 5 |
| - Petroleum/Petrochemicals | 5 |
| - Textiles/Garments | 10 |
| - Industrial Machinery | 5 |
| - Cement | 2 |
| - Plastics | 10 |
| - Printing | 3 |
| - Pulp and Paper | 3 |
| - Rubber-based Products | 3 |
| - Footwear | 3 |
| - Iron and Steel | 5 |
| - Glass and other Construction Materials | 4 |
| Services | 35 |
| | ----- |
| - Construction | 15 |
| - Commercial banks | 5 |
| - Finance | 5 |
| - Hotel and Tourism | 5 |
| - Insurance | 5 |
| Trading | 5 |
| | --- |
| - Retail Trade and Department Stores | 3 |
| - Wholesalers/Importers/Exporters | 2 |
| Computers | 5 |
| | --- |
| TOTAL | 150 |
| | ===== |

3 In view of difficulties in contacting some preselected companies, the actual distribution pattern was somewhat altered. For example, 10 chemical companies were originally selected but only 6 were actually interviewed. The difference was accounted for by getting more samples in other sectors. Originally, only 12 companies were sampled in the food processing sector, in the course of the survey, four more companies were added to the list. There were sampling replacements done in virtually all sectors because of late responses or companies declined to participate. At the final count, there were 157 respondents, seven more than the proposed sample size.

APPENDIX III-B

QUESTIONNAIRE FOR THE HUMAN RESOURCES SURVEY

- 1 Company _____
- 2 H O Address _____

Factory Address. _____

- 3 Respondent _____
- 4 Title/Position _____
- 5 Tel. Nos _____
Fax No _____
- 6 Type of Business _____

- 7 Company Ownership _____ % Thai _____ % European
_____ % American _____ % Canadian
_____ % Japanese _____ % Australian
_____ % Taiwanese _____ % Other Asian
_____ % Others (_____)
- 8 Date of Interview _____
- 9 Interviewer _____

1 How many employees does the company have? _____
 Broken down into

Managerial _____

Administrative _____

Engineers _____ Type: _____

Technical Graduates _____

Vocational Graduates _____

Non-skilled _____

Trainees _____

Others _____

2 Please indicate work experience required by the company when hiring the following personnel:

| | Has relevant work experience in same field (# of years) | | | Has worked in other field (# of years) | | | No experience necessary | Above Ave GPA |
|----------------------|---|-------|-------|--|-------|-------|-------------------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Managerial | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Administrative | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Engineers | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Technical graduates | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Vocational graduates | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Non-skilled workers | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Trainees | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |

3 In general, how do you recruit employees/workers? Choose two most commonly used methods

| | Rank 1 | Rank 2 |
|---------------------------|--------|--------|
| Managerial staff | _____ | _____ |
| Administrative staff | _____ | _____ |
| Engineers | _____ | _____ |
| Technical staff | _____ | _____ |
| Vocational graduate staff | _____ | _____ |
| Non-skilled workers | _____ | _____ |
| Trainees | _____ | _____ |

METHODS.

1. Announcement at the factory site
2. Newspaper advertisement
3. Recruitment agency
- 4 Friends/relatives of management
5. Connection with company employees
- 6 Self-application
- 7 Private "broker" (not a recruitment agency)
- 8 Train/promote old employee
- 9 Educational institutions
- 10 Industrial clubs, associations
11. Others _____

4 What types of manpower training and human resources development programs have you offered to your employees during the last three years?

- 4 1 Management _____
- 4 2 Administrative _____
- 4.3 Engineers _____
- 4.4 Other technical staff _____
- 4.5 Staff with vocational training _____
- 4.6 Non-skilled workers _____

TYPES OF MANPOWER TRAINING AND DEVELOPMENT PROGRAMS.

1. Introductory training program (getting-to-know the company's operations)
2. On-the-job training
3. In-house training programs using company trainers
4. In-house training programs using outside trainers
5. Outside training programs conducted by local associations, universities, consulting firms, etc.
6. Continuing education programs conducted by local institutions like Chulalongkorn and Thammasart Universities.
7. Overseas training programs
- 8 Management skills improvement
9. Communication (oral and writing) skills improvement
10. Overseas bachelor's (BS, AB) degree programs
11. Overseas masters or PhD degree programs
10. Other training programs _____

- 5 Have you offered study leaves for your staff? And if so, were they "bonded" to serve the company for a proportional number of years, e.g. for one year of studying, the employee must stay working for the company for two years, etc ?

- 6 Does the company have any special arrangement or tie-up with any of the following

- _____ Local university
- _____ Foreign university
- _____ Local technical institute
- _____ Local vocational school

related to sending staff for continuing education or advanced training? Please specify these institutions or organizations and describe briefly the arrangement details.

7 During the last three years, have you encountered problems related to the following?

| | Acuteness of the Problem | | |
|---|--------------------------|--------|-----------|
| | None | Little | Very Much |
| - difficulty in hiring managerial staff | _____ | _____ | _____ |
| - difficulty in hiring administrative staff | _____ | _____ | _____ |
| - difficulty in hiring engineers | _____ | _____ | _____ |
| - difficulty in hiring technicians | _____ | _____ | _____ |
| - difficulty in hiring staff with vocational training | _____ | _____ | _____ |
| - high turnover rate in: | | | |
| * managerial staff | _____ | _____ | _____ |
| * administrative staff | _____ | _____ | _____ |
| * engineers | _____ | _____ | _____ |
| * technicians | _____ | _____ | _____ |
| * staff with vocational training | _____ | _____ | _____ |
| * non-skilled workers | _____ | _____ | _____ |
| - high salary/wage rates | _____ | _____ | _____ |

8 ASK THIS QUESTION ONLY IF THERE WERE PROBLEMS CITED IN QUESTION 7. OTHERWISE, GO TO QUESTION 10

What have been or are the consequences of these problems?
Or, how have these problems affected your operations?

- _____ lower production output by _____% of total production
- _____ lower quality of production
- _____ delayed introduction of new products
- _____ lower revenue targets
- _____ others

9 What is the average annual turnover rate in the company?
With regard to engineers? Other technical personnel?

10 Please assess the availability or shortage of manpower resources in these fields according to their degree of importance in the business community

| | Critical | Important | Desirable | No Problem | Not Applicable |
|---|----------|-----------|-----------|------------|----------------|
| Electrical/ Electronics Engineering | _____ | _____ | _____ | _____ | _____ |
| Mechanical Engineering | _____ | _____ | _____ | _____ | _____ |
| Industrial Engineering | _____ | _____ | _____ | _____ | _____ |
| Chemical Engineering | _____ | _____ | _____ | _____ | _____ |
| Environmental Engineering | _____ | _____ | _____ | _____ | _____ |
| Other Engineering Fields | _____ | _____ | _____ | _____ | _____ |
| Computer Systems | _____ | _____ | _____ | _____ | _____ |
| Marketing | _____ | _____ | _____ | _____ | _____ |
| Finance | _____ | _____ | _____ | _____ | _____ |
| Human Resources | _____ | _____ | _____ | _____ | _____ |
| Accounting | _____ | _____ | _____ | _____ | _____ |
| Materials Management | _____ | _____ | _____ | _____ | _____ |
| Operations Management | _____ | _____ | _____ | _____ | _____ |
| Technical Skills | _____ | _____ | _____ | _____ | _____ |
| Skilled Labor | _____ | _____ | _____ | _____ | _____ |

Critical Important Desirable No Not
 Problem Applicable

| | | | | | |
|---|-------|-------|-------|-------|-------|
| Secretarial | _____ | _____ | _____ | _____ | _____ |
| English Skills for Administrators/ Managers | _____ | _____ | _____ | _____ | _____ |
| English Skills for Technical Staff | _____ | _____ | _____ | _____ | _____ |
| Machine Operators | _____ | _____ | _____ | _____ | _____ |

11 How have you tried to alleviate the problem of manpower shortage in your company?

- ___ Intensify in-house training efforts
- ___ Increase salaries, wages and incentives
- ___ Recruit employees from other firms
- ___ Utilize less qualified personnel than desired
- ___ Contract out work which the firm would rather undertake itself

- ___ Utilize expatriates more than the firm would like
- ___ Delay product introductions, projects
- ___ Intensify campus recruiting
- ___ Collaboration through associations
- ___ Slow the pace of technology transfer
- ___ Improve work environment
- ___ Recruit overseas Thais
- ___ Intensify public relations efforts
- ___ Support continuing education

12 To what extent are you substituting science graduates for engineers, technicians for engineers, engineers for foremen, etc ? [NOT BEING DONE, VERY LITTLE, MODERATELY, TO A LARGE EXTENT] Please elaborate

13 Are you a member of any industry club or trade association?

Name _____

14 What issues has your club or association brought attention to the government pertaining to manpower (e.g skills requirements, shortages in both quantity and quality, other problems)?

15 Could you give comments and recommendations as to what steps the private sector should take in order to improve the quantity and quality of human resources in Thailand? In what ways could the private sector influence educational policies? [Through the Joint Public and Private Sector Consultative Committee (JPPSCC)?]

16 What should the government's role be (in improving the country's human resources)? Role of educational institutions?

17 What would your company be willing to contribute to address the problems in human resources development in Thailand? (PROMPT. DONATE TIME TO ATTEND REGULAR CLUB MEETINGS AND CONSULTATIVE DISCUSSIONS BETWEEN INDUSTRIAL CLUBS AND GOVERNMENT; ETC)

APPENDIX IV

DISTRIBUTION OF COMPANIES BY TYPE OF OWNERSHIP

| OWNERSHIP | NUMBER OF COMPANIES |
|--------------------------------------|---------------------|
| Thai 100% | 74 |
| European 100% | 3 |
| American 100% | 6 |
| Japanese 100% | 3 |
| Others 100% | 3 |
| Thai 50%, Taiwanese 50% | 1 |
| Thai 50%, Japanese 50% | 1 |
| Thai 50%, European 50% | 2 |
| Thai 51%, European 49% | 2 |
| Thai 51%, American 49% | 1 |
| Thai 51%, Japanese 49% | 15 |
| Thai 51%, Taiwanese 49% | 3 |
| Thai 51%, Others 51% | 3 |
| Thai 55%, Others 45% | 1 |
| Thai 56%, Japanese 44% | 1 |
| Thai 60%, Japanese 40% | 1 |
| Thai 60%, Others 40% | 1 |
| Thai 61%, Australian 39% | 1 |
| Thai 65%, Japanese 35% | 1 |
| Thai 75%, Japanese 25% | 1 |
| Thai 75%, European 25% | 2 |
| Thai 75%, Others 25% | 2 |
| Thai 79%, Oth Asean 21% | 1 |
| Thai 80, Japanese 20% | 1 |
| Thai 83%, Others 17% | 1 |
| Thai 90%, Others 10% | 3 |
| Thai 96%, Japanese 4% | 1 |
| European 51%, Canadian 49% | 1 |
| Japanese 70%, Thai 30% | 2 |
| Japanese 69%, Thai 31% | 1 |
| Japanese 67%, Thai 33% | 1 |
| American 60%, Thai 40% | 1 |
| Taiwanese 55%, Thai 45% | 1 |
| Others 99%, Thai 1% | 1 |
| Thai 51%, European 44%, Canadian 5% | 1 |
| Thai 51%, European 31%, Others 18% | 1 |
| Thai 51%, American 33%, Others 16% | 1 |
| Thai 51%, American 22%, Others 27% | 1 |
| Thai 51%, Canadian 25%, Japanese 24% | 1 |

Distribution of Companies by Type of Ownership (Continued)

| OWNERSHIP | NUMBER OF COMPANIES |
|--|---------------------|
| Thai 60%, Oth Asean 30%, American 10% | 1 |
| Thai 60%, Taiwanese 30%, Japanese 10% | 1 |
| Thai 60%, Taiwanese 20%, Others 20% | 1 |
| Thai 65%, American 33%, European 2% | 1 |
| Thai 80%, Oth Asean 15%, Japanese 5% | 1 |
| Thai 86%, European 11%, American 3 | 1 |
| European 58%, Thai 40%, Others 2% | 1 |
| Taiwanese 65%, Japanese 25%, Thai 10% | 1 |
| Th 40%, Oth Asn 16%, Eur 14%, USA 9%, Oths 21% | 1 |
| TOTAL | 157 |

Source IMRS Survey of Companies, 1991

APPENDIX V

AVERAGE NUMBER OF EMPLOYEES BY TYPE OF BUSINESS AND LEVEL OF EDUCATION

| Type of Business | Level of Education | | | | | |
|--|--------------------|-----------|------------|-------------|----------|--------|
| | Engineers | Technical | Vocational | Non-skilled | Trainees | Others |
| Automotive/Auto Parts | 12 | 128 | 214 | 553 | 28 | 205 |
| Chemicals | 22 | 93 | 54 | 123 | 5 | 59 |
| Electrical and Electronics | 20 | 74 | 104 | 432 | 9 | 89 |
| Food Processing | 6 | 47 | 63 | 668 | 16 | 759 |
| Pharmaceuticals | 10 | 10 | 8 | 246 | 50 | 42 |
| Petroleum/Petrochemicals | 38 | 169 | 83 | 48 | 29 | 120 |
| Textile/Garment | 18 | 81 | 60 | 622 | 159 | 59 |
| Industrial Machinery | 4 | 13 | 34 | 20 | 2 | 17 |
| Cement | 105 | 331 | 396 | 1,516 | 0 | 345 |
| Plastic | 7 | 52 | 25 | 276 | 14 | 474 |
| Printing | 0 | 28 | 110 | 105 | 40 | 87 |
| Pulp and Paper | 12 | 57 | 65 | 415 | 0 | 78 |
| Rubber-based Products | 23 | 89 | 59 | 186 | 2 | 33 |
| Footwear | 11 | 20 | 36 | 1,092 | 0 | 178 |
| Iron and Steel | 3 | 28 | 10 | 70 | 10 | 16 |
| Glass and other Construction Materials | 18 | 138 | 172 | 365 | 200 | 63 |
| Construction | 28 | 45 | 48 | 95 | 6 | 62 |
| Commercial banks | 20 | 0 | 728 | 533 | 984 | 3,170 |
| Finance | 5 | 0 | 49 | 12 | 0 | 193 |
| Hotel and Tourism | 31 | 52 | 260 | 400 | 22 | 667 |
| Insurance | 0 | 6 | 296 | 19 | 0 | 192 |
| Retail Trade and Department Stores | 1 | 30 | 814 | 258 | 100 | 1,024 |
| Wholesalers/Importers | 8 | 10 | 34 | 46 | 0 | 12 |
| Exporters | 16 | 22 | 10 | 71 | 1 | 29 |
| Computer Related | 22 | 30 | 41 | 7 | 102 | 340 |

Source IMRS Survey of Companies, 1991

APPENDIX VI

DISTRIBUTION OF COMPANIES BY TYPE OF EMPLOYEES AND RECRUITMENT METHODS

| Type of Employees | Recruitment Methods | | | | | | | | | | | Total |
|---------------------------|---------------------|----|---|----|----|----|---|----|----|----|----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| Managerial staff | 3 | 46 | 4 | 47 | 2 | 2 | 0 | 43 | 1 | 0 | 4 | 152 |
| Administrative staff | 10 | 62 | 2 | 23 | 7 | 4 | 0 | 31 | 10 | 1 | 2 | 152 |
| Engineers | 6 | 68 | 3 | 12 | 5 | 4 | 0 | 6 | 22 | 0 | 2 | 128 |
| Technical staff | 10 | 72 | 1 | 6 | 9 | 5 | 0 | 8 | 29 | 1 | 2 | 143 |
| Vocational graduate Staff | 14 | 62 | 3 | 7 | 11 | 10 | 0 | 6 | 33 | 2 | 2 | 150 |
| Non-skilled workers | 56 | 17 | 0 | 12 | 27 | 14 | 0 | 0 | 3 | 5 | 5 | 139 |
| Trainees | 9 | 7 | 0 | 2 | 3 | 9 | 1 | 0 | 37 | 0 | 0 | 68 |

Codes (Recruitment Method)

- 1 *Announcement at the factory site*
- 2 *Newspaper advertisement*
- 3 *Recruitment agency*
- 4 *Friends/relatives of management*
- 5 *Connection with company employees*
- 6 *Self-application*
- 7 *Private "broker" (not a recruitment agency)*
- 8 *Train/promote old employee*
- 9 *Educational institutions*
- 10 *Industrial clubs, associations*
- 11 *Others*

Source IMRS Survey of Companies, 1991

APPENDIX VII

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL

| Type of Employees | Rel Work Exp * | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|----------------|----|----|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial staff | 12 | 46 | 74 | 0 | 2 | 5 | 6 | 0 |
| Administrative staff | 31 | 52 | 19 | 1 | 6 | 3 | 39 | 0 |
| Engineers | 34 | 27 | 17 | 2 | 4 | 0 | 44 | 1 |
| Technical graduates | 39 | 27 | 7 | 6 | 4 | 0 | 60 | 0 |
| Vocational graduates | 27 | 13 | 2 | 7 | 3 | 0 | 93 | 1 |
| Non-skilled workers | 13 | 1 | 1 | 2 | 1 | 0 | 120 | 0 |
| Trainees | 4 | 1 | 1 | 0 | 0 | 0 | 68 | 1 |

* Relevant Work Experience

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL BY TYPE OF BUSINESS

1 Automotive/Auto Parts

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 1 | 6 | 5 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 0 | 8 | 1 | 0 | 0 | 0 | 3 | 0 |
| Engineers | 3 | 3 | 1 | 1 | 0 | 0 | 4 | 0 |
| Technical graduates | 2 | 2 | 0 | 1 | 1 | 0 | 6 | 0 |
| Vocational graduates | 0 | 0 | 0 | 2 | 0 | 0 | 10 | 0 |
| Non-skilled workers | 1 | 0 | 0 | 1 | 0 | 0 | 10 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

2 Chemicals

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 0 |
| Administrative | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 |
| Engineers | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 |
| Technical graduates | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 0 |
| Vocational graduates | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

3 Electrical and Electronics

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 1 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 3 | 6 | 0 | 0 | 0 | 0 | 2 | 0 |
| Engineers | 2 | 4 | 0 | 0 | 0 | 0 | 4 | 0 |
| Technical graduates | 3 | 2 | 0 | 0 | 0 | 0 | 6 | 0 |
| Vocational graduates | 2 | 1 | 0 | 0 | 0 | 0 | 7 | 0 |
| Non-skilled workers | 0 | 0 | 1 | 0 | 0 | 0 | 10 | 0 |
| Trainees | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 |

4 Food Processing

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 3 | 6 | 4 | 0 | 0 | 1 | 0 | 0 |
| Administrative | 6 | 2 | 1 | 1 | 1 | 0 | 4 | 0 |
| Engineers | 8 | 0 | 1 | 0 | 0 | 0 | 6 | 0 |
| Technical graduates | 8 | 0 | 1 | 0 | 0 | 0 | 6 | 0 |
| Vocational graduates | 7 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

5 Pharmaceuticals

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Engineers | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Technical graduates | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Vocational graduates | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Non-skilled workers | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |

6 Petroleum/Petrochemicals

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 2 | 8 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 2 | 2 | 1 | 0 | 0 | 1 | 3 | 0 |
| Engineers | 4 | 2 | 2 | 0 | 0 | 0 | 2 | 0 |
| Technical graduates | 4 | 2 | 1 | 0 | 0 | 0 | 3 | 0 |
| Vocational graduates | 3 | 1 | 1 | 0 | 0 | 0 | 4 | 0 |
| Non-skilled workers | 3 | 0 | 0 | 0 | 0 | 0 | 7 | 0 |
| Trainees | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 |

7 Textile/Garment

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 2 | 3 | 6 | 0 | 0 | 1 | 1 | 0 |
| Administrative | 5 | 0 | 4 | 0 | 0 | 0 | 6 | 0 |
| Engineers | 3 | 1 | 2 | 0 | 0 | 0 | 6 | 0 |
| Technical graduates | 4 | 1 | 2 | 0 | 0 | 0 | 7 | 0 |
| Vocational graduates | 3 | 0 | 1 | 0 | 0 | 0 | 11 | 0 |
| Non-skilled workers | 3 | 1 | 0 | 0 | 1 | 0 | 9 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

8 Industrial Machinery

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Engineers | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Technical graduates | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Vocational graduates | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Non-skilled workers | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Trainees | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

9 Cement

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Technical graduates | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

10 Plastics

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 0 |
| Administrative | 2 | 5 | 0 | 0 | 0 | 0 | 3 | 0 |
| Engineers | 2 | 1 | 0 | 1 | 0 | 0 | 4 | 0 |
| Technical graduates | 1 | 2 | 0 | 1 | 0 | 0 | 7 | 0 |
| Vocational graduates | 2 | 0 | 0 | 1 | 1 | 0 | 8 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

11 Printing

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

12 Pulp and Paper

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Engineers | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical graduates | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

13 Rubber-based Products

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Administrative | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| Engineers | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical graduates | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vocational graduates | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Non-skilled workers | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

14 Footwear

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Administrative | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Technical graduates | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 |
| Vocational graduates | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |

15 Iron and Steel

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 |
| Administrative | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 |
| Engineers | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 |
| Vocational graduates | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |

16 Glass and other Construction Materials

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| Engineers | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical graduates | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Vocational graduates | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

17 Construction

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 1 | 4 | 9 | 0 | 1 | 0 | 1 | 0 |
| Administrative | 2 | 8 | 3 | 0 | 0 | 1 | 2 | 0 |
| Engineers | 3 | 5 | 3 | 0 | 0 | 0 | 5 | 0 |
| Technical graduates | 4 | 8 | 0 | 0 | 0 | 0 | 4 | 0 |
| Vocational graduates | 3 | 7 | 0 | 0 | 0 | 0 | 5 | 0 |
| Non-skilled workers | 2 | 0 | 0 | 1 | 0 | 0 | 6 | 0 |
| Trainees | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

18 Commercial Banks

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 0 |
| Administrative | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 0 |
| Engineers | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Technical graduates | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

19 Finance

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical graduates | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vocational graduates | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

20 Hotel and Tourism

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 |
| Engineers | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 |
| Technical graduates | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 |
| Vocational graduates | 0 | 2 | 0 | 0 | 2 | 0 | 1 | 0 |
| Non-skilled workers | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Trainees | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |

21 Insurance

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Administrative | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Vocational graduates | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

22 Retail Trade and Department Stores

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Administrative | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| Engineers | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

DISTRIBUTION OF COMPANIES THAT REQUIRE CERTAIN WORK EXPERIENCE WHEN HIRING PERSONNEL
BY TYPE OF BUSINESS (Continued)

23 Wholesalers/Importers

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Engineers | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Vocational graduates | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

24 Exporters

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Engineers | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical graduates | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Vocational graduates | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

25 Computer Related

| Type of Employees | Rel Work Exp | | | Other Fields | | | No Experience | Above Ave GPA |
|----------------------|--------------|---|---|--------------|---|---|---------------|---------------|
| | 1 | 3 | 5 | 1 | 3 | 5 | | |
| Managerial | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 |
| Administrative | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Engineers | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 0 |
| Technical graduates | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Vocational graduates | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Non-skilled workers | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Trainees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

APPENDIX VIII

LIST OF INDUSTRIAL CLUBS, ASSOCIATIONS AND OTHER AFFILIATIONS

- 1 Asian Institute of Technology Association
- 2 Australian-Thai Chamber of Commerce
- 3 Autoparts Club
- 4 Bangchan Industrial Estate Club
- 5 Board of Trade of Thailand
- 6 Brokers Association
- 7 Business Law Center
- 8 Chachoengsao Personnel Management Club
- 9 Computer Association of Thailand
- 10 Environmental Association
- 11 Exporter Association of Thailand
- 12 Fuyo-Kai (Japanese Club in Thailand)
- 13 Plastic Industries Association
- 14 Ferrous and Non-Ferrous Metal Employers' Association
- 15 Finance and Trust Association of Thailand
- 16 Fish Sauce Factories Association
- 17 Forex Club
- 18 Foundrymen Forum
- 19 Frozen Seafood Industry Association
- 20 Hotel Human Resources Management Club
- 21 Human Resources Committee
- 22 Industrial Tapioca Association of North East
- 23 Industrial Tapioca Association of Thailand
- 24 Insurance Association
- 25 Japan External Trade Organization (JETRO)
- 26 Japanese Chamber of Commerce
- 27 Law and Education Center
- 28 Leading Hotels of the World Association
- 29 Marble Club
- 30 Marketing Association of Thailand
- 31 Mining Federation
- 32 Mining Industry Council
- 33 Mold Making Association
- 34 Non Life Insurance Association
- 35 Packaging Association
- 36 Personnel Management Association of Thailand
- 37 Petroleum Association
- 38 Pharmaceutical Products Association
- 39 Preferred Hotels and Resorts Worldwide
- 40 Printing Association of Thailand
- 41 Pulp & Paper Association
- 42 Quality Control Circle Association
- 43 Rangsit Personnel Management Association

List of Industrial Clubs, Associations and Other Affiliations (Continued)

- | | |
|----|---|
| 44 | Reporters Association of Thailand |
| 45 | Retailers Association |
| 46 | Sack Industrial Association |
| 47 | Safety and Health Promotion Association |
| 48 | Saha Pattanaphibul Personnel Management Club |
| 49 | Saha Group Management |
| 50 | Samutprakarn Industries Association |
| 51 | Securities Exchange of Thailand |
| 52 | Thai Bankers Association |
| 53 | Thai Computer Association |
| 54 | Thai Employers' Association |
| 55 | Thai Food Processors' Association |
| 56 | Thai Garment Manufacturers Association |
| 57 | Thai Hotel Association |
| 58 | Thai Pharmaceutical Manufacturers Association |
| 59 | Tour Association of Nakhon Ratchasima |
| 60 | Toyota Cooperation Club |

Source *IMRS Survey of Companies, 1991*

APPENDIX IX-A

DISTRIBUTION OF COMPANIES BY EXTENT OF SKILLS SUBSTITUTION

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|------|-------|
| | To a Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 28 | 38 | 21 | 3 | 90 |
| Mechanical Engineering | 29 | 41 | 17 | 2 | 89 |
| Industrial Engineering | 21 | 31 | 17 | 4 | 73 |
| Chemical Engineering | 30 | 16 | 10 | 0 | 56 |
| Environmental Engineering | 27 | 8 | 8 | 2 | 45 |
| Other Engineering Fields (Specify) | 27 | 9 | 10 | 1 | 47 |
| Computer Systems | 35 | 49 | 35 | 9 | 128 |
| Marketing | 30 | 30 | 45 | 9 | 114 |
| Finance | 47 | 35 | 23 | 12 | 117 |
| Human Resources | 24 | 39 | 42 | 18 | 123 |
| Accounting | 51 | 42 | 25 | 13 | 131 |
| Materials Management | 28 | 31 | 28 | 17 | 104 |
| Operations Management | 27 | 34 | 32 | 11 | 104 |
| Technical Skills | 26 | 62 | 36 | 8 | 132 |
| Skilled Labor | 17 | 42 | 46 | 21 | 126 |
| Secretarial | 22 | 34 | 52 | 22 | 130 |
| English Skills for Administrators/Managers | 18 | 61 | 38 | 15 | 132 |
| English Skills for Technical Staff | 20 | 55 | 29 | 17 | 121 |
| Machine Operators | 26 | 29 | 34 | 17 | 106 |
| Total | 533 | 686 | 548 | 201 | 1968 |

APPENDIX IX-B

DISTRIBUTION OF COMPANIES BY EXTENT OF SKILLS SUBSTITUTION BY TYPE OF BUSINESS

Automotive/Auto Parts

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|------|-------|
| | To a Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 2 | 1 | 4 | 1 | 8 |
| Mechanical Engineering | 6 | 1 | 3 | 1 | 11 |
| Industrial Engineering | 2 | 2 | 3 | 0 | 7 |
| Chemical Engineering | 2 | 1 | 2 | 0 | 5 |
| Environmental Engineering | 2 | 1 | 2 | 0 | 5 |
| Other Engineering Fields (Specify) | 2 | 0 | 2 | 0 | 4 |
| Computer Systems | 4 | 4 | 3 | 1 | 12 |
| Marketing | 4 | 1 | 5 | 0 | 10 |
| Finance | 6 | 2 | 3 | 0 | 11 |
| Human Resources | 2 | 2 | 3 | 2 | 9 |
| Accounting | 5 | 1 | 3 | 1 | 10 |
| Materials Management | 3 | 4 | 3 | 1 | 11 |
| Operations Management | 1 | 4 | 5 | 0 | 10 |
| Technical Skills | 2 | 5 | 5 | 0 | 12 |
| Skilled Labor | 2 | 4 | 3 | 1 | 10 |
| Secretarial | 3 | 5 | 3 | 1 | 12 |
| English Skills for Administrators/Managers | 1 | 5 | 2 | 3 | 11 |
| English Skills for Technical Staff | 1 | 6 | 2 | 2 | 11 |
| Machine Operators | 1 | 4 | 2 | 2 | 9 |
| Total | 51 | 53 | 58 | 16 | 178 |

Chemicals

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 3 | 1 | 0 | 5 |
| Mechanical Engineering | 1 | 4 | 0 | 0 | 5 |
| Industrial Engineering | 1 | 3 | 0 | 0 | 4 |
| Chemical Engineering | 1 | 0 | 0 | 0 | 1 |
| Environmental Engineering | 1 | 0 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 1 | 0 | 0 | 0 | 1 |
| Computer Systems | 1 | 3 | 2 | 0 | 6 |
| Marketing | 1 | 0 | 1 | 1 | 3 |
| Finance | 1 | 0 | 1 | 3 | 5 |
| Human Resources | 1 | 0 | 2 | 3 | 6 |
| Accounting | 1 | 0 | 1 | 3 | 5 |
| Materials Management | 1 | 0 | 2 | 3 | 6 |
| Operations Management | 1 | 1 | 2 | 2 | 6 |
| Technical Skills | 1 | 2 | 2 | 1 | 6 |
| Skilled Labor | 1 | 0 | 1 | 3 | 5 |
| Secretarial | 1 | 0 | 1 | 3 | 5 |
| English Skills for Administrators/Managers | 1 | 1 | 1 | 3 | 6 |
| English Skills for Technical Staff | 1 | 0 | 2 | 3 | 6 |
| Machine Operators | 1 | 0 | 0 | 3 | 4 |
| Total | 19 | 17 | 19 | 31 | 86 |

Electrical and Electronics

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 6 | 1 | 0 | 8 |
| Mechanical Engineering | 0 | 4 | 0 | 0 | 4 |
| Industrial Engineering | 0 | 2 | 1 | 0 | 3 |
| Chemical Engineering | 0 | 1 | 0 | 0 | 1 |
| Environmental Engineering | 0 | 1 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 2 | 0 | 0 | 0 | 2 |
| Computer Systems | 4 | 1 | 5 | 0 | 10 |
| Marketing | 0 | 2 | 4 | 1 | 7 |
| Finance | 3 | 3 | 2 | 0 | 8 |
| Human Resources | 2 | 3 | 4 | 0 | 9 |
| Accounting | 5 | 2 | 2 | 1 | 10 |
| Materials Management | 1 | 3 | 3 | 0 | 7 |
| Operations Management | 1 | 3 | 2 | 0 | 6 |
| Technical Skills | 3 | 3 | 4 | 0 | 10 |
| Skilled Labor | 0 | 4 | 6 | 0 | 10 |
| Secretarial | 0 | 3 | 5 | 1 | 9 |
| English Skills for Administrators/Managers | 0 | 2 | 5 | 1 | 8 |
| English Skills for Technical Staff | 1 | 2 | 3 | 0 | 6 |
| Machine Operators | 3 | 1 | 0 | 3 | 7 |
| Total | 26 | 46 | 47 | 7 | 126 |

Food Processing

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 6 | 2 | 4 | 0 | 12 |
| Mechanical Engineering | 3 | 5 | 4 | 0 | 12 |
| Industrial Engineering | 1 | 5 | 3 | 0 | 9 |
| Chemical Engineering | 3 | 3 | 3 | 0 | 9 |
| Environmental Engineering | 2 | 1 | 2 | 0 | 5 |
| Other Engineering Fields (Specify) | 0 | 2 | 0 | 0 | 2 |
| Computer Systems | 3 | 5 | 3 | 2 | 13 |
| Marketing | 2 | 2 | 6 | 3 | 13 |
| Finance | 3 | 5 | 2 | 0 | 10 |
| Human Resources | 4 | 5 | 3 | 2 | 14 |
| Accounting | 1 | 8 | 3 | 2 | 14 |
| Materials Management | 3 | 3 | 4 | 1 | 11 |
| Operations Management | 5 | 4 | 2 | 0 | 11 |
| Technical Skills | 0 | 8 | 6 | 0 | 14 |
| Skilled Labor | 0 | 3 | 9 | 1 | 13 |
| Secretarial | 1 | 0 | 11 | 1 | 13 |
| English Skills for Administrators/Managers | 2 | 9 | 3 | 0 | 14 |
| English Skills for Technical Staff | 3 | 7 | 3 | 0 | 13 |
| Machine Operators | 2 | 4 | 5 | 1 | 12 |
| Total | 44 | 81 | 76 | 13 | 214 |

Pharmaceuticals

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 1 | 1 |
| Mechanical Engineering | 0 | 0 | 1 | 0 | 1 |
| Industrial Engineering | 1 | 0 | 0 | 1 | 2 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 0 | 0 | 2 | 1 | 3 |
| Marketing | 0 | 0 | 2 | 0 | 2 |
| Finance | 0 | 1 | 1 | 1 | 3 |
| Human Resources | 0 | 1 | 1 | 1 | 3 |
| Accounting | 1 | 1 | 0 | 0 | 2 |
| Materials Management | 1 | 1 | 0 | 1 | 3 |
| Operations Management | 2 | 0 | 1 | 0 | 3 |
| Technical Skills | 0 | 1 | 0 | 2 | 3 |
| Skilled Labor | 0 | 0 | 2 | 0 | 2 |
| Secretarial | 0 | 1 | 1 | 0 | 2 |
| English Skills for Administrators/Managers | 0 | 1 | 2 | 0 | 3 |
| English Skills for Technical Staff | 0 | 2 | 0 | 0 | 2 |
| Machine Operators | 0 | 0 | 0 | 0 | 0 |
| Total | 5 | 9 | 13 | 8 | 35 |

Petroleum/Petrochemicals

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 6 | 1 | 0 | 8 |
| Mechanical Engineering | 1 | 6 | 2 | 0 | 9 |
| Industrial Engineering | 0 | 4 | 2 | 0 | 6 |
| Chemical Engineering | 1 | 3 | 2 | 0 | 6 |
| Environmental Engineering | 2 | 2 | 1 | 0 | 5 |
| Other Engineering Fields (Specify) | 1 | 2 | 1 | 0 | 4 |
| Computer Systems | 2 | 3 | 3 | 0 | 8 |
| Marketing | 2 | 3 | 4 | 0 | 9 |
| Finance | 2 | 5 | 2 | 0 | 9 |
| Human Resources | 0 | 5 | 3 | 1 | 9 |
| Accounting | 2 | 5 | 2 | 0 | 9 |
| Materials Management | 1 | 4 | 4 | 0 | 9 |
| Operations Management | 0 | 4 | 3 | 0 | 7 |
| Technical Skills | 1 | 7 | 1 | 0 | 9 |
| Skilled Labor | 0 | 5 | 4 | 0 | 9 |
| Secretarial | 0 | 2 | 5 | 1 | 8 |
| English Skills for Administrators/Managers | 0 | 4 | 5 | 0 | 9 |
| English Skills for Technical Staff | 0 | 5 | 3 | 0 | 8 |
| Machine Operators | 0 | 5 | 4 | 0 | 9 |
| Total | 16 | 80 | 52 | 2 | 150 |

Textile/Garment

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 3 | 0 | 0 | 4 |
| Mechanical Engineering | 1 | 4 | 0 | 0 | 5 |
| Industrial Engineering | 2 | 3 | 2 | 0 | 7 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 1 | 0 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 2 | 0 | 2 | 0 | 4 |
| Computer Systems | 3 | 5 | 4 | 0 | 12 |
| Marketing | 4 | 3 | 0 | 1 | 8 |
| Finance | 3 | 1 | 1 | 4 | 9 |
| Human Resources | 1 | 5 | 2 | 4 | 12 |
| Accounting | 4 | 2 | 2 | 3 | 11 |
| Materials Management | 3 | 3 | 2 | 5 | 13 |
| Operations Management | 2 | 3 | 5 | 3 | 13 |
| Technical Skills | 0 | 7 | 4 | 0 | 11 |
| Skilled Labor | 4 | 3 | 2 | 4 | 13 |
| Secretarial | 0 | 1 | 5 | 5 | 11 |
| English Skills for Administrators/Managers | 1 | 5 | 1 | 4 | 11 |
| English Skills for Technical Staff | 0 | 4 | 2 | 4 | 10 |
| Machine Operators | 3 | 2 | 2 | 4 | 11 |
| Total | 37 | 54 | 36 | 41 | 168 |

Industrial Machinery

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 1 | 0 | 0 | 1 |
| Mechanical Engineering | 0 | 0 | 1 | 0 | 1 |
| Industrial Engineering | 1 | 1 | 0 | 1 | 3 |
| Chemical Engineering | 1 | 0 | 0 | 0 | 1 |
| Environmental Engineering | 0 | 0 | 0 | 1 | 1 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 1 | 1 |
| Computer Systems | 1 | 1 | 0 | 1 | 3 |
| Marketing | 1 | 0 | 1 | 1 | 3 |
| Finance | 0 | 0 | 1 | 1 | 2 |
| Human Resources | 0 | 0 | 2 | 1 | 3 |
| Accounting | 0 | 2 | 0 | 1 | 3 |
| Materials Management | 0 | 0 | 0 | 1 | 1 |
| Operations Management | 0 | 1 | 0 | 1 | 2 |
| Technical Skills | 1 | 1 | 1 | 0 | 3 |
| Skilled Labor | 0 | 1 | 0 | 1 | 2 |
| Secretarial | 0 | 0 | 1 | 1 | 2 |
| English Skills for Administrators/Managers | 1 | 0 | 0 | 1 | 2 |
| English Skills for Technical Staff | 0 | 2 | 0 | 1 | 3 |
| Machine Operators | 0 | 0 | 1 | 0 | 1 |
| Total | 6 | 10 | 8 | 14 | 38 |

Cement

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 2 | 0 | 0 | 2 |
| Mechanical Engineering | 0 | 2 | 0 | 0 | 2 |
| Industrial Engineering | 2 | 0 | 0 | 0 | 2 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 2 | 0 | 0 | 0 | 2 |
| Other Engineering Fields (Specify) | 1 | 0 | 0 | 0 | 1 |
| Computer Systems | 0 | 2 | 0 | 0 | 2 |
| Marketing | 1 | 1 | 0 | 0 | 2 |
| Finance | 1 | 1 | 0 | 0 | 2 |
| Human Resources | 1 | 1 | 0 | 0 | 2 |
| Accounting | 0 | 2 | 0 | 0 | 2 |
| Materials Management | 2 | 0 | 0 | 0 | 2 |
| Operations Management | 2 | 0 | 0 | 0 | 2 |
| Technical Skills | 1 | 1 | 0 | 0 | 2 |
| Skilled Labor | 2 | 0 | 0 | 0 | 2 |
| Secretarial | 2 | 0 | 0 | 0 | 2 |
| English Skills for Administrators/Managers | 2 | 0 | 0 | 0 | 2 |
| English Skills for Technical Staff | 2 | 0 | 0 | 0 | 2 |
| Machine Operators | 2 | 0 | 0 | 0 | 2 |
| Total | 25 | 12 | 0 | 0 | 37 |

Plastic

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 2 | 2 | 1 | 0 | 5 |
| Mechanical Engineering | 2 | 3 | 1 | 0 | 6 |
| Industrial Engineering | 1 | 4 | 0 | 1 | 6 |
| Chemical Engineering | 2 | 3 | 1 | 0 | 6 |
| Environmental Engineering | 2 | 1 | 1 | 0 | 4 |
| Other Engineering Fields (Specify) | 1 | 2 | 1 | 0 | 4 |
| Computer Systems | 0 | 3 | 1 | 1 | 5 |
| Marketing | 1 | 1 | 3 | 1 | 6 |
| Finance | 0 | 3 | 3 | 0 | 6 |
| Human Resources | 1 | 3 | 3 | 1 | 8 |
| Accounting | 0 | 5 | 1 | 1 | 7 |
| Materials Management | 1 | 3 | 2 | 1 | 7 |
| Operations Management | 1 | 2 | 2 | 1 | 6 |
| Technical Skills | 2 | 7 | 2 | 0 | 11 |
| Skilled Labor | 1 | 5 | 4 | 1 | 11 |
| Secretarial | 2 | 2 | 3 | 3 | 10 |
| English Skills for Administrators/Managers | 2 | 5 | 1 | 0 | 8 |
| English Skills for Technical Staff | 2 | 5 | 3 | 0 | 10 |
| Machine Operators | 1 | 4 | 5 | 0 | 10 |
| Total | 24 | 63 | 38 | 11 | 136 |

Printing

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 0 | 0 | 0 | 0 | 0 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 0 | 0 | 2 | 0 | 2 |
| Marketing | 0 | 0 | 1 | 0 | 1 |
| Finance | 0 | 0 | 0 | 0 | 0 |
| Human Resources | 0 | 0 | 2 | 0 | 2 |
| Accounting | 1 | 0 | 1 | 0 | 2 |
| Materials Management | 0 | 0 | 0 | 0 | 0 |
| Operations Management | 0 | 0 | 0 | 0 | 0 |
| Technical Skills | 1 | 1 | 0 | 0 | 2 |
| Skilled Labor | 0 | 1 | 0 | 0 | 1 |
| Secretarial | 0 | 1 | 1 | 0 | 2 |
| English Skills for Administrators/Managers | 0 | 1 | 1 | 0 | 2 |
| English Skills for Technical Staff | 0 | 1 | 0 | 1 | 2 |
| Machine Operators | 0 | 1 | 0 | 0 | 1 |
| Total | 2 | 6 | 8 | 1 | 17 |

Pulp and Paper

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 0 | 0 | 1 | 2 |
| Mechanical Engineering | 1 | 1 | 0 | 0 | 2 |
| Industrial Engineering | 0 | 1 | 0 | 0 | 1 |
| Chemical Engineering | 1 | 0 | 0 | 0 | 1 |
| Environmental Engineering | 1 | 0 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 1 | 0 | 0 | 0 | 1 |
| Computer Systems | 1 | 0 | 0 | 0 | 1 |
| Marketing | 0 | 2 | 0 | 0 | 2 |
| Finance | 1 | 1 | 0 | 0 | 2 |
| Human Resources | 1 | 0 | 0 | 1 | 2 |
| Accounting | 1 | 0 | 1 | 0 | 2 |
| Materials Management | 0 | 1 | 0 | 1 | 2 |
| Operations Management | 1 | 1 | 0 | 0 | 2 |
| Technical Skills | 1 | 1 | 0 | 0 | 2 |
| Skilled Labor | 0 | 1 | 0 | 1 | 2 |
| Secretarial | 0 | 2 | 0 | 0 | 2 |
| English Skills for Administrators/Managers | 0 | 2 | 0 | 0 | 2 |
| English Skills for Technical Staff | 0 | 2 | 0 | 0 | 2 |
| Machine Operators | 1 | 0 | 1 | 0 | 2 |
| Total | 12 | 15 | 2 | 4 | 33 |

Rubber-based Products

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 1 | 0 | 0 | 2 |
| Mechanical Engineering | 1 | 1 | 0 | 0 | 2 |
| Industrial Engineering | 0 | 1 | 0 | 0 | 1 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 2 | 0 | 0 | 0 | 2 |
| Other Engineering Fields (Specify) | 2 | 0 | 0 | 0 | 2 |
| Computer Systems | 2 | 0 | 1 | 0 | 3 |
| Marketing | 2 | 0 | 0 | 0 | 2 |
| Finance | 1 | 1 | 0 | 0 | 2 |
| Human Resources | 2 | 0 | 0 | 0 | 2 |
| Accounting | 1 | 1 | 0 | 0 | 2 |
| Materials Management | 2 | 0 | 0 | 0 | 2 |
| Operations Management | 2 | 0 | 0 | 0 | 2 |
| Technical Skills | 2 | 1 | 0 | 0 | 3 |
| Skilled Labor | 2 | 0 | 1 | 0 | 3 |
| Secretarial | 1 | 1 | 0 | 0 | 2 |
| English Skills for Administrators/Managers | 1 | 1 | 0 | 0 | 2 |
| English Skills for Technical Staff | 1 | 1 | 0 | 0 | 2 |
| Machine Operators | 2 | 1 | 0 | 0 | 3 |
| Total | 29 | 10 | 2 | 0 | 41 |

Footwear

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 0 | 1 | 0 | 2 |
| Mechanical Engineering | 0 | 0 | 2 | 0 | 2 |
| Industrial Engineering | 0 | 2 | 1 | 0 | 3 |
| Chemical Engineering | 1 | 0 | 0 | 0 | 1 |
| Environmental Engineering | 1 | 0 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 1 | 0 | 1 | 1 | 3 |
| Marketing | 1 | 0 | 1 | 0 | 2 |
| Finance | 2 | 0 | 1 | 0 | 3 |
| Human Resources | 0 | 0 | 2 | 0 | 2 |
| Accounting | 1 | 0 | 1 | 0 | 2 |
| Materials Management | 0 | 1 | 1 | 0 | 2 |
| Operations Management | 0 | 0 | 2 | 0 | 2 |
| Technical Skills | 1 | 1 | 2 | 0 | 4 |
| Skilled Labor | 0 | 0 | 2 | 2 | 4 |
| Secretarial | 0 | 0 | 1 | 1 | 2 |
| English Skills for Administrators/Managers | 0 | 1 | 3 | 0 | 4 |
| English Skills for Technical Staff | 1 | 0 | 2 | 0 | 3 |
| Machine Operators | 0 | 0 | 4 | 0 | 4 |
| Total | 10 | 5 | 27 | 4 | 46 |

Iron and Steel

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 1 | 1 | 0 | 2 |
| Mechanical Engineering | 0 | 1 | 0 | 1 | 2 |
| Industrial Engineering | 0 | 1 | 1 | 1 | 3 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 2 | 0 | 0 | 0 | 2 |
| Other Engineering Fields (Specify) | 0 | 0 | 1 | 0 | 1 |
| Computer Systems | 1 | 2 | 0 | 0 | 3 |
| Marketing | 2 | 1 | 1 | 0 | 4 |
| Finance | 3 | 1 | 0 | 0 | 4 |
| Human Resources | 2 | 1 | 1 | 0 | 4 |
| Accounting | 2 | 2 | 0 | 0 | 4 |
| Materials Management | 1 | 1 | 2 | 0 | 4 |
| Operations Management | 1 | 1 | 2 | 0 | 4 |
| Technical Skills | 1 | 1 | 1 | 1 | 4 |
| Skilled Labor | 0 | 1 | 3 | 0 | 4 |
| Secretarial | 1 | 1 | 1 | 0 | 3 |
| English Skills for Administrators/Managers | 0 | 3 | 1 | 0 | 4 |
| English Skills for Technical Staff | 0 | 4 | 0 | 0 | 4 |
| Machine Operators | 1 | 0 | 2 | 1 | 4 |
| Total | 19 | 22 | 17 | 4 | 62 |

Glass and other Construction Materials

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 2 | 0 | 0 | 3 |
| Mechanical Engineering | 2 | 2 | 0 | 0 | 4 |
| Industrial Engineering | 2 | 1 | 0 | 0 | 3 |
| Chemical Engineering | 1 | 2 | 0 | 0 | 3 |
| Environmental Engineering | 2 | 1 | 0 | 0 | 3 |
| Other Engineering Fields (Specify) | 1 | 0 | 0 | 0 | 1 |
| Computer Systems | 1 | 2 | 0 | 0 | 3 |
| Marketing | 1 | 2 | 0 | 0 | 3 |
| Finance | 1 | 1 | 0 | 0 | 2 |
| Human Resources | 1 | 1 | 0 | 0 | 2 |
| Accounting | 1 | 2 | 0 | 0 | 3 |
| Materials Management | 1 | 1 | 1 | 0 | 3 |
| Operations Management | 2 | 1 | 0 | 0 | 3 |
| Technical Skills | 1 | 1 | 1 | 0 | 3 |
| Skilled Labor | 0 | 2 | 1 | 0 | 3 |
| Secretarial | 1 | 1 | 0 | 0 | 2 |
| English Skills for Administrators/Managers | 1 | 2 | 0 | 0 | 3 |
| English Skills for Technical Staff | 1 | 2 | 0 | 0 | 3 |
| Machine Operators | 0 | 3 | 0 | 0 | 3 |
| Total | 21 | 29 | 3 | 0 | 53 |

Construction

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|------------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 5 | 4 | 3 | 0 | 12 |
| Mechanical Engineering | 7 | 4 | 1 | 0 | 24 |
| Industrial Engineering | 6 | 0 | 2 | 0 | 8 |
| Chemical Engineering | 5 | 2 | 1 | 0 | 8 |
| Environmental Engineering | 4 | 1 | 1 | 1 | 7 |
| Other Engineering Fields (Specify) | 10 | 2 | 1 | 0 | 13 |
| Computer Systems | 5 | 3 | 2 | 1 | 11 |
| Marketing | 3 | 3 | 3 | 0 | 9 |
| Finance | 6 | 3 | 1 | 1 | 11 |
| Human Resources | 3 | 3 | 3 | 0 | 9 |
| Accounting | 7 | 3 | 3 | 0 | 13 |
| Materials Management | 4 | 2 | 1 | 0 | 7 |
| Operations Management | 2 | 4 | 1 | 0 | 7 |
| Technical Skills | 3 | 5 | 2 | 2 | 12 |
| Skilled Labor | 1 | 5 | 2 | 2 | 10 |
| Secretarial | 2 | 5 | 4 | 2 | 13 |
| English Skills for Administrators/Managers | 2 | 9 | 3 | 0 | 14 |
| English Skills for Technical Staff | 2 | 6 | 4 | 1 | 13 |
| Machine Operators | 4 | 1 | 3 | 0 | 8 |
| Total | 81 | 65 | 41 | 10 | 197 |

Commercial Banks

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 2 | 0 | 0 | 0 | 2 |
| Mechanical Engineering | 2 | 0 | 0 | 0 | 2 |
| Industrial Engineering | 2 | 0 | 0 | 0 | 2 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 2 | 0 | 0 | 0 | 2 |
| Other Engineering Fields (Specify) | 2 | 0 | 0 | 0 | 2 |
| Computer Systems | 1 | 1 | 2 | 0 | 4 |
| Marketing | 1 | 1 | 2 | 0 | 4 |
| Finance | 1 | 1 | 2 | 0 | 4 |
| Human Resources | 1 | 2 | 1 | 0 | 4 |
| Accounting | 1 | 2 | 1 | 0 | 4 |
| Materials Management | 2 | 0 | 0 | 1 | 3 |
| Operations Management | 1 | 1 | 0 | 1 | 3 |
| Technical Skills | 1 | 1 | 0 | 1 | 3 |
| Skilled Labor | 2 | 1 | 0 | 1 | 4 |
| Secretarial | 3 | 0 | 1 | 0 | 4 |
| English Skills for Administrators/Managers | 1 | 1 | 2 | 0 | 4 |
| English Skills for Technical Staff | 1 | 1 | 0 | 1 | 3 |
| Machine Operators | 3 | 0 | 0 | 1 | 4 |
| Total | 31 | 12 | 11 | 6 | 60 |

Finance

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 0 | 0 | 0 | 0 | 0 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 1 | 2 | 0 | 0 | 3 |
| Marketing | 2 | 1 | 0 | 0 | 3 |
| Finance | 2 | 1 | 0 | 1 | 4 |
| Human Resources | 1 | 1 | 2 | 0 | 4 |
| Accounting | 2 | 1 | 1 | 0 | 4 |
| Materials Management | 1 | 0 | 0 | 0 | 1 |
| Operations Management | 1 | 0 | 1 | 0 | 2 |
| Technical Skills | 1 | 0 | 0 | 0 | 1 |
| Skilled Labor | 1 | 0 | 0 | 0 | 1 |
| Secretarial | 1 | 1 | 2 | 0 | 4 |
| English Skills for Administrators/Managers | 1 | 2 | 0 | 0 | 3 |
| English Skills for Technical Staff | 2 | 0 | 0 | 0 | 2 |
| Machine Operators | 1 | 0 | 0 | 0 | 1 |
| Total | 17 | 9 | 6 | 1 | 33 |

Hotel and Tourism

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 2 | 1 | 2 | 0 | 5 |
| Mechanical Engineering | 2 | 1 | 1 | 0 | 4 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 1 | 2 | 2 | 0 | 5 |
| Marketing | 0 | 2 | 2 | 1 | 5 |
| Finance | 2 | 1 | 2 | 0 | 5 |
| Human Resources | 0 | 3 | 1 | 1 | 5 |
| Accounting | 2 | 1 | 2 | 0 | 5 |
| Materials Management | 0 | 3 | 1 | 1 | 5 |
| Operations Management | 0 | 3 | 0 | 1 | 4 |
| Technical Skills | 2 | 2 | 1 | 0 | 5 |
| Skilled Labor | 1 | 2 | 1 | 1 | 5 |
| Secretarial | 0 | 3 | 2 | 0 | 5 |
| English Skills for Administrators/Managers | 2 | 1 | 1 | 1 | 5 |
| English Skills for Technical Staff | 1 | 2 | 1 | 1 | 5 |
| Machine Operators | 0 | 1 | 3 | 1 | 5 |
| Total | 15 | 28 | 22 | 8 | 73 |

Insurance

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 0 | 0 | 0 | 0 | 0 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 1 | 0 | 0 | 0 | 1 |
| Computer Systems | 0 | 2 | 1 | 0 | 3 |
| Marketing | 0 | 1 | 2 | 0 | 3 |
| Finance | 1 | 0 | 1 | 1 | 3 |
| Human Resources | 0 | 0 | 3 | 0 | 3 |
| Accounting | 1 | 0 | 1 | 1 | 3 |
| Materials Management | 0 | 0 | 0 | 0 | 0 |
| Operations Management | 0 | 1 | 1 | 0 | 2 |
| Technical Skills | 0 | 0 | 1 | 0 | 1 |
| Skilled Labor | 0 | 0 | 0 | 0 | 0 |
| Secretarial | 0 | 0 | 1 | 2 | 3 |
| English Skills for Administrators/Managers | 0 | 1 | 2 | 0 | 3 |
| English Skills for Technical Staff | 0 | 1 | 0 | 0 | 1 |
| Machine Operators | 0 | 0 | 0 | 0 | 0 |
| Total | 3 | 6 | 13 | 4 | 26 |

Retail Trade and Department Stores

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 0 | 0 | 0 | 0 | 0 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 0 | 0 | 0 | 0 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 1 | 0 | 1 |
| Computer Systems | 1 | 2 | 0 | 0 | 3 |
| Marketing | 0 | 1 | 2 | 0 | 3 |
| Finance | 1 | 2 | 0 | 0 | 3 |
| Human Resources | 1 | 0 | 1 | 0 | 2 |
| Accounting | 2 | 1 | 0 | 0 | 3 |
| Materials Management | 0 | 0 | 1 | 0 | 1 |
| Operations Management | 0 | 0 | 2 | 0 | 2 |
| Technical Skills | 1 | 1 | 0 | 0 | 2 |
| Skilled Labor | 0 | 2 | 0 | 0 | 2 |
| Secretarial | 0 | 2 | 1 | 0 | 3 |
| English Skills for Administrators/Managers | 0 | 2 | 1 | 0 | 3 |
| English Skills for Technical Staff | 1 | 1 | 0 | 0 | 2 |
| Machine Operators | 0 | 1 | 0 | 0 | 1 |
| Total | 7 | 15 | 9 | 0 | 31 |

Wholesalers/Importers

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 0 | 1 | 0 | 0 | 1 |
| Industrial Engineering | 0 | 0 | 0 | 0 | 0 |
| Chemical Engineering | 0 | 1 | 0 | 0 | 1 |
| Environmental Engineering | 0 | 0 | 0 | 0 | 0 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 0 | 1 | 0 | 1 | 2 |
| Marketing | 0 | 0 | 2 | 0 | 2 |
| Finance | 1 | 1 | 0 | 0 | 2 |
| Human Resources | 0 | 1 | 0 | 0 | 1 |
| Accounting | 1 | 1 | 0 | 0 | 2 |
| Materials Management | 0 | 0 | 1 | 0 | 1 |
| Operations Management | 0 | 0 | 1 | 0 | 1 |
| Technical Skills | 0 | 2 | 0 | 0 | 2 |
| Skilled Labor | 0 | 0 | 1 | 1 | 2 |
| Secretarial | 0 | 0 | 2 | 0 | 2 |
| English Skills for Administrators/Managers | 0 | 1 | 1 | 0 | 2 |
| English Skills for Technical Staff | 0 | 0 | 1 | 0 | 1 |
| Machine Operators | 0 | 1 | 0 | 0 | 1 |
| Total | 2 | 10 | 9 | 2 | 23 |

Exporters

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 1 | 1 | 0 | 0 | 2 |
| Mechanical Engineering | 0 | 1 | 0 | 0 | 1 |
| Industrial Engineering | 0 | 1 | 0 | 0 | 1 |
| Chemical Engineering | 2 | 0 | 0 | 0 | 2 |
| Environmental Engineering | 1 | 0 | 0 | 0 | 1 |
| Other Engineering Fields (Specify) | 0 | 0 | 0 | 0 | 0 |
| Computer Systems | 1 | 1 | 1 | 0 | 3 |
| Marketing | 1 | 1 | 2 | 0 | 4 |
| Finance | 2 | 1 | 0 | 0 | 3 |
| Human Resources | 0 | 2 | 1 | 0 | 3 |
| Accounting | 4 | 0 | 0 | 0 | 4 |
| Materials Management | 0 | 1 | 0 | 1 | 2 |
| Operations Management | 1 | 0 | 0 | 1 | 2 |
| Technical Skills | 0 | 1 | 0 | 1 | 2 |
| Skilled Labor | 0 | 1 | 2 | 0 | 3 |
| Secretarial | 1 | 2 | 1 | 0 | 4 |
| English Skills for Administrators/Managers | 0 | 2 | 2 | 0 | 4 |
| English Skills for Technical Staff | 0 | 0 | 3 | 0 | 3 |
| Machine Operators | 0 | 0 | 1 | 1 | 2 |
| Total | 14 | 15 | 13 | 4 | 46 |

Computer Related

| Type of Manpower | Extent of Substitution | | | | Total |
|--|------------------------|------------|-------------|-----------|-----------|
| | A Large Extent | Moderately | Very Little | None | |
| Electrical/Electronics Engineering | 0 | 2 | 2 | 0 | 4 |
| Mechanical Engineering | 0 | 0 | 1 | 0 | 1 |
| Industrial Engineering | 0 | 0 | 2 | 0 | 2 |
| Chemical Engineering | 0 | 0 | 1 | 0 | 1 |
| Environmental Engineering | 0 | 0 | 1 | 0 | 1 |
| Other Engineering Fields (Specify) | 0 | 1 | 1 | 0 | 2 |
| Computer Systems | 1 | 4 | 0 | 0 | 5 |
| Marketing | 1 | 2 | 1 | 0 | 4 |
| Finance | 4 | 0 | 0 | 0 | 4 |
| Human Resources | 0 | 0 | 2 | 1 | 3 |
| Accounting | 5 | 0 | 0 | 0 | 5 |
| Materials Management | 1 | 0 | 0 | 0 | 1 |
| Operations Management | 1 | 0 | 0 | 1 | 2 |
| Technical Skills | 0 | 2 | 3 | 0 | 5 |
| Skilled Labor | 0 | 1 | 2 | 2 | 5 |
| Secretarial | 3 | 1 | 0 | 1 | 5 |
| English Skills for Administrators/Managers | 0 | 0 | 1 | 2 | 3 |
| English Skills for Technical Staff | 0 | 1 | 0 | 3 | 4 |
| Machine Operators | 1 | 0 | 1 | 0 | 2 |
| Total | 17 | 14 | 18 | 10 | 59 |

APPENDIX X

RESPONDENTS FROM BILATERAL AND MULTILATERAL ORGANIZATIONS

| No | ORGANIZATION | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|-------------------|---|---------------|
| 1 | Australian Education Center | Wip Treeratt | Senior Counsellor | 231-0531-3 |
| 2 | Australian Embassy | David Barber | Counsellor, Technical and | 287-2680 |
| 3 | British Council | Ian Stewart | English Language Officer | - |
| 4 | British Embassy | Mrs Storp | - | - |
| 5 | Canadian Embassy | Rosalind Coleman | Development Counsellor | - |
| 6 | Carl Duisberg Gessellschaft | Mendeluz Bautista | Program Specialist | - |
| 7 | Delegation of European Communities | Ron Gallimore | - | - |
| 8 | French Embassy | Mr Treutenaere | Cultural Attache | - |
| 9 | German Embassy | Mrs Huss | Third Secretary | - |
| 10 | ILO Regional Office for Asia and the Pacific | Heinz M Bissmann | Regional Adviser Vocational Training | 282-9161-200 |
| 11 | Japan International Cooperation agency | Makoto Ashino | Assistant Resident Representative | 286-4783 |
| 12 | Royal Netherlands Embassy | Ron G Strikker | First Secretary | 254-7701-5 |
| 13 | Swedish Embassy | Mr Bertil | Counsellor | 234-3891-2 |
| 14 | The World Bank | Shigeko M Asher | Sr Operations Officer Population & Human Resources Asia Country Department II | (202)458-1393 |
| 15 | The World Bank | Philip Annez | Country Representative | - |
| 16 | United Nations Development Programme | Suchada Kulawat | National Programme Officer | 282-9161 |

RESPONDENTS FROM BILATERAL AND MULTILATERAL ORGANIZATIONS (Continued)

| No | ORGANIZATION | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|-------------------|----------------------------|-----------|
| 17 | United Nations Development Programme | Amara Rattakul | National Programme Officer | 282-9161 |
| 18 | United Nations Industrial Development Organization | Roeland Kortas | Programme Officer | 280-1862 |
| 19 | United Nations Industrial Development Organization | Nils Ramm-Ericson | UNIDO Country Director | 280-1862 |

APPENDIX XI

RESPONDENTS FROM THAI UNIVERSITIES

| No | THAI UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|---|--|-------------|
| 1 | ABAC School of Management Assumption University | P Martin Komolmas, Ph D | Rector | 319-0899 |
| 2 | Assumption University | Dr Khine Nyunt | Dep Dean, Engineering Faculty | 314-0456 |
| 3 | Assumption University | Sukkree Serivalsatit | Asst Dean, Fac of Science and Technology | - |
| 4 | Assumption University | Dr Sutthiporn Pathumthevapibarl | Dean, Faculty of Engineering | 319-0899 |
| 5 | Chiang Mai University | Assoc Prof Norkun Sithhipong | Dean, Faculty of Engineering | - |
| 6 | Bangkok Business College | Pichai Buranasombati | President | 252-7644 |
| 7 | Chulalongkorn University | Dr Salag Dhabanandana | Vice-President for Research | 215-0880 |
| 8 | Chulalongkorn University | Charas Suwanwela, M D Professor of Surgery | President | 215-3619 |
| 9 | Chulalongkorn University | Dr Withaya Yongchareon | Project Director in Science and Technology Asso Professor | 215-0875-85 |
| 10 | Chulalongkorn University | Vanchai Rijiravanich, Ph D | Associate Professor President's Assistant for Continuing Education | 251-3969 |
| 11 | Chulalongkorn University | Dr Tavee Lertpanayavit | Dean, Faculty of Engineering | 252-7178 |
| 12 | Chulalongkorn University | Dr Wiwat Mungkandi | Vice President for International Affairs | 215-3648 |
| 13 | Chulalongkorn University | Rabin Ruttanaphani Associate Professor | Vice President for Planning and Development | 215-3632 |
| 14 | Chulalongkorn University | Kamchad Mongkolkul Ph D | Director, The Petroleum and Petrochemical College | 215-2602 |
| 15 | Chulalongkorn University | Assoc Prof Somchai Thayarnyong | Director, Computer Service Center | 215-3550 |

RESPONDENTS FROM THAI UNIVERSITIES (Continued)

| No | THAI UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|---|-------------------------------|--|------------|
| 16 | Chulalongkorn University | Viboon Sangveraphunsiri, Ph D | Engineering Computer Center, Faculty of Engineering | 252-1701 |
| 17 | Chulalongkorn University | Suravuth Pratishtananda, Ph D | Engineering Computer Center, Faculty of Engineering | 252-1701-2 |
| 18 | Kasetsart University | Assoc Prof Boonsom Suwachirat | Dean, Faculty of Engineering | - |
| 19 | Khon Kaen University | Dr Prinya Jindaprasert | Dean, Faculty of Engineering | - |
| 20 | King Mongkut's Institute of Technology Ladkrabang | Prof Dr Srisakdi Charmonman | Distinguished (C11) Prof of Computer Engineering | 326-9969 |
| 21 | King Mongkut's Institute of Technology North Bangkok | Dr Chana Kasipar | President | 586-9000 |
| 22 | King Mongkut's Institute of Technology Ladkrabang | Kosan Kusamran, D Phil | Vice-Rector for International Affairs | 326-9157 |
| 23 | King Mongkut's Institute of Technology Ladkrabang | Kosol Petchsuwan Ph D | President | 326-9157 |
| 24 | King Mongkut's Institute of Technology Ladkrabang | Somkiat Supadech D Eng | Dean, Faculty of Engineering | 326-9444 |
| 25 | Mahanakorn College | Dr Sittichai Pookaiyaudom | President | - |
| 26 | NIDA | Titaya Suvanajata Ph D | Social Development | 377-7400-9 |
| 27 | Payap University | Dr Amnuay Tapingkae | President | - |
| 28 | Prince of Songkhla University | Asst Prof Phasook Kullsvani | President | - |
| 29 | Rajamangala Institute of Technology | Dr Thamnoon Rittimani | President | - |
| 30 | Rangsit University | Supat Poopaka, Ph D | Dean of Faculty of Engineering | 533-9020-1 |
| 31 | Rangsit University | Suchai Thanawastien, Ph D | Director, Computer and Information Technology Inst | 533-9020-1 |
| 32 | Rangsit University | Benjapon Wethyavivorn, Ph D | Faculty of Engineering | 533-9020-1 |
| 33 | Rangsit University | Athorn Chonhenchob | President | 533-9020-1 |

RESPONDENTS FROM THAI UNIVERSITIES (Continued)

| No | THAI UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|---|--|------------------------------|-----------|
| 34 | South East Asia College | Prof Samornwadee Phakphol-ngam Assoc Prof Sawat Dharmikarak | | - |
| 35 | Thammasat University | Dr Naksitte Coovattanachai | Dean, Faculty of Engineering | - |
| 36 | University of the Thai Chamber of Commerce | Dr Manit Boonprasert Ed D | Vice President | 276-2126 |
| 37 | University of the Thai Chamber of Commerce | Professor Patchai Bunnag | President | 276-1040 |

APPENDIX XII

THAI-U S UNIVERSITY LINKAGES

| THAI UNIVERSITY | U S UNIVERSITY/IES | DISCIPLINE/AREA OF COLLABORATION | STATUS |
|------------------------------|--|--|---------------------------------------|
| Assumption University (ABAC) | University of Southern Illinois | Business Administration | Ongoing |
| | Pittsburgh State University | Exchange of faculty in business administration | Ongoing |
| | University of Missouri at Columbia | Engineering Management graduate program | Ongoing |
| | Loyola College at Maryland | Exchange of faculty and students in business administration (starting June 1991) | To start in June 1991 |
| Chiang Mai University | Loyola University at Chicago | Visiting professors to lecture in short seminars in business administration | Ongoing |
| | University of Minnesota (Duluth) | Exchange of faculty | Sporadic |
| | University of Alabama at Birmingham (Sparkman Center) | Exchange of faculty | Sporadic |
| | California State University (Long Beach) | Exchange of faculty | Sporadic |
| | University of Wisconsin (Madison) | Exchange of faculty | Sporadic |
| | Colorado State University | Exchange of faculty | Sporadic |
| | University of California | Exchange of faculty | Sporadic |
| | University of Illinois (Chicago) | Exchange of faculty | Sporadic |
| | George Peabody College for Teachers at Vanderbilt University | Exchange of faculty and students | Sporadic |
| | Louisiana State University | Exchange of faculty | Sporadic |
| | Oregon State University | Exchange of faculty | Sporadic |
| | Auburn University | Exchange of faculty | Sporadic |
| | MIE University | Exchange of faculty in agricultural engineering | Ongoing |
| | University of California at Sta Barbara | Exchange of faculty | Sporadic |
| | George Washington University | Joint graduate programs in engineering technology | Planned (not yet started) |
| Chulalongkorn University | University of Texas | Exchange of faculty in postgraduate education | Terminated |
| | University of Washington | Exchange of faculty and students in engineering management | Agreement signed (not yet started) |
| | University of Missouri at Rolla | Joint graduate program in engineering | Not yet started (looking for funding) |
| | University of Illinois at Chicago | Exchange of faculty | Planned |

THAI-U S UNIVERSITY LINKAGES (CONTINUED)

| THAI UNIVERSITY | U S UNIVERSITY/IES | DISCIPLINE/AREA OF COLLABORATION | STATUS |
|--|--|---|--|
| Chulalongkorn University | The City University of New York | Exchange of faculty | Sporadic |
| | College of Charleston | Exchange of faculty | Sporadic |
| | San Jose State University | Exchange of faculty | Sporadic |
| | Vanderbilt University | Exchange of faculty in education | Sporadic |
| | University of Alabama at Birmingham | Exchange of faculty | Sporadic |
| | University of Wisconsin at Madison | Exchange of faculty | Sporadic |
| | University of Wisconsin at Parkside | Exchange of faculty | Sporadic |
| | University of California | Exchange of faculty | Sporadic |
| | University of Minnesota | Professorial chair in management | Ongoing |
| | Portland State University | Exchange of professors & students in management | Sporadic |
| | Indiana State University | Education | Sporadic |
| | The Ohio State University | Information Service | Ongoing |
| | George Washington University | Joint graduate program in engineering management | Not yet started |
| Kasetsart University | University of Columbia at New York | Joint research program in the field of management | Starts in 1991 |
| | University of Oregon | Exchange of faculty in agriculture | Terminated |
| Khon Kaen University | University of Iowa | Exchange of faculty in humanities & social science | To start soon |
| | Case Western Reserve University | Student exchange program in medical science | Ongoing |
| | University of Illinois at Urbana-Champaign (through MUCIA) | Exchange of faculty in biotechnology | To start soon |
| King Mongkut's Institute of Technology North Bangkok | Oklahoma State University | Visiting professors | Informal linkage |
| | University of Ohio at Columbus | Personal contacts with Univ of Ohio professors working for the Int'l Education and Training Association (IVETA) | Ongoing, Third World Conference to be held in Bangkok in June 1991 |
| | University of Indiana | Exchange of faculty | Planned |
| | Chicago State University | Exchange of faculty | Planned |
| | Illinois Institute of Technology | Exchange of faculty | Planned |
| | University of California at Berkeley | Exchange of faculty | Planned |
| | Stanford University | Exchange of faculty | Planned |
| California State Univ Long Beach | Exchange of faculty | Planned | |

THAI-U S UNIVERSITY LINKAGES (CONTINUED)

| THAI UNIVERSITY | U S UNIVERSITY/IES | DISCIPLINE/AREA OF COLLABORATION | STATUS |
|--|--|---|--------------------------------------|
| Mahidol University | University of Hawaii | Exchange of information (information systems) | Agreement signed (to start soon) |
| Pavap University | Withworth College Washington Northern Illinois University University of Washington | Student exchange programs Business Administration Science and engineering | |
| Prince of Songkla University | University of Rhode Island (URI) | Joint research program in coastal resources | Ongoing |
| | University of Missouri at Rolla | Joint graduate programs in engineering | Ongoing |
| | Washington State University | Exchange of faculty in management | Ongoing |
| | University of Pennsylvania | Exchange of faculty in management | Ongoing |
| Rajamangala Institute of Technology | University of Missouri | Informal linkage (personal contacts between faculty) | Ongoing |
| | University of Mississippi | Informal linkage (personal contacts between faculty) | Ongoing |
| | Oklahoma State University | Exchange of faculty in engineering | Agreement signed (to start soon) |
| Rangsit University | Northeastern University | Student exchange program | Agreement signed (to start soon) |
| | University of Nevada | Hotel management | Agreement signed (to start soon) |
| | University of Pittsburgh | Engineering management, construction and industrial | Planned |
| | University of Missouri at Rolla | Engineering management, construction and industrial | Planned |
| Siam University | California State University at Long Beach | Exchange of faculty and students in engineering | Agreements signed (to start soon) |
| | University of Bridgeport at Connecticut | Exchange of faculty and students in engineering | Agreements signed (to start soon) |
| | Northrop University | Exchange of faculty and students in engineering | Agreements signed (to start soon) |
| | Mercy College at New Jersey | Exchange of faculty and students in engineering | Agreements signed (to start soon) |

APPENDIX XIII

RESPONDENTS FROM U S UNIVERSITIES

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|-------------------------|--|---------------|
| 1 | Case Western Reserve University | Dr Hatsuo Ishida | Professor | (216)368-4285 |
| 2 | Cornell University | Michael H Redlin | Associate Dean for Academic Affairs | (607)255-3692 |
| 3 | Harvard Institute for for International Development | Charles N Myers | Research Associate | (617)495-4248 |
| 4 | Midwest Universities Consortium for International Activities Inc (MUCIA) | William L Flinn | Executive Director | (614)291-9646 |
| 5 | Midwest Universities Consortium for International Activities Inc | James T Riordan, Ph D | Associate Executive Director | (614)291-9646 |
| 6 | Midwest Universities Consortium for International Activities Inc | Jon Mark Simpson, Ph D. | Staff Assistant | (614)291-9646 |
| 7 | Midwest Universities Consortium for International Activities Inc | Lesa Esbaum Kuebler | Staff Assistant | (614)291-9646 |
| 8 | Milwaukee School of Engineering | John N Farrow | Prof and Chair, Mechanical Eng'g | (414)277-7287 |
| 9 | Milwaukee School of Engineering | Thomas W Davis, P E | Sr VP of Academics and Dean & Dean of Faculty | (414)277-7324 |
| 10 | Milwaukee School of Engineering | Dr Robert R Spitzer | President | (414)277-7100 |
| 11 | Milwaukee School of Engineering | Ray W Palmer, P E | Prof & Chairman, Electric Eng'g & Comp Sc | (414)277-7323 |
| 12 | Milwaukee School of Engineering | Dr Warren E Snyder, P E | Engineering Consultant | (414)786-5429 |
| 13 | Milwaukee School of Engineering | Owen Smith | Dean of Admission | (414)277-7202 |

RESPONDENTS FROM U S UNIVERSITIES (Continued)

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|----------------------------|----------------------------|--|---------------|
| 14 | Northeastern University | Leonard Zion | Prof and Proj Coordinator | (617)437-4221 |
| 15 | Northeastern University | Dr Robert E Vozzella | Director & Prof , Int'l Cooperative Education | (617)437-4222 |
| 16 | Northwestern University | William Ihlanfelot | Institutional Relations Department | (708)491-7490 |
| 17 | Oklahoma State University | Karl N Reid, Jr ,Sc D ,P E | Dean, College of Eng'g | (405)744-5140 |
| 18 | Polymer Technologies, Inc | Vahid Sendjarevic, Ph D | Research Associate | (313)927-1270 |
| 19 | Stanford University | Marie Bun | Bechtel International Service Center | |
| 20 | Texas A&M University | Emily Yaung Ashworth | Assistant Provost | (409)845-3086 |
| 21 | Texas A&M University | Tep Sastri Ph D | Associate Professor | (409)845-5448 |
| 22 | Texas A&M University | Joel S Watkins | Earl F Cook Professor of Geoscience | (409)845-1371 |
| 23 | Texas A&M University | James C Holste, Ph D , P E | Professor | (409)845-3367 |
| 24 | Texas A&M University | Donald B Hall | Director | (409)845-3099 |
| 25 | The Ohio State University | Charles F Hermann | Director, Mershon Center | (614)292-1681 |
| 26 | The Ohio State University | Jacques L Zakin | Chairman, Chemical Eng'g Department | (614)291-6986 |
| 27 | The University of Akron | Rudolph J Scavuzzo, Jr | Assoc Dean, College of Polymer Science & Polymer Engineering | (216)972-5904 |
| 28 | The University of Akron | Rose Marie Konet | Asst to the Director, Center for Computer Based Education | (216)972-6510 |
| 29 | The University of Akron | Joseph P Kennedy, Ph D | Distinguished Professor of Polymer Science & Chem | (216)972-7512 |
| 30 | The University of Akron | Marion A Ruebel | Executive Assistant to the President | (216)375-5247 |
| 31 | The University of Maryland | Clarence J Mann | Director, International Management Program | (301)985-7989 |

RESPONDENTS FROM U S UNIVERSITIES (Continued)

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|-----------------------------------|-------------------------|---|---------------|
| 32 | The University of Maryland | Milton A Grodsky | Dean, Graduate Studies and Research | (301)985-7999 |
| 33 | The University of Michigan | David C Martin, Ph D | Asst Professor, College of Engineering | (313)936-3161 |
| 34 | The University of Michigan | H Scott Fogler | Vennema Professor of Chemical Engineering | (313)763-1361 |
| 35 | The University of Michigan | Johannes Schwank | Prof and Interim Chairman, College of Engineering | (313)764-3374 |
| 36 | The University of Michigan | George R Carignan | Associate Dean for Research, | (713)749-2174 |
| 37 | The University of Michigan | Brice Carnshan | Professor of Chemical Eng'g | (313)764-3366 |
| 38 | The University of Michigan | Robert W Schnelder, P E | Director, Corp Relations | (313)763-5630 |
| 39 | The University of Michigan | Ruth G Hastie | Director, International Academic Affairs | (313)764-4492 |
| 40 | The University of Oklahoma | Gordon Atkinson | Professor of Chemistry | (405)325-1607 |
| 41 | The University of Oklahoma | Barnet Groten | Executive Director, Energy Center | (405)325-3821 |
| 42 | The University of Oklahoma | Dr Lawrence E McKibbin | Director, Office of International Programs | (405)325-1607 |
| 43 | The University of Oklahoma | Raymond D Daniels, Ph D | Prof and Director, Sch of Chemical Eng'g & Material Science | (405)325-5811 |
| 44 | The University of Oklahoma | Billy L Crynes | Dean, College of Eng'g | (405)325-2621 |
| 45 | The University of Texas at Austin | Dale E Klein, P E | Associate Dean for Research | (512)471-5130 |
| 46 | The University of Texas at Austin | Kitty M Villa | Asst Director, International Office | (512)471-1211 |
| 47 | The University of Texas at Austin | Larry W Lake, Ph D | Shell Distinguished Chair & Halliburton Annual Prof | (512)471-5136 |
| 48 | The University of Texas at Austin | Maroaret A Kidd | Director, International Office | (512)471-1211 |

RESPONDENTS FROM U S UNIVERSITIES (Continued)

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|--------------------------------------|--|---|---------------|
| 49 | The University of Texas at Austin | Dr Thomas F Edgar, P E | Professor of Chemical Eng'g | (512)471-3080 |
| 50 | University of California at Berkeley | Chang-Lin Tien | Chancellor | (415)642-7464 |
| 51 | University of California at Irvine | Dr Kathy Jones Cliff Ochser Dr Harut Barsamian | International Relations Dean of Engineering | - |
| 52 | University of Detroit | J E Kresta, Ph D | Research Professor and Project Director | (313)927-1003 |
| 53 | University of Detroit | Dr Kaneyoshi Ashida | Senior Research Professor in Polymer Science | (313)927-1015 |
| 54 | University of Detroit | Michael Whitty | Assoc Director, Institute f for Urban & Community Affairs | (313)927-1357 |
| 55 | University of Detroit | Paul J Eagle, D Eng , P E | - | (313)927-1371 |
| 56 | University of Detroit | Eric Panitz Ph D | Assistant Professor Col of Business Admin | (313)927-1172 |
| 57 | University of Detroit | Gregory W Ulferts | Dean, College of Business Administration | (313)927-1172 |
| 58 | University of Detroit | Shulamith Schlick | Professor, Department of Chemistry | (313)927-1012 |
| 59 | University of Detroit | Yogendra S Chadda, Ph D | Chairman, Department of Mechanical Engineering | (313)927-1242 |
| 60 | University of Houston | Shirley Exell, Ph D | Associate V P for Academic Programs | (713)749-7341 |
| 61 | University of Houston | M Thomas Jones | Deputy to the President and Prof of Chemistry | (713)749-2236 |
| 62 | University of Houston | Dr John A McDonald Dr Dan Ebron | Director, Allied Geophysical Laboratories | - |
| 63 | University of Houston | Roger Elchhorn | Dean | (713)749-2401 |
| 64 | University of Houston | Alvin F Hildebrandt, Ph D | Director | (713)749-4861 |

RESPONDENTS FROM U S UNIVERSITIES (Continued)

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|--|---------------------------|---|---------------|
| 65 | University of Houston | Frank S Kovarik, Ph D | Director | (713)749-4632 |
| 66 | University of Houston System | Alexander Schilt | Chancellor | (713)754-7400 |
| 67 | University of Houston | Willis K King, Ph D | Chairman, College of Eng'g | (713)749-4791 |
| 68 | University of Illinois at Urbana-Champaign | Howard L Wakeland, P E | Associate Dean, College of Engineering | (217)333-2280 |
| 69 | University of Illinois at Urbana-Champaign | Phillip H Ceil | Assoc Dir & Prof , Polymer Science Engineering | (217)333-0149 |
| 70 | University of Illinois at Urbana-Champaign | Roger E Kanet | Director, International Programs and Studies | (217)333-6104 |
| 71 | University of Illinois at Urbana-Champaign | Isabel K F Wong | Director, Overseas Projects & Foreign Visitors | (217)333-0715 |
| 72 | University of Illinois at Urbana-Champaign | Richard Alkire | Department of Chemical Engineering | (217)333-0063 |
| 73 | University of Illinois at Urbana-Champaign | Dr John J Nicholaides III | Associate Dean, College of Agriculture | (217)333-6420 |
| 74 | University of Massachusetts at Amherst | Richard Stein | Polymer Science & Eng'g | - |
| 75 | University of Minnesota | Delane E Welsch | Director, International Programs | (612)624-3221 |
| 76 | University of Missouri-Rolla | Gary K Patterson | Associate Dean for Research & Graduate Affairs | (314)341-4149 |
| 77 | University of Missouri-Rolla | Stephen L Rosen | Professor and Chairman, College of Engineering | (314)341-4443 |
| 78 | University of Missouri-Rolla | Eunice P French | Director, Center for International Programs and Studies | - |
| 79 | University of Missouri-Rolla | Oliver K Manuel | Chairman & Professor | (314)341-4420 |
| 80 | University of Missouri-Rolla | Marshall E Findley, Ph D | Professor | (314)341-4416 |
| 81 | University of Missouri-Rolla | R B Lewis | Director | (314)341-4165 |

RESPONDENTS FROM U S UNIVERSITIES (Continued)

| No | U S UNIVERSITY | CONTACT PERSON | POSITION | TELEPHONE |
|----|---|----------------------------|--|---------------|
| 82 | University of Missouri-Rolla | Don L Warner, Ph D , P E | Dean and Professor of Geological Engineering | (314)341-4153 |
| 83 | University of Nevada at Reno | Lee Thomas | Director, Office of Int'l Programs and Services | - |
| 84 | University of Wisconsin-Madison | Paul Beckett | Assistant Dean, Office of Int'l Studies & Programs | (608)262-9895 |
| 85 | University of Wisconsin-Madison | John D Wiley | Dean, Dep't of Electrical & Computer Engineering | (608)262-1044 |
| 86 | University of Wisconsin-Madison | Wayne McGown | Special Assistant to the Chancellor | (608)262-3677 |
| 87 | University of Wisconsin-Madison | John T Quigley, Ph D , P E | Professor, College of Eng'g | (608)262-0820 |
| 88 | University of Wisconsin-Madison | Camden A Coberly | Professor of Chemical Eng'g | (608)262-7727 |
| 89 | Virginia Polytechnic Institute and State University | Irma Silva-Barbeau, Ph D | Director, Office of Int'l Development | (703)231-6338 |
| 90 | Virginia Polytechnic Institute and State University | William Lavery, Ph D | Preston Professor of Int'l Affairs | - |
| 91 | Western Carolina University | Ellerd Hulbert | Director, Office of International Development | - |

APPENDIX XIV

MISCELLANEOUS RESPONDENTS (U S ASSOCIATIONS, PRIVATE/PUBLIC INSTITUTIONS, ETC)

| No | ASSOCIATION/INSTITUTE/ FOUNDATION/ETC | CONTACT PERSON | POSITION |
|----|---|-----------------------------|---|
| 1 | Agency of International Development Department of State | Melody J Bacha | - |
| 2 | Agency for International Development | John R Eriksson, Ph D | Director Center of Development Information & Evaluation |
| 3 | Asian Institute of Technology Alumni Association | Prof Dr Srisakdi Charmonman | President |
| 4 | Engineering Centres Division National Science Foundation | Lynn Preston | - |
| 5 | Engineering Consulting Firms Association, Japan | Kiyofumi Tanaka | Development Anthropologist |
| 6 | Engineering Consulting Firms Association, Japan | Yumiko Okamoto, Ph D | Economist |
| 7 | Food Processing Machinery & Supplies Association | George Melnykovich, Ph D | President |
| 8 | Human Resources Directorate, Bureau for Science and Technology, AID | Antonio Gayoso | Agency Director |
| 9 | IMCC | Clifton G Barton | International Trade Specialist |
| 10 | International Franchising Association | Robert O Jones, Jr | Director of International Affairs |
| 11 | National Education Corp | Shawn Mokhtari | V P for Operations |
| 12 | NMTBA (The Association for Manufacturing Technology) | Charles G Koella | Vice President International Trade |
| 13 | NMTBA (The Association for Manufacturing Technology) | C M (CHET) Maccio | International Marketing Director |

MISCELLANEOUS RESPONDENTS (U S ASSOCIATIONS, PRIVATE/PUBLIC INSTITUTIONS, ETC) [Continued]

| No | ASSOCIATION/INSTITUTE/ FOUNDATION/ETC | CONTACT PERSON | POSITION |
|----|---|----------------------|---------------------------------------|
| 14 | State of Ohio Office in East and Southeast Asia | Sara M Simpson | Deputy Director |
| 15 | State of Ohio Office in East and Southeast Asia | Chung-min Chen, Ph D | Director |
| 16 | Telecommunications Industry Association | Patrick H Williams | Director of Government Relations |
| 17 | United States Agency for International Development (Thailand) | Mit Pramuanworachat | Commercial Specialist (Investment) |

APPENDIX XV

THE PETROLEUM AND PETROCHEMICAL COLLEGE PROJECT
FOR
COLLABORATION WITH AMERICAN UNIVERSITIES

PETROLEUM AND PETROCHEMICAL COLLEGE

CHULALONGKORN UNIVERSITY

PROJECT FOR COLLABORATION

WITH

AMERICAN UNIVERSITIES

PROJECT FOR COLLABORATION WITH AMERICAN UNIVERSITIES

The Petroleum and Petrochemical College of Chulalongkorn University, the oldest university in Thailand and one of the most respected in Southeast Asia, is looking for American university partners to upgrade its curriculum in polymers and petrochemicals. The mission of the College is to become a private-sector oriented center of technological excellence to serve the growing need for petrochemical and polymer technical manpower in both Thailand and the other countries in the region. The College requires full partners committed to the long term development of the petroleum and petrochemical industries in Southeast Asia, the world's fastest growing region, that will participate in the development of curricula, the establishment of laboratories, the conduct of applied research projects, the provision of faculty for four week periods, and the upgrading of the College's current faculty. The United States Agency for International Development (USAID) and the petrochemical companies in Thailand are exploring ways in which they can help this dream become a reality.

1 Background

Thailand

The past ten years in Thailand have been marked by unprecedented economic growth and rapid socioeconomic change resulting from modernization and industrialization. Since 1987 real growth in GDP has surpassed ten percent per annum. Although the traditional base of the economy has been agriculture, the industrial sector now accounts for a larger share of the GDP, and by the mid 1990's more people will be engaged in other sectors than will be engaged in the agricultural sector.

Given the predominantly agricultural background of the majority of the labor force and the recent rapid economic growth, Thailand is experiencing an acute shortage of qualified technical personnel. As a stop-gap measure, industrial enterprises in Thailand have been importing large numbers of foreign engineers more than 3,000 since 1988. This is inadequate as a solution in the long run the demand for engineers continues to grow and importing engineers provides no basis for sound industrial development in the national interest.

The Royal Thai Government has taken several basic measures to address this problem. These include calling on existing university engineering faculties to provide training to

upgrade the technical skills of the industrial work force, increasing the numbers of students accepted into existing engineering programs, getting universities lacking them to add engineering to their academic program, setting up new universities exclusively for engineering, and encouraging the private sector to invest in the establishment of new institutes of technology. While such measures are expected to contribute substantially to the alleviation of the problems facing the industrial sector by adding to the supply of basic technical personnel, many constraints remain that make it difficult for any of the existing or planned technical training institutions to develop into centers of excellence. Yet, given the requirements of modern industry and its increasing reliance on high technology, such centers are essential to train highly qualified technical manpower required by both the institutions of higher learning and the more advanced and progressive industrial enterprises.

Chulalongkorn University has launched a new initiative to achieve this objective in relation to one of the most important groups of the industrial sector—the petroleum and petrochemical industry. The demand for polymer and petrochemical engineers in Thailand is booming because of the Eastern Seaboard Development Program (ESDP) and rapid growth in the plastics industry. The ESDP involves the establishment of two new oil refineries, an olefins and an aromatic plant as well as downstream end users. The olefins and aromatics plants will be fed with natural gas from fields in the Gulf of Thailand. Thailand began manufacturing plastic products in the 1950's, however, it was not until the 1970's that the industry began to grow rapidly. Today there are over 2,000 companies comprising the Thai plastics industry.

Southeast Asia

Currently, Indonesia, Malaysia, and Brunei are major exporters of petroleum products. These countries will eventually be joined by Vietnam and Burma. Recent oil finds in the Philippines offer promise that oil revenues may help alleviate the myriad of problems faced by this country. American technology and multinationals have played important roles in the development of the petroleum industries in these countries. As technologies rapidly change, it is imperative that students of petroleum, petrochemical and polymer engineering have access to the latest technologies and that American universities keep abreast of the developments in the petroleum industry in Southeast Asia. In addition to providing education for Thai students, the College will educate students from other South and Southeast Asian countries.

2. The Model The Sasin Graduate Institute of Business Administration of Chulalongkorn University

The Sasin Graduate Institute of Business Administration, which at the time was known as GIBA, was chartered as an independent institution of higher education in Thailand. The Sasin Institute is a joint endeavor among Chulalongkorn University, the J. L. Kellogg Graduate School of Management of Northwestern University and the Wharton School of Management of the University of Pennsylvania. The institute offers two major programs, both in English: the Masters of Business Administration and the Masters of Management. These programs are taught by faculty members from both Kellogg and Wharton, complemented by supporting staff from Chulalongkorn University. A copy of the agreement between the three universities is included in the attachments.

The MBA program is offered on a full-time, day time basis. The two year program operates on a quarter system. There are three teaching quarters to the year, each ten weeks in duration. In order to obtain maximum mobility of faculties from Kellogg and Wharton to Sasin, the ten-week quarter is typically divided into two half-quarters of five weeks with the sixth week set aside for examinations. Two courses are taught each half-quarter. Students are required to take a total of 25 courses and are advised to register for two courses for each half-quarter.

The entering class in 1990 comprised 68 students, evenly divided among men and women. Thirteen percent of the students come from foreign countries. The average student is 25 years old, and the students range from 21 to 35 years old. Forty-four percent of the students completed their undergraduate education in foreign institutions. The current tuition at the Sasin Institute for first year students is Baht 151,200 or about US\$6,000.

The most interesting aspects of the Sasin model are the fees that are market rates, the salaries of the faculty which are also market rates, the use of professors from prestigious American programs to teach courses, the institutionalization of linkages between Thai and American universities, the division of the school year into six half-quarters to facilitate the participation of the American institutions, the inclusion of foreign students, and the Institute's commitment to excellence in education. The involvement of international students encourages the Thai students to learn English and also supports the image of the school as offering a quality of education that is international. The Petroleum and Petrochemical College would like to emulate these features of the Sasin model.

3 History of the Petroleum and Petrochemical College (PETC) Project

Chulalongkorn University, the oldest and most prestigious university in Thailand, has been training students in science and technology for many decades in its Faculties of Science and Engineering. Under its original name of SEATO Graduate School of Engineering, the present Asian Institute of Technology (AIT) was in fact launched originally in collaboration with Chulalongkorn University professors on the Chulalongkorn campus and using Chulalongkorn laboratory facilities.

Following the discovery and exploitation of important oil and natural gas deposits in the Gulf of Thailand and inland locations and the development of the most dynamic petrochemical industry in the region, the need for Thailand to develop its technical manpower to handle the various petrochemical complexes coming on stream became obvious. Chulalongkorn University has been aware of this problem for several years and felt it had a role to play in the development of Thailand's petrochemical industry through research and development, the provision of services and training courses for industries and government agencies, and the supply of skilled manpower for the petroleum, petrochemical, and downstream industries. The most appropriate means to accomplish this was seen to be the establishment of a graduate college specifically designed for this purpose.

As a forerunner of the proposed program, the Graduate School of the University with the cooperation of the relevant Departments of the Faculties of Science and Engineering opened four Masters programs in 1985 in petrochemistry and polymer technology. The programs proved to be very popular among both prospective students and employers. During the past six years, over 90 students have enrolled and 36 have already graduated. They were quickly employed by various industries.

On September 21, 1988, a Royal Decree charged the Petroleum and Petrochemical College with responsibility for graduate programs and research and development in these important fields.

The Royal Thai Government and Chulalongkorn University have demonstrated their commitment to this project. The University has provided out of its own resources the land for the construction of a building to house the College and two scholarships for training faculty members abroad. The Government has provided Baht 105 million (about US\$ 4 million) for the construction of the building, funding for 21 staff positions at civil service salary levels (9 academics, 5 research, and 9 administrative), and basic capital and operational costs. The College will be housed in a 16 story building, seven stories of which (7,000 sq m) will be occupied by the College and the remainder by the University.

Research Institute for Metallurgy and Materials Science This building will be completed in August 1992 ¹The Ministry of Science, Technology, and Energy has provided scholarships for training three of the College's faculty members abroad The University has also requested the Government to provide in the 1992 budget Baht 20 million (US\$800,000) for the procurement of equipment for the College The College expects that the Government and the University will commit more staff and resources to the project once the building has been completed

The United States Agency for International Development is exploring ways in which it can act as a facilitator in building a relationship between the College, American universities, and the companies involved in the Thai petroleum and petrochemical industries A preliminary survey of these companies indicate that they can be counted on to support the College though the provision of scholarships for students studying at the College, the endowment of professorial chairs, funds for visiting scientists and experts, and funds for equipment and research

4 Project Constraints and Challenges

As mentioned earlier, many constraints remain that make it difficult for any of the existing or planned technical training institutions to develop into centers of excellence Most of these tie in with the traditional university set-up and approach to education in this country Universities are dependent on inadequate sources of funding for their operations namely, perennially insufficient annual budget allocations and low student fees, the latter of which contributes but a negligible fraction of the actual costs of the programs As a result, equipment is inadequate and teaching staff salary scales are low and non-competitive with those of private sector employment, especially in the fields of science and technology Many instructors leave the university to take on more remunerative employment with the private sector Some stay on but get involved in private consultation to supplement their income Although there are motivated instructors, the system itself is not conducive to outstanding dedication in the teaching staff

It follows then that although the traditional universities might be adequate to train their students in the basic technical skills at the undergraduate level, these are as yet incapable of providing graduate training meeting international standards Consequently, existing institutions providing technical training do not attract the best students in their

1 Should the building not be completed on time, the College is prepared to begin course using the classrooms of the old building that housed the Sasim program and to continue using the laboratories of the Faculties of Engineering and Science

graduate programs. These prefer to go abroad to pursue advanced study in industrialized countries. As this is possible only for those obtaining scholarships or having access to family wealth, their numbers are relatively few and insufficient to meet current and future needs. The problem is compounded by the brain drain that ensues due to the fact that many of these find remunerative employment abroad after training and do not return to Thailand. Many more mature students already engaged in a working career in Thailand are daunted by the thought of spending several years abroad separated from their families to engage in graduate study. If a quality program of study were offered in Thailand, studying in this program would be a much more attractive option than going abroad.

A main objective of Chulalongkorn University in setting up the Petroleum and Petrochemical College is the establishment of a pilot graduate institute of technology that can overcome the constraints mentioned and achieve a quality of performance meeting the highest international standards. The concept of the new College project is designed to provide it with the flexibility to overcome the limitations of the traditional system and the capacity to meet the challenges of the new industrial era of the nation. The success of this model will encourage other universities to adopt similar models as a means of generating additional resources for their programs and increase the quality of education that they provide their students.

5. The College Concept

The Petroleum and Petrochemical College will have four divisions: the Petroleum Division, The Petrochemical Division, the Polymer Technology Division, and the Techno-Economics Division. When it becomes operational, the College will assume responsibility for the M.S. and M.Eng. programs in petrochemistry and polymer technology offered by the Graduate School since 1985, but under its new format.

The College will have a Governing Board chaired by the President of Chulalongkorn University. Board membership will include not only University faculty but also representatives from the private oil and petrochemical industries, government and state enterprises. This diverse membership will ensure that the College stays in constant touch with latest developments and the changing needs of the private sector.

A key feature of the College project concept is that it is to be set up in collaboration with one or more prestigious American universities with expertise in petrochemical and polymer studies, they providing members of their own faculties to engage in teaching and research alongside their Thai counterparts. The College would accept good foreign students from neighboring countries. Of necessity, the medium of instruction would be

English The initial inconvenience for non-native speakers of English will be more than offset by the advantage of dealing in a language giving access to world sources of information on petroleum and petrochemical studies rather than being limited to the narrow sources of information usually drawn upon by Thai university students

Faculty salaries would be substantially increased to be competitive with those earned by private sector technical personnel with similar qualifications Student tuition fees would provide one of the major sources of income of the College and be realistic enough to largely finance the operation of the program Other sources of revenue include the continuing support from the Thai Government's and the University's budgets, revenue from contract research with private companies, and donations from companies and private individuals Many Thai or Asian students are expected to be supported by a scholarship program contributed to by the several large petroleum and petrochemical firms operating in Thailand and in the region, and other donors The financial conditions described should make it possible to recruit and retain top quality instructors The quality of the program as well as the financial assistance provided should also attract the best students for enrollment The feasibility of the project is supported by the fact that it closely conforms to the model of the highly successful Chulalongkorn University Sasin Graduate Institute of Business Administration

Overall, the College aims to be, first and foremost, a center for teaching based primarily on the experience gained from its R&D work Hence, research and development is inevitably seen as a significant part of the College's mandate It aims at the promotion of local capabilities to address local conditions Service to industry and consultancy work will also be important functions with the College's laboratory facilities being made available for testing and research Close cooperation with the private sector will be encouraged through the organization of various short training courses for industry personnel and the arrangement of colloquia involving experts from industries

6 Expected Outcome

- 1 Once it is fully operational, the College will graduate approximately 40 engineer/scientists a year to serve in the petrochemical and polymer industries in Thailand and the region and in related enterprises such as laboratories for research and quality control, training programs, consultancy programs, etc

- 2 The project will contribute to the formation and consolidation of Thai expertise in these fields so that dependence on foreign universities and teaching staff can be eventually reduced. While it is an objective of the project to upgrade the Thai faculty, the presence of the American professors is intended to be long term. A continual exchange of professors between the College and its American joint venture partners will assist the College in following new developments in the petrochemical field and the American joint venture partners in keeping abreast of industry developments in Southeast Asia. This exchange of information and ideas will help the College attain and maintain an international reputation. While the American involvement will be greatest in the start-up phase, it should not be assumed or encouraged that the American professors be phased out.
- 3 The project will establish mutually beneficial linkages between the University and industry. The University will train staff and conduct applied research and development projects requested by the companies in the industry. As virtually all of the students will later work for the large petroleum, petrochemical and polymer companies and as the College will provide training and R&D support, these companies should willingly provide assistance to the College.
- 4 The project will be a model of collaboration between Chulalongkorn University and American universities and will promote their efforts to become "global universities." The collaboration will comprise faculty and student exchanges, collaborative applied research, jointly sponsored international conferences.
- 5 For Thailand and the region, the project will serve as a model for upgrading teaching of science and technology as well as upgrading technical training.
- 6 Finally, the project will serve as a useful training base for students from other Asian countries in line with the Asia and Pacific Economic Cooperation (APEC) initiative announced by the American Secretary of State, James Baker. This is particularly relevant for the Indochinese countries and Burma, which are beginning to develop their petrochemical industries and are becoming more receptive to foreign investment. The College envisions that most of the students from these countries will require scholarships.

7 **Criteria for Selection of American University Partners**

- 1 Long term commitment to the mission of the College the provision of high quality scientists and engineers and applied research to the petroleum, petrochemical and polymer industries in Thailand and other countries of Southeast Asia
- 2 High caliber Masters degree programs in petrochemical and/or polymer technologies It may well be that there will be more than one American partner for one or both programs
- 3 Large enough faculty to schedule professors to teach at the College for four week periods
- 4 Interest in Southeast Asia as part of the American universities drive for globalization
- 5 Emphasis on applied rather than basic research

8 **The Anticipated Participation of the American University Partners**

The College hopes to offer two masters degree programs, one in petrochemical and the other in polymer technology There will be about 24 credits of course work (one academic year) and one year of research for a thesis Consequently, each program will need about eight professors The courses will involve about 40 hours of instruction This instruction will be provided on a daily basis and each class will last for two hours The visiting professors will need to teach for a four week period Specifically, the College is seeking the following interventions from the American university partners

- 1 The provision of professors for four week periods to teach courses Each program would need about eight professors per year, each of whom would stay in Thailand for four weeks
- 2 The provision of a coordinator who is also a professor for each of the two programs to come to Thailand on or about August 1991 for a one month period to assist in the development of curricula and the procurement of equipments The coordinators would return in September of 1992 for a one year period to assist in the start-up of the College's new programs The coordinator may be called upon to teach one course per semester

*STATEMENT OF UNDERSTANDING
ON THE DEVELOPMENT OF A GRADUATE INSTITUTE
OF BUSINESS ADMINISTRATION
BETWEEN
NORTHWESTERN UNIVERSITY, THE UNIVERSITY OF PENNSYLVANIA
AND CHULALONGKORN UNIVERSITY*

Both Northwestern University and the University of Pennsylvania are renowned as leading business schools in the United States of America, and Chulalongkorn University is the seat of the longest-established school of business education in Thailand. In view of the need foreseen by Chulalongkorn University for a postgraduate degree program to serve the growing regional and international business requirements and to satisfy the demand for a deeper knowledge of business administration generally, while at the same time ensuring that postgraduate students possess a high level of English language proficiency in the relevant fields, Northwestern University and the University of Pennsylvania agree to assist Chulalongkorn University in the setting up of a new institute that will have the following objectives:

- 1 To produce at Chulalongkorn University postgraduate students of business administration who are comparable in both knowledge and capability to those from Northwestern University and the University of Pennsylvania
- 2 To make possible the exchange of academic staff between Northwestern University and the University of Pennsylvania on the one hand, and Chulalongkorn University on the other
- 3 To make possible the cross-registration of students
- 4 To encourage collaboration in the field of research and academic development between the two American Universities and Chulalongkorn University
- 5 To ensure high level of communication skills in using English as an international language for commerce and business administration

In order to meet these objectives, the three participating Universities accept the following undertakings. On the part of Northwestern University and the University of Pennsylvania, to provide academic support for the institute, and in particular to give advice on the curriculum, to make possible the exchange of academic staff, to provide assistance in recruiting staff, to help in developing case studies and appropriate teaching strategies, and to give general advice on the degree program, including such areas as library acquisitions.

On the part of Chulalongkorn University, to contribute to the academic support in the area of English Language instruction and other professional subjects, to provide financial and administrative support, and in particular to supply the required physical infrastructure, to find adequate funding, and to make available appropriate accommodation for exchange personnel, as well as generally looking after their welfare

This statement of understanding may be modified or revoked by consent upon the request and at the convenience of any of the three participating universities

Donald P Jacobs, Dean
J L Kellogg Graduate School of Management
Northwestern University

Donald C Carroll, Dean
The Wharton School
University of Pennsylvania
Philadelphia

Kasem Suwanagul Rector
Chulalongkorn University

TENTATIVE SCHEDULE

1991

- January - Visit by Director of Petroleum and Petrochemical College to US universities that have strong programs in petrochemical and polymer technologies
- February-March - Project framework approved by USAID followed by visit of C U delegation to target US universities
- April - Finalization of the joint partnership
- Recruitment of Project Coordinator and Deputy Project Coordinator
- May - Promotion of programs to private sector and international agencies seeking support for scholarships etc
- Promotion of programs to potential student in Thailand and abroad
- August - Project Coordinator comes to C U for 1 month to help preparing curriculum, scientific equipments, library materials, computers, professor scheduling etc
- October - First group of 2-4 C U academic staff attending classes in collaborating institutes for a semester in subjects to be taught in October 1992 at the College

1992

- January - Application of students submitted (Nov 1-Jan 31)
- February - Project Coordinator comes to C U for 2 weeks for interviews and follow up of project preparation
- Interview of applicants
- March - Notification to acceptances
- April - Second group of 2-4 C U academic staff in U S
- August - Construction of New College Building finished*
- September - Project Coordinator and Deputy Project Coordinator start work at C U
- October - First two Visiting Professors arrive
- Courses begin*

* Note if the new building is not finished in time, classes for the first semester could be held in other buildings at the university until the second semester

SELECTED MAJOR PETROLEUM, PETROCHEMICAL AND POLYMER
COMPANIES IN THAILAND

| |
|---|
| CONCESSIONAIRES |
| <p>BP PETROLEUM DEVELOPMENT CO , LTD (THAILAND) ESSO EXPLORATION AND PRODUCTION KHORAT INC GOPHER OIL LTD MITSUI OIL EXPLORATION CO , LTD (MOECO) PETROCORP EXPLORATION THAILAND LTD THAI SHELL EXPLORATION & PRODUCTION CO , LTD TOTAL EXPLORATION & PRODUCTION THAILAND CO , LTD UNOCAL THAILAND CO , LTD</p> |
| REFINERIES AND GAS SEPARATION PLANTS |
| <p>ESSO SRIRACHA REFINERY</p> |
| PETROLEUM PRODUCT MANUFACTURING AND TRADING COMPANIES |
| <p>BP OIL (THAILAND) CO , LTD CALTEX OIL (THAILAND) LTD ELF PETROLEUM (THAILAND) LTD ESSO STANDARD (THAILAND) CO , LTD MITSUBISHI OIL CO , LTD MOBIL OIL THAILAND LTD SUMITOMO CORP THAILAND, LTD KUWAIT OIL THAILAND LTD</p> |
| PETROCHEMICAL AND CHEMICAL PRODUCT MANUFACTURING AND TRADING COMPANIES |
| <p>AMOCO CHEMICALS THAILAND LTD ARCO CHEMICAL (THAILAND) LTD BARA CHEMICAL CO , LTD BASF (THAI) LTD DOW CHEMICAL THAILAND LTD DU PONT (THAILAND) LTD HMC POLYMERS CO , LTD (HIMONT) HOECHST CHEMICAL INDUSTRIES CO , LTD ICI (THAILAND) LTD MONSANTO THAILAND LTD SOLVAY FAR EAST LTD TOA CHEMICAL INDUSTRIES CO , LTD UNION CARBIDE THAILAND LTD</p> |
| DRILLING COMPANIES |
| <p>RIO GRANDE (THAILAND) LTD SANTA FE DRILLING OFFSHORE CO , LTD</p> |

Pilot Project for Petroleum and Petrochemical College

| | | |
|---|---|---------|
| 1 | TDY to US in April 1991 to finalize negotiations | |
| | Air fares (3 R/T * US\$3,250) | 9,750 |
| | Per Diem (3 * 14 days * US125) | 5,250 |
| | Ground Transportation (3 * US\$200) | 600 |
| | | ----- |
| | | 15,600 |
| 2 | TDY of American University Deans | |
| | Air fares (2 R/T * US\$3,000) | 6,000 |
| | Per Diem (2 * 7 days * US125) | 1,750 |
| | Ground Transportation (2 * US\$100) | 200 |
| | | ----- |
| | | 7,950 |
| 3 | US professors TDY in August 1991 | |
| | Consulting Fees (22 days * 2 * US\$285) | 12,540 |
| | Air fares (2 R/T * US\$3,250) | 6,500 |
| | Per Diem (2 * 31 days * US100) | 6,200 |
| | Ground Transportation (2 * US\$150) | 300 |
| | | ----- |
| | | 25 540 |
| 4 | Thai professors TDY in Fall 1991 | |
| | Air fares (3 R/T * US\$3,000) | 9,000 |
| | Per Diem (3 * 120 days * US100) | 36,000 |
| | | ----- |
| | | 45,000 |
| 5 | US professors TDY in January 1992 | |
| | Consulting Fees (22 days * 2 * US\$285) | 12,540 |
| | Air fares (2 R/T * US\$3,250) | 6,500 |
| | Per Diem (2 * 31 days * US100) | 6,200 |
| | Ground Transportation (2 * US\$150) | 300 |
| | | ----- |
| | | 25,540 |
| 6 | Thai professors TDY in Spring 1992 | |
| | Air fares (3 R/T * US\$3,000) | 9,000 |
| | Per Diem (3 * 120 days * US100) | 36,000 |
| | | ----- |
| | | 45 000 |
| 7 | TDY for Thai professors to liaise with counterpart institutions (Fall 1991 and Spring 1992) | |
| | Air fares (2 R/T * US\$3 250) | 6,500 |
| | Per Diem (2 * 14 days * US125) | 3,500 |
| | Ground Transportation (2 * US\$200) | 400 |
| | | ----- |
| | | 10,400 |
| 8 | Consultant to assist in proposal preparation--Aug 1991 | |
| | Consulting fee | 5,000 |
| | | ===== |
| | <i>Grand total</i> | 180,030 |

APPENDIX XVI

PROPOSAL

MARKET AND DISTRIBUTION RESEARCH PROGRAM -- THAILAND

1 BACKGROUND

- 1 1 The National Machine Tool Builders Association (NMTBA) is interested in facilitating the export of its members machine tools to new markets. The market for machine tools in Thailand is booming, having grown from 368 million baht in 1980 (US\$ 16.7 million) to 6.2 billion baht in 1989 (US\$ 243 million). U.S. companies had less than five percent of this market in 1989. The NMTBA is interested in assisting its members effectively penetrate this growing market. Some of the members are interested in donating their machine tools to educational institutions in Thailand as a means of training future users of the equipment and of introducing their equipment to Thailand.
- 1 2 While such donations are useful to Thailand and the marketing strategies of the machine tool manufacturers, an effective market entry strategy involves an assessment of the market for the specific machine tool, the distribution network for machine tools in Thailand, and the selection of an appropriate distributor.
- 1 3 USAID could facilitate the involvement of US machine tool manufacturers in a program to donate machine tools to Thai educational institutions and to penetrate the Thai market through sponsorship of research on the market in Thailand for the types of machine tools that the US machine tool manufacturers intend to donate.

2 OBJECTIVES

2 1 The objectives of the market survey program are as follows

- (a) To analyze Thailand's import potential for the machine tools researched, to describe and analyze the marketing outlets for imports
- (b) To analyze local production, if any, of the machine tools researched
- (c) To analyze the distribution network for the researched machine tools
- (d) To project and analyze future developments and their effect on the exploitation of marketing opportunities
- (e) To recommend, in line with findings and objectives, an efficient marketing strategy which will enable the penetration of the Thai market
- (f) To identify potential distribution agents or joint venture partners and to analyze their suitability

3 METHODOLOGY

- 3 1 The machine tool manufacturers that participate in the program should provide a research brief to the consultant that includes brochures on the machine tool, background on the company, and a profile of the characteristics that are needed in a distributor or joint venture partner (sizes of sales force, equity, maintenance capability, annual sales) Individual machine tool companies may wish to enclose questionnaires for suppliers and potential distributors if they choose
- 3 2 The principal focus of the research will be to formulate a market entry strategy for the machine tool manufacturers for which the study is commissioned, while providing sufficient hard data so that the company can take immediate action to initiate exports to Thailand
- 3 3 The consultant should carry out the project in the following sequence:
- Analyze the product brochures on the machine tools and match these with Thai import requirements
 - Carry out desk research (e.g. data on imports, exports, local production, and segmentation of end users)
 - Conduct select interviews with informed sources (e.g. producers, importers, distributors, end-users)
 - Carry out data analysis
 - Write the final report

DESK RESEARCH

- 3.4 Desk research will be used primarily to collect and compile quantitative data. The consultant will obtain these data from known sources, including
- government agencies. Various agencies in the Thai government carry out research or compile statistical data that will be useful in conducting the survey. Among these are the National Economic Social & Development Board, the Ministry of Industry, the Business Economics Department (Ministry of Commerce), the Board of Investment, the Customs Department, the Bank of Thailand, Thailand Development Research Institute (TDRI) and the Industrial Finance Corporation of Thailand (IFCT)
 - international agencies such as UNIDO
 - educational institutions Thai universities and technical institutions are frequently useful sources of survey data on industrial markets. For this project, the consultant will conduct literature searches at Thammasat University, Kasetsart University, and the King Mongkut Institute of Technology (KMIT)
 - research departments of commercial banks Three commercial banks --- Bangkok Bank, Thai Farmers Bank and Krung Thai Bank --- carry out industry surveys on a regular basis
 - chambers of commerce Various chambers carry out or compile industry-related studies, including the American Chamber, the Australian-Thai Chamber, the Thai-Israel Chamber, the Thai-Canadian Business Club and the Federation of Thai Industries.
 - commercial offices of foreign embassies.
- 3.5 Although the data base on the Thai economy is reasonably comprehensive, the data are not always accurate. The consultant will need to complete the desk research component of the project first, then crosscheck data in interviews with informed sources and again during the data analysis phase prior to the preparation of the final report
- 3.6 The consultant will prepare quantitative time-series data covering the periods 1986-90 and projected from 1991-1995. All data will be presented in tables, graphs and charts which will be fully detailed and annotated, and designed so that the data can be easily digested by the reader

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INTERVIEWS

- 3.7 Primary interviews with informed sources will be used as the basis for gathering qualitative variables and verifying quantitative data. Should the machine tool manufacturers provide questionnaires, these will be used as the basis of interviews. However, the consultant may add questions that he or she deems germane to the study based upon knowledge of the Thai market and the information gathered in the desk research portion of the survey. Because of the importance of qualitative factors, open-ended questions are useful to encourage respondents to speak freely and to provide relevant information that was not considered at the time of the questionnaire's preparation.
- 3.8 The number of interviews for each study will vary, depending on the quality of information developed during the desk research phase and the quality of interviews as the project moves forward. In total, each survey should require 15 to 20 interviews.
- 3.9 The final report for each survey will follow the basic format set out below.
- 1 Executive Summary
 - 2 Demand
 - 2.1 Consumption levels: Is there a market for the for the machine tool in Thailand?
 - 2.2 Who are the major users? In what segments is the major growth potential?
 - 3 Supply
 - 3.1 Domestic production, import demand and trends.
 - 3.2 Who are the current major suppliers? What are their strengths and weaknesses? Sizes and trends in market shares.
 - 3.3 Distribution Network Who are the major agents/distributors? What is the present distribution chain? What are the accepted markups?
 - 3.4 What prices are being charged? Recommended prices

4 Recommendations for Market Entry

4.1 What costs are involved and what is the time frame required to achieve market entry?

4.2 Who are the potential agents?

4.3 What distribution method is required and why?

4.4 Recommended launch strategy

- recommended product adaptations where required

- best estimates of sales targets and cost of sales budgets

5 Profiles of Potential Agents or Distributors

4 TIMING AND FEES

4.1 The research program for a single product should be completed within three months of commissioning.

4.2 The completion of a single market survey will require the following inputs.

| | |
|---|----------|
| Senior researcher man days (40 days @ US\$260/day) | \$10,400 |
| Travel (2 months @ US\$300/month) | 600 |
| International communication (2 months @ US\$200/month) | 400 |
| Secretarial services (2 months @ US\$400/month) | 800 |
| | ----- |
| Total | \$12,200 |

Thus, the total fees for a single machine tool product are US\$12,200.

APPENDIX XVII

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