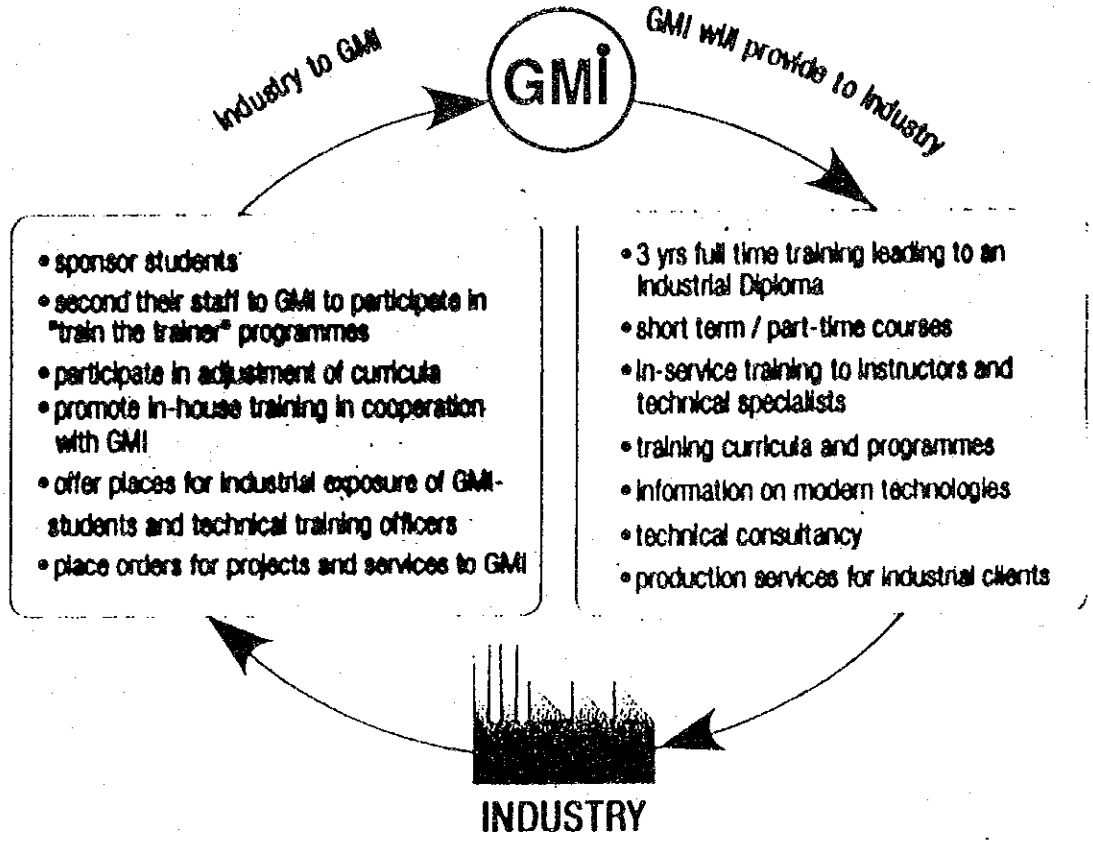
資料３－３

GMI

Co-operation Between GMI and Malaysian Industry



Training for Advanced Technology

資料３－４

PSDC MEMBERS
(as at 30 March 1994)

APPENDIX A

FOUNDER MEMBERS

		TYPE OF INDUSTRIES	ORIGIN
1.	ADVANCED MICRO DEVICES SDN BHD	Semiconductor	USA
2.	AESCULAP SURGICAL INDUSTRIES SDN BHD	Medical Prod.	Germany
3.	APPLIED MAGNETICS (M) SDN BHD	Semiconductor	USA
4.	AUDIO ELECTRONICS SDN BHD	Consumer Elec.	Holland
5.	BAXTER HEALTHCARE S.A.	Medical Prod.	USA
6.	B BRAUN MEDICAL IND SDN BHD	Medical Prod.	Germany
7.	CONNER PERIPHERALS MALAYSIA SDN BHD	Consumer Elec.	USA
8.	EASTRADE ELECTRONICS MALAYSIA SDN BHD	Consumer Elec.	Malaysia
9.	ENG HARDWARE ENGINEERING SDN BHD	Engineering	Malaysia
10.	FASTRON SDN BHD	Consumer Elec.	Germany
11.	GRUNDIG (M) SDN BHD	Consumer Elec.	Germany
12.	HEWLETT-PACKARD (M) SDN BHD	Consumer Elec.	USA
13.	HITACHI SEMICONDUCTOR (M) SDN BHD	Semiconductor	Japan
14.	INSTITUTION OF ENGINEERS MALAYSIA (IEM)	Professional Association	Malaysia
15.	INTEGRATED DEVICE TECHNOLOGY (MALAYSIA) SDN BHD	Semiconductor	USA
16.	INTEL TECHNOLOGY (M) SDN BHD	Semiconductor	USA
17.	INVENTEC ELECTRONICS (M) SDN BHD	Consumer Elec.	Taiwan
18.	KANEBO MALAYSIA SPINNING MILLS SDN BHD	Textile	Japan
19.	LITRONIX MALAYSIA SDN BHD	Consumer Elec.	USA
20.	LOH KIM TEOW ENGINEERING SDN BHD	Engineering	Malaysia
21.	TOWAM SDN BHD	Engineering	Japan
22.	MOTOROLA (M) SDN BHD	Consumer Elec.	USA
23.	NATIONAL SEMICONDUCTOR SDN BHD	Semiconductor	USA
24.	PEN GROUP OF COMPANIES	Textile	Japan
25.	PENANG DEVELOPMENT CORPORATION	State Devt Corp	Malaysia
26.	PENANG SEAGATE INDUSTRIES (M) SDN BHD	Consumer Elec.	USA
27.	PUBLIC PACKAGES SDN BHD	Packaging	Malaysia
28.	ROBERT BOSCH (M) SDN BHD	Consumer Elec.	Germany
29.	SONY ELECTRONICS (M) SDN BHD	Consumer Elec.	Japan
30.	THOMSON ELECTRONIC PARTS (M) SDN BHD	Consumer Elec.	France
31.	OTIS MANUFACTURING COMPANY SDN BHD	Engineering	USA

FULL MEMBERS

		TYPE OF INDUSTRIES	ORIGIN
1.	FMS AUDIO SDN BHD	Consumer Elec.	USA
2.	KESP SDN BHD	Burn-in	Singapore
3.	LEONG BEE & SOO BEE SDN BHD	Engineering	Malaysia
4.	SOUTHERN STEEL BHD	Engineering	Malaysia
5.	PERDA	Government	Malaysia
6.	ASE ELECTRONICS (M) SDN BHD	Semiconductor	Taiwan
7.	MATTEL TOOLS SDN BHD	Engineering	USA
8.	KOMAG USA (M) SDN	Consumer Elec.	USA
9.	READ-RITE MALAYSIA SDN BHD	Disk Drive	USA

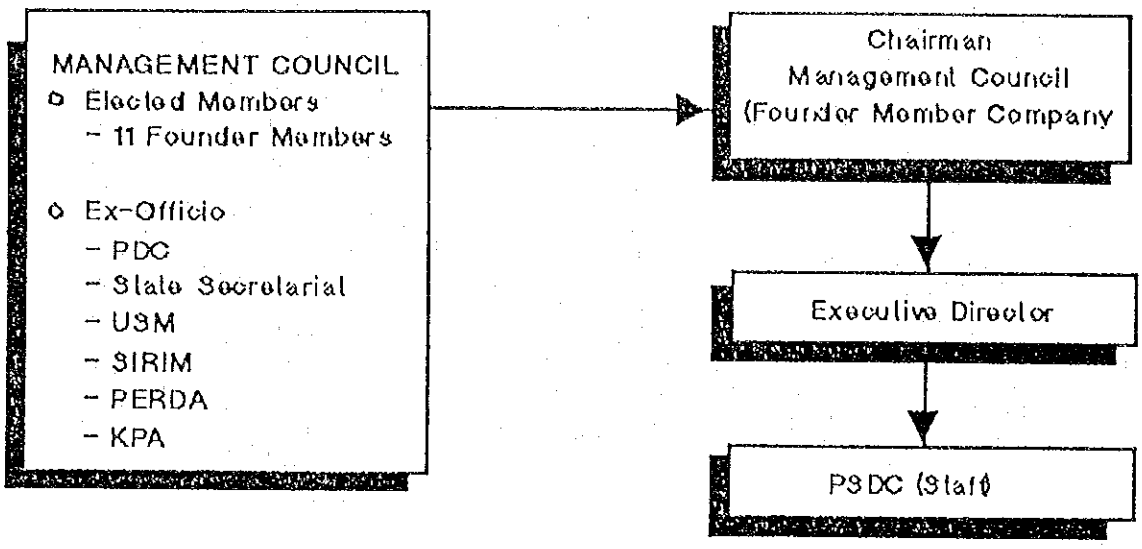
ORDINARY MEMBERS

		TYPE OF INDUSTRIES	ORIGIN
1.	GLOBETRONICS SDN BHD	Semiconductor	Malaysia
2.	DASTEK (M) SDN BHD	Consumer Elec.	USA
3.	KONSORTIUM PERKAPALAN BHD.	Contrainer Transportation	Malaysia
4.	AGRICULTURAL CHEMICALS (M) SDN BHD	Agro-chemical	Japan
5.	PRODELCON SDN BHD	Engineering	Malaysia
6.	SANDA PLASTICS INDUSTRIES SDN BHD	Plastics	Malaysia
7.	ACER TECHNOLOGIES SDN BHD	Electronics	Taiwan
8.	CRYSTAL PRECISION (M) SDN BHD	PCB Assembly	Japan
9.	INDUSTRI PESAWAT JAYA SDN BHD	Engineering	Malaysia
10.	ZF STEERINGS (M) SDN BHD	Engineering	Germany
11.	SOLECTRON TECHNOLOGY SDN BHD	PCB Assembly	USA
12.	KOBE PRECISION TECHNOLOGY SDN BHD	Consumer Elec	Japan
13.	TARGET IMPACT SDN BHD	IT Services	Malaysia
14.	QUANTUM PERIPHERALS (M) SDN BHD	Peripherals	USA
15.	BAKTI COMINTEL MANUFACTURING SDN BHD	Electronics	Malaysia
16.	UNICO ELECTRONICS (PG) SDN BHD	Printed Circuit Boards	Malaysia

PSDC Update
30 March 1994

資料３－５

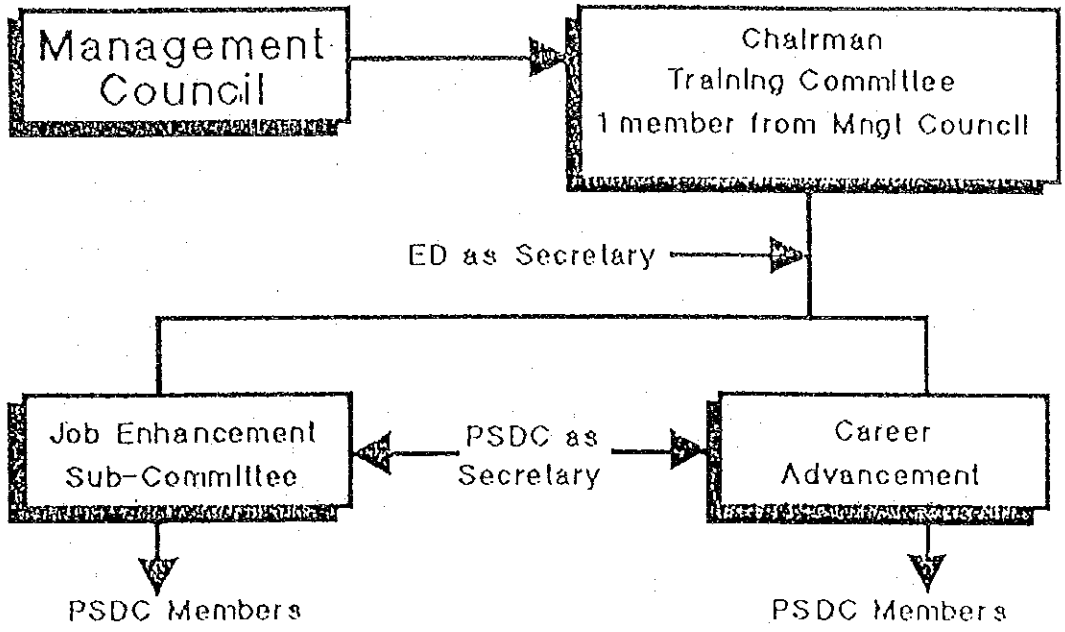
Figure 1 : Management Structure



PSDC UPDATE/Page

資料 3 － 6

Figure 2 : Training Committee Structure



資料３－７

SUPPORT FOR THE PSDC

The PSDC has been able to secure industry support in terms of courses, equipment, cash grants and donations from its members as well as other well wishers.

It is the strategy of the PSDC to go into strategic alliance with other training institutions and equipment vendors to organise training courses to benefit the manufacturing sector.

To encourage more well wishers to come forward to assist the PSDC, it is imperative that the Internal Revenue Department, Malaysia approves tax exemption for the PSDC under Section 44(6) Income Tax Act 1967.

To date the PSDC has received donations and loan of equipment from various organisations.

Government Sector		
- State Grant	$ 420,000	
- Subsidised rental by PDC	$ 462,000	
- Secondment of PDC Officer (1 year)	$ 27,600	
	$ 909,600	17.6%
Private Sector		
- Outright donation	$2,676,753	52.0%
- Loan of Equipment	$1,569,000	30.4%
	$4,245,753	83.3%
GRAND TOTAL	$5,155,353	100.0%

資料3 － 8

FMM ESDC TRAINING SCHEDUL

July 6

Gas Turbine Cogeneration System
To provide an overview of energy technologies and introduce cogeneration system which utilizes natural gas. The feasibility and application of cogeneration in various industries will be discussed.
Trainer – Dr Yukio Otsuki

July 6 – Nov 11 (Evening classes)

Certificate in Supervisory Management For Industries
To upgrade skills of supervisors in understanding group behaviour, conflict management, organisational skills, grievance handling, counselling, safety and health, job designing and enrichment, preparing work schedule, implementing quality related actions etc.
Trainer – Mr Tan Kwang How

July 7 – 8

Quality Manual and Procedure Writing
To provide training in writing work procedures and the preparation of a Quality Manual to meet the requirement of MS/ISO 9000. It comprises a series of practical instruction sessions and group works which are supported by detailed examples of procedures and work instructions etc.
Trainer – Mr Philip Tonge

July 12 – 15

Low Cost Automation 1 – Introduction To Pneumatics
To provide participants with a basic knowledge of the construction and function of pneumatic element, as well as an understanding of fundamental controls and circuits.
Trainer – Mr Jivan Bahva

July 16 – 17

Air Conditioning and Refrigeration Technology – Design and Load Analysis
To provide a basic understanding of air conditioning principles and calculation of the cooling load as well as some form of designing for air conditioning and refrigeration system.
Trainer – Dr Ling Foon Fatt

July 28 – 29

Practical Quality Auditing
To concentrate on the practical aspects of auditing the documentation of processes and is structured on the ISO 9000 Quality Management System.
Trainer – Mr Philip Tonge

Aug 2 – 6

5 Star Health and Safety Management System
To examine the existing health and safety programme in an organisation and to learn the audit techniques as well as establishing management controls on the heaith and safety system.
Trainer – Dr Bill Pomfret

Aug 3 – 4

Statistical Process Control Techniques
To concentrate on making data and its analysis understandable to non-mathematicians. It demonstrates the power of basic techniques to assist with both problem solving and process control.
Trainer – Mr Philip Tonge

Aug 5 – 6

New Development in the Soldering Process
Emphasize on hand soldering technology such as solder joint and manual soldering processes as well as examining wave soldering machine and handy solder bar feeder designs. Techniques for trouble shooting of soldering process will also be discussed.
Trainer – Mr Michael W K Siew

Aug 9 – 10

Materials Planning and Control
To examine various aspects of managing materials requirements and to design a systematic approach in order to prevent down times caused by material shortage and other delay factors. It also include planning and forecasting materials in terms of achieving economic and operational efficiency.
Trainer – Mr Ong Geok Quee

Aug 14 – 21

Entrepreneur Development Programme
To inculcate entrepreneurial traits amongst Malaysians. An overview of types of potential industries, business planning and other functional aspects of managing a manufacturing business will be provided.
Trainers – Practitioners, entrepreneurs, academicians, government officials, consultants etc.

Aug 16 – 19

Low Cost Automation 4 – Introduction to Electro-Pneumatics
To provide a knowledge of electrical components as well as developing participants' ability to design and construct simple electro-pneumatic controls.
Trainer – Mr Jivan Bahva

* *FMM ESDC is registered with the Human Resources Development Council as a Training Provider.*

** *The Federation of Malaysian Manufacturers (FMM) reserves the right to cancel or reschedule any of the above programmes and all efforts will be taken to inform participants of the changes.*

*** *More programmes would be added to this calendar from time to time. Please look out for our individual brochures.*

FROM JULY TO DECEMBER 1993

Aug 23 – 26 **Low Cost Automation 2 – Maintenance of Pneumatic Equipment and System**
To provide participants with a wider knowledge of components subject to wear and the possible sources of faults in complex pneumatic circuits and to raise the value of the product without prejudice to Quality.
Trainer – Mr Jivan Bahva

Aug 26 **Quality Costs and Its Impact on Profits**
To provide an understanding of the effective implementation of a Quality Cost Saving Project, analysing costs which can be reduced and correcting adverse trends.
Trainer – Mr Philip Tonge

Aug 27 – 28 **Air Conditioning and Refrigeration Technology – Psychrometry**
To introduce the properties of moist air and heat factor as well as examining the process lines on the psychrometric chart, especially looking at design calculations.
Trainer – Dr Ling Foon Fatt

Sept 1 – Apr 15, 1994 (Evening classes) **Certificate in Training and Development (UK)** ✓
Provide knowledge and skills necessary to carry out a wide range of professional training duties such as identifying training needs, planning and administration of training, training techniques and evaluation of training effectiveness.
Trainers – Mr K C See and Mr Michael Chua

Sept 2 – 3 **Effective Report Writing Skills**
To teach participants to sharpen their writing skills through identification of common problems in report writing and understanding the principles of effective writing.
Trainer – Mr Alistair King

Sept 6 – 9 **Certificate in Purchasing**
To examine the fundamental areas of practical management techniques and skills in purchasing and to improve purchasing functions in meeting corporate objectives.
Trainer – Mr Ong Geok Quee

Sept 17, 18 & 24 **Principles of Air Conditioning and Refrigeration**
To study the basic principles in the functioning of air conditioners and refrigerators. It includes looking at the characteristics and properties of refrigerants as well as examining the relation between temperature and enthalpy.
Trainer – Dr Ling Foon Fatt

Especially for the attention of:

- Chief Executive Officers
- Human Resources Managers
- Training Managers
- Personnel Managers
- Executives etc.

Sept 20 – 23 **Low Cost Automation 6 – Introduction to Programmable Logic Controller (PLC)**
A course on the construction and operation of programmable logic control, writing of simple programmes and operating control systems.
Trainer – Mr Jivan Bahva

Sept 22 – 23 **Quality Manual and Procedure Writing**
To provide training in writing work procedures and the preparation of a Quality Manual to meet the requirement of MS/ISO 9000. It comprises a series of practical instruction sessions and group works which are supported by detailed examples of procedures and work instructions.
Trainer – Mr Philip Tonge

Oct 7 – 8 **Practical Quality Auditing**
To concentrate on the practical aspects of auditing the documentation of processes and is structured on the ISO 9000 Quality Management System.
Trainer – Mr Philip Tonge

Oct 11 – 14 **Low Cost Automation 8 – Introduction to Hydraulics**
To provide participants with the fundamental and important physical principles of hydraulics. It also acquaint them with hydraulic elements commonly used in the industry.
Trainer – Mr Jivan Bahva

Oct 15 – 16 **Air Conditioning and Refrigeration Technology – Air Expansion Valves**
This intermediate course on air conditioning and refrigeration focuses on the various types of expansion valves, capillary tubes and evaporators as well as examining the different sorts of liquid and gas charge in expansion valves.
Trainer – Dr Ling Foon Fatt

Head Office

17th Floor, Wisma Sime Darby
Jalan Raja Laut
50350 Kuala Lumpur
P O Box 12194
50770 Kuala Lumpur
Tel: 03-2931244
Fax: 03-2935105/2681

Branch Offices

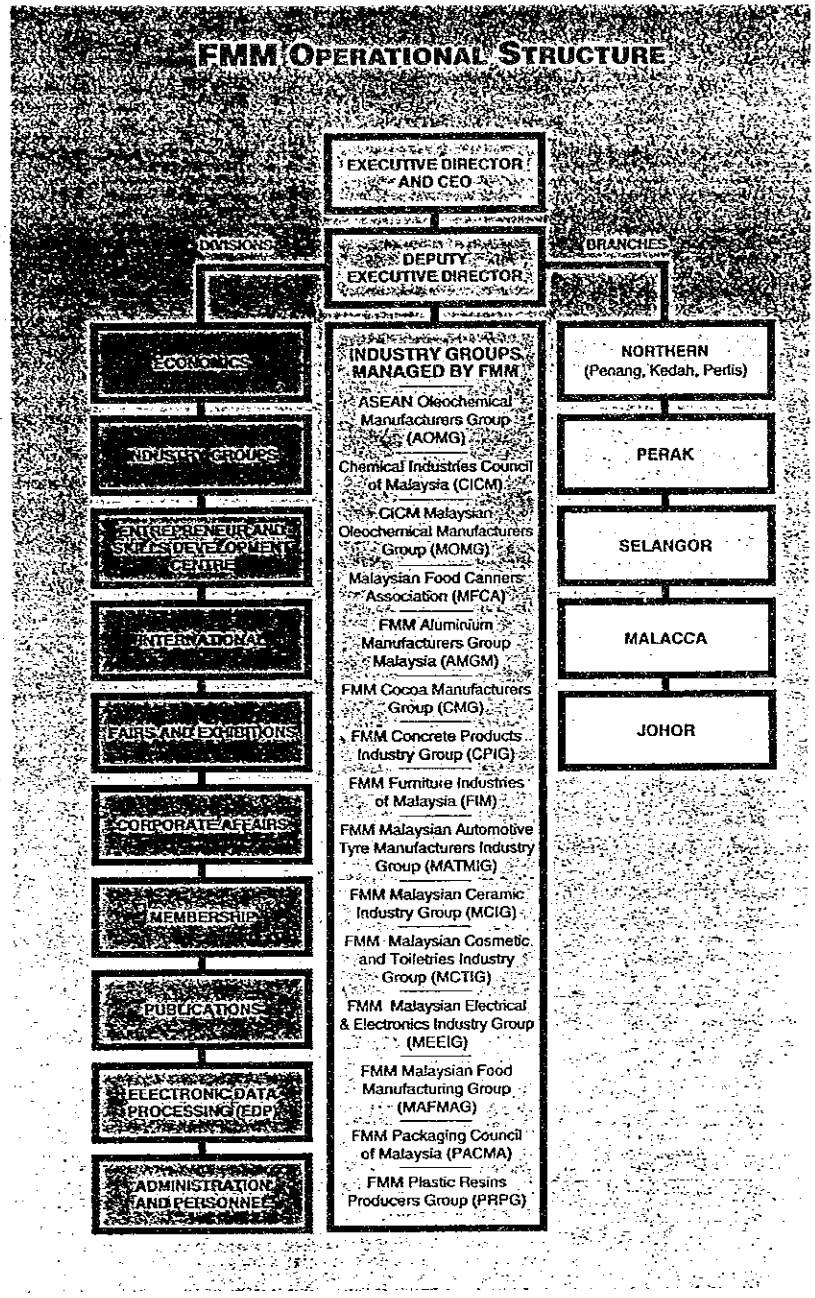
Northern Branch
No 23, Tingkat Kikik 7
Taman Inderawasih, 13600 Prai
P O Box 81, 12710 Butterworth
Penang
Tel: 04-392057, 394901, 397805
Fax: 04-394863

Perak Branch
No 130, Jalan Kampar
P O Box 290, 30730 Ipoh
Perak Darul Ridzuan
Tel: 05-512311 Fax: 05-541222

Selangor Branch
3rd Floor, Electrolux Building
Lot 2C, Jalan Keluli, Section 15
Kawasan Perindustrian Shah Alam
40200 Shah Alam
Selangor Darul Ehsan
Tel: 03-5508069 Fax: 03-5508533

Malacca Branch
164/3, 3rd Floor
Kompleks Munshi Abdullah
Jalan Munshi Abdullah
75100 Melaka
Tel: 06-231639 Fax: 06-238090

Johor Branch
FMM House
19A, Jalan Bukit Chagar
80300 Johor Bahru
Johor Darul Takzim
Tel: 07-236131 Fax: 07-245098



For more enquiries on FMM's services or how you can be a member to enjoy the benefits just call the **Membership Division, 03-2931244**

PERSEKUTUAN PEKILANG-PEKILANG MALAYSIA
FEDERATION OF MALAYSIAN MANUFACTURERS
Leadership and Service

In conjunction with the FMM's 25th Anniversary Celebration, entrance fees for all new applications admitted from July 2, 1993 to June 30, 1994 will be waived

④　日本－マレイシア技術学院設立に係る正式要請書
（1993年５月20日付マレイシア経済企画庁
ＥＰＵ発在マレイシア日本大使館宛文書）

UNIT PERANCANG EKONOMI
Economic Planning Unit
JABATAN PERDANA MENTERI
Prime Minister's Department
JALAN DATO' ONN
50502 KUALA LUMPUR
MALAYSIA

Telefon: 2300133/2933333
Cable: ECONOMICS
Telex: EPUPM MA 30098
Fax: 2914268

往電第871号別FAX信

Ruj. Tuan:
Your Ref:

Ruj. Kami: (61)dlm.UPE 40/240/168
Our Ref:

Tarikh:
Date: 20 May 1993

BY HAND

Mr. K. Katakami,
Head of Economic Section,
Embassy of Japan,
No. 11 Persiaran Stonor,
50450 KUALA LUMPUR.

Dear Sir,

Proposal for the Establishment of a
Japan-Malaysia Technical Institute (JMTI)

With reference to the above-mentioned matter, you will recall that during the discussions between Japanese High-level Mission and Malaysian officials from 17 to 19 March 1993 on the future frame-work of Japan-Malaysia Economic and Technical Cooperation, the priority areas identified were environmental management, poverty eradication and regional revitalization, development of human resources and promotion of small and medium scale industries (SMIs).

2. Human resources development has become an important aspect of Malaysia's development plans. This development should especially be seen in the context of where the demand for skilled workers is more than the supply. In view of this, we would be most grateful if technical assistance could be provided by the Japanese Government to undertake a study to work out the details of the proposal for the establishment of a Japan-Malaysia Technical Institute (JMTI). Attached herewith is a concept paper of the project for your further action.

3.. Your kind cooperation on the matter will be greatly appreciated.

Thank you.

Yours faithfully,

(K. THILLAINADARAJAN)
for Director General
Economic Planning Unit

c.c. Resident Representative
JICA Malaysia Office
Suite 18.1W, 18th Floor
Wisma Sime Darby
Jalan Raja Laut
50350 KUALA LUMPUR

/ha/sesn2

Proposal for the Establishment of a Japan-Malaysia Technical Institute (JMTI)

1. Introduction

The objective of this paper is to present a proposal for the establishment of a Japan-Malaysia Technical Institute (JMTI) with Japanese assistance and expertise. The organization and structure of the proposed Institute could be modelled along the lines of the German-Malaysian Institute, though the areas of training may be different.

This proposal was discussed during the meeting with the ODA mission of senior Japanese officials on 18 March 1993. The Malaysian government is submitting this proposal as a priority project for technical assistance under the Japanese ODA. Initially immediate technical assistance will be needed to undertake a study to work out details of the proposed project.

2. Background

The rapid expansion of the economy led by the service and manufacturing sectors as well as the accompanying industrial restructuring have significantly increased capital intensity and the level of technology. This has resulted in changing the profile of skills required, thereby placing heavy demands on the skill delivery system to meet the demand for industrial manpower in all sectors of the economy. In the next decade these two sectors will provide the impetus for the annual growth target of 7 per cent. Rapid industrialization is expected to continue into the next decade with accompanying technological changes in production processes and changing skill requirements.

The demand for industrial manpower is currently for engineers and technicians especially in the areas of mechanical, electronic, electrical and production engineering, followed by some categories of skilled production and

process workers. Due to the rapid growth of the economy the demand for these industrial skills has outstripped the supply from both public and private educational and training institutions.

The shortage of these skills, especially of technicians and skilled workers at the supervisory level has become a major policy concern. Concerted efforts are being made to increase supply as the demand for industrial skills is not only at the basic and intermediate Sijil Kemahiran Malaysia (SKM), but also at the advanced SKM and professional levels. As factories and industries are constantly introducing modern machinery and manufacturing processes, skilled workers need to be retrained in advanced skills so that they can operate efficiently in an environment of advanced and modern technology. Highly skilled technicians and supervisors trained in advanced skills are also urgently needed as industries moved into high-technology areas. With the expansion of vocational education and training in both public and private sectors, there is also demand for technical and industrial lecturers and instructors trained in advanced and modern technologies.

Currently the training in public training institutions is concentrated on skills training at the basic and intermediate SKM levels. There are 24 industrial training institutes of which 10 are industrial training institutes under the Manpower Department, 9 are Institute Kemahiran MARA and 5 youth training centres under the Ministry of Youth and Sports, conducting such training. In contrast there are only 3 institutions conducting skill training at the advanced level and they are the Centre for Instructors and Advanced Skill Training (CIAST), Advanced Skill Training Centre (ASTC), Sepang, the German-Malaysian Institute (GMI).

ASTC, Sepang produced its first output of 100 trainees in mid 1992 while the GMI's first output of 100 technicians will complete their courses in 1994.

Among these three institutions, CIAST, established with Japanese technical assistance in 1984 was the Malaysian government's first attempt to

provide advanced skills level training. Since its inception a total of about 8,000 participants had attended its courses in automotive mechanics, machine operation and die-making, welding and metal fabrication, foundry and casting, plastic moulding, and electrical and electronic controls. In practice CIAST conducts mainly short modular courses of 3 days to 3 weeks duration aimed at skills upgrading of the professional and supervisory groups, and instructors in specialized technical areas, besides the 6-months pedagogy courses for instructors. An average of 1000 participants attend CIAST's courses annually. CIAST therefore do not produce technicians or offer long-term courses, similar to the ASTC and GMI.

In addition to this, the number of candidates who have sat and passed the advanced SKM during the last ten years had been discouraging. During 1980-1990, an average of 45 candidates sat for the advanced level examination but only about 12 candidates managed to pass the examination. In 1991 a larger number of 172 candidates sat for the examination and 60 of them passed.

3. Need for Establishment of a Japan-Malaysia Technical Institute

It can be seen that there are only a few institutions conducting advanced skill level training, and the number of trainees with advanced SKM are also not significant. The majority of multinational corporation (MNCs) operating in Malaysia are moving rapidly into automation and 'leading edge' technologies. To sustain and support these industries, training and retraining of the workforce in advanced technologies is necessary. It is with this in mind that the German-Malaysian Institute (GMI) was set up to produce highly skilled technicians and provide consultancy and advanced production services in German technologies. Since the number of MNCs with Japanese investment are quite substantial it is timely to propose the establishment of a Japan-Malaysia Technical Institute which will conduct skill training at the advanced level in Japanese technologies so that technicians specialized in Japanese technologies are available to meet industry needs.

The proposal for JMTI is logical as Japanese firms dominate the Malaysian industrial scene. Since 1981 Japan has become one of Malaysia's largest foreign investors. At the end of the first quarter of 1992 there were 846 Japanese-related companies operating in this country employing about 10 per cent of the country's manufacturing workforce. During the period 1980-1991, out of the 838 projects approved by MIDA, 314 were wholly Japanese-owned, 193 Japanese majority-owned, 312 Malaysian majority-owned and 19 were joint-ventures on a 50/50 basis. Japanese equity was predominant in 10 industrial sub-sectors, namely scientific and measuring equipment (99.8%), electric and electronics (89.8%), machine manufacturing (81.5%), textile and textile products (79.6%), leather and leather products (78.3 %), rubber products (68.2%), plastic products (67.4%), furniture and fixtures (64.7%), fabricated metal products (59.5%) and non-metallic products (57.7%). In contrast Malaysian equity predominated in only 4 industries: petroleum and coal (60.1%), food manufacturing (57.4%), transport equipment (55.7%) and basic metal products. The dominance of Japanese firms in Malaysian industries is also reflected in the Kuala Lumpur Stock Exchange (KLSE). As at the end of 1991, there were 18 companies with 5 per cent or more Japanese interests. If companies with less than 5 per cent Japanese interests are included, there are 23 Japanese-related companies listed on the KLSE.

Against this backdrop of extensive Japanese business investment and interests in Malaysia, it is inevitable that the development of a strong base of knowledge and skills in Japanese technologies is critical for industrial growth. Technology transfer effected through training is one of the ways to strengthen the knowledge and skills base, and the setting up of a Japan-Malaysia Technical Institute will be one of the most effective means for technology transfer and technology development.

In order to ensure that the training programme for skilled manpower is relevant and responsive to labour market needs the participation of industry is essential. This can be effected through collaboration with MNCs and foreign governments, similar to that being undertaken in Singapore. A number of specialist training centres with the cooperation and support of MNCs and

governments of Germany, France and Japan have been established since mid-1970 in Singapore (Please see Appendix 1 for details). These centres are staffed by highly experienced expatriate and local instructors to give hands-on training under the philosophy of 'teaching factories' -- a training environment that closely simulates working conditions in real factories. The emphasis in training in these centres is on precision engineering(tool and die-making and precision engineering), automation and related technologies. To remain competitive it is important for Malaysia to set up similar training centres specializing in key technologies with the collaboration of industrialized countries and MNCs. Malaysia has only set up the GMI in 1992 and the planning for the French-Malaysia Institute is in progress.

The proposed JMTI which is expected to produce technicians trained in Japanese technologies will be beneficial to industries which have Japanese interests and use Japanese technologies. Industries with Japanese-related interest will be able to source the supply of skilled technicians from this Institute. As the Institute will not be concentrating on providing training in technical skills but also the development of good work ethics such as discipline, diligence, efficiency and loyalty, typical of the Japanese workforce the technicians trained in this Institute will most probably be acceptable to Japanese industries. In addition to this, the Institute may be able to provide training facilities to Japanese industries which have been sending their employees for training in Japan.

4. Project Description

It is proposed that the JMTI will be established as a cooperative project between Governments of Japan and Malaysia. While the Government of Malaysia will provide the land and the infrastructure, the Japanese government will provide the equipment and expertise for training and initial management of the Institute. The Institute will be set up as a corporate body, similar to that of the German-Malaysian Institute which is a Company Limited by Guarantee.

Japanese MNCs will be encouraged to participate in the management of the Institute through representation in the management board.

The Institute will conduct courses of 2-years duration for SPM level school leavers from the Science stream. Students will be charged course fees. These school leavers will have completed 11 years of primary and secondary level schooling. (Please refer to Charts 1 and 2 for the Malaysian education system). At the end of the 2-years course the student will be awarded an industrial technician certificate, which is expected to be of a higher level than the advanced Sijil Kemahiran Malaysia awarded by the National Vocational Council. However details of the level of training and certification can be detailed out in the proposed project study.

The proposed Institute will concentrate on pre-employment training aimed at supplying technicians to the labour market. Its emphasis on training will therefore differ from that of CIAST which conducts primarily courses for skills upgrading and pedagogical courses for trainees to become instructors.

The Institute will not only be a centre for training highly skilled technicians. It will also act as a technology centre in the field of manufacturing on Japanese technologies through the provision of consultancy services. Areas in which the JMTI will concentrate are as follows:-

- Mechatronics Engineering
- Industrial Electronics Engineering
- Instrumentation and Control Engineering

Proposed details of courses to be conducted under these areas in the JMTI are in Appendix 2.

The Institute should be located within the industrial zones and possibly near institutions of higher learning to tap industrial and academic expertise and resources for teaching and training. A possible location could be the Kulim Technology Park as it could serve the northern industrial zone and enjoy

the advantages arising from the close proximity of Universti Utara Malaysia and Universiti Sains Malaysia.

Currently industrial training is under the purview of a few ministries. It is proposed that the JMTI be placed under the Ministry of Human Resources for implementation.

5. Manpower Implications

The Institute will require Japanese experts to manage the Institute and conduct courses in technical areas during the initial stage of the project. Since the Institute will be set up under Japanese technical assistance the Government of Japan may be able to provide the experts. Malaysian counterparts from public education and training institutes will be assigned to learn and work with the foreign and industrial experts. In addition to these, short-term experts from Japanese industries in Japan and MNCs in Malaysia may be used to supplement the long-term experts. Malaysian instructors and engineers who have been trained in Japan can also be recruited to be instructors in the Institute.

6. Benefits and Justification

During the Sixth Malaysia Plan (1991-1995) employment in the manufacturing sector is expected to grow at 5.7 per cent per annum to reach 1.7 million by 1995. The sector is expected to generate about 408,900 jobs or about one-third of the total new employment in the economy. With the increasingly advanced technologies which will be utilized in industry, about 4,200 engineers and 10,600 technicians are expected to be required by selected manufacturing subsectors. These selected subsectors contribute to about half of the total manufacturing employment, thus, reflecting a high demand for engineers and technicians. From the total requirement of engineers and technicians about 2,500 engineers and 9,200 technicians will be needed in the mechanical and electrical and electronic fields. In addition, about 93,600 specialized skilled labour (estimated at the ratio of engineers/technicians to production and process workers

of 1:8) will also be required by the various industries. There will be an increasing need for trained manpower that can take advantage of new emerging manufacturing technologies as industries upgrade and modernize their operations to remain competitive. Therefore, training for technical and superyisory staff, particularly technicians and skilled workers will have to be accelerated so that shortages of skills will not pose a major bottleneck to the growth and modernization of the industrial sector.

Despite the demand for skills only a few of the public training institutions conduct training at advanced SKM and technician levels. The establishment of the Institute will enable expertise from Japanese industries to be used in training Malaysian workers. A new breed of technicians able to set up, operate, maintain and trouble-shoot highly sophisticated equipment and machinery is expected to be produced by the proposed JMTI.

As the JMTI will be set up as a limited company, public funding will initially be for grants for infrastructural development and start-up operation activities. The Institute will eventually become self-sustaining as the students will be paying course fees and it can also earn revenue by conducting modular and customized courses and consultancies for industries. With the operation of the Human Resource Development Fund (HRDF) demand for advanced skill training aimed at skill upgrading of existing employees is expected to increase substantially. The JMTI will therefore act as a conduit for training by industries using the HRDF.

7. Cost

The amount of funding required for setting up the JMTI could be roughly estimated based on the costing of the German-Malaysia Institute and the planned French-Malaysia Institute. The total cost of the GMI is about RM45 million. While the German Government's contributions are in the form of expertise and equipment, the contributions from the Malaysian Government are in the form of land, building, equipment and local staff.

The proposed French-Malaysia Institute (FMI) is estimated to be about RM70 million. The French Government will be providing a soft loan for the financing of the FMI.

The total cost for the proposed JMTI therefore could be about RM50 - 70 million based on that for the GMI and FMI.

8. Foreign Assistance Requirement

The types of foreign assistance required are expected to be as follows:-

a) expertise to manage the Institute and conduct courses
b) equipment
c) training for Malaysian counterparts

Immediate technical assistance is required to conduct a study to detail out the project document. Some of the major elements proposed to be included in the document are as follows:-

a) organization structure.
b) course and curriculum profiles.
c) physical infrastructure and training facilities requirements.
d) staff requirements, recruitment and training schedules for local instructors.
e) financing requirements.
f) foreign expertise requirements.
g) implementation schedule.

9. Proposed Implementation Schedule

It is proposed that the study should commence in 1993 and the project document be completed by early 1994. Discussions between the Malaysian and Japanese governments could begin immediately after completion of the project document in 1994. We envisage the implementation of the project proceed to commence by 1995/96 and the institute could have its first intake in the early part of the Seventh Malaysia Plan Period (1996-2000).

10. Conclusion

The proposal in this paper is conceptual and a feasibility study may be necessary to concretize the proposal. The Malaysian Government would like to request for immediate technical assistance for the study. The proposed Terms of Reference for the study is as shown in Appendix 3.

Seksyen Sumber Tenaga Manusia
15 April 1993.

SINGAPORE (ECONOMIC DEVELOPMENT BOARD)'S TRAINING INSTITUTES

Singapore through its Economic Development Board has set up the following training institutes in collaboration with MNCs and foreign governments:-

A. Craftsman Training Centres (courses for craftsman certificates)

1. Tata-Government Training Centre --- set up with India's Tata/Telco

2. Brown Boveri-Government Training Centre --- set up with West Germany's Brown Boveri Cie

3. Philips-Government Training Centre --- with the Netherlands' Philips

B. Institutes of Technology
(GSI & FSI: Diploma Courses
JSTI: Industrial Technician Certificate Courses)

1. German-Singapore Institute (set up with German Government)

Areas of training

Production technology and advanced manufacturing processes (including application training in computer-aided design and manufacture [CAD/CAM], robotics and CNC).

2. French-Singapore Institute (with French Government)

Areas of training

Electronics engineering, micro-processor and computer applications, control engineering, industrial automation, machine vision and CAE (computer-aided engineering/CAD/CAM).

3. Japan-Singapore Technical Institute (with Japanese Government)

Areas of training

Maintenance skills in mechatronics and industrial electronic engineering for highly-automated computer-controlled production processes.

Seksyen Sumber Tenaga Manusia
2 Mac 1993

y/Singapor

PROPOSED COURSES FOR THE JAPAN-MALAYSA TECHNICAL INSTITUTE

The courses for the first year will be directed towards providing a good foundation in engineering concepts and principles in both mechanical and electronic engineering fields.

In the second year the students will specialize in mechatronics engineering and industrial electronics and instrumentation and control. Topics to be taught under the different fields are as follows:-

Mechatronics Engineering:
automation & controls, industrial automation peripheral design, pneumatics/hydraulics, robotics, computer numerical control technology, mechatronics maintenance, workshop technology and practice.

Industrial Electronics Engineering:
industrial studies, motion control, computer interface and control, digital electronics, microprocessors, automation & control, and computer programming, FA-tronics maintenance.

Instrumentation and control engineering:
workshop technology and practice process instrumentation, micro processors, process measurements; control principles, industrial instruments, and digital control systems.

PROPOSED TERMS OF REFERENCE

FEASIBILITY STUDY FOR THE ESTABLISHMENT OF A JAPAN-MALAYSIA TECHNICAL INSTITUTE (JMTI)

The Malaysia Government would like to request for immediate technical assistance for a Feasibility Study with regard to the establishment of a Japan-Malaysia Technical Institute (JMTI).

The feasibility study are to undertake the following:-

(a) Prepare a project document for the establishment of the Japan-Malaysia Technical Institute (JMTI) with Japanese Technical Assistance.

(b) Propose the organizational and management structure of the proposed JMTI.

(c) Identify the size, training capacity and courses to be offered as well as to develop curriculum profiles.

(d) Prepare a preliminary plan for the physical infrastructure and training facilities requirements.

(e) Determine staff requirements (Japanese and local) and the recruitment and training schedule .

(f) Determine costing and financing requirements.

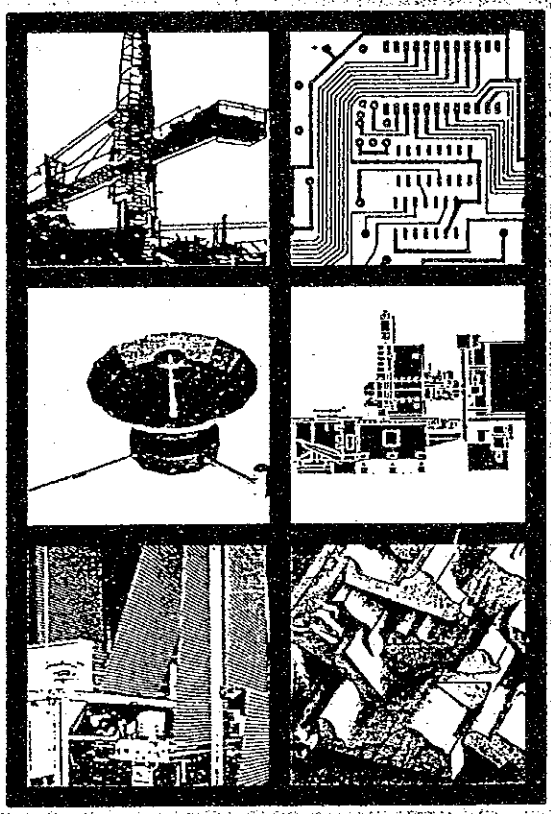
(g) Specify the types and extent of Japanese assistance and collaboration in the project.

(i) Determine the implementation schedule for the project.

⑤ “Report of the Cabinet Committee on Training”
（「訓練に関する内閣委員会報告書」）

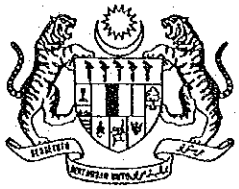
Report of

THE CABINET COMMITTEE ON TRAINING



TRAINING FOR INDUSTRIAL DEVELOPMENT

CHALLENGES FOR THE NINETIES



MALAYSIA

REPORT OF THE CABINET COMMITTEE ON TRAINING

TRAINING FOR INDUSTRIAL DEVELOPMENT
– *CHALLENGES FOR THE NINETIES*

Economic Planning Unit
Prime Minister's Department

Ministry of Education
Malaysia

1991

MINISTER OF EDUCATION MALAYSIA

FOREWORD

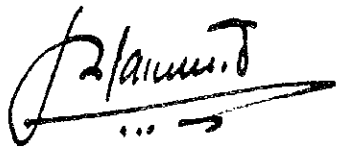
The sustained growth of the Malaysian economy depends on our industries achieving and maintaining high productivity and competitiveness. To a large extent, industrial productivity relies upon skilled human resource and technology. Without the educated, skilled and motivated labour force which could take advantage of modern technology, productivity will suffer and the country's ability to compete in a global economy will be undermined.

This report by the Cabinet Committee on Training was prepared as a result of increasing skill shortages in the country. This situation arose as a direct consequence of rapid economic growth which was propelled by the expanding manufacturing sector in recent years. Futhermore, the Government recognised that efficient training, re-training and upgrading of the current workforce should be given due attention since they are of crucial importance in industrial restructuring and generating economic dynamism in the country.

An important recommendation of the report is that the current skill delivery system will have to be significantly improved. This is to ensure that skill shortages will not pose as a serious bottleneck to future industrialisation. The existing skill training system should undergo some basic changes for it to be more dynamic. Among others the provision of training should be more sensitive to market needs, with much greater participation from the private sector in training. The private sector is urged

to come forward and support the new initiatives to revitalise the training system. It should play a bigger role in training by setting up more training programmes in specific skills, as well as participating in consultancy work and the design and development of practical training programmes. The revitalisation of the training system is crucial in meeting the heavy demand for skills anticipated for the nineties, as well as paving the way for Malaysia to become a developed country by the year 2020.

This report is prepared with the close collaboration between the Government, the private sector, and academia. Accordingly, it has brought together, and benefited from, the experiences and expertise of various government agencies, training institutions, employers, workers and academicians. I would like to take this opportunity to record the deep appreciation of the Government to all those who have rendered their views and given assistance in the preparation of the report.



(DATUK DR. SULAIMAN BIN HAJI DAUD)

29 May 1991

CONTENTS

APPENDICES

MEMBERS OF THE CABINET COMMITTEE ON TRAINING

Chairman
Minister of Education
Y.B. Dato' Seri Anwar Ibrahim
(March 21, 1990 - March 14, 1991)

Y.B. Dato' Dr Sulaiman Hj. Daud
(March 15, 1991 to present)

Members

Minister of Science, Technology and Environment
Y.B. Encik Law Hieng Ding
(October 27, 1990 - to present)

Minister of Human Resources
Y.B. Dato' Lim Ah Lek

Minister of Youth and Sports
Y.B. Dato' Seri Mohd. Najib Tun Abdul Razak
(March 21, 1990 - October 27, 1990)

Y.B. Encik Annuar Musa
(October 27, 1990 - to present)

Minister of Works
Y.B. Datuk Leo Moggie anak Irok

Director General, Economic Planning Unit
Y.Bhg. Dato' Mohd. Sheriff Mohd. Kassim
Chairman, Coordinating Committee

Director of Technical and Vocational Education
Y.Bhg. Dato' Mohd. Hussein bin Ahmad - Secretary

REPORT OF THE CABINET COMMITTEE ON TRAINING

TRAINING FOR INDUSTRIAL DEVELOPMENT – *CHALLENGES FOR THE NINETIES*

1. BACKGROUND

Efficient training of the current and future workforce is critical for industrial development and sustained economic growth of the country. The Report of the Cabinet Committee on Training is, therefore, our response to meet this training imperative. It outlines a comprehensive programme of policy reforms in our skill delivery system so that training institutions can respond more effectively to changing patterns of employment demand.

This report was prepared following the decision of the Cabinet to assess the industrial manpower requirements and skill training as well as make relevant recommendations for policy reforms. The Cabinet Committee on Training was requested to undertake the following activities:-

1) to collect and compile detailed information on the types of skills required in six industries, *viz.* electric and electronic, textile, construction, manufacturing, information technology and wood-based industries;

2) to conduct a comprehensive assessment relating to the shortage of skilled manpower, especially in the private sector, as well as to provide a trend analysis on the skill requirements; and

3) to present specific recommendations to overcome the problem of the shortage of skilled manpower.

2. SCOPE AND METHODOLOGY

The Cabinet Committee on Training was established on March 21, 1990 under the Chairmanship of the Minister of Education. The Cabinet Committee was, in turn, assisted by six Working Groups, which comprised members from the private sector, the public sector, professional groups and academicians (**Appendix I**). The Working Groups focused on the industrial structure, as well as skill profile and shortages of six industries where rapid growth was anticipated in the next five years. The industries were construction, electric and electronics, information technology, textile, wood-based industry, and five selected manufacturing subsectors (ceramics, chemical, machinery and engineering, foundry and plastic.) In addition, the Working Groups examined the effectiveness and adequacy of the training provided by the public and private sectors in supplying skilled manpower. (Please see **Appendix II** for a list of programmes and courses.) The Director General of the Economic Planning Unit (EPU), Prime Minister's Department was assigned to coordinate the activities of the six Working Groups.

The reports of the Working Groups were prepared using existing data, on-going research and studies of government agencies, and information provided by the industries. No new surveys were carried out due to time constraint. All reports of the six Working Groups were submitted to the EPU, which then prepared the overall report for the Cabinet Committee on Training. This report contains the major findings and recommendations of the Working Groups, and an assessment of the skill requirements and the policy recommendations for future action.

3. SUMMARY OF REPORTS BY THE WORKING GROUPS

3.1 Construction Industry

Current Status and Structure

The construction industry is fast expanding. In 1989, this industry accounted for 377,800 jobs or 5.9 per cent of total employment. In 1989 the value added reached $2.380 billion, registering an increase of 11.6 per cent over the previous year. For the period 1990-2000, the industry is expected to expand at an average annual growth rate of about 7 per cent.

This industry is facing problems of abandoned and delayed projects coupled with poor quality building materials. It also lacks skilled local labour and has resorted to employing foreign labour. With expected high growth of the economy during this decade and improvements in the quality of life, the demand for buildings will increase. Participation from professional contractors is needed so as to response effectively to the increased demand for high technology and better quality construction. This calls for a review of the cost, time scheduling of construction, security of building and maintenance, and the adoption of efficient and systematic management and financing.

Skill Shortages

The critical skills currently in short supply and which are dependent on foreign workers are:-

Concretor
Carpenter
Bricklayer/mason
Plasterer and paviour
Painter
Tiler

Other skills which are also in short supply are:-

Bar bender
Joiner
Metal worker
Drainage layer
Plumber
Welder
Glazier
Sheet-metal worker
Machinery maintenance operator
Wiremen

The shortage is due to workers looking for other stable jobs, location of building sites, low status of jobs, low promotional prospects, and unattractive working conditions.

Training Courses Offered

Ministry of Education - the Technical and Vocational Programme in Secondary Vocational Schools and Polytechnics.

Ministry of Youth and Sports - Advanced Skill Training Centre (ATC) at Sepang and Youth Training Centres.

Ministry of Human Resources - Centre for Instructors and Advanced Skill Training (CIAST) and Industrial Training Institutes (ITIs).

Majlis Amanah Rakyat (MARA) - Institute Kemahiran MARA (IKM)

Private Sector

- Agro-Training Centre
- City College
- Pay Fong Secondary School
- The Electrical and Electronic Association of Malaysia (TEEAM)
- Institut Elektro Tek Gemini
- Workers Institute of Technology - Kelang
- Workers Institute of Technology - Ipoh
- Institut Teknologi Bintang
- Institut Teknologi MIDAS

Recommendations

1) Institute a system of registration and certification for all grades of skilled workers by trade.

2) Provide wage guidelines for skilled workers to draw youth into the construction industry.

3) Set up a coordinating body for construction activities, with the function, among others, of certifying skilled workers, as in (1) above.

4) Introduce an open system of recruitment to supplement the present 'kepala' system.

5) Encourage developers/contractors to carry out training to ensure adequate supply of skilled craftsmen for the industry.

6) Establish the Malaysian Construction Academy to conduct training programmes and promote skill upgrading in the industry.

7) Create training mechanisms involving greater private sector participation.

8) Increase training specialisation in construction, in order to provide more attractive and systematic training for skills in the industry.

9) Study the possibility of imposing a levy on foreign workers which can be utilised for training.

3.2 Electrical and Electronics Industry

Current Status and Structure

Currently, Malaysia is a major producer and exporter of semi-conductors. The industry accounted for 59.0 per cent of net export value in 1989. The electrical sub-sector accounted for about 14,000 jobs, while the electronics sub-sector provided employment for 123,000 persons, or 11 percent of the total employment in the manufacturing sector.

The two major problems facing the industry are low usage of local resources and minimal participation of local entrepreneurs. The industry is moving towards the production of 'consumer electronics' and 'industrial electronics' goods.

Skill shortages

Skills currently in short supply are:-

Engineers and technicians in micro-processing, micro-electronics, CAD-CAM and robotics
Electrical/electronics/mechanical technicians
Electro-mechanical technicians
Advanced-level machinists

Intermediate/advanced level electrician
Pneumatic instrumentation technician
Electronics instrumentation technician
Chargemen

Training Courses Offered

To meet the requirements for skilled, semi-skilled and technical manpower, courses at the certificate, diploma and degree levels are being offered by the local institutions. The main trade areas covered by these courses are electrical and electronics engineering, mechanical engineering and instrumentation engineering. The following local institutions are involved in training the manpower required:-

Vocational schools
Polytechnics
Local universities
Institut Kemahiran MARA
Industrial Training Institutes
Advanced Skills Training Centre, Sepang
Youth Training Centres

Recommendations

1) Increase the output from existing public training institutions at all levels, especially at the middle technician level.

2) Existing courses in these institutions should also aim at equipping the labour force with technical skills relevant for the market.

3) Local universities could utilise vacation periods by conducting short-term training, or farmed out facilities to the private sector.

4) Trainers in local education and training institutions should be encouraged to get 'hands-on' experience. Schemes of service of trainers should be reviewed to enable more lecturers and trainers to spend their sabbatical leave in the industries.

5) Universities and training institutions should set up curriculum development committees for each area of specialisation and regular studies on training needs should be undertaken with the industry.

6) Mechanisms to encourage public-private sector collaboration in training should be developed. In this connection, the private sector could donate equipment for training or release experts to public training institutions as instructors.

3.3 Information Technology Industry

Current Status and Structure

Information Technology (IT) industry, which consists of computers, telecommunications and office automation, is a fast-growing sector. The output of the industry is in the form of hardware, software and communications equipment. Although the industry is in the early stages of development and emphasise the production of software and peripherals, these can be the basis for the future growth of the industry.

A total of 18,200 persons were employed in the IT industry in 1990, of which 64 per cent were corporate users while 36 per cent were involved in companies supplying computers.

Skill Shortages

The skills that are expected to be in short supply during the period 1991-95 are in the areas of:-

Systems programming
Software specialists
Data network/communication
System security
Hardware and software maintenance
Management of electronic data processing
Data-base management
Systems integration

Training Courses Offered

Training is available presently at the following:-

Computer clubs in primary and secondary schools
Technical and vocational schools
Polytechnics
Universities and other institutions of higher learning
Other public sector training institutes
- National Institute of Public Administration (INTAN)
- Industrial Training Institutes
- CIAST
- Institut Kemahiran MARA
- SIRIM
- National Productivity Centre (NPC)

Private training institutes/centres
- Private companies such as ICL, Systematic, Stamford College, Informatic Institute, etc.
- Vendor training - many suppliers of IT equipment have their own training programmes.

Recommendations

1) Streamline and improve skill training through the following:-

   a. Government training institutions should sponsor training programmes in critical skills in cooperation with IT bodies.

   b. Improve curriculum and increase courses offered by technical and vocational schools.

   c. Increase output of polytechnics, especially those trained in IT related courses.

   d. Provide more training in IT skills in institutions of higher learning, such as through extension classes, etc.

   e. Increase training opportunities for the private sector in public training institutions in order to increase the supply of trained manpower.

   f. Review incentives for in-house training:-
      - training for the IT industry should be considered as a component of training under the proposed Skill Development Fund.

      - the double deduction incentive be expanded to cover the IT industry.

   g. Set up a Council for accreditation and monitoring of private schools.

2) Increase research and development (R&D) activities through:-

   a. Promotion of exchange schemes with foreign universities to gain exposure in developments in IT.

b. Invitation of foreign experts to do R&D in Malaysia.

c. Encouragement of joint research projects between the private and public sector.

d. Provision of increased personnel for research projects.

e. Review incentives for R&D in IT, such as tax credit, double tax deductions etc.

3) Set up a National Information Technology Board with the task of managing, planning, monitoring and implementing related policies.

4) Review the compensation system for IT personnel in the public sector in order to attract manpower to the industry.

5) Undertake an integrated and comprehensive survey of the industry.

6) Create an information technology society as a national objective. This could be done through a programme of education, training and awareness building.

3.4 Selected Manufacturing Industries

3.4.1 Ceramics

Current Status and Structure

The industry is divided into family-owned companies and large-scale companies, consisting of the Malaysian Ceramics Industries Group and the foreign-owned companies. There are about 350 companies in Peninsular Malaysia and 50 in Sabah and Sarawak, employing 20,000 workers and with a total turnover of $320 million in 1989. The industry is expected to expand by 10 per cent per

annum due to the availability of local raw materials. Business operations will move towards greater technological use.

The analysis in this section is confined to the traditional ceramics sector and does not cover advanced ceramic and special purpose materials for the electronic and construction industry.

Skill Shortages

The following skills are in short supply:-

Technical managers/production executives in ceramics
- Product development and recipe formulation
- Manufacturing control practices

Supervisors / foremen
Mould makers

Training Courses Offered

University Sains Malaysia (USM)
- B.Sc. Applied Science
- Bachelor's degree in Materials Engineering, MSc. and Ph.D.

Institut Teknologi MARA (ITM)
- Diploma in Art and Design (Pottery and Ceramic)

Perbadanan Kemajuan Kraftangan Malaysia (PKKM)
- Certificate

Malaysian Ceramic Industry Group (MCIG)
- Supervisors
- Junior executives
- Technical managers

Industrial Training Institute in Melaka
- Supervisory Course.

Recommendations

1) Undertake a study on the special skills of ceramics industry. Presently, the Malaysian Government and JICA is undertaking a study on the ceramics industry, including skill requirements of the industry.

2) Consider the establishment of a ceramic vocational course in public training institutions for the training of skills.

3) Review courses offered by USM and ITM to meet demand of trained personnel for the industry.

4) Provide specialised training and other general courses for industry personnel at the Ceramic Technology Centre at SIRIM.

3.4.2 Chemical

Current Status and Structure

The chemical industry is divided into 9 sub-sectors i.e. inorganic, fertilizers, organic (petrochemical and oleochemical), plastics and resin, paints and inks, pharmaceutical, pesticides, soaps, detergents and cosmetics and other miscellaneous chemical products. There are about 331 chemical processing plants in the country employing about 25,000 workers. Employment is expected to increase to 31,400 in 1995.

The local chemical industry is relatively young and its production is confined to manufacturing imported intermediate chemical products. However, it has the potential to develop further, especially

in the organic (petrochemicals), resin and fertilizer sub-sector. However, the soap, detergent and cosmetics sub-sector will decrease their share of total output value to 15 per cent by 1995.

Skill Shortages

This industry is not facing a skill shortage given the current growth of industry and the output of training institutions. However, if the industry is to upgrade its existing plants and modernise further, it will require management and technological skills which are currently limited. It is not possible to estimate the actual number of skills in short supply due to the lack of data.

Training Courses Offered

Courses for the industry are provided at the following institutions:-

Universities
Industrial Training Institutes
Institut Kemahiran MARA
Advanced Skills Training Centre, Sepang
CIAST
Secondary vocational schools

Recommendations

1) Engineering facilities at local universities should increase output of chemical and mechanical engineers.

2) There should be closer cooperation between the Government and chemical companies, as well as among chemical companies in identifying specific training needs of the industry.

3) An Association of Chemical Manufacturers be formed, among others, to coordinate the identification of training needs.

3.4.3 Machinery and Engineering

Current Status and Structure

The industry is divided into four sub-sectors i.e. fabricated metal, mould and die, machinery and equipment, and foundry and these provide support services for the manufacturing sector.

Skill Shortages

Skills currently in short supply are:-

Mould and die designers and makers
Skilled machinists
Precision and certified welders
CNC programmers and precision machinists
Non-destructive testing engineers and technicians

A shortage of skilled manpower such as welders, non-destructive testing personnel and mould and die makers, including precision machinists, are expected in the future. Besides this, future demand for skilled manpower will also be in areas which are computer-related such as CAD, CAM, CAE, CIM and CNC machines.

Training Courses Offered

Training of skills for the industry are presently provided by the following:-

Universities
CIAST
Advanced Skills Training Centre, Sepang

SIRIM
Industrial Training Institutes
Institut Kemahiran MARA
Youth Training Centres

Recommendations

1) A comprehensive survey on manpower requirements and skill profile be conducted. This is necessary in order to get the correct information from the industry especially on the suitability of the skill training available in the country and critical skills requirements.

2) The National Vocational Training Council (NVTC) should increase the number of examinations per year to overcome the shortage of welders and Non-Destructive Testing (NDT) technicians, and existing training institutions should be better utilised.

3) Need to establish more specialised training institutions in advanced technologies such as CAD/CAM, automation and robotics, microprocessor applications, instrumentation and control, etc. These institutions can be established as a joint government-industry effort in funding as well as management aspects.

4) A comprehensive training programme covering production, materials, maintenance of machinery and mould/die, quality control and good manufacturing practice needs to be introduced for skilled personnel.

3.4.4 Foundry

Current Status and Structure

The industry produces 'casting products' such as steel, iron, malleable iron and non-ferrous products. As a result of the expansion of manufacturing activities and increasing demand for casting goods, the industry has the potential to expand further, moving from 'jobbing product' to mass/medium production. The country's requirement is expected to double by the Year 2000.

Skill Shortages

If the industry is to achieve current production levels in the Year 2000 comparable to the current level of other Newly Industrialising Economies, employment will have to expand by 11 percent per annum. This will require manpower especially in the following occupational groups:-

Occupational groups (with serious shortages):-

Foundry engineers
Pattern makers
Melting

Supervisory and Production Skills (with less serious shortages):-

Moulding
Core making
Casting
Shake out
Finishing
Inspection

Training Courses Offered

The following institutes provide training relevant to the industry:-

Universities
Industrial Training Institutes
CIAST
Advanced Skills Training Centre, Sepang

Recommendations

1) The skills level of foundry workers need to be increased in order to meet the productivity targets of the industry.

2) Existing training institutions such as IKMs and CIAST need to expand their output of trained workers especially in the areas of pattern-making and melting.

3) It would be appropriate to strengthen courses in pattern-making which are currently conducted in the public training institutions. There should be close linkages between training institutions and the industry.

3.4.5 Plastics

Current Status and Structure

The plastic processing industry has grown rapidly with the present investment of more than $800 million. It employs 38,800 workers and the turnover of the industry for 1989 was M$1.1 billion. There are about 700 plastics processing factories involving mainly general injection (160 factories with 6,800 workforce), sub-contracting injection (120 factories with 15,000 workforce) and film (150 factories with 7,500 workforce).

Skill Shortages

The industry is facing a shortage of supervisors and skilled technicians for:-

Production planning
Process trouble-shooting
Machinery maintenance and repair
Quality control
Robotics
Hydraulics
Finishing operations for plastics products.

Training Courses Offered

The following institutions offer courses relevant for the industry:-

Universiti Sains Malaysia.
- Polymer Technology

Universiti Malaya.
- Chemical Engineering

Universiti Teknologi Malaysia.
- Polymer Engineering

Institut Teknologi MARA - Rubber & Plastics Diploma.

CIAST - Plastics Injection Course.

Industrial Training Institute Alor Setar
- Plastics Injection Course.

Plastics and Rubber Institute, Malaysia (PRIM)
- two-year Diploma Course (evening classes).

Recommendations

1) There is a need to increase these courses especially at the technical level and in areas of plastics production, materials, maintenance of machinery, mould and die, quality control and good manufacturing practice.

2) In training institutions where courses in plastic technology are being conducted, the intake of students should be increased.

3.5 Textiles Industry

Current Status and Structure

The textiles industry comprises six sub-sectors, i.e fibre, spinning/texturing, weaving, knitting, processing, and apparels. The apparels sub-sector, with production of about 25 million units of apparels per year, and knitting sub-sector are largest in terms of the number of companies in operation and total employment. The problems facing this industry are labour shortages, high labour turnover and increasing cost of labour. This is evident at the production operators and technicians level, especially for the knitting, processing, apparels and weaving subsectors. This may be due to working conditions and competition with the electronics industries for labour.

The textile industry, especially the apparels sub-sector, has the potential to expand further. Total employment is expected to increase from 100,000 in 1990 to about 169,000 in 1995.

Skill Shortages

Skills/occupations that are in short supply:-

Production operators
Managers, supervisors and technicians

Training Courses Offered

Only ITM offers training courses related to textile/apparel at the advanced-level. These are:-

Diploma in textile design
Diploma in fashion design
Diploma in textile technology

Courses are also conducted by University Malaya, University of Technology Malaysia and polytechnics in the areas of machinery engineering, chemical and electronic engineering. The vocational schools offer courses in basic fashion design and apparel making, while Youth Training Centres offer tailoring courses.

Recommendations

1) Since the shortage of workers is due to working conditions and contracts of service, the industry should undertake efforts to improve working conditions in order to attract workers.

2) Basic training such as in sewing should be provided for secondary school leavers by institutions such as KEMAS and Youth Training Centres. The Industry should be encouraged to be involved in this training by providing machinery for training.

3) Polytechnics could provide courses for supervisory and technical personnel required by the industry.

4) Scholarships for overseas studies in clothing and textile technology should be increased. In this respect, the Association of Textile Manufacturers is prepared to provide assistance to government agencies in the identification of courses/training relevant to the industry.

5) Courses in textiles and clothing conducted at ITM should be reviewed and the curriculum adjusted to meet the needs of the industry. ITM should seek the cooperation of the industry in this matter.

6) Mechanical, electronic and chemical engineering courses at local institutions should also emphasise topics related to the textile industry.

7) Review the criteria for the application of double-deduction incentives for training in order to make it more accessible to industries.

8) For the long term, there is a need to set up a Training and Research Institute specific to the textile industry. This can be undertaken through corporatisation or through public-private sector collaboration.

3.6 Wood-Based Industry

Current Status and Structure

The wood-based industry is sub-divided into four sub-sectors, i.e. sawn timber, plywood/veneer, mouldings/joinery and furniture. In terms of output, sawn timber forms the largest sub-sector, followed by plywood and veneer. Presently, total investment in the wood-based industry is $1,475 million, while employment amounts to 130,000. The development of this sector is closely related to the supply of logs. In view of the limited supply of logs in the future, the wood-based industry needs to intensify downstream processing activities.

Primary processing is also being promoted to increase productivity and efficiency through improvements in technology and operational methods.

Skill Shortages

The skills in short supply are in the following areas:-

Production management
Production and maintenance supervision
Designing and draughtsmanship
Machine operation
Rattan furniture binding and assembling
Finishing
Machine and general maintenance

Training Courses Offered

Courses offered by the local training institutions include:-

Public Training Institutions

Institut Kemahiran MARA and Industrial Training Institutes
- Furniture Technology
- Wood Processing
- Wood Working and Joinery

Sekolah Menengah Vokasional Muadzam Shah
- Furniture Making

Timber Research and Technical Training Centre
- Sawmill Maintenance
- Saw Maintenance

Institut Teknologi MARA
- Diploma in Wood Technology
- Diploma in Industrial Design

Universiti Pertanian Malaysia
- Degree in Forestry, Wood Industry and Wood Technology
- Diploma in Forestry, Diploma in Wood Industry

Universiti Sains Malaysia
- Degree in Wood Technology
  Pulp and Paper

Private Training Institutions

Institut Senilukis Malaysia
- Diploma in Furniture Designing

Workers Institute of Technology
- Furniture Making
- Wood Working and Joinery

Recommendations

Short-term

1) The output of training institutions has to be significantly increased and the quality of output enhanced by matching training with the specific needs of the industry.

2) Training institutions should also provide opportunities for retraining and skill upgrading.

3) Close cooperation between training institutions and the industry need to be fostered, and this could be done through the NVTC.

4) The procedures and criteria relating to the double-deduction incentive for training need to be reviewed to encourage wider coverage.

Long-term

1) The wood-based industries training centre proposed by the Malaysian Timber Industry Board (MTIB) should be implemented.

2) More vocational schools emphasising furniture making should be set up, especially in Klang, Butterworth, Muar, Sabah and Sarawak.

3) A Skills Development Fund should be set up and the wood-based industry would be requested to contribute to the Fund.

4. ASSESSMENT OF CURRENT SKILL SHORTAGES AND FUTURE MANPOWER REQUIREMENTS

4.1 Growth Prospects and Sectoral Development

The growth prospects for the economy in the next few years are expected to be buoyant in view of the successful adjustments by the public and private sectors following the economic recession as well as the favourable international economic environment. As measured in real GDP, economic growth is expected to be maintained at a high growth rate of about 7.5 per cent per annum during 1991-95. Employment will grow by 3.1 per cent per annum or a net addition of 1.1 million new jobs. With labour supply expanding at 2.9 per cent per annum, the unemployment rate is expected to be considerably reduced.

The growth of the economy in the next five years will, to a large extent, be attributed to the growth in the manufacturing sector. This is due to increasing foreign and domestic investments, as well as the Government's concerted efforts to widen and diversify the economic base. The manufacturing sector is projected to grow at a rate of 11.5 per cent per annum and generate about 409,000 new jobs or 36 per cent of the total jobs created.

The construction sector, which was in the doldrums in the mid-eighties, had turned around in the latter part of the 1980's and is poised to grow at around 8 per cent per annum during 1991-95. The growth prospects for the construction industry is due to increased investment in infrastructure development as well as to a buoyant

property market. The sector is expected to create about 120,600 jobs or 11 per cent of the new jobs created.

The contribution of the two sectors to GDP will continue to increase in the 1990's. The manufacturing sector will increase its contribution significantly from 27 per cent in 1990 to around 32 per cent in 1995. The contribution of the construction sector to GDP will remain unchanged at around 3.5 per cent.

4.2 Overview of Industries

Current Status and Structure

While industries like construction, wood-based, textiles, electrical and electronics, plastics, ceramics and chemicals industries are important in terms of employment creation, industries which contribute significantly to export-value include wood-based, textiles, electrical and electronics industries. In terms of value-added, industries like electrical and electronics, construction and plastics are the major contributors. However, industries such as information technology, textiles and machineries and engineering still depend on imports for raw materials.

The industries covered in this Report are beset with problems peculiar to their industries. While the construction industry faces a lack of local skilled labour, abandoned and delayed projects and poor quality construction materials, the wood-based industry is faced with a growing shortage of logs. At the same time, the IT industry has a high import content of raw materials and faces keen competition from other countries. The textile and wood-based industries encounter the problem of high labour turnover and difficulties in attracting labour.

Structural Change and Technology Improvements

The growth and future development of the industries will depend on structural and technological changes, which in turn influence

human resource requirements. In the construction industry, the development of new technology and the use of better quality materials will lead to the need for more professional contractors and demand for skilled labour. For the wood-based industry, the development of downstream processing requires improvements in technology and technical training for its workforce. Structural changes and technological improvements in the IT industry require greater collaboration between the public and private sectors. To remain competitive, the textile industry needs to modernise its machineries and equipment, as well as employ a well-trained workforce.

4.3 Causes of Skills Shortage

In discussing the issue of skills shortage, a few factors should be considered. First, the problem of skills shortage almost always goes beyond the issue of the narrow technical skills that workers must have. More often, the real issue is the shortage of workers with 'appropriate experience'. Thus, it is not so much the electrical engineer that is missing but the electrical engineer with five years of experience, and not just the trained systems analyst but a systems analyst with three years of relevant experience.

Second, there are a few key skills on which the vitality and competitiveness of every industry depends. These skills include strong, or even uncanny, entrepreneurial, managerial and marketing abilities, particularly in international markets, that can help to bring about rapid expansion and modernisation in industry. There is always a great demand for these skills which cannot be easily developed in the classroom of formal training institutions.

Third, labour shortage faced by industries has arisen from several causes, and the direct solution to the problem is not always the provision of training. This is notwithstanding the fact that the provision of adequate and relevant training by both the public sector and industry could go a long way in reducing problems arising from skills shortage.

Finally, the existence of skills shortage need not be viewed negatively, as is often the case. In fact, the most important phase of skill development occurs after a worker enters the labour force, and this tends to be demand-driven. A worker can only gain experience and the relevant exposure when he is exposed to the workload requiring him to move up to a higher skill level. For instance, an experienced worker cannot become a supervisor if there is no supervisor slot to be filled within the firm.

The crucial point is that, within limits, an increase in the demand for workers with a particular competence creates its own supply, setting off a chain reaction of recruitment and upward movement of workers at the lower skill levels. This process will be greatly facilitated with the existence of a ready pool of trained labour and concerted actions taken by various parties concerned to address the shortages through training rather than 'poaching' from other firms.

4.3.1 Demand Factors Affecting Skills Availability

Rapid Expansion of Industry

Although there have been reports of the shortage of skills in the past, the rapid expansion of the manufacturing sector and the large inflow of foreign investments in recent years have accentuated the problem of skills shortage. Since 1987, the manufacturing sector has been growing at an annual rate of 14.0 per cent. Coupled with this, the establishment of new labour-intensive industries tend to be concentrated in certain locations in the country. In a recent survey on labour in the manufacturing sector, it was found that the entire west coast of Peninsular Malaysia is experiencing labour shortage. Reports of the most serious shortages are in Pulau Pinang, Negeri Sembilan, Johor and Melaka, where three out of four firms are affected by labour shortage.

On an industry-wide basis, labour shortages appear to be highest particularly among the labour-intensive industries which are experiencing rapid growth. By 1990, output in the electrical and electronics industry is estimated to have increased by 177 per cent over the 1975 level, wood-based industries by 164 per cent and the

textile industry by 84 per cent. Given the very high growth performance in these industries, it is not surprising that the industries facing highest labour shortage of production workers are the textile and wood-based industries. Although the electronics industry does face labour shortage, the better working conditions in this industry also meant that it is relatively more attractive to production workers than the textile and wood-based industries.

Both the textile and the electronics industries utilise large pools of female production workers who can be quickly trained on-the-job. These industries tend to be located in the free trade zones in the west coast. Since they are essentially competing for the same pool of young female labour, many companies provide transportation to bring in workers living within commuting distance. In certain areas that experience very rapid labour turnover, workers have to be sourced from other parts of the country.

Changes In Technology

In some cases, shortage in skills are experienced as a result of the adoption of new technology by the industry. In general, production processes have some degree of flexibility in the sense that output can be produced by different combinations of skills and capital. For instance, in a sawmill, it may be possible to have a more advanced semi-automated machine to substitute for the skills of an experienced sawyer. Where the technology is such that substitutability is relatively low, skill bottlenecks can arise. In addition, particular skills are needed to complement specific capital input. As the industry moves to a more automated production process, engineers and technicians are needed to manage and maintain the machines.

There is increasing adoption of new technology in Malaysian industry, as reflected in the rapid increase in productivity. During 1973-86, real value added per worker in the electrical and electronics, ceramics, fabricated metal products and textiles subsectors increased by about 100 per cent. This is followed by 63 per cent increase in chemical industry, 33 per cent in basic metal industry, and

20 per cent in wood-based industry. For the manufacturing sector as a whole, productivity increased by 33 per cent during this period.

In the electrical and electronics sub-sector, the adoption of new technology, especially in electronics, is the only way to maintain industry competitiveness and survival. As a result, there have been some measure of the shedding of labour in this industry. Existing workers are also retrained by the establishment to handle new and more complex tasks.

Movement of Skills Within and Without the Industry

In areas where particular skills are in short supply, workers move in search of better working conditions and wages. In some industries which are characterised by less conducive working environment and lower pay, firms would have to maintain, and often lose out, in their output and quality to competitors in the face of rapid and continual turnover of workers.

The machinery and engineering sector is characterised by a dualistic structure. On the one hand, there are many small, under-capitalised firms which are subject to severe competition, offering low job-security and low entry pay to workers. On the other hand, there are an increasing number of transnational corporations (TNC) which constantly come to the labour market to hive off the experienced workers trained by the small firms through offers of higher salaries and better working condition. Paradoxically, the competitive small-scale sector ends up largely bearing the cost of skill training, while the TNC sector mainly reaps the benefits.

The sudden fall in the demand for skills and especially the decline in wages during the recession has had a very strong impact on the supply of skills, especially in the construction industry. Workers at all skill levels to suffered the trauma of the collapse of construction industry. Construction companies and firms associated with the industry had to retrench their workers, even their experienced engineers, technologists and other professionals. The lack of suitable employment forced many to seek employment overseas or

to turn to non-engineering fields for economic survival. Many have chosen to remain overseas or in their new career despite the upturn in the industry. The construction industry face labour shortages because local workers are reluctant to acquire skills in view of the length of time needed to gain competence as well as fluctuations in earnings in the industry.

International Demand for Skills

Particular skill groups are subject to strong demands in the international market. This 'brain drain' phenomenon is not simply limited to the highest skilled groups but can also occur to semi - skilled groups as well. The international movement of skills out of Malaysia apply to all industries. In recent years, the movement of manufacturing skills to Singapore, Taiwan, Japan and Hong Kong has been particularly significant. Thailand, which experienced phenomenal industrial growth in recent years, has also been a destination for Malaysian engineers and other skilled workers.

In the IT industry, the extent of the loss of experienced staff due to emigration appears to be significant. In one recent study, almost every firm interviewed reported such losses, and in some cases, the loss appears to be substantial. The most popular destinations are Singapore and Australia, although some losses to Canada and USA have been reported. A similar situation is also found in the electronics industry, which loses a significant number of its experienced staff through emigration. An even larger number of inexperienced, fresh graduates have emigrated, especially to Singapore, where wage levels are considerably higher.

In the wood-based industry, workers who have gained some years of experience and who have moved up to the level of supervisors are wooed over to Indonesia with incomes of four to five times over their current earnings. With regards to lower level skills, production workers and supervisors in the textile and electronic industries, as well as workers in other occupations move over to work in Singapore. The high wages offered by Singaporean firms also mean that manufacturing companies in the southern part of

Peninsular Malaysia would have to cope with rapid turnover of staff, even the inexperienced ones.

4.3.2 Supply - Related Shortages

Skill shortages arising from an increase in demand are aggravated by the difficulties faced by the public educational and training institutions to produce skills of the required quantity and quality. They have inherent institutional constraints which impede their ability to respond quickly to the industries needs for skills.

Lack of Feedback Response

The majority of the public educational and training institutions lack the mechanism of feedback response which could enable them to detect and respond to changes in the labour markets. These institutions also lack the capacity to produce new skills. Courses offered by many of these training institutions are too basic and not job-specific. For instance, the metal and engineering industry requires welding engineers, metallurgists, and non-destructive testing engineers. At present all of the universities and technical institutes do not have special training programmes to produce these skills.

Similarly, a welder or a machinist from the public training institutes/vocational schools is trained in basic welding or machining but not in precision and complicated welding. The slow response of training institutions to new skills can account for shortages in critical skills, such as CNC programming, precision machining, skilled draughtsman and design engineers, and technicians in CAD techniques and robotics. None of the institutions conduct training programmes in areas of plastic production, quality control and secondary operations.

Contacts with the private sectors or industries are not institutionalised in advisory committees for the majority of the training institutions. These advisory committees are effective vehicles to gauge the industry's needs of the industries with regard

to the volume of training and curriculum development. Permanent advisory committees should be set up in all localities for each major industry to serve as conduits for feedback information to help in decisions on the intake of trainees according to labour market conditions, updating of the curriculum and reviewing the training programmes. Larger and more meaningful representation of the industries in these committees is essential to enable them to contribute positively towards a more responsive training system.

Lack of Staff Participation in Decision-Making

The management structure of most training establishments is not conducive for staff participation in decision-making. By and large, public training institutions are run directly by the relevant ministries, and those responsible for running the training programmes have relatively less say in determining the development of courses and curriculum content. Such lack of autonomy in the training institutions inhibits quick response to change. The private training institutes, however, have a better track record in responding to market signals. The director and other management staff could decide on the modification of the enrolment, programmes, curriculum, facilities, the hiring and the shedding of staff and other conditions of employment.

Inability to Recruit and Retain Quality Trainers

Another factor constraining the ability of training institutes to supply the required manpower is their inability to recruit and retain quality trainers. This problem persists in all training and educational institutions, including the universities. Ideally, the teaching staff should be recruited directly from the industry, given pedagogical training, and paid a salary which is adequate to attract them from the industry and to retain them in the training institutes. The existing schemes of service and pay scales which is based on formal qualification and length of government service do not take into consideration industrial experience or exceptional personal ability. As a consequence, it is difficult to recruit teaching staff in technical fields with relevant industrial experience.

Stringent regulations also imply that it is difficult to make use of external specialists for part-time teaching. The existing Government rate of $50 per hour is insufficient to attract the required specialists needed in these training institutes.

In an environment of fast expanding economic activity, there will be increasing demand for trained and experienced manpower. As such, the market forces are expected to continue to drain the public sector educational and training institutions of their trained and experienced technical and professional workforce. For this reason, the University of Malaya has ceased to offer courses in the plastic options in the chemical engineering department.

Unattractive Schemes of Service

Unattractive pay scales also lead to existing instructors to leave the institutes. Teaching staff who have gained experience leave to join the private sector which offers higher salaries. Besides this, the rigidity of the conditions of service prevents the use of instructors for evening classes or off-lecture hours. Training institutes which have underutilised facilities can be used for this purpose so that courses for the upgrading of skills can be conducted during the evenings or weekends. Presently, there is no mechanism for assigning instructors for evening duty instead of day duty or for paying them overtime if they do both.

Long Process of Formal Certification

The long gestation period needed for acquiring certain skills has also contributed to skill shortages. These skills are based on long formal training or experience. Formal certification is also required for some skills such as chargemen and wireman which require formal training, experience and certification process. The long process involved has not only prevented supply to respond rapidly to demand, but discourages the number of new trainees. Certification of craftsman skills by the NVTC can also pose as a hindrance to the flexibility of supply. The examinations for certification are limited

to once or twice a year, and those who fail need to wait a whole year before they can resit these examinations.

Partnership with the Private Sector

The quality of training provided could also contribute to the skill shortage problem. Today rapid technological changes in the industry, especially the introduction of Computer Numerical Control (CNC) production process and other sophisticated equipment, have raised the technical requirements of jobs. Some local institutions still use outdated machines and their output is often seen as irrelevant to industrial needs. There has to be a close partnership with the private sector in training skilled labour since the private sector is the main user of trained labour.

The present arrangement for public-private collaboration in the area of skill formation is unsatisfactory since the private sector is not participating actively in the curriculum development of training establishments. The lack of such involvement means that training establishments are unable to obtain sufficient feedback. Likewise, training institutions, given their limited capacity in gathering and processing training-related information and the bureaucratic constraints that inhibit speedy responses, would continue producing output that are not in line with industrial needs. Therefore, in order to reduce skill shortages arising from the skill mismatch problem, more effective public - private sector collaboration is paramount.

Training Incentives for Employers and Employees

The problem of shortages of certain core skills also arises because of the lack of incentives for private sector employers to provide and employees to avail themselves of opportunities for skill upgrading. In certain industrial activities, especially in the smaller enterprises, firms tend to under invest in formal skill training and skill upgrading because of the high costs involved in training. Employees are also less motivated to undertake such training on their own due to the financial burden involved and the lack of formal

training programmes which are well organised and accepted by local employers. In addition, the lack of part-time training classes that full-time workers can take without interrupting their work further reduces willingness to undertake such training.

There is thus a need for governmental intervention to stimulate a greater level of investment in skill training. Intervention could be in the form of providing better financial incentives for employers and employees for manpower training and development.

4.3.3 Other Factors

There are some factors that do not fall neatly either as demand or supply, but which also have an impact on skill shortage.

Formal Market Rigidities

Restrictions introduced into the market for skilled manpower can limit the ability of supply to respond to increases in demand. The clearest example is the granting of licenses and certifications required for the practice of certain types of skills. The shortage of chargemen which pervade throughout the whole manufacturing industry is one example in which rules and regulations restrict the supply of particular skills. By legislation, a chargeman can only practice after being certified by the Director General of Electrical Inspectorate. However, training places for chargemen by the authorities is severely limited, and the standards set for chargemen are not in line with the present requirements of the industry. Similar requirements imposed on the electrical engineers, whereby they must be assessed by the Electrical Inspectorate before being permitted to operate and manage electrical installations, is a factor contributing to the shortage of electrical engineers in the country.

Imperfect Information

Certain skills could be in short supply as a result of imperfect labour market information. Students and new entrants into the job market may have misconceptions about the current status of the market and the long-term career possibilities in the industry. A bias against 'blue-collar work' very often influences the career choice of young entrants into the labour market. Shortages of skills in the industry coupled with the rising wages of those skills do not filter down to the students or new entrants into the labour market to help them make appropriate career decisions. Current workers too may have been poorly informed about the industry and the need to upgrade their skills through training or retraining. More importantly, training institutions may be inadequately informed about the state of the labour market with regards to the skills they train, and therefore fail to adjust the curricula to the changing conditions of the labour market. More accurate and timely labour market information has to be widely disseminated to school leavers through counselling programmes and the media.

In addition, a more effective monitoring of technological change is also needed to allow planners and policy makers to forecast more accurately on the skill demands in the future, thereby providing a lead time to plan training programmes and to make the necessary adjustments to existing policies.

4.4 Future Demand for Skills

A key factor determining the future demand for skills is the pattern of overall industrial expansion. Over the next 5 years, the manufacturing sector is projected to grow at around 11.5 per cent per annum and the construction industry at around 8 per cent per annum. During this period, the manufacturing sector is expected to generate about 408,900 jobs, while the construction sector about 120,600 jobs. Both the manufacturing and the construction sectors will account for 36.1 per cent and 10.9 per cent of the total employment created, respectively.

Early estimates done at the EPU indicate that some of the most rapid growth during 1991-95 are expected to be registered in the industries identified in this report. The fastest growing industries in terms of output are transport equipment (17 per cent per annum), electrical and electronics (16 per cent per annum), and wood and wood-based products (14 per cent per annum). The growth rates for textile, rubber, industrial chemicals, and iron and steel will average 7-10 per cent per annum.

The approval of manufacturing projects by MIDA can be used to indicate the pattern of potential new employment by the large industries in the next few years. Based on the projects approved for 1986-89, the largest potential employment will be created by the electrical and electronics industry, accounting for 31.7 per cent of the potential 404,000 jobs to be created by the total approved projects. The other two major generators of jobs in the manufacturing sector are the textile and wood-based industries which will account for 11.2 per cent and 10.7 per cent, respectively, of the potential new employment from approved projects.

EPU estimates indicate that the demand for engineers and technical assistants by nine selected industries[1] will increase by 14,710 between 1990-95. During this period, demand will be highest for mechanical as well as electrical and electronic engineers and technicians. About 2,540 engineers and 9,210 technicians in these two disciplines will be on demand in the next 5 years. The demand for electrical and electronic engineers in 1995 will increase by 75 per cent over its 1990 employment level. This is closely followed by the demand for mechanical engineers which will increase by about 53 per cent over its 1990 level. The increased utilisation of engineers in these disciplines in most sectors reflect the more advanced technologies which are used by these industries. They will also

[1] The nine selected industries are food and beverages, textiles, wood and wood products, chemicals, rubber products, non-metallic mineral products, ferrous and non-ferrous metal products, electrical and electronics products, and transport industries.

require about 300 civil engineers and 260 chemical engineers. There will also be a demand for a considerable number of civil engineering technicians (770) and draughts persons (490).

Many of the jobs created by the electronics and textile industry will be for female production workers, while the wood-based industry will demand largely male production workers. The adequate and continual supply of labour for these industries in the future will depend on their location and the size of the labour force in the catchment area. The entry of a major firm into an industrial area which is already facing labour constraints often leads to further strains on the local labour market, higher labour turnover among the firms in operation, as well as some measures of wage competition among them. Therefore, it would seem reasonable to suggest that some efforts should be made to encourage, in any particular industrial area, the establishment of firms that will demand a balanced profile of workers, in terms of sex, age, educational attainment, and skills. At the same time, there may be a need now for Malaysia to be selective in attracting industries.

The electronics industry during the 1990's exhibits a high growth potential. In view of the strategic contribution it could play towards technological development, it is important to develop certain skills to serve the industry over the long-term. There seems to be critical shortages of various electronics-related skills in the country, and these will have to be addressed to ensure the continual growth of the industry. One particular skill to be emphasised is 'mechatronics', that is, the ability to design, engineer and operate/maintain industrial machineries and automation equipment that incorporate microelectronics and flexible programmable intelligence. This skill, coupled with other electronics-related skills such as 'chemicatronics', will also be demanded by other industries that utilise electro-mechanically-based industrial machineries.

In the 1990's, Malaysia is expected to face rapid technological and economic changes in its international environment, as well as an erosion of its labour cost advantage. Accordingly, its industry is expected to be restructured to enable it to enter the transition

towards a higher level of sophistication and quality in production, product development, marketing, and other areas. The local textile industry is upgrading its technology, such as using shuttleless looms, computer-aided designs, and automated cutting in order to keep up with competitors overseas. Human skills may pose as a bottleneck to growth and modernisation in the industry unless the training for supervisory and technical staff, as well as for operators, designers, etc, is vastly expanded.

The local machinery and engineering industry suffers some severe competitive disadvantages in view of its slow adoption of current information-based manufacturing technologies (CAD, CAM, CAE, CIM, robotics) as well as new managerial and organisational techniques currently adopted by the industry worldwide (flexible manufacturing, just-in-time systems, total quality control, quality circles, etc.). The problem is similar in the other manufacturing concerns. The wood-based industry, for instance, uses largely obsolete equipment in primary processing, with low recovery, efficiency and precision, while its modern downstream capacity is still very limited. Generally, very few plants use modern technology and production management. In complex downstream products, technical skills, technology development capability, and the management of complex organisations are critical. Furthermore, many firms lack expertise in export marketing and product design capabilities. These skills are in short supply in Malaysia and can only be built in the long run.

5. VALUES FOR AN INDUSTRIALISING SOCIETY

The transition from an agricultural to an industrial society involves a simultaneous transition to a new set of industrial values. Survival in a volatile, highly competitive world trading environment requires that Malaysian products maintain a competitive edge, both in terms of cost and quality. It is incumbent, therefore, that Malaysians are constantly and continuously imbued with increasing consciousness towards productivity and quality.

While skill training provides the means of garnering new skills and enhancing efficient work practices, a fundamental requirement for an industrial workforce is proper work attitudes, such as integrity, discipline, punctuality, loyalty to company, diligence, a dedication towards improving oneself and society, cost consciousness and attention to details. It is the sum total of all these that help to raise quality. And it is the result of all these and more that makes an economy competitive.

Since the inculcation of new values has its own gestation period, the development of these values and work culture will have to begin in the schools and in the workplace. It is imperative, therefore, that our school system be geared to develop positive attitudes and values required for industrial development. The training of teachers, both existing and new entrants into the teaching profession, will have to be re-orientated to meet the new challenges.

The Government should introduce motivational and attitudinal training programmes in order to develop such values and make Malaysians more responsive to the demands of development. Apart from this, teaching materials will have to be revamped to give greater emphasis to the new set of values. People will need to be weaned away from being slow, contented and resigned to fate, an orientation often characteristic of a traditional agricultural society. Books must be rewritten with an industrial orientation, reflecting the new values of an industrialising society. Teaching aids and educational kits must be made accessible to all in order to speed up the absorption of the new values. Books, teaching aids and educational kits should enhance the curiosity and search for knowledge, thereby laying the basis for the development of an industrial culture, as well as the creation of a scientific and progressive society, that is innovative and forward-looking.

The national economy can only be competitive if the concept of productivity and quality consciousness is well ingrained in all Malaysians. Malaysian consumers, who are becoming more sophisticated, will place increasing demands on quality and provide the acid test for 'Made in Malaysia' products. It is through the high standards

set by local consumers that Malaysian producers will have to strive continually to upgrade the quality of their products and hence be able to stand up to the rigour of international competition.

More skilled workers will be required to create quality products. As such there is the need to train highly skilled workers who are creative, dedicated and motivated to pursue excellence. The Government should step up recognition of those who excel in their field of expertise and specialization. This will enhance their standing in society. More national and state level competitions should be held to encourage those with skills and abilities to vie for honours. These efforts will encourage the pursuit of excellence and the development of an efficient and disciplined workforce.

6. RECOMMENDATIONS

Analysis of skill shortages and manpower requirements as well as findings of the six Working Groups highlight several features:-

1) While the rapid growth in industrial activities has resulted in an increased demand for skills, on the supply side, the training institutions have been unable to meet these demands due to various rigidities.

2) Rapid technological changes in the production process require significant changes in the skills required by the affected industries. Consequently, there is a need for flexibility by skill supply mechanisms to respond to the changing skill requirements. In particular, skill upgrading/retraining of the existing workforce in addition to pre-employment training needs to be enhanced.

3) In addition to basic formal training, much of the required skills that are short in supply have to be acquired on-the-job.

4) Existing government training institutions are not market driven. Market demand for skills are not well monitored and the mechanism for ensuring relevance of output is inadequate.

In order to strengthen the current educational and training delivery system, sixteen broad policy directions for a comprehensive programme of policy reforms are recommended. Together, they encompass wide ranging policy measures that seek to set in place a dynamic and forward-looking framework for improving the effectiveness and efficiency of skills training in the country. The scope of the proposed reforms is wide, and the individual elements are highly inter-related.

The policy directions outlined below have not only gained from the discussions and reports of the Working Groups, but also relied on the research done by the EPU. Care was taken to ensure a high degree of integration between the strategies for industrial and technology development, on one hand, and training policy reforms, on the other. From the point of view of policy implementation, it is useful to group the proposed measures according to their principle objectives:

1. Improving the responsiveness of public training to market demands.

2. Expanding the role of the private sector.

3. Strengthening linkages between training and technological change.

6.1 Improving the Responsiveness of Public Training to Market Demand

The ability of institutions to respond quickly and effectively to changing patterns of skilled employment constitutes a key factor in improving efficiency in the utilisation of public training capacity. For public training to be more responsive, the development of mechanisms for feedback response on skill requirement and the effectiveness of training is essential.

1) Reorientation of the Value System

- Training and Retraining of Teachers/Instructors

  * Training institutions for teachers and instructors must take into account the need to incorporate appropriate values for an industrializing society.

  * Teachers and instructors must be well exposed to the needs of industrial environment, especially work practices in modern enterprises and industrial concerns.

- Development of Education and Training Materials to orientate students towards the scientific and technological culture.

2) Establishing Feedback Mechanisms

- Permanent advisory committees (jointly with employers) for education and training institutions to be set up to cater for local training needs. These committees will complement the NVTC.

- Tracer studies to be institutionalised and conducted on a regular basis.

- Regular labour market surveys should be undertaken by relevant agencies.

- A system of monitoring technological changes to be instituted as a means of forecasting skill requirements. This can provide inputs to the planning of and adjustments to training programmes.

3) **Greater Flexibility in Management of Education and Training Institutes**

- Greater authority to be given to the directors of training institutes in decision-making with regards to course design, curriculum planning and management of the institutes.

4) **Attracting and Retaining Quality Trainers/Instructors**

- The Public Services Department should give high priority to review the schemes of service of trainers/instructors in public training institutions, especially in its current exercise of reviewing schemes of service. The review should ensure that improved schemes of service for trainers and instructors provide for:

  * remuneration which are commensurate with market rates
  * better promotion and career prospects
  * greater opportunities for training
  * more flexibility in the schemes of service

- Utilisation of private sector/industry expertise in government training institutions and provision of more opportunities for instructors in public training institutions to gain industrial exposure.

5) **Fuller Utilisation of Education and Training Institutes**

- Conduct customised weekend and evening courses for private sector employees.

- Allow private sector to lease training space and equipment to conduct their courses in public training institutions.

- Reduce expenditure on elaborate infrastructure/ buildings for training institutes. Future design of new training institutes should be more practical and factory-oriented.

- Spend funds on upgrading of equipment and staff.

- Review and improve existing facilities in educational and training institutions to ensure that the facilities are fully utilised.

6) **Corporatisation of Training Institutes**

- Undertake studies to explore the feasibility of corporatising public training institutions. This measure will also allow for more flexibility in the administration and management of training institutions.

7) **Constant Review of Course Design and Curriculum**

- Regular review of courses and curriculum according to labour market needs. The systems approach to a total

competency based technical/vocational education will be used to develop curricula.

- Private sector participation in the planning and development of courses and curriculum.
- Courses at the craftsman level in training institutions should be shortened and compressed by reducing time spent in non-technical subjects.
- Training institutes should promote short-term industry specific or customised courses.
- 'Sandwich' courses i.e. courses which incorporate practical training/industrial attachments between sessions of academic/theoretical training should be given priority.
- NVTC should increase the frequency of its trade skills examination to more than twice a year.
- Technical courses for professionals should include a managerial component.

8) **Wider Dissemination of Labour Market Information**

- Wider dissemination of labour market information to employers, school-leavers, and workers.
- Wider mass-media coverage of existing public training facilities.
- A regular publication of information on training facilities and the expected supply of trained graduates and trainees should be produced by all relevant agencies involved in training.

6.2 Expanding the Role of the Private Sector

Enterprises are best placed to identify the training needs for skill upgrading and retraining. They can also identify the technology that is being used in industry as well as acquire expertise in the usage of that technology from vendors.

1) Increasing Collaboration with the Private Sector

- Set up public-private sector training programmes in specific skills. This could be undertaken through joint R&D projects such as those undertaken by Intel and University Sains Malaysia (in electronics), and Proton and Universiti Malaya (in foundry).
- Consultancy work involving public and private personnel.
- Promote the setting up of more specialised training centres, with private sector participation. The Penang Skills Development Centre could be used as a model.
- The practical training programmes in public training institutions should be made more effective. The private sector should be encouraged to participate in the design and development of these practical training programmes.
- Employ private sector personnel on part-time basis.
- The Skills Development Fund should be implemented with a greater role envisaged for the private sector in determining training needs.
- Review the existing apprenticeship with the view of strengthening and widening apprenticeship in industries. The implementation of the Skills Development Fund could be a mechanism by which apprenticeship can be promoted.

2) **Improving Incentives for Training**

- Simplify procedures for the application of double deduction incentives and widen coverage on accredited and approved skills.

- Establish a low-cost loan scheme by commercial banks for workers to finance training or retraining in specific areas.

- Encourage formation of industrial associations that will collectively organise training programmes for the member firms.

3) **Establishing Specialist Training Centres**

- The private sector on its own initiative or with government collaboration should be encouraged to set up specialist centres for particular industries which will incorporate facilities for training. Proposals have been received for the setting up of the following centres:-

  * The Malaysian Construction Academy (**Appendix III**).

  * Foundry Centres (**Appendix IV**).

  * Textile and Fashion Design Centre (**Appendix V**).

  * Wood-Based Training Centre (**Appendix VI**).

- Industry associations/groups should also be encouraged to conduct training especially at the technical staff and craftsman level for their members.

- Private training institutions catering for specialised skills for industry should be considered for government assistance.

6.3 Strengthening Linkages Between Training and Technological Change

This report seeks to link training to technological change so that Malaysian workers are able to face the challenge of absorbing and adjusting to newer technologies in industry, as well as to foster the creation of a forward-looking Malaysian society which is supportive of and contribute to invention, innovation and technological advancement. The monitoring of technological change and advancement will be focused on areas which have a bearing on Malaysian industries.

1) Establishing Centres of Excellence

- Higher learning and training institutions should establish Centres of Excellence in specific fields to support the industries. Each institution can have more than one Centre of Excellence. These Centres will enable them to:

  * Develop and implement R&D activities in close consultation and collaboration with industry so as to ensure that R&D is tailored to industrial needs and can be commercialised.

  * Develop a system in local universities which allow their students to transfer credit across universities in specialised fields. The degree will be conferred by the university in which the student registers or has taken the most number of credits.

  * Develop a coordinating mechanism for R&D activities to allow the sharing of information and to avoid duplicating R&D activities.

  * Develop a mechanism to overcome shortages of experienced lecturers and trainers in specific fields,

and reduce the loss of quality lecturers and trainers to industry.

- These centres should emphasise R&D and training in emerging technologies such as:-

  * automated manufacturing technology
  * advanced materials
  * biotechnology
  * electronics
  * information technology
  * CAD techniques and robotics

- Institutions which have the potential to become Centres of Excellence could be identified and be given priority for upgrading existing facilities.

- Training institutions such as polytechnics/ITIs should specialise in a few specific fields so as to optimise their use of equipment, facilities and expertise.

2) **Expanding the Accreditation of Skills**

- Review the accreditation of skills to include skills in the new and emerging technologies. A high-level committee should be set up to review the accreditation of all skills.

- Expand the accreditation system to include skills higher than the advanced level.

- Explore the possibility of accreditation for master craftsman so that there is a career path for skilled craftsman.

- Expand private sector involvement in the accreditation of skills.

- Explore avenues for the upgrading of skilled workers to technicians and higher level job for the NVTC certificate holders.

3) **Establishing a National Information Technology Board**

- Currently, there are many public sector organisations which are involved in training, R&D and consultancy activities in the field of information technology. There is therefore a need to establish an Information Technology Board to formulate policies, as well as implement, coordinate and manage IT activities. **(Appendix VII).**

7. CONCLUSION

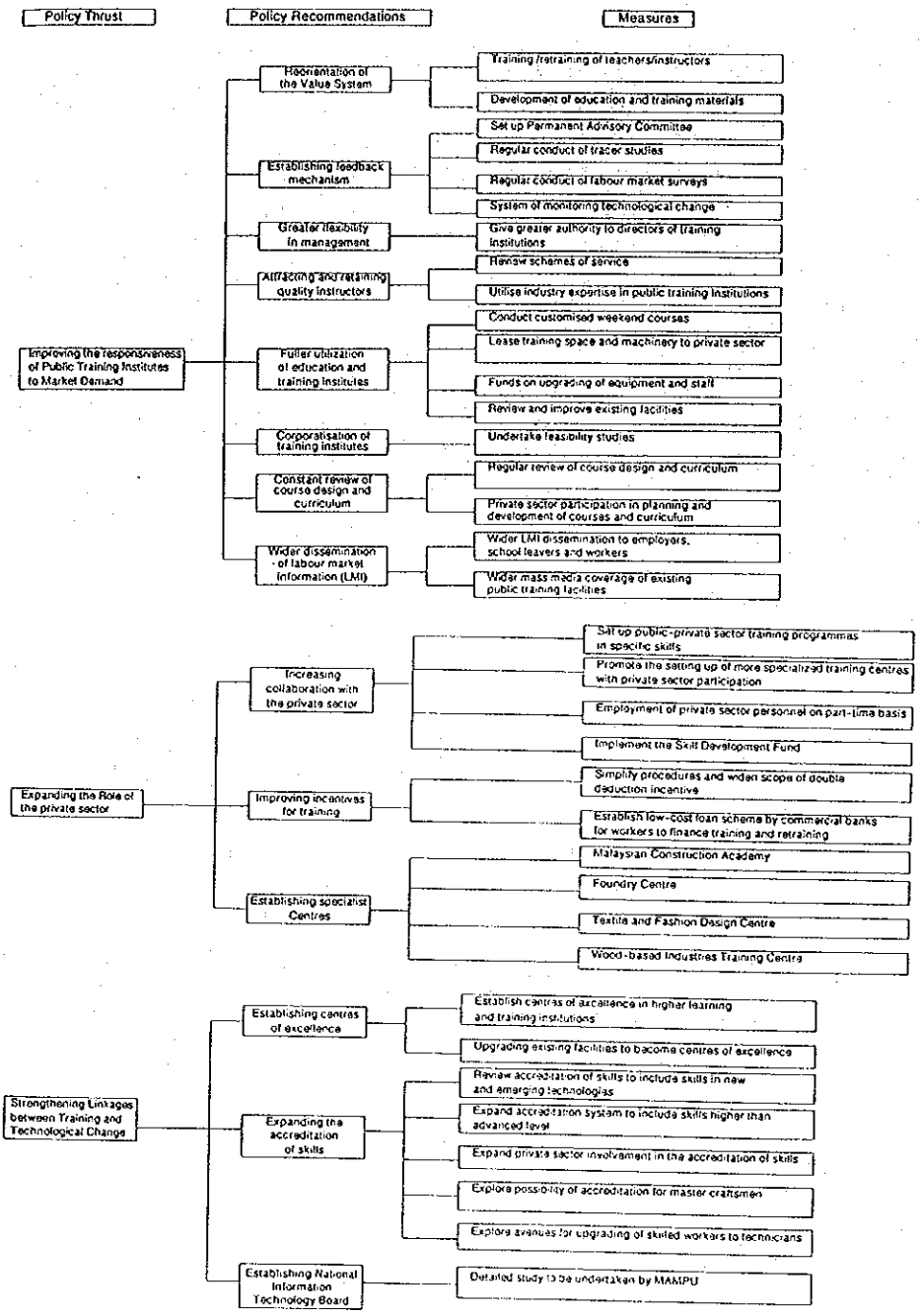
The growth prospects for the Malaysian economy during the next five years are favourable, with the manufacturing and the construction sectors contributing close to 50 per cent of total GDP growth. These sectors will also account for a substantial proportion of new jobs created in the economy. In the face of keen international competition, the survival and continued dynamism of these industries will depend on their ability to undertake structural adjustments and technological change. Even now, these industries are facing skill bottlenecks that constrain their growth momentum. Thus, for these industries to forge ahead in the 1990's, it is critical that these problems are urgently addressed.

While the existing skill delivery system, thus far, has been able to meet some of the industrial skill requirements, there is strong indication that it has not been able to meet the manpower demand of industry satisfactorily. According to feedback, public training institutions are not demand-driven, that is, their output have not matched actual industry requirements. It is clear that for the industries to leap forward without experiencing skill bottlenecks, the

present training arrangements would have to be reviewed. This is not only to ensure increased skill output, but also to fulfil the qualitative aspects of future manpower requirements. A decision will have to made to replace the present skill delivery system with one which is more sensitive to market needs. This would require much greater inputs from the private sector which, after all, is the major user of skills.

It has to be recognised that the recommendations contained in this report are fundamental and cut across several agencies. The successful implementation of these recommendations will require not only concerted action, but also a single-minded determination by all parties concerned, in particular the Government and the private sector, to address current weaknesses.

RECOMMENDATIONS OF THE CABINET COMMITTEE ON TRAINING AND EMPLOYMENT



LIST OF ABBREVIATIONS AND ACRONYMS

ACEM	-	Association of Consulting Engineers, Malaysia
ATC	-	Advanced Skills Training Centre
CAD	-	Computer Aided Design
CAE	-	Computer Aided Engineering
CAM	-	Computer Aided Manufacturing
CIM	-	Computer Integrated Manufacturing
CIAST	-	Centre for Instructors and Advanced Skill Training
CNC	-	Computer Numerical Control
EPF	-	Employees Provident Fund
EPU	-	Economic Planning Unit
FMM	-	Federation of Malaysian Manufacturers
GDP	-	Gross Domestic Product
HICOM	-	Heavy Industries Corporation of Malaysia
IKM	-	Mara Skills Institute
INTAN	-	National Institute of Public Administration
IT	-	Information Technology
ITM	-	Mara Institute of Technology
ITI	-	Industrial Training Institute
JICA	-	Japan International Cooperation Agency
KEMAS	-	Community Development
MARA	-	Majlis Amanah Rakyat (Council of Trust for the Indigenous People)
MCIG	-	Malaysian Ceramic Industry Group
MIDA	-	Malaysian Industrial Development Authority
MIMOS	-	Malaysian Institute of Microelectronics System
MTIB	-	Malaysian Timber Industry Board
NPC	-	National Productivity Centre
NDT	-	Non-Destructive Testing

PKKM	-	Malaysian Handicraft Development Corporation
PRIM	-	Plastics and Rubber Institute, Malaysia
R&D	-	Research and Development
NVTC	-	National Vocational Training Council
SIRIM	-	Standards and Industrial Research Institute of Malaysia
TEEAM	-	The Electrical and Electronic Association of Malaysia
TITC	-	Timber Industry Training Centre
UPM	-	University of Ariculture Malaysia
USM	-	University of Science Malaysia
UTM	-	University of Technology Malaysia

APPENDIX I

COORDINATION COMMITTEE ON TRAINING

Chairman	:	1.	Y. Bhg. Dato' Mohd. Sheriff Kassim, Director-General, Economic Planning Unit.
Alternate Chairman	:	2.	Tuan Hj. Ahmad Hassan, Economic Planning Unit. *(until 31 October 1990)*
		3.	Encik Ali Abul Hassan Sulaiman, Economic Planning Unit. *(from 1 November 1990)*
Members	:	4.	Encik Abdul Habib Mansor, Public Services Department.
		5.	Tuan Hj. Abdullah Hj. Hassan, Ministry of Energy, Telecoms and Posts.
		6.	Encik Asmadi Md. Said, Standards and Industrial Research Institute of Malaysia.
		7.	Encik Asnan Pi'i, Manpower Department.
		8.	Y. Bhg. Dato' Baharuddin Hj. Ghazali, Malaysian Timber Industry Board.
		9.	Encik Jamaluddin Hamid, Majlis Amanah Rakyat (MARA).
		10.	Dr. Johari Mat, National Institute of Public Administration.

11. Encik Kong How Kooi,
Ministry of Science, Technology and Environment.

12. Encik Lee Mun Swee,
Department of Statistics.

13. Encik Lim Boh Ang,
Ministry of Human Resources.

14. Encik Mohd. Akbar Baba,
Economic Planning Unit.

15. Y. Bhg. Dato' Mohd. Hussein Ahmad,
Ministry of Education.

16. Encik Mohd. Zahari Hj. Mokhtar,
Ministry of Youth and Sports.

17. Ir. Dr. Nordin Yunus,
Public Works Department.

18. Tuan Hj. Othman Rijal,
Ministry of Finance.

19. Encik Rozikin Hamzah,
National Vocational Training Council.

20. Tuan Hj. Samsuddin Marsop,
Min. of International Trade and Industry.

21. Tuan Syed Azmi Syed Hamid,
MIMOS.

		22.	Dr. Syed Muhamad Syed Abdul Kadir, Ministry of Education.
		23.	Encik P. Venugopal, MAMPU.
Secretary	:	24.	Encik Zainol Abidin Abd. Rashid, Economic Planning Unit.
Secretariat	:	25.	Encik Rabbi Royan, Economic Planning Unit.
		26.	Cik Yap Kim Lian, Economic Planning Unit.
		27.	Encik Victor Wee, Economic Planning Unit.
		28.	Encik Wan Abdul Aziz Wan Abdullah, Economic Planning Unit.
		29.	Encik K. Thillainadarajan, Economic Planning Unit.
		30.	Cik Pauline Chum Siew Min, Economic Planning Unit.
		31.	Puan Siti Halimah Ismail, Economic Planning Unit.
		32.	Encik Kamarul Ariffin Ujang, Economic Planning Unit.

Appendix I

LIST OF MEMBERS IN THE WORKING GROUPS

Working Group for the Electrical and Electronic Industry

Chairman : 1. Dato' Helmi Mohd. Noor
Secretary General,
Ministry of Energy, Telecommunications and Posts

Members : 2. Ir. Abdul Hamid Osman
Department of Electric Supply

3. Tuan Haji Abdul Majid Abdullah
Syarikat Telekom Malaysia.

4. Tuan Haji Abdullah b. Haji Hassan
Ministry of Energy, Telecommunications and Posts

5. Encik Ahmad Zabri Ibrahim
Ministry of Youth and Sports

6. Cik Cheah Saw Hong
Malaysian Industrial Development Authority

7. Cik Chew Swee Leng
Federation of Malaysian Manufacturers
and Malaysian Electrical Industry Group

8. Encik Chin Loi Young
Ministry of Energy, Telecommunications and Posts

9. Encik Effendi Abdul Rahman
Federation of Malaysian Manufacturers

10. Puan Gnanambigai Tharmarajah
Ministry of Energy, Telecommunications and Posts

11. Encik Gurdev Singh
    Manpower Department

12. Puan Inon Abdul Hamid
    Malaysian Industrial Development Authority

13. Encik K. Thiruchelvam
    Ministry of Science, Technology and Environment

14. Puan Mazidah Dato' Abdul Majid
    Public Services Department

15. Tuan Haji Md. Hashim b. Bujang
    Ministry of Human Resources

16. Dr. Mohamad Othman
    Syarikat Telekom Malaysia.

17. Encik N. Dharmalingam
    National Electricity Board

18. Encik Ng Eng Soon
    National Electricity Board

19. Encik Ramli Mahmud
    Ministry of International Trade and Industry

20. Tuan Saiyed Rasol Tuan Muda
    Malaysian Institute of Micro-electronic System

21. Encik Tan Hock Ghee
    Ministry of Education

22. Encik Wan Abdul Aziz b. Wan Abdullah
    Economic Planning Unit

23. Encik Wan Hussein Wan Endot
    National Electricity Board

24. Cik Yap Kim Lian
    Economic Planning Unit

25. Dr. Yeoh Oon Lee
    Federation of Malaysian Manufacturers

26. Dr. Zainal Abidin Ahmad
    Universiti Teknologi Malaysia.

27. Encik Zainol Abidin Abd. Rashid
    Economic Planning Unit

Appendix I

Working Group for the Wood-based Industry

Chairman : 1. Dato' Baharuddin Hj. Ghazali
Malaysian Timber Industry Board

Members : 2. Encik A. Malek Bidin
Majlis Amanah Rakyat.

3. Tuan Haji Abdul Aziz b. Abdul
Majlis Amanah Rakyat.

4. Encik Abdullah Ali
Ministry of Human Resources

5. Encik Allaudin Anuar
Economic Planning Unit

6. Encik Chew Lye Teng
Malaysian Timber Industry Board

7. Cik Pauline Chum Siew Min
Economic Planning Unit

8. Encik Esparan Munusamy
Ministry of International Trade and Industry

9. Encik Goh Cheng Meng
Federation of Malaysian Manufacturers

10. Tuan Hj. Ishak Abd. Ghani
Furniture and Wood Products Manufacturers Association of Malaysia

11. Encik Kamaruddin Hassan
Majlis Amanah Rakyat.

12. Encik Mohd. Khairi Abd. Karim
Malaysian Timber Industry Board

13. Encik Mohd. Zin Jusoh
Universiti Pertanian Malaysia.

14. Encik Paul Ng
Sime Hyundai Wood Industries.

15. Encik Nik Mahmood Hassan
Federation of Associations of Furniture Manufacturers and Traders Malaysia

16. Encik Ooi Seng Hock
Malaysian Timber Industry Board

17. Dr. Razali A. Kader
Universiti Pertanian Malaysia.

18. Encik Saharudin Mat Ajil
Economic Planning Unit

19. Cik Sia Ka Ngan
Ministry of Education

20. Encik Raymond Tan
Sabah Foundation

21. Encik Wahab Abd. Razak
Federation of Associations of Furniture Manufacturers and Traders Malaysia

22. Encik Victor Wee
Economic Planning Unit

23. Encik Wong Wing Chong
Forest Research Institute Malaysia

24. Cik Yap Kim Lian
    Economic Planning Unit

25. Encik David Yung
    Sarawak Economic Development Corporation

26. Puan Zainab Abdul Karim
    Economic Planning Unit

27. Puan Zanifa Md. Zain
    Ministry of Human Resources

28. Encik Zulkefli Haron
    Malaysian Timber Industry Board

Appendix I

Working Group for the Selected Manufacturing Industry

Chairman : 1. Dr. Ahmad Tajuddin Ali
Standard Institution and Industrial Research of Malaysia

Members : 2. Encik Abdul Khalid Othman
Economic Planning Unit

3. Encik Ahmad Takiyuddin
Heavy Industries Corporation of Malaysia

4. Encik Asmadi Md. Said
Standard Institution and Industrial Research of Malaysia

5. Cik Chew Swee Leng
Gabungan Perindustrian Besi dan Besi Waja Malaysia.

6. Encik Goh Hong Yen
Gabungan Perindustrian Besi dan Besi Waja Malaysia.

7. Ir. Harminder Singh
Factory and Machinery Department

8. Encik Md. Hashim b. Bujang
Ministry of Human Resources

9. Dr. Mohamad Shariff b. Nabi Baksh
Universiti Teknologi Malaysia.

10. Encik Ramli b. Hitam
Advanced Skill Training Centre, Sepang.

11. Encik Rashid Esoofi Mamajiwalla
    Manpower Department

12. Encik Samsudin Marsop
    Ministry of International Trade and Industry

13. Encik Shamsul Anuar Yaakub
    Ministry of Human Resources

14. Dr. Yeoh Oon Lee
    Federation of Malaysian Manufacturers

Appendix I

Working Group on the Construction Industry

Chariman : 1. Tuan Hj. Abdul Rahman Abdullah
Director, Quantity Survey Division
Public Works Department

Members : 2. Encik Ahmad Mansor
Public Works Department

3. Puan Alinda Abdul Ranee
Public Works Department

4. Encik Aminuddin Abdul Karim
Public Services Department

5. Encik Amir Abdullah
National Vocational Training Council

6. Ir. T.T. Chiam
Institute of Engineers, Malaysia.

7. Encik Goh Chye Keat
Master Builders Association of Malaysia.

8. Encik Ishak Kamaruddin
Persatuan Pemborong-Pemborong Binaan Bumiputera Malaysia.

9. Encik Kong Yee Peng
Master Builders Association of Malaysia.

10. Puan Lim Soh Woh
Department of Statistics

11. Encik Kandan Saikon
Majlis Amanah Rakyat

12. Tuan Haji Mansur Ramli
    Public Works Department

13. Encik Mohamad Othman Zainal Azim
    Public Works Department

14. Encik Mahmod Basar
    Ministry of Education

15. Encik Mohd. Zahudi Jalil
    Majlis Amanah Rakyat

16. Encik Mohd. Zahari Hj. Mokhtar
    Ministry of Youth and Sports

17. Encik Mohd. Zain Sulong
    Bumiputera Contractors Association of Malaysia

18. Puan Normah Mohd. Aris
    Department of Statistics

19. Dr. Nordin Yunus
    Public Works Department

20. Dr. Ooi Teik Aun
    Institute of Engineers, Malaysia.

21. Encik Salam Awang
    Bumiputera Contractors Association of Malaysia

22. Encik S.M. Siah
    Master Builders Association of Malaysia.

23. Ir. Sodri Ariffin
    Institut Teknologi MARA.

24. Ir. Soo Tian Tong
    Public Works Department

25. Encik Tahir Majid
Universiti Teknologi Malaysia.

26 . Encik Roy Tan
Electrical and Electronic Association of Malaysia

27 . Encik Teng Cheong Ming
Master Builders Association of Malaysia.

28. Encik Wan Abdul Aziz b. Wan Abdullah
Economic Planning Unit

29. Ir. Wan Ngah Wan Ali
Public Works Department

30. Dr. C.C. Wong
Association of Consulting Engineers Malaysia

31. Encik Woo Fay Meng
Public Works Department

32. Cik Yap Kim Lian
Economic Planning Unit

33. Encik Yau Chin Chong
Malaysian Industrial Development Authority

34. Encik Yusoff Harun
Ministry of Education

35. Ir. Zainol Rashid Zainuddin
Public Works Department

Appendix I

Working Group for the Textile Industry

Chairman :

1. Encik Samsudin Marsop
   Director, Industrial Development
   Ministry of International Trade and Industry

Members :

2. Abang Othman bin Abang Yusof
   Ministry of Education

3. Dato' Ali bin Esa
   Malaysian Textile Manufactures Association

4. Encik Borhanuddin Ramli
   Ministry of International Trade and Industry

5. Encik Chiang Sui Min, Hugh
   Malaysian Textile Manufactures Assocation

6. Encik Choy Ming Bil
   Malaysian Textile Manufactures Association

7. Cik Pauline Chum Siew Min
   Economic Planning Unit

8. Encik Effendi Abdul Rahman
   Federation of Malaysian Manufacturers

9. Encik Goh Cheng Meng
   Federation of Malaysian Manufacturers

10. Dr. Humam Haji Mohamed
    Institut Teknologi MARA.

11. Encik Jamaluddin b. Muhammed
    Institut Teknologi MARA.

12. Encik K.W. Lam
    Malaysian Textile Manufactures Association

13. Encik Liew Kam Ba
    Malaysian Textile Manufactures Association

14. Encik Mohamed Mat Ali
    Ministry of Human Resources

15. Encik Mohd. Zulkifli bin Abdul Rauf
    Ministry of International Trade and Industry

16. Encik Muad b. Kulop Mat Alip
    Manpower Department

17. Encik Nidzam Kamarulzaman
    Ministry of Human Resources

18. Encik Ooi Seong Hoe
    Manpower Department

19. Puan Dorothy F. Robert
    Department of Statistics

20. Encik Saw Lean Wah
    Malaysian Textile Manufactures Association

21. Encik Shamsul Anuar Yaakub
    Ministry of Education

22. Dr. Syed Muhamad b. Syed Abd. Kadir
    Ministry of Education

23. Encik Victor Wee Eng Lye
    Economic Planning Unit

24. Encik Yaakub Arshad
    Malaysian Industrial Development Authority

25. Encik Yap Fong Kong
    Federation of Malaysian Manufacturers

26. Cik Yap Kim Lian
    Economic Planning Unit

27. Encik Yau De Piyau
    Ministry of Human Resources

28. Dr. Yeoh Oon Lee
    Federation of Malaysian Manufacturers

29. Encik Zahid Zakaria
    Ministry of International Trade and Industry

30. Puan Zaiton Hj. Ahmad Jalaluddin
    Institut Teknologi MARA.

Appendix I

Working Group for the Information Technology Industry

Chairman : 1. Dr. Johari Mat
Director,
National Institute of Public Administration

Members : 2. Encik Abdul Aziz b. Yusof
National Institute of Public Administration

3. Encik Dan Ee
New Straits Times.

4. Cik Fazidah Ahmad
Federation of Malaysian Manufacturers

5. Encik Kamil Arif
Computer Industry Association of Malaysia.

6. Encik Hamzah b. Abd. Aziz
Ministry of International Trade and Industry

7. Puan Kang Lay Kim
Malaysian Industrial Development Authority

8. Puan Kee Kerng Cheng
Malaysian Industrial Development Authority

9. Encik Kudratullah Fatimy b. Affandi
Public Services Department

10. Encik Lau Boon Ling
National Institute of Public Administration

11. Encik David Lee
    Computer Industry Association of Malaysia.

12. Prof. Lee Poh Aun
    National Federation of Computer, Malaysia.

13. Encik Mohd. Adzam Musa
    National Institute of Public Administration

14. Encik Mohd. Mat Ali
    Ministry of Human Resources

15. Encik Mohd. Seth Hj. Abu Bakar
    Ministry of Human Resources

16. Encik Mohd. Azli Abdullah
    National Institute of Public Administration

17. Encik Mohd. Yusof Mohd. Johar
    Institut Tadbiran Awam Negara.

18. Encik Musa Mohd. Lazim
    Universiti Teknologi Malaysia.

19. Encik Parmjit Singh
    National Association of Private and
    Independent Educational Institutes.

20. Dr. Rahim b. Haji Daud
    Syarikat Telekom Malaysia.

21. Encik Ramli Mahmud
    Ministry of International Trade and Industry

22. Cik Ruwaidah Othman
National Institute of Public Administration

23. Encik Shafie Mehad
Institut Teknologi MARA

24. Encik Shamsul Amar Yaakub
Ministry of Education

25. Encik Sumali Amat
Public Services Department

26. Encik Wan Rosdi Dolah
Malaysian Administration Modernization and Management Planning Unit (MAMPU)

27. Dr. Yahya Ibrahim
National Association of Private and Independent Educational Institutes.

28. Cik Yap Kim Lian
Economic Planning Unit

29. Puan Zaharah Ali
National Institute of Public Administration

30. Encik Zainol Abidin b. Abd. Rashid
Economic Planning Unit

APPENDIX II

INVENTORY OF PUBLIC VOCATIONAL AND TECHNICAL INSTITUTES

1. Polytechnics - Ministry of Education, Technical and Vocational Education Division (TAVED)

At present, there are seven polytechnics in the country which are as follows:-

1)	Johor	-	Batu Pahat
2)	Kedah	-	Alor Setar
3)	Kelantan	-	Kota Bahru
4)	Negeri Sembilan	-	Port Dickson
5)	Pahang	-	Kuantan
6)	Perak	-	Ipoh
7)	Sarawak	-	Kuching

2. Industrial Training Institutes (ITIs) - Ministry of Human Resources

ITIs offer Skill Trade Certificate courses at all levels of National Industrial Training and Trade Certification Board (NITTCB) trade tests. The existing 10 ITIs are as follows :-

1)	Johor	-	Pasir Gudang
2)	Kedah	-	Alor Setar
3)	Kelantan	-	Kota Bharu
4)	Melaka	-	Bukit Katil
5)	Pahang	-	Kuantan
6)	Perak	-	Ipoh
7)	Pulau Pinang	-	Perai
8)	Terengganu	-	Kuala Terengganu

9)	Wilayah Persekutuan-	Kuala Lumpur
10)	Wilayah Persekutuan-	Labuan

3. Institut Kemahiran MARA (IKM) - MARA

There are at present 13 IKMs in the country. They are as follows :-

1)	Johor	-	Johor Bharu
2)	Kedah	-	Alor Setar
		-	Sungai Petani
3)	Melaka	-	Jasin
4)	Pahang	-	Pekan
		-	Beserah
5)	Perak	-	Lumut
6)	Sarawak	-	Kuching
7)	Selangor	-	Beranang
		-	Petaling Jaya
8)	Terengganu	-	Besut
		-	Kertih
9)	Wilayah Persekutuan	-	Kuala Lumpur

4. Pusat Giat MARA

Pusat Giat MARA are established to provide skill training appropriate to the needs of the local community. Presently, there are the following 15 Pusat Giat MARA:

1)	Kedah	-	Baling
		-	Jitra
3)	Kelantan	-	Kota Bharu
4)	Pahang	-	Bandar Muadzam Shah
		-	Jengka
		-	Kuantan
		-	Raub

5)	Perak	-	Grik
6)	Perlis	-	Kangar
7)	Pulau Pinang	-	Bukit Mertajam
8)	Selangor	-	Banting
9)	Terengganu	-	Kuala Terengganu
		-	Paka
		-	Setiu
10)	Melaka	-	Linggi

5. Youth Training Centres

Youth Training Centres are under the Ministry of Youth and Sports are located at the following places:

1)	Selangor	-	Advance Skill Training Centre (Sepang)
		-	Dusun Tua
		-	Pertak
2)	Terengganu	-	Kuala Trengganu

A new one will be opened at Jitra, Kedah soon, while ATC Sepang has started its operation in June,1990. The courses that it offers are at the intermediate NVTC level.

6. School-Based Training - TAVED

School-based technical and vocational education is provided by the secondary technical schools and the secondary vocational schools, under the Ministry of Education (the Technical and Vocational Education Division). The secondary technical schools are upper secondary schools equipped to teach technical subjects in four areas of mechanical engineering, civil engineering, commerce and agriculture. The list of the Secondary Technical Schools are as follows:

1)	Johor	-	Johor Bharu
2)	Kedah	-	Alor Setar
3)	Melaka	-	Bandar Melaka
4)	Negeri Sembilan	-	Seremban
5)	Pahang	-	Kuantan
6)	Perak	-	Ipoh
7)	Pulau Pinang	-	Bandaraya Georgetown
8)	Selangor	-	Sungai Buloh
9)	Terengganu	-	Kuala Terengganu

The secondary vocational schools offer two-year courses at the Form IV and V levels leading to the SPM(V) examinations or the NVTC basic level. With 46 secondary vocational schools at present and 12 more under construction, the future proposal will be to have one secondary vocational school in every district. The list of the Secondary Vocational Schools is as follows:

1)	Johor	-	Batu Pahat
		-	Johor Bharu
		-	Kluang
		-	Kota Tinggi
		-	Muar
		-	Segamat
2)	Kedah	-	Alor Setar
		-	Kulim
		-	Sungai Petani
3)	Kelantan	-	Kuala Krai
		-	Pasir Mas
		-	Pengkalan Chepa
		-	Tanah Merah
4)	Melaka	-	Alor Gajah
		-	Melaka Tengah
5)	Negeri Sembilan	-	Kuala Pilah
		-	Port Dickson
		-	Rembau
		-	Seremban
6)	Pahang	-	Bentong
		-	Chenor

		-	Kuala Lipis
		-	Kuala Rompin
		-	Kuantan
		-	Temerloh
7)	Perak	-	Ipoh
		-	Kuala Kangsar
		-	Slim River
		-	Taiping
		-	Telok Intan
8)	Perlis	-	Arau
		-	Kangar
9)	Pulau Pinang	-	Bandaraya Georgetown
		-	Butterworth
		-	Nibong Tebal
10)	Selangor	-	Kelang
		-	Sungai Buloh
11)	Terengganu	-	Besut
		-	Kemaman
		-	Kuala Terengganu
12)	Wilayah Persekutuan	-	Setapak

This list does not include the following 12 secondary vocational schools which are under construction:-

1)	Kedah	-	Pulau Langkawi
		-	Sungai Petani
2)	Negeri Sembilan	-	Kuala Kelawang
3)	Pahang	-	Bandar Muadzam Shah
4)	Perak	-	Bagan Serai
		-	Sri Iskandar
		-	Sri Manjung
5)	Pulau Pinang	-	Balik Pulau
6)	Sarawak	-	Kuching
7)	Selangor	-	Kajang
		-	Shah Alam

Appendix II

COURSES CONDUCTED AT PUBLIC VOCATIONAL AND TECHNICAL INSTITUTES

1. Polytechnics

Courses offered at the certificate and diploma level are as follows :

Certificate Level		*Duration of Course*
1)	Civil Engineering - Public and Waterworks	2 years
	- Construction	
2)	Architecture	
3)	Land Surveying	
4)	Highway Engineering	
5)	Quantity Surveying	
6)	Town Planning	
7)	Building services	
8)	Electrical Engineering (Power)	
9)	Electrical and Communication	
10)	Instrumentation and Control	
11)	Computer Technology	
12)	Automotive and Diesel	
13)	Mechanical - General	
	- Manufacturing/ Production	
14)	Air-Conditioning & Refrigeration	
15)	Plant Engineering	
16)	Agriculture	
17)	Business Studies	
18)	Secretarial Science	
19)	Book-keeping	
20)	Data Processing Technology	
21)	Food Processing	

Diploma Level		*Duration of Course*
1)	Computer Technology	]
2)	Electronics and Communications	]
3)	Manufacturing/Industrial Technology	]
4)	Electro - Mechanical Engineering	] 3 years
5)	Automotive Technology	]
6)	Accountancy	]
7)	Marketing	]
8)	Marine Engineering	]

2. Industrial Training Institutes (ITIs)

The craftsman training programmes offered at ITIs are the following:

Basic Level		*Duration of Course*
1)	Engineering	]
2)	Home Science	] 1 year
3)	One Year Skill Training	]

Intermediate Level

1)	Automotive	]
2)	Building	]
3)	Woodwork	]
4)	Electrical & Electronic	] 2 years
5)	Mechanical	]
6)	Printing	]
7)	Tailoring & Beauty Care	]
8)	Testing & Inspection	]
9)	Others, e.g Plastic, Glass, Ceramic Technologies	]

Advanced Level		*Duration of Course*
1)	Automotive	]
2)	Building	]
3)	Woodwork	] 1 additional
4)	Electrical & Electronics	] year
5)	Mechanical	]
6)	Draughting	]

3. Institut Kemahiran MARA - (IKM)

Some courses are offered in certain IKMs, which may not be available in other IKMs. Generally, courses offered in IKMs are as follows:

	Duration of Course
1) Building	
Bricklaying	]
Carpentary and Joinery	] 2 years
Painting and Building Decorating	]
Plumbing	]
2) Wood Working	
Furniture Making	] 2 years
Planning and Wood Moulding	] 1 1/2 years
Upholstery	] 2 years
Wood Designing	] 2 years
3) Electrical	
Electrician	]
Refrigeration and Air Conditioning	] 2 years
Equipment Mechanic	]

				Duration of Course
4) *Automotive*				
Mechanic	-	Motor	]	
	-	Heavy Machinery	]	
	-	Commercial and Heavy Machinery	]	2 years
	-	Marine Machinery	]	
Panel Beating and Spray Painting			]	
5) *Manufacturing*				
Saw	-	Doctoring	]	
	-	Milling	]	2 years
	-	Mill Mechanic	]	
Wood Drying and Tanalising			]	
6) *Tailoring and Beauty Care*				
Beauty Care and Hair Styling			]	
Tailoring	-	Male Clothes	]	1 year
	-	Female Clothes	]	
Fashion Design			]	
7) *Metal Works*				
General Mechanic			]	
Welding	-	Marine	]	
	-	Gas and Arc	]	
Machinist and Lathe			]	2 years
Sheet Metal Works			]	
Metal	-	Smelting	]	
	-	Fabrication	]	
	-	Plating	]	
8) *Electronic*				
Radio Mechanic			]	2 years
Electronic/Instrumentation			]	
9) *Drawing*				
Draugthting	-	Mechanical	]	
	-	Architectural	]	2 years
	-	Structural	]	

4. Pusat Giat MARA *Duration of Course*

Courses offered are as follows:

1)	Radio & Television	]
2)	Refrigeration & air-conditioning	]
3)	Electrical installation	] 1 year
4)	Panel-beating	]
5)	Spray-painting	]

5. Youth Training Centres

The courses offered at the Youth Training Centres are of two-years duration (include on-the-job attachments) and aimed at the NVTC basic and intermediate levels. The courses include training for wiremen and chargemen, refrigeration, air-conditioning, radio and television, automobile mechanics and agriculture production processing.

Courses offered at Advanced Skill Training Centre, Sepang (ATC) are as follows:

Duration of Course

1)	Tool and Die Maker - Press	]	
2)	Tool Maker	]	2 years
3)	Tool Design Draughtsman	]	
4)	Machinists - Turning	]	
	- Milling	]	
	- Drilling	]	
	- Boring	]	
	- Gear Cutting	]	1 year
	- Grinding.	]	
5)	Maintenance Mechanic - Mechanical	]	
6)	Electronic Mechanic - Industrial Equip.	]	

6. Secondary Vocational Schools

The courses offered at the vocational schools are as follows:

	Duration of Course
1) Engineering	
Electrical	]
Electronics	]
Machine Shop Practice	]
Welding & Fabrications	] 2 years
Automotive	]
Building Construction	]
Refigration & Air-conditioning	]
2) Home Science	
Catering	] 2 years
Fashion Design & Tailoring	]
Beautician	]
Child Care	]
Bakery & Confectionary	]
3) Commerce	
Management - Office	] 2 years
- Business	]
4) Agriculture	
Horticulture Scaping	]
Agriculture Engineering	] 2 years
Agriculture Management.	]

APPENDIX III

THE MALAYSIAN CONSTRUCTION ACADEMY

One of the biggest problems facing the construction industry is the lack of a disciplined, skilled and highly motivated workforce. The reason for this is that Malaysian workers have not undergone proper training where they can acquire the necessary knowledge, skills and attitudes in order to appreciate the need for team work, discipline and pride in work.

An industry association had submitted a proposal to establish the Malaysian Construction Academy which will act as a centre of excellence which provides advanced, industry-driven skills training and specialized training for artisans, supervisors and construction managers. This will supplement the training given at existing vocational schools and public training institutes.

The academy will adopt a strategy to:-

1) Identify the training needs of the industry;
2) Convert these needs into appropriate training programme;
3) Conduct programmes by providing practical, on-site training under actual working conditions;
4) Monitor the effectiveness of these programmes; and
5) Continuously update and review the curriculum.

The establishment of the academy will require close cooperation between the private and public sector.

APPENDIX IV

FOUNDRY TRAINING CENTRES

The foundry industry in Malaysia needs to be modernized in order to increase the productivity and quality of foundry products. A foundry park is in the process of being established in Perak while another will be sited in Selangor. Foundry training centres would be located in the foundry parks to provide common training facilities in technical as well as management skills for the industry. These foundry training centres will involved close cooperation between the private and public sector in terms of financing and operations.

APPENDIX V

PROPOSAL FOR A TEXTILE AND FASHION DESIGN CENTRE

The textile industry is one of the 12 industrial sectors identified for expansion by the Industrial Master Plan (IMP). The IMP has recommended that a Textile Centre be set up with the following objectives:

1) To provide trained and skilled manpower for the textile and apparel industry in Malaysia.

2) To undertake research concerning the textile and apparel industry.

3) To collect and disseminate information for the use of the textile and apparel industry.

4) To liaise closely with industry and the Government in planning and implementing the activities for the Centre.

A study mission was formed to look into all aspects of the textile and apparel industry in Japan, Hong Kong and Thailand (in 1989) with a view to developing various options for the setting up of the Centre. The mission submitted a report which proposes that a textile and apparel centre (to be known as MATAC - Malaysian Textile and Apparel Centre) be set up as soon as possible to address the acute shortage of trained and skilled manpower in the textile and apparel industry in Malaysia. Several discussions were held between the Government and the private sector on the proposed centre.

APPENDIX VI

WOOD-BASED TRAINING CENTRE

The idea of a Wood-Based Training Centre (WTC) was proposed by the Malaysian Timber Industry Board (MTIB) in mid-1988 with the main objective of training skilled workers (at operator and technician level) in woodworking, with emphasis on furniture production technology, quality control and finishing.

The proposed centre is to be located in the furniture park in Olak Lempit, Selangor Darul Ehsan, and the site has been acquired. The Government had approved the project and allocated a development budget as a launching grant for the land and building costs for the Wood-based Training Centre. The operation of the Centre is expected to be privatized.

APPENDIX VII

NATIONAL INFORMATION TECHNOLOGY BOARD

The setting-up of the National Information Technology Board (NITB) is aimed at the following:-

1) Manage, formulate and implement policies relating to IT in the public and private sectors, especially the Information Technology Policy, which is presently being drawn up by the National Information Technology Policy Committee.

2) Establish a central agency fully responsible for managing the implementation and ensuring the success of the IT programme and IT industry in the country.

3) Manage or coordinate IT-related training and development of human resources.

4) Provide expertise service in assisting and managing computerisation projects in the public sector.

5) Establish management, operation and technical standards to be used by the public and private sectors.

6) Act on and be proactive to new technological developments from the view point of systems, hardware and software through consortium.

Dicetak Oleh Perniagaan Rita – JPN K.L.