

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
ECONOMIC PLANNING UNIT
MALAYSIA

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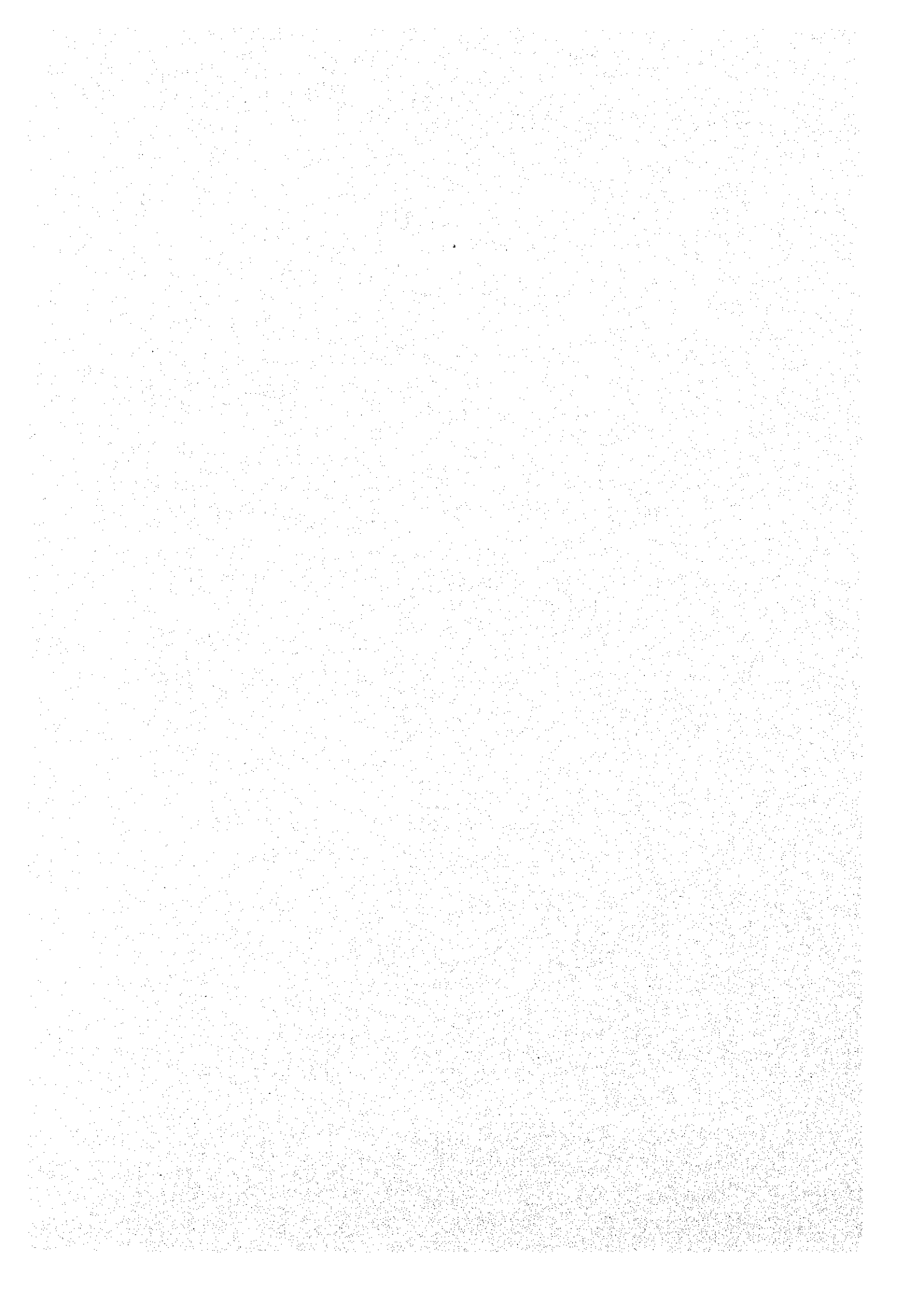
**STUDY ON MANAGEMENT AND PLANNING
OF
R & D SUPPORTING FACILITIES (TECHNO CENTRE)
FOR
KULIM HI-TECH INDUSTRIAL PARK
IN MALAYSIA**

FINAL REPORT

November 1995

**JAPAN INDUSTRIAL LOCATION CENTER
NIPPON KOEI CO., LTD**

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IN MALAYSIA**

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PREFACE

In response to a request from the Government of Malaysia, the Government of Japan decided to conduct the Study on Management and Planning of R&D Supporting Facilities (Techno Centre) for Kulim Hi-Tech Industrial Park in Malaysia, and the study was implemented by the Japan International Cooperation Agency(JICA).

JICA sent a study team, headed by Prof.Dr.Takashi Fujii of Japan Industrial Location Center (JILC) and organized by JILC and Nippon Koei Co.,Ltd., to Malaysia three times from March 1995 to October 1995.

The team held discussions with the officials concerned of Malaysia, and conducted field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

I hope that this report will contribute to the promotion of the industrial development and to the fostering of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of Malaysia for their close cooperation throughout the study.

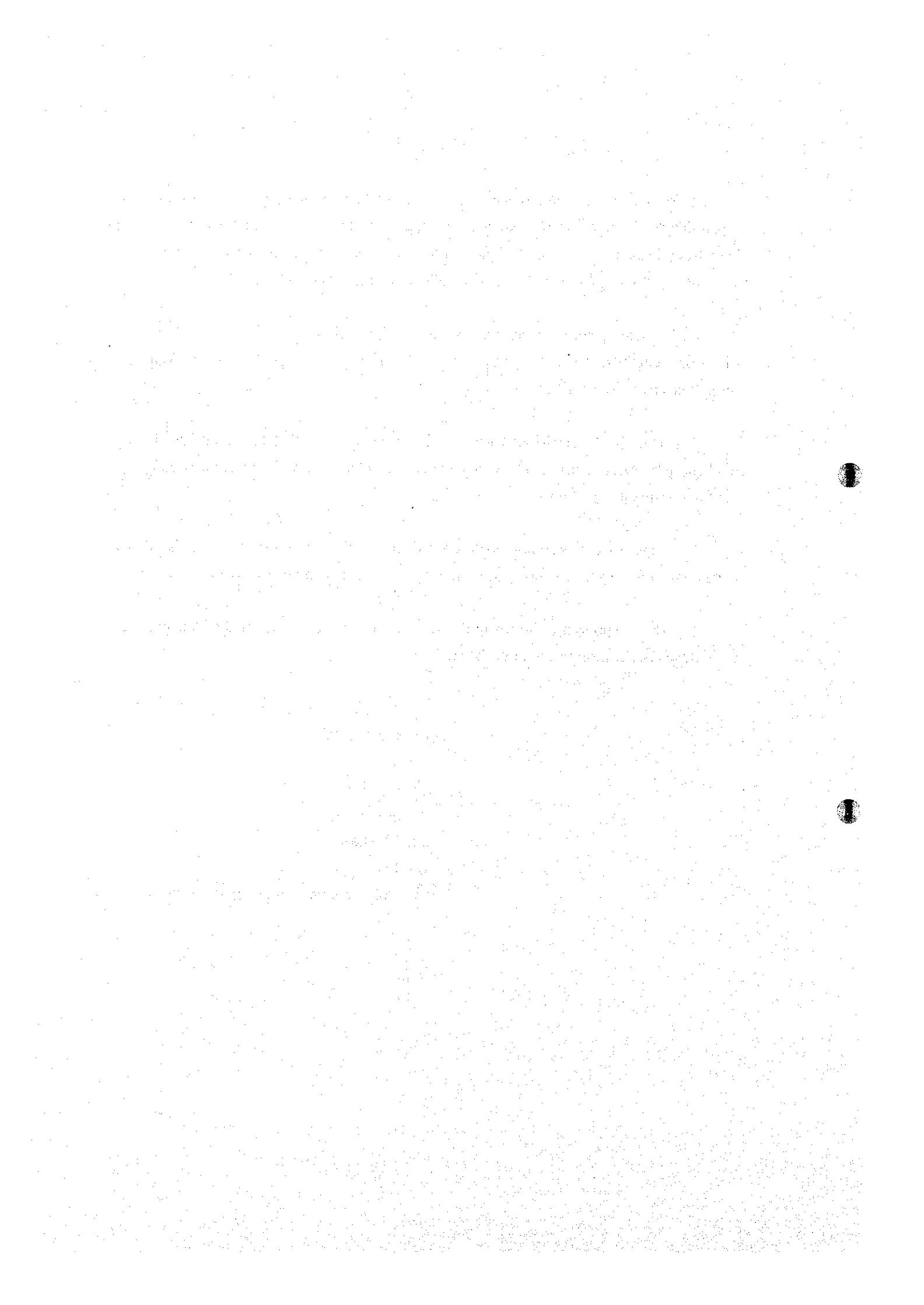
November 1995



Kimio Fujita

President

Japan International Cooperation Agency



November 1995

Mr. Kimio FUJITA
President
Japan International Cooperation Agency
Tokyo, Japan

Subject Letter of Transmittal

Dear Mr. FUJITA:

We are pleased to formally submit herewith the final report entitled "The Study on Management and Planning of R & D Supporting Facilities (Techno Centre) for Kulim Hi-Tech Industrial Park in Malaysia".

This report is a completion and analysis of the result of a study undertaken in Malaysia from March 1995 to November 1995 by a Study Team organized by the Japan Industrial Location Center and Nippon Koei Co., Ltd.

In this report, Kulim Techno Centre is proposed as an organization comprising six different functions. In particular, three centres are the Electronics Testing Centre, the Material & Surface Analysis Centre, and Environmental Analysis Centre, which have the most important roles in solving the problems (lack of human resources, among others) in Malaysian Industry, to improve abilities in R & D, and to advance conformity with worldwide standardization in manufacturing.

We owe much to many people for the accomplishment of this report. First, we would like to express our deep appreciation and sincere gratitude to all those who extended their kind assistance and cooperation to the Study Team, in particular Malaysian officials concerned in the Economic Planning Unit, the Ministry of Science, Technology and Environment, the Kedah State Development Corporation, and the Malaysia Industrial Development Corporation.

We also acknowledge the officials of your agency, the Ministry of Foreign Affairs, the Ministry of International Trade and Industry, and the Embassy of Japan in the Malaysia.

We hope the report will be a realistic and attainable contribution to the Malaysian people and their future industrial development.

Yours Faithfully,



Takashi FUJII

Team Leader
The Study Team for
The Study on Management and Planning of
R & D Supporting Facilities (Techno Centre)
for Kulim Hi-Tech Industrial Park in
Malaysia





Architectural Image of Kulim Techno Centre

CONTENTS

INTRODUCTION	(i)
I. OVERVIEW OF THE BACKGROUND OF THE STUDY	(I- 1)
I.1 Current Situation and Prospects of Malaysian Economy and Industry	(I- 1)
I.2 Present status and Policy of Science and Technology Development in Malaysia	(I-18)
I.3 Present Human Resource Development and Policy	(I-38)
II. REVIEW OF EXISTING PLAN	(II- 1)
II.1 Objectives of KHTP Development	(II- 1)
II.2 Present Status of KHTP Project	(II- 4)
II.3 KHTP's Role in Regional Plan and National Objectives	(II-13)
III. DEMAND FOR TECHNO CENTRE	(III- 1)
III.1 Framework and Method of Needs Analysis	(III- 1)
III.2 Questionnaire Survey Results	(III- 5)
III.3 Results of the Cross Section Interview Survey	(III-13)
III.4 Evaluation of Needs for the Techno Centre	(III-19)
III.5 Needs from Industrial Structural Shifts	(III-24)
IV. CONCEPT FOR TECHNO CENTRE	(IV- 1)
IV.1 Strategic Management Plan for Techno Centre	(IV- 1)
IV.2 Functions and Services	(IV- 6)
IV.3 Organization	(IV-16)
IV.4 Formation of Techno Centre	(IV-19)
IV.5 Roles of Related Organizations	(IV-31)
IV.6 Function/Services/Facilities/Equipment of Techno Centre	(IV-35)
IV.7 Selection of Facilities and Equipment	(IV-70)

Annex

1. Company List of Questionnaire Survey (A1-1)
2. Tabulation of Questionnaire Survey (A2-1)
3. List of Enterprises for Interview Survey (A3-1)
4. List of Equipment (A4-1)
5. Architectural Design (A5-1)
6. Financial Analysis (A6-1)
 - Type A (Lease-type Management) (A6-1)
 - Type B (Total Management-type) (A6-15)
 - Type C (Lease-type Management) (A6-27)
7. Current Status of R & D Organizations and Universities (A7-1)
8. The similar Facilities and Functions of Kulim Techno Centre in the world (A8-1)
9. Outline of Selected Equipment (A9-1)

List of Figures

		Page
Figure I .1.1	Trend of Number Employed by Sector	1 - 2
Figure I .1.2	Growth of Export: Selected Indicator (RM million)	1 - 3
Figure I .1.3	Foreign Investment by Industry (RM billion)	1 - 4
Figure I .1.4	Foreign Investment by Country (RM billion)	1 - 5
Figure I .1.5	Schematic of Economic Development Plan	1 - 6
Figure I .1.6	Trend of GDP by Sector	1 - 7
Figure I .1.7	Trend of Number Employed by Agriculture, Forestry and Fishing Industry / Manufacturing Industry	1 - 8
Figure I .1.8	Industrial Corridor	1 - 13
Figure I .2.1	R & D Expenditure per GNP (%)	1 - 19
Figure I .2.2	R & D Expenditure per Researcher (RM '000)	1 - 19
Figure I .2.3	Researcher per Population and Work Force	1 - 20
Figure I .2.4	Researcher by Sector	1 - 21
Figure I .2.5	R & D Expenditure by Sector	1 - 21
Figure I .2.6	Field of R & D Expenditure by Country	1 - 22
Figure I .2.7	Field of R & D Expenditure by Sector	1 - 22
Figure I .2.8	R & D Expenditure by State	1 - 24
Figure I .2.9	Proposed Expansion of IRPA for Greater Industry Focus	1 - 27
Figure I .2.10	Allocation, Nos. of approved programmes and projects under IRPA	1 - 28
Figure I .2.11	Allocation of IRPA	1 - 28
Figure I .2.12	Distribution of Government Research Organizations	1 - 30
Figure I .2.13	Business Enterprise R & D Expenditure by Type of Ownership (%)	1 - 31
Figure I .2.14	Business Enterprise R & D Expenditure by Industrial Classification (%)	1 - 32
Figure I .2.15	Industrial Technology Development A National Plan of Action	1 - 35
Figure I .3.1	Location of Higher Education Organizations	1 - 39
Figure I .3.2	Higher Education Organizations around KHTP and Future Plans	1 - 44
Figure I .3.3	Researcher by Sector	1 - 49
Figure I .3.4	Researcher by Research Field	1 - 49
Figure I .3.5	Trainees from Malaysia in 1993	1 - 52
Figure I .3.6	Movement of SPM Holders and Facilities in Higher Educational Institutions	1 - 54

Figure I .3.7	Machinery Imports	1 - 57
Figure I .3.8	Direction of Human Resource Development	1 - 63
Figure II .2.1	Development Plan of KHTP	2 - 6
Figure II .2.2	Layout Plan of Phase I (Industrial Zone)	2 - 7
Figure II .2.3	Proposed KHTP Management Organizations in 1992	2 - 11
Figure II .2.4	Existing Organization System for Development Promotion of KHTP	2 - 12
Figure II .3.1	Population Transition in the State of Kedah, Penang and Perak	2 - 14
Figure II .3.2	Transition of GDP in the State of Kedah, Penang and Perak	2 - 14
Figure II .3.3	Transition of Per Capita GDP in the State of Kedah, Penang and Perak	2 - 14
Figure II .3.4	Status of Social Economy by Region	2 - 25
Figure II .3.5	New Strategic Industrial Corridor	2 - 26
Figure II .3.6	Northern Growth Triangle	2 - 27
Figure III .1.1	Framework of Needs Analysis	3 - 1
Figure III .1.2	Target Surveyed	3 - 2
Figure III .1.3	Work Flow of the Survey on Present Status and Demand	3 - 4
Figure III .2.1	Current Problems on Management and Operations	3 - 7
Figure III .2.2	Current Problems on R & D by Manufacturing Type	3 - 8
Figure III .2.3	Expansion Plan on R & D	3 - 8
Figure III .2.4	Fields of R & D in the Future	3 - 9
Figure III .2.5	Current Problems on Human Resource Development	3 - 9
Figure III .2.6	Expansion Plan on Human Resource Development	3 - 10
Figure III .2.7	Interest in Locating in KHTP and in Utilizing the Techno Centre	3 - 10
Figure III .2.8	Expected Services to the Techno Centre	3 - 11
Figure III .2.9	Expected Facilities in Utilizing the Techno Centre	3 - 11
Figure III .3.1	Interest in Locating in KHTP and in Utilizing the Techno Centre by Interview Survey	3 - 15
Figure III .4.1	Results of Confirmed Questionnaire Survey	3 - 21
Figure III .5.1	Three Sifts for Industrial Development	3 - 26
Figure III .5.2	Shift Toward R & D	3 - 28
Figure III .5.3	Production Cycle and Malaysian Industrial Development	3 - 30
Figure III .5.4	Hard Disk Industry in Penang	3 - 37
Figure III .5.5	Manufacturing and Testing / Analysis	3 - 40
Figure IV .2.1	Three Shifts and Services of Techno Centre	4 - 7

Figure IV .3.1	Functions, Services and Organization Chart of Techno Centre	4 - 18
Figure IV .4.1	Proposals for Techno Centre Organization	4 - 23
Figure IV .4.2	Relationship between Techno Centre and each Centre	4 - 25
Figure IV .4.3	Techno Centre Operation Structure	4 - 26
Figure IV .4.4	Structure of Techno Centre Project Promotion	4 - 28
Figure V .1.1	1st Phase Layout Plan	5 - 2
Figure V .2.1	Spatial Relationship of Business and R & D Core	5 - 3
Figure V .3.1	Techno Centre Layout Plan	5 - 6
Figure V .3.2	Site Condition for Techno Centre	5 - 7
Figure V .4.1	Function & Spatial Relationship	5 - 12
Figure V .4.2	Techno Centre Ground Floor Plan	5 - 16
Figure V .4.3	Techno Centre 1st Floor Plan	5 - 17
Figure V .4.4	Techno Centre 2nd Floor Plan	5 - 18
Figure V .4.5	Techno Centre Elevation & Section	5 - 19
Figure V .4.6	Anechoic Chamber	5 - 20
Figure VI .4.1	Equipment Utilization Rate	6 - 24
Figure VI .4.2	Income before Tax & Cumulative income (Lease-Type Management)	6 - 28
Figure VI .4.3	Repayment Schedule (Lease-Type Management)	6 - 29
Figure VI .4.4	Debt Service Management	6 - 30
Figure VII .1.1	Implementation Plan	7 - 3

List of Tables

		Page
Table I .1.1	Trend of Major Economic Indicators	1 - 1
Table I .1.2	Trend of Output of Major Industrial Production (RM million)	1 - 3
Table I .1.3	Major Economic Indices in the NDP and the MP6	1 - 10
Table I .1.4	Import Structure Ratio by Function	1 - 14
Table I .1.5	Trend of Employment	1 - 15
Table I .1.6	Trend of Starting Salary by Academic Career at Japanese Corporation in Malaysia	1 - 16
Table I .2.1	R & D Expenditure by Field of Research (FOR)	1 - 25
Table I .2.2	R & D Expenditure by Field of Research (FOR) per Researcher (FTE)	1 - 25
Table I .2.3	Summary of Major R & D Organizations and Universities	1 - 29
Table I .3.1	Science-Technology Oriented Faculties in Universities	1 - 40
Table I .3.2	Departments and Divisions in Polytechnics	1 - 43
Table I .3.3	Changing of Capacity in Public Training Organization	1 - 45
Table I .3.4	Major Training Centres	1 - 48
Table I .3.5	Training at CIAST	1 - 50
Table I .3.6	Training at NPC	1 - 51
Table I .3.7	Training at AOTS	1 - 51
Table I .3.8	Technical High School Graduates	1 - 53
Table I .3.9	Capacity of Universities and Polytechs	1 - 53
Table I .3.10	Capacity of Public Training Centres (long-term Training)	1 - 54
Table I .3.11	Estimate of the Number of Skilled/Semi-Skilled Workers in Kedah State	1 - 54
Table I .3.12	Labour Demand and Targets	1 - 56
Table I .3.13	Training Organizations by Career	1 - 58
Table I .3.14	Human Resource Development by IMP	1 - 60
Table II .2.1	Land Use of KHTP	2 - 4
Table II .2.2	Outline Plan of SIRIM and MIMOS in KHTP	2 - 5
Table II .2.3	Land Use Plan in Hi-Tech Core	2 - 7
Table II .2.4	List of Admission or under negotiation Companies	2 - 10
Table II .3.1	Major Economic Indices in the State of Kedah, Penang and Perak	2 - 15
Table II .3.2	Transition of Major Industries in Kedah State	2 - 15
Table II .3.3	Industrial Parks in Kedah State (As of 1994)	2 - 16

Table II .3.4	Employment in Industrial Estates in Kedah State (1987-1994)	2 - 16
Table II .3.5	Transition of Manufacturing Industry in Penang State	2 - 17
Table II .3.6	Manufacturing by Businesses in PDC Region	2 - 18
Table II .3.7	Major Economic Indices in the States of Kedah, Penang and Perak	2 - 20
Table II .3.8	Industry-by-Industry GDP Plans in the States of Kedah, Penang and Perak	2 - 20
Table II .3.9	Major Economic Indices in KDAP State	2 - 21
Table III .2.1	Replied Numbers of Questionnaire Survey	3 - 6
Table III .2.2	Interest in KHTP and Techno Centre	3 - 12
Table III .3.1	Expected Equipment for Techno Centre by Interview Survey	3 - 17
Table III .4.1	Nos. of Enterprises with High Probability of Utilization of the Techno Centre	3 - 20
Table III .4.2	Expansion Coefficient to Estimate by Industries	3 - 22
Table III .4.3	Estimate of Overall User's Demand for the Techno Centre	3 - 23
Table IV .2.1	Scope of Services at Techno Centre	4 - 15
Table IV .4.1	Relative Merits of Public Bodies and Private Bodies	4 - 24
Table IV .4.2	Techno Centre Management Structure	4 - 27
Table IV .4.3	Proposed Members on each Board & Committee	4 - 30
Table IV .5.1	Roles of each Body	4 - 34
Table IV .6.1	Office Space of IT Centre	4 - 58
Table IV .6.2	Major Facilities and Equipment of IT Centre	4 - 58
Table IV .6.3	Summary of JMTC	4 - 65
Table IV .7.1	List of Equipment	4 - 71
Table V .4.1	Scope of Services at Techno Centre	5 - 10
Table V .4.2	Space Requirement and Priorities	5 - 11
Table VI .1.1	Demand Estimation of Semiconductor and Hard Disk Industries	6 - 3
Table VI .1.2	How Training is Performed at NPC and KISMEC	6 - 5
Table VI .1.3	Structure of Earnings at NPC	6 - 6
Table VI .1.4	Estimated Demand	6 - 6
Table VI .2.1	Construction Cost Summary	6 - 8
Table VI .3.1	Kedah / Employment in Manufacturing Industries (Industrial Estates)	6 - 13

Table VI .3.2	Manufacturing Sector (NPC Data)	6 - 14
Table VI .3.3	Estimated Value-Added and Total Output in Manufacturing Sector	6 - 15
Table VI .3.4	Private R & D Expenditure Malaysia, 1990/1991	6 - 16
Table VI .3.5	Projection of R & D Revenue in 2000 from KTPC Industrial Estate	6 - 18
Table VI .4.1	Summary of Financial Analysis	6 - 27
Table VI .4.2	Income Statements (Lease-Type Management)	6 - 31
Table VI .4.3	Cashflow Statements & Financial Analysis (Lease-Type Management)	6 - 32
Table VI .4.4	Balance Sheets (Lease-Type Management)	6 - 34

List of Abbreviations and Acronyms

AES	Auger Electron Spectroscope
AMREC	Advanced materials Research Center
AMT	Advanced Manufacturing Technology
AOTS	The Association for Overseas Technical Scholarship
AST	Advanced Skill Training Department
ATR-Cell	Attenuated Total Reflection - Cell
BCIC	Bumiputra Commercial and Industrial Community
BOD	Biochemical Oxygen Demand
BPP	Housing Research Division, Ministry of Housing & Local Government
CAD/CAM	Computer Aided Design / Computer Aided Manufacture
CD-ROM	Compact Disk Read Only Memory
CEN	European Standardization Committee
CENELEC	European Electrotechnical Standards Committer
CIAST	Centre for Instructor and Advanced Skill Training
CNC	Computer Numerical Control Machine
COD	Chemical Oxygen Demand
DDI	The Double Tax Deduction Incentive Scheme
DOE	Department of Environment
EA	Environmental Audit
ECD	Economic Cooperation among Developing countries
EDX	Energy Dispersive X-ray spectrometer
EFTA	European Free Trade Association
EL	Eco- Labelling
EMAS	Eco-Management and Audit Scheme
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility
EMS	Environmental Management System
EN	European Norm
EPE	Environmental Performance Evaluation
EPMA/EDS	Electron Probe X-ray Microanalyzer
EPU	Economic Planning Unit
ESCA	X-ray Photoelectron Spectrometer
EU	European Union
F/S	Feasibility Study
FE-SEM	FE-Scanning Electron Microscope
FID	Flame Ionization Detector
FMM	Federation of Malaysian Manufacturers
FRIM	Forest Research Institute of Malaysia
FTIR	Fourier Transform Infrared Spectrometer
GATT	General Agreement on Tariffs and Trade
GC/MS	Gas Chromatograph Mass Spectrometer

GDP	Gross Domestic Product
GMI	German Malaysian Institute
GNP	Gross National Product
HHBT	High Temp & Humidity Burn-in Test system
HICOM	Heavy Industries Corporation of Malaysia
HRDC	Human Resource Development Council
HRDF	Human Resource Development Fund
ICP	Inductively Coupled Plasma mass spectrometer
IEC	International Electrotechnical Commission
IKM	Institute Kemahiran MARA
IKRAM	Malaysian Institute for Public Works
IMC	Integrated Manufacturing Center
IMP	Industrial Master Plan
IMR	Institute for Medical Research
IMT-GT	Indonesia-Malaysia-Thailand Growth Triangle
IPM	Institute of Precision Moulds
IPP	Fisheries Research Institute
IRPA	Intensification of Research Programme
ISO	International Organization for Standardization
IST	Instruct and Supervisory Training Department
IT	Information Technology
ITAF	Industrial Technical Assistance Fund
ITC	Information Technology Centre
ITI	Industrial Training Institute
ITM	Mara Institute of Technology
JHSB	Sabah Veterinary Department
JISB	Sabah Fisheries Department
JISB	Sabah Agriculture Department
JISK	Sarawak Fisheries Department
JMTC	Japan-Malaysia Technology Center
JMTI	Japan-Malaysia Technical Institute
JPK	Geological Survey Department of Malaysia
JPS	Sarawak Agriculture Department
JPSB	Sabah Forestry Department
JPSK	Sarawak Forestry Department
JV	Joint Venture
KDAP	Kedah Development Action Plan
KEDA	Kedah Regional Development Authority
KHTP	Kulim Hi-Tech industrial Park
KISMEC	Kedah industrial Skill & Management Development Centre
KL	Kuala Lumpur
KSDC	Kedah State Development Corporation
KTAR	Kolej Tunku Abdul Rahman
KTC	Kulim Techno Centre
KTCF	Kulim Techno Centre Fund
KTPC	Kulim Technology Park Corporation

LCA	Life Cycle Assessment
LCR	Least Cost Routing
LKM	Malaysian Cocoa Board
MACRES	Malaysian Centre for Remote Sensing
MARA	Council of Trust for Indigenous People
MARDI	Malaysian Agricultural Research and Development Institute
MASTIC	Malaysia Science and Technology Information Centre
MHRD	Ministry of Human Resources Development
MIDA	Malaysian Industrial Development Authority
MIMOS	The Malaysian Institute of Microelectronics System
MINT	Malaysian Institute for Nuclear Technology Research
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOSTE	Ministry of Science, Technology and the Environment
MP2	Second Malaysia Plan
MP5	Fifth Malaysia Plan
MP6	Sixth Malaysia Plan
MPKSN	National Council for Scientific Research and Development
MS	Malaysian Standard
MTDC	Malaysian Technology Development Corporation
MYS	Ministry of Youth and Sports
NDP	New Development Plan
NEP	New Economic Plan
NIE's	Newly Industrial Economies
NIOSH	National Institute of Occupational Safety & Health
NPC	National Productivity Center
NVTC	National Vocational Training Council
OEM	Original Equipment Manufacturing
OJT	On the Job Training
OPP1	First Outline Perspective Plan
OPP2	Second Outline Perspective Plan
OTA	Office of Technology Assessment
PDC	Penang Development Corporation
PEGAMA	Mines Research Institute
PIC	Penang International College
PKNK	Kedah State Economic Development Corporation
PL	Product Liability
PORIM	Palm Oil Research Institute of Malaysia
PPM	Parts Per Million
PPB	Parts Per Billion
PPT	Parts Per Trillion
PSDC	Penang Skill Development Centre
PC	Personal Computer
PCB	Print Circuit Board
R&D	Research and Development (R & D)
RI'S	Research Institutions

ROE	Return On Equity
ROI	Return On Investment
RRIM	Rubber Research Institute of Malaysia
RY	Ray
S&T	Science and Technology (S & T)
SDC	Skill Development Centre
SEM	Scanning Electron Microscope
SEPU	Kedah State Economic Planning
SIMS	Secondary Ion Mass Spectrometer
SIRIM	Standards and Industrial Research Institute of Malaysia
SISIR	Singapore Institute for Standards & Industrial Research
SPM	Scanning Probe Microscope
SPVM/SPM	Malaysian Certificate of Education
SS	Suspended Solid
STM	Scanning Tunneling Microscope
STS/SMT	Secondary Technical School
SVS	Secondary Vocational School
TAR	Tunku Abdul Rhaman
TEM	Transmission Electron Microscope
TOC	Total Organic Carbon
TPM	Technology Park Malaysia
UIA	International Islamic University
UKM	National University of Malaysia
UM	University of Malaya
UPM	University of Agriculture Malaysia
USM	University of Science Malaysia
UTM	University of Technology Malaysia
UUM	University of Northern Malaysia
UV	UV visible spectrometer
WDX	Wavelength Dispersive X-ray spectrometer

INTRODUCTION



INTRODUCTION

The Malaysian economy has been enjoying a high growth rate over the past decade due to the success of forming a series of industrial complexes and inviting foreign enterprises to locate in that country. Under this economic development, the Kulim Hi-Tech Industrial Park was planned as the base for promoting the progress of industrialization for the northern part of the Malaysian Peninsula. The plan called for inviting high-tech enterprises to the northern region in order to cope with the high tech era as an industrial complex, and to direct the flow of economic development to the northern district. Thus, in order to entice high-tech enterprises into the northern region, the Kulim Techno Centre will be opened to offer support services to research and development and services for nurturing support businesses as an incentive for these enterprises.

However, the rapid change in the world's industrial economy in the past two years has effected a major change in the location concept of the group of enterprises from advanced industrial nations that are unfolding their operations globally. The importance of regional demand in the Asia-Pacific region has increased rapidly. As seen in Japan-U.S. economic negotiations, the emphasis on international trade has rapidly changed from trading final goods to trade of parts and components. This change is not seen only between Japan and the United States. Amidst the formation of a wide-area manufacturing network aimed by the overseas-type economic integration of the Pacific region, the enterprises that set up operations in existing industrial complexes are now being forced to speedily examine the re-modeling of network-type manufacturing systems as plants for exporting high-tech parts.

In addition, the Malaysian economy that has so far enjoyed growth and development is not only being pressed to make a major shift in industrial structure, but also is being forced to face new difficulties in terms of the conditions for industrial locations.

First of all, one can hardly expect technological transfer or the forming of regional ethnic capital under the method that envisages economic development by inviting foreign enterprises into the industrial complexes and relying on import and export trade conducted by them. It is easy for foreign enterprises to come and leave (functional

replacement), and the frenzied movement of such functional replacement will significantly impact regional economies and labor structure.

Secondly, the past decade of growth has changed the Malaysian economy into one suffering from labor shortage. Notably, there has been a progressive shortage of man power in specialized technical fields.

Thirdly, the successes of new industrial policies and policies to invite foreign capital in the more advanced countries, such as Singapore as well as Thailand and Vietnam, are beginning to cause concern for the lowering of the relative position of the Malaysian industry amidst the shift being made from the base-type manufacturing method to wide-area manufacturing method.

In addition, the Malaysian economy is at a state where its development policy, notably its industrial development policy, scientific technology policy, human resources development and policy for educating employees in research are all at a major turning point.

It is only natural that the regional and federal government's expectations and the awareness of roles as well as the perceptions of foreign enterprises will change toward the raison d'etre of the Kulim Hi-Tech Industrial Park and the concept of the Kulim Techno Centre.

The Malaysian Government too is at this important phase. While longing for the success of the Kulim Hi-Tech Industrial Park, the federal government has positioned the Kulim Techno Centre as a national project that goes beyond regional interest. Under the comprehensive cooperation of the EPU that coordinates all organizations, including the various centralized organs, respective state governments, national organizations, the Kedah State Development Corporation in charge of constructing these organizations and government organizations of various classes, the Malaysian Government has researched and investigated the establishment of the concept and methods of operation.

The Techno Centre proposed here is designed to be an advanced structure that will form the core of the mechanism to entice into the region high-tech industries essential for leading Malaysia into this new era of development, and to further expand the sophisticated industrial bases.

However, leading edge technologies and the industries that use them cannot be nurtured overnight merely because the centre is equipped with superior equipment. This can be realized only if the people who operate these facilities are trained and the organizations to

support the operations are established. Progress is seen daily in leading edge technologies, and the contents of the facilities develop with the passing of time. It will be necessary to staff these facilities with experts who have acquired new technological expertise that are above the levels seen in existing corporations in the industrial complexes.

As a leading project for promoting the switch to the formation of a high-tech manufacturing network, an effort must be made to exert leadership in creating a network to convert the existing industrial complexes throughout the nation with the new concept. In order to recover lost time and induce leading edge companies into Malaysia, not only from advanced industrial nations but also from neighboring nations, the first prerequisite will be to rapidly start up the Kulim Techno Centre at the earliest possibility. For this, one must not merely wait for personnel to complete training under the present research and education system. This is because Singapore, Hong Kong and Taiwan are all recruiting personnel from all over the world. The Kulim Techno Centre must be used as a means to recruit personnel from all over the world. It is extremely important to seek the transfer of personnel and technology from within a global network, and promote education and training for high-tech business in order to incorporate the Malaysian economy into the network for advanced industrial regions. Based on this necessity, it is necessary to promote technology and nurture it as speedily as possible. Moreover, in order to keep up with the world's technological advances, the Kulim Techno Centre must plan to promote the transfer of technology by recruiting the necessary personnel and organizations through close cooperation with private enterprises, and think about utilizing these resources until the necessary personnel can be trained within the nation. This is the business objective of the Kulim Techno Centre.

It is eagerly hoped that this national project will be staffed with superior leaders and management teams to make it a success, so that the development of Northern Malaysia will serve as the locomotive to drive the "2020 Project".

CHAPTER I
OVERVIEW OF THE BACKGROUND
OF THE STUDY

I OVERVIEW OF THE BACKGROUND OF THE STUDY

I.1 Current Situation and Prospects of Malaysian Economy and Industry

I.1.1 Current Situation of Economy and Industry

During the period from 1971 to 1985, covering three-fourth of the NEP (New Economic Policy), and in the term covered by the NEP until 1990, economic growth in Malaysia was steady due to the growth of its five major primary commodities of natural rubber, palm oil, tin (top producer in the world for these three items), crude oil and wood products, and their increase in price. During this time, annual growth of about 8% was achieved. However, upon entering 1985, the slump in global trade and the stagnation in the price of primary commodities led to a decrease in exports and resulted in two consecutive years of decline in the GDP growth rate.

However, in 1987, the price of primary commodities rebounded and foreign capital investment rapidly increased as a result of the New Investment Act (1986) which drastically deregulated rules concerning the introduction of foreign capital. This led to a steady pace of industrialization and a rapid recovery in the economy (Table I.1.1). As a result, the growth rate of the economy has maintained the 8% level since 1988. Consequently, the per capita GNP has reached about 2,500 U.S. dollars (1990) and this is the highest level within ASEAN countries excluding Singapore.

Table I.1.1 Trend of Major Economic Indicators (%)

	1987	1988	1989	1990	1991	1992	1993	1994	1995
Gross National Product in 1978 prices	5.4	8.9	9.2	9.7	8.7	7.8	8.7	8.6	8.1
Manufacturing	13.4	17.5	14.2	15.7	13.9	10.5	12.9	13.6	12.5
EXTERNAL TRADE: Manufacturing	32.5	32.0	36.2	28.1	31.2	15.8	26.1	28.0	25.0
Employment rate: Manufacturing	6.3	6.2	18.6	13.8	12.5	9.3	6.3	7.8	6.4
Employment rate: Agriculture							-0.5	-3.7	-2.5
Unemployment rate	7.3	7.2	6.7	5.1	4.3	3.9	3.0	2.9	2.9

Source; Ministry of Finance, Economic Report 1993/94/95

This process led to the rapid modernization of Malaysia's industrial structure. Manufacturing surpassed agriculture, forestry and fishing in the GDP for the first time in 1987. The number of employees in manufacturing also posted annual growth of 6% or more during

the period of 1987-1992. This sector also absorbed nearly 60% of employees, including those transferring from agriculture, forestry and fishing. As a result, manufacturing sector's employment reached 1.64 millions, surpassing agriculture, forestry and fishing in the category of the number of employees, for the first time ever in 1992. According to employment figures by industry, it is observed that although agriculture, forestry and fishing comprised 40% of the total in 1980 it had declined to nearly half in 1994. By contrast, manufacturing had increased in the same period from 13% to 25% and had become the largest industry (Figure I.1.1). A similar situation applies to the share of GDP held. Thus agriculture, forestry and fishing declined from 23% (1980) to 15% (1994) while manufacturing increased from 20% to 29%.

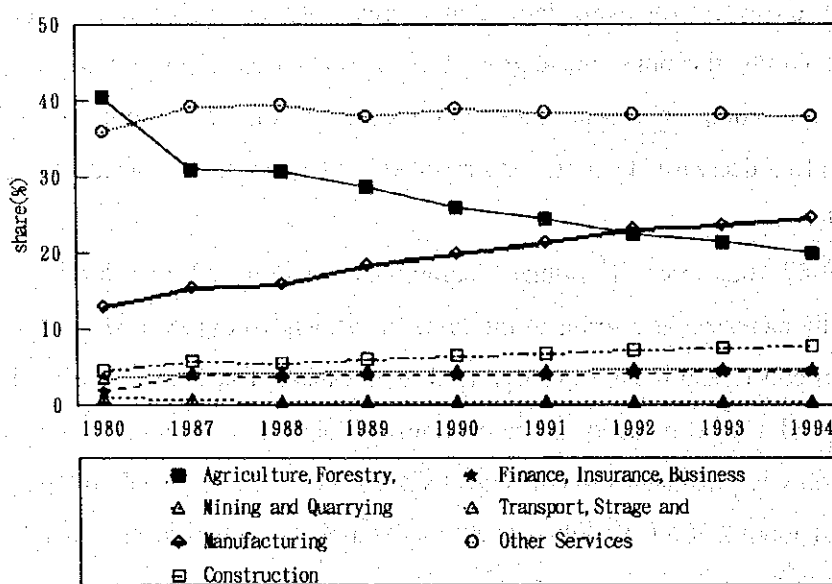
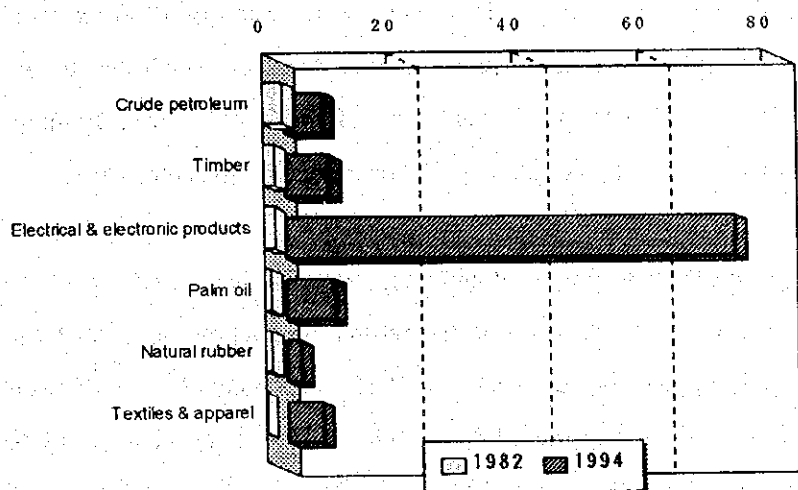


Figure I.1.1 Trend of Number Employed by Sector

These changes also appear in the structure of exports. During 1982, primary products such as crude oil, wood products, palm oil and natural rubber ranked at the top for exports, amounting to 60% or more of the total. In 1994 they dropped to 15% of all exports. Instead, electrical and electronic products have emerged in top rank by themselves, accounting for nearly half of the total in 1994 from 15% in 1982. The growth of electrical and electronic products is extremely remarkable on a monetary base also, and exports of textiles and apparel are growing as well. Thus, the structure of exports is changing from primary commodities to industrial products (Figure I.1.2).



Source: Economic Report 1994/1995, United Nation Commodity Trade Statistics

Figure I.1.2 Growth of Export: Selected Indicator (RM million)

Manufacturing, which is the prime engine of the Malaysian economy, is steadily growing with electrical and electronic products as main sectors. The output of the manufacturing industry as a whole more than doubled the total for 1988 in the first half of 1994 and in the case of electrical and electronic products the total tripled (Table I.1.2). As a result, Malaysia is currently the largest producer of air conditioners in the world and third in the production of integrated circuits and semi-conductors, ranking only behind Japan and the U.S.

Table I.1.2 Trend of Output of Major Industrial Production (RM million)

	1988	1989		1990		1991		1992		1993	
Iron & steel bars & rods ('000 tons)	610	970	59.0	1,114	14.8	1,293	16.1	1,585	22.6	1,913	20.7
Household refrigerators ('000 units)	197	185	-6.1	212	14.6	266	25.5	288	8.3	250	-13.2
Room air-conditioners ('000 units)	723	862	19.2	981	13.8	1,928	96.5	2,519	30.7	2,387	-5.2
Semiconductors (million units)	2,182	2,262	3.7	2,565	13.4	2,689	4.8	3,121	16.1	3,491	11.9
Integrated circuits (million units)	4,709	5,071	7.7	6,084	20.0	6,413	5.4	6,730	4.9	8,047	19.6
Television sets (million units)	1,221	2,375	94.5	3,238	36.3	4,838	49.4	5,553	14.8	6,628	19.4
Telephone and telegraphic cables (tons)	4,667	9,923	112.6	10,757	8.4	15,312	42.3	21,659	41.5	28,403	31.1
Passenger cars (units)	60,665	94,687	56.1	130,908	38.3	152,413	16.4	136,951	-10.1	145,070	5.9
Motorcycles (units)	120,012	176,729	47.3	214,174	21.2	223,234	4.2	235,239	5.4	241,615	2.7

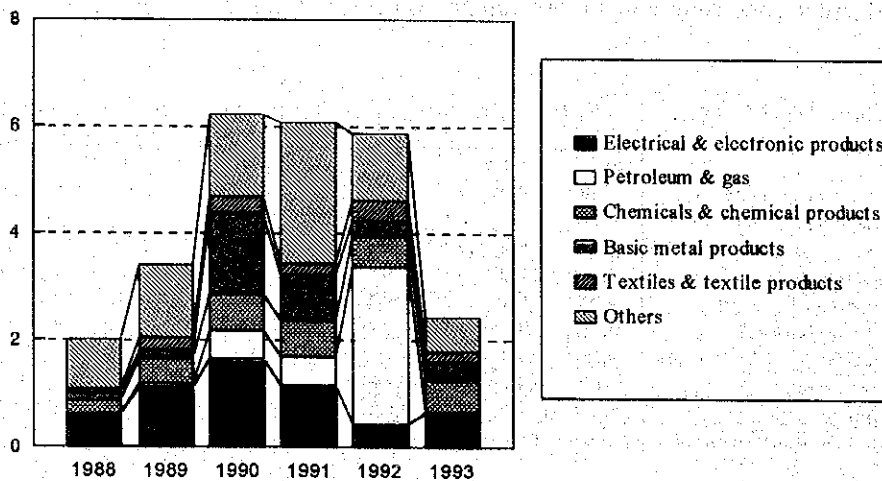
Note: The figures in the right column of each year shows the ratio (ratio (%) to the preceding year.

Malaysia has always been aggressive concerning the introduction of foreign investment. It had already established the Investment Incentive Act in 1968 along with preferential treatment

measures for foreign capital corporations. However, the recession of 1985 led to a large slump in investment. In 1986, the Investment Promotion Act was established to promote further foreign investment, and a foreign capital ratio of up to 100% was permitted for foreign companies with an export ratio of 80% or 350 or more full-time employees.

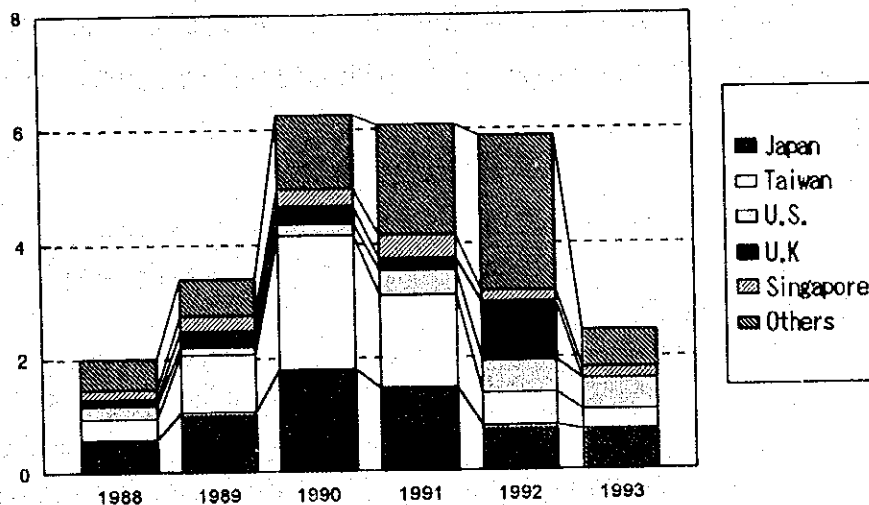
Consequently, foreign investment posted double-digit growth on a year-on-year basis, centring on Japanese companies which began to transfer production bases overseas as a result of the yen's rapid appreciation following the 1985 Plaza Accord. As a result, the highest level of RM 6.3 billion was recorded in 1990. However, the flow of foreign investment into Malaysia has dulled since 1991 as a result of the appearance of new investment sites such as China, Indonesia, and so on.

Structure wise, foreign investment has been moving into export-oriented industries in Malaysia. In particular, the ratio held by electrical and electronic products is extremely high but the amount shows a tendency toward decline after the peak year of 1990 (Figure I.1.3). Investment by country shows high cumulative figure held by Japan, Taiwan and other East Asian countries as well as Singapore (Figure I.1.4). However, investment from the United States has been increasing in recent years.



Source :Jetro " Malaysia Economic in Figures "

Figure I.1.3 Foreign Investment by Industry (RM billion)



Source :Jetro "Malaysia Economic in Figures"

Figure I.1.4 Foreign Investment by Country (RM billion)

I.1.2 Economic and Industrial Policies

(1) History of economic and industrial development during the "New Economic Policy (1971-1990)"

The economic and industrial policy of Malaysia in the 1960's after it became independent in 1957 focused on measures to promote the agriculture, forestry and fishing industry with the purpose of improving the living standards of Malaysians. In 1970, agriculture, forestry, and fishing sectors shared about 30% of all industries while manufacturing only had a share of about 13%. Also, there was a large disparity in the productivity of the agriculture, forestry, and fishing sectors compared to the manufacturing sector. In addition, the income of those involved in manufacturing and commerce sectors, principally Chinese Malaysians, was nearly double that of those involved in agriculture, forestry and fishing sectors, principally Malaysians, and thus the greatest issue facing economic policy was the correction of this income disparity.

Therefore, the government announced the "New Economic Policy (1971-1990)" (NEP) in 1970 which had as its objectives the eradication of poverty and the elimination of economic disparities in regions and in household income. This policy was designated the "First Outline Perspective Plan (1971-1990)" (OPP1). Measures to reach the goals of this plan were

established in four 5-year plans beginning with the “Second Malaysia Plan (1971-1975)” (MP2), which began in 1971, and ending in the “Fifth Malaysia Plan (1986-1990)” (MP5) (Figure I.1.5).

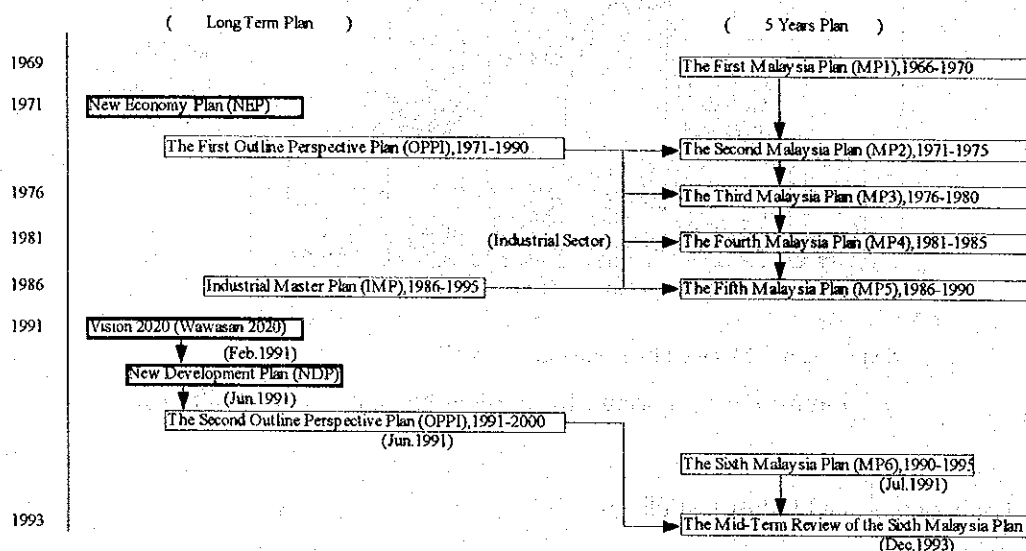


Figure I.1.5 Schematic of Economic Development Plan

Industrial policy was developed greatly during this time. In the period 1957-70, emphasis was placed on the development of import substitution industries. However, growth in the demand of import substitution goods did not continue for a long period of time partially due to the smallness of the Malaysian market. Therefore, growth in employment began to slow down from the latter half of the 1960's. As a result, limits began to be seen in the policy to develop import substitution industries.

In place of the policy to develop import substitution industries, the policy to develop export-oriented industries was aggressively promoted. The objective of this policy was to attract foreign capital export companies and to secure employment. In correlation with this policy various laws were established including the Investment Incentive Act (1968), the Free Trade Act (1971), the Special Promotion Act for the Electronic Industry (1971) and the Licensed Manufacturing Warehouse (1972). These measures served to stimulate electrical and electronic industries and textile and apparel industries, and they posted rapid growth as export industries growing from 10% in 1970 to about 70% of the total import value in 1980.

Since 1981, in addition to continuing and developing measures for promoting export-oriented

industries, measures to promote import substitution industries again became considered necessary due to the fact that increase in the export income was leaking as import demand. For this reason, measures to promote heavy industries including domestic automobile production, direct reduction integrated steel works, cement production, etc. were introduced under the promotional aegis of the Heavy Industry Corporation of Malaysia (HICOM).

However, due to financial pressure on the government resulting from investment in heavy industries and increase in the borrowing of public corporations, public corporations began to struggle under deficit operations. And also due to the fall in prices of primary commodities, the Malaysian economy marked negative growth rate in 1985.

On the other hand, during the term of NEP (1971-1990), the plan's goal of reducing the poverty rate bore fruit as the poverty rate fell drastically from 52% in 1970 to 17% in 1990. This was achieved due to the increase in employment within manufacturing, which accompanied the change in industrial structure, as relatively high incomes can be earned in this sector. In other words, GDP of the manufacturing sector surpassed agriculture, forestry, and fishing in terms of GDP since 1984 and has become entrenched in this position. In the area of employment also, the number employed in manufacturing has increased with a rather large momentum each year (Figure I.1.6). Since 1988, it has been keeping a growth rate of 11% a year and reached 1,878,000 in 1994, occupying 24% of the total number employed in all industries. (Figure I.1.7)

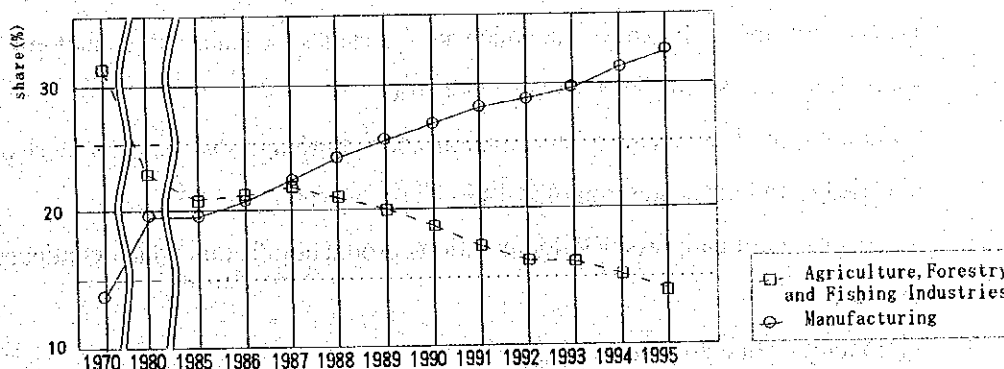


Figure I.1.6 Trend of GDP by Sector

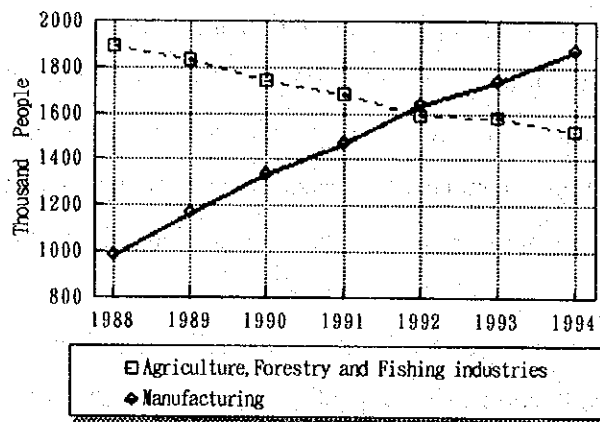


Figure I.1.7 Trend of Number Employed by Agriculture, Forestry and Fishing Industry / Manufacturing Industry

(2) Prospects for the economy and industry in “Vision 2020” and the “New Development Policy (1991-2000)”

In February of 1991, Prime Minister Dr. Mahathir gave an address titled “Malaysia: The Way Forward” (commonly called “Vision 2020”) at a meeting of the Malaysian Business Council. In this address, he established the target of Malaysia becoming a developed nation by the year 2020 and raised the following economic objectives.

- Economy balanced among diversified industrial sectors
- Flexible economy which can promptly respond to changes in the supply and demand pattern and competition
- Technically proficient economy which has both an appropriate and innovative capacity for new technology, and which always climbs the ladder of technology
- Economy with strong links between industries
- Economy with a wealth of information and knowledge that uses its level of knowledge and the acquisition of skills as its propellant
- Economy with high productivity in various production factors which continues to improve
- Economy with entrepreneurial spirit
- Economy supported by labour morale, and the pursuit of quality awareness and excellence

- Economy in which inflation is low and living is inexpensive
- Economy which follows market principles strictly

In addition, the following policies were indicated as means to achieve these economic objectives.

- The private sector will be taking the principal role for promoting economic growth.
- The government will strive to develop an infrastructure and form an environment attractive to business.
- Deregulation measures will continue to be promoted.
- In the manufacturing sector, efforts will be made to diversify export products, strengthen links among manufacturing industries, make value-added products, reduce costs and secure skilled labour.
- In regards to medium and small-sized enterprises, efforts will be placed into creating employment, strengthening ties among industries, market entry, and development of the entrepreneurial spirit.
- Diversification of the export market. Lower the level of dependence on exports in the long-term.
- Development of human resources including inculcation of the entrepreneurial spirit.

The above policies were compiled in June 1991 as the "New Development Policy (1991-2000)" (NDP) and long-term measures were made clear in the "Second Outline Perspective Plan (1991-2000)" (OPP2), while med-term measures were made clear in the "Sixth Malaysian Plan (1991-1995)" (MP6).

In the NDP, the following items were outlined as basic policies for the period of 1991-2000.

- Maintaining of high economic growth
- Promotion of Bumiputra in the commercial sector and the realization of the Bumiputra Commercial and Industrial Community (BCIC)
- Economic administration driven by the private sector
- Development of an economic growth foundation by the government

The following is an outline of the macro-economic framework for achieving these basic policies of the NDP (Table I.1.3). Furthermore, the policy framework of the MP6 released in July 1991 has the same goals as the NDP.

- Expected average GDP growth rate of 7% for national economy.
- Expected growth rate for manufacturing of 10.5%. As a result, the ratio of GDP held by manufacturing will increase to 32%.
- Expected growth in private investment of 8% primarily centered on manufacturing, construction and transportation services.
- Expected growth of 7.2% for private consumption centering on middle class consumption.
- Government spending to be relatively suppressed.
- The surplus in the international trade balance accounting for 9.4% of GDP in 1990 will drop to 6% by the last fiscal year of this plan. However, it will continue to maintain a firm tone.
- The unemployment rate to drop to 4.0% by the year 2000.

Table I.1.3 Major Economic Indices in the NDP and the MP6

		5 MP Results:1990	6 MP Purpose:1995	OPP 2 Purpose:2000
Economic Growth	GDP(M\$)	79,103	113,620	155,780
	Growth rate	6.7	7.5	7.0
	(of Manufacturing:M\$)	(21,381)	(36,860)	(58,010)
	<Ratio to GDP:M\$>	<27.0>	<32.4>	<37.2>
	Per capita GDP(\$)	4,392	5,607	6,874
	Growth rate	-	27.7	22.6
Labour	Population(thousand people)	18,010.2	20,262.7	20,660
	Growth rate	-	12.5	2.0
	Labor supply(thousand people)	7,046.5	8,114.0	9,364.5
	Growth rate	-	15.1	15.4
	Unemployment rate (%)	6.0	4.5	4.0
Balance of Payments	Balance of trade(M\$)	4,267	14,250	22,050
	Balance of invisible trade	▲9,812	▲12,150	▲15,790
	Current account balance	▲5,245	2,300	6,470
Commerce	Export(M\$)	79,548	141,160	255,670
	(of Manufacturing:M\$)	(48,047)	(105,830)	(209,250)
	<Rate to export :%>	<60.4>	<75.0>	<81.8>
	Inport(M\$)	79,122	130,360	240,990
	(of Capital goods:M\$)	(28,088)	(54,230)	110,130
	<Rate to inport:%>	<35.4>	<41.6>	<45.7>
	(of Intermediate goods:M\$)	(32,836)	(53,190)	(96,880)
	<Rate to inport:%>	<41.5>	<40.8>	<40.2>
Poverty rate	Poverty rate(%)	17.1	11.1	7.2
	(of Peninsular Area)	(15.0)	(9.1)	(5.3)

Source:Selected from NDP(New Development Plan) and 6MP(6th Malaysia Plan)

(3) Major Policies in the Industrial Master Plan

In 1985, the government established the "Industrial Master Plan (1986-1995)" (IMP) to outline Malaysian industrialization policy for the next ten years. The following measures are emphasized in this plan with the objective of further export promotion of industrial products and privately driven economic administration. Thus, industrial policies of the past were strengthened further. In addition, the Investment Incentive Act (January 1986), the "Privatization Guidelines" (1985), the "Privatization Master Plan" (1991) and such were put into effect to help realize the policies of this plan.

- To promote private investment aggressively through the establishment of investment incentives
- To invite foreign investment
- To promote export-oriented industries
- To promote industries which add value to natural resources
- To utilize free trade zones
- To develop small and medium scale industries (SMIs)
- To decentralize industries to underdeveloped areas
- To promote participation in the economy and society of BCIC

Currently, industrialization policies are proceeding based on these IMP measures, but there exist the following industry related problems.

- Exporting of final products is limited to electrical, electronic products, and textiles and apparel.
- Export markets are limited to specific markets such as the U.S., Japan, and Singapore.
- Linkage between foreign capital manufacturing and the domestic economy is weak.
- SMIs have not been sufficiently nurtured.
- Technically skilled labourers are lacking.

As a result, the NDP, which was established later, promotes industrialization policies with emphasis on the following to correct the above issues based on the same goals as the IMP.

- Nurturing of SMIs to enlarge the industrial base and strengthen linkages

between industries.

- Promoting the regional decentralization of industries and developing new industrial parks to promote a balanced distribution of investment, resources and labour-oriented industries.
- Developing of new markets, and support of export promotion which emphasizes the strengthening of export competitiveness.

Furthermore, in the review of the IMP executed in 1994 after the NDP was established, the following measures concerning industrialization were reconfirmed.

- Continuation of current investment incentives and their restrictive application
- Continuation of incentives for new investment and new establishment of incentives for reinvestment
- Promotion of decentralization measures of industry such as the distribution of industries to underdeveloped areas
- Promotion of strategic projects
- Encouragement of domestic investment

(4) Basic Policy on regional development in the OPP2 and the MP6

Currently, there is a large disparity in economic growth between industrial regions heavily populated and those less populated. The OPP2 is designed to correct such imbalance and to improve the distribution of income.

To achieve these objectives, the government is planning to utilize outcome of the development of urban areas where the population is relatively concentrated and use it to improve underdeveloped regions. The government is preparing the necessary infrastructure in these surrounding areas so that SMIs can be induced. In addition, it plans to simultaneously promote the policy of decentralizing industries by developing industrial parks equipped fully. This investment in infrastructure and social services in underdeveloped regions will serve to promote new growth centres and will contribute to regional development.

With the goal of lessening the industrial disparity of regions, the MP6 established the "National Urbanization Policy" to strive to promote the creation of industrial zones and the exchange of industries between urban and rural areas.

I.1.3 Issues and Future Prospects on the Economy and Industry in Malaysia

(1) Adjustment and upgrading of industrial structure

As mentioned before, a particular feature of Malaysian exports is that electrical and electronic products, textiles and apparel comprise almost half of all exports, and also that these exports are increasing. On the other hand, capital goods and intermediate goods make up approximately 80% of all imports. Forty-two percent of capital goods are for machinery or metal products, while 80% of intermediate goods are for manufacturing (Table I.1.4). This fact reveals that equipment, machinery, raw materials, and parts are procured from overseas, assembled in Malaysia and then exported. It also illustrates that the ratio of imports is high compared to exports.

Table I.1.4 Import Structure Ratio by Function

By Goods	1980	1991	1993
Investment goods (Investing in Manufacturing)	30.0 (10.8)	37.7 (18.7)	40.9 (17.2)
Intermediate Goods (Investing in Manufacturing)	50.3 (25.5)	45.3 (29.7)	42.7 (34.4)
Total	80.3	83.0	83.6

Note : Only for export excluding aircraft, ship and offshore equipment like oil-rigs.

Source : Bank Negara, "Annual Report 1991 and 1995"

To prevent this situation it is necessary to correct the current industrial structure heavily dependent on electrical and electronic products, textiles and apparel, diversify industries and enlarge exports of manufactured products. It is also necessary to strive to add high value to products. In addition, along with strengthening mutual cooperation among domestic industries, it is simultaneously necessary to nurture supporting industries and to reduce the importing of capital goods and intermediate goods.

Both the NDP and the OPP2 foresee a further increase in the ratio of exports held by manufacturing to 82% of overall export volume, but if the current structure is maintained, the enlarging of exports will leak as imports. Due to this, it is necessary to strongly push forward policies for nurturing SMIs with the objective of expanding the industrial base and strengthening links among industries.

(2) Shortage of labour and skilled manpower, and increase in wage level

The population growth rate in Malaysia is 2% or more. Due to its population size being small to begin with, Malaysia has maintained a condition of full employment with an unemployment rate of just under 3% (Table I.1.5) under continuous high economic growth. Thus, the situation of demand and supply for labour is straining, and the shortage of scientific and technological manpower is acute. In 1990, there were approximately 7,000 scientific and technological manpower. This converts to 400 per one million people and is far less than the 3,500-6,500 per million of other industrialized countries.

Table I.1.5 Trend of Employment

	1989	1990	1991	1992	1993
Number Employed ('000)	6,390.0	6,686.0	6,891.0	7,096.0	7,341.0
Number Unemployed ('000)	460.0	356.0	313.0	274.0	226.0
Total Labour Force ('000)	6,850.0	7,042.0	7,204.0	7,370.0	7,567.0
Unemployment Rate (%)	6.7	5.1	4.3	3.7	3.0

Source : Yearbook of Statistics 1993

On the other hand, the rise in the wage level is also remarkable. If this is looked at by studying the initial wages of Japanese companies, the average increase rate of graduate of junior high school and high school for 1995 compared to 1994 over 10% (Table I.1.6). As a result, the price competitiveness of labour-intensive products produced in Malaysia is being rapidly lost and the eagerness of foreign capital to invest in Malaysia also is being lost. This is also leading to the possibility of plants shifting from Malaysia to overseas seeking more advantageous conditions.

Table I.1.6 Trend of Starting Salary by Academic Career at Japanese Corporation in Malaysia

	Junior High School	High School	2-year Junior College	3-year Junior College	3-year College	College	Graduate School
1990	298	371	530	688	908	995	1,259
1993	392	459	662	909	1,271	1,491	1,929
1994	378	487	696	922	1,451	1,611	2,160
1995	437	535	687	988	1,449	1,703	2,172
'94/'93(%)	-3.6	6.1	5.1	1.4	14.2	8.0	12.0
'95/'94(%)	15.6	9.9	-1.3	7.2	-0.1	5.7	0.6

Source: Selected from Malaysia Hand book '95

The following programmes are possible for resolving these conditions.

- Improvement in productivity: To improve labour productivity. The MP6 targeted the growth rate of productivity to increase from the 3.4% in 1985 to 4.3% in 1990 by introduction of modernization and automation of the process.
- Open-doors to foreign labour: To combat labour shortages, it is necessary to increase labour productivity through improvements in productivity as shown above. However, the labour shortage will be filled by the employment of foreign labour.
- Improvement of efficiency of labour market: To transfer labour in divisions and regions, the labour market will be made efficient.

(3) Strengthening of R & D base and nurturing of scientific and technological manpower

As mentioned earlier, the industries introduced into Malaysia in the process of promoting export-oriented industrialization are basically assembly type industries which are labour-intensive and the production technology and systems are standardized mass production technology. This technology has lost its competitiveness in the advanced countries but held a comparative advantage in Malaysia and so it was possible to introduce it without accumulated technology.

In addition, the industrialization of Malaysia until now has been driven by foreign companies, and so it is difficult to establish linkages with domestic companies. Furthermore, the technological transfer from foreign companies centred on the processes of labour-intensive assembly or inspection. Therefore, due to a result of not being the entire production process, and the lack of ability to receive technology transferred as a result of a shortage in engineers, the technology transfer effects from foreign companies were minimal.

A large reason for this weakness in Malaysia's technological strength is that industrialization was achieved by dependence on the foreign sector. However, cause also lies with technology education and training, the absolute shortage of personnel and facilities in the R & D field, and the limited accumulation of these arising from the short history of modernization of Malaysia.

In response, "Vision 2020" proposes the policies of strengthening links between manufacturing sectors, securing skilled manpower, development of human resources including the developing of the entrepreneurial spirit to apply and innovate new technology.

In addition, the ratio of R & D versus GNP for Malaysia in the OPP2 is around 0.8% and is low compared to the 2-3% level of developed countries. Therefore, it should seek to raise this level to 1% by the year 2000, and to raise the number of scientific and technological workers from 400 per million in 1990 to 1,000 per million in the year 2000.

The following are possible measures for achieving a concrete resolution of the above themes.

- Strengthening of technological development ability among local industries: As measures now, it is necessary to introduce technology from outside such as technological tie-ups with foreign companies, OEMs and instruction from foreign engineers.
- Strengthening of support by public institutions: In the medium and long term, it is necessary to execute measures to strengthen the support for modernization, research & development, education and training of local companies, and to prepare and expand public institutions.