4) Water supply system

- Muda intake, pumping station and treatment plant, outside Park as first step construction
- Transmission main to R1 reservoir, outside Park
- Service reservoirs R1 and R2 and main supply pipe situated in other zones
- Distribution pipes within Industrial Zone

5) Telecommunication system

- Kulim switching center, outside Park
- Junction line in Kulim, outside Park
- Duct and cables, other zones and outside Park
- Telephone office with digital exchanger, industrial zone
- Duct and cables, Industrial Zone

6) Drainage system

- Drainage channels, ditches and pipes, industrial zone
- Retention ponds, industrial zone and other zones

7) Sewerage system

- Sewer collection and monitoring facilities, industrial zone
- Waste water central treatment plant, industrial zone

8) Industrial solid waste

- Temporary storage yard and facilities and incidentals in the industrial zone

9) Architecture works (related facilities of urban block in the Industrial Zone)

- Skills development center, administration core, business center, fire station, police station, commercial center, central plaza, etc.

10) Landscaping cost for Industrial Zone

The direct construction cost is estimated by multiplying the unit cost of each work item by the corresponding work quantity. The unit costs of respective work items consist of the cost for materials, laborers, equipment and

contractor's indirect costs for site expenses, overhead and profit.

The unit costs for civil construction works are developed based on the collected cost data at the site.

(2) Land acquisition

Those cost are estimated based on the unit cost.

(3) Administration expense

The cost was estimated in proportion to the direct construction cost and land acquisition cost as for the project's administration, management and supervision for the implementation. An allowance of about 5% of the total direct construction cost and land acquisition cost was provided.

(4) Engineering services cost

The cost was estimated in proportion to the direct construction cost to cover the engineering works such as detailed design, construction supervision by consultant's. The engineering services cost was estimated about 12.0% of total direct construction cost.

(5) Interest during construction

8% per annum was estimated for 1992 to 1994.

(6) Contingency

Physical contingency

The physical contingency was provided to cope with the unpredictable physical conditions during implementation of the project amounting 10% approximately of the total direct cost.

Price contingency

The price contingency was provided for cost inflation. The price contingency was estimated assuming the inflation rate of 3.2% per annum.

6.1.4 Project Investment Costs of First Phase Industrial Zone

The project investment costs for the first phase Industrial Zone was worked out as tabulated below.

	Cost items	Cost in M$ million
i)	Direct construction cost	221.0
ii)	Land acquisition	9.0
iii)	Administration expense*	11.5
iv)	Engineering expense**	26.5
	Sub total, i) to iv)	268.0
v)	Contingencies***	45.7
	Total, i) to v)	313.7
vi)	Interest****	50.6
	G. Total, i) to vi)	364.3

* 5% of i) + ii)

** 12% of i) for design and supervision

*** 10% of sub total for physical contingency, and 3.2% p.a. for price contingency of 1992 and 1994.

**** 8.0 % p.a. during construction, 1992 to 1994

The direct construction cost for the first phase Industrial Zone, as stipulated above, was worked out as broken down in the Annex (advisary works) based on the basic design, and as summarized below.

Summary of Direct Construction Cost

Cost items	Cost, M$ million
Land preparation	10.4
Infrastructure	
– Road network	15.7
– Power supply system	81.9
– Water supply system	46.4
– Telecommunication system	8.5
– Drainage system	9.7
– Sewerage system	10.0
– Industrial solid waste	9.0
Sub total of infrastructure	181.2
Architecture works	24.4
Landscaping	5.0
Total	221.0

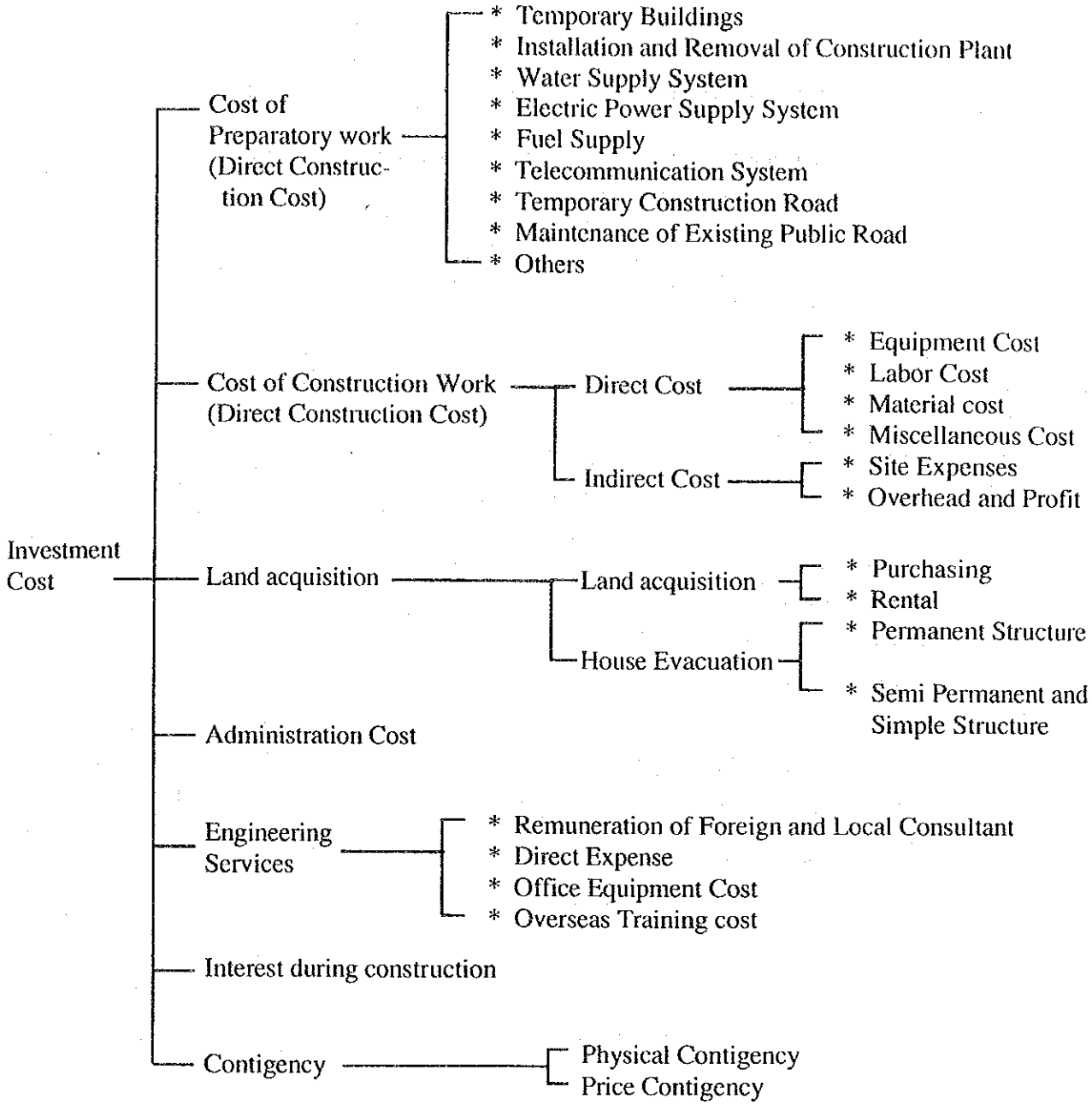


Fig. 6.1 Constitution of Investment Cost

6.2 Operation and Maintenance Cost

The operation and maintenance costs consist of the salary of staffs, labours charge, costs for materials and equipment for O & M works of the facilities.

The annual operation and maintenance costs were estimated by each sector. As a result, the ratio to the direct construction cost becomes as follows.

Facilities	Annual O & M Cost (M$ thousand)	Ratio to Direct Construction Cost
1. Road	100	0.6 %
2. Power supply	1,500	1.8 %
3. Water supply	250	0.6 %
4. Telecom system	430	5.0 %
5. Drainage system	100	1.0 %
6. Sewerage system	150	1.5 %
7. Industrial solid waste	100	1.0 %
8. Related facilities (Buildings)	500	2.0 %
9. Landscaping	150	3.0 %
Total	3,280	

6.3 Construction Plan and Schedule

Following to the proposed implementation schedule, the construction works of first phase industrial zone is scheduled to be started in April 1992 and completed in middle of 1993, while the stepwise completion is planned for the outside infrastructure related to the first phase industrial zone as described in Cause 4.4. Required construction items and its construction field for the first phase industrial zone are summarized as follows.

Construction items	Construction field *		
	Industrial zone	Other zone	Outside park
Land preparation	*		
Road network			
– Arterial roads	*		
– Collector roads	*		
– Primary access, B–C		*	
– State road, K–115		*	
Power supply system			
– T/L, 132 kV		*	*
– Extension, Kulim S/S feeder bay			*
– Main substation	*		
– Distribution S/S	*		
– Distribution lines	*		
Water supply system			
– Muda intake, treatment plant, pump station			*
– Transmission main		*	*
– Service reservoir, R1		*	
– Service reservoir, R2		*	
– Pipe laying	*	*	
Telecom system			
– Telephone office	*		
– Duct/cables/manholes	*	*	*
– Kulim GSC extension			*
– Junction line	*	*	*
Drainage system			
– Improve. Air Merah river	*		
– Improve. Parit B. river	*		
– Drainage ditch/pipes	*		
– Retention ponds	*	*	
Sewerage system			
– Sewer collection	*		
– Central treatment plant	*		
– Monitoring system	*		
Industrial solid waste			
– Access road/drainage	*		
– Workshop/office	*		
– Storage facility	*		
Architecture works	*		
Landscaping	*		

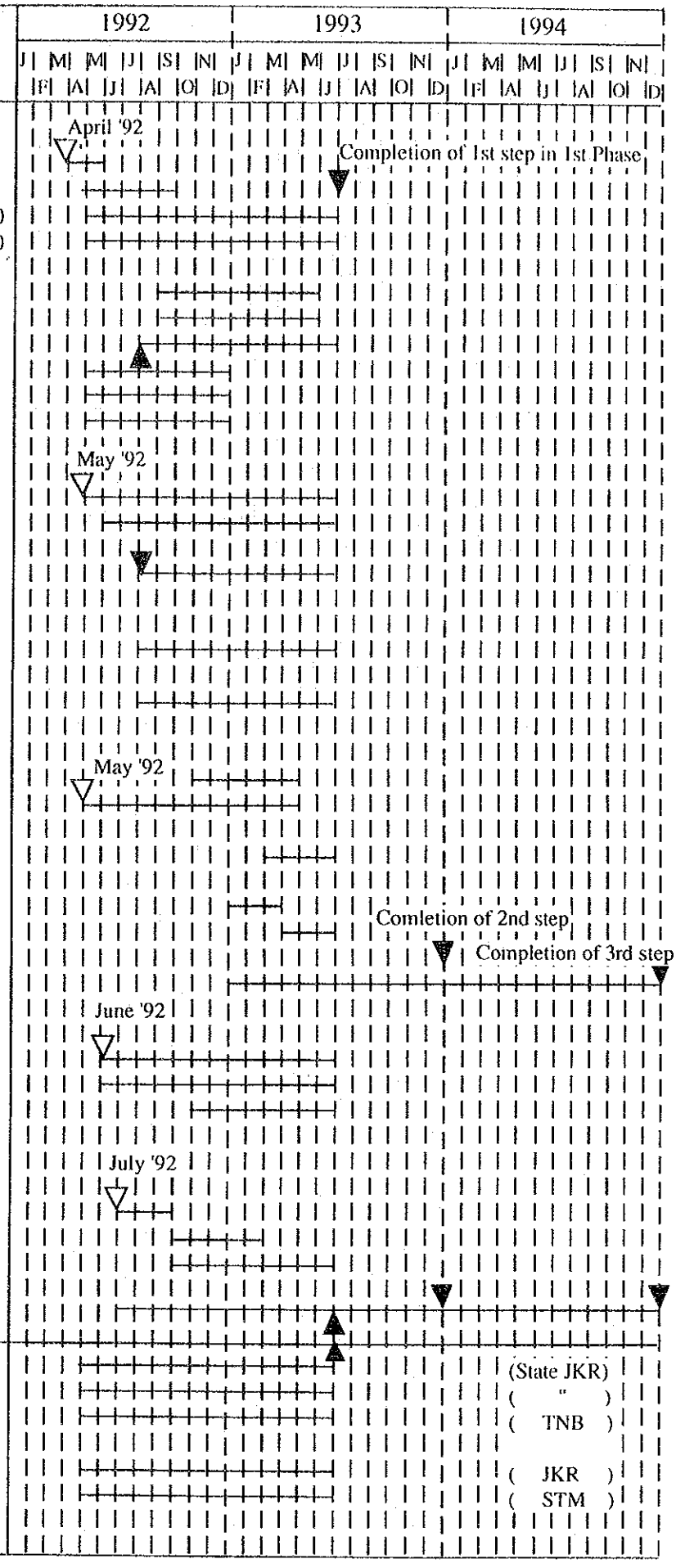
Fig. 6.3.1 shows a proposed construction time schedule for the first phase industrial zone. Most items of construction works, mentioned above, are carried out concurrently during 1992 to 1993, and it is quite a tight schedule based on the required work items and its quantities.

In preparing the construction plan and schedule, the following points will have to be taken into consideration.

- To utilize the existing state road, K115, as a main access road.
- To balance cut and fill volume with minimum hauling distance.
- To avoid to jungle the construction works, so that detailed work sequence and its strict control are required.
- To apply two (2) shift construction operations.
- The procurement of sewerage central treatment plant will takes one (1) year. The import procedure should be taken at an early stage.
- Mean annual rainfall is 2,686 mm, and heavy in April to May and September to October.

Fig.6.3.1 CONSTRUCTION TIME SCHEDULE FOR INDUSTRIAL ZONE OF FIRST PHASE

No. of Item Tender No. Work Items Package	Unit	Q'ty
1 1-1 Land preparation		
(1) Mobilization	L.S	-
(2) Site Clearance	ha	217
(3) Earthwork, Cut	10^3 m^3	2340
" , Fill	"	2300
1-2 Drainage System		
(1) Improve, Air Merah river	km	1.31
(2) " , Parit B river	"	1.68
(3) Drainage ditch/pipes	L.S	-
(4) Retention pond, No. 1	L.S	-
(5) " . No. 2	L.S	-
(6) " . No. 3	L.S	-
1-3 Road network		
(1) Arterial roads w/bridges	km	4.59
(2) Collector roads	"	4.18
1-4 Water supply system		
(1) Internal reticulation piping/valves for 250ha	L.S	-
1-5 Telecom system		
(1) Ducting and manholes	L.S	-
1-6 Sewerage System		
(1) Sewer collection	L.S	-
(2) C.T.P		
- Civil works	L.S	-
- Design, manufacture & site delivery	L.S	-
- Erection	L.S	-
(3) Monitoring		
- Monitoring pit	L.S	-
- Installation, equipment		
1-7 Turfing & Landscaping		
2 Water Supply System		
(1) Service reservoir, R1	L.S	-
(2) " , R2	L.S	-
(3) Main supply pipes	km	
3 Industrial Solid Waste Management		
(1) Land preparation	L.S	-
(2) Workshop/office	L.S	-
(3) Storage facility	L.S	-
4 Building & Related Works		
- Improve K115		
- Primary Access B-C		
- Power supply, Kulim line T/L, S/s & Distribution line		
- Water supply, Outside park		
- Telecom, Kulim GSC Ext., Telephone office		



CHAPTER 7

INSTITUTION AND MANAGEMENT ASPECT

7. INSTITUTION AND MANAGEMENT ASPECT

7.1 Institutional Aspect

There has been more than one hundred fifty (150) industrial estates in Malaysia. Most of them have been constructed by the State Economic Development Corporations (SEDCs) which are one of the statutory organizations on State level being entrusted in promoting industrial development activities. The continued expansion of the industrial sector has brought about a sign of turning point to address the structural weaknesses in the sector, particularly super structure as well as infrastructure facilities. The main problems associated with the industrial estate are as follows :

1) there has been lack of spatial planning coordination among existing authorities involved in industrial estate development at the pre-construction stage,

2) there has been also lack of coordination for potential and existing investors among existing authorities in providing licenses, permits and approvals at the pre-investment stage, and

3) there has been absence of operation and maintenance services in industrial estate providing adequate utilities services such as power, water, telecommunication for industrialists at the post-investment stage.

For the first issue it is cited that serious considerations have not been given properly to the need to integrate industrial estate planning in the states in the context of region-wide development planning strategies in the regions. It is because of this that inadequate housing and infrastructural endowment for industrial estates, such as deficiencies of transportation means, housing, community development plans have been observed in the various parts of the country . In case of the proposed Hi-Tech park, timely implementation of all relevant infrastructure development, such as East-West Highway, power transmission line, telecommunication network, end water supply system, is of serious concern. Integrated planning and coordinated implementation of relevant infrastructure facilities must be ensured.

As far as the second problem is concerned, it is also cited that there is a need to expedite and integrate various industrial permit and approval issuing procedures into a single service body in order to facilitate investors smooth implementation. The development approval process such as land conversion subdivision and individual title approvals by the Land office as well as layout plan, building plan and other plans approval by the Local Authority is a time-consuming process. Streamlining with flexibility of necessary government procedures needs

to be done.

For the third issue, it is strongly pointed out by industrialists that there is no sole agency to deal adequately with management and maintenance services of the industrial estate after factory construction. The estate developer's obligation currently ceases as soon as the land is sold which thus result in subsequent problem of inadequate maintenance services. For the success of the industrial estate it is clear that cooperation between the developer of industrial estate and agencies providing infrastructure supplies is critical and in fact, it is more so in case of Hi-Tech industrial park project.

However, the current practice for industrial land development prevents the land developer from ensuring its subsequent maintenance services. And these "follow-up" task of organizations at the Federal as well as the State level. The problems of coordination, delays, and sometimes conflicting activities thus appear.

In addition, in view of new horizons that the hi-tech park can achieve, the management body is expected to perform the following new functions:

a) It would facilitate technology interface among private industries, universities, and public research institutions,
b) It would assist manpower development by providing on-the-job training schemes such as Skill Development Centre,
c) It would nature potential R & D venture capital under incubation system,
d) It would liaise with universities under innovation centre,
e) It would help organizing seminars and workshops on technology exchange among the industries in the hi-tech park, and lastly,
f) It would provide supporting services for the industries through privatization such as banking, shopping, courier, restaurants, library.

In this connection, a question would be raised as to how to integrate related functions or if it is appropriate to establish a new institutional body to solve the above matters.

Three alternative options are proposed as follows:

Alternative 1:	Establishment of Kulim Hi-Tech Industrial Park Corporation (private corporation style)
Alternative 2:	Establishment of Kulim Hi-Tech Industrial Park Authority (State corporation style)
Alternative 3:	Strengthening Kedah State Development Corporation (Extension of KSDC(PKNK))

7.2 Management Organization

7.2.1 Alternative 1: Establishment of Kulim Hi-Tech Industrial Park Corporation (KHIPC)

This is an option to create a private management company under KSDC with participation of private sector. This option would bring about substantial improvement in the present implementation of industrial estate development and management in view of private sector's commercial initiative. Investment promotion would be undertaken certainly in a more effective as well as efficient manner in light of its aggressive marketing strategy. Management of industrial estate would be also carried out differently in a style of private company management to cater to local industrialists' requirements. This may be in the area of courier, communication, business support services and community development.

Yet, there are some demerits associated with this option. For instance, as it is a private concern, it would be difficult for the KHIPC to take part in the Federal and State's regional planning activities to coordinate regional infrastructure requirements together with government agencies. For Kulim Hi-Tech Park it would be also difficult for the KHIPC to initiate and lead planning of second phase development of related supporting infrastructure without strong Government support.

Likewise it would be hardly possible that official licensing and approval procedures can be performed as "one-stop centre" by this private company. And concerning maintenance services this private company alone is not financially capable of providing adequate services unless being endorsed by relevant Government agencies or unless 15 collects very heavy management fees. Although, appropriate level of management fee collection is not necessarily objected by the private industrialists as long as adequate service can be provided according to our recent questionnaire study.

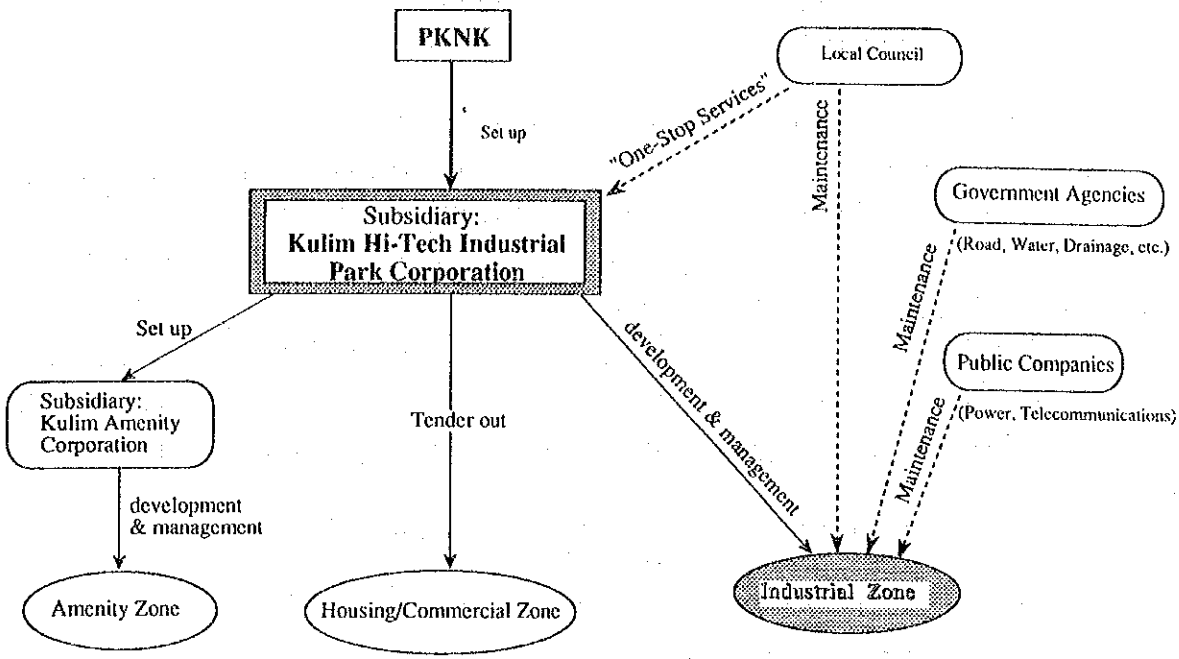
On the other hand , it is wondered if there would be any strong incentive for private sector to join the proposed management company. Industrial land sales alone may not be very much charming. The housing scheme and amenities development ,if it is an integral part of Hi-Tech park management, would be an appealing offer. The managing industrial park may not be always commercially viable venture. It should be differentiated, therefore, between commercially-motivated project and national socio-economic considerations with regard to a Hi- Tech park management.

The suggested organizational structure illustrated of the Alternative One is illustrated in the following figure. The PKNK would set up a subsidiary private company to manage the

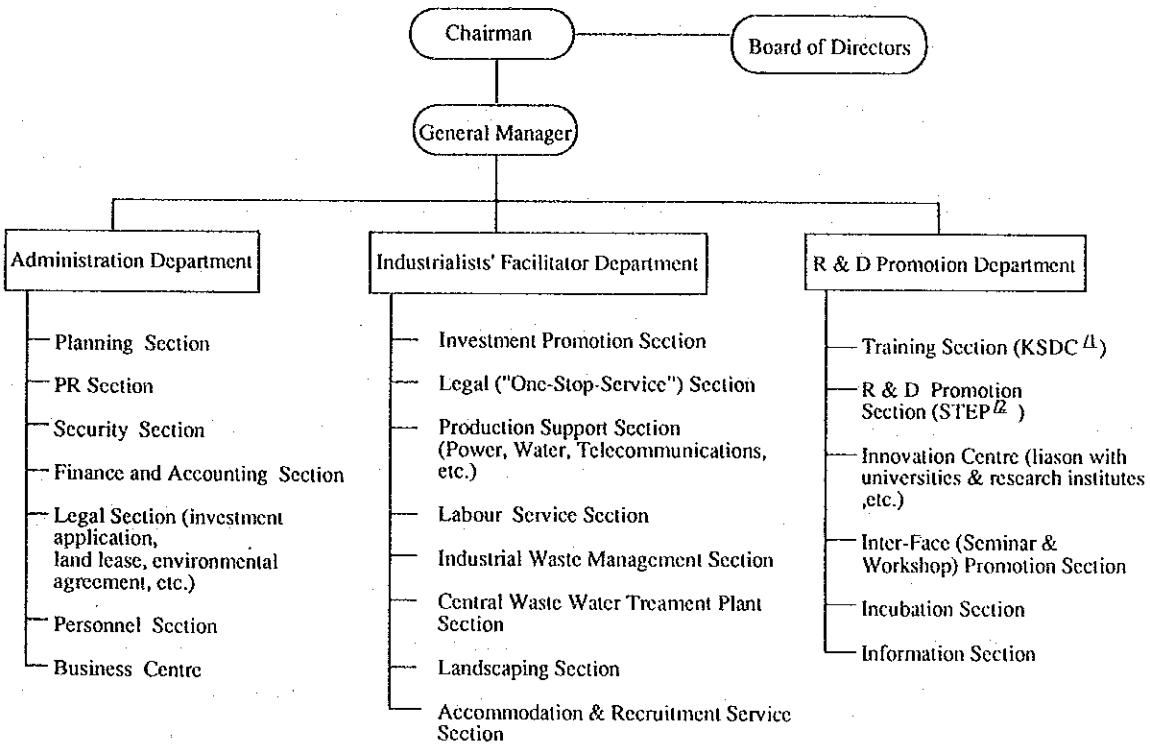
industrial zone of the Hi-Tech Industrial Park while housing/commercial zone development would be tendered out to the private sector and amenity zone would be developed by another subsidiary to be established by PKNK/KHIPC. The role of "one-stop-centre" would be played by the present Kulim Local Council.

Fig. 7.1

Alternative 1: Establishment of Kulim Hi-Tech Industrial Park Corporation (Private Company Type)



Suggested Organizational Structure for Kulim Hi-Tech Industrial Park Corporation



/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 1

7.2.2 Alternative 2: Establishment of Kulim Hi-Tech Industrial Park Authority (KHIPA)

This is an option to establish a new state corporation deal with Kulim Hi-Tech industrial park management. As it is a state organization it should be entrusted with overall responsibility for the Park's management and maintenance. The regional planning and coordination function for industrial infrastructure development as well as permits and approval issuing functions could be transferred to KHIPA and it would be empowered like the Local Authority to collect assessment charges from industrial tenants. The utilities maintenance services would be also performed by this State Authority. The maintenance services which come under the control of a single institutional body would be a great improvement.

The functions to be played by KHIPA would include:

(a) The coordination of provision and development of industrial infrastructure with government agencies.

(b) The "one-stop service centre" to cater for investors' complaints and problems regarding application for licenses, permits and approvals and related investment environment information.

(c) The provision of maintenance services of the utilities for industrialists such as power, water, and telecommunications.

This is an institutional frame which is being practiced by Jurong Town Corporation (Singapore) and Hsinchu Science Park (Taiwan). Both have been entrusted with the principal role of developing and managing industrial estates, particularly science parks and related infrastructure facilities.

This alternative has some disadvantages. First, since this is a state authority, it would go through varied time-consuming legal steps to create a new corporation which may jeopardize smooth implementation of the Project. And it may need full-fledged technical manpower and necessary physical equipment for operation and maintenance activities which would incur considerable financial burden on the Authority. In light of on-going privatization policy, it is a proposal against this trend.

Technical personnel availability is another critical path for this new authority which has had no practical experiences and knowledge in industrial estate planning, development and implementation. Particularly, a proposed Hi-Tech park requires comprehensive aftercare from investment permit procedure to a training and interface promotion activities with national R&D institutions. With land sales and management being transferred to this authority, a substantial

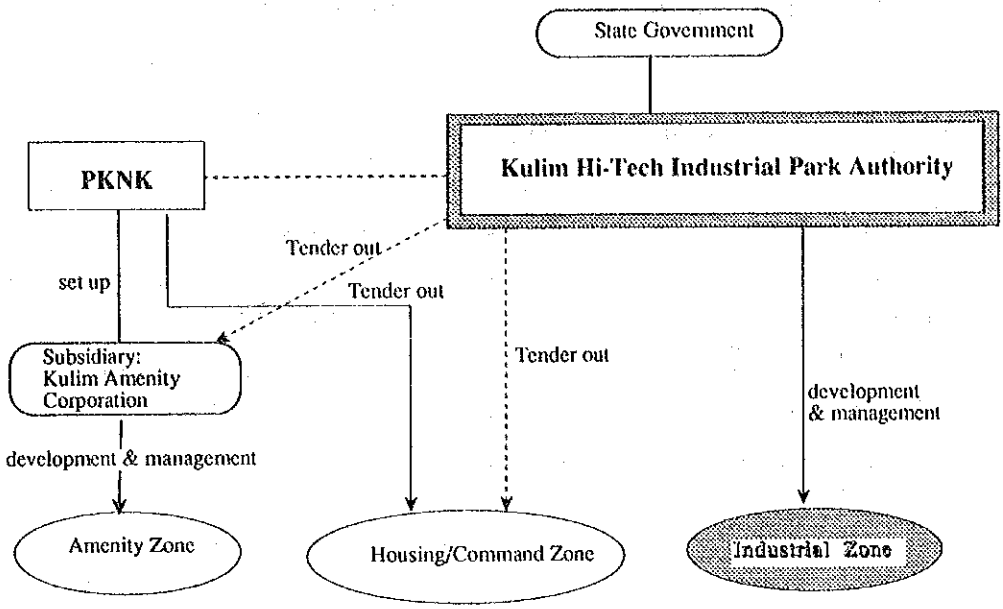
loss would be incurred by KSDC which has forgone for preparation of the Kulim Hi-Tech Park.

Possible solutions could be 1) sub-contract out of maintenance work to related organizations or private sector, yet financial obligation would still incur, 2) secondment of KSDC experienced staff to this authority at initial stage for smooth "take-off", and adequate compensation for actual expenses foregone to the PKNK.

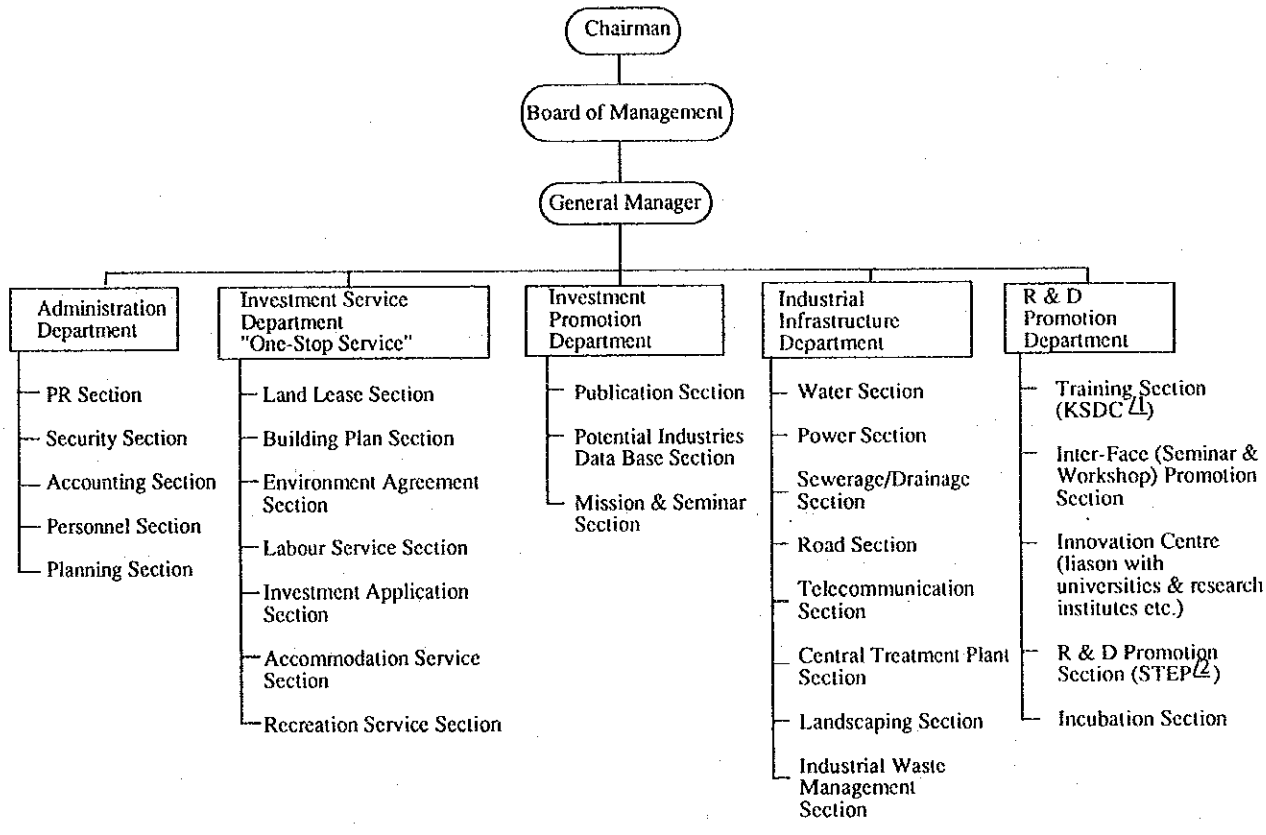
A suggested organizational structure for Alternative Two is depicted in the following figure.

Fig. 7.2

Alternative 2: Establishment of Kulim Hi-Tech Industrial Park Authority (State Authority Type)



Suggested Organizational Structure for Kulim Hi-Tech Industrial Park Authority



/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 2

7.2.3 Alternative 3: Strengthening Kedah State Development Corporation

This third option could be considered as a conservative solution. The enactment of the KSDC states that it shall be the duty of the Corporation:

1) to promote or undertake any residential, industrial, agricultural and commercial development of areas in the State designated for such purposes,

2) to act as local authority in areas outside local authorities if so authorized in accordance with any written law, and

3) to do all such other acts and things as areas necessary for the exercise or performance of all or any of the functions and duties of the corporation under this Enactment or to perform such other functions a body or authority if appointed as such by the State of Federal Government in accordance with any written law.

Recently, some States have established a "one-stop-agency" to facilitate industrial investors in their application for licenses, permits and approvals. The Johor State, for instance, applied a new system to Pasir Gudang Industrial Estate whereby the Pasir Gudang Local Council (PGLC) was established under the Johor State Economic Development Corporation (JSEDC). Both JSEDC and PGLC are in constant liaison with each other to streamline bureaucracy. The PGLC acts as a "one-stop agency" in expediting all necessary official procedures such as land conversion, layout plan, certificates and building plan approvals.

The PKNK should reorganize its structure to cater to creating a special unit to closely look after the proposed Hi-Tech Park from the view of timely construction,.progress monitoring, administration set-up, community development and, above all inter-relation communication with government agencies.

In case of Kulim Hi-Tech park, a "task force" team has been already established at the State level under the State Secretary to coordinate planning and implementation of the related infrastructure development. It is recommended that this task force should be developed into the Kulim Hi-Tech Industrial Park Committee which then would help the PKNK undertake overall responsibility for maintenance.

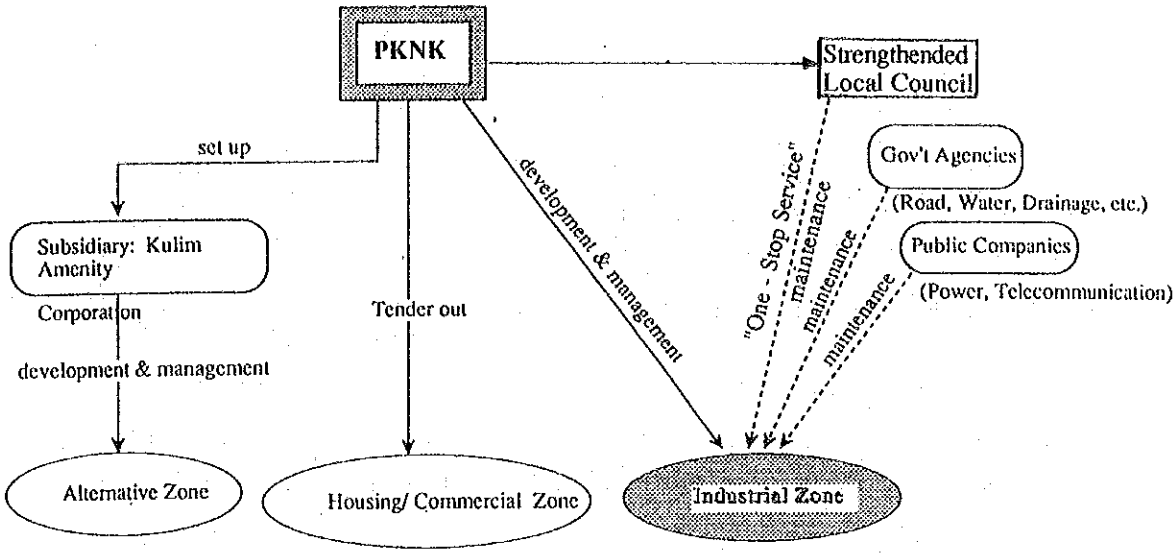
The PKNK can also act as Local Authority if so authorized and if the land is alienated to the PKNK. Then it could collect assessments from Park tenants. This would enable PKNK to be financially better-off.

Since PKNK has implemented various industrial estate projects, it has ample experiences and know-how bout their planning and development. Some disadvantages that can be seen are that PKNK undertakes wide-range development projects such as housing, commercial and industrial projects under slimmed technical personnel. with this staffing situations running the Hi-Tech park, specially new dimension of industry supporting services like skill development centre, interface promotion between public and private R&D institutes, and innovation and incubation activities would be difficult.

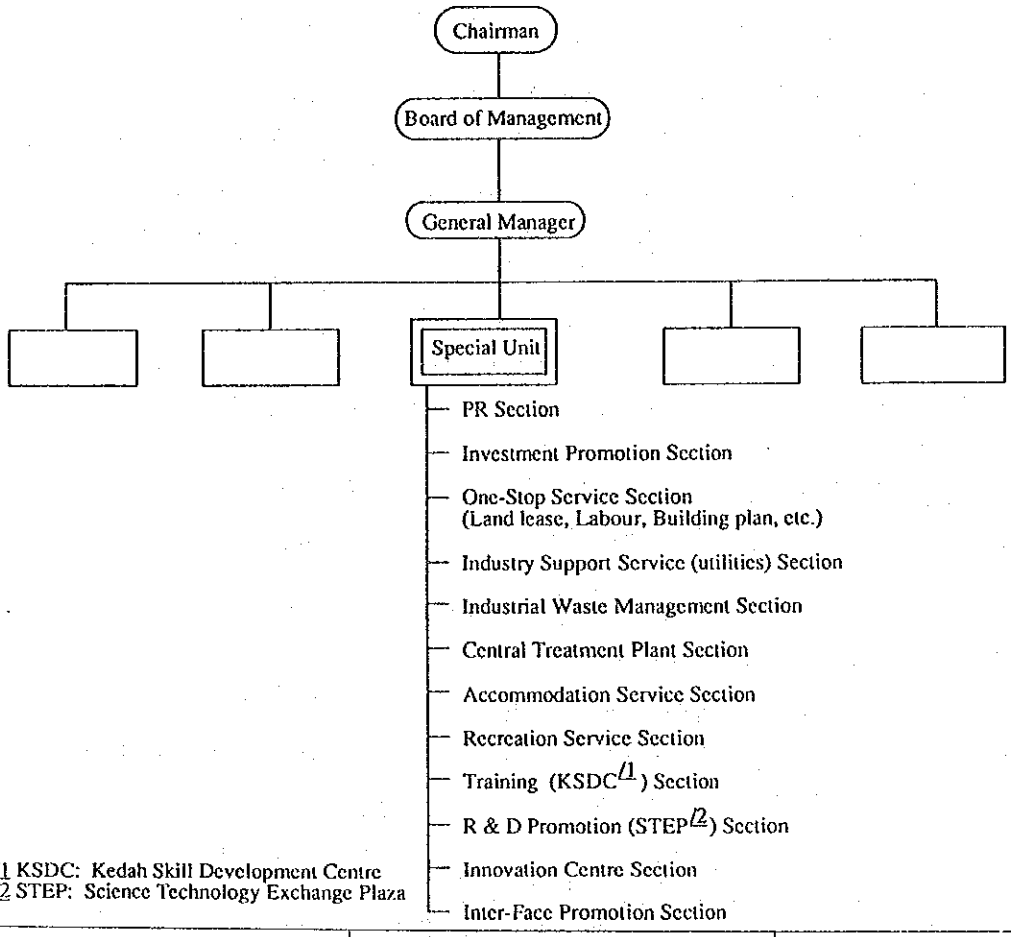
A suggested organizational structure for Alternative there is :

Alternative 3: Strengthening Kedah State Development Corporation

Fig. 7.3



Suggested Organizational Structure for PKNK



/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 3

As seen above, the three alternatives of institutional organization have been discussed. Each has their own relative merits and demerits.

Alternative 1 is an innovative option involving private sector's participation under privatization policy. It would certainly improve promotional works and would manage the Park efficiently on a commercial basis. But to perform "one-stop service centre" and to alleviate most serious issue of maintenance services problem a private company status may be a limit.

Alternative 2 is a dynamic solution integrating all relevant powers under one state corporation. Nevertheless as it has no practical organizational experiences in matters like estate planning and development, building construction and utility services maintenance ; it would need substantial support from relevant agencies like PKNK.

Alternative 3, on the other hand, is a conservative approach, whereby existing PKNK, with appropriate reorganization and modified legal power, would undertake appropriate operation and management responsibility of the Kulim Hi-Tech Park. Under the present diversified activities and staff constraint of PKNK, this institutionally conservative option would most likely result in certain difficulties for full-scale implementation.

The comparison of the alternatives in quantitative term is difficult. Yet after thorough examination as well as in the context of the present situations and ease of implementation, it is recommended that a hybrid between the alternative one and three should be adopted as the most appropriate form of management among the proposed three alternatives. The suggested organization should be thus,

1) establishing a subsidiary under PKNK to deal with development and management of the Hi-Tech Park as well as promotion of R & D activities, and

2) creating a new local council under control of PKNK to provide "one-stop services" maintenance services functions.

The subsidiary to be set up should be fully-owned private company by PKNK which undertakes implementation of industrial zone development. For housing/commercial zone it should contract out to private developers while for amenity zone it should create another subsidiary, this time a joint-venture with a private sector, which undertakes development and management of the sports facilities such as golf club.

The subsidiary should also perform R & D promotional activities for this Hi-Tech Park include incubation, technology exchange, skill development centre and joint research

programme among industries, research institutions and university.

The local council which is to be newly created should administer the area of Hi-Tech Park which must be designated and legally gazetted under PKNK. It should facilitate foreign and local investors in their plan approvals and their ordinary maintenance services such as rubbish collection, road cleaning and lighting maintenance. It should, however, have a minimal number of the staff personnel by privatizing the said maintenance activities to the subsidiary company. The subsidiary company would be called upon to provide appropriate maintenance services to the park and cross-subsidise such services if the need arises.

To ensure financial viability, the proposed subsidiary should collect management fees from the industries while the new local council collect annual assessment. To further strengthen financial sustainability, it is proposed that the federal grant for road maintenance services should be channeled through the new local council.

Besides, in order to ensure efficient management and implementation of the Hi-Tech Park, it is strongly suggested that the utility authorities should set up their respective unit specifically to cater for the needs of the Park, namely, TNB, STMB, and JKR.

The recommended form of the management organization is thus depicted in the Fig. 7.4

In summary, to achieve the said objectives effectively the proposed management organization should preform the following functions

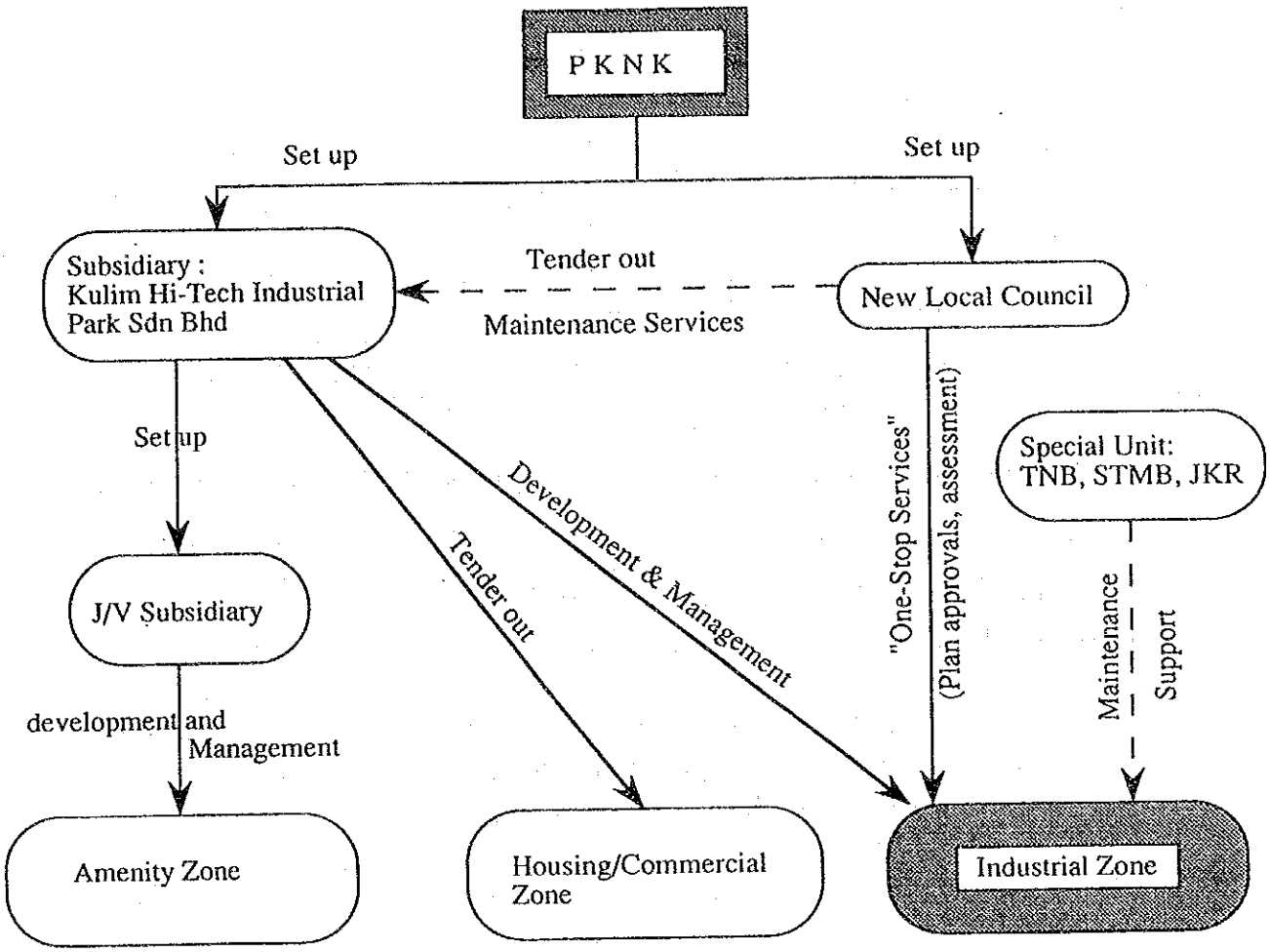
(a) "one-stop centre" to deal with problems and complaints from industrialists regarding investment-related permits and approvals, security, and environment and to undertake investment promotional activities.

(b) "industrial facilitator" to make efficient management and maintenance services for Hi-tech industrial tenants in close combination with relevant technical agencies. The sewerage treatment plant and temporary industrial waste storage facility are proposed to be managed by the management organization.

(c) "interface catalyst" to manage and maintain common service functions and facilities for Hi-Tech industries including Skill Development Centre (manpower training), University Innovation centre (University of Science Malaysia, University of North etc.), Technology Development Centre (public R & D institutions: SIRIM, MIMOS, etc.), Incubation unit, Science Technology Exchange Plaza (technology transfer promotion), exhibition centres, and amenities.

Fig. 7.4

HYBRID ALTERNATIVE : ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK SDN BHD AND NEW LOCAL COUNCIL



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Hybrid Alternative

7.3 Training

7.3.1 General

Under the Fifth Year Plan, 140,000 students were expected to graduate from public technical training institutes. The number of students enter these institutes increased from 37,000('85) to 76,000('90) in total. Particularly, Industrial Training Institutes were expected to enhance their capacity from 2,800 to 10,300. Vocational schools from 13,900 to 35,400. In line with this policy, the present public training systems are shown :

(A) Industrial Training Institute (ITI)

Under the jurisdiction of the Ministry of Labor.

Location : Kuala Lumpur, Prai, Pasir Gudang, Kuala Trengganu, Labuan, Ipoh, Kuanta, Melaka, Alor Setar and Kota Baharu.

ITI has 3 courses as follows :

(a) National Apprenticeship Scheme (NAS)

Term : 3 years
Course : Mechanics, electronics, architecture and printing

(b) Preparatory Trade Course

Term : 1 year
Course : Mechanics, electronics, architecture and printing

(c) Skill Upgrading Course

Term : decided with trainee's requirement
Course : Mechanics, electronics, architecture and printing

(B) Youth Upgrading Course

Under the jurisdiction of the Ministry of Youth and Sport

Term : 1 year

Course : Mechanics, electric, metalworking, architecture, dress making and cooking

(C) Vocational School

Under the jurisdiction of the Ministry of Education 37 existed in 1985, 31 new in the Fifth Five Year Plan

Term : 2 years
Course : Mechanics, electric, architecture, agriculture and trade

(D) Polytechnic

Under the jurisdiction of the Ministry of Education

Location : Ipoh, Kuan, Batu Pahat, Alor Setar, Kota Bahru, Kuching and Port Dickson
Term : 2 years 3 months
Course : Mechanics, electric, architecture and trade

(E) Centre for Instruction and Advances Skill Training (CIAST)

Under the jurisdiction of the Ministry of Labor

Location : Shah Alam
Course : Advances Skill Training
supervisory Skill Training
Instruction training

(F) MARA Vocational Institute (IKM)

Under the jurisdiction of the Council of Trust for Indigenous 11 existed in 1985, 3 new in the Fifth Year Plan

Term : 2.5 years
Course : Architecture, metalworking, car mechanics, dress making and hair dressing

Some staffs to these institutes states the there are few problems of facilities and equipments, the problems are those of teaching staffs and curriculum system. As for teaching staffs those who are well-experienced and able tend to be enticed to private companies. In their place, comes in experienced staff. This shall bring deterioration to education and training quality and prevent an institute's advance. The status of teaching staffs must be guaranteed well and supply of sufficient well- trained staffs is an urgent problem. Curriculum system must be reviewed and improved to meet the demand of private sector requirements and to build

up more consistent structure.

Besides these public training system, there is a unique training centre which is run by an association of private enterprises, Penang Skill Development Centre (PSDC). The style of this centre is quite suggestive. Below is a brief description of PSDC.

7.3.2 Penang Skill Development Centre (PSDC)

With the vision of "To establish Penang and the northern region of Malaysia as the manufacturing centre in the Asian Pacific", PSDC started its operations in July 1989 in the centre of the Bayan Lepas Free Trade Zone. It was officially opened in July, 28 1990.

PSDC will make annual training programmes basing on member's request considering carefully their importance, urgency, effect and feasibility. Thus, Requirements and needs of the member enterprises, but also others are allowed to join. Targeted level of its training is to up-grade the skill of workers follow the development of technology and new applications.

PSDC organized, between June 1, 1990 and May, 31, 1991.

- 49 Generic Courses for 512 participants
- 16 Customized Courses for 326 participants
- 3 In-House Courses for 78 participants
- 8 Continuing Education Courses for 206 participants
- 4 Tea talks for 254 participants

Compared with the previous year, the number of courses increased by 140% and the number of participants increased by 101%. It can be observed that more various courses were prepared for more intensive training.

PSDC facility is located on an approximately 1,000m^2 land. The facility consists of two lecture rooms, 3 computer machine equipped training rooms, heavy machine equipped workshops with an administration office, Kitchen, etc. The current staff is three ; the executive director, training coordination, and administration assistant.

They have only two years' achievement at present, but it can be said it shall be established as a workable model of an industry-led demand driven training centre with a policy of being open, non-profit, and self sustained.

7.3.3 Manpower Development of Kulim

Baisng on data of the "Housing and Population Census", Labor force – population of 20-59 age – of Kedah State in 1990 was estimated at approximately 694,000. With the average annual growth rate of labor force of 6th Malaysia Plan, 2.9%, labor force in 1995 is estimated 801,000 with an increment of 107,000. For Kulim Hi-Tech Park, it is assumed that the districts of Kulim, Bandar Baharu, Baling, Kuala Muda and Sik are to be the labor supply area, which has 44.8% of the population of Kedah State. Therefore, 48,000 increment in labor force is expected with allocation by population distribution (see Fig.7.5).

Out of this increment of 48,000, SungaiPetani Industrial Estate requires a 20,000 labor force by 1995, thus, 26,000 will be the real increment in Kulim area. This is recognized to be large enough for the demand of the Industrial Zone of the first Phase, 12,540, and, moreover, it can be expected that more labor force is available from eastern districts along E-W highway and Penang as well.

Industrial Zone is estimated to require 12,540 labor force by the completion of the first phase. Through our survey of Hi-Tech and Hi-Tech oriented industries, workers' grade ratio and number cut of 12,540 can be estimated as follows;

Manager/Engineer	5%	627
Technician	25%	3,135
Operator	70%	8,778
Total	100%	12,540

As for recruiting and training, the following is assumed.

- Manager/Engineer class will be recruited and dispatched from outside of the supply area on a nation-wide and world-wide level. These are well educated and experienced,thus are out of the training scope.

- Operator class will be recruited from the supply area and trained in the individual industries with OJT system or so.

- Technicians will be recruited, 40% from the supply area and 60% from outside. And 80% from the area and 50% from outside are estimated

To train these un-trained technicians, the Urban Block of the Industrial Zone will have a skill development centre. It must prepare 1,944 trained technicians by 1997 when the Zone

will be fully working . With assumptions of 360 hour basic training per trainee, and 50% workability with consideration of the initial motivation, capacity demand for training is estimated 179, approximately 200.

7.3.4 Kulim Skill Development Centre (KSDC)

(1) Goal and Objectives

The KSDC aims to utilize effectively resources among the members, industrial and service industries, by preparing and providing training and educational programmes. Its goal is to upgrading the educational and skill level of the workers in preparation to attain the necessary skills and to follow the technology progress. And its objects are to establish a mechanism to coordinate and utilize the resources among industries, respond to the urgent training needs of the members, and construct a network with a training institute in the region.

(2) Training Fields

The training courses for upgrading skills shall focus on the following fields at the first stage:

- Technical Skills
  - Electronics
  - Mechanical Engineering
  - Computer Soft & Hardware
  - CAD/CAM Courses
- Manufacturing Skills
  - Operative
  - Just-in-time
  - SPC
  - Cycle time
  - Equipment Based Training
  - MIM
- Management Skills
  - Communication
  - Leadership
  - Supervisory
  - Problem Solving Skills

(3) Proposed Facilities

The KSDC is proposed to be located in the Centre Block with 1.2 ha including reserved land for future extension. The first stage facilities below shall be prepared.

- 6 training rooms of 100 m^2, used as lecture rooms, computer; laboratories and light equipped laboratory for 25 students each.
- 1 administration room for 5 staffs
- 1 canteen for 100 students maximum

With these facilities, a maximum 200 students can study at the same time. These sufficient facilities enable the Centre to work for first several years with out any extension.

(4) Operation and Management

All the members of the association shall be members of the Training committee. The committee will prepare training calendar basing on members' request, monitor the out-come of the calendar and evaluate the effectiveness of the courses. The committee will also encourage the sharing of resources among the members i.e. spending experts as trainers, providing training materials and machinery.

The KDSC is managed by the management council, consisting of several member companies, Kedah State Development Corporation, the state government and some public and academic institutes. The council is the highest authority which is responsible for management and administration of the centre, including approval o all courses and events for implementation.

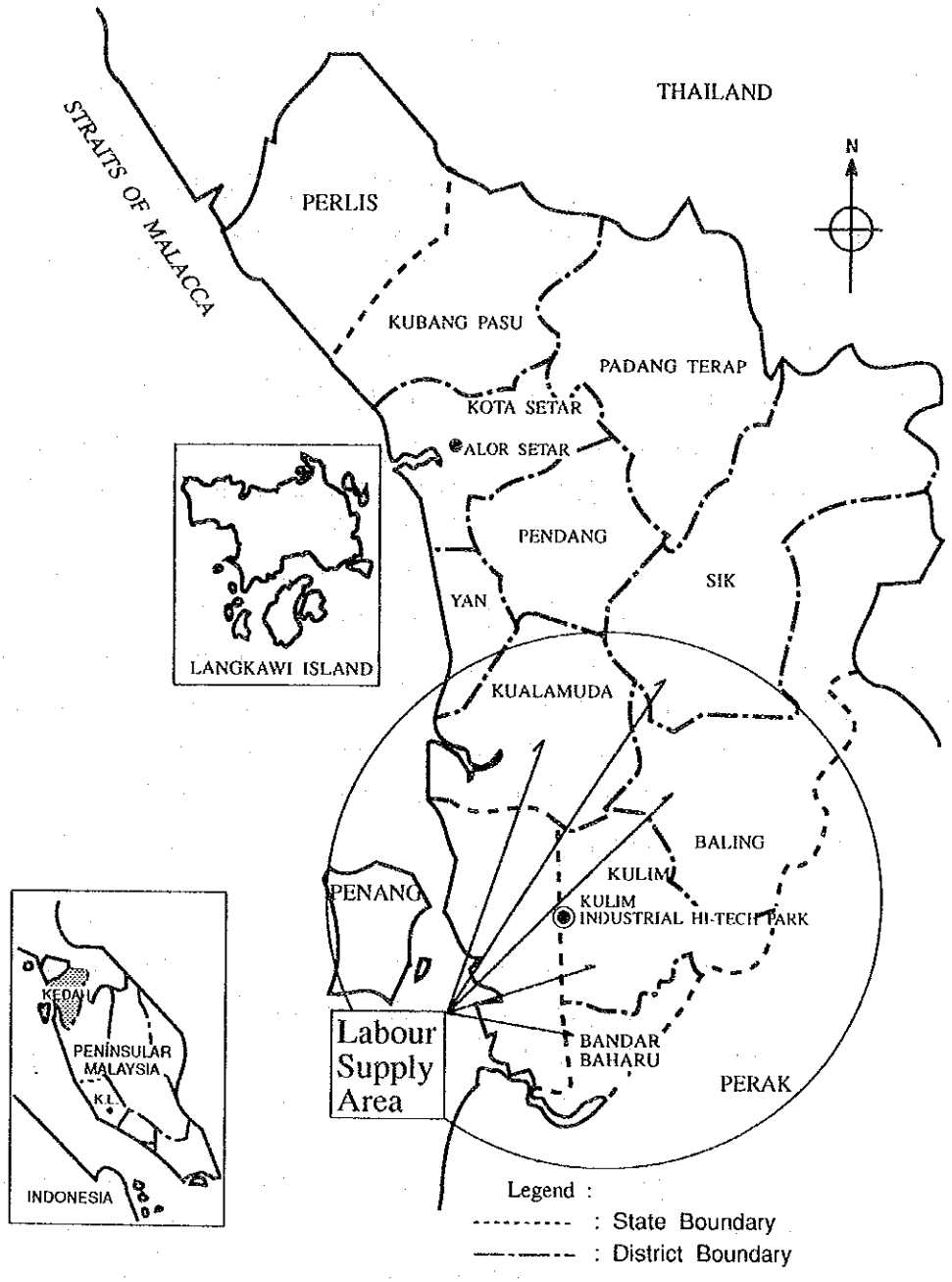
Differing from Penang's case, Kulim's case will start from the very start. The core authority will be required to make the most effort to organize private enterprises, to promote to prepare first facilities, to encourage the association members' activities, and to organized the council and committee to work.

In the future, when each major industrial estate will have their own skill development centres, it is quite strongly exacted to construct network which will bring a big multiplier effects.

Assumption : Growth Rate of Labour Force = 2.9%
(6th Malaysia Plan)

Kedah
Labour Force in 1990 : 694,000
Labour Force in 1995 : 801,000

Increment of Labour Force : 107,000 (1990 - 1995)
Increment of Labour force in Labour Supply Area
48,000 (44.9% of 107,000)



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Potential Labour Supply

7.4 Investment Promotion

7.4.1 Trend of Hi-tech Industries in 1990s

Major changes are taking places in locational factors, particularly in the sector of electric and electronics hi-tech industries. In case of Japan, the leading electric and electronics industries have reviewed global production network and marketing strategies and started to put them into implementation. Notable changes, particularly in this part of the world, are that production centers such as computer production, have come to concentrate in either Singapore and Malaysia.

It is also true that the shortage of operations in Japan is getting more serious and labor costs have gone up which have made the industries extremely uncompetitive to continue their production in Japan and thus accelerate a dramatic shift in production location from Japan to ASEAN countries.

As production centers move from the headquarters, some of the research functions will shift to the abroad accordingly. The typical function would be "product development" research which usually needs to be located nearby production center to comply with the needs of the consumers.

In general global market has been recently divided into four blocks i.e., EC, Japan, USA/Canada, and South-East Asia. The regional headquarters will be located in the four areas respectively and their relative independence is to be given. The four "polars" strategy would further intensifies as the time goes by. The research functions such as basic research, applied research and product development were undertaken in the headquarters only in the past, yet due to international marketing product research function needs to be sifted to this part of the world as well in near future.

In fact, the Matsushita, Sony, Hitachi have expressed their willingness to establish R&D centers in this country and preparation by other multi-national corporations is also being underway in such a way to recruit more engineers and their on-the-job trainings at the headquarters.

On the other hand, Malaysia is renowned with political stability and good infrastructure. A rival country in this connection has been Thailand and foreign investors normally choose either Malaysia and Thailand. However China and Indonesia are now catching up with two countries in terms of infrastructure provision such as free trade zone, Batam Island, and Bukasi industrial estate. The multi-nations corporations which are labor

intensive-oriented would select these two countries.

In view of forthcoming shortage of manpower, Malaysia needs to upgrade human resource development, and strengthen research and development (R&D) capacities in order to meet requirements of the higher value added production and capical-intensive production of the private industries.

The concentration of electric and electronics industries and their related component industries in Malaysia has become distinguished. Nevertheless housing amenity, transportation (Penang airport should be international) and utilities are problematic. The integrated functions such as a hi-tech industrial estate would be an effective vehicle to pull the foreign potential investors.

7.4.2 Proposed Criteria for Hi-Tech Industries

It should be noted that there has been no authorized and clear-cut and quantitative definition of the hi-tech industries and products in the world. It is because the technologies change and develop in a dynamic manner and thus a static definition of the technologies easily become obsolescent or need chronic reviews. As we indicated in the report, a high technologies can be considered not only in the products but also in the production process. Sophistication of the technologies in production and the properties of the products face an extreme difficulty in defining.

Nevertheless we have prepared tentative criteria as the second best for hi-tech industries and products in reference to the case of Office of Technology Assessment (OTA), USA. The industries of "technology intensity" are defined as those of which R&D expenditures are more than 3.2% to the value-added production and the engineers' proportion against the total employees is more than 2.8%. For hi-tech industries 10% and 10% or more taken respectively.

For investment promotion the criteria of the hi-tech industries would be necessary to identify and shortlist potential investors. Due to difficulties mentioned above, clearcut classification are not available. Nevertheless the tentative list of Japanese hi-tech companies are prepared for the use of MIDA. For other countries it needs a study on potential hi-tech companies based on the sub-sectors and products discussed above.

For selection of the investors which can be qualified to move in the proposed hi-tech park, the following general criteria are recommended. Yet as to actual selection of the applications, it is proposed that the selection committee headed by MIDA in cooperation with

SIRIM, MIMOS and others should be created to examine and assess the applications from the investors.

1) The industry which applies for entry in the hi-tech park should be the one to contribute to technology development of Malaysia.

2) The industry should submit an appropriate investment plan, production plan and research and development plan for the years to come (e.g. 5 years).

3) Incase of R&D oriented industry the research topics and R&D plan, preferably in the sector of hi-tech industries such as electric, electronics, new materials and bio-technologies should be submitted.

4) The industry should contribute to human resource development of Malaysia.

5) The industry should be financially sound and submit a financial report for the last three years.

6) The industry should be free of pollution and should be equipped with appropriate treatment facilities in case of toxic waste production potentials.

7) The industry should have appropriate proportion of permanent research staff and should submit a staff personnel plan.

7.4.3 Suggested Plan of Action for Implementation

The tentative criteria for hi-tech products and industries have been give above, yet it needs further clarification and coordination. As far as investment promotion is concerned, the following two steps are proposed.

1) Preliminary Promotion

The "Task Force" headed by MIDA should be established comprising PKNK, SIRIM, MIMOS, and other relevant agencies. The task force will identify the list of the hi-tech products and prepare overall hand-outs. Dissemination of hand-outs to foreign and local firms should be undertaken as soon as possible.

2) Intensive Promotion

The task force will shortlist potential investors to which intensive investment promotion will be carried out. Overseas promotion missions and investment

seminars abroad need to be effectively organized. Follow-up missions will be necessary afterwards.

7.4.4 Proposed Investment Incentives

Under present Promotion of Investment Act 1986, special incentives specifically for hi-tech industries are not granted. Nevertheless in order to launch into effective investment promotion for Kulim Hi-Tech Industrial park, the "promoted industrial area" concept should be introduced and the following incentives, in addition to existing incentives such as Pioneer Status, Investment Tax Allowance (ITA), should be provided.

Pioneer Status/ITA:

The companies which are allowed to come to the Park will be automatically granted pioneer Status or Investment Tax Allowance (ITA).

R&D Incentive:

The companies which are allowed to enter the Park will be automatically eligible for double deduction for R&D expenditures and tax holiday for seven (7) years period for hi-tech industries.

Training Incentive:

The companies which are allowed to be located in the Park will be automatically eligible for initial allowance of twenty (20) percent and annual allowance of five (5) percent for expenditure on training.

Abatement of Adjusted Income:

Abatement of more than five (5) percent of adjusted income for location of hi-tech industries at the Park will be granted.

Export Incentive:

Double deduction for export expenses and allowance for five (5) percent for FOB values of export will be granted.

Equity Ownership:

No equity conditions will be imposed on companies to be located in the Park.

Employment of foreign Expatriate Personnel:

Those companies which are allowed to enter in the Park will be automatically granted ten (10) or more expatriate posts including key posts. The appropriate numbers of expatriate posts will be decided upon application.

Royalty Incentive:

Ratio of royalty will be raised to five (5) percent for those hi-tech industries locating at the Park.

7.5 Questionnaire Survey

7.5.1 Questionnaire Survey on Potential Investors in Japan

1. Objective

In order to sound preliminary interests of the potential investors in Japan as well as to identify their requested requirements for utilities services, a questionnaire survey was undertaken in Japan between May and June, 1991. As a result, this questionnaire contributed to exposure of the proposed project among related Japanese industrialists.

2. Methodology

The companies were selected out of the ones which can be categorized as hi-tech industries and their supporting industries, amounting to a sample number of one hundred and seventy-eight (178) companies. The fifty-nine (59) replies were returned, resulting in a return ration of 33.1%.

3. Findings

(1) Investment Plan

Regarding a question if there is any overseas investment plan in near future, majority answered they have new overseas investment plan including expansion.

Yes	47 (70.1%)
No	20 (29.9%)

(2) Interest in Malaysia

Among those which replied that they have new overseas investment plan, thirty-one (52.5%) companies showed interest in investing in Malaysia.

Operating in Malaysia with New Investment Plan	18 (30.5%)
Not Operating, but New Investment Plan	13 (22.0%)
Operating in Malaysia, but No Investment Plan	5 (8.5%)
Not operating in Malaysia and No Investment Plan	16 (27.1%)

(3) Items of Production

The products which are planned to be produced overseas are as follows:

Final Product	18 (26.9%)
Components	20 (29.9%)
Not Decide	29 (43.2%)

(4) Factors for Investment Decision

Regarding the factors for investment decision the following are selected. It seems they are equally important (multiple answers).

	Not Important	Important	Not Important	No Answer
Global Market Access	14 (20.9%)	11 (16.4%)	7 (10.4%)	35 (52.2%)
Local Potential	9 (13.4%)	13 (19.4%)	9 (13.4%)	36 (53.7%)
Local Potential	12 (17.9%)	16 (23.9%)	3 (4.5%)	36 (53.7%)
Incentives	10 (14.9%)	16 (23.9%)	3 (4.5%)	38 (56.7%)
Workforce	22 (32.8%)	9 (13.4%)	0 (0.0%)	36 (53.7%)
Supporting Industries	14 (20.9%)	14 (20.9%)	2 (3.0%)	37 (55.2%)
Infrastructure	19 (28.4%)	10 (14.9%)	0 (0.0%)	38 (56.7%)

Amenity	13 (19.4%)	17 (25.4%)	1 (1.5%)	36 (53.7%)

(5) Merits of Location at Kulim

Concerning merits of locating factories at proposed Kulim Hi-Tech Park, its market access, infrastructure, amenity are said to be good while availability of supporting industries as well as raw materials and components appear to be slightly problematic.

	Good	Ordinary	Bad	No Answer
Global Market Access	20 (29.9%)	10 (14.9%)	0 (0.0%)	37 (55.2%)
Workforce	15 (22.4%)	9 (13.4%)	7 (10.4%)	36 (53.7%)
Supporting Industries	6 (9.0%)	14 (20.9%)	8 (11.9%)	39 (58.2%)
Infrastructure	18 (26.9%)	11 (16.4%)	0 (0.0%)	38 (56.7%)
Raw material availability	7 (10.4%)	17 (25.4%)	5 (7.5%)	38 *56.7%)
Parts availability	6 (9.0%)	15 (22.4%)	7 (10.4%)	39 (58.2%)
Amenity	16 (23.9%)	10 (14.9%)	3 (4.5%)	38 (56.7%)

(6) Required Incentives

In order to locate factories the following incentives are requested (multiple answers). Tax holiday, training allowance and educational allowance are regarded as important incentives.

Tax Holiday	25 (37.3%)
Training Allowance	16 (43.2%)
R&D Allowance	10 (14.9%)
Higher Royalty	12 (17.9%)
Export Allowance	12 (17.9%)
Education Allowance	21 (52.2%)

No Answer 35 (52.2%)

(7) Proposed Infrastructure

Regrading proposed infrastructure at Kulim Hi-Tech Park, the following are comments. In general the proposed infrastructure are thought to be very good and good compared with the existing infrastructure facilities.

	Very Good	Good	Ordinary	Bad	No Answer
Airport	4 (6.0%)	16 (23.9%)	10 (14.9%)	0 (0.0%)	37 (55.2%)
Port	4 (6.0%)	13 (19.4%)	12 (17.9%)	0 (0.0%)	38 (56.7%)
Railway	1 (1.5%)	8 (11.9%)	15 (22.4%)	3 (4.5%)	40 (59.7%)
Related Road	3 (4.5%)	20 (29.9%)	9 (13.4%)	0 (0.0%)	35 (52.2%)
Park Road	8 (11.9%)	16 (23.9%)	6 (9.0%)	0 (0.0%)	37 (55.2%)
Power	1 (1.5%)	18 (26.9%)	9 (13.4%)	0 (0.0%)	39 (58.2%)
Water	1 (1.5%)	15 (22.4%)	11 (16.4%)	0 (0.0%)	40 (59.7%)
Communication	5 (7.5%)	18 (26.9%)	5 (7.5%)	0 (0.0%)	39 (58.2%)
Sewerage	2 (3.0%)	20 (29.9%)	5 (7.5%)	0 (0.0%)	40 (59.7%)
Ind. waste	2 (3.0%)	16 (23.9%)	6 (9.0%)	0 (0.0%)	43 (64.2%)

(8) Interest in Kulim High-Tech Park

Regarding a question if they have a keen interest in locating their factory/R&D facilities in Kulim Hi-Tech Park, fifteen (15) companies responded favorably.

Very Interested 2 (3.4%)

Interested 13 (22.0%)

Not Interested 16 (27.1%)

Don't Know 28 (47.5%)

Those which replied favorably are CD, audio equipment, IC, oxygen gas, LED, computer-related parts industries.

7.5.2 Questionnaire Survey on Potential Investors in Malaysia

1. Objective

In view of facilitating an advanced investment promotional activities, a questionnaire survey has been done with mainly Japanese-related companies which are located and operating in Malaysia. Primary objectives are 1) to expose the proposed project to the attentions of Japanese industries, 2) to question if they have any new investment plan in near future, and 3) to sound their interest in relocating factories to Kulim.

2. Methodology

To do above study, a questionnaire format has been prepared and distributed among major Japanese-related firms based on the directory of the JACTIM (Japanese Chamber of Trade and Industry, Malaysia) members. The sampled number is one hundred twenty four (124) in total while the answers returned are forty seven (47) resulting in a return ratio of 37.9% which appears rather high.

3. Main Findings

(1) New Investment Plan (including expansion)

Regarding a question if there is any investment plan, the majority firms replied that they have new investment plan in foreseeable future.

Yes	35 (74.5%)
No	12 (25.5%)

(2) Manufacturing Sub-Sectors Covered

The industries which are sampled are VTR, Computer related components, IC, Color TV, Audio equipment, Display monitor, capacitor, plastic molding, LSI, Industrial ga, communication cable, electric and electronics parts and others.

(3) Location of Existing Factories

The majority of the sampled companies are located in Kuala Lumpur and its

neighborhood followed by Johor and Penang.

KL	26 (55.3%)
Johor	4 (8.5%)
Penang	4 (8.5%)
Kedah	2 (4.2%)
Others	3 (6.4%)

(4) Factors of Location Selection (multiple replies)

It is found that the most important factor for the existing industries to choose the location is proximity to the presently operating factory location. The good infrastructure available is second priority followed by components and manpower availability. Seventeen (17.0) percent companies pointed out that the good living environment is also priority factor.

Nearest to present factory	31 (66.0%)
Availability of good infrastructure	23 (48.9%)
Availability of components	12 (25.5%)
Availability of manpower	8 (17.0%)
Good living environment	8 (17.0%)
Availability of raw materials	5 (10.6%)

(5) Present location in FTZ or LMW

The presently operating factories are found mostly LMW (Licensed Manufacturing Work) while eight firms are located in FTZ (Free Trade Zone).

LMW	22 (46.8%)
FTZ	8 (17.0%)
Other	17 (36.2%)

(6) Difference in Benefits between FTZ and LMW

Regarding a question if there is any difference in locational advantages betwen FTZ and LMW or which to prefer, the majority has commented that there is no significant difference.

No difference	25 (53.2%)
FTZ	3 (6.4%)
LMW	2 (4.3%)
Don't know	17 (36.2%)

(7) Incentives Requirements (multiple replies)

Concerning incentive requirements, it is revealed that tax exemption incentive is still requested as first priority. Increase in royalty ratio is the second required priority followed by re-investment allowance and export allowance. Flexibility of working visa issues and training cost allowance are also pointed out.

Corporate Tax Exemption	30 (63.8%)
Royalty increase	23 (48.9%)
Re-investment allowance	22 (46.8%)
Export allowance	18 (38.3%)
R&D allowance	17 (36.2%)
Flexible Work Permit	2 (4.3%)
Training Allowance	2 (4.3%)

(8) Major infrastructure Problems Face (multiple replies)

It is found that the main problems which present industries in this country face are: 1) power cut, 2) lack of industrial waste dumping site, 3) inappropriate access road, 4) instantaneous power cut, 5) lack of appropriate industrial waste treatment companies, 6) voltage down and 7) malfunction of telefax communication, 8) telephone cut, 9) unclear telephone communication, 10) inadequate estate inside road, and others. It is noted that power, waste management, road access and communication are major problems to be improved urgently.

Electricity	
Power cut	31 (66.0%)
Instantaneous power cut	17 (36.2%)
Voltage down	11 (23.4%)
Water Supply	
Water deficiency	7 (14.9%)
Water Quality	6 (12.8%)
Road	
Access road	19 (40.4%)
Inside estate road	9 (19.1%)
Telecommunication	
Telephone cut	10 (21.3%)
Telefax malfunction	11 (23.4%)
Unclear communication	9 (19.1%)
No satellite station	8 (17.0%)
Sewerage	
Sewerage problem	8 (17.0%)
No central treatment plant	5 (10.6%)
Industrial Waste	
No waste dumping site	21 (44.7%)
Few waste management company	14 (29.8%)

(9) Creation of New Management Company

To undertake appropriate maintenance of a hi-tech park, it is proposed that a management company should be newly established. More than Seventy (70.0) percent of the companies interviewed responded that the said management company is good and very good proposal.

Very good proposal	16 (34.0%)
Good proposal	17 (36.2%)
No change	4 (8.5%)

(10) Collection of Management Fees

For operation and maintenance of the hi-tech park, management fee collection is proposed. Majority companies have replied that they support the collection of management fees.

Positively Support	3 (6.4%)
Support	34 (72.3%)
Status quo	2 (4.3%)
Against	0 (0%)
Don't know	8 (17.0%)

(11) Establishment of Training Centre (e.g. Skill Development Centre)

To cope with growing shortage of manpower, particularly skilled worker, technician and engineer, it is proposed to establish a training centre supported by private sector. Majority companies replied that they are interested in the said proposal.

Very interested	0 (0%)
Interested	34 (72.3%)
Don't know	13 (27.7%)

(12) Criteria of Hi-Tech Industries

As criteria for hi-tech industries, it is proposed that a company investing ten (10) percent value-added in R&D activities and having engineer staff of ten (10) percent against the total employees can be regarded as a hi-tech industry. The result reveals that the proposed criteria appears to be little bit severe criteria.

Too severe	28 (59.6%)
Resonable	8 (17.0%)
Don't know	11 (23.4%)

(13) Interest in Participation in Kulim Hi-Tech Park

Among the companies sampled nine (9) firms showed that they would like to participate in the proposed hi-tech park project.

Very interested	4 (8.5%)
Interested	5 (10.6%)

Not interested	38 (90.9%)

Those which answered favorably are optical fiber, audio products, computer-related components, electronics parts, oxygen gas, capacitor, CD player industries.

CHAPTER 8

FINANCIAL ANALYSIS

8. FINANCIAL ANALYSIS

8.1 Investment Costs

The investment cost for the proposed First Phase Industrial Zone of the Kulim Hi-Tech Industrial Park has been estimated at M$ 268.0 million including land acquisition, direct construction costs, administration expenses, and engineering services. Contingencies (price and physical contingency) being further taken, the total costs would reach M$ 313.7 million. The detailed breakdown is summarized below:

Project Cost for First Phase Industrial Zone (250 ha)

(Unit: M$ million)

1. Land Acquisition	9.0
2. Direct Construction	221.0
(1) Land Preparation	10.4
(3) Road Network	15.7
(4) Power System	81.9
(5) Water Supply	46.4
(6) Telecommunication	8.5
(7) Drainage System	9.7
(8) Sewerage System	10.0
(9) Industrial Solid Waste	9.0
(10) Architecture Work	24.4
(11) Landscaping	5.0
Sub-Total	230.0
3. Administration Expenses (5%)	11.5
4. Engineering Services (12%)	26.5
Sub-Total	268.0
5. Contingency (10% for physical contingency and 3.2% p.a. for price contingency of 1992 to 1994)	45.7
Grand Total	313.7

Please note that the interest during construction has been excluded from the above and been included in case that the loan is borrowed to finance the investment costs.

8.2 Industrial Land Cost

If we take M$313.7 million as the total investment cost for the first phase of the Hi-Tech Industrial Park and if we also take 150 ha as saleable industrial land, the land cost per m² becomes M$209.1. This land cost is rather high compared with the existing land sales prices in the neighbourhood of Kedah. For comparison, neighbouring industrial land prices in the north of the country are shown below.

Industrial Areas	M$ per m²
Kedah:	
Kulim Industrial Estate	21.53
Mergong Barrage Industrial Estate	53.82
Bandar Darulaman Industrial Estate	37.67
Penang:	
Prai Free Trade Zone	78.04
Prai Indutrial Complex	86.11
Bayan Lepas Free Trade Zone	96.88
Bayan Lepas Industrial Estate	94.19
Perak:	
Seramik BT 10 Phase I	37.66
Kinta Free Trade Zone	57.03
Kanthan Industrial Estate	43.04
Seri Manjong Industrial Estate	43.06
Perlis:	
Jejawi Industrial Estate	21.48
Kuala Perlis Industrial Estate	25.78

As seen from this Table, the competitive prices of hi-tech Park lots compared with those of Penang, Perak, Perlis would range between M$ 80.00/m² and M$100.00/m² at maximum at initial stage. Therefore, if the land cost of Hi-Tech Park of M$209.1/m² is directly applied to the sales price, it would be hardly competitive.

In addition, the recent prices of industrial estates in the neighbouring countries, which might be competing for hi-tech industries are quoted as follows:

Country	M$/m^2 (US$/m^2)
Thailand:	
Salabri Industrial Estate	96.00 (35.00)
Indonesia:	
East Jakarta Industrial Park	150.00 (55.00)
MM 2100 Industrial Town	150.00 (55.00)
Bukasi Int'l Industrial Estate	122.00 (45.00)

8.3 Financial Cost for Industrial Land

Among the breakdowns of the Project investment costs, some of the costs could be separated out totally and some could be reduced partially from the land sales cost items in terms of their cost recovery systems and national policy point of view.

In so doing, the project investment costs were readjusted in close consultation with PKNK and their breakdowns are as follows:

Re-adjusted Project Investment Costs

(Unit: M$ million)

(1) Land acquisition	9.0
(2) Direct construction cost	66.7
Land preparation	10.4
Road network	15.7
Water system	15.0
Telecom ducting	0.9
Drainage system	9.7
Sewerage system	10.0
Landscaping	5.0
(3) Sub-Total	75.7
Administration expense (5%)	3.8
Engineering service (12%)	9.1
(4) Sub-Total	88.6
Contingency	14.7
(10% of 4 above for physical and 3.2% p.a. for price contingency of 1993 and 1994)	
Grand Total	103.3 (M$ 68.9/m^2)

If these costs are considered as Project financial costs, the unit land cost per m2, which is derived from the saleable land area (150 ha), becomes M$ 68.9/m2 which is very competitive cost for sales promotion in the northern region.

8.4 Financial Analysis

A financial analysis has to be confined to the industrial zone in the Hi-Tech Industrial Park. Through the financial analysis the appropriate range of the selling (leasing) prices are expected to be examined. The financial evaluation has been carried out based on the following assumptions.

(1) Project Investment Costs

As a base case, project investment costs are assumed at M$ 103.3 million as seen above.

(2) Disbursement plan

The disbursement period is assumed between 1992 and 1994.

(3) Land price and sales schedule

In view of land prices of neighbouring industrial estates and high-level infrastructure endowment of the proposed Hi-Tech Park as seen above, two sets of land sale prices and sales schedule have been studied as option A which is rather positive option and option B which is rather conservative case. The appropriate range of the land prices, however, would be between M$80.0/$m^2$ and M$110.0/$m^2$ in five year time.

Option -A	1992	1993	1994	1995	1996
Sales price (M$/m2)	90	100	110	110	110
Sales schedule (%)	10	20	20	20	30

Option -B	1992	1993	1994	1995
Sales price(M$/m2)	80	80	90	90
Sales Schedule (%)	20	30	30	20

(4) Operation and maintenance cost

The operation and maintenance costs adjusted for relevant infrastructure items are as follows:

Items	Annual O&M Cost (M$ thousand)
Road	100.0
Water supply	50.0
Telecommunication duct	20.0
Drainage	100.0
Sewerage system	150.0
Landscaping	150.0
Total	570.0

(5) Cost of sales

For sales promotion cost, it is assumed that two percent (2.0%) of land sales revenue would be expended.

(6) Taxes

In case that tax is to be paid, income tax is assumed at thirty-five percent (35.0%) of gross revenues is assumed as case study for a private type of management body. A development tax is not counted.

(7) Dividends

In case of optional case of a private company type of the management body, dividends are assumed to be paid at 8.0 percent p.a. of the paid-up capital.

(8) Depreciation

Due to financial practice in Malaysia, depreciation allocations are omitted in this analysis.

(9) Management Fees

To cater for operation and management expenses, management fees are proposed to be collected from the industrialists located in the Kulim Hi-tech Industrial Park. This may be allocated in terms of the total factory area occupied or the total number of the working employees. The management fees to be collected would be M$ 0.57 million per annum.

(10) Financial Plan

In view of Project viability and respective cost items, a financing plan has been assumed as follows.

Federal loan to cover investment cost is assumed to be provided with the following terms and conditions:

Interest rate:	8.0%
Grace period:	three (3) years
Repayment period:	ten (10) years

And equity portions, if required, would be 20% of the estimated investment costs.

For optional cases, the following three cases are tested in terms of financial rates of return; ROI (Return on Investment) and ROE (Return on Equity).

Case 1A: In case that PKNK is a management organization which is to finance all the costs by loan, to pay income taxes and to collect management fees.

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995	1996
Price (M$/$m^2$)	90	100	110	110	110
Schedule (%)	10	20	20	20	30

O & M cost: M$ 0.57 million
Tax: To be paid (35%)
Financial Plan: all loan basis
Management Fees: To be collected
FIRR(ROI): 1.80%, (ROE): not relevant

Case 1B: as above

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995
Price (M$/m^2)	80	80	90	90
Schedule (%)	20	30	30	20

O & M cost: M$ 0.57 million
Tax: To be paid (35%)
Financial Plan: all loan basis
Management Fees: To be collected
FIRR(ROI): Negative, (ROE): not relevant

The case 1A gives that ROI (return on investment) has been positive whereas the case 1B shows that ROI has been negative. as a result of sensitivity analysis, the following policy implications are revealed to make this option case feasible:

1) Tax (income tax) holiday should be admitted for the initial two years, or

Plan A	Plan B
FIRR (ROI) : 12.9%	FIRR (ROI) : Negative
(ROE) : not relevant	(ROE) : not relevant

2).Around 20% of investment cost should be provided by grant system,or

Plan A	Plan B
FIRR (ROI) : 18.5%	FIRR (ROI) : Negative
(ROE) : not relevant	(ROE) : not relevant

3) Management fees should be raised double.

Plan A	Plan B
FIRR (ROI) : 6.5%	FIRR (ROI) : Negative
(ROE) : not relevant	(ROE) : not relevant

For the Case-1 which is PKNK type of the management body, the results show not much exciting. It is foreseen that the government supports such as tax exemption or subsidy, or management fee increase would be necessary.

Case 2A: In case that a management body is a state corporation type where equity is to be set at 20% of the total project costs, loan to be borrowed to finance the remaining project costs, income tax is to be exempted and management fees are to be collected.

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995	1996
Price (M$/m^2)	90	100	110	110	110
Schedule (%)	10	20	20	20	30

O & M cost: M$ 0.57 million
Tax: To be exempted
Financial Plan: Equity portion is 20% while the rest is on loan basis
Management Fees: To be collected
FIRR(ROI): 37.99%, (ROE): 50.86%

Case 2B: As above.

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995
Price (M$/m^2)	80	80	90	90
Schedule (%)	20	30	30	20

O & M cost: M$ 0.57 million
Tax: To be exempted
Financial Plan: Equity portion is 20% while the rest is on loan basis
Management Fees: To be collected
FIRR(ROI): 51.18%, (ROE): 73.74%

For the Case-2 which is a state corporation type of the management organization, the proposed land pricing and sales schedule of the both Case-2A and -2B reveal very high internal rates of return. It was due to the fact that the public organization could enjoy the merits of the public status such as tax exemption compared with other alternatives. Financially this would be the best alternative.

Case 3A: In case that the management body is a private company type where the investment costs are to be financed by the equity (20%) and loan (80%), taxes are to be paid, dividends also to be paid and management fees to be collected.

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995	1996
Price (M$/m^2)	90	100	110	110	110
Schedule (%)	10	20	20	20	30

O & M cost: M$ 0.57 million
Tax: To be paid (35%)
Financial Plan: Equity portion is 20% while the rest is on loan basis
Management Fees: To be collected
Dividends: To be paid at 8% p.a. of the paid-up capital.
FIRR(ROI): Negative, (ROE): Negative

Case 3B: As above.

Investment Cost: M$ 103.3 million
Land Prices and Sales Schedule:

	1992	1993	1994	1995
Price (M$/m^2)	80	80	90	90
Schedule (%)	20	30	30	20

O & M cost: M$ 0.57 million
Tax: To be paid (35%)
Financial Plan: Equity portion is 20% while the rest is on loan basis
Management Fees: To be collected
Dividends: To be paid at 8% p.a. of the paid-up capital
FIRR(ROI): Negative, (ROE): Negative

The both cases show the negative internal rates of return due to severe conditions such as tax payment, and dividends payment. Land prices cannot be further raised which would become not competitive at all in terms of marketing policy. Policy implications for this case are:

1) Tax (income tax) exemption should be admitted for the first three (3) years, or

Plan A	Plan B
FIRR (ROI) : 13.6%	FIRR (ROI) : 34.4%
(ROE) : 19.4%	(ROE) : 55.8%

2).Management fees should be increased double, or

Plan A	Plan B
FIRR (ROI) : Negative	FIRR (ROI) : Negative
(ROE) : Negative	(ROE) : Negative

3) Twenty (20) percent of the investment costs should be financed by grant scheme.

Plan A	Plan B
FIRR (ROI) : 9.6%	FIRR (ROI) : Negative
(ROE) : 17.9%	(ROE) : Negative

The Case 3 was a private company type of management body. The results, however, show the negative rates of financial return for both Case 3A and 3B. This was because a private company needs to pay taxes and dividends which would bring about negative factors in the financial analysis compared with other alternatives. Since land pricing as seen above is rather high already, substantial incentives such as tax holiday, or financial subsidy from the government or management fee increase would seem to be essential for this type of management organization.

For a hybrid type of management between the alternative one and three which was recommended in the chapter of Institution and Management Aspect, the financial analysis results however are negative as the Case-3, though the latter assumed provision of the equity by twenty (20) percent of the Project costs. The policy implication would be, in addition to tax holiday and subsidy, to further welcome private sector's participation by equity holder.

It is also suggested that the housing and recreational development in the Project should be privatized to the private developers under the proposed management organization. These revenues generated might well contribute to financial position of the said management body.

Note : due to progress in work of on-going Master Plan Study and unavailability of cost data for development outside industrial zone, financial computation for cross- subsidization by housing and recreational facility sales was difficult here.

CHAPTER 9

ENVIRONMENTAL IMPACT ASSESSMENT AND MONITORING

9 ENVIRONMENTAL IMPACT ASSESSMENT AND MONITORING

9.1 Environmental Laws and Regulations in Malaysia

A list of legislative acts related to various environmental aspects in Malaysia is given in the supporting report. The Environmental Quality Act, 1974 is in its seventeenth year of implementation. In 1989, new enactment of regulations for control and safe disposal of toxic and hazardous wastes were made. Pollution abatement and control via the enforcement of pollution control regulations under the Acts complement and are complemented by other activities including inventory of pollution sources, environmental quality monitoring and land-use planning process. The application of environmental impact assessment in planning has increased significantly in Malaysia since the implementation of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order, 1987. The siting of any major projects prescribed under the Order requires assessment to determine the extent of impact that such a project will have or likely to have on the environment.

9.2 Summary of Environmental Impact Assessment(EIA)

9.2.1 Introduction

An industrial estate covering an area of 50 ha or more, or a housing estate covering an area of 50 ha or more are prescribed activities requiring an Environmental Impact Assessment(EIA) as determined by the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987.

The EIA of the Kulim Hi-Tech Industrial Estate was conducted by considering it as part of the project planning and design. This is to enable identification of significant impacts for which suitable remedial action could be taken, before actual construction of the estate begins. The EIA was done by local consultant Geotechnical and Environmental Associates Sdn. Bhd., with advice and assistance from the JICA Study Team. As far as possible, the EIA procedures as listed in "A Handbook of Environmental Impact Assessment Guidelines, 1987", published by the Department of Environment (DOE), Malaysia were followed. The project activities that have the potential to cause significant environmental impact during construction and operation were selected or modified from the list given in the DOE handbook.

The scope of the EIA covers all the zones of the Industrial estate being planned i.e. the total area of 1,450 ha. The overall EIA is sufficiently detailed using the available information, in order to enable determination of significant project impacts and its subsequent use in project planning.

9.2.2 Baseline Data

The EIA was carried out by initial collection of baseline data about the study area. Data on the existing environment, which included climate and air quality, water quality, hydrology, flora and fauna, population perception and socio-economy was collected from the project site and project area of influence (defined as an area of 4 km radius from the boundary of the proposed project site). Data was also obtained from published materials, government agencies, and non-governmental organizations. Some of the key relevant features of the existing physical, biological, and socio-economic environment are presented in the supporting report.

9.2.3 Assessment of Potential Impacts Due to Project Activities and Formulation of Mitigation Measures

Project activities were identified for each stage of the project; during construction, housing, and industry operation. Detailed information concerning the same is presented in the supporting report.

The impact of the project activities identified on various environmental components (physio-chemical, biological and human) was determined using the baseline data on the existing environment collected earlier. The physio-chemical environmental components were land, surface water, ground water, atmosphere, and noise. The biological components included species and population and habitats and communities. The human factors were with respect to socio-economy, aesthetic, and cultural factors. The significance and degree of importance of the impact was evaluated and presented in matrix form in fig. 9.1.

Once the importance and significance of impacts was identified, mitigation measures were formulated for each potential impact identified with respect to each project activity. The summary table of impact and mitigation measures is presented in the supporting report.

During project construction stage, various project activities like setting up of base camps to house workers, construction of access roads and river crossings, site clearing,

earthworks and drainage alterations, piling, piping and sewering, transportation of materials used for construction, and supply of utilities could lead to significant adverse impacts. Effect on water quality, air quality, noise level increase, problems of erosion and occurrence of flash floods are significant. Suitable design and operational methods and mitigation measures formulated include provision of suitable sanitation facilities in base camps, compaction of loose earth as soon as possible, water trough provision for vehicle to reduce dispersion of air particles, limiting working hours to day time only, observation of suitable safety measures and good maintenance of all equipment, provision of suitable landscaping and provision of temporary drainage system.

During project operation, housing and industry operation related to waste and wastewater generation, transport and treatment, as well as traffic and transportation problems, raw materials and product handling and storage, occurrence of accidents, and pest control are some project activities having significant environmental effects. Provision of suitable drainage and sewerage system, wastewater treatment system as well as industrial treatment system is necessary. Elsewhere in this report, details of the drainage, sewerage and wastewater treatment system and the industrial waste management system for the industrial zone is presented. Proper implementation and running of these systems and other mitigation and monitoring measures formulated should ensure control of any adverse environmental impact. As the master planning of zones other than the industrial zone is presently in progress, detailed information regarding these zones is presently not available. However, the overall EIA is sufficiently detailed using the available information to determine suitable mitigation measures for the impacts identified for zones other than the industrial zone also.

It was determined that there appears to be no apparent residual adverse impacts associated with this project. The site chosen is not an environmentally sensitive area and there are no endangered species there. Further, the existing oil, palm and rubber plantations are very old. The proposed 40% green area to be maintained in the Hi-Tech park is expected to have a positive impact of re-establishing previously lost flora and fauna with a new assemblage of biotic communities, in particular, in the proposed nature parks, golf course and landscaped grounds. Well maintained facilities, reliable and adequate services and proper landscaping of both the industrial as well as residential zones play crucial roles in enhancing the aesthetic and inducement aspects of the Hi-Tech park with regard to overall success of the project and well being of the workers and residents of the area.

Fig. 9.1

[E] Significant environmental enhancement.

[T] Environmental impact that is potentially significant but on temporary basis and will assume equilibrium after certain period of time.

[D] Potentially significant adverse environmental impact for which design solution has been identified.

[N] Environmental impact that is potentially significant but about which there is insufficient information to make a reliable prediction. Close monitoring and control is recommended

[P] Permanently lost but no adverse environmental impact.

[U] Adverse environmental impact that is potentially significant but about which insufficient information has been obtained to make a reliable prediction.

[R] Residual and significant adverse environmental impact.

ENVIRONMENTAL COMPONENTS			IDENTIFICATION OF ACTIVITIES	PROJECT ACTIVITIES: CONSTRUCTION FOR ALL STAGES														OPERATION HOUSING											OPERATION INDUSTRY																							
				1 Site Investigation	2 Base Camp	3 Access Rd & Strm Crossg.	4 Site Clearing	5 Earthwork & Drainage Alter.	6 Piping & Sewering	7 Transportation	8 Piling	9 Construction & Equip.	10 Supply of Utilities	11 Landscaping	12 Waste Disposal	13 Labour Force	14 Golf Course	15 Building Maintenance	16 Drain./Sewer. Sys. Maint.	17 Landscaping	18 Garbage Disposal	19 Sewage Disposal	20 Transportation & Traffic	21 Utilities	22 Amenities	23 Pest Control	24 Security	25 Golf Course	26 Mechanical Processing	27 Chemical Processing	28 Biotechnological Process.	29 Operation Feature	30 Indus. Wastewater Disposal	31 Sewage Disposal	32 Gaseous Emission	33 Atmospheric Heat Disposal	34 Solid Water Disposal	35 Transportation & Traffic	36 Material & Prod. Handl. & Storg.	37 Accidents	38 Water Requirement	39 Energy Requirement	40 Services	41 Landscaping	42 Pest Control	43 Labour Force	44 Research Institution	45 ABANDONMENT
PHYSICO-CHEMICAL	LAND		Soil Profiles																																														
			Soil Composition																																														
			Slope Stability			D	D	D				D		E			D			E							W																				
			Subsidence and Compaction								E																														E						
			Salemicity																																													
			Flood Plains/Swamps			D	D	D				D																																			
			Land Use																	E			E																									
			Engineering and Mineral Resources																																												D	
			Buffer Zones																																													
	SURFACE WATER		Shoreline																																											R	
			Bottom Interface																																													
			Flow Variation																																													
			Water Quality		D/T	D/T	D/T	D/T	D/T			D/T		E	D/T		D/T		D/N	E	D	D/N					D/N	D/N	D/N	D/N	D/N	D/N					D/N	D/N			E			D/N	R	
			Drainage Pattern		D/T	D	D/T	D/T				D/T																																	D/N	D	
			Water Balance																																													
			Flooding		D/T	D	D/T	D/T				D/T							D/N																											D/N	R	
			Existing Use																																													
	GROUND WATER		Water Table																																													
			Flow Regime																																													
			Water Quality						D										D/N														D														
			Recharge																																													
			Aquifer Characteristics																																													
			Existing Use																																													
	ATMOSPHERE		Air Quality			D/T	D/T	D/T		D/T		D/T		E			D/T			E	D		W			D	D		D/N	D/N	D/N			D/N		D/N	D/N		D/N			E	D		D/N	R	
			Air Flow																																													
			Micro Climate Changes				P					P		E						E																O										
			Visibility			D/T	D/T	D/T				D/T		E			D/T																											E			R	
	NOISE		Intensity	T		T	D/T	D/T	D/T	D/T	D/T	D/T		D			D/T			D			D					D	D	D							U					D				
			Duration	T		T	D/T	D/T	D/T	D/T	D/T	D/T		D			D/T			D								D	D	D							D					D				
			Frequency																																								D				
BIOLOGICAL	SPECIES & POPULATION		Terrestrial Vegetation				D/T							D/E			D		D/N	D/E							W															D/E			D/E	D
			Terrestrial Wildlife				P																																								D
			Other Terrestrial Fauna				P							D					D/N						E																	D				D
			Aquatic Flora				T	T				T								D																						D				D
			Fish				T	T				T		D						D/N																						D				D
			Other Aquatic Fauna		D/T	D/T	T	T				T		D						D								D													D				D
	HABITATS & COMMUNITIES		Terrestrial Habitat				P							D						D																					D				D
			Terrestrial Communities				P							D																												D				D
			Aquatic Habitats				T	T				T		D						D		D																			D				D
			Aquatic Communities				T	T				T		D								D							D													D				D
HUMAN	HEALTH & SAFETY		Physical Safety/Health			D/T	D/T	D/T		D/T	D/T	D/T							D/E	D/E	D/E	D/E	D/E			E	E	E	D	D	D	D	D	D	U		D	D	D				D/E				D
			Psychological Well-Being											E			E	E	E	E	E	D			E	E	E	D	D	D						D	D				E				
			Parasitic Disease		D/T										D/T			D		D	D																										
			Communicable Disease		D/T										D/T																																
			Physiological Disease																																												
	SOCIAL & ECONOMY		Employment		E		E	E				E				E							E		E																	E		E		E	E	
			Housing																					E	E																					D	
			Education																						D																					E	
			Utilities									D	D			D								D																				D	D		E	
			Amenities				E																		D																					D	
			Commerce		E		E	E				E				E		E	E	E	E	E		E			E										D/E					E		E	E	
	AESTHETIC & CULTURAL		Landforms					P																																							
			Biota				P							D/E						D/E								D															D/E			D/E	
			Wilderness				P							D						D																						D				
			Water Quality		D/T	D/T	D/T	D/T	D/T			D/T		E		D/T		D/N	E		D/N							D/N	D/N	D/N							D/N	D/N			E			D/N		
			Atmospheric Quality			D/T	D/T	D/T		D/T		D/T		E		D/T			E			W							D/N	D/N				D/N		D/N	D/N			E			D/N		
			Micro-Climatic Changes				P					P		E						E																					E			D		
			Tranquility				D/T	D/T		D/T		D/T		E						E																					E			D		
			Sense of Community																							E																	D	D		D	
			Community Structures																																												
			Buildings																F							E/E																					
			Historic Places or Structures																																												
			Religious Places or Structures				P																																								
			Landscape					P				E								E								E														E			E/E	D
			Composition					P				E								E																						E			E	
			Odour		D/T															D/N		D	D						D	D				D	D	D							D		

Fig. 9.1 Environmental Impact Assessment Matrix for Kulim Hi-Tech Park

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE

9.3 Review of Environmental Impact Assessment

A review of the Environmental Impact Assessmentwas done in order to highlight potential impacts and recommended mitigation measures on major environmental components. This would help in formulation of the posr-construction environmental monitoring and and management plan for the industrial estate.

(1) Drainage Pattern and Flooding

Several flood prone areas are located around Sg. Ayer Merah, Sg. Jalak, Sg. Parit Bunian, Sg. Seluang and Sg. Kelang Lama. The floods that occur are mainly of one day duration after only a few hours of rainfall. The existing Kulim industrial estate is also prone to flash floods.

The development plans of the industrial estate need to provide a solution to the predicted flooding problem. This is being done by use of a retention pond storage facility. Elsewhere in this report, details of the retention pond design are presented. For the first phase of the industrial zone of the park, two retention ponds are located on Sg. Ayer Merah and Sg. Parit Bunian. These ponds also serve as multi-purpose areas providing recreation for the community.

(2) Water Quality

Fig. 9.2 shows the river system in the project area. The present water quality of all the rivers in the project area is good. All industrial wastewaters and sewage should be sufficiently treated to meet Standard B of the EQ(SIE)R 1979 discharge limits before discharging into Sg. Jarak or its tributary. The wastewater treatment method adopted is detailed in an earlier chapter of the present report. Basically in the industrial zone, the organic matter wastewater or miscellaneous kitchen, toilet, and canteen wastewaters from each industry will be transported by means of sewers to a central treatment plant. An oxidation ditch process has been designed to meet the 'Hi-Tech Standard (Standard B + a)'. The effluent from the treatment plant will be transported to the retention ponds where biological monitoring using fish is proposed. The process industrial wastewater from each industry will be treated in individual treatment plants located within each factory lot. Industries are required to meet the 'Hi-tech Standard'. Biological monitoring using fish is recommended to be carried out by the industries before discharging the effluent to the retention ponds. A

Water Sampling Pit outside each factory lot is proposed for monitoring purposes.

For the housing area, where the treated effluent will be released into Sg. Kulim, the Effluent Standards should meet Standard A of the EQ(SIE)R 1979 as there is a water intake point downstream on Sg. Kulim. Again, a treatment process giving higher and more reliable pollutant removal rate than oxidation ponds is recommended. Close surface quality monitoring including surface quality monitoring before discharge into Sg. Kulim is to be ensured.

Excessive use of chemicals (fertilizers, herbicides and pesticides) is to be strictly avoided in the maintenance of the golf course. To minimize pollution by suspended solids and excess fertilizers it has to be ensured that there are run-off collection channels around the golf course leading to sediment settling ponds during construction as well as operation.

(3) Waste Management

Proper management of the industrial and domestic solid wastes is necessary. Details of the proposed industrial waste management system in including a Waste Manifest Tracking System and design of Monitoring/Separation Station and secure Storage Facility are presented elsewhere in this report.

(4) Air Quality and Climate

Existing air quality in the project area is generally good. However, the topographical and meteorological features of Kulim (the proposed industrial park is situated in a valley and has a low temperature inversion layer) indicate that the project area is prone to air pollution.

There is little information on the nature of air pollutants that are emitted from the proposed industries to be set up in the industrial park. A variety of very toxic gases (epitaxial gas, arsine , phosphine, boron trichloride) are used in an IC manufacturing plant though the quantities are relatively small. Another possible source of pollution could be from individual garbage and toxic waste incinerators in the individual industries. It is therefore essential that each industry designs, constructs and operates an adequate plant air management system. This includes installation, operation and maintenance of adequate pollution control equipment by each industry to adhere to ambient air quality standards. An agreement between each industry and, KSDC and DOE shall

specify details of the plant air management system. Regular monitoring must be carried out by the respective industries with supervision by the management company proposed for the industrial estate to ensure that ambient air quality is within acceptable limits. A sample of the agreement is presented in the supporting report.

Although the predicted impact due to traffic on air quality is small, various measures are suggested to reduce air pollution from road traffic in the EIA report.

Open burning of garbage in housing zone is to be strictly prohibited. Garbage collection services should be adequate.

(5) Noise Levels

The present noise levels (day and night) distributions inside the project area are generally low due to the absence of any major human activities. The noise levels are not expected to increase beyond allowable limits during operation of the high tech park. An agreement between each industry, and KSDC and DOE shall specify details of the individual industry's noise control and management system. A suggested format of the same is presented in the supporting report.

(6) Animal Diversity

The project area is very poor in animal diversity. No species of special conservation interest are present in the study area. Further, the existing oil, palm and rubber plantations are very old. The proposed 40% green area to be maintained in the hi-tech park is expected to have a positive impact of re-establishing previously lost flora and fauna with a new assemblage of biotic communities, in particular, in the proposed nature parks, golf course and landscaped grounds.

(7) Health Services

Health related facilities in the district are inadequat. There are only 224 hospital beds available to cater to a large number of residents, and this has to be shared with residents in the neighboring district of Bandar Baru.

(8) Fire Protection Services

The hi-tech park and the Kulim district require a more effective and adequately staffed and equipped fire protection services. Present fire service available is a

class C fire brigade located in Kulim town serving not only the 296 sq miles of the district but also the Bandar baru district. Under the Fifth Malaysian Plan, a Class B fire brigade station was planned to be built near Kulim Industrial estate to cater to the industries in the estate. However, the project is yet to be implemented by the relevant authorities.

(9) Socio-Economic Impacts

A number of socio-economic impacts due to the project are as follows:

- Enhancement of employment opportunities during construction stage.

- Enhancement of employment opportunities during operation and maintenance stage. The proposed Kulim hi-tech park is expected to be able to create a substantial number of employment opportunities of about 24,000 posts. These posts include technical, professional, administrative, research, sales and general workers as depicted by various sectors of the proposed project.

- Enhancement of commercial activities of the area, nearby towns, and villages during operation and maintenance stage. With an additional population of about 95,000 persons (including workers and their family members) created through the project, it is expected that the demand for services such as banking, postal and medical services, retailers etc. will be on the increase. This will subsequently lead to an increase in employment in the respective sectors in order to meet the increase in demand. The extra expenditures and purchasing power of the workers will create income and employment multiplier effects on the other sectors of the local economy, such as recreational and entertainment industries, banking, financial and communication services.

- Enhancement of inflow of local and foreign investors.

(10) Labor Shortage

There is an acute shortage of labor in Kedah and in existing Kulim industrial estate. There is considerable difficulty in obtaining workers. There is the question of whether labor will be available to take up the employment opportunities that will be created by the project.

(11) Landscaping

Good landscaping is necessary for a number of reasons. It results in enhancement of aesthetic and recreational value of the area. The bio-diversity of the urban habitat can be enriched through planting of mixed varieties of plant and tree species to serve various landscaping functions such as climate amelioration, erosion control, abatement of noise and air pollution, for traffic control etc. Proper landscaping of both the industrial as well as residential zones play crucial role in enhancing the aesthetic and inducement aspects of the hi-tech park with regard to overall success of the project and well being of the workers and residents of the area.

9.4 Post Construction Environmental Monitoring Program

The purpose of post-construction monitoring is to make periodic checks on the actual environmental impacts of the projects over the years following completion of construction, as compared with those projects at time of project appraisal. This Environmental Monitoring Program (EMP) furnishes feedbacks for use in correcting any serious project deficiencies and for use in planning of future projects.

The technical uncertainties and continuous technological innovations involved in the so called hi-tech industries in the field of electronics, biotechnology and new material research has raised considerable social anxieties. The hi-tech industries have certain features from the viewpoint of the impact on the environment.

(a) Harmful chemical substances are often used. In addition to various organic solvents, including trichloroethylene, used in the wafer washing process, a variety of gases are employed in an IC manufacturing plant; silicon gas (epitaxial gas) used for growing semiconducting single crystals on silicon wafers, arsine and phosphine (doping gases) used in the semiconductor device production process, and boron trichloride (etching gas) used for removing oxide films. Except for the organic solvents, the above gases are used in relatively small volumes in these processes. Some of these chemical substances ave high chemical reactivity or strong toxicity, and in addition, their application for the most part have not been made public on the ground that they are related to the companies' know-how. In the hi-tech industries, new materials are being used to develop and manufacture highly functional products, and often these new substances have no record of application to date.

(b) The production process changes rapidly with time.

(c) Ultimate technology such as use of high-purity substances, processing under high temperatures and pressures, and high precision engineering is often used.

Keeping these in mind, the following is considered to be important when we consider high-tech industries:

(a) Amplification of the pre-examination system for new chemical substances.

(b) Introduction of a post-monitoring cum environmental management system for the industrial zone.

The former is the responsibility of the DOE and the local government agency (KSDC in this project) who must collect, compile and make available information regarding chemicals used in the hi-tech industries and the appropriate pollution prevention measures. In this connection, efforts must be made to update and improve on the "Identification and Registration Scheme for Hazardous Chemicals- Malaysian Inventory of Chemicals and Chemical Substances" survey, which was revived by DOE in 1989. In case of the present project, DOE and KSDC must clearly have the chemical substances used and wastes produced in each kind of hi-tech industry defined in the agreement to be signed with the companies. The agreement must clearly specify the type and quantities of substances used as well as the waste type and quantities generated, including treatment systems and disposal methods.

9.4.1 Individual Industry Monitoring Activities and Overall Surveillance Monitoring Activities

Effective monitoring following commencement of industry operations is essential to ensure that the industrial waste management and the wastewater treatment system are being properly operated and maintained. The overall monitoring program should include two components:

(1) A program carried out by each industry including both performance of treatment equipment and effects on environment, by the plant staff with outside assistance as needed.

The monitoring program to be carried out by each industry would depend on the kind of industry and the quantities and types of wastes generated. Details of this monitoring program would be clarified in the agreement each industry would make with DOE. Some important factors which need to be considered are given in Table 9.1.

Table 9.1 Individual Industry Monitoring Characterestics

Environmental Aspects	Water, air, noise, industrial waste
Locations	To be defined within each factory lot depending on each industries' pollutant treatment systems
To be done by:	Individual industries with/without outside help
Responsible to and Supervised by:	Management company, DOE
Purpose	Individual industries are meeting environmental quality standards as agreed
Report to:	to management company (every month) and DOE (every 3 months); management company will submit a report to DOE itself based on its supervision every 6 months
Costs:	by individual industries

(2) Surveillance monitoring by the management company to be established under KSDC for management and administration of the estate.

This monitoring program to be carried out by the management company to be established under KSDC during regular operations of industries is necessary to:

(1) Check extent of compliance with existing water, air, noise and toxic waste standards and to determine what is required to ensure that compliance levels improve or remain high.

(2) Determine trends in air, water and toxic waste quality change; to determine whether conditions are improving or getting worse; to determine whether current pollution control measures are effective in improving environmental quality.

(3) To determine whether potentially toxic constituents that can seriously affect the ecosystem are being released.

Some characterestics of the overall surveillance monitoring are listed in Table 9.2. Detailed discussion is as follows:

An review of the EIA leads to the identification of the environmental aspects which need to be monitored periodically during industry operations. These are surface water quality including biological monitoring for toxic wastes, air quality, noise levels and industrial wastes.

Table 9.2 Overall Surveillance Monitoring Characterestics

Environmental Aspects	Water, Air, Noise, Industrial Waste
Locations	Defined station locations within industrial zone
To be done by:	Management company with outside help
Supervised by:	Department of Environment
Purpose	Effluent and Ambient Standards are being met
Report to:	Management company to DOE every 6 months
Costs	% of operation and maintenance cost of industrial zone facilities

The responsible agency for monitoring would be the management company to be developed under KSDC for administration, maintenance and supervision of the estate. The management company will compile the monitoring results and present an annual report to DOE. The monitoring program recommended including for each of the aspects with respect to parameters to be monitored, monitoring frequency, monitoring station locations and methods to be used are as follows:

(a) Surface water quality including toxic materials monitoring

The recommended water quality monitoring program for the proposed project site is given in Table 9.3. Locations of the sampling stations is shown in Fig.9.2. The physical parameters of T, pH, ORP and DO would give rapid in-situ indication of water quality. The ORP, DO, COD and OG would indicate possible pollution by organics whether of domestic or industrial origin. The values of NO_3 and PO_4 would indicate risk of eutrophication and also possible pollution by industry or farming activities (application of fertilizers in golf course). The OG, DS and heavy metals (Cu, Cr, Pb, and Zn) would indicate pollution by industries. The SS would indicate industrial pollution or erosion. The MPN would indicate possible sewage pollution. The biological indicators would indicate general health of the water body. The level of chlorinated organics has to be monitored if they are going to be used in the industries in the project area.

Table 9.4 gives a list of biological indicators of clean and polluted water. As seen from Table 9.3, biological monitoring with fish is proposed to be carried out. The effects of contaminants on aquatic organisms is complex. Synergistic and antagonistic chemical/physical reactions, bio-magnifications and other natural events cannot be easily quantified.

Shellfish such as mussels (These are long lived bottom dwelling filter feeders) accumulate toxic materials, pesticides and other hazardous substances from the surrounding water even when the pollutants are present in concentrations far below the levels detectable by chemical analysis of grab water samples. Collection and analysis of these organisms semiannually will provide useful information on long term trends of the presence of toxic substances in the water. Because of their great water filtering capabilities, shell fish are excellent concentrators of contaminants.

Shellfish fish are carnivorous species representing higher trophic levels in the aquatic ecosystem and are likely to have the highest bio-magnifications of toxicants which can pass through the food chain. Shell fish and possibly catfish or keli, tilapia and carp could be used for monitoring of toxic pollutants in the retention ponds and individual industry's inspection pond.

The following facilities and equipments are recommended to carry out effective surveillance monitoring within the industrial zone:

(1) Inspection pond with fish

(2) Water sampling pit: water sampling to be carried out once every three months and also occasional random sampling. This is to analyze water quality discharged from each industry. The analysis would be done under the management company supervision by an outside laboratory authorized by the Malaysian government.

(3) Laboratory with the following equipment: water sampling equipment, pH meter, DO meter, Mixed liquor suspended solids (MLSS), ORP (oxidation-Reduction Potential (ORP) meter, Conductivity meter, thermometers, flow meter etc.

(4) Fish ponds within retention ponds. These shall function as final monitoring facilities. Water sampling to be carried out once every three months or in case of an emergency.

(5) Jeep for patrol

(b) Air quality

The air quality monitoring program within the industrial zone is given below. The sampling stations are to be located one in each of the housing zones (low

cost and high grade), in the urban zone, at the proposed university site and at the road intersections of primary access road with arterial road No. 1 and 2 respectively. Samples of dust, CO, NO_2, SO_2, PCB need to be taken and strange odors need to be reported. This is to check on the ambient air quality levels during operations of the industries due to individual industries' air pollutant emissions and vehicular pollution. The monitoring frequency should be once a month. The management company responsible for the monitoring will have the monitoring done by an outside laboratory.

(c) Noise:

Monthly recordings of noise levels during industry operation at various locations in the industrial zone as well as in the housing zones, urban center and university need to be done to ensure noise levels are not being exceeded. A simple noise level meter can be used. This monitoring can be easily carried out by the management company of the industrial estate.

(d) Industrial Waste

The Industrial Waste Manifest Tracking System and Monitoring and storage system to be adopted is detailed in an earlier section.

9.5 Responsibilities of Management Company

The management company to be established under KSDC for management of the industrial estate, shall be responsible for the the following with respect to environmental management of the industrial park:

(1) carry out overall surveillance monitoring of the industrial estate on a regular basis.

(2) Supervise individual industries' monitoring activities and act as interface between industries and, DOE and KSDC. for environmental monitoring and management of industrial zone. Regular reports of monitoring data to be sent to DOE by management company.

(3) Operation and Maintenance: The management company will carry out the operation and maintenance of the following facilities:

(a) Central Wastewater Treatment Plant(CWWTP): As the operation and

maintenance of CWWTP is difficult, a plant maker making an contract with KSDC shall have an obligation to perform the commissioning test with the management company and furthermore to execute the technical transfer of operation and maintenance.

(b) Drainage and Sewer Facilities: the management company shall put into checking, cleaning and maintaining of drainage and facilities at least once a month.

The necessary O and M costs are estimated as follows:

(a) Technician: M$ 1000/m x 2 persons

(b) Permanent workers: M$ 500/m x 3 persons

(c) Temporary workers: M$ 50/d x 5 persons x 5 d/m

(d) Water quality testing fee: M$ 6000/m

(e) Fuel: M$ 200/m

(f) Miscellaneous: M$ 2050/m

Total O&M cost:s M$ 13,000/m

9.6 Recommendations Regarding Agreements on Environmental Aspects

Each industry should make an agreement regarding prevention of pollution concerning various environmental aspects which include water quality, industrial wastes, air quality and noise attenuation due to their business activities, with DOE as well as with KSDC. The management company to be established under KSDC for managing the industrial estate shall act as the intermediary between the industries on one side and DOE and KSDC on the other side. The responsibilities and work related to environmental aspects to be carried out by the management company is given earlier in this chapter. It is expected that this kind of arrangement will make the responsibilities of various bodies and agencies involved very clear and render effective environmental management of the industrial estate.

Suggested samples of the agreement concerning various aspects is given in the supporting report. In general, the contents can be summarized as follows:

(1) Purpose of agreement

(2) Ambient and Effluent Standards.concerning various environmental aspects.

(3) Countermeasures proposed by each industry for mitigation of impacts and to meet ambient Environmental Standards set. This should give in detail process details, quantities and nature of chemical substances used, wastes (wastewater, air and hazardous pollutants) generated, treatment and recycle facilities within their factory lot, plant air management systen, noise attenuation measures and details of monitoring program.

(4) Maintenance of facilities set by each industry; operation and maintenance plan, staff with their responsibilities.

(5) Reporting and investigation: The management company and DOE should be able to ask each industry to submit a report in order to ensure effective monitoring, and if necessary, to visit the plant or other facilities for investigation.

(6) Pre-notification on any changes in process/factory plans by each industry.

(7) Penalty or measures to be taken when violating the agreement.

(8) Indemnity: If KSDC/Management company or other third parties should suffer losses in connection with business activities of individual industries, each industry shall compensate for losses incurred.

(9) Charge for monitoring, operation and maintenance: The management company should be able to charge the fee for monitoring, operation and maintenance for various facilities including drainage facilities including retention ponds, wastewater collection pipes, and central wastewater treatment.

Table 9.3: Water Quality Monitoring Programme

a	Parameters to be monitored: Temperature (T) pH Oxidation Reduction Potential (ORP) Dissolved Oxygen (DO) Chemical Oxygen Demand (COD) Oil and Grease (OG) Suspended Solids (SS) Dissolved Solids (DS) Nitrate (NO_3) Phosphate (PO_4) Chlorinated Organics * Copper (Cu) Chromium (Cr) Lead (Pb) Zinc (Zn) E-Coli Count (MPN) Biological Indicators (see Table 8.3(a))
b	Monitoring frequency: once every 3 months
c	Monitoring points are sampling points 2, 3, 4 and 5 (see Figure 9.1) the retention ponds, and water sampling pits outside each industry lot.
d.	Analytical method for: Temperature: temperature probe (incorporated with pH or DO meter) pH, ORP & DO: pH, ORP & DO meters Other parameters: use Standard Methods (see Second Schedule of the EQ(SIE)R 1979)
* if the solvent is employed in industrial operations.	

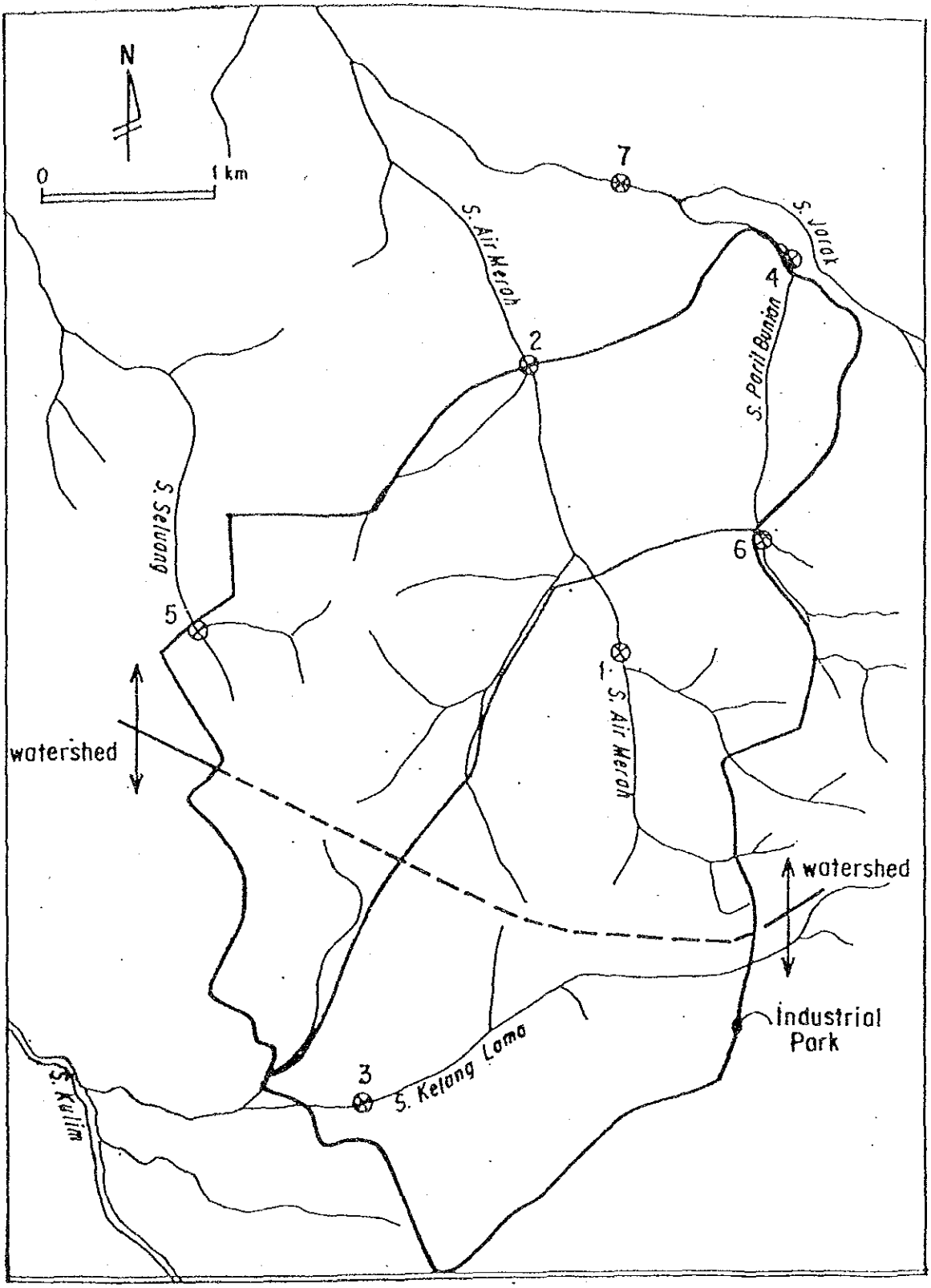
Table 9.4: Indicators of Clean and Polluted Water

Animals found in water of very high quality only Mayfly larvae - Rhithrogena (H) Stonefly larvae - Chloroperla (C) Freshwater Shrimp - Gammarus (F) Caddis larvae - Rhycophila; Hydropsyche (H) Flatworms - Crenobia; Dendrocoelom; Polycelis (C) Newts (C) Frogs (C) Toads (C) Sponges (F)
Animals tolerating water of moderate quality Jenkins spire shell - Hydrobia jenkinsi (F) Limpet - Ancylastrum (H) Ramshorn - Planorbis (H) Orb shell - Pisidium (F) Pea shell - Sphaeridium (F) Damselfly larvae - Coenagrion (C) Greater waterboatman - Notonecta (C) Beetles - Hydroporous; Gyrinus (C) Beetle larvae - Dytiscus (C) Mites - Hygrobates (C) Fish (C)
Animals tolerating water of poor quality (recovering from pollution) Pond snails (but not those above) Wandering snail - Limnea pereger (H) Waterlouse - Ascellus (F) Alderfly larvae Lesser waterboatman - Corixa (F) Water fleas - Daphnia; Cyclops (F) Leeches - Glossiphonia (C) Water cricket - Velia (C) Pond measurer - Hydrometridae (C) Pond skater - Gerris (C)
Note: the animals in this category are also found in better quality water, but because of competition, in smaller numbers.
Animals found in water of very poor quality (polluted) Sludge worms - Tubifex; Nais (F) Fly larvae - Chrinomus (midge) (F) Chironomid (gel sac) (F) Chaoborus (phantom larvae) (F) Tipula (cranefly) (F)

(C) - carnivores (H) - herbivores (F) - filterfeeders

Source: Kulim Hi-Tech EIA, gea sdn. bhd., 1991

Fig. 9.2



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE River System and Location of Sampling Stations

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

10. CONCLUSION AND RECOMMENDATIONS

The basic design study for first phase industrial zone of 250 ha on the establishment of Kulim Hi-Tech Industrial Park shall recommend the following action plans for its successful implementation.

(1) Implementation schedule

1) First phase industrial zone

Land preparation of first phase industrial zone should be scheduled to be completed by middle of 1993.

2) Other zones in first phase

First phase other zones (housing, R & D, urban and amenity) be completed partially to meet with the basic requirement of first phase industrial zone.

3) Related infrastructure for first phase industrial zone

Stepwise construction is recommended for infrastructure development related to the first phase industrial zone as :

1st step : middle 1993	Completion
2nd step : end 1993	Completion
3rd step : end 1994	Completion

Coordination and detailed clarification on scope of works among agencies concerned for related infrastructure works are necessary. Required construction period for major infrastructure works will be 2 years or more. Therefore, necessary action such as tender design and budgetary appropriation should be completed within in an early 1992 under the such coordination and clarification.

(2) Introduction of public R & D and university

The introduction of private industries as well as their R & D departments to such an isolated area or a new town to be created is rather difficult. An appropriate approach would be that public R & D institutions and universities should be introduced at the outset in order to encourage acceleratedly invitation of private industries. Formal procedure to introduce those institutions should be taken as soonest possible.

(3) Technicality

For subsequent consulting works such as tender design and detailed design, the following technical recommendations on infrastructure development should be duly adopted.

1) Road network

Primary access road of 2 lanes with full stretch should be constructed in parallel with the completion of first phase industrial zone, and be expanded to 4 lanes with 40 m reserve width in future.

2) Power supply system

The ring formation system should be introduced from TEN's 275 kV power grid by 132 kV transmission lines. Further, ring form connection with double circuits system are to be applied for 33 kV and 11 kV distribution lines for major consumers in order to secure reliable and stable supply.

3) Water supply system

Service reservoirs should be designed having sufficient capacity for the whole area of the Hi-Tech park. R1 and R2 reservoirs are to be constructed with 33,900 m3 and 32,000 m3 in capacity and to meet with the schedule for first phase industrial zone.

4) Telecommunication system

Telephone lines of 900 by 1993 and 5,000 by 1996 should be connected with the Kulim switching centre. Fiber optics junction is to be created to meet with the schedule for first phase industrial zone. For international and nation wide telecommunication system, optical fiber long distance transmission line is also to be installed.

5) Drainage system

Return period of 20 and 100 years should be adopted for drainage channel, ditch and retention pond respectively.

6) Sewerage system

Separate system is adopted, and individual treatment at each factory should be applied according to the "ppp". Central treatment plant is to be constructed as for the domestic wastewater. A treatment method is an activated sludge process. Fish ponds should be provided for the monitoring.

7) Industrial waste management

Temporary secure storage site with facilities should be provided with 25 years capacity. A manifest tracking system is to be applied for monitoring the industrial waste.

(4) Financial Analysis

The financial analysis has been undertaken on the first phase of industrial zone alone excluding housing, urban and amenity zone components. As seen above the result was unfortunately not favorable. The substantial support by the Government such as tax exemption and subsidy provision, is thus essential. A concessionary loan from foreign donors for related infrastructure development would be also commendable.

In this connection it is noted that the Master Plan Study is now being underway and it covers the areas of industrial zone as well as housing, urban and amenity zones in the proposed Hi-Tech Park. It is suggested, therefore, that the Master Plan Study should re-examine the said financial results from the view point of cross-subsidization of the project by additional revenues of housing and other facilities sales.

(5) Investment promotion

For investment promotion, a task force should be established headed by MIDA, and the following action is needed in early stage.

1) Identification of potential hi-tech industries
2) Project launching seminar
3) Investment promotion visits/missions
4) Kulim Hi-Tech Industrial Park investment seminar
5)Direct mailing campaign

(6) Implementing organization

An implementing organization involving fully responsible agency and supporting agencies is required to establish in order to undertake smooth implementation.

APPENDIX

APPENDIX (I) SUMMARY OF ADVISARY WORKS

1. General

In response to a request of GOM, JICA agreed to execute the following advisary works on the master plan study for whole KHTP which has been scheduled to be completed in the end of February 1992 including the basic design by the MHLG with the local consultants, in view of the urgency and importancy.

(1) Town planning
(2) Power supply system
(3) Sewerage system
(4) Landscaping

The advisary works were carried out by four (4) experts with the following service periods.

Town planner (K. Yamazaki):	Dec. 13 to Dec. 27, 1991 and Jan. 08 to Jan. 19, 1992 at Malaysia (27 days)
Electrical engineer (Y. Watanabe):	Dec. 01 to 27, 1991 (27 days) at Malaysia
Sewerage engineer (H. Wakasa):	Dec. 01 to 27, 1991 (27 days) at Malaysia
Landscape planner (S. Yukutomi):	Dec. 1991 to Jan. 1992 (15 days) at Japan

JICA's advisary team forwarded the "advisary notes, No. 1 to 14" to the master plan study team during the service period containing the contents as briefly explained below.

2. Power Supply System

Scope of advisary service is to provide essential data and specifications. Comprehensive power demand was forecasted for the whole zone and subsequent master plan study was accelerated and ensured for realization of the project.

a) To provide data and specification of ring formation system of power distribution system for further basic and detailed design.
b) To advise and assist MHLG for operation and maintenance (control and protection and restoration) system on ring formation system of power distribution system.
c) To review power demand forecast for the whole zone
d) Review of implementation schedule
e) To provide draft master plan study report
f) Review of construction cost

Telecommunication system was also reviewed by the electrical engineer.

3. Town Planning

The advisary works were conducted mainly to avoid deviation as far as possible on the UNIDO's/JICA's concept and conceptual zoning for KHTP.

a) Comments on master plan study (PR 1 and draft master plan)
b) Management and institutional plan on KHTP
c) Master schedule for implementation on infrastructure works
d) Implementation schedule for first phase
e) Preliminary cost estimate for phase 1, KHTP

4. Sewerage System

a) Review of demand projection
b) Advice and direction of layout plan
c) Advice and direction of wastewater treatment plant
d) Advice and direction of other sectors related with sewerage system

5. Landscaping

The following fundamental data on the landscape plan for the whole Kulim Hi-Tech Park was given to the master plan study team.

a) Basic design policy
b) Basic design concept
c) Design standard
d) Design criteria
e) Planting

APPENDIX (2) MEMBER LIST OF JICA STUDY TEAM

	STATUS	NAME	
1.	Team Leader	: Mr. H. Sato	Nippon Koei Co., Ltd.
2.	Estate Design/Land Preparation (Deputy Team Leader)	: Mr. K. Yamazaki	Nippon Koei Co., Ltd.
3.	Industrial Estate Planner	:.Mr. A. Aoki	Mokuseisha Co., Ltd.
4.	Transportation Engineer	: Mr. M. Kawabata	Nippon Koei Co., Ltd.
5.	Water Supply Engineer	: Mr. Y. Oyama	Nippon Koei Co., Ltd.
6.	Drainage/Sewerage Engineer	: Mr. H. Wakasa	Nippon Koei Co., Ltd.
7.	Industrial Waste Management Expert	: Mr. T. Matsunami	Sanyu Consultants Inc.
8.	Telecommunication Engineer	: Mr. K. Muramatsu	The Nippon Telecommunications Consulting Co., Ltd.
9.	Electrical Engineer	: Mr. Y. Watanabe	Nippon Koei Co., Ltd
10.	Building Engineer/Landscape	: Mr. S. Yukutomi	Y-Up Architects PC Inc.
11.	Environment Expert	: Mr. R. V. Sumdaram	
12.	Operation and Management Expert	: Mr. J. Tanimizu	Nippon Koei Co., Ltd.
13	Institutional/Financial Expert	: Mr. H. Takanashi	J.C.C. Inc.