

VI. 3 Financial Model

The financial model is constructed from the standpoint of the Techno Centre for both alternatives; namely "Total Management" and "Lease-Tape Management".

1. Capital Structure

The equity is set at RM15 million, which is slightly below 20% of the project cost estimated in 1995 price. The capital structure is tentatively planned to consist of the following parties;

	<u>Proportions of share</u>	<u>Amount of equity</u>
1. KTPC/KSDC	51 %	7.65 million RM
2. Federal fund (or in the form of Grants or through Khazanah Nasional Berhad)	29 %	4.35 million RM
3. Private sector	20 %	3.0 million RM

The capital is to be paid-up over the period up to 2005 in three phases from each party in a proportion of the share.

Principally, the balance between the required investment amount and the equity amount will be financed in the form of debt borrowing. The proportion of the required debt is 70% from KSDC and 30% from the commercial banks. The interest rate of the loans is assumed to be 7 % and 10 %, respectively.

2. Revenue & Expense Projection

Revenue Projection

The revenue projection appears to be the most crucial to the viability of the project. The projection is fully based on the market demand of the services provided by the Techno Centre.

The basic annual revenue in full operation is estimated as a total amount of RM17.8 million consisted of Mechatronics Testing Centre, RM5.6 million, Material & Surface Analysis Centre, RM10.3 million, Environmental Analysis Centre, RM1.9 million.

On the other hand, the revenue projection for the Human Resources Development Centre is assumed to be estimated at about RM1.3 million / year at full operation.

The revenue projection for the Industrial Network Centre is made on a rental charge basis; Open laboratory, RM10 /m²/month and Enterprise office, RM15 /m²/month.

The average rate of operation of the equipment is assumed that initial rate in 1998 will be 50%, and increasing 10% per 2 years, then full operation will reach in 2009.

The lease charge can be calculated at the acquired cost of the equipment multiplied by the lease rate. The lease conditions are as follows.

	<u>Base Case</u>	<u>Incentive Case</u>
Interest	18 %	15%
Period	20 years	20 years
Lease rate	18.7 %	16.0%

The other revenue projection includes revenue from restaurant, Hostel, membership fee (RM2,000 /member/year), etc.

The demand projection is carried out from macro-economic aspect to justify the revenue projection based on the enquiry & interview survey.

The R & D revenue in 2000 from Kedah State as a whole can be estimated at RM25 million, and that from PKNK's and KTPC industrial estates at RM11.4 million.

Compared with RM25 million from the Kedah State and RM11.4 million from the KSDC's industrial estates, the projected revenue of this study amounting to RM13.5 million, could be judged to be rather reasonable.

Expenses Projection

The administrative expenses for running the centres are estimated based on the required number of staff and the average salary of the staff. The required number of staff are estimated at 54 personnel; for 1st phase at 37, 2nd phase at 49, and finally 54.

The average salary of the staff is estimated at RM40,000 /year in 1995. In addition, the social insurance is estimated at 10 % of the above calculated personnel expenses.

O & M (Operation and Maintenance) for the facilities and equipment are as follows;

O & M for Building & Utilities (Unit : RM1,000)

	<u>Acquisition cost</u>	<u>rate</u>	<u>O&M cost</u>
Phase I*	27,375	2%	547
Phase II	3,331	2%	67
Phase III	2,662	2%	53

O & M for R & D Equipment**

	<u>Acquisition cost</u>	<u>rate</u>	<u>O&M cost</u>
Phase I	41,439	10%	4,144
Phase II	13,075	7%	915
Phase III	9,152	7%	641

* Utilities are included

* *Expenses for utilities charge are included.

The expense for advertisement and promotion is estimated at RM50,000 /year at 1995 price.

The depreciation is calculated on the following basis.

Depreciation method	: Straight-line method
Depreciation rate	: 10 % of the asset for the initial year
Initial allowance (Annual allowance)	: 2 % of the asset for the remaining years

On the other hand, the establishment cost is planned to be amortized at 20 % per year over a period of 5 years.

The cost for renovation & replacement is estimated at 15 % of the estimated cost in 1995

price for every five years.

The same method of depreciation computation is applied for the renovated and replaced equipment.

The cost for foreign experts who will be dispatched from the private companies experienced in this business is estimated at RM 300,000 /year, one experts for each centre.

The cost for royalty to be paid to the above foreign company is estimated at 3 % of the revenue.

Payment to "Sales & Promotion Company"

The cost of payment to "Sales & Promotion Company" is estimated at 10 % of the revenue.

Corporate tax is assumed to be exempted.

Inflation factor

The inflation factor is adopted as 5% for revenue and 3% for expense in the period of 1995-2000, and as 0% for both factors from the year 2000.

The difference in percentage between revenue and expense is expected to occur, supposing that the operation and management be properly done in a business-like manner, eventually resulting in cost reduction.

VI.4 Financial Analysis

The viability of the Project is evaluated by indicative figures of Return on Equity (ROE) on a cashflow basis.

Furthermore, the Project is evaluated as a whole in term of "Return on Investment" (ROI).

The project is recommended to be implemented and managed under a private-initiative formation with a positive support from the Government. This is called "CASE-A", the equipment utilization rate of which is shown on Figure VI.4.1.

ROI used as an indicator for representing the project profitability is calculated at 9.2% under "Total Management".

On the other hand, the "CASE-B" representing that the project be managed under a public-initiative formation without any involvement of a private sector, is examined. The management and operation is not efficient in comparison with "CASE-A". The equipment ROI for "CASE-B" is calculated at 7.4 % under "Total Management" assuming lower rate of operation as 20% in comparison with "CASE-A" at initial stage.

From a practical viewpoint, the Project will be managed under "Lease-type Management" in which the involvement of private companies experienced in this business be vital to the success of the Project. ROI for CASE-A is calculated at 9.6 % under "Lease-type Management". It means that some "business risk" is to be shared by the Partner consisting of the above private companies.

To mitigate such "business risk" of the Partner, or to provide the Partner with some incentive, here, lower lease rate (from 18% to 15%), it will be advised to obtain some kind of positive financial support from the Government.

Therefore, ROI for CASE-A be decreased to 7.6% for the Techno Centre and ROI is increased from 6.3 % to 20.5 % for the Partner.

In addition, the other case called as CASE-C is examined, in which the equipment utilization rate be increased by 10 % in the initial operation stage compared with CASE-A, and eventually some incentive be given to the "Sales & Promotion Company", say, from 10% of the revenue to 12%, resulting in the increase of the cost for the Partner.

ROI for the Partner is calculated at 30.1%, being about 10% increase from CASE-A.

Finally, the financial viability of the Project is examined in several aspects from the viewpoint of the main player of the Techno Centre based on the cashflow stream.

Among them, the term of ROE will be a major indicator for evaluating the financial viability of the Techno Centre in a long term. As shown on Table VI.4.1, ROE for the Techno Centre is calculated at 13.8% for CASE-A under "Lease-type Management".

In addition, from the stream of income before tax and its cumulative income, the cumulative deficit will clear up with 8 years from commencement of the operation. The repayment schedule is shown on Figure VI.4.3, representing principal repayment, interest payable and debt outstanding for the evaluation period of 20 years. The debt service coverage ratio defined as operating profit divided by debt service (= interest payable + principal repayment), except the years of 2001 and 2002, could be secured at more than 1.0 over the period, causing no fund shortage on cumulative cashflow basis.

The financial statements are to be projected over a period of 20 years up to 2010 from the viewpoints of the Techno Centre focusing on CASE-A for lease-type Management.

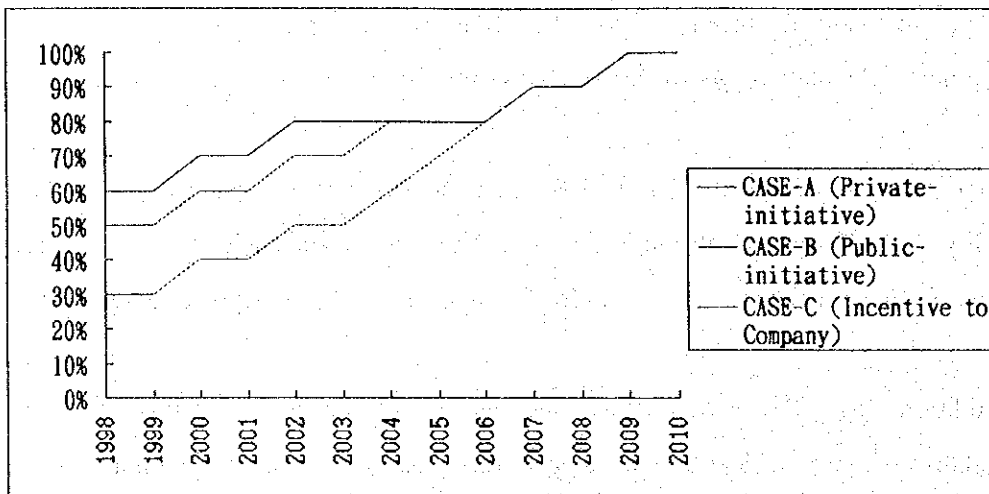


Figure VI.4.1 Equipment Utilization Rate

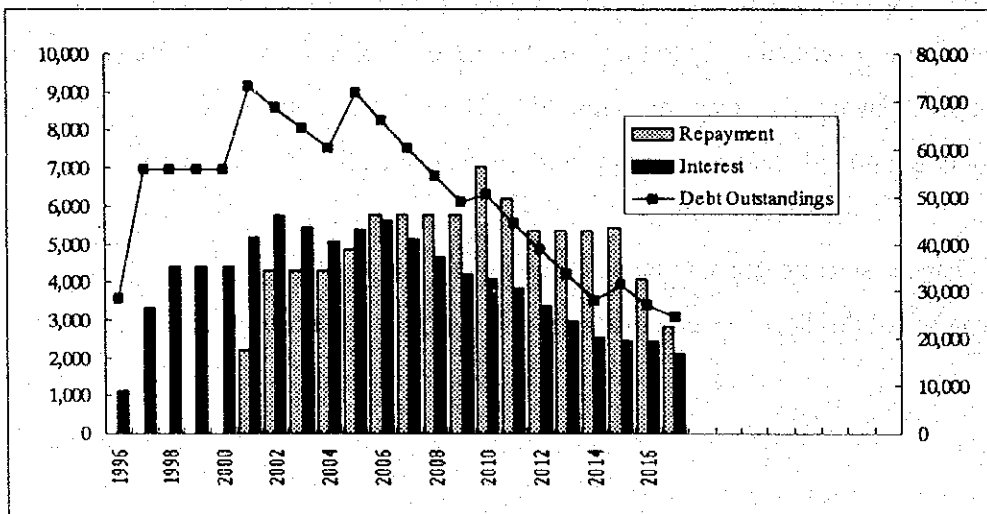


Figure VI.4.2 Repayment Schedule (Lease-type management)

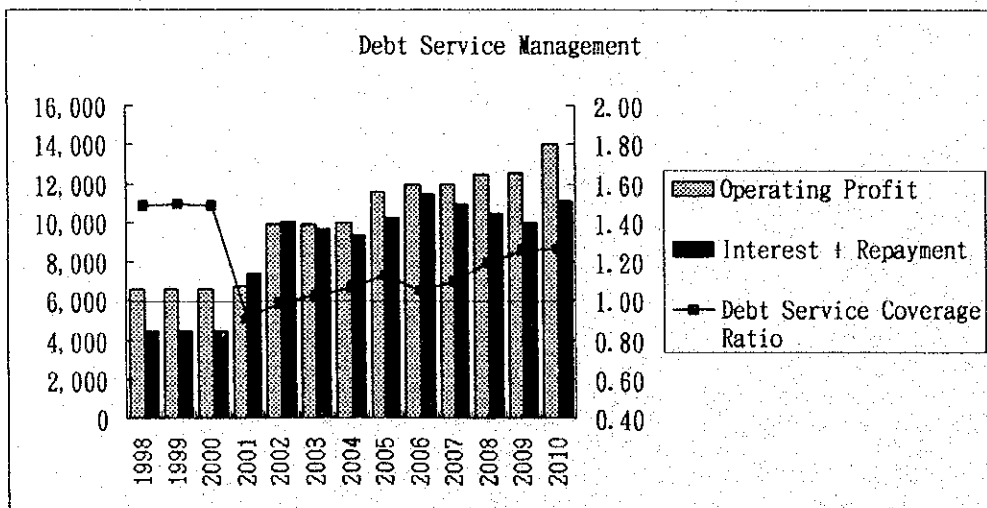


Figure VI.4.3 Debt Service Management (Lease-type management)

Table VI.4.1 Summary of Financial Analysis

	Total Management		Lease-type Management				Interest Rate %
	ROI		ROI	ROE	Partner ROI		
A Private-initiative Formation	<u>9.2%</u>	←	<u>9.6%</u>		<u>6.3%</u>		18.0%
		"Risk" shared by the Partner					
		→					
A-1 Private-initiative Formation with Government support			<u>7.6%</u>	<u>13.8%</u>	<u>20.5%</u>		15.0% CASE-A
B Public-initiative Formation	<u>7.4%</u>						CASE-B
C Incentive to "Sales & Promotion Company"			<u>7.5%</u>	<u>13.6%</u>	<u>30.1%</u>		15.0% CASE-C
10% => 12% of revenue							

Table VI.4.2 Income Statement (Lease-type Management)

	1	2	3	4	5	6	7	8	9	10
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1.0 Revenues	7,538	7,598	7,671	7,995	11,269	11,371	11,549	13,148	13,665	13,818
2.0 Expenses	924	952	1,044	1,233	1,395	1,436	1,560	1,606	1,714	1,860
3.0 Operating Profit	6,614	6,646	6,628	6,763	9,874	9,935	9,989	11,541	11,952	11,958
4.0 Depreciation, etc.	7,115	2,846	2,846	2,846	4,487	3,970	3,668	3,668	4,436	5,200
5.0 Interest	4,409	4,409	4,409	5,177	5,766	5,416	5,067	5,368	5,612	5,140
6.0 Income before Tax	-4,910	-609	-628	-1,261	-379	548	1,254	2,505	1,904	1,617
7.0 Corporate Tax	0	0	0	0	0	0	0	0	0	0
8.0 Net Income	-4,910	-609	-628	-1,261	-379	548	1,254	2,505	1,904	1,617
Cumulative Income	-4,910	-5,519	-6,147	-7,408	-7,787	-7,239	-5,984	-3,479	-1,576	41

Income before tax/Turnover A										
Turnover/Total assets B										
Income before tax/Total assets AxB										
	11	12	13	14	15	16	17	18	19	20
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
14,369	14,555	16,139	16,139	16,139	16,139	16,139	16,139	17,529	17,529	17,529
1,916	2,074	2,137	2,137	2,137	2,137	2,137	2,137	2,137	2,137	2,137
12,453	12,480	14,002	14,002	14,002	14,002	14,002	14,002	15,392	15,392	15,392
4,530	4,530	4,530	5,400	4,965	4,965	4,965	4,965	4,965	5,835	3,328
4,668	4,197	4,069	3,838	3,349	2,941	2,533	2,470	2,470	2,410	2,099
3,255	3,754	5,403	4,764	5,689	6,096	6,504	7,958	7,148	7,148	9,965
0	0	0	0	0	0	0	0	0	0	0
3,255	3,754	5,403	4,764	5,689	6,096	6,504	7,958	7,148	7,148	9,965
3,296	7,050	12,453	17,217	22,906	29,002	35,506	43,463	50,611	60,576	60,576

**Table VI.4.3 Cashflow Statement & Financial Analysis
(Lease-type Management)**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	1	2	3	4	5	6	7	8	9	10	11	12
Net Income												
Plus : Subsidy(Operating)												
Plus : Depreciation & Amortization												
Minus : Investment Repayment												
Plus : Equity Capital Borrowing												
Grant												
Net Cashflow	34,610	35,203	0	0	0	22,444	0	0	0	19,494	0	0
Cumulative Cashflow incl. previous special subsidy	0	0	2,205	2,237	2,218	-608	-171	239	644	1,311	570	1,048
Plus : Special Subsidy	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative cashflow after Special Subsidy	0	0	2,205	2,237	2,218	6,052	5,881	6,120	6,764	8,075	8,645	9,693
Plus : Special Subsidy (Cumulative special subsidy) (minus represents payback to the Federal)	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative cashflow being more than 200,000 RM	0	0	2,205	4,442	6,660	6,052	5,881	6,120	6,764	8,075	8,645	9,693
	200	200	200	200	200	200	200	200	200	200	200	200
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	1	2	3	4	5	6	7	8	9	10	11	12
Computation of ROE	13.8%											
Equity Portion	15,000	3,000	0	0	0	3,000	0	0	0	3,000	0	0
Cashflow from Operation	54,909	0	0	2,237	2,218	-608	-171	239	644	1,311	570	1,048
Net Cashflow	39,909	-6,000	-3,000	2,237	2,218	-3,608	-171	239	644	-1,689	570	1,048
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	1	2	3	4	5	6	7	8	9	10	11	12
Computation of ROI	7.6%											
Investment Portion	129,154	34,610	35,203	0	0	22,444	0	0	0	19,494	0	0
Operating profit	246,160	0	0	6,614	6,646	6,628	6,763	9,874	9,935	9,989	11,541	11,952
Net cashflow	117,005	-34,610	-35,203	6,614	6,646	6,628	-15,681	9,874	9,935	9,989	-7,952	11,952
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	1	2	3	4	5	6	7	8	9	10	11	12

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Net Income	11	12	13	14	15	16	17	18	19	20
Plus : Subsidy(Operating)	3,255	3,754	5,403	4,764	5,689	6,096	6,504	7,958	7,148	9,965
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
Plus : Depreciation & Amortization	4,530	4,530	4,530	5,400	4,965	4,965	4,965	4,965	5,835	3,328
Minus : Investment	0	0	8,702	0	0	0	0	8,702	0	0
Repayment	5,770	5,770	7,034	6,176	5,360	5,360	5,360	5,444	4,109	2,839
Plus : Equity Capital	0	0	0	0	0	0	0	0	0	0
Borrowing	0	0	8,702	0	0	0	0	8,702	0	0
Grant	0	0	0	0	0	0	0	0	0	0

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Net Cashflow	2,015	2,514	2,899	3,988	5,294	5,701	6,109	7,479	8,874	10,454
Cumulative Cashflow incl. previous special subsidy	11,708	14,221	17,120	21,109	26,402	32,104	38,212	45,691	54,565	65,019
Plus : Special Subsidy	0	0	0	0	0	0	0	0	0	0
(Cumulative special subsidy) (minus represents payback to the Federal)	0	0	0	0	0	0	0	0	0	0
Cumulative cashflow after Special Subsidy	11,708	14,221	17,120	21,109	26,402	32,104	38,212	45,691	54,565	65,019
(Cumulative cashflow being more than 200,000 RM)	200	200	200	200	200	200	200	200	200	200

Financial Analysis

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Computation of ROE	11	12	13	14	15	16	17	18	19	20
Equity Portion	0	0	0	0	0	0	0	0	0	0
Cashflow from Operation	2,015	2,514	2,899	3,988	5,294	5,701	6,109	7,479	8,874	10,454
Net Cashflow	2,015	2,514	2,899	3,988	5,294	5,701	6,109	7,479	8,874	10,454

Computation of ROI

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Investment Portion	0	0	8,702	0	0	0	0	8,702	0	0
Operating profit	12,453	12,480	14,002	14,002	14,002	14,002	14,002	15,392	15,392	15,392
Net cashflow	12,453	12,480	5,301	14,002	14,002	14,002	14,002	6,691	15,392	15,392

Table VI.4.4 Balance Sheets (Lease-type Management)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Current Assets																
Cash	0	0	0	2,205	4,442	6,660	6,052	5,881	6,120	6,764	8,075	8,645	9,693	11,708	14,221	17,120
Work in progress	33,610	68,814	0	0	0	0	22,444	0	0	0	19,494	0	0	0	0	8,702
(Building)	12,882	14,159	0	0	0	0	3,331	0	0	0	0	0	0	0	0	0
(M & E)	0	334	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Equipment)	20,729	20,710	0	0	0	0	19,112	0	0	0	0	0	0	0	0	0
Fixed Assets																
Building				61,899	59,253	56,607	53,960	72,117	68,147	64,479	60,810	75,868	70,667	66,137	61,608	57,078
M & E				24,337	23,796	23,255	22,714	25,172	24,564	23,957	23,349	25,404	24,530	23,869	23,209	22,548
Equipment				267	234	201	167	134	100	67	33	0	0	0	0	0
Deferred Charges				37,295	35,223	33,151	31,079	46,812	43,483	40,455	37,428	50,464	46,137	42,268	38,399	34,530
Total Assets	0	34,610	69,814	64,904	64,295	63,667	82,656	77,998	74,267	71,243	88,379	84,513	80,360	77,845	75,829	82,900
Liabilities & Shareholders' Equity																
Liabilities																
Short-term liabilities																
Long-term Liabilities																
Sub-total	28,610	55,814	55,814	55,814	55,814	55,814	73,064	68,785	64,506	60,227	71,858	66,089	60,319	54,549	48,779	50,447
Shareholders' Equity																
Capital-equity	6,000	9,000	9,000	9,000	9,000	9,000	12,000	12,000	12,000	12,000	15,000	15,000	15,000	15,000	15,000	15,000
Grants	0	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Subsidy(Operating)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Special subsidy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retained earnings	0	0	0	-4,910	-5,519	-6,147	-7,408	-7,787	-7,239	-5,984	-3,479	-1,576	41	3,296	7,050	12,453
Sub-total	6,000	14,000	14,000	9,090	8,481	7,853	9,592	9,213	9,761	11,016	16,521	18,424	20,041	23,296	27,050	32,453
Total Liabilities & Shareholders' Equity	34,610	69,814	69,814	64,904	64,295	63,667	82,656	77,998	74,267	71,243	88,379	84,513	80,360	77,845	75,829	82,900

VII IMPLEMENTATION PLAN

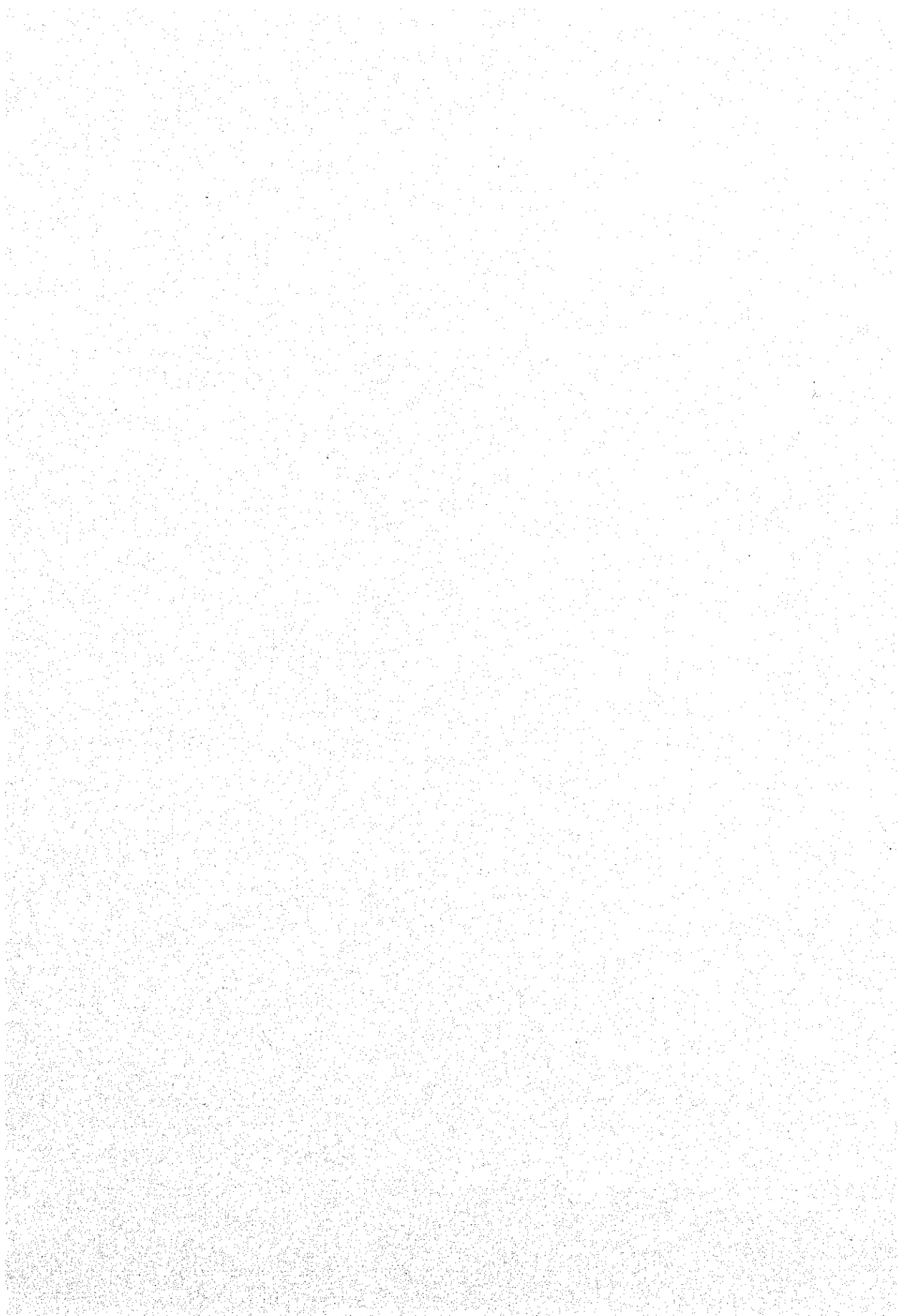
VII.1 Overall Plan

The Techno Centre has a double structure in terms of organization. The Techno Centre will be responsible for the general operation of the Centre, Human Resource Development and provision of Industrial Network services. There are three testing and analytical centres that will offer specialized services. Construction of the buildings, organizational establishment, manpower development, and introduction of equipment will need to be completed before the Centre can start full operation in 1998.

The starting day of the Centre's operation will be determined by the construction of the buildings. All respective centres will need to be prepared at the same time. Since the Techno Centre's operation is based on linkages with private enterprises, such private enterprises will need to be selected and a new corporation established jointly. Manpower recruitment, equipment procurement, and layout will be done under an agreement with such partner enterprises.

Figure VII.1.1 shows implementation plan of the Techno Centre and respective centres. What needs to be done first is to design the buildings. All other preparations will be done while the buildings are being built. These will include organizing and establishing a system of cooperation with the partners. The confirmation of the equipment and discussion of layout will be followed. The recruitment and training of employees, as this will take the longest period in the project, will begin. Training will be done first by foreign partners, and then in Malaysia after the equipment is introduced. Preparation of tender documents prior to equipment procurement shall be needed. This will be done in parallel with training.

Among the three centres, the Mechatronics Testing Centre will be built first and put into operation before the other two because there already exists demand for it. In addition, initiating such a facility in Malaysia before other areas (in other parts of Malaysia or in



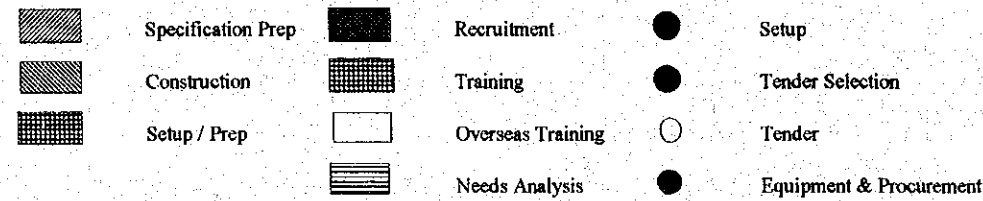
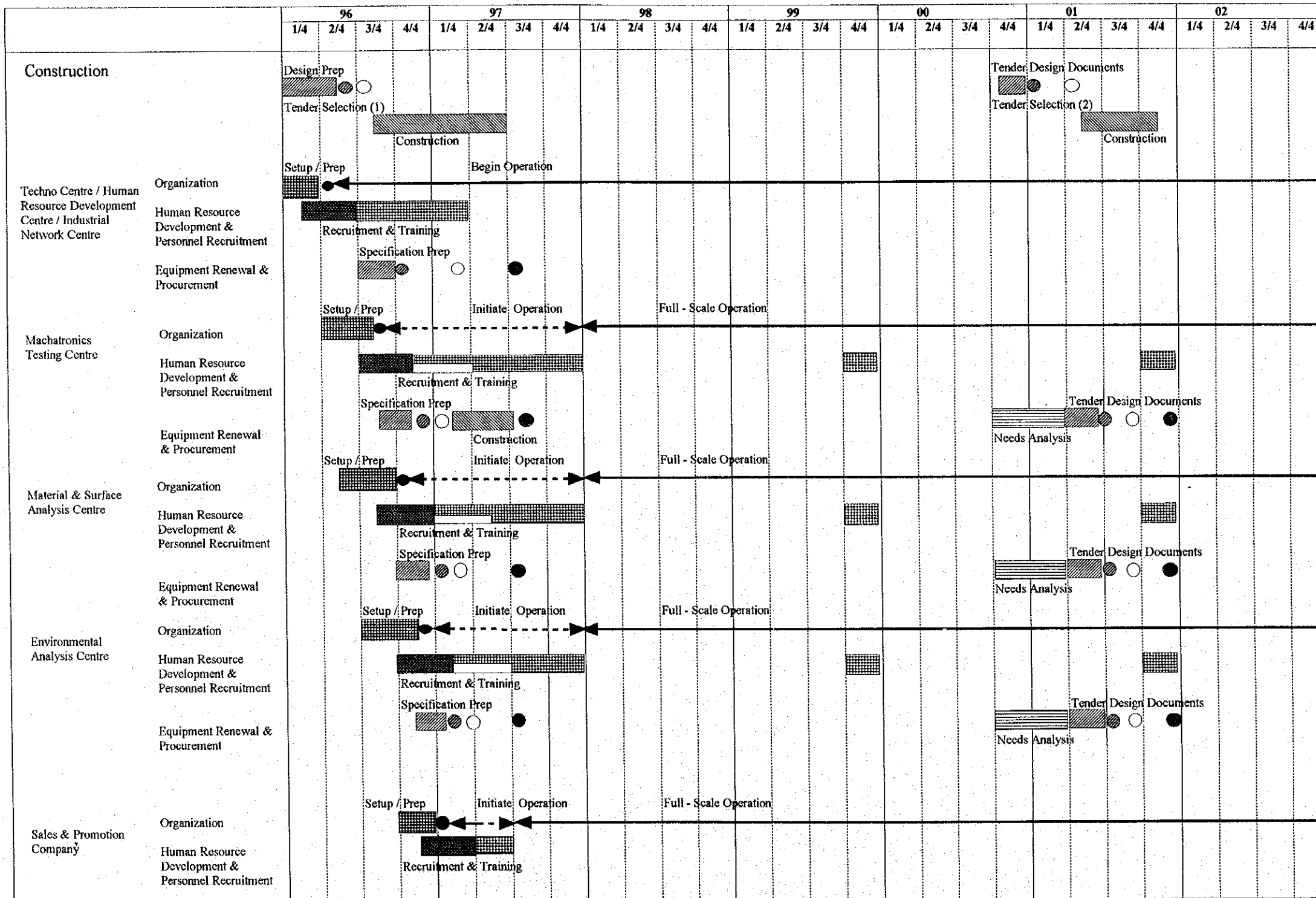
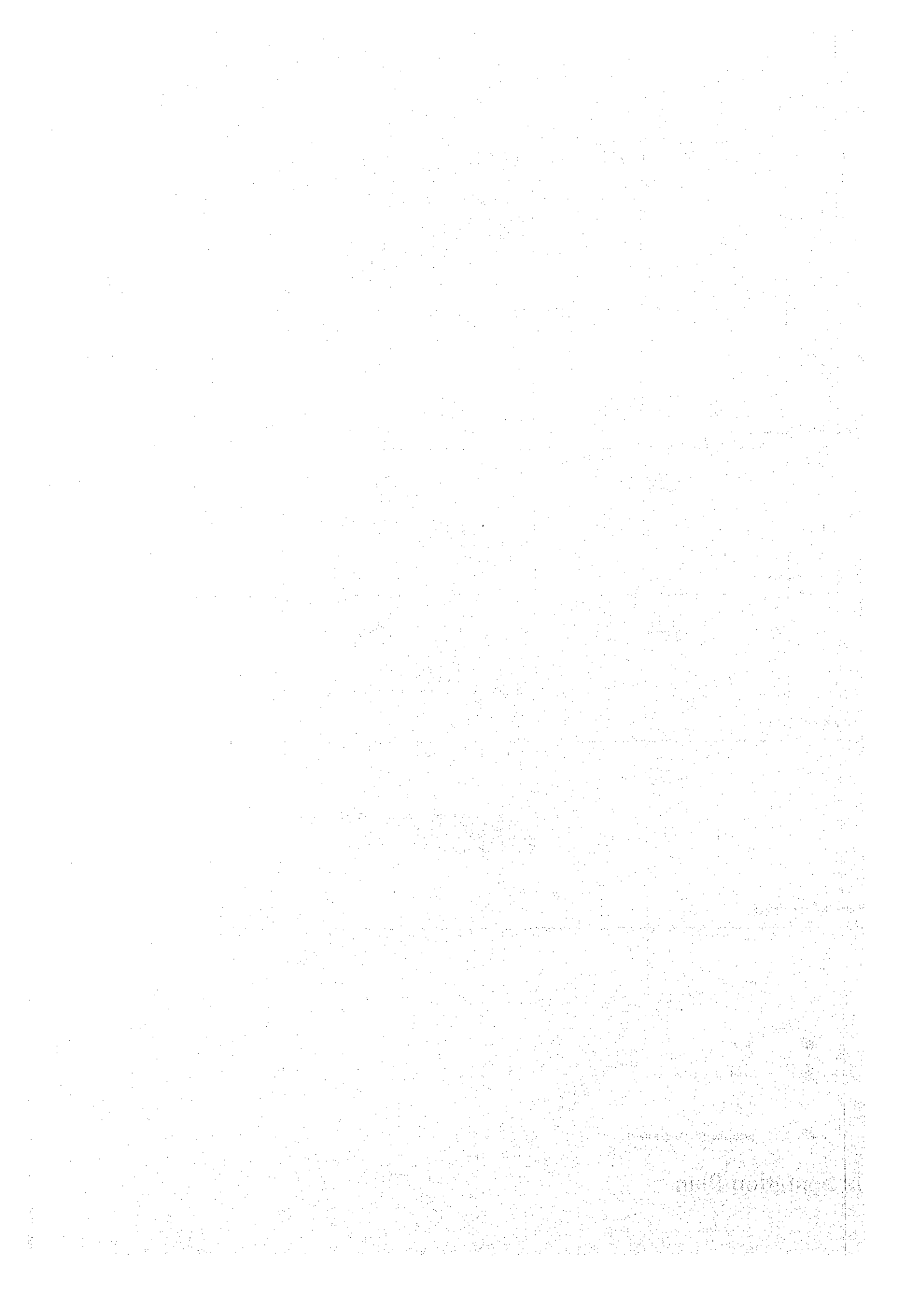
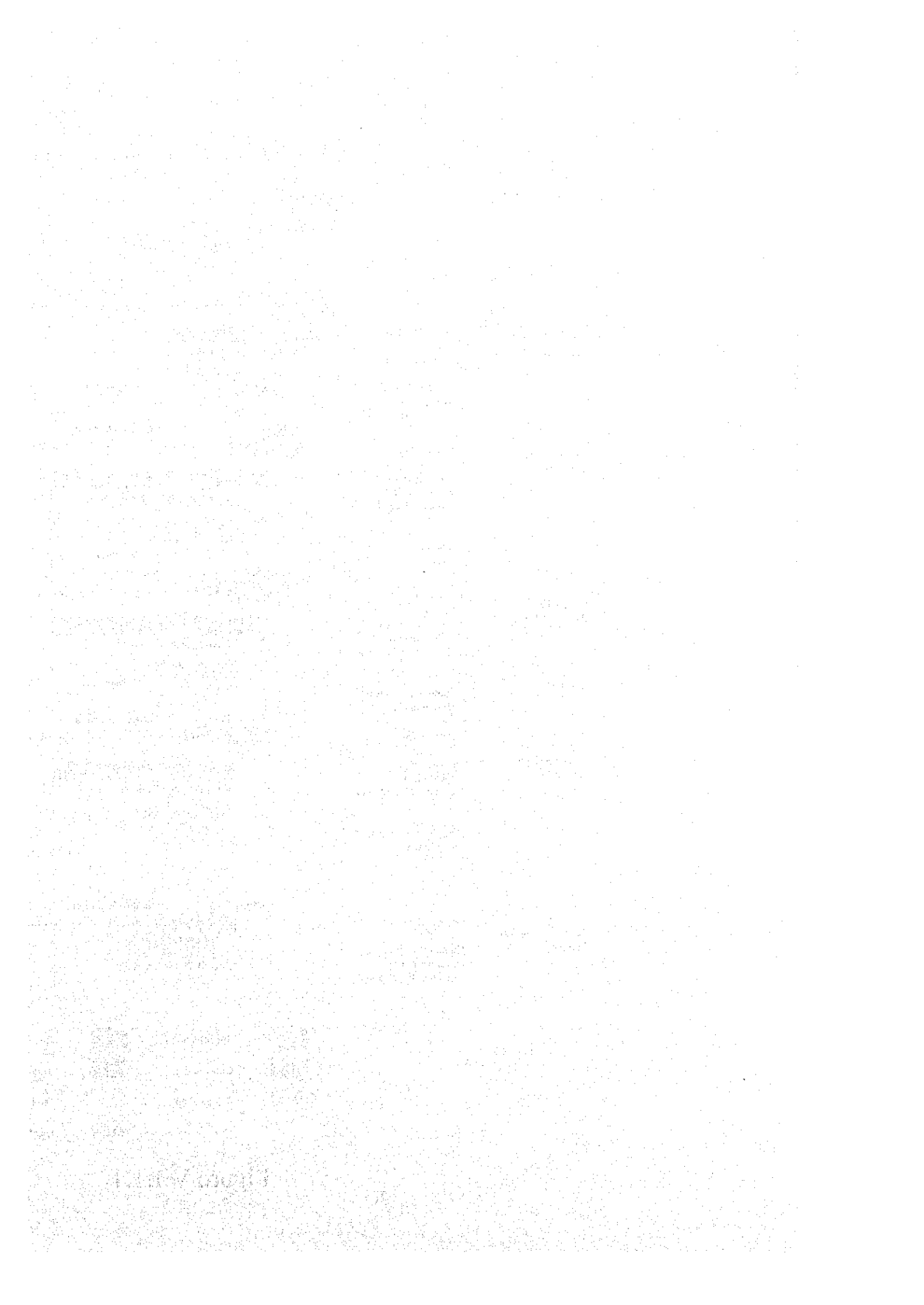
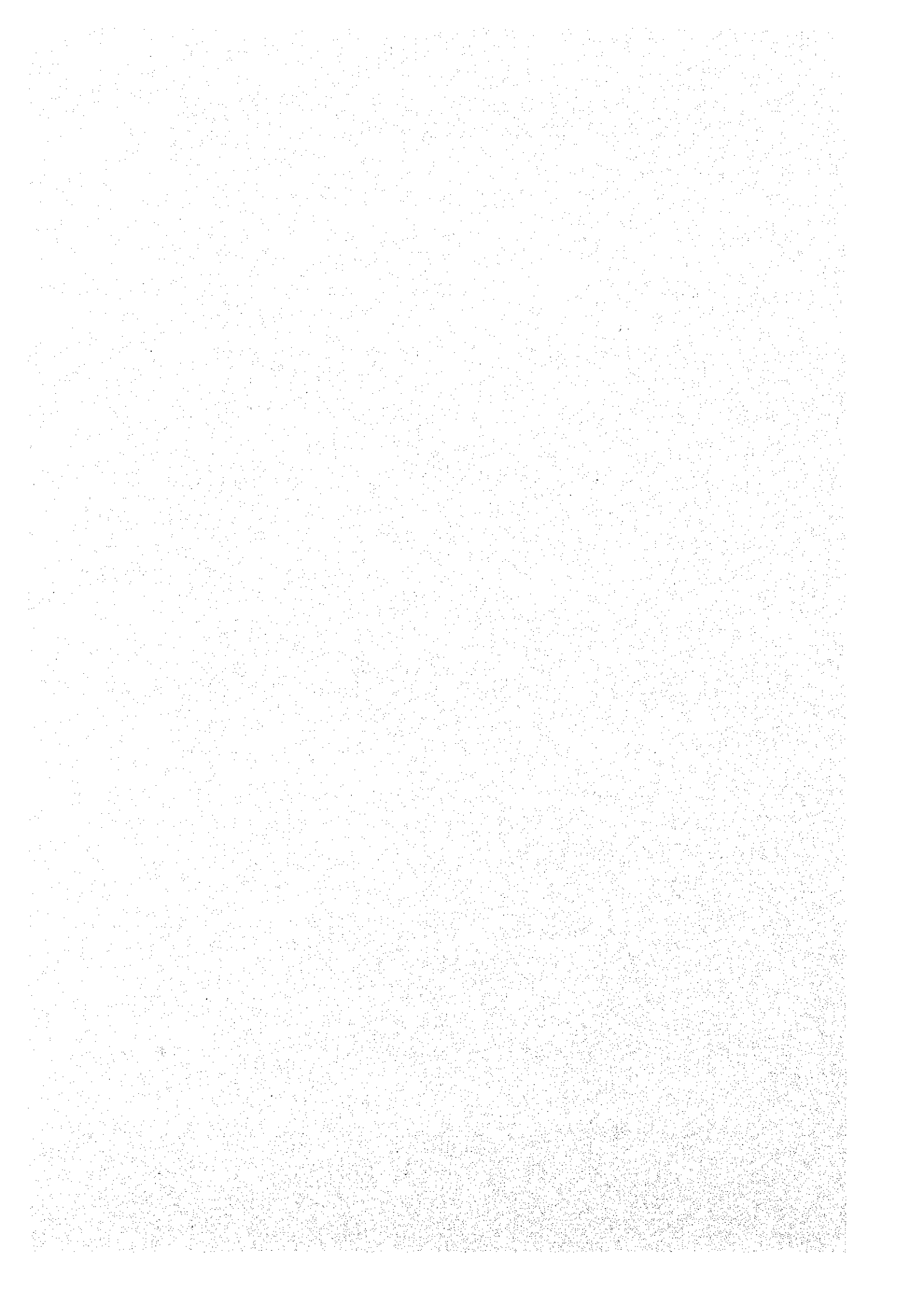


Figure VII.1.1 Implementation Plan







neighboring countries such as Singapore and Thailand) will give us a head start. Timing is also important as it will require a lengthy time before the centre is approved under EN45000, etc. This centre will also require construction of a separate facility (Anechoic Chamber).

To be built next will be the Material & Surface Analysis Centre that is closely related to the Mechatronics Testing Centre. This will be followed finally by the Environmental Analysis Centre.

The contents of 2nd phase and thereafter will need to be discussed again because technological innovation in the future will most likely require replacement of the original equipment. Future needs may also require new equipment. For this reason, it will be necessary to conduct another survey on future needs before procurement of equipment for 2nd phase and thereafter.

VII.2 Organization

The Techno Centre must be organized in compliance with the guidelines of its business operation systems (Refer to IV.4.1). The Centre consists of the management division that is responsible for the entire operation, more specialized testing and analytical centres, and a sales promotional company. They are discussed below separately for ease of understanding.

Organization of the management division

A number of alternatives were presented as to the operating entity of the Techno Centre. The style of organization would normally vary by the type of the operating entity. This means such an entity must be determined before discussions concerning organization. Among the several alternatives, the survey report discussed that the KTPC play the main role and that it receive investments by private enterprises and financial support from the governments (federal and state). The report also argues that a special foundation be

established to ensure smooth start-up of the Centre's operation. The following discussion assumes these proposals:

The first step is to establish the Board of Academic Science and Technology (hereinafter referred to the Board) that will serve as the supreme organ of decision making. The Board must be established through coordination among the Steering Committee of this study, the KTPC Board, KSDC, and Kedah State Government. The Board should be presided by a person capable of communication with federal government organs and various industries.

The second step will be to organize the management division of the Centre. This depends to a high degree on the positioning of the KTPC. We have been stressing that the KTPC be the main player in this project. Therefore, the KTPC will have the initiative in running the Techno Centre even if it is a joint venture formed by government and private sectors including the KTPC (in other words, the Techno Centre will not be run regularly by the JV partners). However, the KTPC has no expertise of its own directly related to the businesses that will be performed by the Techno Centre. KTPC need to recruit the necessary personnel. The Techno Centre itself must be presided by a person who is knowledgeable of science and technology as well as business management.

The third step would be to start making preparations to establish six centres and a sales & promotion company based upon this report. The Board will organize a project promotion committee and a technical committee as the need arises. The former committee will be a temporary one lasting only through the pre-establishment and initial stages of the Centre. Its role will eventually be transferred to the Board at an appropriate point in the future. The Technical Committee will be of a more lasting nature as its mission is to study business operation of the respective centres. It will be responsible during the pre-establishing period for the direction of the centres as well as the selection of necessary equipment. Its roles will remain after the Centre will be established for closely monitoring the trends in technology, steering the projects of the Centre, renewal of equipment, etc.

Organization of the six Centres

The three testing and analysis centres may be operated by private companies, although the concrete style of operation should be decided carefully. The first step of organization, then, is the selection of such private companies. Since all three centres are engaged in highly specialized activities, it would be extremely difficult for a single company to run all. Therefore, three different companies would be needed based upon their expertise. Selection will most likely be done through a tender, and the tender documents will be prepared by the technical committee.

The Human Resource Development Centre is basically designed for operation by an outsider. The area and style of training at this centre were discussed previously. The technical committee will verify the validity of the proposal and will select an outside organization that is experienced in the proposed activities.

The Industrial Network Centre is designed for operation by the Techno Centre itself in the initial stage. It will be responsible for selecting books, magazines, and journals for the library in accordance with building construction schedules. Its role will also include organization of the enterprises and researchers that will take part in salons and workshops. This may be done, for instance, according to the list resulting from this survey.

The IT Centre is already in the planning stage by USM and KTPC. Therefore, further discussion will centre on sharing of the management division.

The most important aspect in the process of organization will be agreed cost and profit sharing with partner companies. As discussed under organization in Chapter IV, this will centre on the type of operation (lease, commissioning, or a combination of both) and profit sharing. This will require time before an agreement is reached.

The contents of service's by respective centres, their equipment, and manpower recruitment and training will need to be coordinated based on the agreed-upon project plan.

Organization of external organs

External organs refer to the occupants of KHTP, prospective user enterprises of the testing and analysis centres, similar organs overseas, etc. Organizing and networking those external organs will be done primarily by the Industrial Network Centre. Therefore, it could be done after the centre begins operation. However, it should ideally be done sooner to ensure a sufficient demand for the three centres or access to the ever-changing trends in science and technology. In this regard, it would be desirable to establish an international science and technology committee and a local industry exchange plaza within the Board, and initiate necessary steps well in advance towards organization and networking of external organs. The committee and the plaza may be transferred to the Industrial Network Centre as soon as it begins operation.

VII.3 Introduction of facilities and equipment

Facilities and equipment should be introduced ensuring integrity with construction plans. The building space is planned carefully to allow a flexible introduction of equipment (Table IV.7.1) during the construction stage. For this reason, the concrete layout of the respective centres is not mentioned in the construction plan. Equipment should be introduced in close coordination with the analysts (partner organs).

VII.3.1 Introduction of facilities

Only the standard prices of facilities are listed in Table IV.7.1. Actual prices may be lower.

The equipment was selected very carefully, but there was not enough time to study accessory facilities and equipment (pre-processing facilities and equipment, etc.) in any detail. For this reason, more facilities and equipment for pre-processing may be necessary in addition to those listed. Their cost may be offset by the difference between the listed and actual prices of the facilities mentioned above.

VII.3.2 Use of space and introduction of facilities

The Centre will purchase necessary equipment regardless of their size. For this reason, each room will be fairly large and partitioned into several sections as appropriate. This ensures flexibility in the introduction of equipment while meeting changing demand in the future. On the other hand, the clean rooms will have different degrees of cleanliness for different purposes. Their investment costs will be decided accordingly. The large clean rooms may be divided into several sections to serve several needs. Such sections will need to be constructed using appropriate materials and methods depending on the nature of analytical activities.

Toxic gases may be produced during inspection or measurement, and a draft chamber may not be sufficient to eliminate the hazard. Safety must be given priority by all means. Skeleton systems of drainage and ventilation are discussed in Chapter V, but actual arrangement of facilities and safety facilities must be studied in detail ensuring integrity with the construction plans.

VII.4 Recruitment and training of manpower

Recruitment and training of manpower are important for stable operation of the Techno Centre. Guidelines with regard to the Techno Centre's manpower are presented below.

VII.4.1 Manpower recruitment

Recruitment of technical manpower by the general manager of the each centre

Manpower recruitment will begin when the centres are organized to a certain degree. The general manager of the centre should be hired from among private individuals who are capable in tests and analyses. Once the directors are hired, the engineers and researchers should be hired after interviews and other methods by the general manager himself.

Recruitment of private individuals as the first resource

When the Techno Centre begins operation, it would be difficult for the Centre to secure enough manpower with sufficient experience and know-how in inspection and analysis (which is a long process in the first place). In addition, some of analytical techniques are not available in Malaysia alone. For this reason, it will be necessary to hire foreign engineers and rely on their expertise for the Centre's operation as well as for the training of new personnel.

The sales promotion company of the Techno Centre will specialize in sales activities. It would be beneficial to hire private individuals having sufficient knowledge and know-how. However, such sales activities would require technical knowledge and it would be necessary to train so-called sales engineers.

Use of outside researchers

The researchers working in universities and other research organs are generally more experienced in inspection and measurement. It would be wise to utilize their expertise. For instance, the Centre could subcontract some of its activities with those researchers on some incentive basis. Such incentives may include free access to the Centre's inspection and measurement equipment, taking part in a joint project involving

universities, etc., that they belong to, the client, and the Techno Centre, or using the Centre's facilities for writing a thesis, etc.

VII.4.2 Guidelines for manpower training

Overseas training and creation of manpower training opportunities by private enterprises

Training of technical manpower requires many years and highly advanced methods, and it would be difficult to do the training in Malaysia alone. Therefore, it would be necessary to plan such training in a foreign countries (participation in a foreign engineers training scheme).

In general, private companies possess useful techniques and know-how for inspection and analytical activities. If the general managers of the centres are recruited from among the private sector, they will be able to find private enterprises that are willing to accept the Centre's manpower training requests.

On-the-Job Training and continuous training

Personnel to be engaged in inspection and measurement assignments at the respective centres must be familiar not only with theories but also with job-performing capabilities. It would be necessary, therefore, to prepare a training scheme where those personnel can experience actual jobs (training based on actual samples).

While mastering the technique to operate equipment is very important, it is more important to master the pre-processing technique (setting the sample in the equipment). This requires a highly skilled technique, and even a highly skilled person could lose part of his or her expertise unless it is used frequently. Even if a person maintains a certain level of expertise, it needs to be checked on some regular basis. It would be necessary, therefore, to plan a training scheme under which every person receives the same type of training every 2 to 3 years.

Training according to type of equipment in use

There are many varieties of analytical equipment but, in most cases, their methods of operation vary from one manufacturer to another. During a training session, principles alone may be taught without worrying about the equipment manufacturer. If the training is designed for application, it would be necessary to use the equipment of the same manufacturer for both training and actual job assignments.

VII.4.3 Schedule of manpower recruitment and training

During pre-operation stage of the centres

- * Recruitment of specialists and researchers
- * Possible exchanges with other related organs

During construction

- * Training of the hired specialists and researchers
 - Training on principles and operation of inspection and measurement equipment (overseas training, in-house training)
 - Training on pre-process activities (overseas training, in-house training)

During Phase 1

- * OJT within respective centres by outside specialists
- * Training on pre-process activities (repetitive training to maintain technique and know-how)
- * Training of new personnel
- * Training on principles and operation of inspection and measurement equipment (overseas training, in-house training)

During Phases 2 and 3

- * Primarily OJT within respective centres (less reliance on outside specialists)

*** Training on pre-process activities (repetitive training to maintain technique and know-how)**

*** Training of new personnel (training on principles and operation of inspection and measurement equipment through overseas training, in-house training, etc.)**

VIII. PROPOSALS FOR THE ESTABLISHMENT AND OPERATION OF TECHNO CENTRE

VIII. 1. Economic Influence

We should recognize that not much economic effect can be derived from the Techno Centre from either a direct, or a value-added basis. That is, if its direct economic effect is presented in figures, the sales volume at full operation is RM18 million, and a few million in orders on a value-added basis. This is less than 0.1% of GDP of Kedah state in 1995, which totaled RM5,585 million. Assuming that the multiplier effect is large enough (though a study was not made on this), the rate of contribution to orders is small enough to brush aside the range of error to the real value. This helps us realize that the direct economic contribution to GDP in Kedah would be minuscule to Malaysia's overall economy.

Hence, it is meaningless to assess Techno Centre projects in terms of their contribution to GDP. Rather, the influence of Techno Centre should be measured by its indirect effects. In an earlier part of this study, we pointed out that the establishment of Techno Centre would offer advanced corporations a large incentive to move to KHTP. We have neither the means to prove this prospect correct nor the claim that the existence of Techno Centre alone is the factor which will attract high tech industries. Hence, it is impossible to estimate the economic effect of Techno Centre in sales volume. As has proven true in Japan, however, establishing support functions, including R & D, became an incentive to high tech firms.

We have already mentioned that indirect effects on enterprises located in KHTP would expand to other areas. In the initial stage, however, the direct influence of Techno Centre project on production would be limited, because, for the time being, its task is testing and analysis in quality control. However, R & D support, once begun at full scale, will help spawn local parts and components manufacturers. Then procurement, hitherto dependent upon other countries, will be satisfied by domestic production. (These manufacturers may grow to the extent of being able to export their parts.) Growth of the domestic parts production industry would have an enormous influence on Penang and Kedah State

whose GDPs depend largely on manufacturing (Penang 55%, Kedah more than 30%).

Another Techno Centre task is to help local enterprises improve productivity. We neither have figures of Techno Centre contribution to productivity contributed, nor recognize such figures (there is no established formula). But even a few percent would have enormous effects on the local economy.

VIII. 2. Financial Assessment

The analysis was based on the market size of existing enterprises (other than those which will establish in KHTP) to which Techno Centre furnishes services. The market size we are applying in the analysis is undershot, or conservatively assessed. Also, the operation rate of facilities is conservatively estimated (low in the early phase). On the other hand, the estimate of the cost is slightly larger than what it would actually be.

ROE, the profit rate from own capital, which is an index used in estimation of monetary profitability, was slightly less than 14% (in case of lease type management) under these conditions.

The profitability of the project depends both on the profit estimate and the cost of operation/maintenance of the Techno Centre. And the appropriate profit rate from ROE is determined by each investor. Therefore, whether our appropriate profit rate of approximately 14% is low or high should be left to actual investors to judge. Accordingly, we applied a general formula to justify this project using related data.

The first data is average stock interest return in advanced industrialized nations, which hovers around 16% annual yield over the past ten years (1981 - 1990).

The second data (though not always appropriate) is the profit rate of own capital which is calculated based on long-term treasury bond interest rate, taking credit risk and anticipated inflation rate into account. Let us take U.S. 30-year treasury bonds. The interest rate was about 7% as of August 1995. Credit risk is determined by the country's political stability. Malaysia has low risk at about 1% to 2%. Its anticipated inflation is not very high, about 3% to 5%.

These being the case, appropriate profit rate of own capital should be 13% to 15%.

Therefore, if ROE of this project is 14%, profitability would be secure.

VIII. 3 Proposals

In this section, we offer proposals which will lead to the smooth onset of projects promoted by Techno Centre. We also refer to Techno Centre's role in the setting of national as well as local economic policies.

VIII.3.1 Seven Proposals for Establishment

Here are seven crucial proposals for the smooth launching of Techno Centre.

1. Positioning as the most important project in the national development strategy

In shifting world development, Malaysia's economy and industry are at a turning point toward the next stage of development. Techno Centre must be positioned to be the most important element in the national development strategy. To gain this recognition, emphasize the key role of Techno Centre determined in the concept agreed upon by the Steering Committee of the study.

2. Immediately establish a system, and clarify responsibilities

The organizational characteristics of Techno Centre is its nature. It is a "compound" organization related to several Malaysian government ministries and other agencies of Kedah, Penang, and Perak States. We propose immediate appointment of a board which is Techno Centre's highest decision making body that orders policy implementation. In order to clarify responsibilities, the board should appoint heads of the organizations (six centers and one corporate) which comprise the system.

3. Speedy budget appropriation

Not only does Techno Centre have a high priority in the national development strategy, it also is a national project, an investment in the public good which must be furnished with seed money. We propose that steps be taken immediately to win budget appropriation.

4. Speedy commencement of construction

We propose that construction, in accordance with facility proposals, begin immediately as soon as project receives budget appropriation. It is desirable to begin some operations even if they must be carried out from a makeshift office.

5. Smooth equipment installation

We propose that equipment orders be issued immediately in parallel with construction work. It is generally known that the time lag between ordering and delivery is considerable. Also, functions of many types of equipment show more usefulness when more data can be accumulated.

6. Give priority to the information service operation

It is imperative to begin furnishing information on industry, technology, and the market immediately. Marketing these Techno Centre services is, of course, included in the above activities. Necessarily, establishing corporate member organizations is also important.

7. The key is securing and training specialist engineers

Training specially skilled engineers who will operate the facility is time consuming. Therefore, we propose tie-ups with enterprises which have such engineers to help begin making profit, as well as train Techno Centre's own engineers at the same time.

VIII. 3. 2 Three recommendations for launching

The JICA team offers three proposals to help Techno Centre take off.

1. Access to the world's advanced research and development organizations

KHTP should offer Techno Centre's services to overseas enterprises which have superb research and development functions in their home countries, and invite these enterprises to build factories in KHTP. It also should invite overseas and domestic "hi-tech centers" and its "branches" to establish in KHTP. This not only increases "customers" of Techno Centre, but also, through linkage with these facilities, also provides Techno Centre access to the world's advanced research and development organizations.

2. Invite universities and integrated graduate schools

KHTP should offer university and integrated graduate schools its rich facilities, including Techno Centre, as well as its networks for research, training, testing, and measuring.

Establishment of these educational facilities in KHTP will secure Human Resource Development Centre instructor training, as well as Research and Testing Centre staff training. This move will form a human foundation to create industry.

3. Establish cooperative, mutually supplemental relationships with overseas and domestic high-tech centers

Upon establishment of Techno Centre, it is desirable to make connections and affiliations with high-tech centers throughout Malaysia and overseas. This is, in part, to avoid unwarranted competition and to create cooperative, mutually supplemental relationships, as well as to disseminate Kulim style management to enhance industrial parks across Malaysia from mere organization operation to the local area management level. Shoring up industrial parks is Malaysia's ticket to an era of new industrial might.

VIII. 3. 3 Six Proposals to Use Techno Centre Effectively

The JICA team has six proposals that optimize Techno Centre's significance as a national project which will carry out the strategy for national development. These proposals will improve Techno Centre's management environment and secure the effect its management will furnish outside the Centre.

The establishment of Techno Centre itself does not mean an accomplishment of all goals of this national project. It only means another birth of a national body with a role to play. For example, a bridge has not accomplished its task when it connects two bodies of land. It is not until local economies on both shores are linked and develop together that the task of the bridge becomes clear.

Since Techno Centre is a nationally supported project to develop the economy, it must design formulas that prepare a policy-forming environment, and must endeavor to prepare such an environment.

In the following section, we offer proposals from the viewpoint of what is required to accomplish goals of national development.

1. Management conditions are improved by improving relative location conditions (local policy formula)

Techno Centre's characteristics include technology transfer to local areas, business creation, industrialization of local areas, and access to wide-area production networks.

Industrialization of northeastern Malaysia, which will connect other industrial areas to each other, was planned through the view of Malaysia's consolidated national development plan. It expands industrialized areas and forms many supporting industries and transforming disadvantages of location into advantages. This leads to management improvement of both KHTP and the Techno Centre.

2. How to render Techno Centre a model plan for industrial development (industry policy formula)

Aggressively designate Techno Centre as part of the Seventh Malaysia Plan, and position Kulim style management as the model for all industrial parks and high-tech centers in Malaysia. This increases the importance of the formula of Kulim network in industrial development policies. Use of the equipment will also change, bringing a shift in quality.

3. Positioning as an advanced science and technology organization (science and technology policy)

Optimize Techno Centre's characteristics which are linked to high-tech industries in KHTP to establish its relative position to university research bodies and various ministerial and agency research organizations. Secure access to the world's high-tech knowledge via academic and industrial channels.

4. Become a link between localities and enterprises' measures regarding the environment (environmental policies)

The environmental testing body of the Techno Centre is expected not only to conduct studies for enterprises but also for local organizations. Creating a network of a model system which organizes responses to the environment from both sides has the potential to be welcome throughout the country.

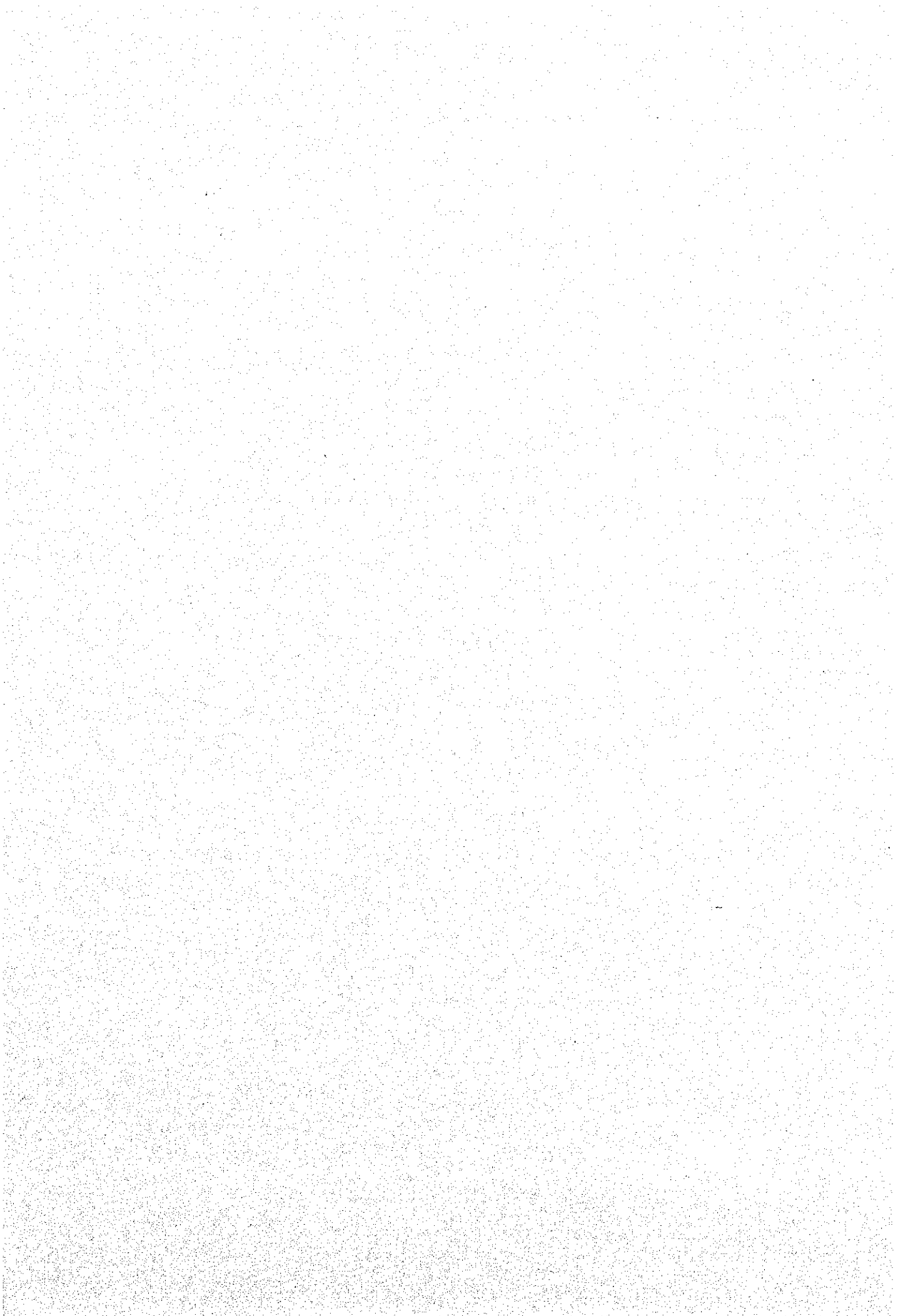
5. Educational revolution via multimedia (education training policy)

An organic utilization of IT Centre and the Human Resource Development Centre has the potential to generate educational innovation in Malaysia.

6. Malaysia's world market created by exporting parts (own export policy and improvement of the position in the international community)

Creating international networks and linking domestic industrial networks will promote exports. This leads to a structural improvement of the economy which grows without outside aid, and which will eventually enhance Malaysia's position in the international community.

Techno Centre's management goals in the first phase will be attained through the planning proposals in the report and by carrying out our proposals. However, the mechanism in the second phase of the management of this organization which aims to be designated as a national project should determine its usefulness. First, Techno Centre must step away from the management of merely one organization, and link with comprehensive national economic management policies adjusted by EPU which utilizes the mechanism. If various pertinent organizations support the concept provided in these proposals and cooperate aggressively, their input in Techno Centre will undoubtedly prove to be a most efficient national investment.



JICA

