

Chapter 5

Present Condition of Infrastructure In and Around the Candidate Site at Gurgaon

(1994)

1. The first part of the report is a general introduction to the project and the objectives of the study.

Chapter 5 Present Condition of Infrastructure In And Around the Candidate Site at Gurgaon

5.1 IMT Site and its Characteristics

(1) IMT site

The proposed site is located near the village Manesar in Gurgaon district of Haryana state, at a distance of 45 km from New Delhi (Connaught Place) along the National Highway 8 (NH 8). The IMT site falls within the administrative boundaries of the Gurgaon Tehsil of the Gurgaon District. A Tehsil is an administrative sub-division of a District. The population of Manesar is 5,649 as per the 1991 population census. The IMT site and its surrounding area is shown in Fig 5.1.1. The detailed layout of the site is same as that mentioned in the Master Plan Study, however, based on practical consideration, minor modifications have been made in the layout of the site. The topography of the site is fairly flat and the site is presently being used for agriculture.

(2) Climate

The Manesar area receives an annual rainfall of 625 mm. The mean humidity varies from 47% in May to 83% in December. The temperature of the area varies from a minimum of 4 degree Celsius in January to a maximum of 45 degree Celsius in June. The prevailing wind direction in the area is from the north-west to the south-east. The mean wind velocity varies from 2.7 kmph in December to 7 kmph in May.

(3) Soil Condition of IMT site

The site lies in the midst of the Aravali Hills and the area is flat agricultural land with wheat and mustard as the main crops. The sub-soil strata predominantly consists of non-plastic yellowish silt or silty sand of medium compressibility, with traces of *Kankar* (a variety of gravel) at different levels. The safe bearing capacity at a depth of about 1.0 m is in the range of about 10.00 ton per sq. mtr.

5.2 Traffic and Transportation

The establishment of the IMT will inevitably generate additional traffic (both passenger & goods) on the road network around the IMT. In order to plan for the smooth flow of this additional traffic in the future, the present condition of the traffic around the IMT was studied. Section 5.2.1 describes the presently available modes of travel to the IMT and the village Manesar which is located adjacent to the IMT.

5.2.1 Access to IMT site

(1) Access to IMT site by road

The proposed site of IMT is well connected by road network and the National Highway 8 (NH 8) passes through this site. About 80% of the IMT site is located on the right side of the

NH 8 (while going from Delhi towards Jaipur) and the remaining 20% is located on the left side of the NH 8. The NH 8 connects New Delhi to Bombay via Jaipur. The IMT site is about 50 min drive from the center of New Delhi and about 35 min from the Indira Gandhi International Airport, which is also located close to the NH 8.

(2) Access to IMT site by bus transport

The village Manesar, which is situated adjacent to the IMT site, is reasonably well served by bus transport. The majority of bus transport in Haryana is owned and operated by the Haryana Roadways, a State government owned company. However, in the last few years the government has released some portion of the bus routes (about 25%) to the private sector. Some of the salient features of the bus services are discussed below.

(a) The bus services in the Gurgaon District is operated by the Gurgaon Depot of Haryana Roadways, and its headquarters is located in Gurgaon city. The Depot carries 231 buses and operates its own workshop to repair the buses.

(b) The Haryana Roadways provide 11 bus services daily between Gurgaon and Manesar and at least one daily bus service for the surrounding 7 other villages of the IMT site. Also, there are about 13 bus services daily between Delhi and Gurgaon.

(c) Bus fare between Delhi - Gurgaon is Rs. 8 and between Gurgaon - Manesar Rs. 4 (one way).

(d) The long-route buses (inter-city) running between Delhi - Jaipur and other areas also stop at the Manesar bus stop, which is located on the NH 8.

(3) Access to IMT by rail

The nearest meter-gauge rail head is at Garhi Harsaru which is at a distance of 10 Kms. This meter-gauge rail line runs between Delhi and Jaipur via Rewari. The conversion of meter-gauge railway line into broad-gauge from Delhi to Rewari via Gurgaon has been completed by the Govt. of India, Ministry of Railways. The nearest broad-gauge rail head is at Faridabad which is at a distance of 45 Kms from Manesar.

(4) Access to IMT site by air

The Indira Gandhi International Airport at Delhi, which is one of the five International Airports of the country (the other being Bombay, Calcutta, Madras & Trivandram), is located at a distance of 32 Kms from Manesar and is only 30 minutes drive. Passenger and cargo facilities of International standard are readily available at this Airport.

(5) Access to IMT site by sea

Although the IMT site is situated in the hinterland of the country, but dry port facilities with container services are available in New Delhi. These facilities are located at a distance of about 40 Kms. from Manesar. Most of the existing industries in Gurgaon use Kandla Port (in Gujarat) for shipping heavy machinery and raw materials via the sea routes.

5.2.2 Road Network in and around the IMT

(1) Road Network in Gurgaon District

Haryana is one of the leading state in India in providing black-top roads to all the villages and towns in Haryana. As of the 1st of April 1992, there was a total of 1677 kms of roads in the Gurgaon District, which has an area of 2700 sq. kms. The break-up of the roads in the Gurgaon District is as follows.

National Highways =	44 Kms.
State Highways =	195 Kms.
Major District Roads (M.D.R.) =	178 Kms.
Other District Roads (O.D.R.) and Village Roads (V.R.) =	1260 Kms.

Total	1677 Kms.

The 2000 Road Development Plan aims at the improvement of the road network further with improvement in strengthening and widening of the existing State Highways and M.D.R.s and also construction of additional link roads and some bypasses.

(2) Characteristics of National Highway 8.

The National Highway 8 is one of the main highway in India and extends from Delhi to Bombay via Jaipur and Gurgaon. The total length of NH 8 is 1,428 kms, out of which 101 km passes through Haryana state. Some of the large size industries like Maruti and Hero-Honda are located along this highway in the Gurgaon District. The section of NH 8 between Delhi and Gurgaon (about 36 Kms.) is a dual carriageway (i.e. 2-lanes in each direction, physically separated by a median of about 1 mtr.). The section of NH 8 beyond Gurgaon to Jaipur is two-lane with the metalled road-width of 8.50 meters and the formation-width of about 12 meters. However, the four-laning of this section (between Gurgaon and Jaipur) has been approved by the Govt. of India and is likely to be taken up under Asian Development Bank (A.D.B.) Loan-III. The four-laning of the section between Kotputli (in Rajasthan, at about 162 km from Delhi) to Jaipur has already been sanctioned and taken up for construction.

(3) Traffic Census Data for National Highway 8

Traffic census data for the NH 8 was collected from the relevant sources in order to understand the present traffic volumes and the vehicle composition on the NH 8. Traffic census data was obtained for two points on the NH 8, which were were closest to the IMT site. One point was located upstream of IMT site on the NH 8 (about 14 km towards Delhi from the IMT site or about 31 km from Delhi on NH 8) and the second point was located at the down-stream side of the IMT site (at about 30 km from the IMT site or about 76 km from Delhi). The traffic census data for these two points by vehicle composition is shown in the Table 5.2.1 and Table 5.2.2 respectively. The salient features of the traffic census data are as follows.

(a) The total number of daily fast moving four-wheeled traffic is about 19,824 vehicles at point one and 10,480 vehicles at point two.

**Table 5.2.1 : Traffic Census Data for National Highway 8
(31 km. from New Delhi towards Jaipur)**

Date : 25 Dec. 93 to 1 Jan. 1994 (One Week)
Place : National Highway 8 (31 Km from New Delhi)
District : Gurgaon (Haryana)

(Total No. of vehicles in both direction)

From (6:00 am)	To (6:00 am)	Cars, Jeeps Vans	Buses	Trucks	Sub- Total	Tractor	Motor Cycles, Scooters	Bullock cart	Cycles	Rickshaw	Sub- Total	TOTAL
25/12/93	26/12/93	8182	777	8777	17736	250	5351	159	1430	321	7511	25247
26/12/93	27/12/93	10188	994	10537	21719	179	5284	87	1197	253	7000	28719
27/12/93	28/12/93	8889	729	9745	19363	253	5729	97	1201	298	7578	26941
28/12/93	29/12/93	8436	762	10348	19546	169	5091	68	879	312	6519	26065
29/12/93	30/12/93	8236	732	9801	18769	170	5155	66	1193	267	6851	25620
30/12/93	31/12/93	8119	710	9798	18627	152	4943	95	1358	338	6886	25513
31/12/93	1/1/94	10992	968	11049	23009	287	6428	182	2333	390	9620	32629
Weekly Total		63042	5672	70055	138769	1460	37981	754	9591	2179	51965	190734
Daily Average		9006	810	10008	19824	209	5426	108	1370	311	7424	27248
P.C.U. * Factor		1	3	3		3	0.5	8	0.5	1.5		
Total P.C.U.		9006	2431	30024	41460	626	2713	862	685	467	5352	46813

Note : * Passenger Car Unit (P.C.U.)

Source : Sub Divisional Engineer, Provincial Sub Division No. II, P.W.D.B. & R., Faridabad.

**Table 5.2.2 : Traffic Census Data for National Highway 8
(76 km. from New Delhi towards Jaipur)**

Date : 24 Dec. 93 to 31 Dec. 93 (One Week)
Place : National Highway 8 (76 Km from New Delhi)
District : Rewari (Haryana)

(Total No. of vehicles in both direction)

From (6:00 am)	To (6:00 am)	Cars, Jeeps Vans	Buses	Trucks	Sub- Total	Tractor	Motor Cycles, Scooters	Bullock cart	Cycles	Rickshaw	Sub- Total	TOTAL
24/12/93	25/12/93	2958	1073	5221	9252	320	1076	157	725	15	2293	11545
25/12/93	26/12/93	3227	1138	5964	10329	233	1132	162	623	25	2175	12504
26/12/93	27/12/93	3328	1124	6191	10643	265	1501	115	660	5	2546	13189
27/12/93	28/12/93	3555	1137	5744	10436	272	1509	127	771	8	2687	13123
28/12/93	29/12/93	3291	1308	5940	10539	283	1285	167	790	0	2525	13064
29/12/93	30/12/93	3307	1222	6048	10577	271	1148	148	889	0	2456	13033
30/12/93	31/12/93	3568	1228	6791	11587	251	1246	203	840	0	2540	14127
Weekly Total		23234	8230	41899	73363	1895	8897	1079	5298	53	17222	90585
Daily Average		3319	1176	5986	10480	271	1271	154	757	8	2460	12941
P.C.U.* Factor		1	3	3		3	0.5	8	0.5	1.5		
Total P.C.U.		3319	3527	17957	24803	812	636	1233	378	11	3071	27874

Note : * Passenger Car Unit (P.C.U.)
Source : Sub Divisional Engineer, Provincial Sub Division No. II, P.W.D.B. & R., Faridabad.

(b) Among the fast moving four-wheeled traffic, the share of trucks is largest (about 50% at point 1 and 57% at point 2), followed by cars, jeeps and vans (at about 45% at point 1 and 30% at point 2).

(c) The share of slow moving traffic (Bullock cart, Cycles & Rickshaw) is between 4% to 6% of the total traffic in terms of Passenger Car Units (PCU).

(d) The peak-hour traffic varies from 625 vehicles to 796 vehicles depending on the day of the week for fast-moving traffic.

(4) Indian Road Congress (IRC) Standards for the Design of Highways

In India, IRC standards are followed for the design and construction of highways and traffic control devices. The IRC Standards related to the width of carriageway is shown in Table 5.2.3.

Table 5.2.3 : Width of Carriageway as per the IRC Standards

Description	Width (in meters)
1. Single Lane	3.75
2. Intermediate Lane	5.50
3. Two Lanes (without raised kerbs)	7.00
3. Two Lanes (with raised kerbs)	7.50
5. Multi-Lane, Width per Lane	3.50

(5) National Capital Region (NCR)

The National Capital Region Planning Board has approved the transportation network for the NCR. As per the NCR plan :

(a) The NH 8 from Delhi to Behror via Gurgaon will be widened to six lanes from the present four lanes.

(b) The outer and inner grids around New Delhi will be developed by connecting the Regional Roads in the adjoining States (including Haryana). The inner grid comprises of the portion Meerut- Baghpat- Sonapat- Kharkhoda- Rohtak- Jhajjar-Gurgaon- Faridabad. The outer-grid comprises of Panipat- Gohana- Rohtak- Jhajjar- Rewari- Sohna- Palwal- Khurja- Bulandshahr- Meerut.

(c) The road connecting Rewari and Palwal via Sohna will be widened to 7.2 mtrs. from the present 5.5 mtrs.

5.3 Water Supply

The industrial development in Gurgaon is expected to increase rapidly in the future which will lead to a rapid increase in population. The population of Gurgaon is projected to be more than 1 million by the year 2001. In order to cope with the high water demand due to the increase in the population and industrial activity in the future, the water supply network should be developed as early as possible.

5.3.1 Present Condition of Water Supply

Until recently, the underground water has been the only source of water for drinking, industrial and agricultural uses. Underground water is available at a depth of 10 to 25 meters below the surface. This underground water is brackish and will not be sufficient in the future as rapid increase in demand is anticipated. Therefore, in order to secure additional sources of water, a 70-km water channel has been constructed to supply water from the Yamuna River to Gurgaon. Reference should be made to the overall view shown in fig 8.8.1.

(1) GWS (Gurgaon Works Supplies) Channel

GWS Channel is an open channel which is 69.4 km long, and total water supply capacity from the intake facility named Kakroi Head Works, is 3.8 m^3 per second ($245,000 \text{ m}^3$ per day), 2.83 m^3 /second of which is supplied to Gurgaon. The balance will be supplied to Bahadurgarh. Total construction cost of the channel is about Rs. 360 million.

(2) Construction of Water Purification Facilities

Raw water which is sent by the channel, is distributed to the Gurgaon District after purifying by the water purification facilities at village Basai. The water purification facilities will be constructed step by step in three phases, in each of which a water purification plant which has a capacity of $90,000 \text{ m}^3$ per day, will be constructed and total capacity of the facilities will become $270,000 \text{ m}^3$ per day. The first phase of $90,000 \text{ m}^3$ /day has been completed and was officially opened in March 1995.

The outline of this three phase project is as follows. The raw water, which is carried by the channel, flows into the reservoir. The reservoir consists of two basins, each of which has a capacity of $175,000 \text{ m}^3$ (which is equivalent to the demand for 4 days). Raw water is pumped to the coagulation ponds, where aluminum sulfide is added as coagulant to lower turbidity and flock generated is settled and removed in the flocculant settling basins and the water is further treated in the rapid filtration ponds. The treated water in the rapid filtration ponds is disinfected with chlorine and it is accumulated in two pure water reservoirs, each of which has a capacity of $5,000 \text{ m}^3$. The treated water is then sent to the main pipings by the send-out pumps.

The analysis of the raw and treated water is shown in Table 5.3.1. The results of the water analysis shows that the pH value is rather high, though it does not exceed the acceptable limit for the potable water. Among the analytical items, only the turbidity of raw water exceeds the acceptable limit for potable water. As a result of start-up operation, it can be concluded that the water purification plant is designed to meet specifications because turbidity of treated

water shows nil, though the plant is now operating at 10 % of the design capacity. Turbidity will be 2 to 5, when it is operated at the design capacity. Total investment cost will amount to about Rs. 700 million, which includes cost of the main pipings of total 103 km long and land acquisition of 100 ha.

(3) Supply of Service Water

Potable water is supplied by sixty two wells in the city of Gurgaon and surrounding area, and availability of water per well is at the rate of 230 to 300 liter per minute. The water supply network covers about 65 % of the total area where water supply is required. Availability of potable water is now at about 15,000 m³ per day, and this is short in total demand of potable water in this area at 28,000 m³ per day. Purified water from the plant completed at the first stage, will displace water from the water wells and will be further distributed to the area which has not been covered yet. The distribution schedule as of 1994 is as follows.

1. Residential	34,100 m ³
2. Requirement of Old Town	13,600 m ³
3. Commercial Area	1,800 m ³
4. Industrial Area	7,300 m ³
5. Requirement of Colonizers	27,300 m ³
6. Requirement of the villages in urban estate	2,300 m ³

Total	86,400 m ³ (19MGD)

The implementation of the above plan will be completed by the middle of 1995.

Table 5.3.1 : Analysis of Raw and Treated Water

Source of Sample : Water treatment Plant at village Basai (Gurgaon)

Date of testing : 17/8/94

PHYSICAL CHARACTERISTICS

S. No	Property	Raw Water	Treated Water
(i)	Appearance	Clear	Clear
(ii)	Odour	Normal	Normal
(iii)	Taste	Normal	Normal
(iv)	Turbidity*	18	Nil

* By Nephlo Turbidity Meter

CHEMICAL CHARACTERISTICS

(The following values are expressed as mg/l)

S.No.	Raw Water	Treated Water	Acceptable	Cause for Rejection	
1	Total Dissolved Solids as such (103-5.C)	200	180	500mg/l	1500mg/l
2	Total Hardness (as CaCO ₃)	80	80	200mg/l	600mg/l
3	Calcium (as Ca)	60	60	75mg/l	200mg/l
4	Magnesium (as Mg)	20	20	30mg/l	150mg/l
5	Phenolphthaiein Alk.	Nil	Nil		
6	Methyl orange Alk.	80	80		
7	Iron (as Fe)	Nil	Nil	0.1mg/l	1.0mg/l
8	Chlorides (as Cl)	50	50	200mg/l	1000mg/l
9	Sulphates (as SO ₄)	Absent	Absent	200mg/l	400mg/l
10	Fluorides (as F)	Nil	Nil	10mg/l	1.5mg/l
11	Nitrites (as NO ₂)	Nil	Nil	Nil	0.001mg/l
12	Nitrates (as NO ₃)	Traces	Traces	45mg/l	45mg/l
13	pH	8.5	8.4	7.0 to 8.5	< 6.5 or > 9.2
14	Residual Chlorine				

5.3.2 Potable Water Supply Plan

Water supply to the IMT shall be incorporated in the water supply plan of the Gurgaon district because the IMT is expected to be constructed from the latter part of 1990's to the year 2000. The water supply plan for the year 2010, was confirmed at the Haryana P.W.D. (Haryana Public Works Department), which is responsible for planning of water supply in the Gurgaon district. Results are shown in the Table 5.3.2 and Table 5.3.3., which shows construction schedule of the water purification plants up to the year 2010. Based on this schedule, the water purification plant at second phase will be constructed by 1998 and if it is planned that water is supplied to the IMT by this plant, requirement of water by the IMT is about 40,000 m³ per day, which is about 50 % of the plant design capacity of 90,000 m³ per day.

According to the water supply plan, at the year 2001 when construction of the IMT will be well under way, availability of industrial water is expected to be 100,000 m³ per day, which would allow for constructing another industrial area equivalent to the IMT. At this stage, a water purification plant at third phase, will be completed and total availability of water will be 315,000 m³ per day. Total water supply rate is larger than the design capacity of the three water purification plants by 45,000 m³ per day, which is equivalent to the water supply rate to the IMT.

According to the planning by the Haryana P.W.D., a water purification plant which is exclusively used for the IMT, is to be constructed and it is planned that water is to be supplied from the plant at the second phase only at the beginning of the construction phase of the IMT.

However, it is advisable to make a water supply planning, in which water supply to the IMT is included, considering construction of water purification plants, all of which have same capacity of 90,000 m³ per day, so that specifications and drawings for the plant completed at the first stage, will be made use of, to shorten construction term and maintenance of equipment will become easier due to applying same equipment for all plants. During the visit to India this time, it was confirmed to the Haryana P.W.D. that further increase in capacity of water purification is planned besides the three plants above if shortage of water supply is anticipated.

In conclusion, the water supply to the IMT is assumed to be secured when the plants are constructed as planned by the Haryana P.W.D..

5.3.3 Basic Planning of Water Supply to IMT

As per the basic plan, the main water supply pipelines from the water purification facilities are laid in such a way that they first pass under the railway tracks and meet with the National Highway No. 8, from there onwards, they run along the National Highway No. 8 to reach the IMT. The distance from the water purification facilities to the IMT is about 16.5 km. The diameter of each main water supply pipe is 600 mm and two such pipes, made of cast iron will be laid in parallel. This is a reasonable design considering the redundancy of water supply system. Purified water which is sent by the two pipes from the purification facilities, is accumulated in the reservoir, from which it is distributed by pumps.

In the industrial zone, water is directly distributed by pumps to supply water at a pressure of 4 to 5 kg/cm² and in the residential and commercial area, water is to be distributed via water tower, where water is accumulated after sending it by pumps.

Table 5.3.2 : Water Supply Plan at Gurgaon

Year	1990	1995	2001	2010
Demand for Water				
(1) Population (in million)			1.0	1.5
(2) Water Consumption Rate (Liters/Day/Person)	160	180	200	200
(3) No. of Person in a family	6	6	6	6
(4) Popularization of Water Supply (%)	70	90	100	100
1. For Public Utility (m ³ /Day)		76,500	200,000	310,000
2. For Industrial Use (Including IMT)		7,200	100,000	115,000
3. Others		1,800	15,000	20,000
Total Demand		85,500	315,000	445,000
Planned Supply Capacity		90,000	315,000	445,000

Table 5.3.3: Construction Plan of Water Purification Facilities

Capacity (m ³ /Day)	Target Date	Remarks
9,000	Sept., 1994	10% Operational
45,000	Dec., 1994	50% Operational
90,000	July, 1995	100% Operational
180,000	March, 1998	
315,000	March, 2001	

5.4 Sewage Treatment

At present, almost all waste water is discharged into the drains without any treatment thus leaving the water to the self-purification of nature. However, it is urgent to provide the waste water treatment facilities in Gurgaon in order to cope with the industrialization and rapid increase in population in the future.

5.4.1 Present Conditions of Sewage Treatment

A sewage treatment plant having a capacity of 68,000 m³ per day is now under construction at Gurgaon and will be completed by 1995. The analysis of waste water which will be treated at this plant, is shown in the Table 5.4.1.

The conventional activated sludge process can be applied for waste water treatment so that the concentration of contaminants can be lowered than those specified in the Japanese Uniformity Standard, though the indexes of water contamination such as BOD, COD and SS are higher in waste water in Gurgaon than those of waste water from living quarters in Japan.

In the Indian standard of effluents from industries, allowable limit of BOD is only specified among BOD, COD and SS whereas the criteria of BOD, COD and SS are specified respectively in the Japanese Uniformity Standard. The Japanese Uniformity Standard gives the maximum allowable limits of contaminants in Japan, which should at least be applied to the standard for the IMT, considering industrial development in India in the future. (Refer to Table 8.4.1). The waste water treatment plant now under construction at Gurgaon, stated above, has also applied the conventional activated sludge method for treatment.

5.4.2 Sewage Treatment Plan

The sewage treatment plan for Gurgaon is shown in the Table 5.4.2. With reference to these tables, sewage treatment capacity is forecasted about 60 % of water supply capacity when ratio of sewage treatment capacity to water supply capacity is checked each year. Separated system is to be applied for collecting waste water in this area, so capacity of the waste water treatment facilities can be greatly reduced, comparing to a capacity when combined system is applied.

Industrial effluents having a lower concentration of BOD, COD and SS can be discharged into the drains without being sent to the waste water treatment plant. The new waste water treatment facility to be established in Gurgaon will adopt the split flow treatment system, treatment capacity of which can be reduced, compared with the combined system.

The waste water treatment facilities for the IMT are planned to treat about 55 % of total amount of waste water in the IMT. The IMT is not an industrial estate but a model town, where the residential area for the workers and the commercial and public utilities are also provided, and in a sense, the IMT projects industrialized Gurgaon in future. Then, it is reasonable that the ratio of sewage treatment capacity of water supply will be fall into about 60 %.

Table 5.4.1 : Analysis of Waste Water

S.No.	Characteristic	Result
1.	pH Value	8.3
2.	Suspended Solids mg/l	358
3.	Dissolved Solids mg/l [inog]	1,132
4.	BOD for 5 days at 20°C mg/l	440
5.	COD mg/l	690
6.	Chlorides as Cl ⁻¹ mg/l	368
7.	Sulphates as SO ₄ mg/l	132
8.	% Sodium	56
9.	Oil and Grease mg/l	22.6
10.	Amonical Nitrogen mg/l	2.4
11.	Hexavalent churmium Cr ⁺⁶ mg/l	ND
12.	Cynide as CN ⁻¹ mg/l	ND
13.	Nickel as Ni mg/l	ND
14.	Zinc as Zn	ND
15.	Silver as Ag mg/l	ND
16.	Copper as Cu mg/l	ND

ND : Not Detected

Table 5.4.2 : Forecast of Demand and Capacity for the construction of Sewage Treatment Facilities

Year		1990	1995	2001	2010
1. Sewage from Houses	(m ³ /Day)	21,000	36,000	140,000	210,000
2. From Industrial Zones	(m ³ /Day)	12,000	16,000	30,000	50,000
3. Others	(m ³ /Day)	-	-	-	-
Total Demand of Sewage Treatment	(m ³ /Day)	33,000	52,000	170,000	260,000
Total Planned Capacity	(m ³ /Day)	-	68,000	120,000	Not Planned

5.5 Electric Power Supply

5.5.1 General Conditions of Power Sector in India

(1) Power Supply and Demand Trends

In fiscal 1993/94, the generated energy in India increased by 7.3% to 323.3 billion KWh compared to previous year, mainly because of improvement in the load factor (ratio of average load to maximum load) from 51.1% to 61%. The future power demand, calculated on the basis of a minimum growth rate of 7% for the industrial sector, is forecast to record a spiraling increase to 360.0 billion KWh in fiscal 1994/95, 416 billion KWh in fiscal 1996/97 and 517 billion KWh in fiscal 1990/2000 (see Table 5.5.1).

In response to this demand forecast, the generation capacity is planned to increase by 30,538 MW to 99,563 MW at the end of fiscal 1996/97 from the 69,025 MW available at the beginning of the 8th Five-Year Plan (fiscal 1992/93 - fiscal 1996/97).

The prospect of government funding for the planned expansion of the generation capacity was already bleak at the time of the 8th plan's preparation as the limited scope to raise the necessary investment funds from the public sources forced the government to rely on both India's private sector and foreign capital for the construction of generation facilities with a total capacity of some 100,000 MW. To make matters worse, the Gulf crisis in 1990 caused oil and foreign currency crises in India, exacerbating the shortage of funds for the power sector. As a result, the government has been forced to call for increased funding by the private sector for the construction of an additional 12,000 - 13,000 MW out of the 28,000 MW to be constructed by the government under the 8th plan. In short, more than half of the funding for the construction of new generation facilities during the 8th plan period has now come from the private sector.

(2) Bankruptcy of State Electricity Boards (SEB)

The less than favorable prospects for future power development and the strong need to stimulate both private capital investment and foreign capital investment in India's power sector has compelled the central and state governments to seriously discuss all causes of the repeated power shortages and the public finance problems (changing needs of consumers, low utilization rate of installed facilities, differential charge system, large transmission loss and inefficient management, etc.). In particular, the worsening financial health of the state electricity boards (SEBs) has been paid special attention. (The accumulated total loss of the SEBs was Rs. 44 billion in fiscal 1992/93 and Rs. 50 billion in fiscal 1993/94. The figure is expected to increase to Rs. 55 - 56 billion in fiscal 1994/95).

There are several causes for this state of bankruptcy. Firstly, the extremely low power charge level (approximately Rs. 0.3 per KWh on average) for the agricultural sector, arbitrarily set for political reasons, must be pointed out. This power charge level brings in only Rs. 1.2-1.25 per KWh compared to a generation cost of Rs. 1.5 per KWh with the difference being supplemented by state governments.

Secondly, problems concerning the physical facilities exist, ranging from the low utilization rate of available facilities to transmission and other losses. A 1% improvement of the load factor in

India is equivalent to an additional generation capacity of 500 MW and a 1% improvement of the transmission/distribution loss is said to increase the revenue by Rs. 500 million a year. While the load factor is apparently improving each year, the transmission/distribution loss level still remains at more than 20% vis-à-vis the 6 - 12% commonly observed in industrialized countries.

The SEBs have so far failed to implement effective measures to reduce the transmission/distribution loss. Unless an answer to the vicious circle (the failure to introduce a higher charge makes it impossible to invest in new facilities, the lack of which increases the cost) is found, the shortage of investment funds will continue to haunt the power sector in India.

Table 5.5.1 : Trend of Power Generation

(Unit : Billion KWh)

Year	Thermal/ Nuclear	Hydro	Total	Load Rate (%)
1980-81	64.3	46.5	110.8	45.0
1984-85	103.0	53.9	156.9	50.1
1985-86	119.4	51.0	170.4	52.4
1986-87	133.9	53.8	187.7	53.2
1987-88	154.6	47.5	202.1	56.5
1988-89	163.5	57.9	221.4	55.0
1989-90	183.3	62.1	245.4	56.5
1990-91	192.6	71.7	264.3	53.8
1991-92	214.2	72.8	287.0	55.3
1992-93	231.5	69.9	301.4	57.1
1993-94 (forecast)	249.2	67.5	316.7	57.8
1993-94 (actual)	253.0	70.3	323.3	61.0
1994-95 (forecast)	-	-	360.0	-
1996-97 (forecast)	-	-	416.0	-
1999-00 (forecast)	-	-	517.0	-

Source: ECONOMIC TIMES, JULY 15, 1994

(3) Introduction of Foreign Investment Promotion Measures

As described above, both the central and local governments cannot be relied upon to provide financial assistance for the development of the power sector. Given the limited disposable funds of the power sector, the government has found it necessary to attract private capital and provides various incentives/ preferential measures, the main items of which are described below.

- a) Exemption from income tax for 5 years for businesses which construct their first power plant in a designated backward area.
- b) Reduced import duty of 20% instead of the normal 30% on project-related equipment.
- c) Preferential treatment in regard to the commodity tax.

- d) State guarantee of a post-tax profit rate of 16% for equity investment.
- e) Permission for 100% foreign subsidiaries.
- f) Submission of a letter of guarantee by the central government to SEBs on full payment of the power charge for 12 years (the standard contract period for power purchase agreements for SEBs is 25 years).
- g) Allocation of coal mines for exclusive use by coal-fired thermal power plants.
- h) Increase of the annual depreciation rate from 5.06% to 7.5% for generation facilities (the depreciation period is shortened from 18 years to 12 years with a residual value of 10%).

Some 70 foreign investment projects in India's power sector have so far been conceived in response to an earnest request made by the Indian government. Most of these, however, are still at the inception stage and the plans for only 7 projects, including that of the Enron Power Development Co. of the US, have received final approval.

In short, the key requirement to stimulate foreign investment is rebuilding of the financial health of each SEB and intense discussions have been taking place to find ways to achieve this.

5.5.2 Present Situation of Electric Power Supply in Gurgaon

(1) Present source of Supply

The area around Gurgaon is serviced via a 220 kV Substation, Badshahpur, having an installed capacity of 160 MVA. This Substation is presently connected to a 400 kV Substation, Samaypur through a 220 kV Double-Circuit Samaypur-Badshahpur line. The 400 kV Samaypur Substation, is one of the main stations of the NTPC/NPTC Network, which is fed from the Singrauli Super Thermal Power Station, the Rihand Super Thermal Power Station, and the NCR Dadri Gas Station. While a 400 kV side of this station is under the control of the NPTC, the 220 kV bus is controlled by the DBMB.

Prior to the commissioning of the Samaypur-Badahapur circuits, there used to be frequent over-loading on the BBMB feeders resulting in unscheduled power cuts in the command area of the 220 kV Substation, Badshahpur. After commissioning these circuits, over-load problems in the Gurgaon area were improved as compared to other parts of India.

The main distribution voltage in Gurgaon district is 66 kV. The substations listed in Table 5.5.2 below serve the proper demand of the district.

Power supply to IMT will be fed from Manesar Substation by 66 kV transmission line, if the power demand of IMT is less than 30 MVA. If the power demand of IMT is more than 30 MVA and upto 100 MVA, the power will be supplied from Badshahpur Substation through 220 kV transmission line. Recorded peak demand of Haryana (monthly variation) is shown in Table 5.5.3.

Table 5.5.2 : Existing Substations in Gurgaon District

No.	Name of Substation	Installed Capacity	Recorded Peak Demand (1993-1994)
1	Badshahpur 220 kV Substation	220/66 kV (45/60 MVA) 220/66 kV (100 MVA) 66/11 kV (12.5/16 MVA) 66/11 kV (7.5 MVA)	54.8 MVA (Mar. 1994) 94.8 MVA (Nov. 1993) 11.1 MVA (Jan. 1994) 7 MVA (Dec. 1993)
2	Faruk Nagar 66 kV Substation	66/11 kV (7.5 MVA) 66/33/11 kV (12/4/8 MVA) 33/11 kV (4 MVA)	7.4 MVA (Feb. 1994) 8 MVA (Mar. 1993) 3.3 MVA (Nov. 1993)
3	Gurgaon 66 kV Substation (Mehrolli Road)	66/11 kV (12.5/16 MVA) 66/11 kV (8 MVA) 66/33 kV (8 MVA) 33/11 kV (6.3 MVA) 33/11 kV (10/12.5 MVA)	15.8 MVA (Jan. 1994) 7.8 MVA (May 1993) 6.8 MVA (May 1993) 7.3 MVA (Jan 1994) 9.8 MVA (May 1993)
4	Maruti 66 kV Substation	66/11 kV (12.5/16 MVA) 66/11 kV (10 MVA)	10.8 MVA (May 1993) 8.4 MVA (May 1993)
5	Manesar 66 kV Substation	66/11 kV (12.5/16 MVA) 66/11 kV (6 MVA)	15.4 MVA (Jan. 1994) 5.7 MVA (Dec. 1993)
6	Patodi 66 kV Substation	66/11 kV (10/12.5 MVA) 66/11 kV (12.5/16 MVA)	12.5 MVA (Mar. 1994) 16 MVA (Mar. 1994)
7	Sohna 66 kV Substation	66/11 kV (12.5/16 MVA) 66/33 kV (8 MVA)	14.5 MVA (Jan. 1994) 7.6 MVA (Jan. 1994)
8	Taoru 66 kV Substation	66/11 kV (10 MVA) 66/11 kV (8 MVA)	8.8 MVA (Nov. 1993) 8.4 MVA (Jan. 1994)
9	Bhadas 66 kV Substation	66/11 kV (7.5 MVA) 66/33 kV (6 MVA) 66/33 kV (6 MVA)	1.6 MVA (Mar. 1994) 6.8 MVA (Nov. 1993) 4.8 MVA (Dec. 1993)
10	Sector-10 66 kV Substation (Gurgaon)	66/11 kV (12.5/16 MVA)	9.1 MVA (May 1993)
11	Dundahera 66 kV Substation	66/11 kV (12.5/16 MVA)	9 MVA (Nov. 1993)

Source : HSEB

Table 5.5.3 : Recorded Peak Power Demand of Haryana (Monthly Variation)

(All Figures in MW)

Month	1989-90	1991-92	1992-93	1993-94
April	1,149	1,070	1,216	1,337
May	1,141	1,186	1,367	1,538
June	1,117	1,360	1,350	1,709
July	1,208	1,395	1,611	1,855
August	1,307	1,562	1,660	1,657
September	1,445	1,574	1,675	1,817
October	1,419	1,262	1,603	1,674
November	1,234	1,320	1,387	1,682
December	1,268	1,446	1,445	1,740
January	1,328	1,473	1,482	1,670
February	1,219	1,555	1,583	1,733
March	1,218	1,414	1,575	1,812
Recorded Peak	1,445	1,574	1,675	1,855

Source: HSEB

(2) Future Plan

Considering the importance of the Gurgaon Industrial Complex, improvement plans to increase generating capacity were made to ensure abundant uninterrupted power to this belt. The 400 kV Samaypur Substation, will be connected to the Faridabad Gas-based Thermal Power Station, which is to be constructed by the National Thermal Power Corporation. The Faridabad power station will have 400 MW capacity and the construction of the station is expected to be completed in 1996. GAIL is implementing the project to extend the gas supply trunk line for the purpose of supplying natural gas to this power plant via a 36 inch pipeline. The project is expected to be completed by 1996 too.

As a future project, Haryana is to take up a thermal power station at Palwal which is likely to be completed by the turn of the century. With the commissioning of this thermal power station, the power available in this area will further increase.

Augmentation plan of substations and transmission lines in Gurgaon District is shown in Table 5.5.4.

Table 5.5.4 : Augmentation Plan of Substations and Transmission Lines in Gurgaon District

No.	Name of Substation	Installed Capacity	Remarks
1	1)Maruti Motors 220 kV Substation (Gurgaon) 2)Badshahpur - Maruti Motors 220 kV transmission line	220/66 kV (100 MVA) Double circuits x 11 km	Consumer Substation Covered by 8th Plan 8th Plan
2	1)Nuh 66 kV Substation 2)Mandkola-Nuh 66 kV transmission line with extension upto Bhadhas	66/11 kV (12.5/16 MVA) Single circuit x 38 km (18 km + 20 km)	7th Plan 7th Plan
3	1)Sector-23-23A 66 kV Substation (Gurgaon) 2)Sector-10 to Sector 23, 23A 66 kV transmission line 3)Rerouting of one circuit of existing double circuit Rohtak Road Delhi-Gurgaon line at Sector-23, 23A (Gurgaon)	66/11 kV (12.5/16 MVA) Double circuit x 7 km Single circuit x 3.5 km	7th Plan 7th Plan
4	1)Bilaspur 66 kV Substation 2)Badshahpur-Bilaspur 66 kV transmission line	66/11 kV (12.5/16 MVA) Single circuit x 21 km	8th Plan 8th Plan
5	1)Punhana 66 kV Substation 2)Hathin-Punhana 66 kV transmission line	66/11 kV (12.5/16 MVA) Single circuit x 17 km	8th Plan 8th Plan
6	1)Sector-54/56 66 kV Substation (Gurgaon) 2)Rerouting of Badshahpur-Dundahua line for feeding Sector 54/56 (Gurgaon)	66/11 kV (12.5/16 MVA) Single circuit x 2 km	
7	1)220 kV Maruti Substation-66 kV Maruti Substation 66 kV transmission line	Double circuit x 5 km	
8	1)Badshahpur Substation- Dundahera Substation 66 kV transmission line	Single or Double circuit x 17.2 km	8th Plan

Source: HSEB

(3) Main Issues

In the Master Plan Study, the scheme for power supply to the IMT was based on the assumption that that 70% of power demand will be covered by the power supply from the Haryana State Electricity Board (HSEB) and remaining 30% will be covered by the captive power plant.

However, after the review of the power conditions around Gurgaon in this study, it was considered appropriate to have a complete and reliable power supply to the IMT through an isolated power supply system or a captive power plant.

(a) Balance between power supply and power demand

Although the Gurgaon district has been designated as a priority area for the power supply, however considering the power balance in Haryana state for the year 1994-95, the demand for power was 11,745 Gwh and the supply was only 91% of the demand at 10,640 Gwh. This gap between demand and supply could affect the power supply to the Gurgaon district.

(Source : "Current Energy Scene in India" June 1994, Center for Monitoring Indian Economy Pvt. Ltd.)

In addition, since the balance between demand and supply of power in future is not very clear, it is supposed by people in general that lack of electric power will occur in future in these areas where further industrialisation is expected.

(b) Stability of power supply

The results of the questionnaire survey carried out during the Master Plan Study also indicate that power interruption occurs frequently, i.e., 3 or 4 times per day, especially during the summer months, though the conditions in the Gurgaon area are rather good when compared to other parts of India.

(c) Comparison with other industrial estates

Almost all industries of large and medium size which are located around the Delhi area have a captive power plant as countermeasure for the frequent power interruption.

In NOIDA where large scale industrial development is taking place, had earlier planned to buy electric power from existing sources. However, because of frequent power interruptions, NOIDA is recently planning to construct a gas turbine based power plant. The IMT is being planned to have a higher or at least equal level of infrastructure compared to existing industrial estates.

(d) Participation of private sectors

The private sector has been recently permitted to participate in the power projects, and the private companies has shown keen interest for the IMT project.

(e) Utilization of natural gas

The planned captive power plant for the IMT will be gas turbine based power plant for which natural gas will be used as fuel.

The supply of natural gas is managed by Gas Authority of India Limited (GAIL), a public corporation and at present it is supplied from Bombay to the suburban areas of Delhi by a gas pipeline. The supply of natural gas is available in Haryana and the factory of Maruti Udyog Limited located in Gurgaon has its own power plant driven by natural gas fired turbine with a capacity of 20MW.

5.6 Telecommunication

5.6.1 Present Situation

(1) Status of Nearest Manesar Exchange

As of this date, there is no telephone exchange in operation at the candidate site. The nearest telephone exchange is the Manesar exchange (CDOT) which has the capacity of 256 Subscriber line.

(2) Telecom Facility in Gurgaon District

Gurgaon Main Exchange is of 13,000 lines capacity, and going to be expanded by more 5,000 lines. There are 3 remote exchanges, in Gurgaon area, which are connected with Main Exchange and controlled from the computer in Main Exchange. The PCM signals for control are processed through optical fiber cables.

(3) Main Links

Gurgaon Main Exchange is connected with Delhi and Bombay by optical fiber system. Accordingly, easy access to the international calls from the Gurgaon area can be realized, since the call is accessed through ground station for communication satellite in Bombay.

5.6.2 Future Plan

(1) Status of Nearest Manesar Exchange

A 512 line will be proposed in year 1994 - 1995. 1024 port will be installed in year 1997 - 1998.

(2) Telecom Facility in Gurgaon District

The demand for telephones in Gurgaon is about 16,000 as of this date. The department is planning to expand the capacity of more 5,000 lines during 1994-1995 in addition to the existing digital exchanger which has 13,000 lines capacity in Gurgaon Main Exchange.

(3) Access to Data Transmission Network

Access to Packet Switching service on the I-NET of the Department of Telecom and Gateway Packet Switching System of the Videsh Sanchar Nigam Ltd. (VSNL) and the Remote Area Business Message Network (RABMN), can be provided from any location.

5.6.3 Issues and Constraints

Telecommunication lines in IMT should be directly connected to the exchange in the Gurgaon Main Exchange, so that high reliability can be maintained on the line, considering the fact that advanced digital exchanging system is already installed in the Main Exchange and is connected with Delhi and Bombay by optical fiber main links.

Chapter 6

Investment Demand Survey

1998

1999



Chapter 6 Investment Demand Survey

An investment demand survey was conducted to identify Indian and overseas potential investors and the possibility of investment for the Industrial Model Town (IMT) in India using the statistical data, the results of questionnaire and interview survey. Also, this survey gathered possible future investment plans in the likelihood that investors would be interested in a project in India or such as the IMT, and identified the conditions which investors required.

6.1 Investment Demand Survey : Methodology

(1) Investment Demand Survey: Countries Sampled

The investment demand survey essentially sampled target populations from India, Japan, the United States, the United Kingdom, Germany and Singapore, because each country is a prominent investor in India and has myriad levels of experience in foreign investment, technology transfer agreements, and the availability of hard currency. Specifically, a summary of each country surveyed will follow below.

(a) India

Investment trends and investors' opinions regarding an industrial model town are key factors in determining the IMT project's success. Reliable partners are also fundamental requirements when foreign companies are planning to establish joint ventures or technology transfers. Collaboration with an Indian company appears necessary, regardless of whether a foreign partner holds a controlling investment share in the company or not. In view of this, a survey that describes the needs of Indian enterprises became essential. In addition, in order to project the future trends of foreign investment, the experience and opinions of foreign enterprises operating in India were surveyed.

(b) Japan, the U.S., the U.K., Germany and Singapore

Japan is recognized as a primary foreign investor country, but its investment to India is comparatively small. Given that Japanese capital and technology transfers to Southeast Asian countries have made beneficial economic and social contributions and provided substantial development in that region, it appears reasonable that such investments to India might also provide similar economic benefits. It is reported that India anticipates a similar economic impact through increased Japanese investment and technology transfers. Therefore, Japanese companies became a primary sample group for this survey.

The U.S., the U.K. and Germany rank as the primary investors to India for the past three years and are expected to be so in the future. In addition, Singapore is expected to increase the investment in India. Based on this assumption, these 4 countries are selected as a sample group.

(2) Methodology

The investment demand survey of the six countries were accomplished in three phases. The first phase consisted of shortened questionnaire forms selected from the detailed questions used in the second-phase questionnaire survey. The third phase survey was interviews.

The objective of the first phase survey is as follows:

- To obtain the maximum number of replies
- To increase the size of the sample population to ensure objective results.
- To ensure improved response rate for the second phase survey.

After examining the response of the first phase, enterprises which showed rather positive opinions regarding investments in India were selected as a purposeful sample for second phase survey. The detailed opinions of companies on investing in India were designed to obtained at the second phase survey.

Furthermore as the third phase survey, interviews were held to each company to evaluate the possibilities of investing in India and to obtain more detailed opinion. The statistical results of the companies' opinion to investing in India were obtained from the first phase simplified questionnaire, and the detailed requirements of the potential investors were analyzed from the second phase detailed questionnaires. Figure 6.1.1 shows the survey methodology and the procedure.

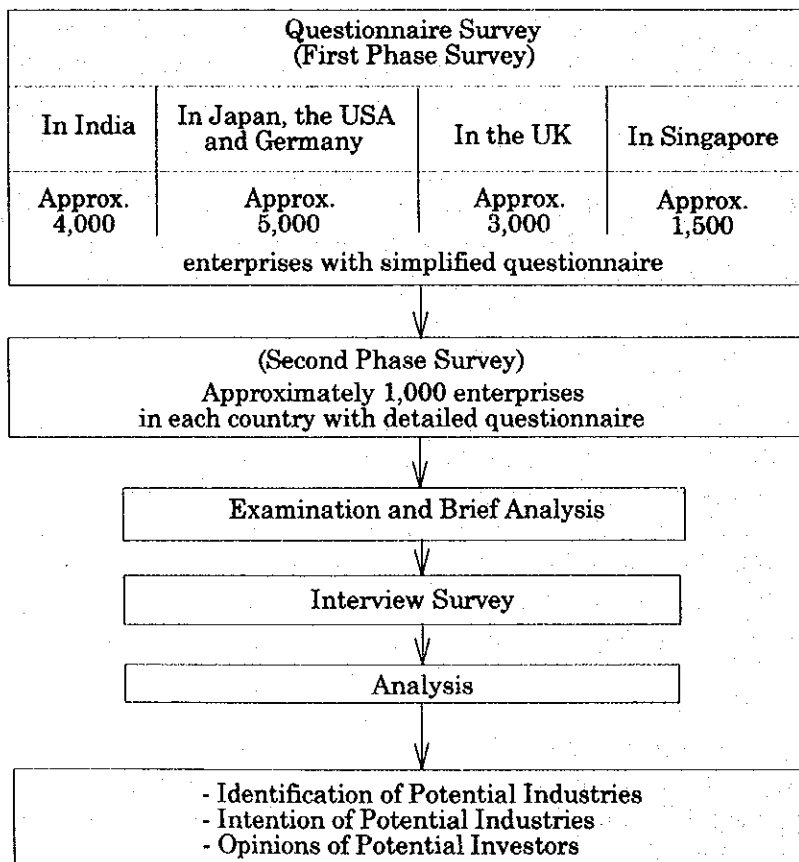


Figure 6.1.1 : Survey Methodology and Procedure

(3) Industries Surveyed

The industries surveyed are mainly in the manufacturing sector such as food processing, textiles, pulp and paper, chemicals, petroleum and coal, rubber and plastics, stone and clay products, metal and non-metallic products, machinery, electrical equipment, electronics, transport equipment and others. These industries are summarized in Table 6.1.1.

Table 6.1.1 : Details of Manufacturing Industry (1/3)

S I C	Short Title	
20	FOOD AND KINDRED PRODUCTS	201 Meat Products, 202 Dairy Products, 203 Preserved Fruits and Vegetables, 204 Grain Mill Products, 205 Bakery Products, 206 Sugar and Confectionery Products, 207 Fats and Oils, 208 Beverages, 209 Misc. Food and Kindred Products
21	TOBACCO PRODUCTS	211 Cigarettes, 212 Cigars, 213 Chewing and Smoking Tobacco, 214 Tobacco Stemming and Redrying
22	TEXTILE MILL PRODUCTS	221 Broadwoven Fabric Mills, Cotton, 222 Broadwoven Fabric Mills, Manmade, 223 Broadwoven Fabric Mills, Wool, 224 Narrow Fabric Mills, 225 Knitting Mills, 226 Textile Finishing, Except Wool, 227 Carpets and Rugs, 228 Yarn and thread Mills, 229 Miscellaneous Textile Goods
23	APPAREL AND OTHER TEXTILE PRODUCTS	231 Men's and Boys' Suits and Coats, 232 Men's and Boys' Furnishings, 233 Women's and Misses' Outerwear, 234 Women's and Children's Undergarments, 235 Hats, Caps, and Millinery, 236 Girls' and Children's Outerwear 237 Fur Goods, 238 Miscellaneous Apparel and Accessories 239 Misc. Fabricated Textile Products
24	LUMBER AND WOOD PRODUCTS	241 Logging, 242 Sawmills and Planing Mills, 243 Millwork, Plywood & Structural Members, 244 Wood Containers, 245 Wood Buildings and Mobile Homes, 249 Miscellaneous Wood Products
25	FURNITURE AND FIXTURES	251 Household Furniture, 252 Office Furniture, 253 Public Building & Related Furniture, 254 Partitions and Fixtures 259 Miscellaneous Furniture and Fixtures
26	PAPER AND ALLIED PRODUCTS	261 Pulp Mills, 262 Paper Mills, 263 Paperboard Mills, 265 Paperboard Containers and Boxes, 267 Misc. Converted Paper Products
27	PRINTING AND PUBLISHING	271 Newspapers, 272 Periodicals, 273 Books, 274 Miscellaneous Publishing, 275 Commercial Printing, 276 Manifold Business Forms, 277 Greeting Cards, 278 Blankbooks and Bookbinding, 279 Printing Trade Services

Table 6.1.1 : Details of Manufacturing Industry (2/3)

S I C	Short Title	
28	CHEMICALS AND ALLIED PRODUCTS	281 Industrial Inorganic Chemicals, 282 Plastics Materials and Synthetics, 283 Drugs, 284 Soap, Cleaners, and Toilet Goods, 285 Paints and Allied Products, 286 Industrial Organic Chemicals, 287 Agricultural Chemicals, 289 Miscellaneous Chemical Products
29	PETROLEUM AND COAL PRODUCTS	291 Petroleum Refining, 295 Asphalt Paving and Roofing Materials, 299 Misc. Petroleum and Coal Products
30	RUBBER AND MISC. PLASTICS PRODUCTS	301 Tires and Inner Tubes, 302 Rubber and Plastics Footwear, 305 Hose & Belting & Gaskets & Packing, 306 Fabricated Rubber Products, NEC, 308 Miscellaneous Plastics Products, NEC
31	LEATHER AND LEATHER PRODUCTS	311 Leather Tanning and Finishing, 313 Footwear Cut Stock, 314 Footwear, Except Rubber, 315 Leather Gloves and Mittens, 316 Luggage, 317 Handbags and Personal Leather Goods 319 Leather Goods, NEC
32	STONE, CLAY, AND GLASS PRODUCTS	321 Flat Glass, 322 Glass and Glassware, Pressed or Blown 323 Products of Purchased Glass, 324 Cement, Hydraulic 325 Structural Clay Products, 326 Pottery and Related Products, 327 Concrete, Gypsum, and Plaster Products, 329 Misc. Nonmetallic Mineral Products
33	PRIMARY METAL INDUSTRIES	331 Blast Furnace and Basic Steel Products, 332 Iron and Steel Foundries, 333 Primary Nonferrous Metals, 334 Secondary Nonferrous Metals, 335 Nonferrous Rolling and Drawing, 336 Nonferrous Foundries (Castings), 339 Miscellaneous Primary Metal Products
34	FABRICATED METAL PRODUCTS	341 Metal Cans and Shipping Containers, 342 Cutlery, Hand-tools, and Hardware, 343 Plumbing and Heating, Except Electric, 344 Fabricated Structural Metal Products, 345 Screw Machine Products, Bolts, Etc., 346 Metal Forgings and Stampings, 347 Metal Services, NEC, 348 Ordnance and Accessories, NEC, 349 Misc. Fabricated Metal Products
35	INDUSTRIAL MACHINERY AND EQUIPMENT	351 Engines and Turbines, 352 Farm and Garden Machinery, 353 Construction and Related Machinery, 354 Metalworking Machinery, 355 Special Industry Machinery, 356 General Industrial Machinery, 357 Computer and Office Equipment 358 Refrigeration and Service Machinery, 359 Industrial Machinery, NEC

Table 6.1.1 : Details of Manufacturing Industry (3/3)

S I C	Short Title	
36	ELECTRONIC & OTHER ELECTRIC EQUIPMENT	361 Electric Distribution Equipment, 362 Electrical Industrial Apparatus, 363 Household Appliances, 364 Electric Lighting and Wiring Equipment, 365 Household Audio and Video Equipment, 366 Communications Equipment, 367 Electronic Components and Accessories, 369 Misc. Electrical Equipment & Supplies
37	TRANSPORT- ATION EQUIPMENT	371 Motor Vehicles and Equipment, 372 Aircraft and Parts 373 Ship and Boat Building and Repairing, 374 Railroad Equipment, 375 Motorcycles, Bicycles, and Parts, 376 Guided Missiles, Space Vehicles, Parts, 379 Miscellaneous Transportation Equipment
38	INSTRUMENT AND RELATED PRODUCTS	381 Search and Navigation Equipment, 382 Measuring and Controlling Devices, 384 Medical Instruments and Supplies 385 Ophthalmic Goods, 386 Photographic Equipment and Supplies, 387 Watches, Clocks, Watchcases & Parts
39	MISCELL. MANUFACT. INDUSTRIES	391 Jewelry Silverware, and Plated Ware, 393 Musical Instruments, 394 Toys and Sporting Goods, 395 Pens, Pencils, Office, & Art Supplies, 396 Costume Jewelry and Notions 399 Miscellaneous Manufactures

Note : SIC is the abbreviation of Standard Industrial Classification (Executive Office of the President, Office of Management and Budget, U.S.A)

(4) Selection Procedure

The companies to be surveyed in each phase have been selected by the below procedure.

(a) First Phase Survey (Questionnaire)

- Decision of number of companies to be surveyed (4,000 in India, 5,000 in Japan / U.S. / Germany, 3,000 in U.K., 1,500 in Singapore)
- Classification of companies according to the 3 digit SIC code.
- Selection of upper 20 companies per each SIC code by total sales.
- Additionally, random sampling of other companies distributed among the code numbers.

(b) Second Phase Survey (Detailed Questionnaire)

- Selection of companies interested in India from the first Phase.
- Selection of companies according to investment possibilities in India from various sources.

(c) Third Phase Survey (Interviews)

- Selection of companies based on results of 1st and 2nd Phases.
- Selection of companies according to investment possibilities in India from internal sources. Companies with no replies to 1st and 2nd Phases have also been included.

6.2 Results of Survey

6.2.1 INDIA

(1) Results of Replies

Of all 4,187 companies surveyed in the 1st Phase, 460 have replied with a reply rate of 11.0%. The 2nd Phase survey was conducted on 1,026 companies including the respondents of the 1st Phase, but only 43 (4.2%) have replied. Interviews were carried out on the selected 33 companies from the 1st and 2nd Phase surveys.

Table 6.2.1 : Results of Questionnaires

Industry	1st Phase			2nd Phase			3rd Phase
	Mailed	Replied	Rate of Reply%	Mailed	Replied	Rate of Reply%	Interviewed
Food & Kindred Products	176	22	12.5	64	2	3.1	1
Tobacco Products	4	0	0.0	4	0	0.0	0
Textile Mill Products	355	39	11.0	77	1	1.3	2
Apparel & Other Textile	178	23	12.9	12	2	16.7	1
Lumber & Wood Products	239	13	5.4	11	0	0.0	0
Furniture & Fixtures	238	13	5.5	1	0	0.0	0
Paper & Allied Products	226	10	4.4	23	0	0.0	0
Printing & Publishing	8	3	37.5	5	0	0.0	0
Chemicals & Allied Products	284	54	19.0	132	7	5.3	8
Petroleum & Coal Products	95	9	9.5	21	1	4.8	0
Rubber & Misc. Plastics Products	222	29	13.1	62	5	8.1	2
Leather & Leather Products	264	25	9.5	16	1	6.3	0
Stone, Clay, & Glass Products	126	16	12.7	71	3	4.2	2
Primary Metal Industries	203	29	14.3	79	2	2.5	1
Fabricated Metal Products	240	17	7.1	45	1	2.2	0
Industrial Machinery	222	45	20.3	100	3	3.0	5
Electronic & Electrical Equipment	185	34	18.4	92	4	4.3	4
Transportation Equipment	123	23	18.7	77	3	3.9	5
Instruments & Related Products	241	31	12.9	39	5	12.8	1
Misc. Manufacturing Industries	398	22	5.5	12	0	0.0	1
Transportation & Public Utilities	160	3	1.9	78	3	3.8	0
Others	0	0	0	5	0	0.0	0
Total	4,187	460	11.0	1,026	43	4.2	33

(2) First Phase Survey Results (India)

(a) Experience in Joint Ventures with Foreign Companies

Of companies replied (460), 162 or 35.2% had experience in joint ventures with foreign companies.

By industry classification, the chemicals and allied products, the industrial machinery and equipment, the electronic & other electrical equipment, and the transportation equipment industries have had much experience in joint ventures.

(b) Experience in Technical Collaborations with Foreign Companies

Of the companies replied (460), 252 which constitute half had experience in technical collaborations with foreign companies.

By industry classification, the chemicals and allied products, the industrial machinery and equipment, and the electronic and other electrical equipment industries have had experience in technical collaborations with foreign companies.

(c) Possibilities of Joint Ventures and Technical Collaborations with Foreign Companies

Of the companies replied (460), 348 which constitute 75.7% consider the possibility of establishing joint ventures and technical collaborations with foreign companies. 21 companies (4.6%) consider the possibility of establishing only joint ventures, and 27 companies (5.9%) consider the possibility of establishing only technical collaborations while 23 companies (5%) consider neither joint ventures nor technical collaborations.

By industry classification, the textile mill products, the chemicals and allied products, the primary metal industries, the industrial machinery and equipment, and the electronic and other electrical equipment industries consider the possibility of establishing joint ventures and technical collaborations with foreign companies.

(d) Timing of Future Investment Plans

Of the companies replied (460), 216 which constitute half of the companies replied their future investment plans were within the next two years. 123 companies mentioned as within one year, and 31 companies replied as after three years.

(e) The IMT (IMT) in India

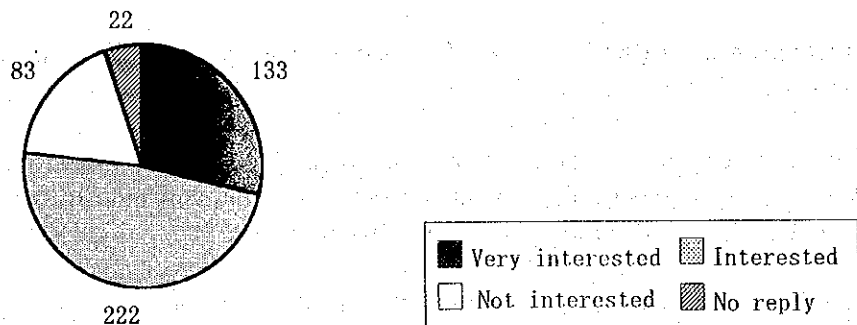
Of all replies (460 companies), 245 which constitute 53.3% knew about the plan of the IMT in India, and 197 which constitute 42.8% had no knowledge about the plan.

(f) The Possibility of Investment in Industrial Estate in India

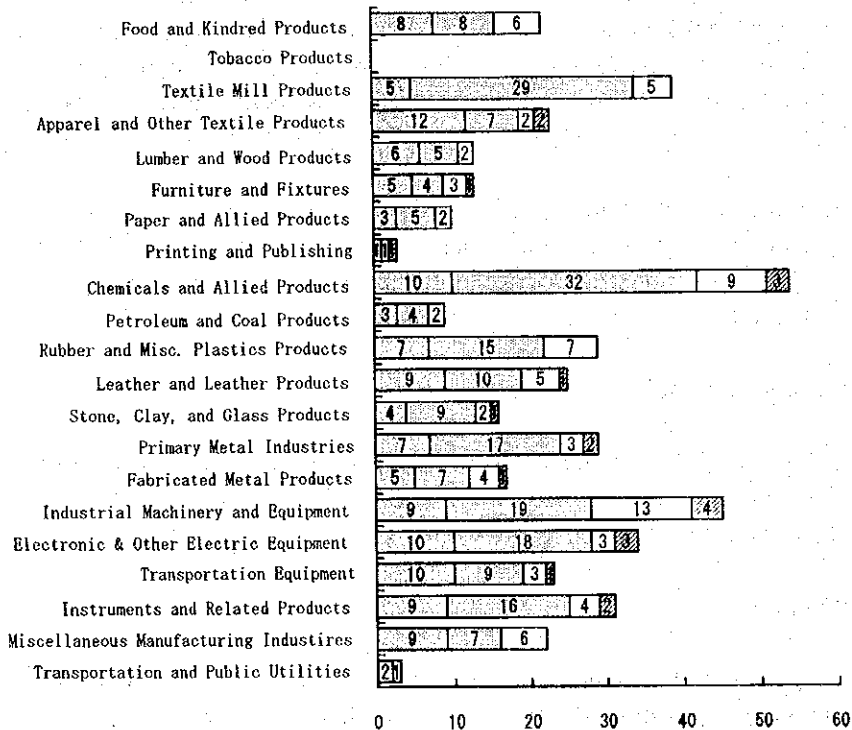
Of all replies (460 companies), 355 which constitute 77.2%, replied as either very interested or interested in the investment in the industrial Estate in India.

By industry classification, the textile mill products, the chemicals and allied products, the primary metal, the electronic and other electric equipment, and the instruments and related products industries had high rate of replies of "very interested" and "interested" in investment in the industrial Estate in India.

Overall



By Industry

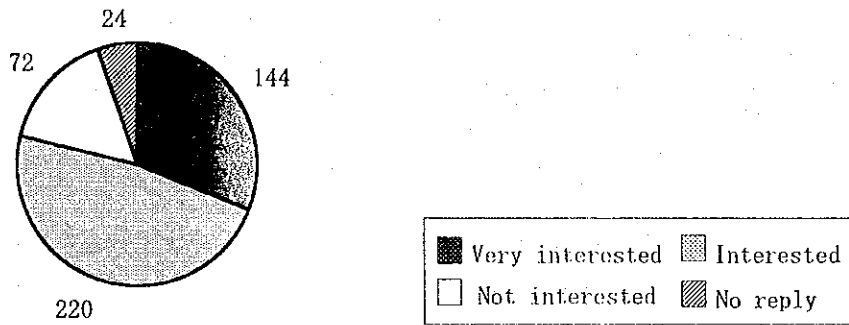


(g) The possibility of Joint-investment in the Industrial Estate with Other Foreign Companies

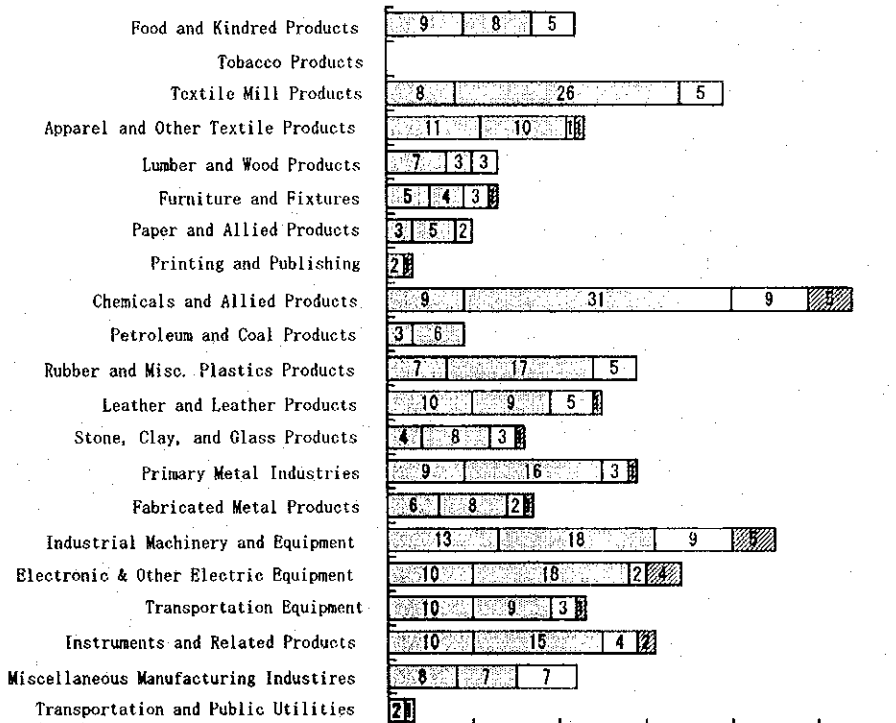
Of all replies (460 companies), 364 which comprise 79.1% replied as either very interested or interested in joint-investment in the industrial estate in India with other foreign companies.

By industry classification, the textile mill products, and the apparel and other textile products, the chemicals and allied products, the leather and leather products, the primary metal, the electronic and other electric equipment, and the instruments and related products industries had high rates of replies of "very interested" or "interested" in investment in the industrial estate in India.

Overall



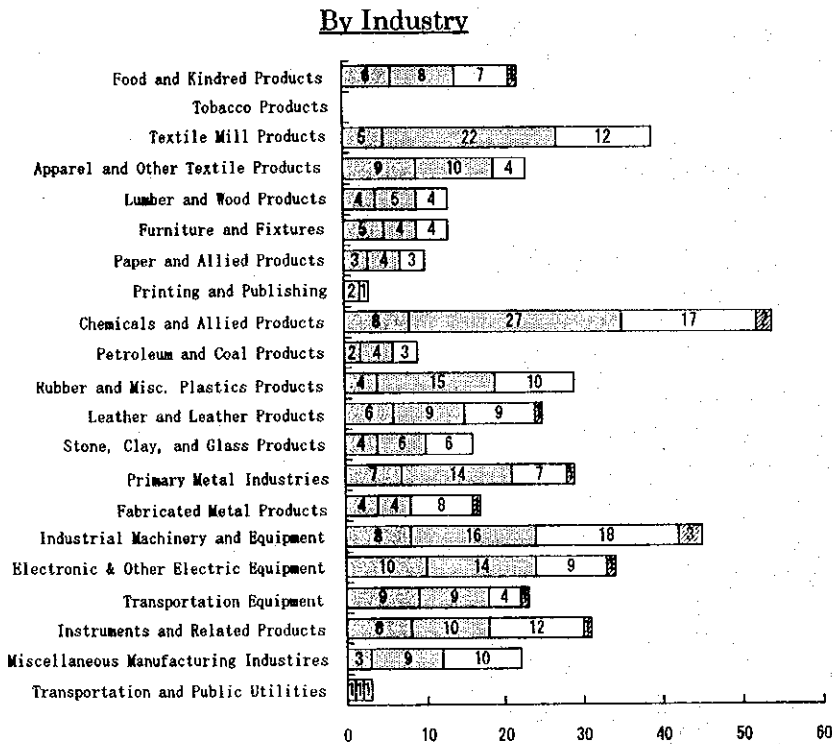
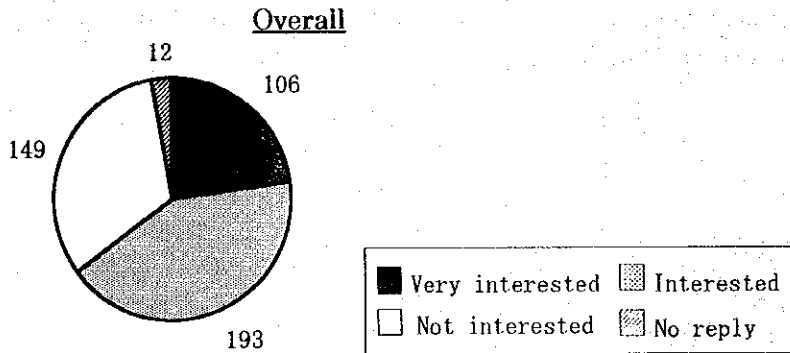
By Industry



(h) The possibility of Investment in the IMT in Gurgaon

Of all replies (460 companies), 299 which comprise 65.0% replied as either very interested or interested in the investment in the IMT in Gurgaon.

By industry classification, the primary metal, and the electronic and other electric equipment industries had high rate of replies of "very interested" and "interested" in investment in the IMT.



(3) Second Phase Survey Results (India)

Of 1,026 companies surveyed, 43 or 4.2% have responded.

(a) Level of Interests in the IMT

Of 40 companies, 23 were either very interested or interested in the IMT at Gurgaon, near New Delhi, and 10 companies (25%) had no interests.

By industry classification, food and kindred products, apparel and other textile products, chemicals and allied products, rubber and misc. plastics, leather and leather products, stone, clay and glass products, primary metal industries, industrial machinery and equipment, electrical and other electric equipment, transportation equipment and instruments related products industries showed interests.

(b) Potential Products for the IMT

The products of the 23 interested companies that would consider producing in the IMT are listed below.

Production Items

Industry	Products
Food and Kindred Products	<ul style="list-style-type: none">- Biscuits- Other health care products- Frozen food- Freeze dried/Spray dried food products- Cold storage facilities
Apparel and Other Textile Products	<ul style="list-style-type: none">- Premium grade textiles- Garments
Chemicals and Allied Products	<ul style="list-style-type: none">- Pharmaceuticals & health care
Rubber and Misc. Plastics	<ul style="list-style-type: none">- Rubber lining- Rubber rolls- Electronic parts- Flexible packaging- Other related products
Leather and Leather Products	<ul style="list-style-type: none">- Chemicals for leather- Agro-based products- R&D on commercial sale
Stone, Clay, and Glass Products	<ul style="list-style-type: none">- High-technology ceramics- Glass
Primary Metal Industries	<ul style="list-style-type: none">- Automotive components
Industrial Machinery and Equipment	<ul style="list-style-type: none">- Software- Chemicals

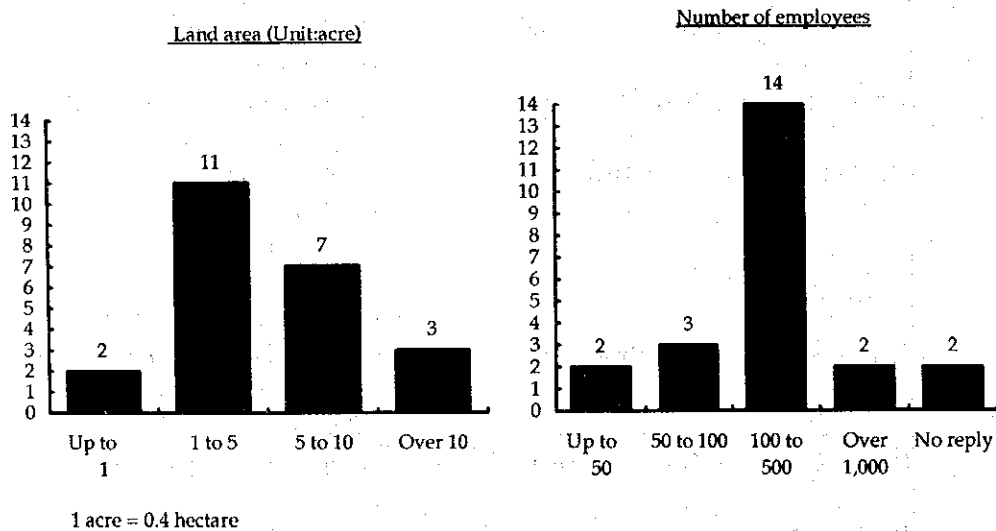
Electronic & Other Electric Equipment	- Electronic items
Transportation Equipment	- Precision fasteners - Automotive components - Automobiles - Plastics
Instruments and Related Products	- Machine tools - Miniature screws - Food products - Auto products - Measuring instrument - Electrical switch gears - Switches
Transportation and Public Utilities	- Software - Telecommunication products

(c) Selling of Products Manufactured in the IMT

Of the 23 interested companies, about half or 12 replied as 50 - 75% of the products from the IMT would be sold domestically rather than exported. The percentage of domestic sales was replied as 25 - 50% by 5 companies (21.7%), and below 25% and 10% by 2 companies each (8.7%).

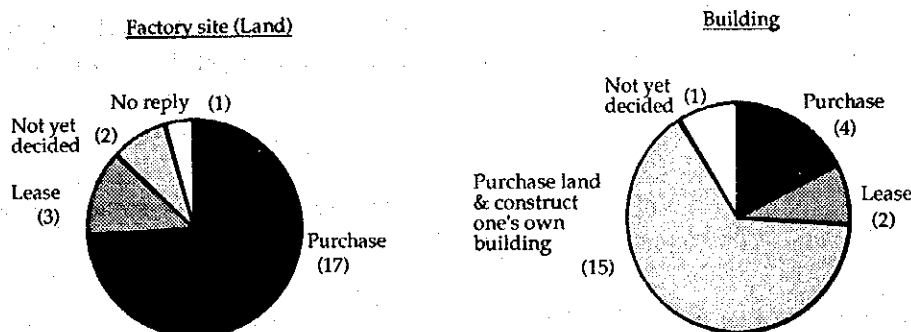
(d) Necessary Facilities in the IMT

The facility requirements of the 23 interested companies are listed below.



(e) Land/Buildings

Of the 23 interested companies, 17 (73.9%) preferred purchase of land, and 15 (65.2%) preferred the land to be leased.



(f) Expected Living Conditions and Recreational Facilities

The 23 interested companies regarded schools, Western-style medical facilities, Western-style living accommodations, vocational training facilities, shopping center, recreational facilities (pool, theaters, golf, tennis) as important items.

(g) Price of the IMT Estate

Of the 23 interested companies, 11 showed interests in participating in the IMT at twice the price (up to Rs 1,200/m²) than the price of certain existing neighboring industrial estates, provided the infrastructure is at international levels, and 11 said they would not be interested. The expected price by the "No" respondents was Rs 700 - 900.

(h) Type of Investments

Of the 23 interested companies, 11 (33.3%) preferred technical collaborations with local companies, and 10 (30.3%) preferred joint ventures with local companies with foreign investment of 51% or above, 4 companies (12.1%) were interested in joint ventures with less than 50% but above 26% foreign investment, and 3 companies (9.1%) were in 50% foreign investment.

(i) Joint Ventures Foreign Companies by Type

Of the interested in 23 companies, 13 companies (54.2%) preferred joint ventures with an independent and reputed local company. 7 companies (29.2%) preferred small to medium-sized local companies, and 3 companies (12.5%) preferred reputed local company within a major conglomerate.

(j) Others

1) Planned time for investment

40 (93%) of 43 replied companies had considered of investments. Of the 40 companies, 17 (42.5%) plan to make an investment within one year, and 14 (35%) plan within 2 years. Of the others, 5 companies plan after 2 years, 1 company in more than 2 years and 3 companies have yet decided on the time period.

2) The type of investment

Of 40 companies, 36 (90%) plan to make an investment in the same field, and 3 companies (7.5%) plan in different fields.

3) Amount of planned investment

Of 40 companies, 22 (about half) plan to invest within Rs 15 crores, (17.5%) between Rs 15 and 45 crores, 6 (15%) between Rs 45 - 90 crores, and 2 companies (5%) between Rs 90 - 150 crores. 2 companies (5%) plan to invest more than Rs 150 crores. (Rs 1 crores = Rs 10,000,000)

4) Method of investment

Of 40 companies, 23 or about half plan to invest in an already developed industrial town. 12 companies (30%) plan to secure the development of the site by themselves.

(4) Interview Results (India)

(a) Summary of Interview

In interviews, 31 of 33 replied companies (94%) showed interests in investing in the industrial estates in Gurgaon, a high percentage. This is probably because of the majority of companies with offices in New Delhi. Among them, 22 (67%) companies also showed interests in IMT. About 43% of the replies are assuming joint ventures with foreign partners probably to rely on foreign investments and/or technology to be able to afford the expensive investment to the IMT.

(b) Results of Interviews

Table 6.2.2 summarizes the results of interviews.

(c) Selection Items of Industrial Estate

The general important items for selection of industrial town are as:

- 1) governmental incentives
- 2) proximity to suppliers of raw materials
- 3) adequate infrastructure such as stable supply of electricity, communication system, and access to highways of suitable condition.
- 4) access to waste disposal facilities, public transportation, vocational training facilities, financial institutions and insurance companies.
- 5) access to schools, meeting rooms, medical facilities, park, hotels, sport facilities, recreational house and theater from the residential area of the industrial town.
- 6) public safety
- 7) preferential sales taxes and tariffs

Many investors consider the above items for the selection of the state and site.

(d) Comments on the IMT at Gurgaon

1) Benefits in investment in the IMT

- Outstanding manufacturing base in terms of location close to the northern part of India (near New Delhi), a major consumption area.
- Proximity to the international airport in New Delhi which is also the capital.
- Possibility of export from the Tughlabad port.

2) Requests to the IMT

- Early completion of the IMT is expected since Indian companies are likely to consider other industrial towns or develop the site independently if completion (15 companies (45%) prefer within two years) is delayed.
- Simplified procedures for investment approval by the Governmental agencies are expected to reduce time and costs incurred.
- Public safety in the IMT region is requested by some companies that are concerned with the safety level in the northern India.

Table 6.2.2 Results of Interviews (India)

SIC	Survey Result* Phase I II	Industrial estate	Gurgaon	IMT	Price (₹4U)	JV Possibility (%)	Tech. Coll. Possibility (%)	Product	Time Frame (Year)	Land (Acre)	Water (lit/day)	Power (KW)
1	20	-	VI	YES	YES	NA	100	Food products	~1	1-5	NA	NA
2	22	VI	YES	YES	NO	NA	NA	Pharmaceuticals	3~	~1	~10,000	~100
3	22	I	YES	NO	NA	25~	NA	Textile	2~	10~	NA	NA
4	23	I	NO	NO	YES	NA	100	Cotton garments	~1	5-10	~10,000	100
5	28	I	YES	YES	NA	76-100	100	Food & Plastics	2~	1-5	10,000-100,000	500-1,000
6	28	VI	NO	YES	NO	100	100	Chemicals	2~	10~	100,000-500,000	1,000~
7	28	I	YES	YES	NA	NA	NA	Coating	2~	10~	10,000-100,000	1,000~
8	28	I	NO	YES	NO	100	NA	Construction	1-2	10~	500,000~	10,000~
9	28	I	YES	YES	NA	26-50	NA	Chemicals	NA	~1	~10,000	100-500
10	28	I	YES	YES	NO	51-75	26-50	Electronics	3~	10~	NA	NA
11	28	I	NO	NO	NA	NA	51-75	Devices	NA	NA	NA	NA
12	28	VI	YES	YES	NA	NA	100	Batch	1-2	~1	10,000-100,000	500-1,000
13	30	VI	YES	YES	YES	100	NA	Telecommunications	~1	10~	~10,000	1,000~
14	30	I	YES	YES	NO	51-75	51-75	Rubber linking	2~	1-5	10,000-100,000	500-1,000
15	32/23	VI	YES	YES	YES	NA	26-50	Juice products	1-2	NA	NA	NA
16	32	-	VI	YES	YES	100	100	Ceramics	2~	10~	~10,000	1,000~
17	39/20	I	YES	YES	NO	NA	100	Agro tech	1-2	5-10	NA	1,000~
18	35	I	NO	NO	NA	NA	NA	Industrial equipment	NA	NA	NA	NA
19	35	I	YES	YES	NO	100	100	Telecommunications	1-2	NA	NA	NA
20	35	VI	NO	YES	NA	100	100	Software	2~	NA	NA	NA
21	35	I	YES	YES	NA	26-50	26-50	Security devices	2~	1-5	NA	~100
22	35	VI	YES	YES	NO	51-75	NA	Software	2-3	1-5	NA	NA
23	36	I	YES	YES	NO	NA	NA	Telecom software	3~	1-5	10,000-100,000	1,000~
24	36	I	YES	YES	NO	NA	NA	Existing line	2-4	5-10	10,000-100,000	100-500
25	36	VI	YES	YES	NO	51-75	51-75	Electrical appliances	1-2	10~	10,000-100,000	~1,000~
26	36	-	I	NO	YES	51-75	51-75	Converters	1-2	5-10	NA	NA
27	37	I	YES	YES	NO	NA	51-75	Fasteners	~1	5-10	10,000-100,000	NA
28	37	VI	YES	YES	NO	100	NA	Auto components	1-2	5-10	NA	NA
29	37	I	YES	YES	YES	NA	NA	Auto components	1-2	1-5	NA	NA
30	37	VI	YES	YES	NO	100	100	Automobile	3-4	100	NA	NA
31	37/30	VI	YES	YES	NO	NA	76-100	Plastics for auto	1-2	1-5	NA	1,000~
32	38	I	YES	YES	YES	76-100	76-100	Machine tools	1-2	~1	NA	NA
33	39	VI	YES	YES	YES	100	NA	Shoe polish	3-5	NA	NA	NA

Note * : VI ... (Very interested in investing to IMT)
I ... (Interested in investing to IMT)

6.2.2 JAPAN

(1) Results of Replies

The number of mailed questionnaires and replies by industry of 1st and 2nd Phase survey, as well as that of interviews are shown below in Table 6.2.3.

Table 6.2.3 : Results of Questionnaires

Industry	1st Phase			2nd Phase			3rd Phase
	Mailed	Replied	Rate of Reply%	Mailed	Replied	Rate of Reply%	Inter-viewed
Heavy Construction, ind. buildings				9	2	22.2	1
Food & Kindred Products/ Tobacco Products	365	57	15.6	42	7	16.7	2
Textile Mill Products	360	56	15.6	35	4	11.4	1
Apparel & Other Textile	200	28	14.0	6	2	33.3	0
Lumber & Wood Products	120	13	10.8	0	0	—	0
Furniture & Fixtures	100	11	11.0	3	0	0.0	0
Paper & Allied Products	75	9	12.0	5	1	20.0	0
Printing & Publishing	140	18	12.9	3	0	0.0	0
Chemicals & Allied Products	185	33	17.8	80	10	12.5	2
Petroleum & Coal Products	137	16	11.7	1	1	100.0	0
Rubber & Misc. Plastics	280	60	21.4	15	2	13.3	1
Leather & Leather Products	200	19	9.5	4	1	25.0	0
Stone, Clay, & Glass Products	250	38	15.2	35	4	11.4	2
Primary Metal Industries	440	74	16.8	47	4	8.5	3
Fabricated Metal Products	360	72	20.0	51	11	21.6	3
Industrial Machinery & Equipment	270	67	54.8	122	14	11.5	3
Electronic & Other Electrical Equipment	450	100	22.2	123	20	16.3	15
Transportation Equipment	200	46	23.0	77	10	13.0	4
Instruments & Related Products	350	60	17.1	43	4	9.3	4
Misc. Manufacturing Industries	240	30	12.5	29	5	17.2	2
Transportation & Public Utilities				6	0	0.0	0
Trading Company	50	18	36.0	52	5	9.6	0
Automotive Dealers & Service Stations				1	0	0.0	0
Finance, Insurance, & Real Estate				19	0	0.0	0
Services				2	0	0.0	0
Others				6	2	33.3	0
Total	4,772	825	17.3	816	109	13.4	43

Of all 4,772 companies surveyed in the 1st Phase, 825 have replied with a rate of reply of 17.3%. Of the companies replied, 188 companies or 22.8% had 1,000 or more of employees, 297 companies or 36.0% had employees between 300 and 1,000, and the remaining 331 companies or 40.1% had employees below 300. Regarding sales revenue, 442 companies or 53.6% had annual sales of ¥10 billion or more, 244 or 29.58% had sales above ¥2 billion but less than ¥10 billion, and the remaining 119 or 1.4% had sales

of ¥2 billion or less. The 2nd Phase survey was conducted on 816 companies including the 70 interested companies from the 1st Phase and from internal source, and 109 or 13.4% replied. Interviews were carried out on 43 companies from the results of the 1st and 2nd Phase surveys and internal source.

(2) Investment requirements and Evaluation of India

The 109 companies were asked about the importance of the following 6 items - Political and Social Environment, Economic Conditions and Governmental Policies, Geographic location, Market, Resources, Infrastructure, which include subcategories. The most important item for both foreign investment in general and in India was the political and social environment. The least important item was the geographic location. The importance in foreign investment are drawn in solid lines and that in India is drawn in dotted lines in the next chart. Items with dotted lines beyond solid lines are those with higher importance for India, and they are economic conditions and infrastructure.

The 6 major items were broken into the following subcategories.

Political and Social Environment:	Political stability Public order and safety Labor union activities
Economic Conditions & Governmental Policies:	Stable economic situation Consistency in Policies Bureaucracy Facilitated (Simplified) administrative procedures Tax incentives Other incentives
Geographic Location:	Climatic Condition Distance from Japan Distance from Export market
Market:	Size of local markets Proximity to local markets Access to overseas markets
Resources:	Quality of labor Cost of labor Availability of skilled labor Supporting industries Availability of raw materials Availability of parts
Infrastructure:	Stable power supply Water supply and effluent treatment Telecommunication facilities Airport

Port facilities
 Rail transport
 Road transport

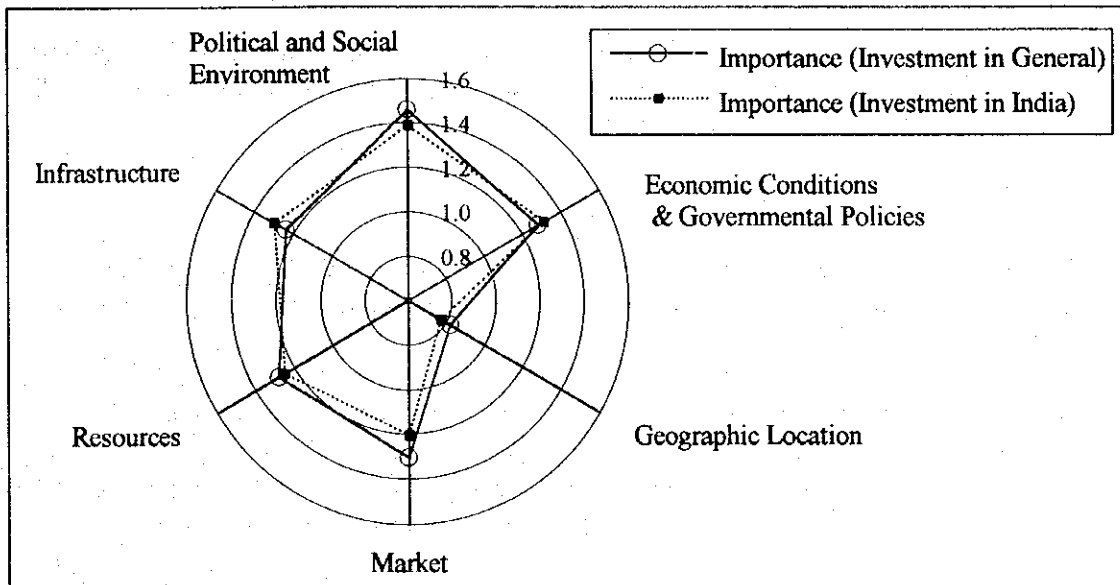


Figure 6.2.1 : Investment Requirements

(3) First Phase Survey Results (Japan)

(a) Developments in overseas business

Of the 825 replied companies, 453 or 54.9% had already expanded overseas business or had experience technical collaborations with other companies.

By industry classification, the apparel and other textile products, the furniture and fixtures, the chemicals and allied products, and the rubber and miscellaneous plastic products industries had higher rates of experience in overseas business, but most of the lumber and wood products and the printing and publishing industries had no experience.

(b) Plans of Overseas Investments

Regardless of prior experience in overseas expansion or overseas technical collaborations, 250 companies, which constitute 30.3% of the 825 replied companies had plans of overseas investments.

By industry classification, trading companies had high rates of plans of overseas investment. The printing and publishing, the petroleum and coal products and the leather and leather products industries mostly replied as no plans in overseas investment.

(c) Plans of investment in Southeast or South Asia

182 companies which constitute 72.8% of 250 replied companies with investment plans had plans in Southeast or South Asia.

(d) Attractiveness of the Indian market

Of 825 replied companies, 267 which constitute 32.3% noted the Indian market as attractive.

By industry classification, the chemicals and allied products, the industrial machinery and equipment, the electronic and other electric equipment industries and trading companies regarded India as an attractive market.

(e) Possibilities in Investments in India

Of the 825 replied companies, 70 or 8.5% have considered investments in India. Trading companies had higher replies of having considered investment in the Indian market.

(f) Possibilities of a Joint Ventures or Technical Collaborations with India

Of the companies replied (825), 180 or 21.8% consider joint venture or technical collaborations with India if they received such proposal from India.

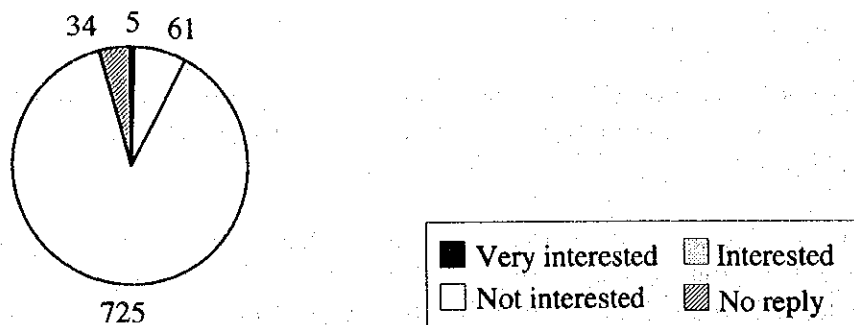
By industry classification, the petroleum and coal products, the stone, clay and glass products, the industrial machinery and equipment industries and trading companies would consider joint ventures or technical collaborations with India.

(g) The Possibility of Investment in the Industrial Estate in India

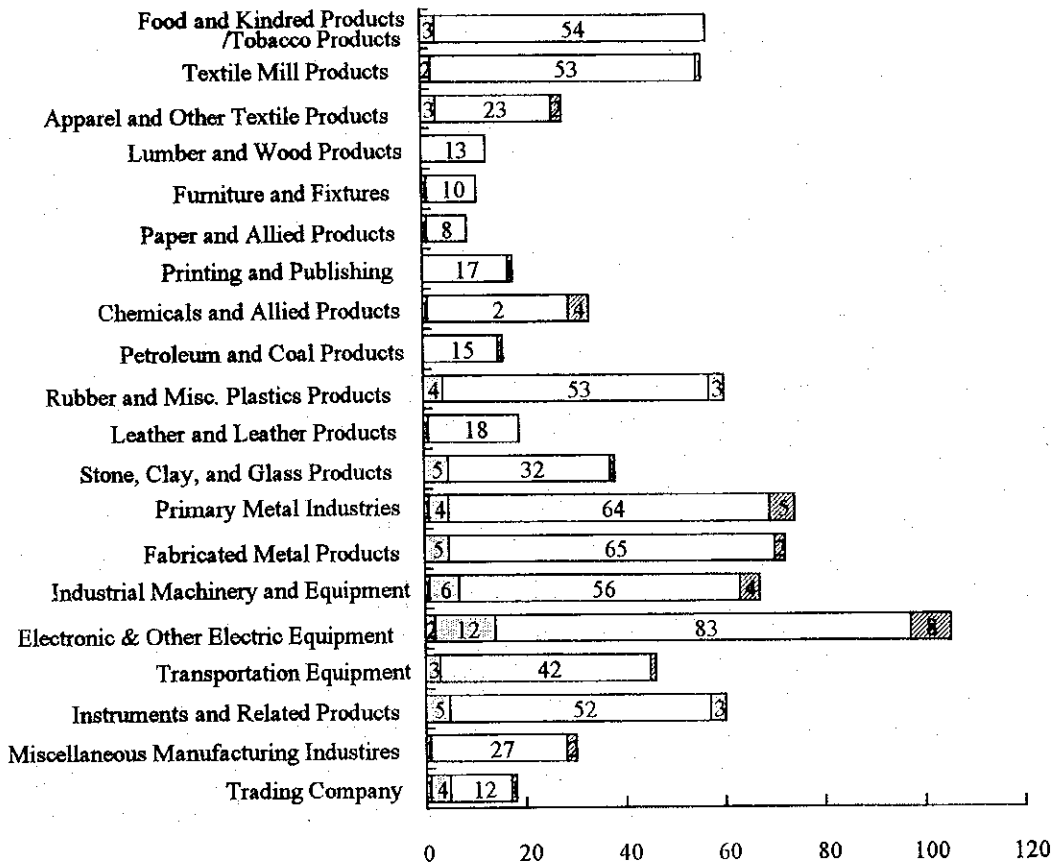
Of all replies (825 companies), 66 which comprise 8.0% replied as either very interested or interested in the industrial estate in India.

By industry classification, the stone, clay and glass industry, the electronic and other electric equipment industry and trading companies had high rates of replies of "very interested" or "interested" in investment in the industrial estate in India.

Overall (Survey Results in Japan)



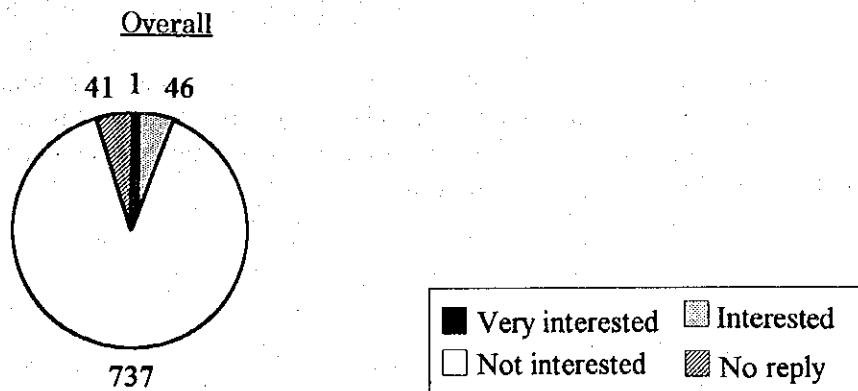
By Industry



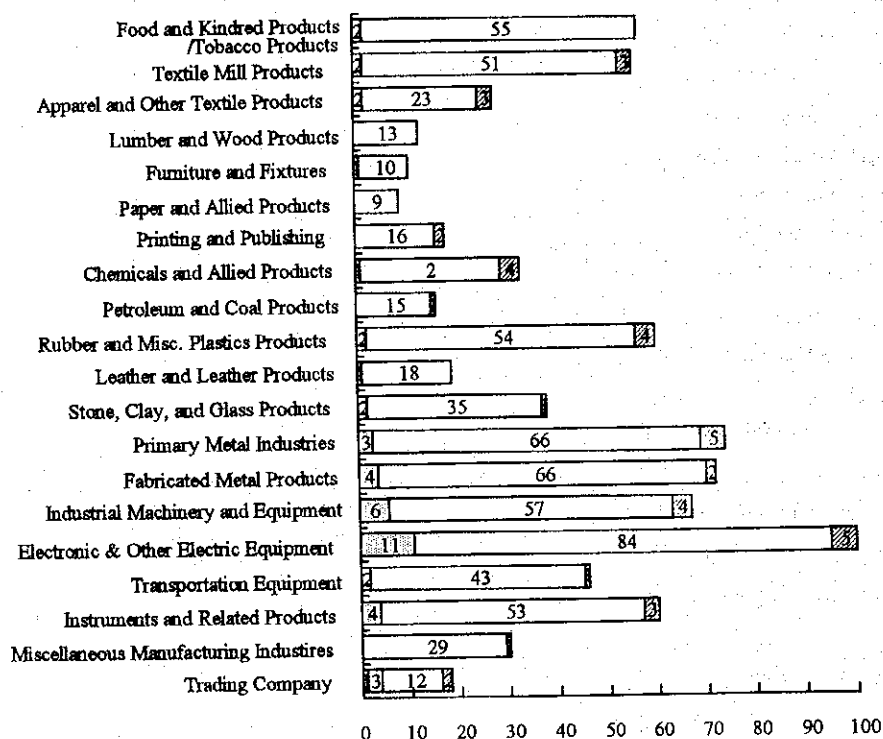
(h) The Possibility of Investment in the IMT at Gurgaon (located near New Delhi)

Of all replies (825 companies), 47 which comprise 5.7% replied as either very interested or interested in the investment in the IMT at Gurgaon.

By industry classification, the electronic and other electric equipment industry had high rates of replies of "very interested" or "interested" in the investment in the IMT at Gurgaon.



By Industry



(4) Second Phase Survey Results (Japan)

Of 816 companies surveyed, 109 or 13.4% have responded.

(a) Level of Interests in the IMT in India

Of 35 companies, 11 (31.4%) were either very interested or interested in the IMT at Gurgaon, near New Delhi, and 18 companies (51.4%) had no interests in the IMT.

By industry classification, construction companies, food and tobacco manufacturers, apparel and other related products, chemical and allied products, rubber and misc. plastics, stone, clay and glass products, transportation equipment and instruments related products, other products and trading companies showed interests.

(b) Potential Products for the IMT Facilities

The products of the 11 interested companies that would consider producing in the IMT are listed below.

Production Items

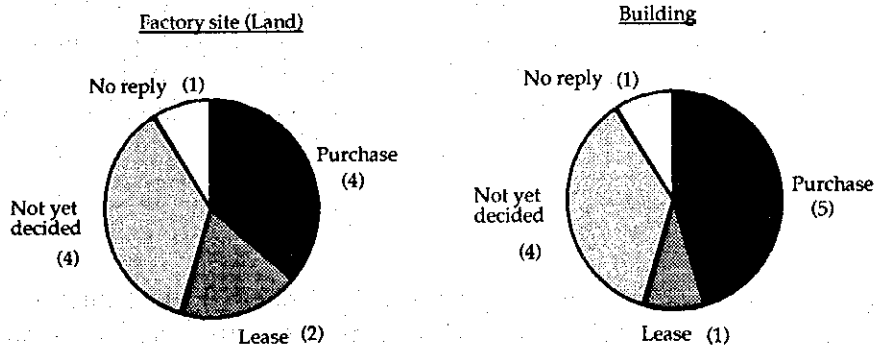
Industry	Products
Chemicals and Allied Products	- Plastic materials and resins
Rubber and Misc. Plastic Products	- Tires and tubes for automobiles
Stone, Clay, and Glass Products	- Basic PC - Concrete pipe - Steel pipe
Transportation Equipment	- Automobiles - Motorcycles
Instruments and Related Products	- Copy machine - Facsimile equipment - Disposable products
Miscellaneous Manufacturing Industries	- Fasteners

(c) Selling of Products Manufactured in the IMT

Of the 11 interested companies, 3 or 27.3% replied as more than 75% of the products from the IMT would be sold domestically rather than exported. 2 companies (18.2%) replied to each of all domestic sales, all exports, and 25 - 50% domestic sales.

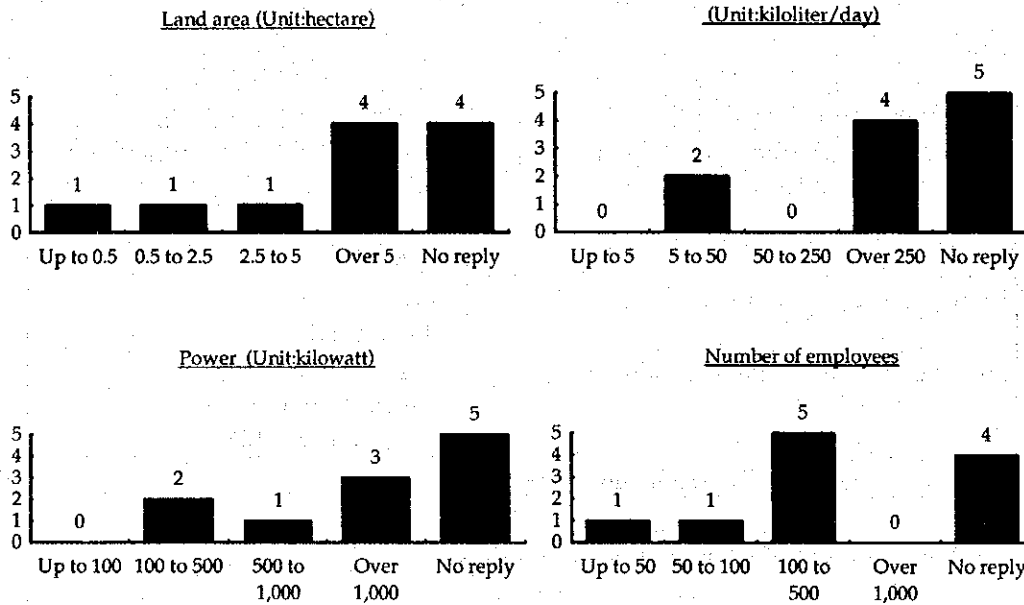
(d) Land/Buildings

Of the 11 interested companies, 4 (36.4%) preferred purchase of land, and 5 (45.5%) preferred the land to be leased. 4 companies (36.4%) were undecided on both questions.



(e) Necessary Facilities in the IMT

The facility requirements of the 11 interested companies are shown below.



(f) Expected Living Conditions and Recreational Facilities

The 11 interested companies regarded living accommodations, shopping center, medical facilities, Japanese schools, recreational facilities (golf, tennis, pool) and vocational training facilities as important items.

(g) Rent of the IMT Estate

Of the 11 interested companies, 5 showed interests in participating in the IMT at twice the price (4,000 yen/m²) than the price of certain existing neighboring industrial estates, provided the infrastructure is at international levels, and 3 said they would not be interested. The expected price of the "No" respondents was 2,000 yen/m² by 2, and 1,500 yen/m² by 1.

(h) Type of Investments

Of the 11 interested companies, 5 companies (33.3%) preferred joint ventures with more than 51% foreign investment, and 4 (26.7%) preferred 100% foreign investment. 2 companies (13.3%) preferred collaborations and 2 companies (13.3%) preferred licensing arrangement with local companies.

(i) Local Companies by Type

Of the 11 interested companies, 5 companies (41.7%) preferred independent reputed large-sized companies. 2 companies (16.7%) preferred small to medium-sized local

companies and 2 companies (16.7%) preferred reputed local companies within a major conglomerate.

(j) Others(Investments to India)

1) Planned time for investments

35 (32.1%) of 109 companies had considered of investments in India. Of 35 companies, 6 (17.1%) plan to set up in India within 1 year, 3 (8.6%) plan to set up within 2 years, and 1 (2.9%) in after 2 years. 20 companies or above half have yet decided on the time period.

2) Type of investment in India

Of 35 companies, 28 (80%) plan to set up in the same field as in Japan, and only 1 (2.9%) plans in a different field.

3) Amount of planned investment

Of 35 companies, 14 (40%) plan to invest within 500 million yen, 6 (17.1%) between 500 million to 1.5 billion yen, 1 (2.9%) plans between 3 to 5 billion yen, and 1 plans more than 5 billion yen.

4) Method of investment

Of 35 companies, 16 or about half plan to invest in developed industrial town. 10 companies (28.6%) plan to secure and develop the site by themselves.

(5) Interview Results (Japan)

(a) Summary of Interview Results

Interviews of the potential Japanese investors that replied as interested in investment in India or the Industrial Model Town (IMT) showed that most merely needed general information about investment in India. Japanese investors generally lack information and knowledge of India and are short of time and expense in obtaining information on investment in India, and hence investment in India will be behind China and Vietnam.

Most companies in Japan consider investments in India to "develop and secure the domestic market", and only few consider "exports from India in the future".

Investment in India can be induced by

1) Shifting from export to India to local production

2) Requests from customers and parent companies

3) Shifting manufacturing site to India from ASEAN countries because of inflated labor.

Many of the companies interested in India have had previous experience such as exporting products to India, technical collaborations, license arrangement and forming a joint venture with local companies.

For types of future investments, the Japanese investors tend to avoid risks such as by limiting the amount of investment. If the investment risk increases in the order from

exporting license, technology collaborations, financial cooperation, joint venture formation to 100% subsidiary company foundation, the degree of risk between technical collaborations and financial cooperation is very high. For companies with joint ventures in India, expansion of business activities will mainly be through the existing joint venture operations.

Most of the interviewed companies already have some form of production base (manufacturing subsidiaries, joint venture companies, collaborating plants, etc.) in the NIES and ASEAN countries. These companies, in many cases, give precedence to China, Indonesia and Vietnam over India as a prominent investment target in the future (reflecting poor perception of India among the respondents in addition to lack of sufficient information).

Among the companies currently planning investments in India, most are either searching the site individually or through partners in India. Companies with past difficulties in investment in India tend to set up fully owned subsidiaries and towards industrial towns with well prepared infrastructure. In conclusion, a considerable effort will be needed to promote the IMT at Gurgaon.

(b) Results of Interviews

Table 6.2.4 shows the results of interviews.

(c) Considerations for investments in India and the IMT at Gurgaon

1) Main considerations to be examined for investments in India

The main provisions in investments in India by the Japanese companies are listed below.

a) Reduction of tariffs

At present, raw materials and parts, and manufacturing facilities are levied with relatively high import tariffs, making India not only as in unsuitable exporting base but also limiting the market only to higher income brackets by increased domestic selling prices reflecting high import tariffs. Therefore substantial reduction in tariffs is strongly requested.

b) Improvements in living conditions and recreational facilities

Most of the interviewed personnel represented the Asia region, and common requests such as improved medical facilities, school curricula and stable power supplies were raised.

c) Improvements in quality and morality of workers

There is a common recognition that India has many bright engineers with mathematical background, but objections are raised to morality and productivity of plant operators. Many firms in India are run by families, preventing the growth of the middle management. Job-hopping is observed among the middle management.

Table 6.2.4 Results of Interviews (Japan - 1/2)

SIC	Survey Result*		Investment Possibility(%)	Time Frame (Year)	Industry	Capital (\$ Mil.)	Product 1	Product 2	Land (ha)	Employees	Land Price (\$/sq.meter)
	Phase I	Phase II									
1	16	-	50	10	Same	~5			NA	~50	NA
2	20	I	10	~5	Same	NA	Indian processed foods	Various processed foods	NA	50~100	NA
3	20	-	10	10	NA	NA			NA	NA	NA
4	22/28	I	10	~5	NA	NA	Fishing nets	Plastic sheets	0.5~2.5	100~500	NA
5	28	-	10	10	Same	NA	Acetic acid derivatives	Cellulose	NA	NA	NA
6	28	I	100	50	Same	5~15	Injection molding resins	Resins for inks	0.5~2.5	NA	NA
7	30	-	75	10	Same	30~50	Tires	Auto tubes	5.0	100~500	1,500
8	32	-	10	10	Same	~5	Cement products	Cast iron	0.5~2.5	50~100	NA
9	32	-	10	10	Same	5~15	PC Pile	Concrete conduits	2.5~5.0	100~500	2000
10	33	I	50	50	Same	5~15	Transmission cables	Communication cables	5~	100~500	2000
11	33/34	-	75	10	NA	~5	Magnets	Auto parts	0.5~2.5	100~500	1800
12	33	I	50	10	NA	NA	Transmission cables	Wire harness	0.5~2.5	100~500	3000
13	34	I	10	~5	Same	~5	Blinds	Doors	NA	50~100	NA
14	34/36	I	10	10	Same	~5	Household cooking appliances	Ironing	~0.5	50~100	NA
15	34/39	-	100	10	Same	5~15	Zippers	Cast iron	5.0	100~500	NA
16	35	I	10	10	Same	NA	Bronze materials		0.5~2.5	100~500	2000
17	35	I	50	10	Same	~5	Synthetic fibers product equipment		NA	1000~	2000
18	35/36	I	10	10	Same	NA	Office air conditioners	Household air conditioners	NA	100~500	NA
19	36	-	10	~5	Same	NA	Step motors	Semiconductor chips	NA	NA	2000
20	36	I	10	~5	Same	NA	Coaxial connectors	Multiple connectors	NA	100~500	NA
21	36	I	10	~5	Same	~5	VTR	Audio visual equipment	2.5~5.0	100~500	3000
22	36	I	10	10	Same	~5	Automatic control devices	Cashiers	NA	1000~	2500
23	36	-	50	~5	Same	NA	Electricity generators	Controllers	~0.5	100~500	2000
24	36	I	100	10	Same	~5	Speakers		0.5~2.5	100~500	2000
25	36	I	10	~5	Same	NA	Fluorescent light bulbs		NA	NA	2000
26	36	I	10	10	Same	5~15	Resistors	Condensers	2.5~5.0	1000~	2000
27	36	I	50	10	Same	NA	Pocket-sized callers	.o.a.w	5.0~	1000~	NA
28	36	-	75	50	Same	5~15	Printers	Watches	NA	NA	NA
29	36/35	I	50	10	NA	NA	Calculators	Electronic parts	NA	NA	NA

Note * : VI ... (Very interested in investing to IMT)

I ... (Interested in investing to IMT)

N ... (Not interested in investing to IMT)

Table 6.2.4 Results of Interviews (Japan - 2/2)

SIC	Survey Result*		Investment Possibility(%)		Time Frame (Year)	Industry	Capital (\$ Mil.)	Product 1	Product 2	Land (ha)	Employees	Land Price (\$/sq.meter)
	Phase I	Phase II	India	Gurgaon								
30	-	-	50	10	NA	Same	5~15			NA	NA	NA
31	N	-	100	~5	~1	Same	~5	Auto lights		NA	NA	NA
32	N	-	75	10	1~2	Same	5~15	Household appliances	Heavy industrial appliances	NA	NA	NA
33	-	-	75	25	~1	Same	~5	Audio visual products	Synthetizers	0.5~2.5	100~500	4,000
34	37/35	-	10	10	NA	Same	~5	Small-sized injectors		0.5~2.5	50~100	3000
35	37	N	-	10	NA	Same	~5	Trucks	Bus	NA	NA	NA
36	37	I	I	75	50	Same	50~	4-wheeled automobiles	Motorcycles	~0.5	100~500	2000
37	37	-	-	75	50	Same	50~	Automobiles		.50	1,000	NA
38	38	I	I	75	50	Same	~5	Syringes	Medical storing equipment	NA	NA	2000~2500
39	38	N	-	10	~5	Same	~5	Watches	Printers	~0.5	50~100	1900
40	38	I	-	50	10	Same	~5	Plastic lenses		~0.5	~50	NA
41	38	-	-	25	10	Same	5~15	Clocks		NA	NA	NA
42	39	-	-	10	~5	NA	NA	Ball point pens	Mechanical pencils	NA	NA	NA
43	39	-	-	10	10	Same	~5			NA	NA	NA

Note *: VI ... (Very interested in investing to IMT)

I ... (Interested in investing to IMT)

N ... (Not interested in investing to IMT)

d) Improvements in infrastructure

Stable power supply, and adequate communication facilities (telephone and fax) are a prerequisite for investments.

e) Difficulties in closing of firms and termination of employment

Many prefer flexibility in production base and labor adjustments to respond to changes in managerial environment, but the "Exit Policy" does not meet the needs.

f) Difficulties in supplies of raw materials and parts from local markets

Many of the companies planning to launch to the domestic market prefer to increase domestic supply of raw materials and parts also because of high import tariffs. The processing and assembling industry using parts of high quality and technology would first use imported parts from Japan until the growth of supporting industries reaches the level of domestic supplies.

However, many companies prefer Japanese companies as suppliers of parts due to higher technology and language, and improved quality of raw materials and high growth of supporting industries are necessary.

g) Others

Other comments are below.

Legislation, hygiene, information for selecting business partners, wage level of skilled workers, local funding sources, stability of domestic currency and preferential taxation have been raised.

2) Comments to the IMT

The comments to the IMT in Gurgaon are raised in the below order.

a) Distant from Ports

Many interviewed companies mostly use barge for importing raw materials and parts and exporting products, Gurgaon is behind Bombay and Madras in terms of accessibility to ports. To attract Japanese companies to the IMT in Gurgaon, notable features such as

- Industrial infrastructure such as supply of electricity, water and adequate communication system.
 - Social infrastructure such as accommodations, stores and recreational facilities.
 - Competitive land price
- need to be specified to distinguish from other industrial towns.

b) Others

- Gurgaon has an advantage in terms of labor from its location to the capital New Delhi, while the workers of industrial towns normally live in a small area, inducing inflated wages and head-hunting.
- Prices of some raw materials in India are significantly higher than those of ASEAN countries probably reflecting the high tariff because the materials are imported. It is necessary to reduce tariffs to the level comparable to other countries promoting foreign investment.

- The land price of the IMT in Gurgaon is important to companies of the instruments and related products industry that require much plant area. The land price of the IMT is to reflect the level of the supporting industries and infrastructure.

(d) Specific comments to the IMT by the companies in Japan

The interviewed companies were 43 which include the 14 not include in the respondents of the 1st and 2nd-Phase surveys but selected to be interviewed base don internal source. The specific comments are summarized as below.

1) The common comments to India

- The growing large-sized market and the estimated middle-class population of 200 million.
"about 60 million people are known with annual income of ¥2.5 million and above, and the demand in vehicle is growing rapidly based on 50,000 ordered vehicles and 6 months of waiting from order to delivery.
Investment announcements in India by the U.S. and European auto manufacturers shows the high potential of the future market.
- Stable legal system and use of English as a native language
"India is more reliable than China in terms of legal policies and law enforcement. Negotiations and agreements in English can be effectively handled by the employees."
- The congressional democratic society with freedom of speech
"The political stability can be assumed to some extent, and proper action and discussion in solving problems are appreciated among the developing countries."
- Stable society based on higher education and abundant well-educated personnel.
"These people may be the negotiators, but those with higher education have more logical thinking, and there are many bright technicians."
- Others
"Further consideration is required to clarify investment possibilities to the IMT, for the completion is schedule as beyond the next three years and that the price of land is not finalized.
Nevertheless, India will be regarded as the most important market for investments from the size, ¥ appreciation, improved policies in investments and the high development potential of infrastructure."

2) Six companies (14.0%) responded as 50% or above possibility of investments in India or the IMT, and one responded as more than 25%.

These respondents are well-positioned multinational firms that consider India as the large market with high growth potential, and securing the market is regarded, as the most important item in the international strategy. As many plan to invest within the next 1-2 years' time, they currently have some kind of contacts with Indian companies for the selection of suitable joint venture partners.

Company A is to finalize investment in India within one year, and the size is

capital of about ¥5 billion, over 1,000 employees, and the required site area is 50 hectares. It considers securing the market of small-size vehicles in India important in overseas development and plans to form a manufacturing base.

High growth is expected in the market of consumer durables in India, particularly the auto market where the annual growth is to reach 10%, and major U.S. and European auto manufacturers have announced to introduce their products. Company A is placing emphasis on the timing of investment, under the anticipated increase in competition with foreign firms.

The Company is currently negotiating with the joint venture partners. The location of the plant site is not finalized, and the IMT is likely to remain among the final options. It is also showing high interests in the design layout of the IMT which takes the basic design consideration of plants into account, and the possibility of investment in the IMT is 50%. The possibility is likely to increase according to the schedule.

Company B is undecided to the timing of investment, but the planned size is capital of ¥5 billion with employees of about 100 - 500. It is approaching the limit of its current production capacity and is considering capacity expansion or new capital investments to meet the demand.

The IMT may be regarded as a possible investment, as one of related parts industry has invested in the Gurgaon area, but the quality improvement and the availability of the parts industry is under concern.

To prevent possible delays in delivery, investments also by the related industries to the IMT can be considered.

Company C is undecided to the timing of investment, but the planned size is capital of ¥800 million with employees of about 320. The required site area will be 19 hectares. Most of the past overseas investments are in industrial estates. The level of infrastructure and accessibility to markets are its selection base for industrial estates. The attractiveness of investments in India is in well-organized education systems that there are more than 4 million graduates from technical schools.

Company D is to finalize investment in India within one year, and its size is capital of about ¥500 million, 100 - 500 employees, and the required site area will be 0.5 - 2.5 hectares. It is speeding up its schedule from its high expectation to the growth of the market. The level of infrastructure such as stable power supply is regarded as important, and the IMT is worth consideration. From the expected growth of demand in consumer durables, the annual demand in colored TV will be 1.1 million from the current 70% diffusion to the future market size approaching 5 million TVs, and the responsible division has decided to invest in the Gurgaon area.

Despite this division will face the problems in the Exit Policy, India is worth investing from its market potential than its country risks.

- 3) 13 companies or 30.2% responded as 25% or above possibility of investments in India with 10% or above possibility in the IMT. The respondents can be classified into two groups where the first group has some kind of contacts with

Indian companies for the selection of suitable joint venture partners. The timing of investments in the IMT by this group members relies on the implementation schedule in the development of the IMT. The second group is less specific with the investment plans and note that the IMT is worth consideration depending on the schedule.

Company A plans to invest in India within the next two years, and the size is capital of ¥3 - 5 billion, 350 - 400 employees, and the required plant site will be about 30 hectares. It is highly concerned with the price of land from its site requirement for storage of building materials.

Company B plans to invest within the one-year period, and the size is capital of ¥500 million with 10 - 500 employees. The plant site is about 1 hectare. Investments from the Japan side is 30% which will be difficult to specify the location with higher land prices, the negotiations with joint venture partners will be necessary. The possibility of investments in the IMT will hence be in the range of 10 - 25%.

Company C plans to invest within the next two years, and the size is capital of ¥500 million - 1.5 billion, 100 - 500 employees, and the required plant site is about 1 hectare. It has multiple divisions and investment projects but plans to secure the site area by itself. None of the board members are familiar with India, and much time is required to obtain consensus from its internal members. If the overseas investment will be in India, some divisions will position the production base as a supplier to the ASEAN countries.

Company D is undecided to the timing of investment, but the employees will be about 2,000 with the site area of 5 hectares. It is in the selection process of joint venture partners, and the investment project is under study. Industrial estates are basically considered for the plant location, and securing of trained personnel is of higher importance than the price of land.

Company E is undecided to the timing of investment, but the employees will be 100 - 500 with the site area of 0.5 hectare. It has already invested in all industrial estates in the ASEAN region and points out the advantages of industrial estates as suitable infrastructure and less time and process required in securing of land and the related agreements and payments.

- 4) 11 companies or 25.6% responded as 10% possibility of investments in both India and the IMT.

Many respondents under this classification have no contacts with India and are in the information gathering step. They recognize the importance of the market in India but in the process of familiarizing with the market by training of personnel because of lack necessary information for decision-making.

Company A is undecided to the timing of investment, but the size will be capital of about ¥500 million with 50 - 100 employees. The required site area

is 0.5 hectare.

Its supporting industry may have a production base in industrial estates which is advantageous, but that related to Company A is concentrated in the Bangalore region, and the possibility of Company A to invest in the IMT is 10%.

Company B is undecided to the timing of investment, but the size will be capital of ¥500 million - 1.5 billion with 100 - 500 employees. The site area will be 4 hectares. Though it recognizes the market size and the growth, investments to India requires much time and consideration.

Its concerns are in productivity affected by religious issues and labor problems in case it has to terminate employment. Furthermore, many cases of Indian companies ending relationship after obtaining the needed technology are observed among Indian companies preferring technical collaborations over joint ventures, leaving Japanese firms with no support in selling products.

Company C is undecided to the timing of investment.

The planned size is capital of ¥500 million, 50 - 100 employees, and the site area of 0.5 - 2.5 hectares.

It emphasizes stable power supply as a pre-requisite for investment decision and requires accessibility to port facilities because of its heavy weight products.

From the planned power cut observed during July - September due to power shortages, Company C will have to install equipment for self-generation of electricity, unless this situation is improved, and therefore the level of infrastructure in India is important for investments.

Company D is undecided with the timing of investment, and the size is capital of ¥500 million with 100 - 500 employees, and the site area is 2.5 - 5 hectares.

It recognizes the size and growth of the Indian market. It however, lacks resources and know-how in building an overseas production base by itself. Investment incentives at the level of exemption of income tax and import duties on imported capital observed in China, Thailand and Indonesia are not observed in India, and less incentives will hinder foreign investment activities.