

### 1-3-2. Analysis work in Japan

Based on the findings of the field survey, the mission engaged in analysis work in Japan, which included compilation of data on the economic condition and other relevant matters in Egypt forming the background of the project, study on the present condition and outlook of steel demand and supply in Egypt and the availability of raw materials forming the premises for the expansion project and also formulation of the expansion plan and related facilities plan, construction schedule and operation plan. It included financial and economic analyses also. The result of such work is compiled in this report.

In addition, in preparing the report, the mission met two counterparts of Egypt, who visited Japan during the period from July 12 to July 23, 1987, and had interim consultation with them. At the same time, JICA provided them with opportunities to visit similar or related steel mills in Japan. During the consultation, a number of requests and confirmations were expressed from Egypt and it was agreed that some of those matters would be reflected in the report.

### 1-3-3. Explanation of the report

For giving explanation on the draft final report, JICA dispatched a mission to Egypt during the period of October 16 - 25, 1987, and the mission had discussion with Egypt. The mission visited ANSDK and Ministry of Planning and International Cooperation and gave detailed explanation on the report and it was agreed that the final report be submitted by the end of January 1988.

A list of members of the report explanation mission and their itinerary are as shown in Tables 1-4 and 1-5, and the matters agreed between the both parties in preparation of the final report were put down in Memorandum. (See page 81)

Table 1-1 Field survey schedule

Mar. 6 (Fri)	Departure from Tokyo
7 (Sat)	Arrival at Cairo
8 (Sun)	Visit JICA, Embassy of Japan, Ministry of Planning and International Cooperation
9 (Mon)	Meeting with ANSDK
10 (Tue)	Group Meeting with ANSDK counterparts
11 (Wed)	Survey in ANSDK (Technical Group) Visit Ministry of Metallurgical Industries Corp., GOFI, (Marketing Group)
12 (Thr)	Visit Helwan Works, Survey in ANSDK (Technical Group) Visit Central Agency for Public Mobilization and Statistics, Ministry of Housing, Utilitilies and New Communities, FERROMETALCO, Cairo Office of KAJIMA (Marketing Group)
13 (Fri)	
14 (Sat)	Visit the Arab Contractors (Marketing Group) Survey in ANSDK (Technical Group)
15 (Sun)	Visit El-Nasr Automotive Manufacturing Co. and Engineering Industries Co. (Marketing Group) Visit Egyptian Copper Works (Technical Group)
16 (Mon)	Visit Bank of Alexandria (marketing Group) Visit Kajima/EGYCO (Technical Group)
17 (Tue)	Survey in ANSDK
18 (Wed)	Meeting with ANSDK (Progress Report)
19 (Thr)	Visit Ministry of Planning and International Cooperation and JICA
20 (Fri)	
21 (Sat)	Departure from Cairo
22 (Sun)	Arrival at Tokyo

Table 1-2 List of Members of the Mission

Dr. Hiromoto TODA	Mission Leader
Mr. Kazuo ISHIHARA	Sub-Leader, Technical Coordination
Mr. Toshimitsu TANAKA	Market Analysis
Mr. Isamu KAWAKAMI	Steel Making
Mr. Toshiharu YONEYAMA	Civil Engineering
Mr. Hisayuki AOI	Rolling
Mr. Takuji FUJINO	Utility and Infrastructure
Mr. Kiichi YOSHIDA	Industrial Engineering and Relations
Mr. Hiroo MATSUDA	Economic Analysis
Mr. Kiyooki INOUE	Market Analysis
Mr. Yutaka INADA	Direct Reduction
Mr. Ryo AOKI	Financial Analysis
Mr. Kunio TAKAHASHI	Market Analysis
(Study in Japan)	
Mr. Goshichi HIGUCHI	Electric Equipment
Mr. Yoshinori SAITO	Civil Engineering
Mr. Shigeo TAKEUCHI	In-plant Transportation and Maintenance
Mr. Toshimichi MAKI	Technical Coordination
Mr. Toshinobu KATATA	Steelmaking
Mr. Hideo KAWACHI	Continuous Casting
Mr. Takeshi ONDA	Utility
Mr. Masakatsu IJIMA	Infrastructure and Lime Calcining
Mr. Fumio SAKAGUCHI	Raw Materials

Table 1-3 Persons whom the JICA Mission met during the field survey

Date	Place of meeting	Name	Department (section)	Position
Mar.8	Egypt Office, JICA	Mr. AKIHIKO HASHIMOTO	Egypt Office, JICA	Resident Representative
		Mr. TAKESHI KOMORI	Egypt Office, JICA	Deputy Resident Representative, Egypt
Mar.8	Embassy of Japan	Mr. JUNZO YAMADA		Minister
		Mr. MASAZUMI SHIKAMORI		First Secretary
Mar.8	Ministry of Planning and International Corp.	Mr. SAAD BAYOUMI		Under Secretary
		Mr. HAMED MOSTAFA	General Department Asian Corp.	General Director
		Mr. MOHSEN M. SADAK	Japan Corp. Department	Economic Researcher
Mar.9	ANSDK	Eng. MOHAMED ABDEL AZIZ KHATTAB		Joint Managing Director
		Mr. M. IJUIN		General Manager

Date	Place of meeting	Name	Department (section)	Position
Mar. 9	ANSDX	Mr. Y. KAWATA		Deputy General Manager
		Dr. A/FATTAH YOUNIS AHMED YOUNIS		Deputy General Manager
		Mr. AHMED ATEF AWAD	External Relations Department	Department Manager
		Mr. K. SHIRAIISHI	Administration Department.	Department Manager
		Mr. SAAD EL. DIN A/RAOUF	Administration Department.	Fellow Department Manager
		Mr. S. HOSHI	Finance Department	Department Manager
		Mr. AHMED FOUAD ISMAIL	Finance Department	Fellow Department Manager
		Mr. MOHAMED HAZEM AHMED	Finance Department	Fellow Department Manager
		Mr. T. OHGI	Purchasing & Transporta- tion Department	Department Manager
		Mr. El-SOUFY El-SAYED ALY	Purchasing & Transporta- tion Department	Fellow Department Manager
		Mr. N. ISOI	Sales Department	Department Manager
		Mr. HUSSEIN HASSAN SALEH	Sales Department	Fellow Department Manager

Date	Place of meeting	Name	Department (section)	Position
Mar. 9	ANS DK	Mr. T. HIDAKA	Production Department	Department Manager
		Dr. MOHAMED EL-SAYED ABOU EL-SAADAT	Production Department	Fellow Department Manager
		Mr. K. TSUKAGOSHI	Maintenance & Utilities Department	Department Manager
		Eng. SALEH MOHAMED IBRAHIM	Maintenance & Utilities Department	Fellow Department Manager
		Mr. K. YAMAMOTO	Production & Technical Control Department	Department Manager
		Eng. HAFEZ ALEY EL-DIN HAMMAD	Production & Technical Control Department	Fellow Department Manager
		Mr. M. HIRAKI	Construction Department	Department Manager
		Eng. ALI ATEF YEHIA	Construction Department	Fellow Department Manager
	JAPANESE CONSORTIUM	Mr. K. SAITOH		Project Manager

Date	Place of meeting	Name	Department (section)	Position
Mar.10	ANSDK	Mr. YOOJI WAKISAKA	Administration Department	Section Manager
		Mr. FAWZY FARAG GIRGUIS	Administration Department	Section Manager
Mar.10	ANSDK	Mr. SEISHI HOSHI	Financial Department	Manager
		Mr. AHMED PAUAD ISMAIL	Financial Department	Fellow Manager
		Mr. MOHAMED HAZEM HASSAN	Financial Department	Fellow Manager
		Mr. TETSUYA CHŌ	Budget and Cost Control Section of Financial Dept.	Assistant Manager
Mar.10	ANSDK	Mr. Y. KOMATSU	PRD - SMP	Assistant Section Manager for EAF
		Mr. HASSAN BIALLY	PRD - SMP	Engineer for EAF

Date	Place of meeting	Name	Department (section)	Position
Mar.11	Metallurgical Industries Corporation	Mr. ADEL A. DANAF		Chairman
		Mr. FATHALLA KAMAL	Technical Affairs	General Director
		Mr. ADEL M. SHAMS	Economy Sectors	Chief
Mar.11	GOFI	Dr. MONGI		Deputy Chairman
		Eng. HASSAN AMER	Technical Department	Head
		Mrs. F. SIDKY	Financial Department	General Director
Mar.11	JETRO, Cairo	Mr. MITSUO MATSUGI		Managing Director
		Mr. YOSHIO WATANUKI		Director
Mar.11	EBA (Cairo)	Dr. MOUSTEFA A. SWIDAN		Deputy Chairman



Date	Place of meeting	Name	Department (section)	Position
Mar.11	ANSDK	MR. TAKESHI OGAWA	Budget and Cost Control Section of Financial Dept.	Manager
		MR. FUMIHISA HATANO	Accounting Section of Financial Department	Manager
		MR. FAWZI GUIRGUIS	Personnel Section of Administration Department	Manager
		MR. NOBUYUKI ISOI	Sales Department	Manager
		MR. A. KAWAMURA	Production Department DR Section	Section Manager
		MR. TOURKY	Production Department DR Section	Fellow Assistant Section Manager
Mar.12	Ministry of Housing & Utilities	Acc. HAMED SHAFEI	Building Material Department	Under Secretary of State
		Eng. SAMIR NAGGAR	Building Material Department	General Manager
Mar.12	C.A.P.M.A.S.	Dr. HAFEZ HAFEZ SALEH	Resources & Production	Director
		MR. MAHMOUD AHMED SALEH	Trade Statistics	Director

Date	Place of meeting	Name	Department (section)	Position
Mar.12	C.A.P.M.A.S.	Mrs. RAWIA EL-BADRAWY	Technical Affairs	Chief of Estimation of Population Department
		Mr. ZAKI MOHAMED MAUSY	Industrial Stat.	General Director
		Mr. TAHA ABD EL-GHANI	Technical Department	Director
		Mr. MOSTAFA KAMAL	Control St. Adm.	Under Secretary
		Eng. A. SHALABY	CAPMAS Presidency	Under Secretary
Mar.12	FERROMETALCO	Dr. TECHN. PETER WAGNER		Managing Director
		Mr. IBRAHIM EID	Commercial & Financial Department	Manager Member of Board Director
Mar.12	KAJIMA CORPORATION	Mr. MAMORU NAGASAWA	Egypt District Office	District Manager
Mar.12	National Bank of Egypt	Mr. AHMED ISMAIL		Member of the Board Senior Executive G.M.

Date	Place of meeting	Name	Department (section)	Position
Mar.12	MINISTRY OF MANPOWER AND TRAINING	DR. NAGUIB GHETTA	Administration of Wages and Salaries	General Manager
		MR. MORRIS ZAKI	Administration of Wages and Salaries	Assistant General Manager
		MR. MOHAMED YAHCOUB	Administration of Wages and Salaries	Assistant General Manager
Mar.12	EGYPTIAN IRON & STEEL CO.	MR. DIA. TANTAWI		Chairman
		MR. HASSAN ABD EL-LATIF SAAD		Director of Steel Sectors
		MR. ALY A. FAHMY EL-GANAINY		Chief of Iron Making Sector
Mar.12	ANSDK	MR. K. FUNAKOSHI	Production Department SMP Section	Assistant Section Manager
		MR. SABOUR	Production Department SMP Section	Fellow Assistant Section Manager
Mar.12	KAJIMA/EGYCO J.V.	MR. CHIBA		Project Manager

Date	Place of meeting	Name	Department (section)	Position
Mar.12	KAJIMA/EGYCO J.V.	Mr. KUMAGAI		Manager of Housing Construction
Mar.14	ARACON	Eng. HASSAN M. NASSEF	Consulting Engineers & Technical Services	Member of the Board of Directors
		Mr. SOLIMAN M. OSMAN	Central Tendering Department	General Manager
		Mr. LOUTHER M. GUIRGUIS	Tendering Department Home Division	Deputy General Manager
		Mr. ABDULLAH M. EL-ARABI	Technical Services Department	Manager, Struct. Design
Mar.14	ANS DK	Mr. SATORU TAKABAYASHI	Raw Materials Section Purchasing & Transportation Department	Section Manager
Mar.14	ANS DK	Mr. O. NAKAI	PRD - SMP	Assistant Section Manager for CC

Date	Place of meeting	Name	Department (section)	Position
Mar. 14	ANSDK	Mr. OKABE	MUD	Section Manager
		Mr. NASR	MUD	Fellow Section Manager
Mar. 14	ANSDK	Mr. M. HIRAKI	Construction Department	Department Manager
		Mr. ALY ATEFF YEHA	Construction Department	Fellow Department Manager
		Mr. MOHAMED EL-NAGGAR	Construction Department	Engineer
		Mr. M. FARAG	Construction Department	Engineer
Mar. 15	NASR	Eng. ABD EL-MONEM KHALIFA	Planning	Chief
		Mr. MOUSTAFA TABLEIA	Material Requisition Planning	Manager
		Mr. REDAA IMAM	Material Requisition Planning	Manager
		Eng. GEORGE ABDEL MALAK	Feeder industries	General Manager

Data	Place of meeting	Name	Department (section)	Position
Mar.15	ENGINEERING INDUSTRIES CORPORATION	Eng. ABDEL WAHAB A. EL-HABBAK		Chairman of the Board
		Eng. HOSAM EL-DIN HELAL	Metalco	Technical Manager, Member of Board
		Eng. AHMED FOUAD SOLIMAN	Metalco	Chairman
		Eng. MOSTAFA KAMAL A. SAMAD	Engineering Enterprises for Steel Work Co. (STELCO)	Chairman
		Eng. AHMED R. AL-KHOULY	Erection & Industrial Services Co. (ERISCDM)	Chairman
		Dr. Eng. M.Y. ABDALLAH	Nasr Boiler Pressure Vessel. Co.	Chairman
Mar.15	THE OVERSEAS ECONOMIC COOPERATION FUND OF JAPAN	Mr. YOSHIHISA MITSUHASHI	Cairo Office	Chief Representative
Mar.15	GENERAL AUTHORITY FOR INVESTMENT	Mr. MOHEI EL-DIN EL-GHARIB		Vice Resident
Mar.15	EGYPTIAN COPPER WORKS	Mr. A. EL-MERGHANY	Egyptian Copper works	Director
		Mr. A.H. GHALI	Metal Shops and Foundry Sector	Head of Metal Shops and Foundry Sector

Date	Place of meeting	Name	Department (section)	Position
Mar.15	EGYPTIAN COPPER WORKS	Mr. A.A. SHAMS	Wire Drawing & Wire Rope Department	General Manager
		Mr. Y. ABDEL SALAM	Rolling (Hot & Cold) Department	General Manager
		Mr. FAWZI SEIF	Wire Drawing & Wire Rope	Sector Chief
Mar.15	ANSDK	Mr. SATORU TAKABAYASHI	Raw Materials Section Purchasing & Transportation Department	Section Manager
Mar.15	ANSDK	Mr. SALEH IBRAHIM	MUD	Fellow Department Manager
		Mr. M. ODA	MUD - EM	Section Manager
		Mr. M. EL-GHAZALY	MUD - EM	Fellow Section Manager
		Mr. HIROSHI MORI	MUD - MC	Section Manager
		Mr. KATSUYOSHI SUDA	MUD - MC	Assistant Section Manager
		Mr. SALEH IBRAHIM	MUD - MC	Fellow Department Manager

Date	Place of meeting	Name	Department (section)	position
Mar.16	KAJIMA/EGYCO J/V	Mr. YUKIO ABATANI		Deputy Project Manager
Mar.16	EGYPTIAN SWEDISH WELDING ELECTRODES CO.	Eng. IBRAHIM EL-KHOLY		Technical Consultant
		Eng. AHMED SHALABY TOBBAR		General Manager
		Eng. IBRAHIM ISMAIL MOHAMED		Chairman
		Eng. KHALED EL-ZAYAT		ESAB
May.16	BANK OF ALEXANDRIA	Mr. KAMAL ZAYED	Salah Salem Branch	General Manager
Mar.16	MINISTRY OF FINANCE TAXATION AUTHORITY	Mr. MOHAMED KHAMIS	Customs Duties Authority of Alexandria	General Manager
		Mr. MAHMOUD TAHER	General Relations Dept. of Customs Duties Auth. of Alexandria	Manager
		Mr. SAYED KENAWY	General Relations Dept. of Customs Duties Auth. of Alexandria	Manager
		Mr. FAWY ALAAM	Customs Tariffs Department of Customs Duties Auth. of Alexandria	Manager



Date	Place of meeting	Name	Department (section)	Position
Mar. 16	MINISTRY OF FINANCE TAXATION AUTHORITY	Mr. FOUAD MOUSA	Customs Tariffs Department of Customs Duties Auth. of Alexandria	Deputy under secretary of the Ministry of Finance for Customs Technical Affairs
Mar. 16	ANS DK	Mr. YUJI FUKUISHI	Administration Department	Section Manager
		Mr. HANY H. EL-ISKANDARANY	Administration Department	Section Manager
		Mr. SAAD EL-DIN A/RAOUF	Administration Department	Fellow Department Manager
		Mr. S. KINOSHITA	PRD (SMP)	Section Manager
		Mr. A. EL-SAQQA	PRD (SMP)	Fellow Section Manager
		Mr. M. SAFWAT	PRD (SMP)	Fellow Assistant Section Manager
		Mr. S. FARRAG	PRD (SMP)	Fellow Assistant Section Manager
		Mr. H. BIALLY	PRD (SMP)	Engineer

Date	Place of meeting	Name	Department (section)	Position
Mar.17	ANSJK	Mr. ABDEL BAKI DWEEB	Construction Department	In charge of Direct Reduction
		Mr. ALAA EL-DIN MCHARUM	Construction Department	Incharge of Electrical & Instrument

Table 1-4 Schedule of the Report Explanation Mission

Oct. 16 (Fri)	Departure from Tokyo
17 (Sat)	Arrival at Cairo
18 (Sun)	Group A: JICA, Embassy of Japan, Ministry of Planning and International Cooperation Group B: ANSDK
19 (Mon)	ANSDK
20 (Tue)	ANSDK
21 (Wed)	ANSDK
22 (Thr)	JICA, Embassy of Japan, Ministry of Planning and International Cooperation
23 (Fri)	
24 (Sat)	Departure from Cairo
25 (Sun)	Arrival at Tokyo

Group A: Toda, Ishihara, Kitamura, Koide

Group B: Yoneyama, Fujino, Inada, Aoki

Table 1-5 List of Members of the Report Explanation Mission

Dr. Hiromoto TODA	Mission Leader
Mr. Kazuo ISHIHARA	Sub-leader, Technical Coordination
Mr. Kunihiro KITAMURA	Steel Policy
Mr. Toshiharu YONEYAMA	Civil Engineering
Mr. Takuji FUJINO	Utility and Infrastructure
Mr. Joichi KOIDE	Market Analysis (Quality Steel)
Mr. Yutaka INADA	Direct Reduction
Mr. Ryo AOKI	Financial Analysis

Table 1-6 Persons whom the JICA Mission met during the Explanation  
of Draft Report

Date	Place of meeting	Name	Department (section)	Position
Oct. 18, 22	Egypt Office, JICA	Mr. AKIHIKO HASHIMOTO	Egypt Office, JICA	President Representative
		Mr. TAKESHI KOMORI	Egypt Office, JICA	Deputy President Representative
Oct. 18, 22	Embassy of Japan	Mr. HIROSHI HASHIMOTO		Ambassador
		Mr. JUNZO YAMADA		Minister
		Mr. MASAZUMI SHIKAMORI		First Secretary
Oct. 18, 22	Ministry of Planning and International Cooperation	Mr. SAAD BAYOUMI		Under Secretary
		Mr. HAMED MOSTAFA	General Department Asian Corp.	General Director
Oct. 18 to 21	ANSDK	Eng. MOHAMED ABDEL AZIZ KHATTAB		Joint Managing Director
		Mr. Y. MIYAWAKI		General Manager
		Dr. A/FATTAH YOUNIS		Deputy General Manager
		Mr. Y. KAWATA		Deputy General Manager
		Mr. K. YAMAMOTO	Production & Technical Control Department	Department Manager

Date	Place of meeting	Name	Department (section)	Position
Oct. 18 to 21	ANSDK	Mr. HAFEZ	Production & Technical Control Department	Fellow Department Manager
		Mr. S. HOSHI	Finance Department	Department Manager
		Mr. AHMED FOUD	Ditto	Fellow Department Manager
		Mr. MOHAMED HAZEM	Ditto	Ditto
		Mr. M. HIRAKI	Construction Department	Department Manager
		Mr. BARGHASH	Ditto	Fellow Department Manager
		Mr. OZAWA	Production Manager	Department Manager
		Dr. M. SAADAT	Ditto	Fellow Department Manager
		Mr. OKABE	Maintenance & Utilities Department	Department Manager
		Mr. S. IBRAHIM	Ditto	Fellow Department Manager
		Mr. T. OHGI	Purchasing & Transpor- tation Department	Department Manager
		Mr. K. SHIRAIISHI	Administration Department	Department Manager

Date	Place of meeting	Name	Department (section)	Position
Oct. 18 to 21	ANSDK	Mr. N. ISOI	Sales Department	Department Manager
		Mr. H. SALEH	Ditto	Fellow Department Manager

Memorandum of Discussion between JICA Mission and ANSDK

Subject: Draft Final Report for the Feasibility Study on the Expansion Project of El-Dikheila Iron and Steel Works

During the period from October 18 to 21, 1987 Mission of Japan International Cooperation Agency (JICA) explained the Draft Final Report for the Expansion Project and discussed it with ANSDK members from technical and financial point of view.

The following are the major items discussed and/or agreed upon.

1. Market Demand

ANSDK raised questions about the basis of demand estimation for the steel products, since there are no details of figures mentioned in the Report.

JICA stated that such basis would be explained in the Final Report.

2. Expansion Plan

- (1) ANSDK requested that Feasibility study should consider treatment of excess DRI, in excess of the required amount for SMP from the profitability point of view. ANSDK requests for continuous operation of DRP to have optimum utilization and stability of DRP. JICA accepted.
- (2) ANSDK requested for the calculation of expected production on the alternative plan of existing 4 EAFs and 2 LFs to be added from the techno-economic point of view referring the data submitted by ANSDK. JICA accepted.
- (3) The scrap handling facilities in new EAFs should be reconsidered to be capable of handling at least scrap ratio of about 50%. JICA accepted.
- (4) Fourth CCM is considered in the report. ANSDK asked to add to the study of the installation of a changeable mould for the production of the quality steels. JICA accepted.
- (5) JICA clarified that the draft report has been basically based on the information obtained in March visit such as initial design figures and operation data at that time. Final report will be incorporated with further information obtained in October discussion with ANSDK.

- (6) JICA team explained that ANSDK is basically a re-bar producing Company and production of quality steels was originally not considered in the existing facilities, but ANSDK expressed its keen interest that expansion should take into consideration the possibility of production of quality steel.
- (7) ANSDK's decision regarding the DRP installation and size will depend on the EAF capacity and blending ratio.  
JICA stated that scrap availability and price should also be considered when this decision is made.
- (8) JICA accepted to study the material balance for the alternative plan of existing 4 EAFs and new 2 LFs on the 65% DRI blending basis.
- (9) Personnel required for the expansion which was omitted in the draft report will be mentioned in the Final Report.
- (10) Following comment will be added in the Final Report. It will be required to consider in detail the utilization of excess capacity of the existing facilities at the time of implementation of expansion.

### 3. Financial Analysis

The following items shall be adopted in the Final Report.

- (1) The existing purchasing price of natural gas according to the Contract is 2.3 USD/10 therms (1 million BTU), and this rate should be adopted in the financial analysis same as in the basic case.
- (2) Unit consumption shall be decided taking account of oxide materials, electricity and natural gas in ANSDK.
- (3) Repair cost should be increased to cope with the deteriorating capacities of the existing and expansion facilities, especially after the asset have been fully depreciated.
- (4) Moreover depreciation rate for the fully depreciated assets to be 50% of the original rate to accumulate sufficient funds for replacement in the form of special reserve.
- (5) Interest rate on deposits does not exceed 11% for more than 1 year deposit, 8% for three months, 9.5 for 6 months and over. (For L.E.). Minimum cash to be 1 million USD beside the 10000 petty cash.
- (6) No escalation rate of sales price in Escalation case should be applied.



- (7) Case study shall be executed to find out the optimum blending ratio according to the economic results as in page 6-12 table 6-1-3-1 including the case stated in 2-(8) in this memorandum.
- (8) Stock yard charge of Mineral Jetty and transportation fee from Mineral Jetty should be added to the unit prices of pellet and lump iron ore according to data submitted by ANSDK.
- (9) Repayment schedule of IBRD loan for existing facilities based on the contract shall be adopted.
- (10) ANSDK explained that the floating exchange rate has been applied since May, 1987.
- (11) ANSDK requested JICA to show clearly the effect of expansion on the magnitude of present financial difficulties, as well as the impact on ROI and ROE up to the year 2011.

4. Others

- (1) All comments submitted to JICA by ANSDK on 19th October, 1987 (a copy of which is attached) were clarified and will be taken into consideration in the Final Report.
- (2) ANSDK stated that substitutes for imported supplies and services "local fabrication, installation, iron ore ... etc" should be considered due to the financial situation of the Company which cannot bear any additional foreign exchange exposures.

*I.S. Mohammaday*  
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 I.S. Mohammadain  
 Chairman and Managing Director,  
 ANSDK

*21.10.1987*

*Hiro moto Toda*  
 \_\_\_\_\_  
 Hiromoto Toda  
 Leader,  
 The Feasibility Study Mission  
 (JICA)

*21.10.1987*

MEMBERS OF JICA MISSION

Dr. H. TODA	Mission's Leader
Mr. K. KITAMURA	Ministry of International Trade and Industry, Japan.
Mr. K. ISHIHARA	
Mr. T. YONEYAMA	
Mr. T. FUJINO	
Mr. J. KOIDE	
Mr. Y. INADA	
Mr. R. AOKI	

MEMBERS OF ANSDK

Eng. I.S. Mohammadain	Chairman and Managing Director
Eng. M. KHATTAB	Joint Managing Director
Mr. Y. MIYAWAKI	General Mgr.
Mr. Y. KAWATA	Deputy General Mgr.
Dr. F. YOUNIS	Deputy General Mgr.

Department Managers and Fellow Department Managers of PTCD, FD, SD, PTD, PRD, MUD and CD.

## **Chapter II. MATTERS RELATED TO THE STUDY**



## 2. Matters Related to the Study

### 2-1. Outline of Egyptian economy

#### 2-1-1. Outline of the economy

##### (1) General data

- Area: 997,677 km<sup>2</sup>
- Population: 49.61 million (as at Mid-1986)
- Language: Arabic
- Religion: Sunnite Muslim 90%  
Christian & Greek Orthodox Church
- Currency: Egyptian pounds
- Main exports: Oil, raw cotton
- Resources: Crude oil, iron ore, phosphate rock,  
natural gas
- Government system: Republic
- Head of state: President

##### (2) Economic statistics

- GNP: \$32,862.09 million (1983)
- GNP per capita: \$863 (1984)
- GDP: \$39,422.20 million (1984)
- GDP composition: Agriculture 18%, industry 35% (of  
which oil and power 17%), services  
47%
- National budget: Annual expenditures  
£E20,000.22 million
- Foreign exchange  
reserve: \$1,217. million (Aug. 1986)
- Rate of increase  
of consumer price: 17.1% (1984)

## 2-1-2. Features of Egyptian economy in recent years

The Egyptian economy realized high growth from about the middle of 1970s to early 1980s. This reflected inflow of foreign capital mainly from U.S. due to the country's open economic policy and liberalization of economy in addition to increase in foreign exchange earning from oil export which showed rapid rise in price and remittance from workers.

In 1982, the Government announced 5-year plan for economic and social development (1982/83 - 1986/87) with annual growth rate during the period being planned to be 8.1%. The economy showed growth are planned in 1982/83 and 1983/84, but recently decrease of international price of oil which is traditionally main source of foreign exchange income of the country, decrease of remittance from workers working overseas due to slowdown of the economy of oil producing countries in general, decrease of income from the Suez Canal and decrease of foreign sightseers, etc. contributed towards rapid deterioration of the country's balance of international payments and the Government's fiscal deficit increased. All those forced the economic growth rate to decline considerably. In addition, rapid increase of population (about 1.2 million increase a year) and slow growth of social investment were cited as factors. According to IMF and World Bank, the external debt of the country reached about \$40 billion in 1986 and the repayment in the 1985 fiscal year amounted to \$4.5 billion. Such being the case, IMF is requesting correction of subsidy problems and unification of exchange rate which are causes of increase of external debts as condition for providing loans.

The subsidy increased rapidly since the economic open-door policy was introduced in 1974. For the purpose of ensuring social fairness and coping with inflation, a system was set up under which consumers can buy daily necessities such as basic foods and gasoline at prices set up by supply corporation lower than the production costs for protection

of household economy. The difference of the selling prices and the production costs is compensated to the supply corporations as subsidy from the national finance. In 1985/86, agricultural subsidy is overwhelmingly large and the food supply corporation accounted for a large percentage (68%).

There were two exchange rates used, official rate and market rate, but in May 1987 the system was revised to the floating exchange rate system using a unified rate.

In preparing the 1986 budget, the Government announced basic policy including (1) drastic cut of subsidy, (2) 16% increase in tax revenue from tobacco, power rate and car tax and (3) import restriction of 21 luxury items, but the economic restructuring was not so successful.

With such background, the Government is considering promotion of domestic industry to substitute by domestic products import of capital goods as much as possible and is making efforts to renovate or modernize the existing production facilities of industry so as to expand effectively domestic industrial products with least capital investment. The Government contemplates also that priority is given to private sector wherever possible in industrial development in future and that when there is production goal in each of industrial sectors, expansion of public sector is considered only when the goal cannot be attained by projects in private sector alone. Though this is said characteristic of the open economic policy of Egypt, it can be interpreted as showing the Government's intention to push the development by introduction of foreign exchange by private sector because of absolute shortage of foreign exchange of the state.

Thus, the 5-year economic and social development plan drawn up in 1982/83 with announcement of high economic growth could not achieve the goal due partially to decrease of oil price and balance of payments deficit and financial deficit of Egypt increased considerably.

The Egyptian Government formed the new 5-year economic and social development plan starting in 1987 F.Y. and aims at economic reconstruction through measures, among others, priority on housing construction and others.

### 2-1-3. Trend of production of industrial sectors

The Egyptian economy showed annual average growth rate of 8.6% in real terms during the period from 1977 to 1981/82. Succeeding such growth, the 5-year plan from 1982/83 to 1986/87 set the average growth rate during the period to be 8.1% and aimed at continuing high growth. According to the data of Ministry of Planning and International Cooperation, the growth after 1982/83 was fairly good, 10.8% in 1984/85 and 7.4% in 1985/86, but due to rapid decrease of oil prices as mentioned above, the Egyptian economy faces difficulty in recent days and it seems difficult to attain the goal.

Firstly, commodity sector showed growth of 8.9% and 7.7% in 1984/85 and 1985/86, respectively, but in view of slowdown in 1986/87, it is considered a little difficult to attain the goal of 8.5%.

In agricultural sector, the growth rate is markedly low as compared with other sectors and the goal was set very low and it seems even such low target cannot be attained. Its percentage in GDP has dropped from 22.7% in 1977 to 15.9% in 1985/86.

Mining and manufacturing sector showed growth rate of 14.4% and 10.8% in 84/85 and 85/86, respectively, and the target growth of 9.1% seems attainable.

Oil sector is difficult to achieve the target rate of 12.2% because of recent price drop and resulting production cut.



Productive service sector shows a considerable year-to-year difference in the growth rate, but it generally keeps high growth as a whole and the target rate of 7.2% is likely to be met fully. In the meantime, toll revenue of the Suez Canal was forced to show minus growth for three consecutive years because of depression in industrialized countries and the effect of Iran-Iraq war, but some recovery is noted in 1985/86.

Social service sector showed growth of 8.9% and 7.8% in 1984/85 and 1985/86, respectively. Though housing sector is keeping high growth, drop in public works and governmental service sector makes it difficult to attain the 8.1% target.

Thus the Egyptian economy passed the high growth period in 1970s and now is in a slow growth period, and some of the problems become noticeable.

One is the fiscal deficit as discussed later and the other is delay in modernization of agricultural and mining/manufacturing sectors in which the Government is giving high priority of modernization.

The agricultural sector occupies the highest percentage in the share of GNP and of working population. But its percentage in GNP dropped markedly in the last decade (22.7% to 15.9%). This may have resulted from (1) delay in modernization of agricultural technology and (2) the restriction on buying price of farm products of the Government. Though efforts are being made to green desert to farmland gradually, rapid increase of population (2.7% annually) lowered self-supply rate of foods from year to year. Demand for increase of farm production poses a big problem.

The problem in mining/manufacturing sector is that the public sector accounts for a big weight as high as two thirds of the total production and number of companies, but the selling price of those state companies are controlled by the Government and deficit, if any, is compensated by subsidy of

the Government. This makes it difficult for those companies to do business and also it resulted in fast increase of the expenditure of subsidy.

The percentage of private sector in industrial production is gradually rising, but various restrictions including import quota and foreign exchange regulation, etc. are big hindrance to progress and expansion of many enterprises.

Table 2-1 Change in GDP

(Unit: £EMillion)

	1983/84		1984/85		1985/86 (Target)	
	Amount	Weight (%)	Amount	Weight (%)	Amount	Weight (%)
Commodity sectors:	11,798	53.2	12,849	52.3	13,833	52.4
Agriculture	3,965	17.9	4,078	16.6	4,205	15.9
Mining & industry	3,130	14.1	3,582	14.6	3,970	15.1
Petroleum	3,500	15.8	3,913	15.9	4,259	16.1
Electricity	158	0.7	173	0.7	188	0.7
Construction	1,045	4.7	1,103	4.5	1,211	4.6
Productive service sector:	6,289	28.4	7,275	29.6	7,766	29.4
Transportation and communication	1,313	5.9	1,486	6.1	1,618	6.1
Suez Canal	656	3.0	645	2.6	663	2.5
Commerce & foreign trade	2,790	12.6	3,075	12.5	3,307	12.6
Finance	1,218	5.5	1,735	7.1	1,825	6.9
Insurance	47	0.2	57	0.2	62	0.2
Hotel, etc.	265	1.2	276	1.1	291	1.1
Social service sectors:	4,073	18.4	4,436	18.1	4,784	18.2
Housing	430	1.9	490	2.0	532	2.0
Public utilities	64	0.3	64	0.3	69	0.3
Public services	892	4.0	1,028	4.2	1,100	4.2
Social security	32	0.1	34	0.1	38	0.1
Government services	2,655	12.1	2,820	11.5	3,045	11.6
Total	22,160	100.0	24,560	100.0	26,383	100.0
				10.8		
				15.7		
				13.2		
				(-)		
				1.7		
				10.2		
				42.4		
				21.3		
				4.2		
				8.9		
				14.0		
				0.0		
				15.2		
				6.3		
				6.2		
				10.8		
				6.8		
				8.9		
				2.8		
				7.5		
				5.2		
				8.8		
				5.4		
				7.8		
				8.6		
				7.8		
				7.0		
				11.8		
				8.0		

Source: 1985/86 Economic and Social Development Plan

#### 2-1-4. National budget and finance

Compared with the preceding year, the national budget in 1986/87 shows a slight increase, 0.46%, and is positive one despite the worsening of the national finance.

Main sources of the revenue are that from the public sector such as petroleum corporation and the Suez Canal Board which accounts for 18% of the revenue. Next come tax revenue of corporation tax and income tax, which is followed by customs and excise tax. Characteristics of the 1986/87 budget is that on the revenue side, a big increase is planned in taxes and excise tax through increase of tax rate and strict enforcement of taxation. Revenue from petroleum is expected to decrease from LE1,340 million to LE760 million and it is planned to cover the deficit by capital transfer.

On the expenditure side, the subsidy which has been a problem is cut to LE1,750 million from LE2,000 million. The Governmental investments also are reduced from LE5,430 million to LE5,150 million, expecting the investments from private sector.

Thus the Government adopts a positive budget under hard financial condition to help expand the economy and at the same time makes efforts to reconstruct the national finance through curtailment of governmental subsidy which is one of main causes of the financial deficit.

Incidentally, the major part of the government subsidy is directed to Price and Supply Board. This is the subsidy used in purchasing foods such as wheat, flour, maize, vegetable oils, sugar, etc. from domestic agricultural sector or overseas and their domestic sales. Other subsidies include subsidy for supply of fertilizers to farms and state farms, that for Fiber public corporation and price stabilization subsidy for manufacturing industry.

## 2-1-5. Balance of international payments

### (1) Foreign trade

In the Egyptian export, crude oil and petroleum products account for the large part of the total, 68% in 1983/84. The remainder are raw cotton, cotton yarn, cotton textiles (20%) and industrial products are little. On the other hand, intermediate material goods (iron and steel products, chemicals, wood, cork, etc.) account for 33% of the total import, followed by capital goods (parts of bus, car & motor-cycle, electric products, etc.) accounting for 28% and consumables (durable goods such as car, motorcycle, radio & television and foodstuffs such as wheat, meat, etc., and pharmaceuticals) accounting for 24% and the remainder is raw materials and fuels.

### (2) Balance of payments

In the Egyptian balance of international payments, external trade always shows deficit (\$6.1 billion in 1984/85) and it is covered by the service revenue from the Suez Canal, remittance from workers overseas and foreign tourists (\$3.3 billion in 1984/85), foreign loans and direct investments, etc., with the total in balance.

However, in the past few years, the remittance from workers overseas which had the highest weight in invisible trade decreased considerably (\$3,930 million to \$2,800 million) and the repayment of foreign loans increased, and as a result, the total balance showed deficit of \$1,300 million.

According to a study of IMF, the outstanding balance of accumulated foreign debts of Egypt in 1986 reached \$40 billion and the repayment in that year is estimated to reach \$4.5 billion. The Government took measures such as to request assistance from developed nations in the West, discuss a loan from IMF and ask cooperation of the people, and in June 1987 the rescheduling of the debts was approved at Paris Club.



Table 2-3 Export by commodities in Egypt

(Unit: Mil. US\$)

Articles	80/81	81/82	82/83	83/84
Crude oil & petroleum products	3,179.3	3,329.2	2,807.3	2,957.2
Crude oil	2,559.7	2,600.4	2,182.4	2,396.0
Petroleum products	619.6	728.8	624.9	561.2
Raw materials	601.4	647.1	615.8	752.3
Raw cotton	394.3	430.0	387.1	522.8
Rice	38.6	35.7	10.9	18.7
Orange	47.1	54.3	64.1	74.1
Others	121.4	127.1	153.7	136.7
Semi finished commodities	318.6	332.9	230.4	288.1
Cotton yarn	220.0	174.3	155.7	224.7
Others	98.6	158.6	74.7	63.4
Finished commodities	198.6	188.6	230.6	354.9
Cotton textiles	37.1	31.4	26.6	51.7
Woven fabrics	31.4	25.7	21.3	24.7
Sugar	12.9	14.3	10.3	2.4
Chemical products	5.7	10.0	19.1	0.7
Others	111.4	107.1	153.3	275.4
Total	4,297.8	4,497.8	3,884.1	4,352.5

Source: CAPMAS and Egyptian General Petroleum Corporation

Table 2-4 Imports by commodities in Egypt

(Unit: \$)

Articles	80/81	81/82	82/83	83/84 <sup>1)</sup>
Fuel: 2)	1.1	3.2	3.6	5.4
crude oil 2)	-	-	-	1.9
petroleum products	0.7	2.1	2.9	2.9
coke and coal	0.4	1.1	0.7	0.6
Raw materials:	12.5	14.5	11.2	9.6
Wheat	7.8	8.3	6.1	4.2
tabaco	1.4	1.0	1.6	1.5
maize	2.0	4.1	2.5	2.2
cotton seed	0.3	0.3	0.2	0.2
sesame	0.1	0.1	-	0.2
other articles	0.9	0.7	0.9	1.3
Intermediate commodities:	33.6	32.1	32.8	33.1
animal or vegetable fats and oils	2.4	2.3	3.4	2.3
paraffin wax and other mineral waxes	0.4	0.8	0.7	0.5
chemical products	4.5	4.2	4.0	5.1
fertilizers	0.8	0.8	0.4	0.3
synthetic organic dyestuff	1.0	0.7	0.6	0.6
synthetic rubber	0.8	0.8	0.7	0.8
wood and cork	5.3	3.8	3.8	4.1
paper	2.1	2.0	1.6	1.5
iron and steel products	6.8	5.8	6.2	6.0
other metal products	0.7	0.4	0.4	0.5
electric equipments	0.9	1.1	1.4	1.1
other articles	7.9	9.4	9.6	10.3
Capital commodities: 3)	27.8	25.5	27.6	27.9
buses and passenger cars	4.2	4.2	3.4	4.1
other passenger cars	1.2	1.3	0.3	0.5
parts for motorcycles	2.3	2.4	2.8	2.4
other vehicles	1.6	1.1	0.8	1.3
weaving and knitting machines	1.4	1.4	1.6	1.3
electric machines	3.3	2.5	2.7	3.6
excavation, leveling, boring and extracting machines	2.2	1.9	1.7	1.4
other articles	11.7	10.7	14.4	13.3
Consumptive commodities: 3)	24.9	24.8	25.0	24.0
Durable commodities:	4.7	5.6	6.6	6.7
automobiles, motorcycles	(2.6)	(2.6)	(3.2)	(3.2)
radio and television receivers	(0.6)	(1.0)	(1.6)	(1.4)
Other articles	(1.5)	(2.0)	(1.9)	(2.1)
Non-durable commodities:	20.2	19.2	18.4	17.3
flour of wheat	(2.4)	(4.0)	(2.9)	(3.0)
sugar	(2.9)	(2.2)	(1.2)	(0.7)
coffee, tea and cocoa	(1.0)	(0.8)	(1.0)	(1.1)
live animals and products thereof	(6.8)	(5.0)	(5.6)	(5.0)
broad beans and lentiles	(0.2)	(0.5)	(0.4)	(0.3)
medicaments	(0.6)	(1.3)	(1.1)	(0.9)
disinfectants and insecticides	(1.0)	(0.8)	(0.8)	(0.6)
paper and paper board	(0.1)	(0.2)	(0.2)	(0.3)
other articles	(4.7)	(4.4)	(5.2)	(5.4)
Total:	100.0	100.0	100.0	100.0

Source: CAPMAS

Notes: 1) By customs statistics

2) Crude oil import expressed in customs statistics and foreign currency statistics has been lower than that expressed in CAPMAS statistics.

3) Including parts



Table 2-5 Balance of international payment

(Unit: million \$)

	80/81	81/82	82/83	83/84	84/85
Trade Balance	-5,078	-5,095	-5,626	-6,634	-6,074
Exports (FOB)	3,985	4,144	3,555	4,033	4,059
Crude oil	( 2,857)	( 3,032)	( 2,468)	( 2,640)	( 2,659)
Others	( 1,128)	( 1,112)	( 1,087)	( 1,393)	( 1,400)
Imports (CIF)	-9,063	-9,239	-9,181	-10,667	-10,133
Government & public sector	(-7,109)	(-7,464)	(-6,878)	(-7,762)	( ---)
Private sector	(-1,724)	(-1,396)	(-2,046)	(-2,659)	(-2,453)
Others	(- 230)	(- 379)	(- 257)	(- 246)	( ---)
Services	3,473	2,801	3,842	4,519	3,318
Credits	6,464	5,947	7,177	8,204	7,098
Suez Canal Dues	( 780)	( 909)	( 957)	( 974)	( 927)
Worker Remittances	( 2,855)	( 2,082)	( 3,166)	( 3,930)	( 2,800)
Investment income	( 1,330)	( 1,374)	( 1,067)	( 1,285)	( 1,250)
Tourism	( 512)	( 393)	( 304)	( 288)	( 375)
Others	( 987)	( 1,189)	( 1,683)	( 1,727)	( 1,746)
Payment	-2,991	-3,146	-3,335	-3,685	-3,780
Investment	(-1,550)	(-1,432)	(-1,439)	(-1,599)	(-1,804)
Others	(-1,441)	(-1,714)	(-1,896)	(-2,086)	(-1,976)
Unrequited Transfers	---	130	500	700	900
Current Balance	-1,605	-2,164	-1,284	-1,415	-1,856
Capital	1,157	1,384	1,331	705	70
Project Loans (net)	1,062	897	946	925	550
Acquisition	( 1,444)	( 1,371)	( 1,307)	( 1,313)	( 1,144)
Disposal	(- 382)	(- 474)	(- 361)	(- 388)	(- 594)
Suppliers credits (net)	51	- 20	- 65	- 422	- 500
Acquisition	( 882)	( 842)	( 886)	( 825)	( 700)
Disposal	(- 831)	(- 862)	(- 951)	(-1,247)	(-1,200)
Direct investments	230	250	247	146	150
Authorized foreign exchange banks (net)	- 136	305	---	103	---
Others (net)	- 50	- 48	203	- 47	- 130
SDR allocation	29	---	---	---	---
Errors & Omissions	286	857	842	860	500
Overall Balance	- 133	77	889	150	-1,286

Source: Central Bank of Egypt, EGPC &amp; IMF estimate

Table 2-6 Egypt: external debt, end-1986

(\$ million)

Medium/long-term	24,000
Short-term	7,000
Military	9,000
Total outstanding debt	40,000

Source: MEED estimate based on IMF/World Bank reports

Table 2-7 Egypt: dept servicing obligations,  
1987/84-1986/87<sup>1</sup>

(\$ million)

	1983/84 <sup>2</sup>	1984/85 <sup>3</sup>	1985/86 <sup>4</sup>	1986/87 <sup>5</sup>
Principal	1,635	1,800	2,000	2,000
Interest	1,599	1,804	2,200	2,500
Total	3,234	3,604	4,200	4,500

<sup>1</sup> Fiscal years run from 1 July-30 June

<sup>2</sup> IMF estimate

<sup>3</sup> IMF estimate

<sup>4</sup> MEED estimate

<sup>5</sup> MEED projection

2-1-6. The 2nd 5-year economic and social development plan  
and outlook of the economy

The 2nd economic and social development plan starting July 1, 1987, is now available. In this new 5-year plan (1987/88 - 1991/92 F.Y.), the economic growth rate during the period is set at an annual average of 5.8% in terms of factor costs. In view of the planned economic growth rate of 8.1% (actually 6.8%) in the preceding 5-year plan, the growth rate planned in the new plan may be said conservative and sound. This is considered to reflect the effect of sudden fall of oil prices just before drawing up the new plan.

Planned annual growth rate of GDP by industrial sector shows that production of mining and manufacturing industry is set to increase 8.4%, contributing greatly to the GDP growth. On the other hand, the annual growth rate of oil industry is planned to be only 2.3% though it played an important role in the preceding 5-year plan. The annual growth rate of the oil industry in the preceding plan was set very high at 12.2%, but the industry showed actual growth of 7.7%. As it shows further slowdown recently, its growth rate in the new plan, it seems, was planned low. Thus the new 5-year plan reflects strongly the intention of the Government to eliminate the dependence on oil for its economic development and can be evaluated as a realistic and solid plan.

Capital investment under the new plan is planned at LE46.5 billion in total, which is an increase of about 30% as compared to the planned investment of LE34.4 billion and actual investment of LE36.4 billion under the preceding plan. Of the total investment, the public sector will invest LE28.5 billion with the balance of LE18.0 billion being invested by the private sector. The investment by the private sector accounts for 38.7% of the total. Comparing with the investment of 24.7% by the private sector under the preceding plan, it can easily imagined how much expectation the Government places on the vitality of the private sector. It can also

be expected that the Government will strengthen its measures to create an climate which promotes investment by the private sector.

Weight of the investment by the public sector by object is 21.2% for replacement investment, 30.2% for continuing investment and 48.6% for new investment. It is distinctive that the new investment is greatly increased compared to the preceding 5-year plan, in amount as well as in percentage (the ratio of new investment in the preceding plan being 16.8%).

The current account deficit of Egypt in 1986/87 F.Y. is expected to reach about LE2.1 billion. The new 5-year plan envisages that the deficit is to be reduced to LE700 million by 1991/92 F.Y. To achieve this, it is planned that exports of goods and services are greatly increased while the growth of imports is restricted considerably. However, it is considered that import of capital goods for investment and production is still needed for development of Egyptian economy and besides, domestic production of consumer goods is not yet adequate at present.

Incidentally the forecast of steel demand in Chapter 3 is to be given on the basis of the above new 5-year plan. In addition, the annual growth rate of GDP used as the base of the demand forecast is set at 6% for the period after the new 5-year plan to 2000, almost the same rate as that in the new plan.

The 2nd Economic and Social Development Plan

Table 2-8 Balance of Payments

(Unit: LE Million)

	1986/87 (Expected)	1987/88 (Target)	1991/92 (Target)
Payments:	12,379	12,312	13,410
Imports of goods & services	10,922	10,739	11,110
Invisible trade	1,458	1,573	2,300
Receipts:	12,379	12,312	13,410
Exports of goods & services	6,228	6,607	8,355
Invisible trade	4,085	4,105	4,355
Current Account Deficit	2,066	1,600	700

Table 2-9 Gross National Product and Expenditure

(Unit: LE Million at 1986/87 prices)

	1986/87 (Expected)	1987/88 (Target)	1991/92 (Target)	Annual growth rate (%)
Total supply:				
GDP (Factor price)	40,830	43,050	54,126	5.8
Indirect taxes	3,220	3,500	4,000	4.4
GDP (Market price)	44,050	46,550	58,126	5.7
Imports	10,970	10,740	11,110	0.3
Total	54,970	57,290	69,236	4.7
Total demand:				
Consumption	40,590	42,285	50,581	4.5
Private consumption	34,260	35,635	42,496	4.4
Government consumption	6,330	6,650	8,085	5.0
Investment	8,150	8,400	10,300	4.8
Exports	6,230	6,605	8,355	6.0
Total	54,970	57,290	69,236	4.7

Table 2-10 Targets of production by industrial sector

(LE Million at 1986/87 prices)

	1986/87 (Expected)	1987/88 (Target)	1991/92 (Target)	Annual growth rate
Agriculture	8,640	8,960	10,550	4.1
Mining & manufacturing	6,933	7,446	10,397	8.4
Petroleum	1,690	1,769	1,898	2.3
Electric power	518	560	729	7.1
Construction	1,989	2,128	2,647	5.9
Sub-total of commercial sector	19,770	20,863	26,221	5.8
Transportation & communication	3,755	3,928	4,819	5.1
Commerce, financing & insurance	9,646	10,118	12,624	5.5

(To be continued)

Targets of production by industrial sector (Continued)

(LE Million at 1986/87 prices)

	1986/87 (Expected)	1987/88 (Target)	1991/92 (Target)	Annual growth rate
Services	399	424	668	10.9
Sub-total of productive service sector	13,800	14,480	18,111	5.6
Public facilities & public utilities	820	896	1,409	11.4
Social services & insurance	1,842	1,923	2,375	5.2
Government services	4,599	4,898	6,010	5.5
Sub-total of social services	7,261	7,717	9,794	6.2
Total	40,832	43,050	54,126	5.8

Table 2-11 Investment during the plan period

(Unit: LE Billion & %)

	Investment	%
Total investment	46.5	100.0
Private sector	18.0	38.7
Public sector	28.5	61.3
Weight of investment by public sector by object:		
Replacement investment		21.2
Continuing investment		30.2
New investment		48.6
Total		100.0

Source: Egyptian Ministry of Planning and International  
Cooperation

## 2-2. Present condition of Egyptian steel industry

### 2-2-1. Introduction

Egypt is the first among Arab countries who has had an integrated steel mill. In 1954, the Government of Egypt established the Egyptian Iron & Steel Co. (HADISOLB) and in 1956, construction of an integrated steel mill was commenced and in 1958 No.1 blast furnace was blown in, completing an integrated steel mill with capacity of 350,000 t/y of crude steel.

The construction of HADISOLB was the first step in the development of Egyptian steel industry. Since then, in order to satisfy rapidly increasing steel demand, the Government announced in 1964 an expansion plan of the Works and the project was carried out in two stages, the first stage (1965-73) and the second stage (1974-78).

In addition, the Egyptian Government drew up a plan to construct a new integrated steel mill based on DR process to meet increasing steel demand, in particular bar and rod used as construction material, and in 1986, the El Dikheila Iron and Steel Works of ANSDK, a joint venture company, was put into operation. (See Chapter 5)

The start-up of El Dikheila Works embodying fruits of the modern, latest steelmaking technology can be said to mark the second step in the progress of the Egyptian steel industry succeeding the first step by the construction of HADISOLB.

### 2-2-2. Form of steel companies

The 1985 crude steel production in Egypt was 1,130,000 tons.

The Egyptian steel industry consists of public sector mills and private sector mills. Of the public sector mills, those which have capacity to produce crude steel are four as

described below, of which one company is a BF-based steel mill and the other three are open-hearth furnace and/or EAF based steel mills. (Refer to Table 2-13)

(1) The Egyptian Iron & Steel Co. (HADISOLB)

Hadisolb is the only BF-based integrated steel mill in Egypt, (Helwan Steel Works) established in 1954, and has 4 BFs, 7 BOFs and 2 EAFs and can produce almost all kinds of rolled steels from hot rolled sheet to long products. It has also coating lines such as tinning line and galvanizing line.

(2) Delta Steel Mill (DSM)

The company was established in 1944 and the mill has 4 EAFs and produces mainly concrete reinforcing bar by Bar mill. The company operates also section mill and casting plant (cast iron pipe).

(3) The Egyptian Copper Works (ECW)

The company was established in 1935 and has 2 EAFs and 2 OHFs and produces mainly concrete reinforcing bar by Bar mill. It has also a casting plant and produces cast iron pipe.

(4) The National Metal Industries Co. (Nametin, NMI)

The company was established in 1946 and has 2 OHFs. It produces mainly concrete reinforcing bar by 2 bar mills and also has Rod mill.

Those public sector mills are under the control of the Metallurgical Industries Corporation of Ministry of Industry. The Corporation controls also related metallurgical industry such as steel rolling companies, non-ferrous metal companies and ferro-alloy companies.



On the other hand, in the private sector, it is said there are about 15 companies engaged in producing bar and rod, and they are mostly small mills and the details of such mills' operation are not available.

Incidentally, ANSDK is a joint venture company and so considered to belong to the private sector.

### 2-2-3. Characteristics of steel demand

The Egyptian economy showed satisfactory progress in recent years and its growth rate (in real GDP) in the past years was 9.0% in 1983, 6.9% in 1984 and 5.9% in 1985.

Progress of the Egyptian economy brought about increase of steel demand, but the production of crude steel is at the level of 1 to 1.1 million tons as shown in Table 2-8 and the gap is covered by imports.

Steel demand in Egypt is characterized by high weight of construction sector (accounting for 75% of rolled steel consumed). And 85% of the construction demand is non-flat products. Therefore, the share of non-flat products can be said to account for 74% of the total steel consumption in Egypt.

On the other hand, production of non-flat products in Egypt is 477,000 tons in 1985, much less than the demand, and so the import of non-flat products is considerable.

Import of bar in 1985 was 1,976,000 tons, accounting for 79% of the total import of rolled steels.

Main supplying countries are Rumania, Spain, Cuba, Czechoslovakia, Yugoslavia, West Germany and East Germany.

As discussed above, as a result of the progress of the Egyptian economy, there is observed a considerable demand/supply gap in steel, in particular non-flat products used in construction and the Egyptian steel industry has plans to expand the capacity.

The contents of those expansion plans are not always clear, but it is expected that in the total of public sector and private sector, production capacity of crude steel in Egypt will reach about 3 million tons and that of long products 2.1 million tons. (See Tables 3-31 and 3-32 in Chapter 3.)

Table 2-12 Iron and Steel Production in Egypt,  
1980 - 85

(Unit: 1,000t)

Year	1980	1981	1982	1983	1984	1985
Production						
Pig Iron	1,005	917	1,067	990	939	950
Crude Steel	1,153	1,141	1,161	1,050	1,150	1,125
Rolled Product	883	880	848	693	813	864
Bar & Rod	468	496	482	347	406	477

Source: IISI and CAPMAS

Table 2-13 Public sector mills in Egypt

Companies	Major facilities	Capacity (1,000 t/y)	Products
The Egyptian Iron & Steel Co. (HADISOLB) (Helwan Works)	• Blast Furnace 575m <sup>3</sup> x2 1,033m <sup>3</sup> x2	1,630	Heavy plates Hot rolled coil/sheets, Cold rolled coil/sheets, angles, joints, channels, rails, sheet piling, bars, hot dipped tin plate, etc.
	• Sinter Plant	1,450	
	• Converter: Bessemer 17t/chx4 LD 80t/chx3		
	• Electric Furnace (12t/chx2)	50	
	• Continuous Caster: 2 str. for slabs CCx3 6 str. for billets CCx3	270	
	• Blooming mill (900 mm)		
	• Heavy section mill (750 mm)	80	
	• Medium section mill	200	
	• Bar mill	100	
	• Plate mill (1,800 mm)	75	
	• Hot strip mill (x2) 1,200 mm sem-continuous x1 Skelp, strip & sheet mill x1	627	
	• Cold strip mill	120	
	• Hot-dip tinning machine	48	
	• Hot-dip sheet galvanizing machine	10	
The National Metal Industries Co. (Nametin, NMI) (Kalyoubiah works)	• Open hearth furnace (36t/chx2)	83	Re-bars
	• Bar mill (x2)	196	
	• Rod mill	26	
Delta Steel Mill SAE (DSM) (Mostorod Works)	• Electric Furnace (12t/chx1, 18t/chx1, 25t/chx2)	145	Re-bars, Cast iron pipes
	• Section mill	41	
	• Bar mill	80	
	• Foundry plant		
The Egyptian Copper Works (ECW) (Alexandria Works)	• Electric furnace (5t/chx1, 25t/chx1)	53	Re-bars Secondary products in rods, Copper and aluminium products
	• Open hearth furnace (30t/chx1, 50t/chx1)	97	
	• Bar mill	75	
	• Steel foundry		

Source: Iron and Steel of the World

Table 2-14 Imports of bars and rods by countries of origin

(Unit: T)

	1983	1984	1985
Austria	16,230	—	—
Belgium	1,349	151	10,686
Brazil	41,637	8,180	10,447
Bulgaria	—	2,000	5,593
Cuba	32,056	35,872	33,438
Czechoslovakia	280,226	133,012	328,753
Denmark	8	—	3,464
England	2,434	6,110	30,530
France	5,315	21,517	10,326
Germany (GDR)	114,992	80,739	108,311
Germany (FRG)	156,149	53,428	111,171
Greece	146	—	33,467
Holland	17,688	—	—
Hungary	40	1,463	30,947
India	—	5,000	24,532
Italy	3,380	21,090	49,319
Japan	250	11,975	12,317
Korea (North)	11,000	—	9,992
Korea (Republic of)	9,000	19,995	1,985
Poland	13,498	2,010	—
Rumania	126,376	453,666	503,901
Spain	36,013	69,473	368,095
Switzerland	7,148	—	10,659
Sweden	—	1,798	11,207
Turkey	1,891	110,213	6,897
Uruguay	—	—	14,652
United States	656	1,721	48,601
U.S.S.R.	—	500	13,561
Yugoslavia	69,630	142,793	171,118
Others	14,006	49,089	11,507
Total	961,118	1,230,802	1,976,376

Source: CAPMAS

## Chapter III. STEEL DEMAND AND SUPPLY



### 3. Steel Demand and Supply

#### 3-1. Present situation of iron and steel industry in Egypt

##### 3-1-1. Production of iron and steel in Egypt

Iron and steel industry in Egypt consists of the public sector and the private sector. There are four steel mills in the public sector, of which the Egyptian Iron & Steel Co. (HADISOLB) is an integrated steel mill but the remaining three, the Egyptian Copper Works (ECW), Delta Steel Mill SAE (DSM) and the National Metal Industries Co. (NMI) are steel mills based on open hearth furnace and electric arc furnace processes. There are about 15 steel mills in the private sector, but except the Alexandria National Iron and Steel Co. (ANSDK), all the mills are of small scale and the details of their operation are unknown.

The capacity of their facilities as of 1986 is as shown in Table 3-1. The capacity given in the table is nominal but so-called "Effective capacity" is considered to be about 2.0 million T/Y in terms of crude steel and about 1.73 million T/Y in terms of finished steel judging from the actual production in the past.

Table 3-1 Capacity of Facilities of Steel Mills (as of 1986)

Unit: 1,000 T/Y

		Steel making	Steel rolling
Public sector	HADISOLB	1,500	982
	ECW	150	75
	DSM	145	121
	NMI	83	222
	Total	1,878	1,400
Private sector	ANSDK	840	745
	Others	0	655
	Total	840	1,400
Grand total		2,718	2,800

Note: ANSDK figures include the capacity of rod rolling mill plant completed in 1987.

Egypt's steel production by both sectors from 1980 to 1985 is about 1.15 million tons per year in crude steel and about 0.85 million tons per year in finished steel as shown in Table 3-2.

Table 3-2 Steel Production in Egypt

	Unit: 1,000 T/Y					
	80	81	82	83	84	85
Crude steel	1,153	1,141	1,161	1,050	1,150	1,125
Steel:						
Long products	468	496	482	347	406	477
Flat products	352	308	290	271	325	301
Others	63	76	76	75	82	86
Total	883	880	848	693	813	864

Sources: CAPMAS Statistics.  
IISI Statistics.

The term "Steel" shown above covers all of finished steel. And "Long products", "Flat products" and "Others" are classified as shown in Table 3-3.

Table 3-3 Classification of Steel

Long products:	Rail, shapes, sections, bars, wire rods, etc.
Flat products:	Sheet, plate, hot coil, cold coil, etc.
Others:	Pipe & tube, tyre, etc.

### 3-1-2. Steel import by Egypt

Egypt imports a considerable amount of steel, mainly bars, from various European countries. The import has shown an increase year by year and reached 2.49 million tons in 1985, the highest in the past.



Table 3-4 Egypt's Import of Steel by Product

Unit: 1,000 T

	1980	81	82	83	84	85	86
Long products	390	773	872	1,021	1,309	2,055	1,683
(Bars)	(363)	(679)	(812)	( 961)	(1,231)	(1,976)	(1,578)
(Others)	( 27)	( 94)	( 60)	( 60)	( 78)	( 79)	( 105)
Flat products	51	129	113	222	270	345	179
Others	31	65	144	139	132	89	126
Total	472	967	1,129	1,382	1,711	2,489	1,988

Source: CAPMAS Statistics.

Table 3-5 Egypt's Import of Steel by Country

Unit: 1,000 T

Import from	1980	81	82	83	84	85	86
Rumania	18	145	43	135	466	516	598
Yugoslavia	4	7	14	72	153	185	242
Czechoslovakia	47	104	266	300	172	364	172
Spain	23	59	89	48	90	394	166
East Germany	4	11	69	130	102	128	152
West Germany	53	93	185	235	112	185	89
Others	323	548	463	462	616	717	569
Total	472	967	1,129	1,382	1,711	2,489	1,988

Source: CAPMAS Statistics.

## 3-1-3. Steel export by Egypt

Steel export by Egypt still remains small as shown in Table 3-6.

Table 3-6 Steel Export by Egypt

Unit: 1,000 T

	1980	81	82	83	84	85	86
Long products	.	0	.	.	4	.	0
Flat products	29	14	23	20	15	1	20
Others	0	.	0	0	7	.	.
Total	29	14	23	20	26	1	20

Source: CAPMAS Statistics.

### 3-1-4. Apparent steel consumption in Egypt

In terms of apparent consumption of steel (i.e., Production minus Export plus Import), Egypt's steel consumption showed a favorable growth in line with economic growth as shown in Table 3-7. Particularly in 1985, it reached 3.35 million tons, showing a big increase of 0.85 million tons as compared with that in the preceding year. But as domestic production showed only a small rise, the major part of the increased consumption was covered by imported steel.

In 1986 also, if production of finished rolled steels is assumed to be 980,000 tons in view of the mill capacity, the apparent consumption of the steel products is estimated to be 2.95 million tons. The apparent consumption of the steel products in 1986 is 400,000 tons lower than that in the preceding year, reversing the trend, and this is mainly attributable to 500,000 tons decrease in import. As seen from this, the Egypt's demand for the steel products in recent years shows a wide fluctuation.

Table 3-7 Demand and Supply of Steel in Egypt

Unit: 1,000 T

	1980	81	82	83	84	85	86
Production	883	880	848	693	813	864	980*
Import	472	967	1,129	1,382	1,711	2,489	1,988
Export	29	14	23	20	26	1	20
Apparent Consumption	1,326	1,833	1,954	2,055	2,498	3,352	2,948

Source: CAPMAS Statistics.

Note: \* Estimated

3-1-5. Present steel consumption by each demand sector in Egypt

As the apparent consumption of finished rolled steel products in Egypt in the past three years fluctuated widely, it seems questionable to consider the actual demand in the year of 1985, on which the forecast of future demand for the steel products in Egypt is based, to be as shown in Table 3-7.

This was confirmed also by the field survey. Consequently, in estimating the present steel consumption by demand sector in Egypt, the statistical figures in the base year (1985) were adjusted. Namely, the average of the apparent consumption in 1984, 1985 and 1986 was regarded as the actual consumption of the steel products by kind of product in 1985. (See Table 3-8).

Based on these adjusted figures and referring to the component ratio of each demand sector obtained from the field survey and the component ratio by kind of product in each demand sector of Japan, Indonesia and Thailand in the past (Using by historical and cross-sectional analysis. See Attached Table A) and others, the steel consumption by kind of product in each demand sector in Egypt was estimated as shown in Tables 3-9 and 3-10.

The present Egypt's consumption of the steel products in each demand sector is accounted for 75% by construction and the remainder by manufacturing such as industrial machinery, electric machinery and automobile. In construction sector, 85% of the consumption is accounted for by long products. In industrial machinery and electric machinery sector and automotive sector the percentage of long products is 34% and 30%, respectively. As the weight of construction sector is high in the total demand, 74% of the total demand is long products.

Table 3-8 Supply and demand of steel in Egypt

Unit: 1,000 T

	84	85	86	1984~86 Average
Production: Long products	406	477	600	494
Bar	230	288	418	312
Rod	0	0	0	0
Section etc.	176	189	182	182
Flat products	325	301	300	309
Others	82	86	80	83
Total	813	864	980	886
Import: Long products	1,309	2,055	1,683	1,682
Bar	1,231	1,976	1,578	1,595
Rod	3	4	4	4
Section etc.	75	75	101	84
Flat products	270	345	179	264
Others	132	89	126	116
Total	1,711	2,489	1,988	2,062
Export: Long products	4	0	0	1
Bar	0	0	0	0
Rod	0	0	0	0
Section etc.	4	0	0	1
Flat products	15	1	20	12
Others	7	0	0	3
Total	26	1	20	16
Consumption: Long products	1,711	2,532	2,283	2,175
Bar	1,461	2,264	1,996	1,907
Rod	3	4	4	4
Section etc.	247	264	283	264
Flat products	580	645	459	561
Others	207	175	206	196
Total	2,498	3,352	2,948	2,932

Source: CAPMAS Statistics.

Production in 1986 (excl. bar) is estimated by  
production capacity.

Table 3-9 Present steel consumption pattern in demand sectors in Egypt

Units: 1,000 T

Construction	2,199	75%
(Housing)	(1,050)	(36)
(Others)	(1,149)	(39)
Manufacturing	733	25%
(Industrial and electric machinery)	(293)	(10)
(Automobile)	(131)	(4)
(Others)	(309)	(11)
<b>Total</b>	<b>2,932</b>	<b>100%</b>

Source: Field survey and interviews.

Table 3-10 Present steel consumption by steel product in each steel consuming industries in Egypt

Unit: 1,000 T, %

	Long Products				Flat products	Others	Grand total
	Total	Bars	Rods	Sections and others			
Construction Total	(85%) 1,870	(79%) 1,740	(-) 4	(6%) 126	(11%) 241	(4%) 88	(100%) 2,199
Housing	(85%) 893	(79%) 830	(-) 2	(6%) 61	(12%) 126	(3%) 31	(100%) 1,050
Others	(85%) 977	(79%) 910	(-) 2	(6%) 65	(10%) 115	(5%) 57	(100%) 1,149
Industrial and electric machinery total	(34%) 100	(17%) 51	(0) 0	(17%) 49	(49%) 143	(17%) 50	(100%) 293
Industrial machinery	(40%) 94	(20%) 48	(0) 0	(20%) 46	(40%) 94	(20%) 47	(100%) 235
Electric machinery	(10%) 6	(5%) 3	(0) 0	(5%) 3	(85%) 49	(5%) 3	(100%) 58
Automobile	(30%) 39	(27%) 35	(0) 0	(3%) 4	(57%) 75	(13%) 17	(100%) 131
Others	(54%) 166	(26%) 81	(0) 0	(28%) 85	(33%) 102	(13%) 41	(100%) 309
<b>Grand total</b>	<b>(74%) 2,175</b>	<b>(65%) 1,907</b>	<b>(-) 4</b>	<b>(9%) 264</b>	<b>(19%) 561</b>	<b>(7%) 196</b>	<b>(100%) 2,932</b>

### 3-2. Steel demand in Egypt in future

#### 3-2-1. Methods of forecasting steel demand

In forecasting demand for steel in Egypt in future, "micro-method forecast" is mainly used, and "macro-method forecast" is used supplementary.

(Ref. Attached Table B)

Table 3-11 Methods for Forecasting Steel Demand

Micro-method forecasting:

Steel consumption per unit of production in each steel consuming industry is to be assumed.



Future production activities of each steel consuming industry is to be forecasted.



Future demand for steel in each steel consuming industry is to be forecasted.

Macro-method forecasting:

Based on the equation of correlation between apparent crude steel consumption and GDP and final government consumption, apparent crude steel consumption in future is to be forecasted.

### 3-2-2. Micro-method forecasting

#### (1) Unit consumption of steel

Based on the above 3-1-5, consumption of steel products per unit of products (unit consumption of steel) in each steel consuming industry in Egypt is estimated as shown in Table 3-12. Steel consumption in automobile industry includes those for repair parts, tractor, trailer and others in addition to passenger car, truck and bus. Regarding "Others" of the construction and "the Other sectors", the amount in terms of GDP (real) is applied to their production activities.

Table 3-12 Present Unit Consumption of Steel by Steel Consuming Industries

	Production Activities	Steel Consumption (1,000 Tons)	Unit Con- sumption (Ton)
Construction:			
(Housing)	161(1,000 unit)	1,050	6.52174
(Others)	22,586(Mil.LE)	1,149	0.05087
Industrial & electric machinery:	21,008(1,000 LE)	293	0.01395
Automobile:	23(1,000 unit)	131	5.69565
Others:	22,586(Mil.LE)	309	0.01368

#### (2) Forecasting production activities in future

In forecasting the level of production activities in Egypt in future, the 2nd 5-year economic and social development plan starting in July 1987 were used as basis as much as possible. As for demand sectors for which no information was available from the 5-year plan, production activities in future was assumed based on information gained from the field survey, etc.

Annual growth rate of GDP is assumed to be 5.8% for the 2nd 5-year plan period and 6% for the following years up to 2000. The forecast of GDP in the 1981 prices is shown in Table 3-13. Based on this, the forecast of production activity of each demand sector and the steel demand therefrom are calculated as follows:

### Construction

#### Construction activities:

In Egypt, housing construction plays a main role in construction activities. As regards housing construction, statistical data of actual construction in past years were available, and data on future plans was obtained.

On the other hand, with respect to construction other than housing, such as commercial building, public facilities such as school and hospital or infrastructure such as port and road, etc., it is difficult to obtain statistical data in the past, and future plans are not available at present.

Such being the case, future construction activities of housing industry is forecasted based on such information as statistical data and future plans available, while regarding construction other than housing, it is assumed that growth similar to that of GDP (real) can be expected for the total of the non-housing construction. The forecast of housing construction is as follows:

According to the information obtained in Egypt, one million units of house are to be built during the period covered by the 2nd 5-year plan for economic and social development (1987-1991). Therefore, the number of housing construction up to 1991 is estimated from the above-mentioned information.



On the other hand, high correlation is found between the number of housing constructed and the population in Egypt in the past 10 years. Therefore, the number of housing constructed after 1992 is forecasted using the growth rate obtained by the correlation equation. The forecast of population is derived from "World Population Prospect" by United Nations.

Table 3-13 Forecast of GDP (Real)

	1976	77	78	79	80	81	82
GDP (Real) Mil.LE	11,759	12,690	13,974	15,186	16,265	17,343	18,305
Annual Growth rate %	107.2	107.9	110.1	108.7	107.2	106.6	105.5

	1983	84	85	86	90	91	95
GDP (Real) Mil.LE	19,953	21,330	22,586	23,941	29,884	31,617	39,916
Annual Growth rate %	109.0	106.9	105.9	106.0	105.8	105.8	106.0

	1996	2000
GDP (Real) Mil.LE	42,311	53,417
Annual Growth rate %	106.0	106.0

Note: Figures up to 1985 are actual data from CAPMAS statistics, and figures from 1986 to 1991 are estimated from 2nd 5-year plan.

Table 3-14 Forecast of Number of Housing Constructed  
 Unit: 1,000 units

Year	76	77	78	79	80	81	82	83	84
Number of Housing Constructed	20	53	116	130	157	151	169	150	129

Year	85	86	90	91	95	96	2000
Number of Housing Constructed	161	170	210	210	230	230	270

Note: Figures from 1976 to 1985 are actual.

Source: CAPMAS Statistics.

## Demand for steel:

Future demand for steel in construction is obtained by multiplying the above-mentioned unit consumption of steel by number of housing to be constructed or GDP (real) forecasted. However, varying factors such as change in the unit consumption of steel caused by change in the construction method are not taken into consideration as they are unforeseeable.

The correlation with cement consumption is shown in Attached Table D for reference.

Table 3-15 Forecast of Steel Demand by Construction

Unit: 1,000 T

	1990	1991	1995	1996	2000
<b>(Housing)</b>					
Long products	1,164	1,164	1,275	1,275	1,497
Flat products	164	164	180	180	211
Others	41	41	44	44	52
<b>Total</b>	<b>1,369</b>	<b>1,369</b>	<b>1,499</b>	<b>1,499</b>	<b>1,760</b>
<b>(Others)</b>					
Long products	1,293	1,367	1,727	1,830	2,310
Flat products	152	161	203	215	272
Others	75	80	101	107	135
<b>Total</b>	<b>1,520</b>	<b>1,608</b>	<b>2,031</b>	<b>2,152</b>	<b>2,717</b>
<b>Total of construction</b>					
Long products	2,457	2,531	3,002	3,105	3,807
Flat products	316	325	383	395	483
Others	116	121	145	151	187
<b>Total</b>	<b>2,889</b>	<b>2,977</b>	<b>3,530</b>	<b>3,651</b>	<b>4,477</b>

## Industrial and electric machinery

### Production activities:

As shown in Table 3-17, production amount of industrial machinery industry and electric machinery industry in Egypt shows generally a trend of increase though there is seen some dispersion in different years.

As the type of machinery and products of industrial and electric machinery industry vary greatly, it is considered extremely difficult to forecast production of each type of machinery. On the other hand, high correlation coefficient is obtained in the correlation between production amount (nominal) of industrial and electric machinery industry and GDP (nominal) in the past 10 years. Therefore, in this study, future production amount of industrial and electric machinery in the aggregate is forecasted based on the correlation equation.

Factors such as decrease in product cost in line with improvement of productivity and appearance of new products in future which may cause changes in the forecast are not taken into consideration as they are unforeseeable.

Table 3-16 Correlation Equation in Industrial and Electric Machinery Industry

$$Y=0.99577X_1 + 11.1417X_2 - 3,201$$

$$R=0.94 \quad DW: 2.11$$

where Y: Production amount (nominal, 1,000LE) of machinery (Industrial machinery and electric machinery)

X<sub>1</sub>: GDP (nominal, Mil. LE)

X<sub>2</sub>: GDP growth rate over the preceding year (%)

	X <sub>1</sub>	X <sub>2</sub>	Constant	Y(Theoretical)
1985	32,378	+ 1,299	- 3,201	= 30,476 (-224 = 30,252)
86	38,133	+ 1,312	- 3,201	= 36,244 (-224 = 36,020)
87	44,224	+ 1,292	- 3,201	= 42,315 (-224 = 42,091)
88	51,466	+ 1,297	- 3,201	= 49,562 (-224 = 49,338)
89	59,910	+ 1,297	- 3,201	= 58,006 (-224 = 57,782)
90	69,722	+ 1,297	- 3,201	= 67,818 (-224 = 67,594)
91	81,132	+ 1,297	- 3,201	= 79,228 (-224 = 79,004)
92	94,610	+ 1,299	- 3,201	= 92,708 (-224 = 92,484)
93	110,333	+ 1,299	- 3,201	= 108,431 (-224 = 108,207)
94	128,614	+ 1,299	- 3,201	= 126,712 (-224 = 126,488)
95	149,966	+ 1,299	- 3,201	= 148,064 (-224 = 147,840)
96	174,890	+ 1,299	- 3,201	= 172,988 (-224 = 172,764)
97	203,915	+ 1,299	- 3,201	= 202,013 (-224 = 201,789)
98	237,736	+ 1,299	- 3,201	= 235,834 (-224 = 235,610)
99	277,243	+ 1,299	- 3,201	= 275,341 (-224 = 275,117)
2000	323,236	+ 1,299	- 3,201	= 321,334 (-224 = 321,110)

Note: "-224" is a figure for the adjustment of difference between theoretical figures and actual ones.

Table 3-17 Forecast of Production Activities of  
Industrial and Electric Machinery Industry

Unit: LE 1,000

	1976	77	78	79	80	81	82	83
Industrial machinery (Nominal)	5,391	6,704	12,478	5,829	9,137	8,447	20,126	22,697
Electric machinery (Nominal)	582	560	394	403	2,355	951	867	1,492
Total (Nominal)	5,973	7,264	12,872	6,232	11,492	9,398	20,993	24,189
Total (Real)	10,479	11,227	18,389	7,508	12,084	9,398	18,947	19,445
GDP deflater	57.0	64.7	70.0	83.0	95.1	100.0	110.8	124.4

	1984	85	86	90	91	95	96	2000
Industrial machinery (Nominal)	23,858	28,925	---	---	---	---	---	---
Electric machinery (Nominal)	3,553	1,327	---	---	---	---	---	---
Total (Nominal)	27,411	30,252	36,020	67,594	79,004	147,840	172,764	321,110
Total (Real)	20,972	21,008	22,513	28,849	30,657	39,184	41,620	52,840
GDP deflater	130.7	144.0	160.0	234.3	257.7	377.3	415.1	607.7

Note: Figures up to 1985 are actual.

Source: CAPMAS Statistics.

#### Demand for steel:

Future demand for steel by industrial and electric machinery industry is forecasted by multiplying the unit consumption (Table 3-12) by the above-mentioned production amount of those sectors, but the production amount is converted to real terms of 1981 prices.

As regards change in weights of industrial and electric machinery industry in the demand for steel, it is forecasted from the past trend in other countries that the weight of industrial machinery industry will fall gradually while that of electric machinery industry will rise.

Table 3-18 Demand for Steel by Industrial and Electric Machinery Industry

Unit: 1,000 T

	1990	91	95	96	2000
<b>Industrial machinery</b>					
Long products	116	120	143	149	177
Flat products	115	120	142	149	177
Others	58	60	71	74	88
Total	<u>289</u>	<u>300</u>	<u>356</u>	<u>372</u>	<u>442</u>
<b>Electric machinery</b>					
Long products	12	13	20	22	31
Flat products	95	108	161	176	249
Others	6	7	10	11	15
Total	<u>113</u>	<u>128</u>	<u>191</u>	<u>209</u>	<u>295</u>
<b>Total of industrial and electric machinery</b>					
Long products	128	133	163	171	208
Flat products	210	228	303	325	426
Others	64	67	81	85	103
Total	<u>402</u>	<u>428</u>	<u>547</u>	<u>581</u>	<u>737</u>

Table 3-19 Change in Weight of Industrial Machinery and Electric Machinery in Steel Demand

Unit: %

	1985	86	90	91	95	96	2000
Industrial machinery	80	78	72	70	65	64	60
Electric machinery	20	22	28	30	35	36	40
<b>Total</b>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

## Automobiles

### Production activities:

As shown in Table 3-20, annual production of automobiles in Egypt since 1980 remained at the level of about 20,000 units including passenger car, truck and bus.

At present, GM of U.S.A. is constructing a car assembly plant (50,000 cars per year), and assuming that the plant would be in full operation by 1990 at latest, production of automobiles in 1990 and 1991 is forecasted to be 75,000 units per year. And for 1992 and following years, it is assumed that the production would increase at the speed same as that in 1986-91 (50,000 units in 5 years) and the production is forecasted to be 125,000 units in 1995 and 1996 and 175,000 units in 2000.

The automobile industry includes parts, trailer, farm tractor and others, and their production is forecasted to expand at the same speed.

Table 3-20 Forecast of Automobile Production

Unit: 1,000

	1976	77	78	79	80	81	82	83	84	85
Passenger car	10	13	14	16	19	17	25	20	21	19
Truck	1	2	1	2	2	2	3	3	3	3
Bus	-	-	-	1	1	1	1	1	1	1
Total	11	15	15	19	22	20	29	24	25	23

	1986	87	88	89	90	91	95	96	2000
Passenger car	---	---	---	---	---	---	---	---	---
Truck	---	---	---	---	---	---	---	---	---
Bus	---	---	---	---	---	---	---	---	---
Total	23	30	40	55	75	75	125	125	175

Note: Figures up to 1985 are actual.

Source: CAPMAS Statistics.



## Demand for steel:

Future demand for steel by automobile industry is forecasted by multiplying the unit consumption of steel by the number of unit of automobile expected to be produced in future. Factors such as change in production of cars by type, change in the unit consumption and substitution by other materials which may cause change in the forecast are not taken into account as they are unforeseeable.

Table 3-21 Demand for Steel by Automobile Industry  
Unit: 1,000 T

	1990	91	95	96	2000
Long products	127	127	212	212	297
Flat products	245	245	408	408	571
Others	55	55	92	92	129
Total	427	427	712	712	997

### Others

"Others" sector includes shipbuilding, container, etc., but their weight in the entire demand for steel is low, and besides their information and data are very limited, and so they are treated as one group, "Others". Since no effective forecasting method nor information and data could be obtained for forecast of their demand for steel in future, it is assumed that their demand would increase in line with the growth of GDP (real). Their future demand is forecasted by multiplying the unit consumption by GDP.

Table 3-22 Demand for Steel by Others Sector

Unit: 1,000 T

	1990	91	95	96	2000
Long products	220	233	293	311	393
Flat products	135	143	180	191	241
Others	54	57	73	77	97
Total	409	433	546	579	731

The demand for steel by all of the above steel consuming industries is calculated as shown in Table 3-23. Namely, the demand for steel in Egypt which was 2.93 million tons in 1985 is forecasted to reach 4.13 million tons in 1990, five years later, and 5.34 million tons in 1995, 10 years later, and 6.94 million tons in 2000. Annual growth rate during the period is around 6%, which is about same as the GDP growth rate.

By kind of products, in 2000, the demand for long products will be 4.71 million tons which is 2.2 times as much as that in 1985, while that for flat products will be 1.72 million tons which is 3.1 times as much as that in 1986.

Table 3-23 Demand for Steel by All Steel Consuming Industries

Unit: 1,000 T

	1985*	1990	1991	1995	1996	2000
Long products	2,175	2,932	3,024	3,670	3,799	4,705
Flat products	561	906	941	1,274	1,319	1,721
Others	196	289	300	391	405	516
Total	2,932	4,127	4,265	5,335	5,523	6,942

Note: \* Figures for 1985 is the average of apparent consumptions of 1984, 1985 and 1986.

Long products can be divided into "Bars", "Wire rods" and "Others" as shown in Table 3-24.

Table 3-24 Breakdown of Demand for Long Products

Unit: 1,000 T

	1985*	1990	1991	1995	1996	2000
Bars	1,907	2,572	2,651	3,210	3,318	4,106
Wire rods	4	6	6	6	7	9
Bars and wire rods total	1,911	2,578	2,657	3,216	3,325	4,115
Others	264	354	367	454	474	590
Total	2,175	2,932	3,024	3,670	3,799	4,705

Note: \* Figures for 1985 is the average of apparent consumptions of 1984, 1985 and 1986.

### 3-2-3. Change in the composition of demand by steel consuming industries

Because of difference in growth speed of production among steel consuming industries, the composition of demand for steel by steel consuming industries is expected to undergo a considerable change in future as shown in Table 3-25. Namely, the weight of construction will fall from 75% in 1985 to 64% in 2000, while that of manufacturing will rise from 25% in 1985 to 36% in 2000.

Table 3-25 Change in the Composition of Steel Demand by Steel Consuming Industries

Unit: %

	1985	90	91	95	96	2000
Construction	75	70	70	66	66	64
(Housing)	(36)	(33)	(32)	(28)	(27)	(25)
(Others)	(39)	(37)	(38)	(38)	(39)	(39)
Manufacturing	25	30	30	34	34	36
(Industrial & electric machinery)	(10)	(10)	(10)	(10)	(11)	(11)
(Automobile)	(4)	(10)	(10)	(14)	(13)	(14)
(Others)	(11)	(10)	(10)	(10)	(10)	(11)
Total	100	100	100	100	100	100

3-2-4. Change in the composition of Steel Demand by Steel Product

The change in the composition of demand for steel by steel consuming industries is also reflected in the change in the composition of demand by steel product. Namely, the growth rate of manufacturing whose demand shows high weight in flat products is higher than that of construction whose demand is high in long products, the percentage of long products will fall from 74% in 1985 to 68% in 2000, while that of flat products will rise from 19% in 1985 to 25% in 2000.

Table 3-26 Change in the Composition of Steel Demand by Steel Product

Unit: %

	1985	90	91	95	96	2000
Long products	74	71	71	69	69	68
Flat products	19	22	22	24	24	25
Others	7	7	7	7	7	7
Total	100	100	100	100	100	100

### 3-2-5. Macro-method forecasting

As mentioned above, the steel demand is forecasted by so-called "Micro-method forecast" where the demand for steel from each steel consuming industries is forecasted and aggregated to arrive at the future steel demand in Egypt. In Addition to this forecast, the steel demand is forecasted also by so-called "Macro-method forecast" using Correlation equation between GDP and apparent crude steel consumption.

#### Correlation equation between GDP and apparent crude steel consumption

A study of correlation between major relevant indicators of GDP and apparent crude steel consumption in the past 16 years shows a very high correlation between the apparent crude steel consumption and GDP as well as final government consumption (both in real term). Therefore, the apparent crude steel consumption is forecasted using the following correlation equation. The result gives that the apparent crude steel consumption will increase 2.6 times from 3.32 million tons in 1985 to 8.76 million tons in 2000 and such increase is almost same as that (2.4 times) of the demand for steel forecasted by "Micro-method forecast".

Table 3-27 Correlation Equation for Forecasting  
Apparent Crude Steel Consumption

$$Y = 0.12618X_1 + 3.23240X_2 + 0.36464X_3 + 3.00983X_4 - 1,729$$

$$R = 0.98 \quad DW = 1.65$$

where Y: Apparent crude steel consumption (1,000 T)

X<sub>1</sub>: GDP (real, Mil. LE)

X<sub>2</sub>: GDP growth rate over the preceding year

X<sub>3</sub>: Final government consumption (real, Mil. LE)

X<sub>4</sub>: Growth rate over the preceding year of  
the final government consumption (%)

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	Constant	Y (Theoretical)
1985	2,851	+ 342	+ 1,446	+ 315	- 1,729	= 3,225 (+98 = 3,323)
86	3,021	+ 343	+ 1,505	+ 313	- 1,729	= 3,453 (+98 = 3,551)
87	3,184	+ 341	+ 1,568	+ 314	- 1,729	= 3,678 (+98 = 3,776)
88	3,369	+ 342	+ 1,636	+ 314	- 1,729	= 3,932 (+98 = 4,030)
89	3,564	+ 342	+ 1,709	+ 314	- 1,729	= 4,200 (+98 = 4,298)
90	3,771	+ 342	+ 1,788	+ 315	- 1,729	= 4,487 (+98 = 4,585)
91	3,989	+ 342	+ 1,872	+ 315	- 1,729	= 4,789 (+98 = 4,887)
92	4,229	+ 343	+ 1,963	+ 316	- 1,729	= 5,122 (+98 = 5,220)
93	4,483	+ 343	+ 2,061	+ 316	- 1,729	= 5,474 (+98 = 5,572)
94	4,751	+ 343	+ 2,166	+ 316	- 1,729	= 5,847 (+98 = 5,945)
95	5,037	+ 343	+ 2,278	+ 317	- 1,729	= 6,246 (+98 = 6,344)
96	5,339	+ 343	+ 2,399	+ 317	- 1,729	= 6,669 (+98 = 6,767)
97	5,659	+ 343	+ 2,530	+ 317	- 1,729	= 7,120 (+98 = 7,218)
98	5,999	+ 343	+ 2,670	+ 318	- 1,729	= 7,601 (+98 = 7,699)
99	6,359	+ 343	+ 2,820	+ 318	- 1,729	= 8,111 (+98 = 8,209)
2000	6,740	+ 343	+ 2,982	+ 318	- 1,729	= 8,654 (+98 = 8,752)

Note: "+98" is a figure for the adjustment of difference  
between theoretical figures and actual ones.

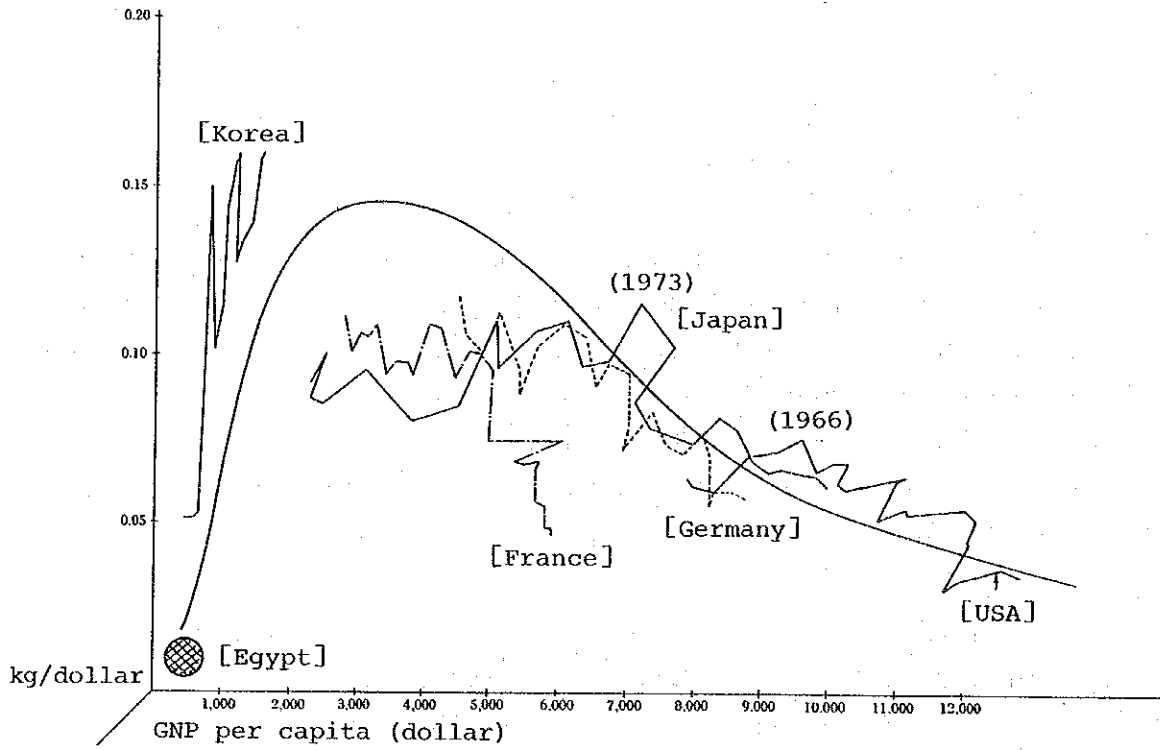
### Steel Intensity Curve:

Generally, there is seen a certain correlation between economic growth and steel consumption in a nation. Generally speaking, steel consumption in a nation increases as its economy expands. However, the past experience in the countries who consume much steel indicates that the growth of economy and increase of steel consumption are not always parallel. When the economy reaches a certain point, or when steel consumed reaches a certain level, steel consumption tends to show decrease. Steel intensity curve given in Fig. 3-1 shows such correlation between the economic growth and the steel consumption.

As shown in the chart below, for example, steel consumption per unit of GNP began to show decrease in 1966 in U.S. and 1973 in Japan. On the other hand, in South Korea which is in the course of economic development and whose stock of steel consumed is still low, the steel consumption per unit of GNP is high and very likely to show further growth in future. (Ref. Attached Table C)

As Egypt in 1986 is on the way of economic growth as South Korea and its stock of steel consumed is still low, it can be expected that steel consumption will show a considerable expansion in future. It is difficult to grasp its future steel demand directly from the steel intensity curve, but in view of the general trend given in the chart it can be considered that the growth of steel demand can be expected to such an extent as forecasted by "Micro-method" and the "correlation equation between GDP and apparent crude steel consumption".

Fig. 3-1 Steel Intensity Curve



Source: Projection 85 IISI.



3-2-6. Comparison between the present forecast and the past ones

Forecast of steel demand in Egypt has been conducted by a number of organizations. These reports except EGITALEC REPORT were prepared years before, and it is unreasonable to compare those forecasts directly with the present forecast. Shown below are the past reports of forecast of steel demand in Egypt and annual growth rate of the demand given in the forecasts are shown only for reference.

Table 3-28 Reports of Forecast of Steel Demand in the Past

Organization	Name of Report	Completed
WSA	Strategic Planning for Metallurgical Industry in ARE	1977
USEC	Expansion of HADISOLB	1978
JICA	Feasibility of Iron and Steel Plant in ARE	1978
UNIDO	Master Plan for the Egyptian Iron & Steel Sector	1979
BSC(OS)	Proposal for HADISOLB	1983
EGITALEC	Sectoral Study for Egyptian Steel Industries up till year 2000	1985

Table 3-29 Growth Rate Given in Forecasts of Steel Demand in Egypt (from '85 to 2000)

Organization	Annual Growth Rate
WSA	10.2 %
USEC	6.4 %
JICA ('78)	9.5 %
UNIDO	9.0 %
BSC(OS)	5.0 %
EGITALEC	5.8 %
JICA ('88)	5.9 %

Incidentally, comparison between the present forecast and that of EGITALEC REPORT, which is the latest of the above reports, shows that as seen in Table 3-30, the present forecast is higher due to the increase in the actual demand in the base year (1985).

Table 3-30 Comparison between Present Forecast and EGITALEC REPORT

Unit: 1,000 T

	1985	90	91	95	96	2000
Steel in aggregate:						
Present forecast	2,932	4,127	4,265	5,335	5,523	6,942
EGITALEC REPORT	2,698	3,683		4,800		6,300
Long products:						
Present forecast	2,175	2,932	3,024	3,670	3,799	4,705
EGITALEC REPORT	1,908	2,539		3,120		3,780

### 3-2-7. Capacity expansion plans of existing steel mills

Capacity expansion plans of existing steel mills in Egypt are not available in detail, but those known at present are as shown in Table 3-31.

Table 3-31 Capacity Expansion Plans of Existing Steel Mills

Unit: 1,000 T

Public Sector	1986	1990	1995
Steel in aggregate	830	1,090	1,540
Long products	450	480	695

Private sector	1986	1990	1995
ANSDK	745	745	745
B.S.C.	80	150	180
SHINNAWI	30	40	60
HODA MISR	20	30	50
AYAD'S & SONS	5	50	50
UNITED	3	50	60
Others	<u>12</u>	<u>110</u>	<u>290</u>
Total	895	1,175	1,435

Sources: ANSDK and Metallurgical Industries Corp. etc.  
(Interviews).

Based on the above expansion plans, this study assumed future capacity expansion plans in Egypt to be as shown in Table 3-32.

In the public sector, as for rolling mill capacities up to 1991, it is assumed to increase as shown in the Table 3-31 above and further increase at the same rate as that in 1986-91 is assumed in 1992 and after. The capacity of long products up to 1995 is to increase as shown in the Table 3-31 above and further increase at the same rate as that in 1990-95 is assumed in 1996 and after. It is assumed that the increment of the capacity of long products includes only bars and rods and that the capacity of sections, etc. remains as it is.

In the private sector, the capacity up to 1995 is to increase as shown in Table 3-31 above and that in 1996 and after to increase at the same rate as that in 1990-95. The expansion plans in the private sector are all confined to long products, in particular bars and rods, and no plan for sections is envisaged.

Increment of nominal capacity in both sectors is assumed to be equal to effective capacity.

Table 3-32 Capacity Expansion Plans of Existing Steel Mills

Unit: 1,000 T

	1985	86	90	91	95	96	2000
[Steel products total]							
Public sector	830	830	1,090	1,170	1,540	1,650	2,170
Private sector	70	895	1,175	1,225	1,435	1,495	1,750
(ANSDK)	0	745	745	745	745	745	745
(Others)	70	150	430	480	690	750	1,005
Total	900	1,725	2,265	2,395	2,975	3,145	3,920
[Long products]							
Public sector	430	450	480	510	695	710	1,000
Bars and rods	220	230	260	290	475	490	780
Sections etc.	210	220	220	220	220	220	220
Private sector	70	895	1,175	1,225	1,435	1,495	1,750
Bars and rods	70	895	1,175	1,225	1,435	1,495	1,750
(ANSDK)	0	745	745	745	745	745	745
(Others)	70	150	430	480	690	750	1,005
Sections, etc.	0	0	0	0	0	0	0
Total	500	1,345	1,655	1,735	2,130	2,205	2,750
Bars and rods	290	1,125	1,435	1,515	1,910	1,985	2,530
Sections, etc.	210	220	220	220	220	220	220

Note: The above plans do not include the expansion plan of ANSDK which is the subject of this F/S. The figures represent the capacity after expansion.

### 3-2-8. Forecast of steel demand and supply balance

In 1985 apparent steel consumption in Egypt was 3.35 million tons whereas domestic steel production was only 860,000 tons. The demand and supply gap was 2.49 million tons with self-supply ratio being as low as 25.8% and Egypt depends upon imports mainly from Europe to fill the gap.

There are much difficulty in forecasting steel demand and supply balance in future, because there are a number of uncertain factors such as steel demand and supply balance in

the steel exporting countries overseas, prices of imported steel and foreign exchange reserve condition of Egypt. However, based on the above forecast of steel demand and the expansion plans, the future demand and supply balance is forecasted as shown in Table 3-33.

According to the table, the future steel demand and supply balance in Egypt will show a continuing supply shortage of 1.8-3.0 million tons a year in terms of the total of finished rolled steel products. As the self-supply ratio will be around 55%, though higher than at present, it will be necessary for Egypt to continue steel imports. Regarding long products also, there will be shortage of 1.3-2.0 million tons a year and dependence on imports will continue.

The demand and supply condition of bars and rods (in terms of the total of bars and rods, as it is difficult to classify clearly the future plans into bars and rods) which are of special interest will show a supply shortage of 1.1-1.6 million tons in 1990 and after, even if expansion plans of a number of facilities in the private sector are taken into account, and the self-supply ratio is expected to remain at around 55-60%. The above supply shortage is calculated on the assumption that future operating rate of the expanded production facilities is 100%, and actually the gap may be much larger.

When the expansion project of El Dikheila Works is implemented as planned in this study, production of re-bars and billets is expected to increase by 375,000 T/Y and 670,000 T/Y, respectively. In view of the demand and supply balance of re-bars in Egypt, the expansion project is judged fully realizable.

Table 3-33 Forecast of Steel Demand and Supply Balance

Unit: 1,000 T

	1985	90	91	95	96	2000
[Steel Products Total]						
Demand A	2,932	4,127	4,265	5,335	5,523	6,942
Production B	864	2,265	2,395	2,975	3,145	3,920
Gap (B - A)	-2,068	-1,862	-1,870	-2,360	-2,378	-3,022
B/A (%)	29.5	54.9	56.2	55.8	56.9	56.5
[Long products]						
Demand A	2,175	2,932	3,024	3,670	3,799	4,705
Production B	477	1,655	1,735	2,130	2,205	2,750
Gap (B - A)	-1,698	-1,277	-1,289	-1,540	-1,594	-1,955
B/A (%)	21.9	56.4	57.4	58.0	58.0	58.4
[Bars and rods Total]						
Demand A	1,911	2,578	2,657	3,216	3,325	4,115
Production B	288	1,435	1,515	1,910	1,985	2,530
Gap (B - A)	-1,623	-1,143	-1,142	-1,306	-1,340	-1,585
B/A (%)	15.1	55.7	57.0	59.4	59.7	61.5
[Sections, etc.]						
Demand A	264	354	367	454	474	590
Production B	189	220	220	220	220	220
Gap (B - A)	-75	-134	-147	-234	-254	-370
B/A (%)	71.6	62.1	59.9	48.5	46.4	37.3

Note: Export is not taken into account in the balance.

Operating rate of the facilities in 1990 and after is estimated at 100%. Figures for demand in 1985 is the average of figures of 1984, 1985 and 1986. Production in 1985 is actual.

### 3-2-9. Market for wire and wire products in Egypt

The term "wire rod" is generally vague, and wire rods under study here, except bar in coil, is defined as "Wire rod for wire industry."

Present demand and supply of wire and wire products in Egypt is shown in Table 3-34.

According to the industry book "Iron and Steel Works of the World, 8th Edition", one or two mills seem to have capacity to produce wire rod, but it was known by the field survey that in fact wire rod is not produced in Egypt.

Production of wire and wire products in Egypt is at present 65,000 t/y including wire rope, welding electrode, wire and nail.

On the other hand, import of wire and wire products including the above is 17-27,000 t/y.

As there seems no export of wire and wire products, the total consumption of the wire products in Egypt at present is assumed to be in a scale of about 100,000 t/y. But besides the above, there is about 10,000 t/y of demand for bolts and nuts. As they are produced from wire rod or bar, the demand for wire and wire products in Egypt may be considered higher than the above.

As it is said that the market for wire and wire products is an epitome of the steel market as a whole, the final use of the products is mainly in construction sector but extends to all branches of manufacturing sector in Japan, one of the most developed steelmaking countries in the world. Compared to Republic of Korea which shows a marked progress of steel industry among NICs, per capita steel consumption in Egypt is one fourth of that in Republic of Korea and Egyptian demand for wire and wire products is also one fourth

of that in Republic of Korea. (See Attached Table E.) Thus the relation between per capita consumption of steel and demand for wire and wire products seems constant in every country.

It may be said that the market for wire and wire products in Japan and Republic of Korea has progressed in line with the growth of steel demand and it is considered that the same trend can be expected in the market for wire and wire products in Egypt in future. Promotion and development of secondary and tertiary wire rod processing industries which need relatively small investment and are easy to organize may be a future task to promote demand for wire rod in Egypt.



Table 3-34 Demand and supply of wire and wire products in Egypt

Unit: 1,000 T

		1984	1985	1986
Production	Wire rope	3.1	5.6	4.8
	Welding electrode	9.0	13.3	6.8
	Mild steel	8.5	12.6	6.2
	Co <sub>2</sub> gas submerged	0.5	0.7	0.6
	Wire	9.7	9.5	8.5
	Galvanized	7.6	7.3	6.5
	Annealed	2.1	2.2	2.0
	Nail	32.1	36.0	46.2
	Total	53.9	64.4	66.3
Imports	Strand wire, cable	2.1	2.2	2.0
	Wire	16.7	24.5	15.3
	Coated	8.5	12.6	6.2
	Barbed	-	0.9	-
	Other	8.2	11.0	9.1
	Nail	-	-	-
	Total	18.8	26.7	17.3
{Reference}				
Bolt, Nut etc.				
	Production	3.9	2.6	**
	Imports *	5.8	2.9	3.3
	Imports of cold * finished steel bar	1.1	5.3	1.9

Sources: CAPMAS and Others

Notes: \* Export from 11 major western steel producing countries (Estimated by The Japan Iron and Steel Federation)

\*\* not available

### 3-3. Steel distribution in Egypt

#### 3-3-1. Steel price policy in Egypt

In Egypt, in line with a rapid increase of population and its gravitation towards cities, necessity of housing construction and requirement for improvement of various infrastructure is rapidly increasing. Availability of various materials including steel is essential and in particular demand for steel which is basic material is showing an ever increasing trend. In this section, distribution of steel in Egypt will be discussed with emphasis on bars and wire rods, and especially rebars, which account for a large part of steel consumption in the country.

The Government of Egypt aims at realization of fair redistribution of national income by ensuring stability of prices of bars and wire rods used in public projects and keeping construction cost of housing and other infrastructure as low as possible. Accordingly, the government provides four public sector steel mills with indirect subsidies such as supply of utilities including electric power at low cost.

On the other hand, prices of rebars for specified uses which are regarded to be useful for social development such as general housing, public buildings except amusement facilities, buildings under new city projects, buildings for production of construction materials, requirements for pre-fabricated housing, water supply and sewerage, food storage facilities, irrigation for agriculture, reclamation projects are controlled by a decree issued by the Ministry of Housing and Utilities.

The so-called "Controlled prices" under the control of the Ministry of Housing and Utilities are, for example, presently LE400/ton for the base size of 37 kg reinforcing bars, but as for rebars produced by steel mills in the public sector, LE375 of the price is paid to the Ministry of Industry and the remaining LE25 is paid as subsidy to the Ministry of Housing and Utilities.

However, such subsidies by the state is said causing difficulty in the national finance and study is being made on plans to improve the situation including review of the controlled prices.

### 3-3-2. Steel distribution channel in Egypt

Distribution channel for bars and wire rods in Egypt is roughly classified into "Distribution channel for specified use (mainly public sector)" and the other, so-called "Free distribution channel" as shown later.

#### Distribution channel for specified use

Distribution of bars and rods for "specified use" is under the control of the Ministry of Housing and Utilities. After grasping production plans of rebars by size of four public sector steel mills and demand from all users in the public sector, the Ministry of Housing and Utilities determines allocation of bars and rods for each user. For this purpose, meetings are held once a year by the Ministry of Housing and Utilities and the 4 steel mills regarding production of bars and rods to decide production quantity in the year. In addition, the both parties meet every month to adjust the production of bars and rods in the following month.

However, the office directly related to the steel mills and the users is the Egyptian Cement Sales Office under the Ministry of Housing and Utilities. This Office buys bars and rods from the 4 public sector steel mills and private sector steel mills for "specified use", and supplies the bars and rods to the users. In addition, Egypt is chronically in short of rolled steel and depends on import to cover the shortage, and, therefore, the Office is also responsible for import of bars and rods for specified use.

### Free distribution channel

Bars and rods other than those for specified use mentioned above are supplied to the users through the free distribution channel. Bars and rods distributed through the free distribution channel include mainly those produced by the private sector steel mills, those for the free distribution channel produced by the 4 public sector steel mills and imported ones.

Distribution channel in the private sector is not yet fully established in Egypt. However, in line with the increase in the volume of steel traded, function of distributors such as financing is sought and development of distribution system remains needed in future. Distributors may be classified by their function as shown in Table 3-35.

Table 3-35 Classification of Steel Distributors

Category	Function
Importers:	They engage in import business, but in many cases they do not have stockyards. Therefore, they sell steel to wholesalers direct from cargo vessels as soon as steel is imported. There are about 60 firms, of which only about 20 are in operation.
Traders:	They perform financial function and buy steel direct from steel mills and resell it to wholesalers. Functionally they are similar to importers, but do not engage in import business and their number is very limited.
Wholesalers:	Their purchasing route are roughly divided into three: (i) Purchasing of imported steel from importers, (ii) Purchasing of domestic steel from traders, and (iii) Direct purchasing of domestic steel from steel mills. Steel purchased is held in their own stockyards and sold to final users or retailers. There are about 100 firms.
Retailers:	They buy steel from wholesalers and sell it to small users.



### 3-3-3. Prices of steel distributed in Egypt

#### Controlled prices

As mentioned above, the Egyptian government has set up controlled prices for both domestic and imported reinforcing steel bars and rods "for specified use" which are used in certain public projects. The controlled prices are published every year according to the decree issued by the Ministry of Housing and Utilities. The controlled prices of rebars show a rising trend as shown in Table 3-36, and the base prices as of 1986 are LE400/ton for 37 kg class and LE440/ton for 52 kg class.

Table 3-36 Controlled Prices of Rebars

Unit: LE/T

Ministerial Decree	Dia	Mild Steel Bars 37			Mild Steel Bars 52		
		Base	Premium	Selling Price	Base	Premium	Selling Price
No 194 of 1984	19 mm and more	263	—	263	283	—	283
	16 mm and more	263	3	266	283	3	286
	12 mm and more	263	8	271	283	8	291
	10 mm and more	263	16	279	283	16	299
	8 mm and more	263	25	288	283	25	308
	6 mm and more	263	33	296	283	33	316
No 24 of 1985	19 mm and more	350	—	350	390	—	390
	16 mm and more	350	5	355	390	5	395
	12 mm and more	350	13	363	390	13	403
	10 mm and more	350	23	373	390	23	413
	8 mm and more	350	32	382	390	32	422
	6 mm and more	350	40	390	390	40	430
No 405 of 1986	19 mm and more	400	—	400	440	—	440
	16 mm and more	400	5	405	440	5	445
	12 mm and more	400	13	413	440	13	453
	10 mm and more	400	23	423	440	23	463
	8 mm and more	400	32	432	440	32	472
	6 mm and more	400	40	440	440	40	480

Free market prices

Bars and rods other than those used for the specified use are sold at so-called "free market prices". For information, price of rebars delivered at the despatching yard of ANSDK shows change as shown in Table 3-37.

Table 3-37 Ex ANSDK Mill Price of Rebars

Unit: LE/T

December, 1986	527.657
January, 1987	527.730
February, 1987	517.400
March, 1987	501.000

Generally speaking, free market prices are governed by factors such as domestic demand and supply condition, import prices and raw material prices, etc. However, since no import restriction is in effect at present in Egypt, the free market prices depend on import price (CIF), customs duties and import charges and condition of profit.

Incidentally, the import tariff rate of reinforcing bar is 20% and its excise tax is LE5/ton at present. Calculation of the import duties and components of market price of imported rebars are as given below.

Import duties and excise tax:

- (i) Price, on which import duties are imposed:  
\$245/ton (Fixed)
- (ii) Exchange rate for calculation of import duties:  
LE 1.49/\$1.00
- (iii) Price in Egyptian Pound for import duties:  
LE365.05/ton
- (iv) Unloading expense (2% of the above):  
LE 7.30/ton

(v) Sub-total	LE372.35/ton
(vi) Import duties (20% of the above):	
	LE 74.47/ton
(vii) Excise tax:	LE 5.00/ton (Fixed)
(viii) Total of import duties and excise tax:	
	LE 79.49/ton

Note: The exchange rate in (ii) above is gradually being shifted every month toward the free market rate and will be unified with the floating exchange rate in the first half of 1988.

Components of market price:

In the following is given outline of breakdown of selling price of imported rebars delivered at Cairo from an importer to a wholesaler assuming the price CIF Alexandria of imported rebars to be \$190, which is the lowest actual example of late.

(i) CIF Alexandria price:	\$ 190.00/ton
(ii) Floating exchange rate:	LE 2.23/\$1.00
(iii) CIF Alexandria price in LE:	LE423.70/ton
(iv) Unloading expense:	LE 7.25/ton
(v) L/C charge, interest, etc.:	LE 4.00/ton
(vi) Import duties & excise tax:	LE 79.47/ton
(vii) Truck freight charge:	LE 7.00/ton
(viii) Total:	LE521.42/ton

To this total, a margin of importer, which is believed to be LE10/ton max, is added and further withholding tax of 1% added, the re-bars are sold to the wholesalers at about LE536.74/ton.



### 3-3-4. Billets

With the start-up of the Steel Making Plant in May 1986, ANSDK commenced production of billets. It was planned to supply those billets to the Bar Rolling Mill Plant and the Rod Rolling Mill Plant. Though the Bar Rolling Mill Plant was put into operation in July 1986, the Rod Rolling Mill Plant started up in April 1987. As a result, the majority of the billets was supplied to the Bar Rolling Mill Plant, but some billets were sold outside until the Rod Rolling Mill Plant was put into operation.

Enquiries for ANSDK's billets were received from three public sector steel mills and six private sector steel mills. ANSDK entered into sales contracts with two public sector steel mills and three private sector steel mills.

ANSDK's shipment and average unit prices of billets to those customers are as shown in Table 3-38.

Table 3-38 Shipment of Billets by ANSDK

Month	Shipment	Unit Price	Stock (for Sale)
1986 August	2,499 (Ton)	410 (LE)	3,295 (Ton)
September	6,470	410	2,179
October	5,224	420	5,239
November	2,339	430	12,907
December	4,407	430	15,957
1987 January	1,999	400	27,713
February	3,032	410	40,469
March	10,011	385	32,979
April	6,087	385	43,284
Total	42,068		

Incidentally, billets sold but not yet shipped as of April 1987 amount to about 56,000 tons, and therefore it is assumed that the total of billets which ANSDK entered into sales contract is about 98,000 tons. Incidentally, the average unit price decreased due to slow market condition, but at present it is on the rise.

As already mentioned, the Rod Rolling Mill Plant started up in April 1987, and when this Plant is put in full operation, ANSDK will have no billets for outside sale. But in case the capacity expansion plan of ANSDK which is under study by this Feasibility Study is implemented, it is expected that 67,000 tons of billets will have to be sold outside annually. Considering the present sales condition of ANSDK, it should be possible for ANSDK to sell all of such billets to the customers within Egypt, although the price will be influenced from time to time by the market conditions of bars and rods.

Attached Table A Steel consumption by Consuming Sectors  
and by products in Japan, Indonesia and  
Thailand

Japan: 1966

Unit: %

	Long Products				Flat Products	Others	Total
	Bars	Rods	Others	Total			
Construction	31		30	61	26	13	100 (47)
Housing	39		11	50	41	9	100 ( 7)
Others	30		34	64	23	13	100 (40)
Manufacturing industries	10	15	6	31	64	5	100 (53)
Industrial machinery	20		19	39	43	18	100 ( 8)
Electric machinery	4		6	10	87	3	100 ( 4)
Automobile	2		4	6	91	3	100 ( 9)
Others	11	26	3	40	57	3	100 (32)
Total	20	8	17	45	46	9	100(100)

Source: Japan Iron and Steel Federation

Indonesia: 1983

Unit: %

	Long Products			Flat Products	Others	Total
	Bars	Others	Total			
Construction	38	14	52	32	16	100 (65)
Housing	48	4	52	41	7	100 (34)
Others	28	25	53	22	25	100 (31)
Manufacturing industries	22	12	34	56	10	100 (35)
Industrial machinery	5	5	10	65	25	100 ( 1)
Electric machinery	0	0	0	100	0	100 ( 1)
Automobile	21	0	21	72	7	100 ( 3)
Others	0	38	38	52	10	100 (30)
Total	26	20	46	40	14	100(100)

Source: Japan International Cooperation Agency

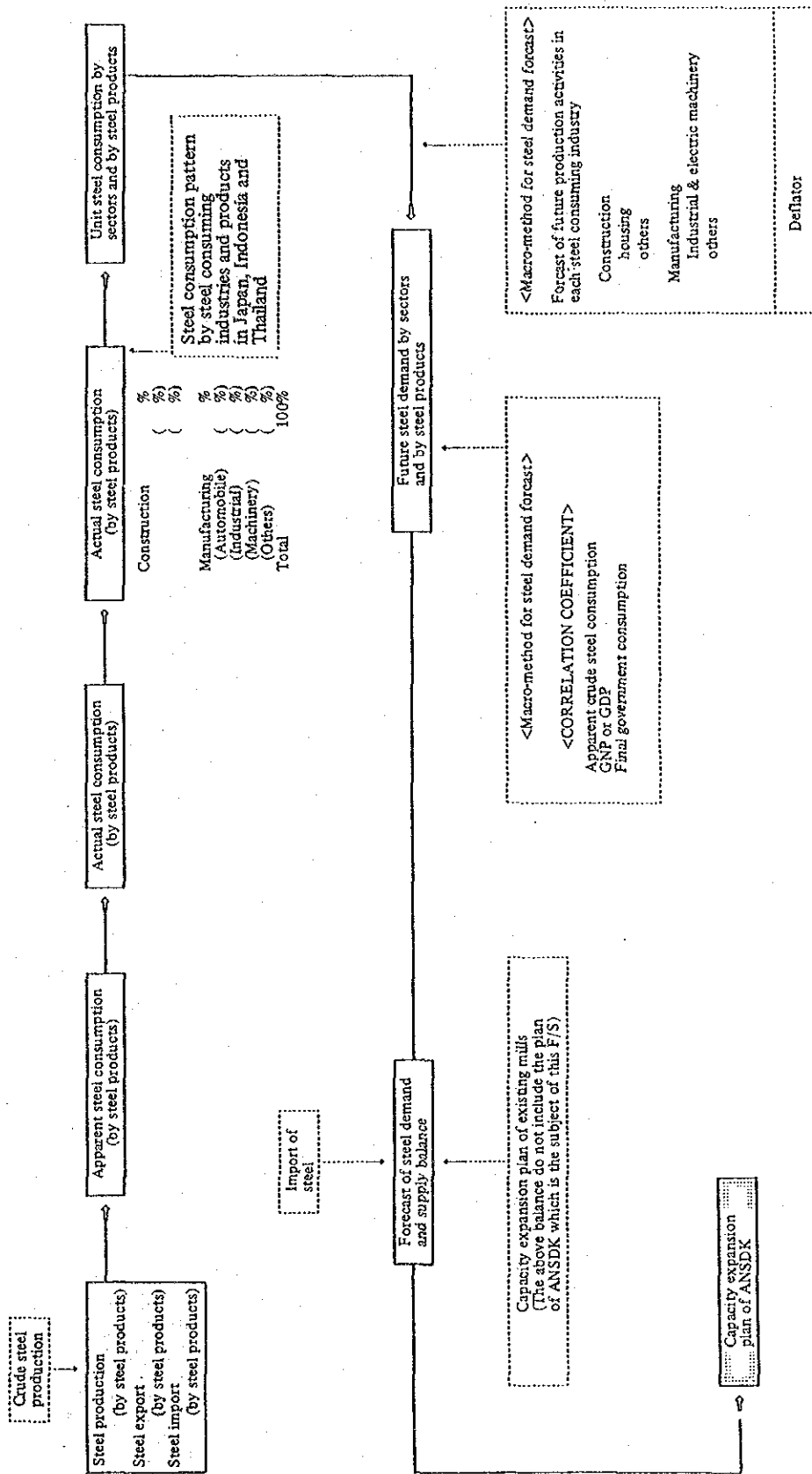
Thailand: 1975 to 1977 Average

Unit %

	Long Products			Flat products	Others	Total
	Bars	Others	Total			
Construction	53	12	65	25	10	100 (61)
Housing	61	14	75	22	3	100 (45)
Others	31	7	38	31	31	100 (16)
Manufacturing industries	10	24	34	59	7	100 (39)
Industrial machinery	3	2	5	83	12	100 ( 9)
Electric machinery	0	0	0	100	0	100 ( 0)
Automobile	27	3	30	57	13	100 ( 2)
Others	10	34	44	51	5	100 (28)
Total	36	17	53	38	9	100(100)

Source: Japan International Cooperation Agency

Attached Table B - Calculation Flow for Steel Demand and Supply



Attached Table C Data used for Calculation of Steel Intensity Curve

[Egypt]

	Year												
	60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	5,893	6,011	5,113	6,430	6,626	6,815	7,619	7,977	7,908	8,381	8,494	8,907	9,251
Exchange rate (yen per dollar)													
Real GNP US dollar	4,531	4,622	4,700	4,944	5,095	5,240	5,858	6,133	6,080	6,444	6,531	6,848	7,113
Population	2,592	2,658	2,726	2,795	2,866	2,939	3,014	3,913	3,169	3,250	3,333	3,408	3,484
GNP per capita	175	174	172	177	178	178	194	198	192	198	196	201	204
Apparent Steel Consumption													
Apparent Steel Consumption per GNP											0.0141	0.0139	0.0146

	Year												
	73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	9,130	9,595	10,967	11,759	12,690	13,974	15,186	16,265	17,343	18,305	19,953	21,328	22,586
Exchange rate (yen per dollar)													
Real GNP US dollar	7,020	7,377	8,432	9,041	9,757	10,744	11,676	12,506	13,335	14,074	15,341	16,399	17,366
Population	3,562	3,642	3,723	3,787	3,879	3,982	4,098	4,229	4,347	4,467	4,592	4,719	4,850
GNP per capita	197	203	226	239	252	270	285	296	307	315	334	348	358
Apparent Steel Consumption	993	1,080	1,562	1,246	1,308	1,283	1,714	2,236	2,270	2,478	2,604	3,010	3,323
Apparent Steel Consumption per GNP	0.0141	0.0146	0.0188	0.0138	0.0134	0.0119	0.0147	0.0179	0.0170	0.0176	0.0170	0.0184	0.0191

Sources: International Financial Statistics (IMF) , Steel Statistical Yearbook (IISI)

Attached Table C Data used for Calculation of Steel Intensity Curve

[Japan]

		Year												
		60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	Billion Yen	50,327	57,512	61,657	68,109	77,050	90,373	99,853	110,237	124,046	139,055	152,208	158,767	172,318
Exchange rate (yen per dollar)														
Real GNP US dollar	Billion dollar	211.0	241.5	258.5	285.5	323.0	378.9	418.6	462.1	520.0	582.9	638.1	665.5	722.4
Population	10 thousand persons	9,410	9,495	9,583	9,681	9,783	9,888	9,979	10,083	10,196	10,317	10,434	10,570	10,719
GNP per capita	dollar	2,242	2,543	2,697	2,949	3,302	3,832	4,195	4,583	5,100	5,650	6,115	6,296	6,739
Apparent Steel Consumption	1,000 Ton	19,302	25,488	22,526	24,375	30,908	28,488	35,032	50,699	49,805	62,459	71,125	60,313	71,008
Apparent Steel Consumption per GNP	KG/dollar	0.0915	0.1055	0.0871	0.0854	0.0957	0.0752	0.0837	0.1087	0.0958	0.1072	0.1115	0.0963	0.0983

		Year												
		73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	Billion Yen	185,923	183,285	186,189	197,215	207,738	218,522	230,074	240,176	248,726	256,395	264,704	278,119	290,684
Exchange rate (yen per dollar)														
Real GNP US dollar	Billion dollar	779.4	768.4	788.9	826.8	870.9	916.1	964.5	1,006.9	1,042.7	1,074.9	1,109.7	1,165.9	1,218.6
Population	10 thousand persons	10,871	10,016	11,157	11,277	11,386	11,490	11,578	11,678	11,765	11,845	11,926	12,002	12,075
GNP per capita	dollar	7,156	7,672	7,071	7,332	7,649	7,973	8,330	8,622	8,863	9,075	9,305	9,714	10,092
Apparent Steel Consumption	1,000 Ton	89,319	78,976	68,080	65,220	63,205	66,652	78,163	79,007	71,136	69,594	65,614	74,367	73,377
Apparent Steel Consumption per GNP	KG/dollar	0.1146	0.1028	0.0863	0.0789	0.0726	0.0728	0.0810	0.0785	0.0682	0.0647	0.0591	0.0638	0.0602

Sources: International Financial Statistics (IMF) , Steel Statistical Yearbook (IISI)

Attached Table C Data used for Calculation of Steel Intensity Curve

[USA]

	Year	60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	Billion Dollar	1,427.4	1,464.6	1,542.4	1,605.7	1,691.4	1,789.4	1,892.9	1,946.9	2,027.7	2,077.1	2,071.1	2,129.9	2,235.9
Population	10 thousand persons	18,068	18,369	18,654	18,924	19,189	19,430	19,656	19,871	20,071	20,268	20,505	20,766	20,900
GNP per capita	dollar	7,900	7,973	8,268	8,484	8,814	9,209	9,630	9,798	10,103	10,248	10,100	10,257	10,658
Apparent Steel Consumption	1,000 Ton	89,875	89,664	91,058	102,309	118,256	127,660	131,697	126,187	137,751	138,680	127,304	127,663	138,410
Apparent Steel Consumption per GNP	KG/dollar	0.0630	0.0612	0.0590	0.0637	0.0699	0.0713	0.0750	0.0648	0.0679	0.0668	0.0615	0.0599	0.0619

	Year	73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	Billion Dollar	2,352.1	2,339.5	2,310.1	2,422.9	2,536.1	2,670.2	2,736.3	2,732.0	2,784.7	2,713.8	2,809.5	2,991.5	3,073.1
Population	10 thousand persons	21,191	21,385	21,597	21,804	22,024	22,259	22,506	22,774	23,004	23,235	23,454	23,668	23,928
GNP per capita	dollar	11,100	10,940	10,696	11,112	11,515	11,996	12,158	11,996	12,105	11,680	11,979	12,639	12,843
Apparent Steel Consumption	1,000 Ton	149,595	144,120	116,821	129,044	133,108	145,150	140,407	113,990	128,504	84,319	94,123	111,343	105,255
Apparent Steel Consumption per GNP	KG/dollar	0.0636	0.0616	0.0506	0.0536	0.0525	0.0544	0.0513	0.0417	0.0461	0.0311	0.0335	0.0372	0.0343

Sources: International Financial Statistics (IMF) - Steel Statistical Yearbook (IISI)



Attached Table C Data used for Calculation of Steel Intensity Curve

[F.R. of Germany]

	Year												
	60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	732.0	763.9	799.9	822.0	875.9	922.7	950.1	949.5	1,004.4	1,079.8	1,134.2	1,168.1	1,217.1
Exchange rate (yen per dollar)													
Real GNP US dollar	248.6	259.5	271.7	279.2	297.5	313.4	322.7	322.5	341.2	366.8	385.3	396.8	413.4
Population	5,543	5,618	5,694	5,759	5,827	5,901	5,950	5,987	6,017	6,044	6,071	6,129	6,157
GNP per capita	4,485	4,619	4,772	4,848	5,106	5,311	5,424	5,387	5,671	6,067	6,347	6,474	6,703
Apparent Steel Consumption	29,211	27,571	27,804	27,276	33,734	31,886	30,492	28,523	34,864	40,104	40,601	35,569	39,970
Apparent Steel Consumption per GNP	0.1175	0.1062	0.1023	0.0977	0.1134	0.1017	0.0945	0.0884	0.1022	0.1093	0.1053	0.0896	0.0957

	Year												
	73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	1,274.1	1,276.5	1,258.1	1,328.3	1,363.5	1,408.0	1,463.7	1,485.3	1,485.4	1,471.1	1,497.9	1,542.5	1,580.9
Exchange rate (yen per dollar)													
Real GNP US dollar	432.8	4,336	427.3	451.2	463.1	478.3	487.2	504.5	504.6	499.7	508.8	523.9	537.0
Population	6,197	6,204	6,183	6,151	6,140	6,131	6,144	6,156	6,167	6,164	6,142	6,118	6,102
GNP per capita	6,984	6,989	6,911	7,335	7,542	7,801	8,092	8,195	8,182	8,107	8,284	8,563	8,800
Apparent Steel Consumption	40,411	34,880	30,263	37,512	33,656	33,288	37,850	34,791	32,592	27,955	30,273	31,089	30,789
Apparent Steel Consumption per GNP	0.0934	0.0804	0.0708	0.0831	0.0727	0.0696	0.0761	0.1450	0.0646	0.0559	0.0595	0.0593	0.0573

Sources: International Financial Statistics (IMF) , Steel Statistical Yearbook (IISI)

Attached Table C Data used for Calculation of Steel Intensity Curve

[France]

	Year												
	60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	1,122.2	1,184.0	1,263.2	1,330.5	1,417.2	1,492.4	1,570.2	1,643.8	1,713.9	1,833.6	1,938.6	2,043.7	2,164.1
Exchange rate (yen per dollar)													
Real GNP US dollar	124.9	131.8	140.6	148.1	157.7	166.1	174.8	182.9	190.7	204.1	215.8	227.5	240.9
Population	4,568	4,616	4,700	4,782	4,831	4,876	4,916	4,955	4,991	5,032	5,077	5,125	5,170
GNP per capita	2,734	2,855	2,991	3,097	3,264	3,406	3,556	3,691	3,821	4,056	4,251	4,439	4,560
Apparent Steel Consumption	13,919	14,167	14,923	15,602	17,234	16,171	17,143	17,941	17,945	22,291	23,236	21,230	24,336
Apparent Steel Consumption per GNP	0.1114	0.1075	0.1061	0.1053	0.1092	0.0936	0.0981	0.0991	0.0941	0.1092	0.1077	0.0933	0.1010

	Year												
	73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	2,280.3	2,354.1	2,356.3	2,480.4	2,556.0	2,652.9	2,740.9	2,769.3	2,782.2	2,832.2	2,853.0	2,896.4	2,937.8
Exchange rate (yen per dollar)													
Real GNP US dollar	253.8	262.0	262.5	320.6	284.5	295.3	305.0	308.3	309.6	315.2	317.5	322.4	327.0
Population	5,213	5,249	5,279	5,291	5,315	5,338	5,361	5,388	5,418	5,448	5,473	5,495	5,517
GNP per capita	4,869	4,991	4,972	6,059	5,353	5,532	5,689	5,722	5,714	5,786	5,801	5,867	5,927
Apparent Steel Consumption	25,262	24,937	19,261	23,601	19,516	19,740	20,728	20,159	17,461	17,197	15,298	15,492	14,755
Apparent Steel Consumption per GNP	0.0995	0.0952	0.0734	0.0736	0.0689	0.0668	0.0680	0.0654	0.0564	0.0546	0.0482	0.0481	0.0451

Sources: International Financial Statistics (IMF) ; Steel Statistical Yearbook(IISI)

Attached Table C Data used for Calculation of Steel Intensity Curve

[Korea]

	Year	60	61	62	63	64	65	66	67	68	69	70	71	72
Real GNP	Billion Won	6,952	7,359	7,516	8,203	8,995	9,512	10,571	11,300	12,581	15,315	17,190	18,770	19,866
Exchange rate (yen per dollar)	Billion dollar													
Real GNP US dollar	10 thousand persons	79.9	84.6	86.4	94.3	103.4	109.3	122.7	129.9	144.6	176.0	197.5	215.7	228.6
Population	dollar	2,470	2,542	2,515	2,690	2,768	2,833	2,896	3,013	3,084	3,154	3,224	3,288	3,351
GNP per capita	1,000 Ton	323	333	330	351	374	386	424	431	469	558	613	655	682
Apparent Steel Consumption	KG/dollar									811	1,017	1,050	1,475	1,937
Apparent Steel Consumption per GNP										0.0561	0.0578	0.0531	0.0684	0.0847

	Year	73	74	75	76	77	78	79	80	81	82	83	84	85
Real GNP	Billion Won	22,754	24,555	26,406	29,760	32,979	36,320	38,982	37,915	40,723	43,035	47,744	51,873	54,545
Exchange rate (yen per dollar)	Billion dollar													
Real GNP US dollar	10 thousand persons	261.5	282.2	303.5	342.1	379.1	417.5	448.1	435.8	468.1	494.7	548.8	595.2	626.9
Population	dollar	3,410	3,469	3,528	3,585	3,641	3,697	3,753	3,812	3,872	3,933	3,995	4,058	4,121
GNP per capita	1,000 Ton	767	813	860	954	1,025	1,129	1,194	1,144	1,209	1,258	1,374	1,469	1,521
Apparent Steel Consumption	KG/dollar	3,396	4,222	3,120	3,877	5,434	6,565	7,104	5,554	7,512	6,607	7,646	9,481	9,996
Apparent Steel Consumption per GNP		0.1298	0.1496	0.1028	0.1133	0.1463	0.1572	0.1585	0.1274	0.1605	0.1336	0.1393	0.1590	0.1595

Sources: International Financial Statistics (IMF) , Steel Statistical Yearbook(IISI)

Attached Table D Steel Demand in the Construction Sector  
(Correlation with Cement Consumption)

Concerning the outlook of steel consumption in future, following study on correlation with the consumption of cement was made.

1) Outlook of consumption of cement

In order to examine the correlation with steel demand, firstly the consumption of cement in the past 11 years (1976-1986) as provided by the Ministry of Housing and Utilities was studied, and the consumption up to 2000 was forecasted by extrapolation.

The result of the forecast by the trend is as follows:

Consumption of Cement

$$Y = 1348.79t + 374.445$$

Y = Consumption of cement

t = Time (1976 = 1 ..... , 86 = 11 )

R : 0.91783

DW : 1.59011

(Actual)		(Forecast)	
1976	4,019 10 <sup>3</sup> T	1990	20,606 10 <sup>3</sup> T
1977	4,116	1991	21,955
1978	4,020	1992	23,303
1979	4,770	1993	24,652
1980	2,643	1994	26,001
1981	9,256	1995	27,350
1982	10,581	1996	28,699
1983	10,454	1997	30,048
1984	12,955	1998	31,397
1985	13,890	1999	32,745
1986	16,615	2000	34,094

Cement consumption and steel demand in the construction sector

In the report, the forecast of steel demand in the construction sector was calculated on the basis of the number of houses built in future and the consumption unit of steel products per house as for residential construction and on the basis of the correlation with GDP as for non-residential construction.

In the following, the future steel demand in the construction was forecasted on the basis of correlation between the cement consumption and the steel demand in the construction sector. It should be noted that the past data on the steel demand in the construction sector were not available and therefore the steel demand in the sector in the past years was assumed by using the 1985 figures based on the field survey as the base and applying growth rate of apparent crude steel consumption estimated by IISI in those years.

The result of the above forecast is as shown below and the figures forecasted for each year is somewhat higher than that forecasted in the report.

Correlation equation for forecasting  
steel demand in construction sector

$$Y = 0.127550X + 367.056$$

$$R : 0.98805$$

$$DW: 2.01550$$

Y = Steel demand in construction sector

X = Consumption of cement,  $10^3$  T

Forecast of steel demand in construction sector

(Actual)		(Forecast in the Report) B			
Year	$10^3$ T	(Forecast) A Year	$10^3$ T	$10^3$ T	A-B $10^3$ T
1976	825	1990	2,995	2,889	106
1977	866	1991	3,167	2,977	190
1978	849	1995	3,855	3,530	325
1979	1,134	1996	4,028	3,651	377
1980	1,480	2000	4,716	4,477	239
1981	1,502				
1982	1,660				
1983	1,723				
1984	1,992				
1985	2,199				

Apparent Steel Consumption

Year	10 <sup>3</sup> T
1976	1,246
1977	1,308
1978	1,283
1979	1,717
1980	2,236
1981	2,270
1982	2,478
1983	2,604
1984	3,010
1985	3,323

Source: International Iron and Steel Institute

Attached Table E Market of wire and wire products in Republic of Korea

Since the per capita apparent crude steel consumption of Egypt is about one fourth of that of Republic of Korea, the consumption of the wire and wire products in Egypt also can be assumed to be about one fourth of that in Republic of Korea (460,000 tons)

Domestic Shipment of Wire and Wire Products in Republic of Korea

Unit: 1,000 T

	1985	1986
Cold finished special steel bar		
Ordinary steel	62	71
Special steel	7	14
Galvanized low carbon steel wire	46	47
Hard drawn steel wire	26	31
Prestressed concrete hard drawn steel	13	15
Galvanized hard drawn steel wire	7	7
Wire strand	12	14
Barbed wire	3	2
Welding electrode	66	62
Low carbon steel wire	80	81
Wire rope	29	29
Nail	28	33
Spring	25	30
Others	23	25
<b>Total</b>	<b>427</b>	<b>461</b>

Source: Korea Iron and Steel Association.

Apparent Crude Steel Consumption per Capita

Unit: kg

Year	77	78	79	80	81	82	83	84	85
Egypt	34	32	42	53	52	55	57	64	69
Korea	182	180	187	146	194	168	191	234	243

Source: International Iron and Steel Institute.



## Chapter IV. RAW MATERIALS



#### 4. Raw Materials

##### 4-1. Iron ore (pellets and lump ore)

##### 4-1-1. General

Raw materials for DR plant (MIDREX Process) are iron oxide in the form of pellets or lump ore.

To ensure productivity of the subsequent steelmaking process by electric arc furnaces (EAF), pellets and lump ore used in DR plant should have favorable quality such as high Fe content, compression strength, low gangue ( $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ) and low impurities (P, S) as shown in Table 4-1.

In view of the past performance of DR plants, it is considered desirable that lump ore and pellets are blended at a ratio of lump ore 30% and pellets 70% in order to keep a desirable level of compression strength of raw materials in the reduction furnace and enable high temperature furnace operation, resulting in high productivity.

However, depending on location condition (availability of pellet plant, closeness to ore mines, etc.), it is necessary to take into consideration economic loss resulting from ore fines (5-10%) to be generated during handling of lump ore.

At present, there is not much price difference between pellets and lump ore. Therefore, with the exception of DR plants which have captive mines or those which can obtain lump ore at low cost as in Argentina, it is necessary to evaluate technical and economical aspects of blending of lump ores.

Table 4-1 Typical Specification Limits for DR-Grade Pellets and Lump Ore

Chemistry	Pellets		Lump Ore	
	Acceptable	Preferred	Acceptable	Preferred
%Fe	66.0 min.	67.0 min.	66.0 min.	67.0 min.
%(SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> )	3.5 max.	2.0 max.	3.5 max.	2.0 max.
%S	0.025 max.	0.015 max.	0.025 max.	0.015 max.
%P	0.03 max.	0.015 max.	0.03 max.	0.015 max.
%Cu	0.03 max.	0.01 max.	0.03 max.	0.01 max.
%TiO <sub>2</sub>	0.35 max.	0.15 max.	0.35 max.	0.15 max.
Size Nominal	5 x 18mm	6 x 16mm	5 x 50mm	10 x 35mm
% 10 x 35mm	---	---	70 min.	85 min.
% 9 x 16mm	85 min.	95 min.	---	---
%-5mm	5 max.	3 max.	8 max.	5 max.
Tumble Strength (%+5mm)	92 min.	95 min.	85 min.	90 min.
%-28 mesh	6 max.	4 max.	10 max.	7 max.
Compressive Strength Avg. (kg)	150 min.	250 min.	---	---
% less than 50 kg	5 max.	2 max.	---	---
MIDREX Linder (760°C)				
% metallization	91 min.	93 min.	91 min.	93 min.
%-3mm degradation	5 max.	2 max.	10 max.	5 max.
Hot Load Test (815°C)				
tumble strength (%+3mm)	90 min.	95 min.	85 min.	90 min.
avg. comp. strength (kg)	50 min.	100 min.	---	---
clustering	none	none	none	none

4-1-2. Supply source of pellets and lump ore for DR plant

In actual operations of DR plants which do not have captive mines and depend on imported iron ore, the materials from the following sources proved satisfactory.

- 1) Pellets: LKAB (Sweden)  
CVRD (Brazil)
- 2) Lump ore: MBR, MUTUCA (Brazil)

In addition to the above 3 brands, recently SAMARCO (Brazil) is increasing the supply of pellets for DR use.

The annual capacity and production of the above 4 brands are as shown in Table 4-2. Because of start-up of new DR plants such as HADEED (800,000 T/Y, 1983), Saba Gas Industries (SGI, 720,000 T/Y, 1984), and ANSDK (720,000 T/Y, 1986), supply of iron ore for DRI has been relatively tight, though the crude steel production and hence the demand for iron ore is rather sluggish throughout the world.

Table 4-2 Sales of Iron Ore for DR

(Million Tons/Year)

		Capacity	Sales (estimated)		Remarks
			1982	1985/86	
LKAB	Pellet	2.00	1.00	1.90	
CVRD	Pellet	2.00 ~ 3.00	1.10	2.40 ~ 2.70	No.1 Pellet plant (2 mil.T/Y) and partly No.2 plant (3 mil.T/Y)
Samarco	Pellet	2.00 ~ 2.50	0.50	1.60 ~ 2.20	One Pellet plant (5 mil.T/Y) for both DR- & BF-grade pellets
MBR (MUTUCA)	Lump	1.50	0.70	1.20	
MINPECO (Peru)	Pellet	0.30	0.30	0.30	for Argentina
Total		7.8 ~ 9.3	3.6	7.4 ~ 8.3	

In recent years, some integrated steel mills in U.S. and Europe shut down or idled their own pelletizing plants in the course of restructuring, and import low cost pellets from ore mines overseas. Because of such shutdown of pellet plants due to the rapid increase of fuel cost after the oil crisis and resultant decrease of pellet supply capacity, the worldwide supply of pellets for blast furnaces became tight, which also had an adverse effect on the demand and supply condition of pellets for DRI.

Expansion plans of iron ore supply for DR

On the background of recent rapid increase of demand for pellets, in particular for DRI, a number of mines are studying expansion plans.

LKAB: Construction of new pellet plant;

MBR (Mutuca): Expansion plan;

San Isidro, Venezuela: Construction of new pellet plant;

Others

Though the quality grade is somewhat inferior to the existing brands, there is a plant of KUDREMUKH, India to produce pellets with an annual capacity of 3 million tons.

4-1-3. Worldwide trend of DR plant

As shown in Table 4-3, the production by DR plants in the world increased from 2.69 million tons in 1975 to 7.20 million tons in 1980, and since then it showed a steady increase up to 12.71 million tons in 1986.

Table 4-3 Worldwide DRI Production

(Million Tons)

Process \ Year	1975	1980	1981	1982	1983	1984	1985	1986
MIDREX	1.11	3.97	4.25	3.87	4.08	4.94	5.99	6.79
HyL	1.09	2.43	2.75	2.70	3.04	3.25	3.71	4.04
Other Gas Based	0.26	0.43	0.48	0.33	0.34	0.35	0.51	0.54
Gas Based Total	2.46	6.83	7.48	6.90	7.46	8.54	10.21	11.37
Coal Based	0.23	0.37	0.41	0.38	0.34	0.67	0.81	1.34
Grand Total	2.69	7.20	7.89	7.28	7.80	9.21	11.02	12.71

Among those DR plants, there are many which use iron ore from their captive mines, and so in Table 4-4 is shown the production of DR plants based on iron ore imported from overseas mines. The production of such DR plants based on imported ore is 5.13 million tons in 1986, consuming 7.2 - 7.7 million tons of iron ore. However, considering that DR plant of ANSDK is still at the start-up stage and also that DR plant of SGI is on a learning curve after start-up, the production of those DR plants in the near future will be 6.06 million T/Y with iron ore requirement of 8.5 - 9.1 million T/Y.

#### Construction plans of DR plants in future

DR plants under construction at present include those at MISRATA, Libya which have a capacity of 1.1 million T/Y and are scheduled to be started up in 1987-88 and those of NISCO, Iran which have a capacity of 3.2 million T/Y and are planned to be completed around 1992. The latter company is engaged in the development of captive mines and is constructing a pellet plant. In addition, there are plans of DR plants as follow:

- 1) Jizel (Algeria): DR plant (Capacity 1.1 million T/Y + pellet plant)
- 2) Krakatau (Indonesia): The existing plant has nominal capacity of 2.3 million T/Y but its effective capacity utilization is 50% and it is planned to increase the capacity by one million T/Y by modernization and expansion.

3) MINORCA (Venezuela): HBI (hot briquetted iron) plant with the capacity of 0.7 million T/Y, iron ore being supplied from the captive mine.

4) Others: There are plans in Bangladesh and Argentina but their details are not available.

Table 4-4 Import Iron Ore Based DR Plant (MIDREX and HyL)

(Unit: Million Tons)

	Start-up	Rated Capacity	Production (1986)	Remarks
<b>MIDREX</b>				
HADEED (Saudi Arabia)	1982/1983	0.80	1.17	
ACINDAR (Argentina)	1978	0.60	0.63	
QASCO (Qatar)	1978	0.40	0.49	
SGI (Saba, Malaysia)	1984	0.72	0.48	
ISCOTT (Trinidad)	1980/1982	0.84	0.38	
DALMINE-SIDERCA (Argentina)	1976	0.33	0.32	
NHSW (West Germany)	1971	0.40	0.16	
DELTA STEEL (Nigeria)	1982	1.02	0.11	
ANSDK (Egypt)	1986	0.72	0.03	
Sub-Total		5.83	3.77	
<b>HyL</b>				
PT Krakatau (Indonesia)	1978/1982	2.30	1.36	
Total		8.13	Actual 5.13	Iron Ore Requirement (x1.5) 7.7

The effective DRI production in the near future:

6.06 million Tons/y (SGI + 0.24, ANSDK + 0.69)

Iron ore requirement for the above: 9.1 million tons/y



#### 4-1-4. Forecast of demand and supply of iron ore for DRI

At present, in addition to a rapid increase of DRI production the demand for pellets for blast furnaces is active, and therefore it is expected that the demand and supply of iron ore for DR will remain tight.

On the other hand, the world crude steel production since 1973 remained at a level of around 700 million tons a year, and consequently the world production and demand of iron ore are also sluggish as shown in Table 4-5 and Table 4-6. Though there may be a change in the regional share of the world steel production and a change among processes such as BF/DR and BOF/EAF in future, not so much increase of demand for iron ore as a whole can be expected.

Therefore, in medium-term and long-term views, the demand and supply condition of iron ore may be expected to be relatively stable and so the demand and supply condition of iron ore for DR could be also stable.

However, as pellets for DR require higher Fe content and other quality better than iron ore for other use, it may be necessary to consider long-term (3 to 5-year) contracts for 2 or 3 brands to ensure the stable supply of high quality ore in consideration of the future expansion of ANSDK.

Though the four brands afore-mentioned have proved satisfactory so far, it may be necessary to consider diversification of supply sources after confirming the applicability of other brands through laboratory tests and basket tests for ensuring economic purchase of required ore.

Table 4-5 World Iron Ore Production

	(Million Tons)									
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Belgium	63	47	42	0	0	0	0	0	0	0
Denmark	8	5	0	6	8	0	0	0	0	0
France	45,181	36,634	33,457	31,665	28,978	21,597	19,391	15,966	17,326	14,680
FR of Germany	2,256	2,487	1,597	1,649	1,948	1,575	1,314	979	979	1,034
Greece	2,208	2,052	1,620	1,850	1,600	1,280	515	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0
Luxembourg	2,079	1,547	835	631	560	429	0	0	0	0
Italy	542	461	353	208	179	128	5	0	0	0
Netherlands	0	0	0	0	0	0	0	0	0	0
United Kingdom	4,585	3,745	4,240	4,268	916	731	470	384	379	274
EC Total	56,922	46,978	42,144	40,277	34,189	25,740	21,695	17,329	18,684	15,988
Austria	3,785	3,450	2,789	3,200	3,200	3,050	3,290	3,540	3,600	3,270
Finland	1,059	1,047	954	969	1,009	1,060	1,086	1,046	1,040	914
Norway	3,921	3,724	3,776	4,249	3,807	4,064	3,266	3,535	3,723	3,468
Portugal	48	52	52	50	57	37	27	36	36	73
Spain	7,908	7,899	8,579	8,827	8,865	8,410	7,621	7,449	7,961	6,451
Sweden	29,861	25,416	21,486	26,619	27,174	23,225	16,138	13,212	18,123	20,577
Turkey	1,771	3,190	3,210	1,960	2,574	2,240	2,646	2,645	2,040	3,254
Yugoslavia	4,260	4,451	4,563	4,616	4,504	4,793	5,105	5,018	5,315	5,850 E
Other Western Europe	52,613	49,229	45,409	50,490	51,190	46,879	39,179	36,481	41,838	43,857
Total Western Europe	109,535	96,207	87,553	90,767	85,379	72,619	60,874	53,810	60,522	59,845
Canada	56,013	54,431	42,941	47,323	50,173	49,696	36,259	29,930	37,810	38,800
United States	79,252	56,275	82,015	86,489	70,727	75,188	36,000	38,574	52,097	48,770
Japan	760	684	595	460	478	441	362	298	324	340
Australia	93,255	95,923	83,134	91,717	95,534	84,661	87,694	71,040	88,969	92,497
New Zealand	2,470	2,650	3,020	3,910	3,160	3,480	2,980	2,200	2,290	2,520
South Africa	15,360	26,480	24,200	31,560	25,738	25,300	24,600	16,600	24,650	24,390
TOTAL INDUSTRIAL CTS.	356,645	332,650	323,458	352,226	331,189	311,385	248,769	212,452	266,662	267,162
Argentina	570	720	910	610	412	382	1,158	751	900	1,050
Brazil	92,610	80,940	84,440	95,460	97,240	97,900	93,100	92,100	112,100	118,500 E
Chile	9,970	7,660	7,040	8,290	8,960	7,480	6,356	5,809	5,590	5,840
Colombia	498	473	513	418	491	412	445	435	442	440
Mexico	5,470	5,380	5,330	6,440	8,149	8,736	8,795	7,888	10,544	9,500 E
Peru	4,764	6,190	4,934	5,417	5,679	5,954	5,629	4,287	3,979	4,892
Venezuela	18,891	13,761	12,562	14,184	15,416	14,858	11,157	10,187	12,723	14,710
Total Latin America	132,773	115,124	115,729	130,819	136,347	135,722	126,640	121,457	146,278	154,932

(continued)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Algeria	2,790	3,180	3,040	3,120	3,454	3,481	3,892	3,684	3,664	3,776
Angola	0	0	0	0	0	0	0	0	0	0
Liberia	20,390	18,140	18,390	18,350	18,250	19,540	18,000	15,410	16,100	16,120
Mauritania	9,540	7,340	7,080	8,910	8,940	8,270	8,210	6,600	9,100	9,200
Morocco	340	410	60	60	60	50	230	300	200	200
Sierra Leone	0	0	0	0	0	0	10	360	420	70 E
Swaziland	1,930	1,480	0	0	0	0	0	0	0	0
Tunisia	490	490	340	390	384	400	270	300	310	300
Total Africa	35,480	31,040	28,910	30,830	31,088	31,741	30,612	26,654	29,794	29,666
India	43,740	42,598	38,838	39,545	40,682	41,122	41,997	37,584	40,764	42,545
Republic of Korea	639	653	587	459	545	555	553	591	554	542
Malaysia	310	320	300	350	372	530	400	100	160	200
Philippines	570	0	0	0	0	0	0	0	0	0
Thailand	20	60	90	100	84	60	30	70	70	100
Total Asia	45,279	43,631	39,815	40,454	41,683	42,267	42,980	38,345	41,548	43,387
TOTAL DEVELOPING CTS.	213,532	189,795	184,454	202,103	209,118	209,730	200,232	186,456	217,620	227,985
TOTAL WESTERN WORLD	570,177	522,445	507,912	554,329	540,307	521,115	449,001	398,908	484,282	495,147
Bulgaria	2,316	2,270	2,453	2,103	1,886	1,754	1,552	1,803	2,063	1,985
Czechoslovakia	1,904	1,994	2,023	2,012	1,927	1,935	1,861	1,903	1,869	1,824
German Dem Rep	59	72	80	65	51	41	41	40	36	0
Hungary	358	262	283	285	198	196	214	215	193	184
Poland	674	659	529	249	104	105	49	10	11	12
Romania	2,834	2,467	2,511	2,523	2,333	2,304	2,146	1,987	1,916	2,287
USSR	239,109	239,716	244,231	241,597	244,762	242,416	244,410	245,189	247,104	247,700 E
Total Eastern Europe	247,254	247,440	252,110	248,834	251,261	248,751	250,273	251,147	253,192	253,992
China	65,000	60,000	70,000	75,000	75,000	70,000	71,000	72,000	77,000	77,000 E
DPR Korea	8,200	8,400	8,500	8,500	8,200	8,000	8,000	8,000	8,000	8,000 E
TOTAL CPE'S	320,454	315,840	330,610	332,334	334,461	326,751	329,273	331,147	338,192	338,992
WORLD TOTAL	890,631	838,285	838,522	886,663	874,768	847,866	778,274	730,055	822,474	834,139

Source: IISI

Table 4-6 Iron Ore Export In The World (1981-1986)

(Million Tons)

	1981	1982	1983	1984	1985		1986		
					Qt'y	Share (%)	Qt'y	Share (%)	1986/1985 (%)
France	6.4	5.8	5.0	4.7	4.6	1.2	P 4.2	1.2	-8.7
Norway	3.7	2.3	2.9	3.1	2.6	0.7	2.5	0.7	-3.8
Spain	2.0	1.7	1.7	2.1	2.0	0.5	E 1.8	0.5	-10.0
Sweden	17.7	12.6	14.3	17.6	18.2	4.8	17.1	4.7	-6.0
Other Europe	0.1	0.1	0.1	--	--	--	--	--	--
S. Total	29.9	22.5	24.0	27.5	27.4	7.3	25.6	7.0	-6.6
U.S.S.R.	44.1	42.8	42.8	45.9	43.9	11.7	42.0	11.6	-4.3
Algeria	1.5	1.4	1.3	1.1	0.0	0.0	0.0	0.0	--
Angola	0.1	--	0.1	--	--	--	--	--	--
Liberia	20.7	16.3	15.4	16.8	16.1	4.3	14.5	4.0	-9.9
Mauritania	8.6	7.8	7.4	9.5	9.3	2.5	8.9	2.5	-4.3
Sierra Leone	--	--	0.4	0.4	P 0.1	0.0	0.0	0.0	-100.0
S Africa	14.0	11.3	7.8	11.9	10.2	2.7	8.8	2.4	-13.7
Other Africa	0.1	--	--	--	--	--	--	--	--
S. Total	45.0	36.8	32.4	39.7	35.7	9.5	32.2	8.9	-9.8
Canada	41.5	30.1	25.5	30.7	32.2	8.6	P29.0	8.0	-9.9
U.S.A.	5.6	3.2	3.8	5.1	5.1	1.4	P 4.8	1.3	-5.9
S. Total	47.1	33.3	29.3	35.8	37.3	9.9	33.8	9.3	-9.4
Brazil	81.0	72.7	70.0	88.6	92.3	24.6	95.0	26.2	2.9
Chile	6.7	5.5	4.7	5.6	4.8	1.3	4.8	1.3	0.0
Peru	5.4	5.8	4.3	4.2	5.4	1.4	4.5	1.2	-16.7
Venezuela	12.4	6.6	6.2	8.5	9.0	2.4	10.0	2.8	11.1
S. Total	105.5	90.6	85.2	106.9	111.5	29.7	114.3	31.5	2.5
India	23.9	25.4	22.0	25.7	28.8	7.7	E30.5	8.4	5.9
Other Asia	--	--	--	--	--	--	--	--	--
S. Total	23.9	25.4	22.0	25.7	28.8	7.7	E30.5	8.4	5.9
Australia	73.9	74.8	76.3	88.0	88.6	23.6	P82.5	22.7	-6.9
New Zealand	2.9	2.5	2.5	2.2	2.1	0.6	P 2.3	0.6	9.5
S. Total	76.8	77.3	78.8	90.2	90.7	24.2	84.8	23.3	-6.5
World Total	372.3	328.7	314.5	371.7	375.3	100.0	363.2	100.0	-3.2

P: Preliminary E: Estimations

## 4-2. Steel Scrap

### 4-2-1. Present situation in Egypt

The supply of steel scrap to the steel industry (mainly 3 steel mills based on open hearth furnace and electric arc furnace processes) in Egypt is about 180,000 T/Y, remaining in the range of 180,000 to 200,000 T/Y in recent years as shown in Table 4-7.

Table 4-7. Domestic Supply of Scrap for Egyptian Steel Industry

Year	Quantity	(Unit: Ton)
1980/81	187,740	
1981/82	146,203	
1982/83	198,551	
1983/84	194,003	
1984/85	181,824	

Source: CAPMAS

So far, the users of domestic scrap were the existing three steel mills based on open hearth and electric arc furnace processes, namely, National Metal, Delta Steel and ECW. In addition to scrap, those mills purchase 50,000 - 60,000 T/Y of pig iron from HADISOLB.

As the recycling system is not well established for scrap, the supply of scrap is getting tight after EAFs of ANSDK were put into operation (April, 1986). Incidentally no scrap was imported in the past 4-5 years.