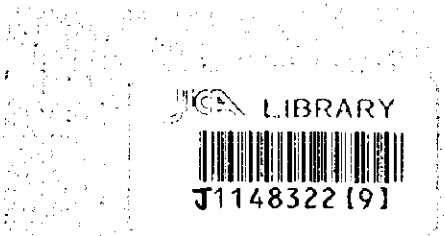
JAPAN INTERNATIONAL COOPERATION AGENCY
MINISTRY OF COMMERCE & INDUSTRY
THE SULTANATE OF OMAN

THE FEASIBILITY STUDY
OF
THE DIRECT REDUCTION PLANT BASED STEEL COMPLEX PROJECT
IN
THE SULTANATE OF OMAN

FINAL REPORT



FEBRUARY 1999

KOBE STEEL, LTD.
IN ASSOCIATION WITH
NKK CORPORATION

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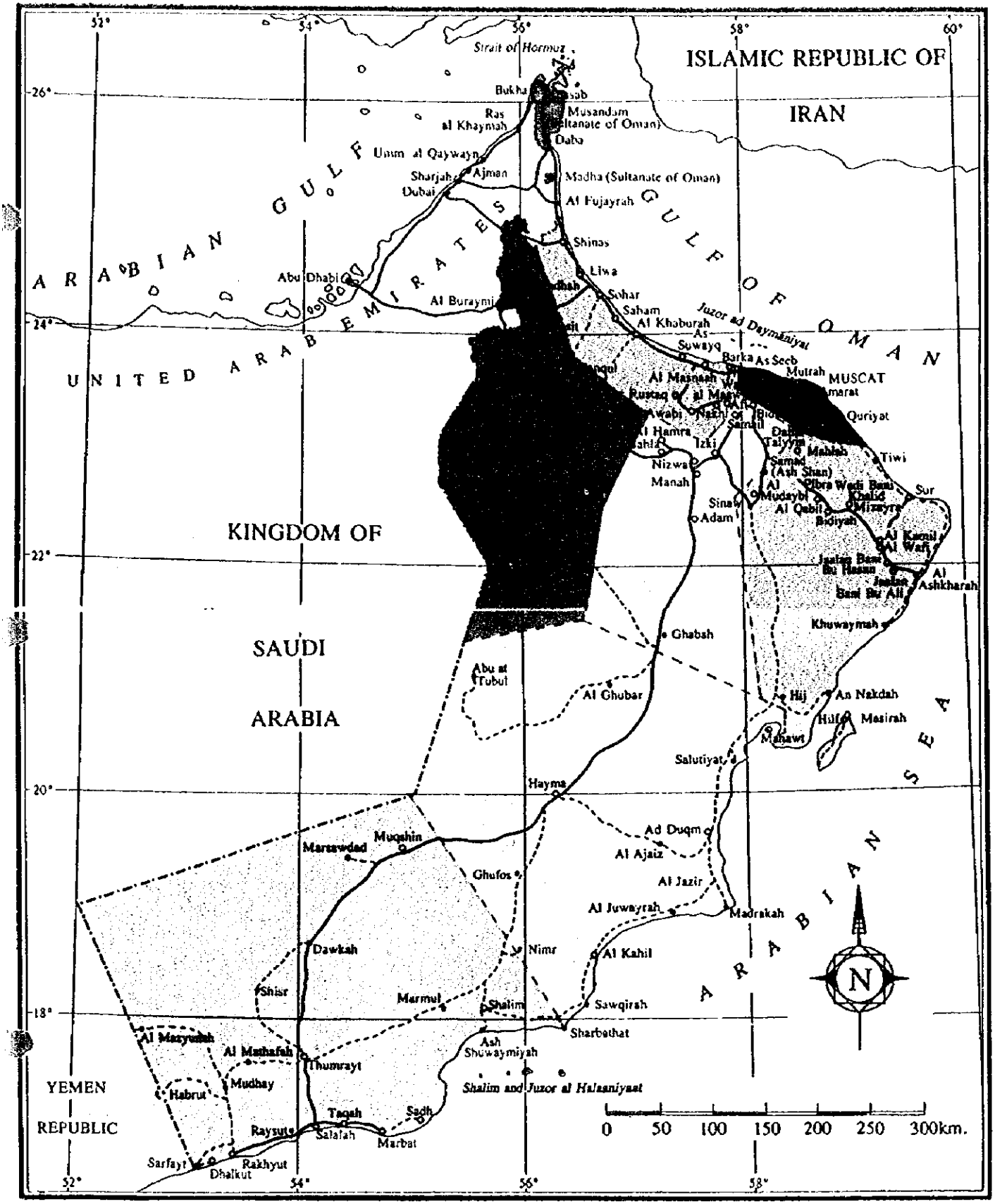


Produced by the Ministry of Information, September 1994

Based on National Survey Authority OR 1, edition 6 dated June 1994

This map is not an authority on international boundaries

o Wilayat

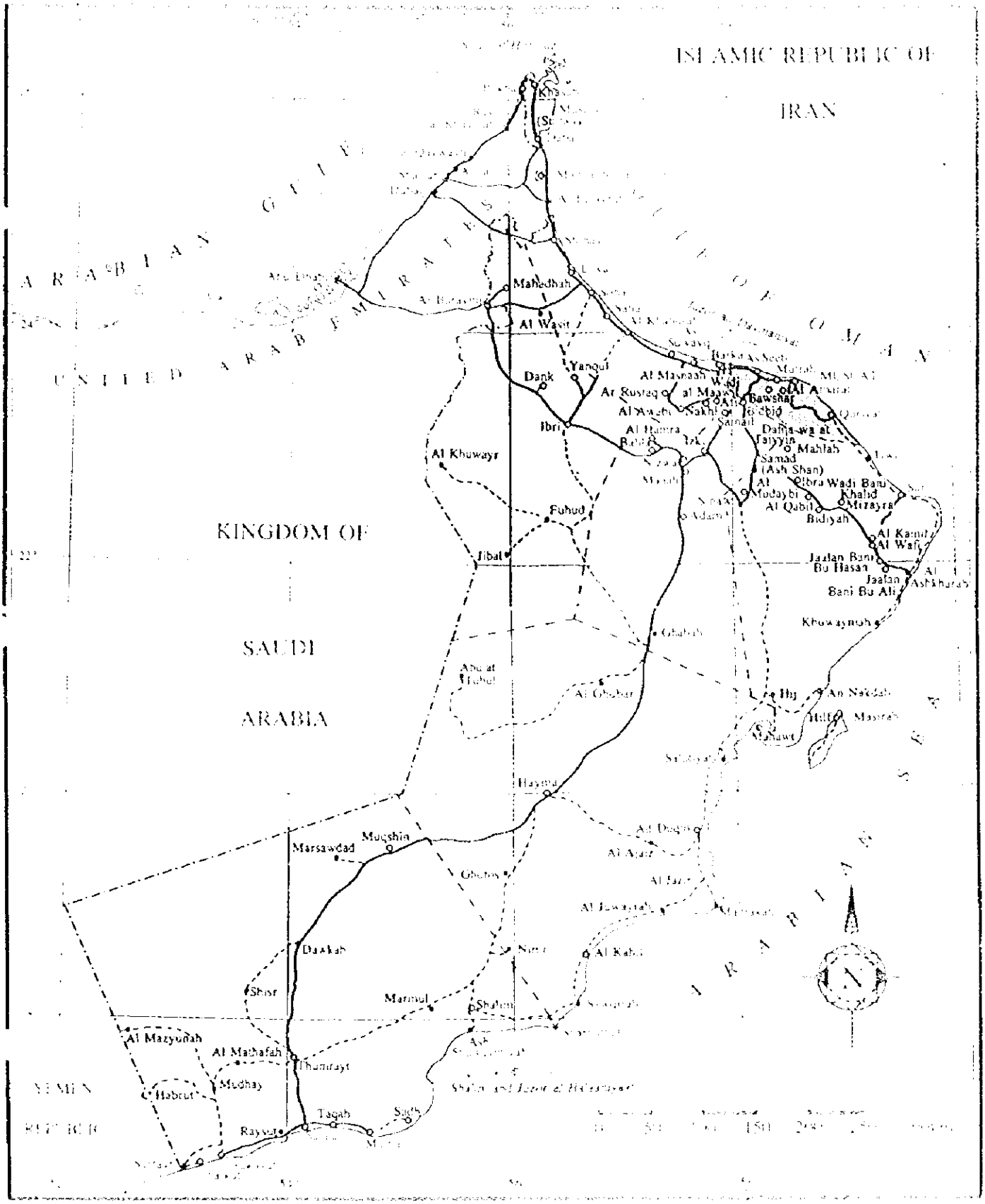
• Village / Town

------ Graded Road

——— Metalled Road

– – – – International Boundary

SULTANATE OF OMAN



PREFACE

In response to a request from the Government of the Sultanate of Oman, the Government of Japan decided to conduct the Feasibility Study of the Direct Reduction Plant Based Steel Complex Project in the Sultanate of Oman, and entrusted the study to Japan International Cooperation Agency (JICA).

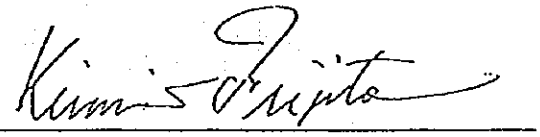
JICA sent a study team, led by Mr. Hiroshi Akedo of Kobe Steel, Ltd. and constituted by members of Kobe Steel, Ltd. and NKK Corporation, to the Sultanate of Oman four times from February 1998 to December 1998.

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

I hope this report will contribute to development of steel industry and related industries in the Sultanate of Oman and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Sultanate of Oman for their close cooperation through out the study.

February, 1999



Kimio FUJITA
President
Japan International Cooperation Agency

February, 1999

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

Letter of Transmission

Dear Mr. K. Fujita:

We are pleased to submit to you the final report for the feasibility study of the Direct Reduction Plant Based Steel Complex Project in the Sultanate of Oman.

The objectives of the study are to evaluate plant sites of Salalah and Sohar and, with regard to the selected site by the government of Oman, to define the requirement for the construction of the Steel Complex in terms of the development of infrastructure and provision of the utilities, road, port and port facilities and to conduct a feasibility study on a new Direct Reduction Plant based Steel Complex using natural gas based on market study, preparation of plant construction and operation plans, in addition to financial and economic analyses of the said complex assuming that the plant will be put into operation in 2004.

The report consists of the following seventeen chapters.

Chapter 16. NATIONAL ECONOMIC ANALYSIS
Chapter 17. CONCLUSION AND RECOMMENDATION

As the result of the feasibility study, it is concluded that, although the total amount of investment except new power generation plant for the Steel Complex will reach US$ 783 million as estimated and prices of natural gas and electricity have some conditions, the materialization of the Steel Complex in Oman will be quite beneficial and feasible in terms of capital investment.

Considering the effects on the national economy of Oman, construction and operation of the Steel Complex requires considerable amounts of construction materials, raw materials such as limestone and scrap, utilities and also generates employment opportunities not only at the Steel Complex itself but also among supporting industries.

The Steel Complex will contribute to Oman by foreign currency earning and saving of approximately US$ 3.2 billion over twenty years.

Therefore, materialization of the Steel Complex Project will have beneficial effects on promoting expanded employment opportunities and development of supporting industries in Oman as well as improvement of the international balance of foreign currency with utilization of national resources.

Consequently, the Study Team concluded that construction of the Steel Complex in Oman is feasible and it will contribute to the development of Omani economy as a whole.

We wish to take this opportunity to express our sincere gratitude to the Ministry of Foreign Affairs, the Ministry of International Trade and Industry, your Agency and Embassy of Japan in the Sultanate of Oman, for valuable advice and support extended to the study. We also wish to express our deep appreciation to the Steering Committee and relevant authorities in the Sultanate of Oman for close cooperation and assistance extended to the study.

Sincerely yours,

H. Akedo

Hiroshi Akedo
Team Leader
The Feasibility Study of the Direct Reduction Plant
Based Steel Complex Project in the Sultanate of Oman

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ACRONYMS AND ABBREVIATION

Organization

IISI	International Iron and Steel Institute
JICA	Japan International Cooperation Agency
MOC	Ministry of Communications
MOCI	Ministry of Commerce and Industry
MOEW	Ministry of Electricity and Water
MOFA	Ministry of Foreign Affairs
MOF	Ministry of Finance
MOHE	Ministry of Higher Education
MOHL	Ministry of Health
MOHO	Ministry of Housing
MONE	Ministry of National Economy
MOOG	Ministry of Oil and Gas
MORE	Ministry of Regional Municipalities and Environment
MOSL	Ministry of Social Affairs and Labor
NFPA	National Fire Protection Association
PDO	Petroleum Development Oman LLC
WHO	World Health Organization

Position

CB	Chairman of Board
DGM	Deputy General Manager
GM	General Manager
MD	Managing Director

Unit (Measurement)

MIGPD	Million Imperial Gallon Per Day
Mpa	Megapascal = 10 bar = 10.1972 kgf/cm^2
NTU	National Turbidity Unit
ppm	parts per million
dB	decibel
MMBTU	Million BTU(British Thermal Unit)
DWT	Dead Weight Ton
RO.	Rial Omani
scf/d	Standard cubic feet per day
TCF(tcf)	Trillion Cubic Feet

Major Technical Terms

AI	Analysis and Inspection Facilities
AC	Alternating Current
BOD	Biochemical Oxygen Demand
DC	Direct Current
DCF	Discounted Casting Machine
DCW	Direct Cooling Water
DR	Direct Reduction
DRI	Direct Reduction Iron
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
FES	Fume Extraction System
FPC	Flicker and Power Factor Compensator
GT	Gas Turbine
GIS	Gas Insulated Switchgear
GPT	Ground Potential Transformer
HBI	Hot Briquetted Iron
HHF	High Harmonic Filters
HHV	High Heat Value
HRSG	Heat Recovery Steam Turbine
ICW	Indirect Cooling Water
IRR	Internal Rate of Return
LA	Lightning Arrester
LF	Ladle Furnace
LHV	Low Heat Value
NGR	Neutral Grounding Resister
ONAF	Oil Natural Air Force
ONAN	Oil Natural Air Natural
OJT	On-the Job Training
RO	Reverse Osmosis
SFC	Static Flicker Compensator
SC	Static Capacitor
SS	Suspended Solid
ST	Steam Turbine
SVC	Static Var Compensator
TDS	Total Dissolved Solid

TR	Transformer
TSP	Total Suspended Particulates
TSW	Treated Sewerage Water
UPS	Uninterruptive Power Source
WTS	Water Treatment Station

Chapter 1. INTRODUCTION

1.1 Background

THE SULTANATE OF OMAN (hereinafter referred to as Oman) has been actively promoting socioeconomic development under its long-term vision called" Oman 2020". The principal objective of Oman 2020 is the long-term transformation of the country's economic structure from the present dependence on oil production. The key component of this strategy is expansion of the manufacturing industry with the view to establishing a self-reliant economy prior to the exhaustion of oil and oil-related resources, the availability of which is limited, and the effective utilization of the manufacturing industry. Four Five-Year Economic Development Plans have so far been implemented and the Fifth Five-Year Economic Development Plan (1996 - 2000) is currently in progress. Such industrial policies as the introduction of a free economy and the development of private sector investment have been adopted during the course of these plans to escape from over-dependence on oil income, to develop key industries and to encourage the economic activities of the private sector. Despite such efforts by the government to encourage non-oil industries, however, Oman's economic structure is still heavily dependent on oil.

While the current Fifth Five-Year Economic Development Plan has inherited all of the strategic policies, it specially emphasizes an industrial development program, including concrete measures to promote promising industries using natural gas, from the viewpoint of effectively utilizing economic as well as human resources.

The Government of Oman appears to be pushing the steel making, petrochemical, fertilizer and aluminum sectors as future key industrial sectors using the country's abundant natural gas resources. With the subsequent preparation of infrastructure and utility development plans, including natural gas supply, power generation, port facilities and also introducing the necessary administrative measures, i.e. preferential measures in terms of taxation, custom duty and investment incentives, the Government of Oman made a request in April 1997 to THE JAPAN INTERNATIONAL COOPERATION AGENCY (hereinafter referred to as JICA) for a feasibility study for the construction of a new steel complex at Salalah which will be projected by the private sector. In response to this request, JICA twice dispatched a pre-study team to Oman.

Under these circumstances, the Scope of Work for the Feasibility Study on the Direct Reduction Plant Based Steel Complex Project was signed on September 24, 1997 by the Government of Oman and JICA. This Scope of Work includes the definition of the requirements for the

construction of the plant in terms of the development of infrastructure and provision of the utilities, port and port facilities, etc. In accordance with this Scope of Work, the JICA Study Team started to conduct the Feasibility Study on the Direct Reduction Plant Based Steel Complex Project.

In March 1998, however, the Government of Oman requested JICA to study Sohar as the plant site for the Steel Complex in addition to Salalah, and JICA and the Government of Oman agreed in May 1998 that the plant site selection of the Steel Complex would be studied for Salalah and Sohar, and that a feasibility study should be completed on the selected one site.

The JICA Study Team made a technical evaluation and economic comparison of Salalah and Sohar, and submitted the site evaluation report with a recommendation. Then JICA Study Team visited Oman on September 1,1998 for a week to explain and discuss the result of the plant site evaluation and the recommendation of the Study Team.

Based on the recommendations of JICA Study Team, the Government of Oman chose Sohar as the plant site and informed JICA and the Study Team on September 19, 1998.
Further feasibility study was conducted and completed only for Sohar as the plant site.

1.2 Member of the Study Team

The Study Team was organized by Kobe Steel, Ltd. in association with NKK Corporation including supporting members from other companies. The members of the Study Team and the assignment are as follows;

Table 1-2-1 Member of the Study Team

Name	Assignment	Company
Mr. Hiroshi Akedo	Leader	KSL
Mr. Shunji Hosokawa	Market Study	SRC
Mr. Tamotsu Inoue	Utilities (Natural gas, Water)	KSL
Mr. Yoshiyuki Kojitani	Port and Port Facilities	NSL
Mr. Akihiko Kawaharada	Plant Layout & Civil	NKK
Mr. Teruaki Hidaka	Plant Management	NKK
Mr. Hironobu Sako	Raw Materials & DR plant	KSL
Mr. Isao Hamanaka	Rolling Technology	STE
Mr. Isamu Kawakami	Sub-Materials & Steel Making Technology	NKK
Mr. Kazuhiko Ose	Financial & Economic Analysis, and Implementation Plan	KSL
Mr. Yoshihiko Oshima	Environmental Assessment	NKK
Mr. Kusuo Inoue	Utilities (Electricity) and Implementation Plan	KSL
Mr. Seppo Tanaka	Coordination	KSL

Note ; KSL : Kobe Steel, Ltd. SRC : Shinko Research Co., Ltd.
NSL : Nikken Sekkei Ltd. STE : Shinko Techno Engineering Co., Ltd.
NKK : NKK Corporation

1.3 Authorities and Personnel from Oman

Through four field surveys in Oman, the Study Team had many meetings with the Steering Committee of the Sultanate of Oman and also visited many authorities and corporations, and met a lot of people concerned with collecting the data and information for this feasibility study.

The authorities and personnel from Oman, whom the Study Team visited and met, are listed in Appendix A1-3-1, A1-3-2, A1-3-3 and A1-3-4.

1.4 Plant Site Selection

With regard to the feasibility study on the Direct Reduction Plant Based Steel Complex Project in the Sultanate of Oman, the Government of Oman requested JICA in March 1998 to study Sohar as the plant site for the Steel Complex in addition to Salalah, and JICA and the Government of Oman agreed in May 1998 that the plant site selection of the Steel Complex would be studied for Salalah and Sohar, and that the feasibility study should be completed on the selected site.

In accordance with "METHODOLOGY FOR PLANT SITE SELECTION" which was agreed by the Steering Committee of the Sultanate of Oman during the second field survey of JICA Study Team from June 23 to July 13, 1998, The JICA Study Team made a technical evaluation and the economic comparison of Salalah and Sohar districts based on the data and information obtained in the first and second field surveys and further study in Japan, and submitted the "SITE EVALUATION REPORT" and its "EXECUTIVE SUMMARY" to the Steering Committee. Then, the JICA Study Team visited Oman on September 1, 1998 for a week to explain and discuss the result of plant site evaluation and the recommendations of the Study Team.

Based on the recommendations of JICA Study Team, the Government of the Sultanate of Oman decided on Sohar as the plant site and informed JICA and the Study Team on September 19, 1998.

This feasibility study was completed only for Sohar as the plant site according to the above agreement in May 1998.

The EXECUTIVE SUMMARY OF SITE EVALUATION REPORT is attached in the following pages, and METHODOLOGY FOR PLANT SITE SELECTION and SITE EVALUATION REPORT are attached in Appendixes A1-4-1 and A1-4-2 respectively.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STEERING COMMITTEE OF THE SULTANATE OF OMAN

THE FEASIBILITY STUDY
ON
THE DIRECT REDUCTION PLANT BASED
STEEL COMPLEX PROJECT
IN
THE SULTANATE OF OMAN

EXECUTIVE SUMMARY
OF
SITE EVALUATION REPORT
ON
SALALAH AND SOHAR

AUGUST, 1998

KOBE STEEL, LTD.
IN ASSOCIATION WITH
NKK CORPORATION

GENERAL

With regard to the Feasibility Study on the Direct Reduction Based Steel Complex Project in the Sultanate of Oman, the Government of Oman and JICA agreed in May, 1998 that a comparative evaluation of the plant site for the Steel Complex would be made for Salalah and Sohar.

In accordance with " METHODOLOGY FOR PLANT SITE SELECTION" which was agreed by the Steering Committee of the Sultanate of Oman during the second field survey of JICA Study Team from June 23 to July 13, 1998, JICA Study Team made the technical evaluation and the economic comparison of Salalah and Sohar districts based on the data and information obtained in the first and the second field surveys, and further study in Japan.

RECOMMENDATION

(1) Conclusion of the Site Selection

It is concluded that Sohar would be more appropriate for conducting further feasibility study, after due consideration of features and results of the technical and economic evaluations on both sites of Salalah and Sohar, as summarized below;

1) Summary of Technical Evaluation Results

The scores of technical evaluation for both sites based on the Methodology for Site Selection are 79.0 points for Salalah and 80.0 points for Sohar.
This result indicates that both sites are technically eligible as the Steel Complex site. Salalah is judged to have a relative disadvantage, however, because the small short circuit level of electricity in Salalah makes it inevitable to have a bigger flicker compensation system than in Sohar, to avoid harmful fluctuation of electricity in order to assure the smooth operation of the Electric Arc Furnaces.

2) Summary of Economic Evaluation Results

2)-1 Financial Evaluation from the Investor's Point of View

- There is not much difference in the initial investment costs between the two sites. The figure is estimated to be slightly higher by US$ 0.1 million in Salalah than in Sohar.

- With respect to the operation costs, Sohar has a definite advantage over Salalah, with a difference of between US$ 12.2 and US$ 15.6 per ton of finished products. This difference in operation costs, equivalent to between US$ 14,200,000 and US$ 18,200,000 per year,

will make a considerable difference in the financial position of the Steel Complex Project.

2)-2 Economic Evaluation from the National Economy's Point of View

- Sohar is judged to have an advantage over Salalah when evaluated from the national economy's point of view. This is because the real resource cost for supplying natural gas, regardless of the actual price applied, will inevitably be lower with Sohar than in Salalah, given the shorter length of the pipeline connecting Sohar with the gas source and hence its smaller construction costs. If the Steel Complex is to be constructed in Salalah, this difference of natural gas supply cost should somehow be subsidized by the Government of Oman or any third parties.

- The two sites are evaluated equally with respect to the economic cost of electric power supply.

(2) Technical Evaluation

- Land

Area and dimension necessary for the Steel Complex (1,200,000 m^2=800 m x1,500 m) is available in both sites. However, only Sohar has a space for future expansion. Geographical condition in Sohar is flat and preferable for the Steel Complex, and the site for the Steel Complex in Salalah has to have three (3) ground levels because the site is considerably undulating (DL +5 m to 30 m). Soil conditions at both sites are acceptable for the Steel Complex.
The location of site for the Steel Complex in Salalah is about 1 km away from the berth facilities whereas Sohar is adjacent to berth facilities and this is preferable for the Steel Complex.

- Port and Location of Port

In Salalah, the port is located at 1,000 km southern east of Muscat. It is far from both domestic and export markets. And Sohar port is located at 250 km northern west of Muscat and is near to the domestic market and the GCC export market.
Both ports have -16m in water depth and berths of 700 m in length to which vessels for raw materials of iron ore are accessible up to 100,000 DWT.

- Natural Gas

The construction of new natural gas pipelines to both sites are scheduled to be completed in 2001. Length of new pipelines is estimated at 700 km to Salalah and 300 km to Sohar.

- Electric Power

No electric power is available for the Steel Complex at present in either site and a new power

generation plant with a capacity of 200 MW needs to be constructed by the Steel Complex or any private sector in either site.

In Salalah, however, short circuit capacity, which is necessary for the stable operation of EAF (Electric Arc Furnace) in steel making plant, is only 1,500 MVA. This is not enough for stable operation even with a bigger flicker compensation equipment installed in the Steel Complex and with 400 MW in total power generation capacity in Salalah district.

In Sohar, short circuit capacity will have maximum 6,000 MVA with more than 2,240 MW in total power generation capacity of interconnection line at 132 kV between Muscat system and Sohar (including Wadi Jizzi power station) by the year of 2004. Short circuit capacity in Sohar is enough for stable operation of EAF with small flicker compensation equipment.

- Industrial Water

The waste water treatment plant, which is now under construction in Salalah, has the capacity to supply industrial water for the Steel Complex.

In Sohar, a new desalination plant has to be constructed in the Steel Complex.

- Social Conditions

There is no difference in social conditions at both sites of Salalah and Sohar.

(3) Economic Evaluation

1) Financial Evaluation

- There is not much difference of initial investment cost between Salalah site and Sohar site.

Initial investment cost caused by the difference of each site conditions is US$ 39.0 million in Salalah site made up of ;

US$ 20,7 million for site preparation,
US$ 7.3 million for piping and conveyer,
US$ 1.9 million for foundation of equipment,
US$ 9.1 million for flicker compensation equipment

and US$ 38,9 million in Sohar site made up of :

US$ 1.2 million for site preparation,
US$ 3.0 million for piping of sea water,
US$ 13.7 million for piling and foundation of equipment,
US$ 17.0 million for desalination plant,
US$ 4.0 million for flicker compensation equipment.

- Difference of annual operation cost is between US$ 14.2 million and 18.2 million. Annual operation cost of Sohar site is much less than that of Salalah site. (The cost related with

industrial water is less by US$ 0.8 million per year in Salalah site, and the cost related with transportation for finished products is less by between US$ 15.0 and 19.0 million per year in Sohar site.)

2) Economic Evaluation for National Economy

- In view of national economy of Oman, investment cost of constructing gas pipeline to Salalah is much higher than that to Sohar because its length to Salalah is longer by 400 km than that to Sohar. Consequently unit technical cost of natural gas is to be different at each site. If the Government of Oman applies the same price for natural gas to each site, the supply of the price difference would be a big burden on the Government of Oman.

  There is not much difference on electric power.

The Steering Committee of the Government of the Sultanate of Oman shall make its decision based on this report and inform the selected site (one site) to JICA and the Study Team by the 14th of September 1998.

SUMMARY OF THE TECHNICAL EVALUATION

Item to be considered	Importance	Rating		Score	
		Salalah	Sohar	Salalah	Sohar
1. LAND					
1.1.Dimension and area of the site	5	A-8	A-10	4.0	5.0
1.2.Geographical conditions	5	A-7	A-10	3.5	5.0
1.3.Soil conditions	5	A-10	A-9	5.0	4.5
2. PORT AND ROAD					
2.1.Port and port facilities	20	A-10	A-9	20.0	18.0
2.2.Berth and berth facilities	5	B-7	B-7	3.5	3.5
2.3.Road	5	A-10	A-10	5.0	5.0
3.UTILITIES					
3.1.Electric power	15	B-5	B-7	7.5	10.5
3.2.Natural gas	15	A-7	A-7	10.5	10.5
3.3.Industrial water and waste water	10	A-9	B-7	9.0	7.0
4.SOCIAL CONDITION					
4.1.Supporting industries	5	B-6	B-6	3.0	3.0
4.2.Human resources and housings	5	B-6	B-6	3.0	3.0
4.3.Environment and pollution	5	A-10	A-10	5.0	5.0
TOTAL	100.0			79.0	80.0

COMPARISON IN TOTAL AMOUNT OF INITIAL INVESTMENT AND OPERATION COSTS

Cost Factors	Salalah		Sohar		Remarks
	Initial Investment Cost (Unit: Million US$)*2	Operation cost (Unit: Million US$/y)	Initial Investment Cost (Unit: Million US$)*2	Operation cost (Unit: Million US$/y)	
1. LAND					
1.1 Acquisition of land or rental fee	*1	100baiza/m2/year	*1	100baiza/m2/year	
1.2 Land preparation	20.7		1.2		
1.3 Slope protection					
2. PORT AND BERTH FACILITIES					
2.1 Port and berth tariffs	*1	same	*1	same	
2.2 Berth	*1	same	*1	same	
2.3 Berth facilities	*1	same	*1	same	
3. FACILITIES IN PLANT					
3.1 Piping	3.1		3.0		
Conveyor	4.2		0.0		
3.2 Foundation	1.9		13.7		
3.3 Desalination plant	0.0		17.0		In case of water supplied from industrial area at SUR
3.4 Waste water	-		-		
3.5 Electric	9.1	*1	4.0	*1	Flicker compensation equipment
4. ENERGY AND UTILITIES					
4.1 Unit cost of electric power	-	*1	-	*1	
4.2 Unit cost of natural gas	-	*1	-	*1	
4.3 Unit cost of industrial water	-	0.22 RO./m3	-	0.8 (0.515 RO./m3)	In case of installation of desalination plant
		0.0		(0.66RO./m3) (1.3)	In case of supply water from industrial area
5. TRANSPORTATION COSTS OF FINISHED PRODUCTS					
5.1 Road and sea	-	15.0 -19.0	-	-	
TOTAL OF INVESTMENT AND OPERATION COSTS	39.0	15.0 -19.0	38.9	0.8	

*1 Conditions of Salalah and Sohar are even.
*2 These figures of Initial Investment Cost are the differences caused by the site conditions.

1.5 Summary

Following is a brief description of the summary on the feasibility study of the Direct Reduction Plant Based Steel Complex Project in the Sultanate of Oman.

1.5.1 Production history and forecast

Consumption of steel products in Oman was 262,000 tons in 1994. Out of this figure, bars and wire rods took up 143,000 tons and pipes 80.000 tons. In 1995 the figure was 215,000 tons including 129,000 tons of bars and wire rods and 51,000 tons of pipes.

In 1996, the figure was 618,000 tons, a remarkable increase. Bars and wire rods took up 482,000 tons and pipes 105,000 tons. In 1997 the figure was 658,000 tons in total with 253,000 tons of bars and wire rods and 336,000 tons of pipes. The existing bar mill plant started its operation using imported billets with a capacity of 57,000 tons per year in 1997. The consumption of steel products in Oman in 2010 is estimated to increase up to around 1,090,000 tons in total. Out of this figure, bars and wire rods are estimated to be 640,000 tons and pipes 360,000 tons. Thus, the domestic market for the bar products of the new Steel Complex is estimated to be 570,000 tons in 2010. About 590,000 tons of bar products of the new Steel Complex will be exported.

1.5.2 Conceptual study for the Steel Complex

(1) Production capacity and products

Production capacity shall be 1,164,000 tons of bar products per year taking into consideration the market and capacity of the direct reduction plant.

(2) Production process

The study shall be conducted assuming the main production process adapting modern technology for each process is as follows;

- Iron making process	:	Midrex Direct Reduction Process
- Steel making process	:	Electric Arc Furnace and Continuous Billet Caster
- Rolling process	:	Bar Rolling Mill

(3) Site for Steel Complex

The site for the Steel Complex in Sohar for which 1,200,000 m2 is necessary in a rectangular area of 800 m x 1,500 m is located adjacent to berth facilities which shall be exclusively used for the Steel Complex. It is flat and the soil conditions are comparatively good. Sohar is selected by the government of Oman based on the SITE EVALUATION REPORT ON SALALAH AND SOHAR.

(4) Port and port facilities

New port construction project with -16 m water depth in Sohar is under way. The construction work is to be commenced at the beginning of 1999 and is expected to be completed in 2003. Berths for the Steel Complex to handle raw materials require 650 m in length and the berths accommodating 100,000 DWT iron ore carriers require -16 m depth along side. These berths shall also be used for the export of products. Space of the berths for the Steel Complex is available at Sohar port with a length of 700 m.

(5) Electricity

Electricity requirements for the Steel Complex are estimated of 200 MW at peak. No power is available for the Steel Complex in Sohar at present and MOEW does not have a plan to provide required power to the Steel Complex. A capacity of 200 MW power generation plant needs to be constructed by the Steel Complex or private sector.
After interconnection of the power supply grid between Muscat system and Sohar with a 132 kV line, the short circuit capacity will reach a min. 3,000 MVA - max. 6,000 MVA by which the Steel Complex can be operated without any power problems.

(6) Natural gas

Natural gas requirements for the Steel Complex are estimated of 63,000 Nm3/h and the requirement of total natural gas for the Steel Complex and power station will be 0.8 tcf for 25 years use. Plans to construct a 300 km natural gas pipe line from Fahud to Sohar is included in the Fifth Five-Year Economic Development Plan of the government of the Sultanate of Oman and is expected to be completed by the summer of 2001.

(7) Water

Industrial water requirements for the Steel Complex are estimated of 5,000 m3/day. It is

necessary to construct a desalination plant in the Steel Complex because there is no capacity to supply industrial water for the Steel Complex in Sohar.

(8) Raw materials

Most of the raw materials, except limestone and some scrap, are not available in Oman and have to be imported.

1.5.3 Implementation plan

(1) Project schedule

The start-up date of the Steel Complex is scheduled to be July 1, 2004. The total construction period from basic engineering to start-up of production is estimated as fifty-four months (four years and six months) and the period of construction from the effective date of the purchasing order to the production start-up is set at thirty-six months (three years).

(2) Shareholding structure of the company

In consideration of the objectives of the company (industrialization and human resource development in Oman) and the privatization policy of Oman, it is advisable and indispensable that Omani leading private entities, foreign companies who can undertake the technology transfer and Omani investment institutions will be involved in the company.

(3) Organization and personnel

In order to make the Steel Complex an internationally competitive plant, it is necessary to make the number of employees as small as possible together with a simplified organization to get world class competitive productivity. Consequently, the number of employees of the Steel Complex is set at 1,239 personnel within the organization of 7 departments and 29 sections.

As there is no integrated steel works in Oman at present and sophisticated operating technology is required for smooth and effective operation of the direct reduction process, electric arc furnace and bar rolling mill, it is necessary to recruit some experienced engineers and skilled workers from foreign countries.

Furthermore, in order to establish a reliable plant management system and realize stable

early operations, it is important to make a consulting agreement with a foreign steel company, and introduce management and operating technology for each area of management and production.

1.5.4 Environmental assessment

An environmental assessment was conducted on the principle pollutants of NOx, SOx and dust, as well as noise and sea water temperature patterns which are supposed to be emitted from the Direct Reduction Plant Based Steel Complex with reference to the following standards.
At present, there is no steel works in Oman, therefore the standard of related works are applied as following:

- Law on the conservation of environment and prevention of pollution for Royal Decree 10/82
- Ministerial Decision 5/86
- Ministerial Decision 145/93
- Ministerial Decision 80/94

Comparison of pollution level, which was calculated by simulation using the actual data from the site and predicted emission level from the Steel Complex, with Omani standards

As a results of the assessment, the emission value from the Steel Complex, and environmental pollution will be maintained within the limits of Omani environmental standards and the guideline of environmental standard of World Health Organization (WHO).
Emissions other than the above mentioned principle pollution are also estimated to be far below the limit of the emission standard.

Therefore, it can be said that pollution will be kept within the limits of Omani standards and the WHO guidelines provided the Steel Complex is equipped with the proper environmental control systems described in this report.

1.5.5 Financial and economic analyses

(1) Investment cost

For this feasibility study, the total investment cost except for the new power generation plant for the Steel Complex Project is assumed to be US$ 783 million (US$ 936 million including new power generation plant).

(2) Financing

Equity capital is assumed to be 30% of total investment cost and the 70% balance is assumed to be long-term loans. Taking the current governmental privatization policy into consideration, it is presumed that whole or almost part of the equity capital would be from private investors, local and foreign. In order to secure the required loans with conditions favourable and suitable to the Steel Complex Project, not only great efforts of private founding investors but also the assistance of the Government of Oman will be necessary.

(3) Financial Analysis

Financial analyses are conducted to evaluate the profitability, investment fund efficiency, solvency and overall feasibility of the construction of the Steel Complex Project based on some pre-conditions of investment, production, sales price, tax and duties, operation expenses, supply of electricity and financing activities.

As a result of financial analyses, the following financial statements have been prepared.

- Production cost per ton of steel bar product
- Profit and loss statement
- Cash flow
- Balance sheet

Profitability of the project at the Recommended Case is high and net profit on sales would be 8.8 % in the third year. Net profit on sales would remain at more than 23% after the tenth year from the start-up.

(4) Evaluation of project feasibility

Internal rate of return (IRR) on total investment (ROI) and IRR on equity (ROE) have

been calculated. The results at the Recommended Case are as follows:

- ROI before tax : 13.9 %
- ROI after tax : 13.7 %
- ROE : 16.1 %

Due to the IRR with an assumed interest of 9% for finance, and also in consideration of projected profits & losses as well as projected cashflow, the Steel Complex Project is feasible at the Recommended Case and further steps forwards materialization should be taken.

Chapter 2. OBJECTIVE AND SCHEDULE OF THE STUDY

2.1 Objectives of the Study

The objectives of the Study are:

(1) to conduct a feasibility study on a new Direct Reduction Plant Based Steel Complex using natural gas based on market analysis, preparation of plant construction and operation plans plus financial and economic analysis of the said complex.

(2) to define the requirements for the construction of the plant in terms of the development of infrastructure and provision of the utilities, port and port facilities, etc.

2.2 Overall Schedule of the Study

The feasibility study was conducted from January 1998 to February 1999 using the following schedule.

Preparation in Japan	:	January 1998
Submission of Inception Report	:	End of January 1998
The first field survey	:	February - March 1998
The first study in Japan	:	March and May 1998
Submission of Interim Report	:	Middle of May 1998
The second field survey	:	June - July 1998
The second study in Japan	:	July - August 1998
Submission of Site Evaluation Report	:	Middle of August 1998
The third field survey	:	Early September 1998
The third study in Japan	:	September - October 1998
Submission of Draft Final Report	:	Early November 1998
The fourth field survey	:	Middle of December 1998
The fourth study in Japan	:	January 1999
Submission of Final Report	:	Middle of February 1999

Detailed schedules of the four field surveys are described in Appendixes A2-2-1, A2-2-2, A2-2-3 and A2-2-4.

Chapter 3. MACRO ECONOMY AND INDUSTRIAL POLICY

3.1 Introduction

In this chapter, the present macro economic conditions, social environment and national policy as background to this study, are discussed. And also, industry and industrial policy are explained. The future outlook is discussed according to the Fifth Five-Year Plan. In industrial policy, the steel industry support policy is discussed in particular. Some hopeful policies to promote steel industry are suggested.

Infrastructure and utilities concerned with steel industry are discussed in Chapter 7.

3.2 Present Situation of Macro Economy

3.2.1 1997 development

The performance of the Oman economy in 1997 depended largely on the non-oil sector which showed a growth rate of 6.2 % in current prices. However, the oil sector registered a negative growth of 1.2 % in 1997. Combining both sectors, GDP grew by 3.1% in 1997 as against 11% in 1996 and 6.8% in 1995.

Owing to a somewhat lower oil price in the international market, and higher imports of goods and services, the external current account deficit reached RO 21 million in 1997, from a surplus of RO 107 million in 1996. This deficit amounts to 0.35% of GDP. However, both non-oil exports and re-exports showed impressive increases i. e., 17.3% and 31.0% respectively in 1997 over 1996. Total government external debt slightly fell in 1997 and debt ratio declined from 24.1% in 1996 to 22.9% in 1997.

Regarding fiscal matters, the official budget deficit which reached 4.4% of GDP in 1996 is likely to fall to 0.7% of that in 1997. This is because of a very small increase in (e.g., 2.4%) total expenditure in 1997 over 1996 : while total revenue increased by 13.9% in 1997 over 1996. However, when compared with the fiscal outrun for 1995 (deficit of 9.0% of GDP), the situation in 1997 is still better.

On the demand side of GDP, total consumption grew around 5.1% in 1996, but showed a lower growth of only 0.5% in 1997; whereas total investment has gone up by 29.8% in 1997 compared to 1996 level. It is also important to note that public investment rose by 54.2% mainly on account of LNG project investment but private investment stagnated. Similarly, while exports surged by 4% in 1997, the higher growth of import and services and private transfers caused the current account deficit to rise modestly over 1996.

Table 3-2-1 GDP, Foreign Trade and Public Finance in Oman in 1991-1997

(Unit : Million O.R.)

	1991	1992	1993	1994	1995	1996	1997
GDP	4,361	4,788	4,804	4,967	5,307	5,890	6,075
Industry	2,154	2,336	2,196	2,241	2,467	2,907	2,957
Agriculture *	115	112	115	126	147	147	155
Services	2,145	2,385	2,543	2,668	2,774	2,927	3,078
Foreign Trade Balance	+594	+636	+411	+588	+648	+1,004	+1,001
Exports	1,873	2,136	2,063	2,132	2,332	2,822	2,934
Imports	1,279	1,500	1,652	1,543	1,684	1,818	1,933
Public Finance							
Revenue	1,585	1,680	1,724	1,757	1,852	1,990	2,267
Expenditure	1,868	2,259	2,242	2,253	2,331	2,254	2,307
Surplus or Deficit	-283	-579	-518	-496	-479	-263	-40

Source : Statistical Yearbook 1997 & Monthly Statistical Bulletin October 1998 by MONE.

Note : at current prices. * Fishing is contained.

3.2.2 1998 outlook

Owing to the decline of international crude oil prices and the economic depression in Asian countries, such as Japan, S. Korea, and ASEAN, which are major importers from Oman, it is feared that the growth rate of GDP in 1998 will further slow down. In spite of hope for high growth in the non-oil private sector, the bad influence of the oil-sector which contributes nearly 40% of GDP will be a heavy burden for the economy of Oman in 1998 according to the Central Bank of Oman.

Table 3-2-2 Dependence of GDP on Oil-Sector, Non Oil-Sector, Agriculture & Fishing and Services

(Unit: %)

Item/Year	1995	1996	1997
Industry (1) + (2)	46.5	49.3	48.7
(1) Petroleum activities	38.1	41.8	40.0
Crude oil	36.2	39.9	39.1
Natural gas *	1.9	1.9	0.9
(2) Non-petroleum activities	8.4	7.5	8.7
Manufacturing	4.7	4.2	4.0
Agriculture & Fishing	2.8	2.5	2.5
Services	52.3	49.7	51.1
GDP	100.0	100.0	100.0

Source: Monthly Statistical Bulletin by MONE.

Note: at current price. Natural gas * is associated oil and gas.

3.3 Present Social Environment

3.3.1 Infrastructure

Owing to Government revenue from the oil-sector, the Government has improved the infrastructure, therefore, roads, electricity, housing, medical facilities and educational facilities are already in good condition. However, infrastructure for large scale manufacturing industry is still being arranged. The Government is promoting construction of port facilities, electricity supplies and natural-gas over the coming years.

3.3.2 Omanization

With rising per capita income, good medical care and the increase of expatriates from Asia and other regions, the population has grown around 3.6% per annum over these ten years. In 1996, over 20,000 citizens registered as job seekers, and with approximately 52% of the population under the age of 15, this labor force will increase over the next few years. At present, the majority of the Omani work force is employed in the public sector, but with the government's strong commitment to education and vocational training, an increasing number of Omanis are gaining the relevant skills to replace expatriate workers in the private sector. The policy of Omanization ensures that the country work force can participate directly in the growth of business and industry.

Each industry sector has been allocated a percentage of Omani personnel to be employed. If it fails to achieve these levels, it has to pay a fine to the Government and is prohibited from employing new foreign labor. The following sectors are required to achieve the following Omanization levels:

- Transportation, storage and communication	60%
- Finance, insurance and real estate	45%
- Industry	35%
- Restaurant and hotel	30%
- Wholesale and retail	20%
- Contracts	15%

3.4 Present Situation by Industrial Sector

3.4.1 General

Industrial production in 1997 in total, slowed down compared with 1996, the reason being mainly that crude oil prices fell on the international crude oil market. However, the production of non-oil sectors in 1997 grew considerably, particularly in manufacturing, electricity & water and construction over 1996.

Table 3-4-1 Industrial Production by Sector

(Unit : Million O. R., %)

Item / Year	1994	1995	1996	1997	95/94	96/95	97/96
Industry (1) + (2)	2,241	2,467	2,907	2,956	10.1	17.8	1.7
(1) Petroleum activities	1,815	2,020	2,463	2,434	11.3	21.9	-1.2
Crude oil	1,750	1,973	2,415	2,378	12.7	22.4	-1.5
Natural gas *	65	47	48	56	-27.7	2.1	16.6
(2)Non-petroleum activities	426	447	443	522	4.9	-0.9	17.8
Mining & Quarrying	11	13	14	16	18.2	7.7	14.3
Manufacturing	216	247	246	254	14.4	-0.4	3.3
Electricity & Water	49	49	55	65	0.0	12.2	18.2
Construction	150	138	129	187	-8.0	-6.5	45.0

Source : Monthly Statistical Bulletin, May 1998 by MONE

Note : at current prices. 95/94, 96/95 and 97/96 are growth rates (%).
Natural gas * is associated oil and gas.

3.4.2 Support for industry

The government is taking a supporting policy for non-oil industries to promote manufacturing, etc. Support for the manufacturing industry through various tax incentives, investment and trade, and incentives available for the manufacturing industry are as follows:

- Exemption from custom duties on imports of equipment and raw materials required for production purposes.
- Exemption from income tax for a period of five years which can be renewed for another five years by a permission from the Deputy Prime Minister for Financial and Economic Affairs.
- Soft loans by the Ministry of Commerce & Industry under Royal Decree 17/97 on financial

support to the private sector in some Economic & Service sectors for projects of investment exceeding RO. 250,000.

- Soft loans for projects of RO. 250,000 and less to be provided by the Oman Development Bank.
- Servicing for industrial plots for setting up factories.
- Competitive utility rates for Electricity, Water and Gas.

3.4.3 Supporting policy for steel industry

(1) General

At present, primary production facilities in the Omani steel industry comprise only a single re-roller mill with limited capacity, which commenced operation in 1997.

The world steel industry has an extremely long history, and during this extensive history, production facilities and technology have evolved to high level of proficiency.

Furthermore, steel production is characterized by delivery of massive, heavy iron and steel, high energy and extensive raw material consumption.

From the standpoint of national development, particularly in the case of a developing country, the steel industry plays a crucial role in the supply of base material and intermediate goods essential for industrial activity. Furthermore, the steel industry in terms of both input and output has a substantial ripple effect on the overall economy.

Steel products also comprise an important trade commodity world-wide.

In the case of Oman, promotion of a viable steel industry given the above noted characteristics will entail development of a sizable export market in the light of the limited scale of the domestic steel market. In order to make such exports possible, an essential point will be whether competitive steel products for the international market can be manufactured or not.

Against the above background, the following government support policy for the steel industry in Oman is recommended.

(2) The policy

A steel industry support policy should be considered laterally in terms of other industries as well, rather than solely in terms of the steel sector alone. Government industrial policy over the immediate term is essentially set out in the current Fifth Five Year Plan. Within this framework, the initiative of the private sector comes into focus as the foundation of the market economy. Also, a major objective is to pursue industrialization outside the petroleum sector in order to effect a transition to an economic structure which

will offer greater future stability for Oman. In light of the above, major support policy directed by the government at the steel industry in Oman is recommended as follows:

1) Establishment of infrastructure under government initiative

Due to the limited scale of the domestic market, it will be necessary to export a large volume of steel products. To effectively achieve this, steel production must be competitive at the international level. Toward this end, infrastructure and utilities including harbor, road, electricity, gas, and industrial water facilities must be provided at low cost. The criterion in this regard is facility quality above the average for other GCC countries at a cost below the average for the same.

2) Public financial policy with regard to development investment

Steel projects require a large investment, impossible without some form of public financing. In the case of Japan, as well, during its period of steel industry development (1950-1960), government financing was forthcoming from the Japan Development Bank and other sources. In the case of other developing countries / NIEs (South Korea, etc.), such public funding has contributed greatly to steel industry development.

3) Collection and collation of domestic and export market data

The following base data pertaining to the steel market survey should be promptly collected, collated and made available on a monthly or quarterly basis. It is hopeful that these statistics would be promoted by government.

a) Domestic market

- Construction sector

  Construction statistics: floor space (m^2) by region and by type of structure (reinforced concrete, steel frame, brick)

  Statistics on start-up of public works projects: Cost by construction category (road, harbor facilities, etc.)

- Manufacturing sector

  Statistics on production volume in steel consuming industries including steel fabrication, can manufacture, steel furniture industries, etc.

b) GCC countries

- Collection and collation of statistics in the above categories as pertaining to the other GCC countries, and publication of the same copies inside Oman.

4) Training of specialists in steel production technology

Establish an institute for the training of specialists in steel production technology, as well as engineering related to other industrial sectors.

3.5 National Development Plan

Oman initiated its process of economic development through launching the First Five-Year Plan in 1976. Since then, Oman has successfully completed four Five-Year Plans and now is passing through the Fifth Plan (1996 - 2000).

3.5.1 Main points in the Fifth Five-Year Development Plan

The Fifth Five-Year Development Plan (1996 - 2000) represents the first plan in a series of plans, formulated and launched with a view to achieve the objectives of Vision of Oman's Economy - 2020. This Plan places greater emphasis on economic diversification, an expanded role for the private sector and development human resources.

(1) Diversification

To accelerate the speed of diversification, the Fifth Plan inter alia places emphasis on adoption of high value added strategy in the industrial sector, diversifying into high value added exports, closer integration with the global economy and technology transfer and promotion of private sector activities.

(2) Role of the private sector

The year 1998 has been heralded " a year for the private sector ". This sector can play a progressively increasing role in socio-economic development of Oman. The private sector is being encouraged to participate in pioneering activities, particularly in production sectors. It is being motivated to invest in certain areas where so far only the government was investing. Manah gas power project has been successfully executed by the private sector. Thus, the private sector is expected to contribute 53% of the total investment planned for the Fifth Plan as against its share of 35% in the Fourth Plan.

(3) Human resource development

While development of human resources is at the core of the Fifth Plan development strategy, 48% of the Omani labor force is expected to be employed in the private sector by 2000 as against 18% in 1975. Thus, Omanization in the private sector is expected to increase from 14.7% in 1995 to 25% in 2000.

(4) Economic policy framework

The economic policy package comprises fiscal and monetary policies, interest and exchange rate policy, policies on savings and investment, trade policies at macro level and sectoral policies specific to each sector at the micro level. Further, new tax reform measures offering incentives for diversified industrial activities have been introduced.

(5) Innovative institutional machinery

- Issuance of the Royal Decree No. (42/96) ratifying privatisation, Policies and Regulations as part of the Overall Economic Policy:
  The current trend of the privatisation policy consists of two distinct components: the selling of government assets to the private and second, to allow the private sector to participate in establishing, operating and financing public services that have been earlier the responsibility of the government.

- Setting up of the Omani Center for the Promotion of Investment and Export Development (OCIPED) under Royal Decree No. 59/96:
  The OCIPED has the responsibility to formulate investment promotion plans and projects in sectors such as tourism, services, manufacturing, agriculture and fisheries, with priority given to projects utilizing natural resources and facilitating transfer of technology. Second, facilitating expansion of exports of Omani origin in the traditional as well as newer markets through an efficient and competitive export market strategy.

(6) Oil sector

The Fifth Plan has assumed to increase the average production rate of crude oil to 880,000 b/d (779,000 in the Fourth Plan). The price of oil has been assumed at US $ 15 per barrel for the entire plan. The share of oil sector in GDP will be reduced to 28.8% in 2000 from 38% in 1995. However, the share of natural gas in GDP is likely to go up to 3.4% in 2000 from 0.9% in 1995 due to the establishment of the LNG project. The Fifth Plan accords a high priority for the development and exploitation of the natural gas resources. This is with a view to achieve economic diversification and the optimum utilization of available natural resources.

With a view to achieve the diversification of the exports, the value of non- oil exports of Omani origin is expected to increase at an average annual growth of 17.6%, while the value of crude oil exports is estimated to decrease at an average annual rate of 0.6% during the Fifth Plan. However, oil still represents around 80% of the total export proceeds.

Net oil revenues presently account for about 76% of the total public revenue. Net oil and gas revenue are expected to reach RO 7,785 million in the Fifth Plan as against RO 6,786 million in the Fourth Plan showing an increase of 14.7%.

(7) Promotion of industry

Oman is focused on developing industries that depend on domestic resources, with special priority to be given to gas, and the following industries:

- Industries that aim at the manufacture and export of natural resources/products.
- Industries that depend on the products of other industries from local resources, such as agriculture, fisheries and mining.
- Import substitution industries.
- Industries that depend on the utilization of traditional techniques.
- Export industries that benefit from the Sultanate's strategic location.
- Establishment of mineral industries, building materials industries and the encouragement of assembly line production.
- Industries that are oriented toward external markets.

In terms of priority and investment, there are five industries where need to be developed in Oman in the short-to- medium term,

- Aluminum. - Petrochemicals and Hydrocarbon.
- Plastics. - Engineering goods. - Minerals (non-copper)

(8) Infrastructure development

The government has realized the need to upgrade the national infrastructure such as roads, ports, electricity, water and telecommunications to a level that would foster private sector development and meet the demand of growing population.

As the Fifth Plan envisages private sector led development strategy, the government intends to promote public-private partnership to successfully execute infrastructure projects. Although some of these are in the manufacturing sector, others are obviously related to ports (Raysut), electricity (Manah power station), water and roads. The government also welcomes foreign/private investment in these projects.

3.5.2 GDP in the Fifth Five-Year Development Plan

In the Fifth Five-Year Development Plan, the government set an annual average growth rate of 4.6% of real GDP for 1996-2000. The target of the other main indices of macro economy is shown in Table 3-5-1. This table shows GDP by kind of economic activity and gross domestic expenditure by demand item.

According to this table, some sectors like manufacturing, electricity and construction will be expanded by using domestic natural gas resources in domestic economic activities during 1996-2000. Also, this table shows that growth of gross capital is higher than other items in gross domestic expenditure demand item.

Table 3-5-1 Balance of GDP and its Uses during Fifth Five-Year Plan (1996-2000)

(Unit : Million O.R. %)

Item	5th plan					Annual growth rate	
Year	1996	1997	1998	1999	2000	96-2000	(91-95)
A: Resources							
(1) Oil sectors	1,974	1,997	1,996	1,994	2,131	1.1	11.4
Crudeoil	1,908	1,924	1,915	1,905	1,909	-0.7	12.8
Naturalgas	66	73	81	89	222	36.4	-28.3
(2) Non-oil sectors	3,766	4,280	4,738	4,861	4,556	6.3	4.1
Goodsproducingsectors	706	911	916	1,142	1,133	13.7	8.2
Mining	21	28	30	25	27	9.7	52.3
Agriculture&fisheries	153	184	177	234	220	7.7	20.8
Manufacturing	274	353	308	337	429	12.2	11.6
Electricity&water	56	62	73	85	88	12.4	0.1
Building&construction	202	284	328	461	369	21.7	-8.1
Servicesproducingsectors	3,060	3,369	3,822	3,719	3,423	4.4	3.3
(1)+(2)	5,740	6,277	6,734	6,855	6,687	4.5	6.7
(3)Imputedbankingservices	-124	-123	-130	-133	-131	-0.2	20.7
(4)Customduties	47	57	67	69	62	6.6	9.1
TotalGDPatmarketprices (1)+(2)+(3)+(4)	5,663	6,211	6,671	6,791	6,618	4.6	6.5
B:Uses							
Finalconsumption	4,163	4,342	4,475	4,745	4,910	4.0	6.9
Grosscapitalformation	994	1,482	1,986	1,734	1,125	7.2	1.7
Surplusofexportsofgoods&non-factorsservices	506	387	210	312	583	4.9	11.7
Exportsofgoods&non-factorsservices	2,486	2,629	2,633	2,723	2,820	3.8	9.4
Importsofgoods&non-factorsservices	-1,980	-2,242	-2,423	-2,411	-2,237	3.5	8.9

Source : Table8-4and8-5intheFifthFive-YearDevelopmentPlan,July1997,byMONE.

Note : At1995prices.(3)isminusitems,and(4)isplusitems.A:Resources,B:Uses.

Chapter 4. MARKET STUDY

In this chapter, the present situation and future outlook of the steel market both inside and outside Oman is discussed. Also, the appropriate steel products for a new steel project are examined from a market standpoint.

4.1 Present Situation of Steel Demand in Oman

4.1.1 Domestic steel demand

(1) Steel demand by product

Steel demand in Oman since 1991 is as indicated in Table 4-1-1. Total steel demand shows a sharp increase during the two year period 1996~97, and this is considered a reflection of large scale construction efforts such as the LNG project, and increased activity in the industrial sector including manufacturing, etc.

Table 4-1-1 Demand for Steel Products in Oman

(Unit:1000tons)

Year / Products	Total	Bars & wire rods *	Sections *	Sheets & plates	Pipes
1991	256	123	22	7	104
1992	256	121	31	16	88
1993	311	165	27	22	97
1994	265	151	21	11	82
1995	215	131	12	21	51
1996	642	487	24	26	105
1997	689	288**	12	53	336

Source : Custom Statistics of Oman.

Note : * Ranges and limits of steel products are shown at Appendix A4-1-1.

** The figure for "Bars & wire rods" in 1997 includes the domestic production of an estimated 60,000 tons

In terms of steel products, bars & wire rods exhibit by far the highest figures, followed by pipes. In contrast, demand figures for sections and sheets & plates are extremely low. A more detailed look at high demand categories of bars & wire rods and pipes according to customs statistics of Oman indicates that the former comprises ordinary steel bar such as

reinforcing bar, while the latter constitutes seamless line pipe and seamless drilling pipe for oil wells. In 1997 in particular, seamless high quality line pipe accounted for nearly 90% of total pipe demand.

From the above, it can be seen that although steel demand in Oman is increasing in recent years, the domestic market remains small at a national level of around 600,000 tons. In Oman, steel demand relies on the construction sector including projects related to petroleum and gas development, and building construction.

(2) Steel demand and economic growth trends

In a sense, steel products comprises the "bread and butter" of industrial activity, playing a major role as a base material for a nation's entire industrial sector. This trend is particularly evident in the case of developing countries, where in many instances steel demand exhibits a strong correlation with real economic growth. The specific situation in Oman in this regard is examined below.

Table 4-1-2 indicates steel demand and real economic growth (GDP) in Oman over the 16 year period 1981~1996. The table clearly indicates the extremely sharp fluctuations in steel demand in the country due to small market size and the fact that demand is primarily related to construction projects. Specifically, "steel demand A" (purely statistical data) shows a major fluctuation vis à vis the real economic growth (GDP) rate. Since fluctuations in stocks of steel products in the construction sector are generally large, the three year average for the specific year in question and the years immediately preceding and succeeding the same is indicated as "steel demand B" in an effort to identify actual consumption to the extent possible.

The following conclusions can be drawn from Table 4-1-2:

- "Steel demand B" in Oman reached an initial peak around 1984~85, followed by a period of depressed demand, and again exhibits expansion from 1996.
- Real growth rate of GDP in Oman showed over 10 % rates in the first half of the 1980s, peaking in 1985. In 1987 and 1989, however, the growth rate of GDP actually fell down below zero. Afterwards the growth rates have been stable at 4 - 6%.
- The ups and downs of real growth rate of GDP and "steel demand B" show a general linkage, with the degree of fluctuation being more gentle in the case of the former and sharper in the case of the latter.
- The average annual growth rate for "steel demand B" during the period between the peak years of 1985 and 1996 is 3.1%, while that for real growth of GDP for the same period is 3.0%. In other words, the elasticity rate of "steel demand B" for real growth rate of GDP

is essentially 1, when these data are taken note of ten year term, although "steel demand B" fluctuated sharply in 1994, 1995 and 1996.

The correlation between the above is analyzed in further detail in the subsequent Section 4-3.

Table 4-1-2 Steel Demand and Growth Rate of GDP in Oman

Year	Steel Demand A	A *	Steel Demand B	B *	GDP**
	Quantity 1000ton	%	Quantity 1000ton	%	Growth Rate %
1981	194	94.0	185	48.0	17.4
1982	261	34.5	237	28.1	11.6
1983	256	-1.9	301	27.0	12.9
1984	387	51.2	365	21.3	13.9
1985	452	16.8	362	-0.8	14.5
1986	247	-45.4	260	-28.2	4.2
1987	81	-67.2	184	-29.2	-4.0
1988	223	175.3	151	-17.9	5.2
1989	148	-33.6	191	26.5	-0.1
1990	203	37.2	202	5.8	8.4
1991	256	26.1	238	17.8	6.0
1992	256	0.0	274	15.1	8.5
1993	311	21.5	277	1.1	6.1
1994	265	-14.5	264	-4.7	3.8
1995	215	-18.9	374	41.7	4.8
1996	642	204.2	515	37.7	3.5

Source : Custom Statistics of Oman. International Iron and Steel Institute (IISI). Statistical Year Book 1996 by Ministry of National Economy (MONE).

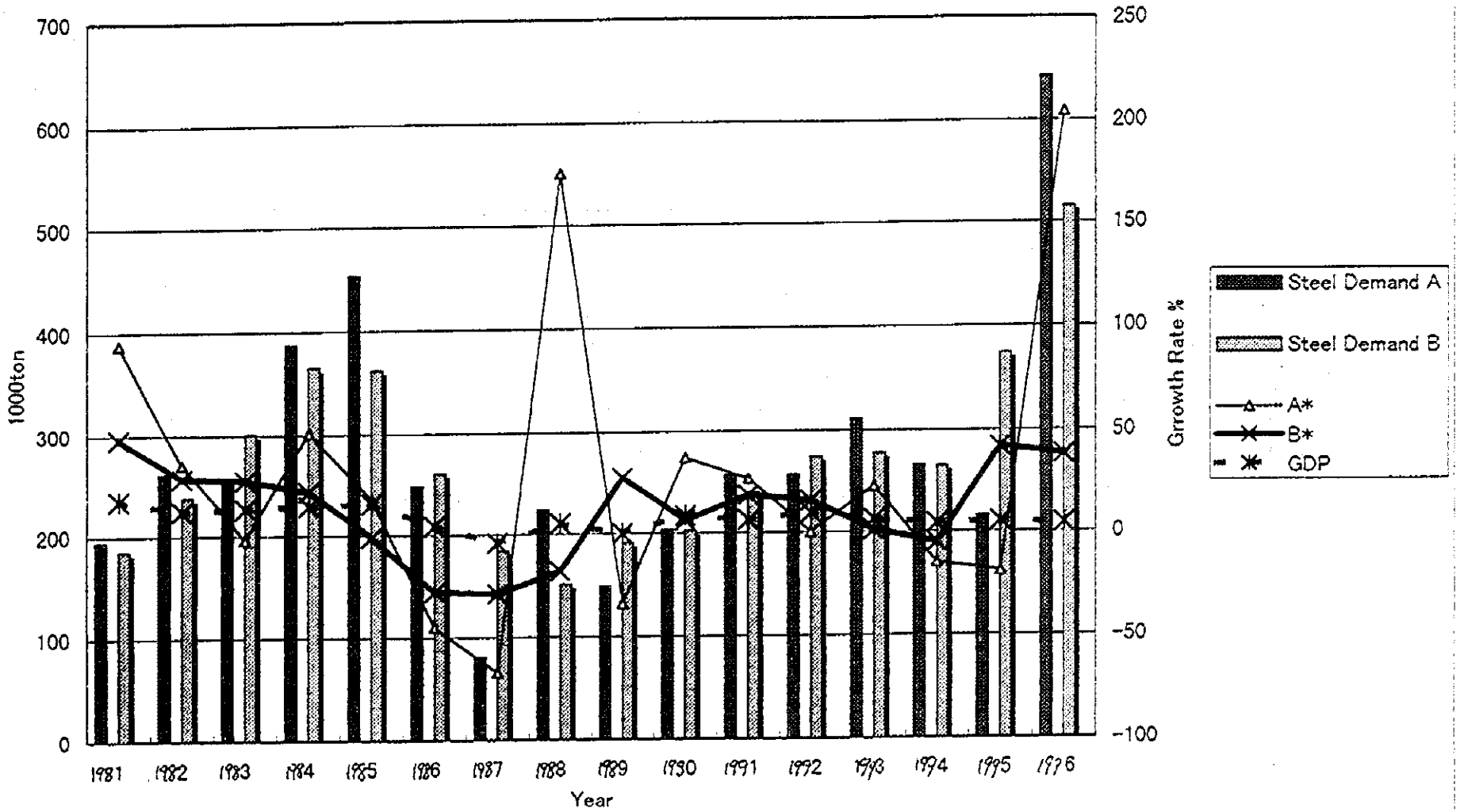
Note : * Steel Demand A is statistical data.

* Steel Demand B is the figure which statistical data of three years are averaged. Growth Rates of GDP and Steel Demand A & B are compared with the former year.

** GDP is at 1988 constant prices.

Planned annual growth rate of GDP (1995-2000)by the Fifth Five-Year Plan is 4.6%.

Figure 4-1-1 Steel Demand and Growth Rate of GDP



4.1.2 Present steel consumption by product and by sector

(1) Estimation of present steel consumption by product and sector

Custom statistics of Oman indicate the details of quality and form of imported steel products. Specifically, indication is made as to whether items are stainless or alloy steel, whether sheets are tinplates or cold rolled sheets, whether pipes are for line pipe use, drilling, casing or general piping, etc.

Also, an interview survey was carried out during the field survey with regard to the end consumer of steel products in Oman. This pertains to such sectors as steel fabrication, steel furniture manufacture, steel can manufacture, wire processing (including nail manufacture, etc.), as well as the trade and marketing sectors. Details of this interview survey are given in Appendix A4-1-2.

In addition, reference is also made to manufacturing industry statistics for Oman.

Further to the above survey components, estimates of present steel consumption by product and by sector in Oman is presented in Table 4-1-3 based on final steel consumption experience in Japan, Saudi Arabia, Thailand, etc. The construction sector includes buildings and civil works construction. Pipes for line pipe use, drilling, casing and general piping are considered as falling within the category of construction sector consumption. Outside of domestic construction related projects, steel consumption in the manufacturing sector in addition to the previously mentioned steel fabrication, steel furniture manufacture and steel can manufacture industries is limited basically to automobile and other mechanical equipment repair. In the case of the steel processing sector, competition with imported products is generally not possible until a certain scale of manufacture is achieved. The general absence in Oman of major consumption sources which are not construction related results in a consumption pattern for steel products which is heavily skewed towards the construction sector as indicated in Table 4-1-3.

Table 4-1-3 Estimation of Present Steel Consumption by Product and by Consumption Sector in Oman

(Unit : 1000 tons, %)

Sector / Product	Total	Bars & rods	Sections	Sheets & Plates	Pipes
Construction	630 (94)	380 (97)	20 (100)	30 (75)	200 (91)
Manufacturing, others	40(6)	10 (3)	0 (0)	10 (25)	20 (9)
Total	670 (100)	390 (100)	20 (100)	40 (100)	220 (100)

Source : Field survey.
Note : Total figures by steel product are the average figures of 1996 and 1997.

4.1.3 Special characteristics of the steel market in Oman

Oman has a present population of 2.13 million, and GDP as of 1996 of US$ 15.3 billion (IMF statistics; US$ 1 = 0.3845 R.O.). Based on the International Iron and Steel Institute (IISI) statistics and with reference to data for other developing countries, the special characteristics of the Omani steel market are discussed below in terms of market scale, stage of economic development, and steel consumption by sector.

(1) Market scale

In appraising national market scale, IISI applies steel consumption, GDP (expressed in US dollars) and population as the key indices for macro comparison of steel related data for each country. In order to elicit the distinguishing features of the scale of the Omani steel market, relevant data for major GCC countries (Saudi Arabia, UAE, Qatar), countries with steel consumption and population levels approximating that of Oman (Jordan, Tunisia, Singapore), and Japan as an example of a major industrialized country are indicated in Table 4-1-4.

Table 4-1-4 Steel Consumption, GDP, Population, Steel Consumption per Capita, Steel Intensity of GDP and GDP per Capita of Select Countries in 1996

Country	Steel Consumption A (1000 ton)	Population (million) B	GDP (1990 price, million $) C	Steel Consumption per Capita (kg) A/B	Steel Intensity of GDP (kg/$ at 1990 prices) A/C	GDP per Capita ($ at 1990 prices) C/B
Oman	642	2.2	16,082	292	0.0399	7,310
Saudi Arabia	3,202	18.8	117,721	170	0.0272	6,262
UAE	910	2.3*	44,620	403	0.0204	19,400
Qatar	60	0.6**	7,515*	107	0.0080	12,525
Jordan	413	5.6	6,109	74	0.0676	1,091
Tunisia	500	9.1	15,924	55	0.0314	1,750
Thailand	8,995	60.0	136,702	150	0.0658	2,278
Singapore	3,764	3.0	60,612	1,238	0.0621	20,204
New Zealand	693	3.6	48,462	194	0.0143	13,461
Japan	75,878	125.8	2,999,130	603	0.0253	23,840

Source : International Iron and Steel Institute (IISI). International Monetary Fund (IMF).

Note : *1995, **1994.

The following are evident from the above table:

- Although the scale of steel consumption in Oman is small in an absolute sense, relative consumption rates in terms of population size and GDP are extremely high.
- Per capita steel consumption and per capita GDP each have their own interpretation as indices for level of economic development maturity. In the case of petroleum producing countries the value for the former is low while that for the latter is high. In the case of industrialized countries both values are high; and conversely, both values are low for developing countries (non petroleum producing).
- In the case of petroleum producing countries, per capita GDP is not necessarily an indication of the stage of economic development. This is discussed in more detail in the following section.

(2) Stage of economic development

Applying an enormous steel related data base, and GDP and population figures for each country in the world, IISI has evolved a "steel intensity curve" theory which indicates the relationship between steel consumption and a nation's stage of economic development. This is shown in Figure 4-1-1.

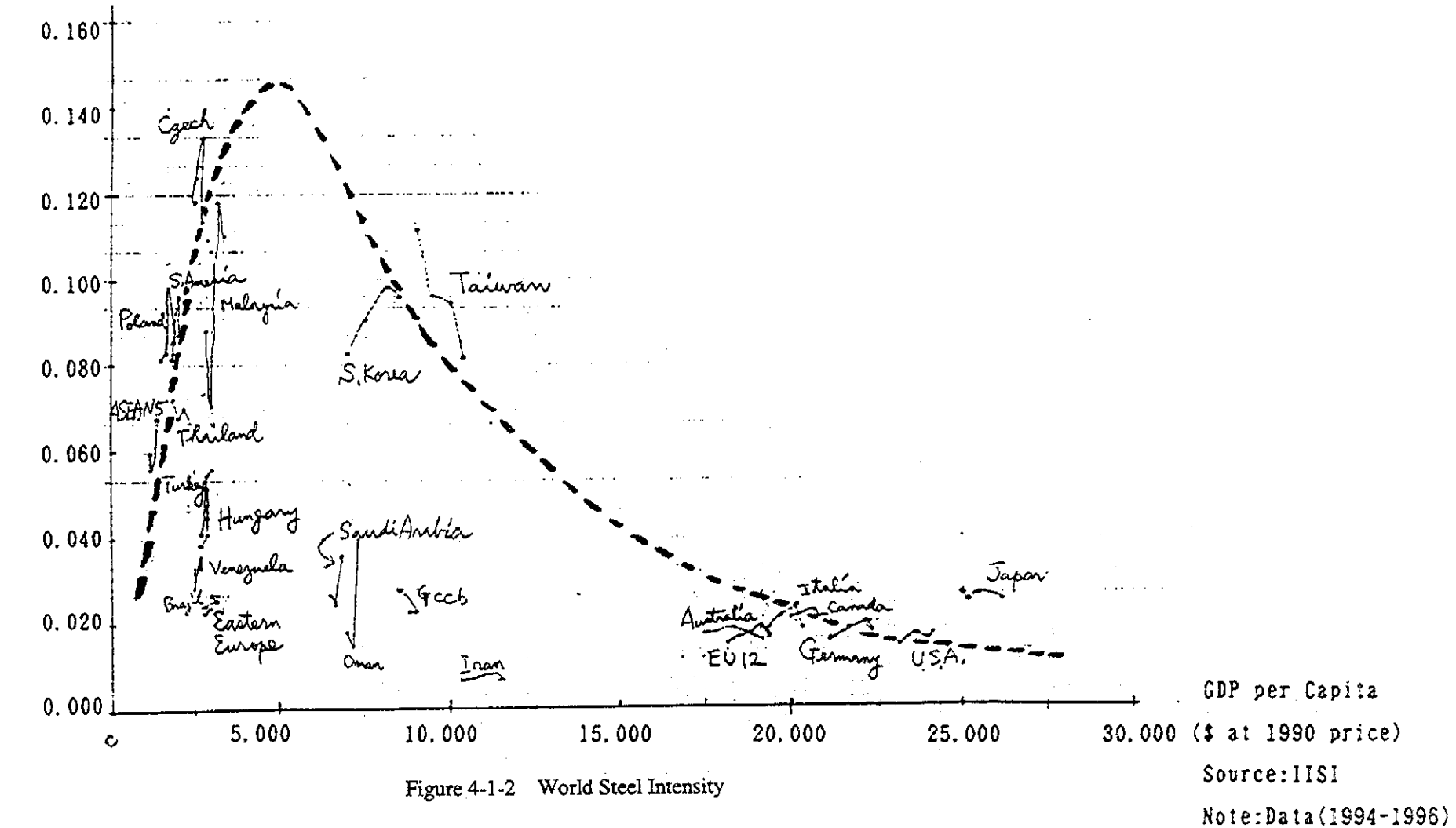


Figure 4-1-2 World Steel Intensity

Source:IISI

Note:Data(1994-1996)

The steel intensity curve theory is described as follows.

By establishing a graph with the vertical axis indicating steel consumption per GDP (kg / US$ at 1990 prices) and the horizontal axis indicating per capita GDP, the bulk of plotted data describes a curve. The horizontal axis serves as an index for a stage of economic development while the vertical axis is an index indicating "steel intensity" (steel consumption / GDP). In the case of developing countries, plotted location is on the upside of the curve, while that for developed countries is on the downside of the curve. In other words, the said curve indicates that steel consumption for a country or region changes in response to the stage of economic development. Empirically, it is a generally recognized fact that as an economy matures it becomes less dependent on steel consumption, and the subject graph serves to depict this quantitatively. However, in cases where figures for steel consumption and GDP are excessively small, plotted location deviates significantly from the curve. Accordingly, a certain level of data is required for meaningful plotting on the graph, and in this regard it is necessary in the case of some developing countries to consider a regional overview which combines the data for multiple countries in the same general area.

In the case of petroleum producing countries, plotted location deviates significantly from the generally described curve. This is attributed to the rapid and large increase in the price of oil from 1973, resulting in a major growth in per capita GDP against a background of economic, industrial and steel consumption structures different in many cases from non-petroleum producing countries. Over the long term, however, it is assumed that these structures will eventually approximate those of other countries. The unique orientation of the petroleum producing countries must thus be interpreted within the context of the steel intensity curve, with full recognizance of the distinctive nature of their respective economies.

(3) Steel consumption by sector

The Japan Iron & Steel Exporters Association (JISEA) has compiled a large data base with regard to the world steel trade market, and the data of this organization has been applied in identifying the special features of steel consumption by sector in Oman. Of the countries indicated in Table 4-1-4, data on composition of product-wise and sector-wise consumption of steel for Saudi Arabia, Singapore, Thailand and Japan is given in Table 4-1-5.

The following can be concluded from the said table:

- With the exception of the Japan, countries exhibiting heavy consumption of long products show steel usage heavily skewed towards the construction sector.

- Countries which exhibit automobile and electrical machinery consumption in the manufacturing sector also show a heavy consumption of flat products.
- The composition of sector-wise and product-wise steel consumption in Oman is heavily skewed towards the construction sector and long products, respectively. With the exception of the categories of electrical machinery and flat products, the Omani steel consumption pattern approximates that of Saudi Arabia.

Table 4-1-5 Product-wise and Sector-wise Steel Consumption in Saudi Arabia, Singapore, Thailand, Oman and Japan in 1997

(Unit : %)

		Saudi Arabia	Singapore	Thailand	Oman	Japan
Product-wise (%)	Long products *	55	50	42	61	42
	Flat products **	35	35	43	6	49
	Pipes	10	15	15	33	9
	Total	100	100	100	100	100
Sector-wise (%)	Construction	70	66	61	94	51
	Manufacturing	30	34	39	6	49
	Electrical machinery	20	13	12	0	7
	Industrial machinery	0	1	1	0	8
	Automobile	0	0	16	0	17
	Ship building	0	12	0	0	5
	Others	10	8	10	6	12
	Total	100	100	100	100	100

Source : Japan Iron & Steel Exporters Association.

Note : * Long products, : bars, wire rods, sections and wires.

** Flat products : sheets and plates.

The data for Oman is taken from Table 4-1-3

4.2 Current Steel Supply in Oman

Steel supply in Oman is only at a re-roller mill which commenced operation in 1997. The mill imports billet as raw material which is used to produce 60,000-70,000 tons of steel reinforcing bar per year.

4.3 Supply and Demand Forecast for Steel Products in Oman

4.3.1 Methodology for steel demand forecast

In terms of steel demand forecast methodology, there is both a macro and a micro approach. The former is used for long-term forecasting, while the later is applied to short-term forecasting.

(1) Macro forecast method

The macro forecast method applies a correlative formula where steel demand is assumed as a dependent variable, and macro indicators such as GDP, etc. are treated as independent variables. In effecting forecast, data on these variables is necessary for a period of past years roughly equivalent to the number of future years for which the forecast is being made. Independent variables comprising GDP and other macro indicators are elicited from the Fifth Five Year Plan and "Vision 2020" data. Generally speaking, the degree of correlation of this formula is high due to the fact that steel is a basic national economical material. However, where steel demand is small scale, steel demand fluctuates more markedly than the macro indicators, resulting in instances where a meaningful correlation is not established. Also, the predicted figures are checked for appropriateness by comparison with data (i.e. per capital steel consumption, steel intensity, etc.) for other developing countries

(2) Micro forecast method

Under the micro forecast approach, future levels of activity are forecast by demand per sector, and future steel demand predicted when it is commensurate with these anticipated levels of activity. The key to this method is thus the accurate prediction of future activity levels in each demand sector. Since this is difficult for the long-term, the micro forecast method is generally more appropriate for short-term forecast.

(3) Steel consumption forecast by product

Under the macro and micro forecast methods in the case of Oman, due to low domestic steel demand, total steel demand is first predicted then product-wise analysis is done on the basis of composition ratio, etc.

4.3.2 Steel demand forecast

(1) Macro forecast

Data input to the correlation formula is as follows:

- Data period: 1981~1996
- Dependent variables:
  - Steel consumption volume (1,000 tons, Table 4-1-2: "Steel demand A")
  - Averaged steel consumption volume (1,000 tons, Table 4-1-2: "Steel demand B")
- Independent variables:
  - Current prices and real prices for GDP, petroleum sector, industrial sector (mining, manufacturing, electricity · water service, construction), final consumption expenditure and gross fixed capital expenditure

The correlative formula applying "steel demand A" (purely statistical value) as the dependent variable yields an excessively low correlation coefficient, resulting in poor effectivity as a forecast formula.

A correlation formula was accordingly attempted applying "Steel demand B" (averaged value) as the dependent variable in various combinations with independent variables. As a result, a high correlation coefficient was achieved under the following 2 formulas:

1) C formula:

$Y = 0.1649\ X_1 - 0.8446\ X_2 + 2.23160\ X_3 - 1.7710\ X_4 + 260.0493$

Correlation coefficient R : 0.7361

- Independent variables : GDP (X_1), petroleum sector (X_2), industrial sector total (mining, manufacturing, electricity · water service, construction) (X_3), construction sector (X_4); all real price base (1988 prices)

2) D formula:

$Y = -0.1803\ X1 + 0.4091\ X2 + 1.7697\ X3 - 303.1170$

Correlation coefficient R : 0.8742

- Independent variables : GDP (X1), petroleum sector (X2), industrial sector total (mining, manufacturing, electricity · water service, construction) (X3); all current price base

Data source for independent variables: "Statistical Year Book, 1996", Ministry of

National Economy (MONB)

Past steel consumption performance and theoretical values (formulas C and D) are indicated by graph in Figure 4-3-1.

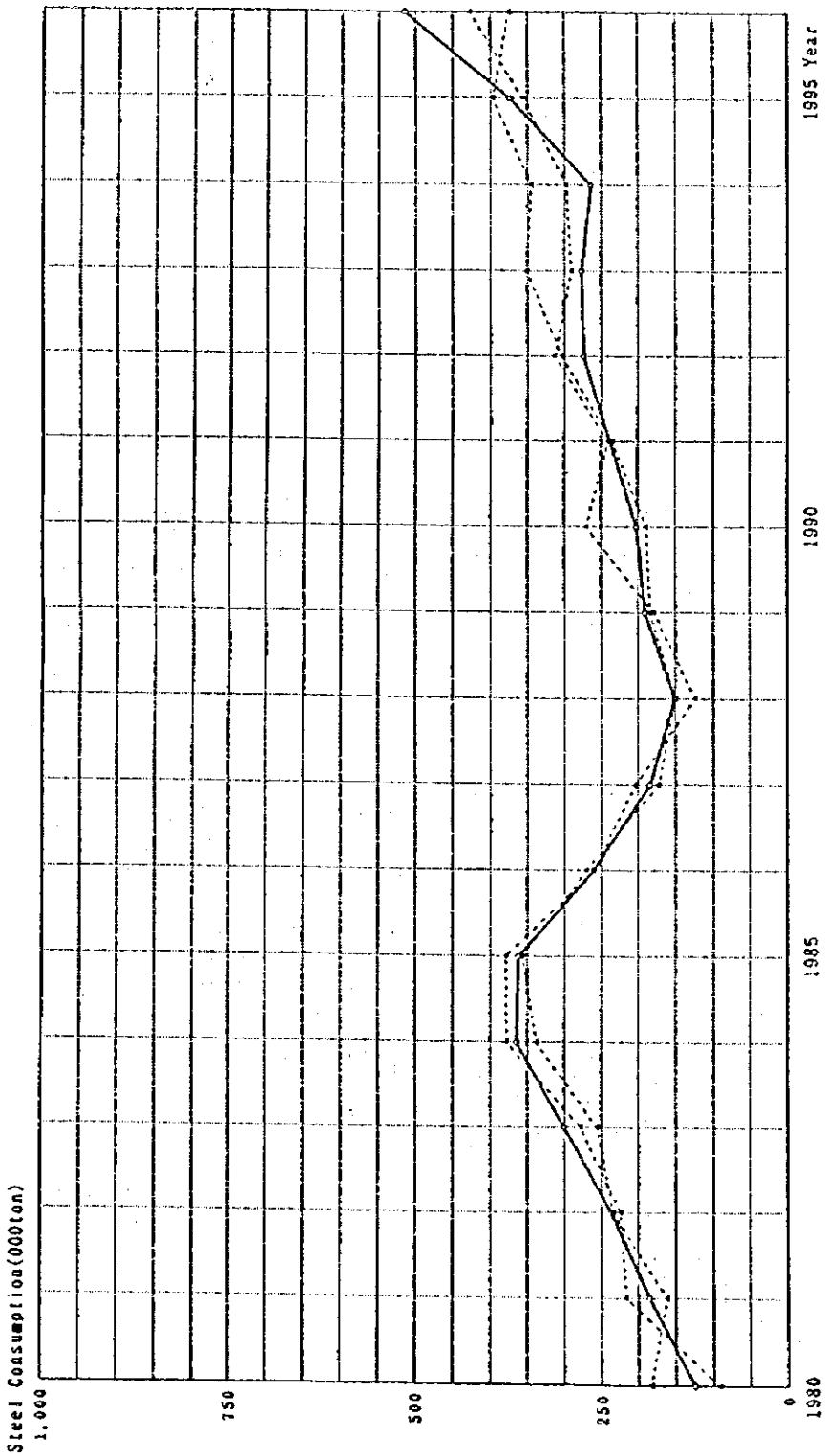


Figure 4-3-1 Development and Theoretical Figures of Steel Consumption in Oman

3) Steel demand forecast for 2010

• Independent variables for the years 2000 and 2020 are determined from the Fifth 5-Year Plan and "Vision 2020" data. Value for the year 2010 is computed from the average growth rate for the period 2000 - 2020. On this basis, steel demand for 2000 and 2010 is calculated as follows:

Table 4-3-1 Forecast of Steel Demand in 2000 and 2010 in Oman (C, D)

(Unit : 1000 ton, %)

Formula/Year	1995 A	2000 B	2010 C	B/A*	C/B*
Steel Forecast C	397	1,044	3,623	21.3	13.2
Steel Forecast D	357	1,570	5,263	34.5	12.9

Note : Independent variables for 2000 and 2010 are shown in Appendix A4-3-1.

* Annual growth rate : %.

Steel Forecast C is from C formula. Steel Forecast D is from D formula.

The above steel demand forecasts for 2000 and 2010 are concluded to be excessively high. This is attributed to high values contained in the Fifth Five Year Plan and "Vision 2020" data particularly for the industrial sector (mining, manufacturing, electricity · water service, construction). Even in the case of the Thai economy (which has garnered world-wide attention due to impressive growth over the past 10 year period), the elasticity rate of steel demand for GDP is in the neighborhood of 2. The actual high growth performance of the Thai economy implies economic take-off. The elasticity rate for the above 1995 - 2000 period in the case of Oman ranges from 7 to 8.

• With consideration of the above, the steel demand forecast in the case of Oman will be corrected as follows.

Specifically, steel consumption is derived in terms of analysis of elasticity rate for GDP, and the results verified on the basis of per capita steel consumption, steel intensity, etc. with reference to data for a wide range of developing countries.

• Assumed macro-indicators are shown in Table 4-3-2.

Table 4-3-2 Forecast of GDP in 2000 and 2010 in Oman

(Unit : Million R. O. at 1995 Prices, %)

Year	1995 A	1996 B	2000 C	2010 D		C/A	C/B	D/C*	
GDP	5,288	5,663	6,618	a 10,376	b 12,658	4.6	4.0	4.6*	6.7
Gross Capital Formation	795	994	1,125	2,255*		7.2	3.1	7.2*	

Source : The Fifth Five-Year Plan. "Vision 2020".

Note : Annual growth rate of GDP in 2000 - 2020 by "Vision 2020" is 6.7%.
GDP (b) in 2010 comes from the above annual growth rate.
GDP (a) in 2010 comes from the same annual growth rate of The Fifth Five-Year Plan.
Gross Capital Formation * in 2010 comes from the same annual growth rate of The Fifth Five-Year Plan.

The past elasticity rate of steel consumption in 1985 and 1996 (peak-to-peak) for GDP in Oman is 1. Under this consideration, steel consumption of two cases (a and b) is forecast in Table 4-3-3 on the assumption that GDP is based on Table 4-3-2 and elasticity rate of steel consumption for GDP is 1.

(Note : Elasticity rate of steel consumption for GDP is explained in Appendix A4-3-2).

Table 4-3-3 Forecast of Steel Demand in 2000 and 2010 in Oman (a, b)

(Unit : 1000 ton, %)

Year	1985	1995	1996	2000	2010	1996/85	2000/96	2010/2000
Steel Consumption a	362	374	515	602	944	3.1	4.0	4.6
Steel Consumption b	362	374	515	602	1,151	3.1	4.0	6.7

Note: Steel Consumption (a and b) is forecast on the assumption that GDP is based on Table 4-3-2 and elasticity rate of steel consumption for GDP is 1

(2) Micro forecast

In the case of micro forecasting, sector-wise levels of activity are predicted as a basis for extrapolating the corresponding steel consumption forecast. As indicated in Table 4-1-3, ninety-four percent (94%) of present steel consumption in Oman is accounted for by the construction sector. Although circularly argumentative, the fixed capital composition in Table 4-3-2 provides the indicators for construction related levels of activity in 2000 and 2010. Growth rate for the remaining 4% of steel consumption accounted for by the manufacturing and other sectors is extrapolated from GDP growth. The results of the foregoing are indicated in Table 4-3-4.

Table 4-3-4 Forecast of Steel Consumption by Sector (c)

(Unit : 1000 tons)

Sector / Year	1996	2000	2010
Construction	494	559	1,120
Manufacturing, and other	21	25	48*
Total	515	584	1,168

Note : * by GDP (b) of Table 4-3-2

(3) Examination of forecast results

The three consumption forecasts, their averages, and related per capita steel consumption and steel intensity are indicated in Table 4-3-5.

Table 4-3-5 Forecast of Steel Consumption, per Capita and Steel Intensity of GDP of Oman in 2000 and 2010

(Unit : 1000 tons, kg, kg / $ at 1990 prices)

Item / Year	2000	2010
Steel Consumption (a)	602	944
Per Capita	251	304
Steel Intensity	0.0310	0.0293
Steel Consumption (b)	602	1,151
Per Capita	251	371
Steel Intensity	0.0310	0.0357
Steel Consumption (c)	584	1,168
Per Capita	243	377
Steel Intensity	0.0300	0.0362
Steel Consumption :Average (a, b, c)	596	1088
Per Capita	248	351
Steel Intensity	0.0306	0.0338
Population (million)*	2.4	3.1
GDP (million $)**	19,450	33,230

Note : * Annual growth rate ; 2.5 %. ** at 1990 $ price. R. O per $ = 0.3845.

Steel Consumption (a) and Steel Consumption (b) from Table 4-3-3.

Steel Consumption (c) from Table 4-3-4.

• Per capital steel consumption

Per capita steel consumption in Oman in 2010 is forecast at 304 – 377 kg. When this level is examined in terms of Table 4-1-4, it can be seen that the figure for Oman is greater than that at present for Jordan (74 kg), Qatar (107 kg), Thailand (105 kg) and Saudi Arabia (170 kg), but less than that for UAE (403 kg), Japan (603) and Singapore (1,238 kg).

These differences are due to the production scale per capita in the steel consumption industries such as construction sector and manufacturing sector.

• Steel intensity

Steel intensity for Oman in 2010 is forecast at 0.0304 - 0.0362. In the same manner as above, examination of this level in terms of Table 4-1-4 indicates that the value for Oman is greater than that at present for the petroleum producing countries of Saudi Arabia (0.0272) and UAE (0.0204), and less than that for Thailand (0.0658) and Singapore (0.0621).

These differences are due to the production share of steel consumption industry in GDP.

The average growth rate of around 5% for steel consumption in the Middle Eastern region as taken from IISI forecast values presented in the subsequent Section 4.4 (Table 4-4-8) can be considered to substantiate the appropriateness of the above forecast for Oman.

(4) Final Forecast for Steel Consumption by Product

The average figures for the three forecast figures in Table 4-3-5 are adopted as the final forecast for Omani steel consumption in 2000 and 2010 under this Study. These are collated on a product-wise basis in Table 4-3-6. Figures for 2005 are derived from the average growth rate over the period 2000 - 2010. Product breakdown is based on the composition ratio for 1996. As discussed in Section 4-1-2, steel consumption in Oman is heavily skewed towards the construction sector, with conversely very little consumption occurring in the manufacturing sector. This is accordingly reflected in the present composition of product-wise consumption of steel in the country.

Under its policy to diversify economic activity outside the petroleum sector in the future, the Omani government has adopted a stance of actively promoting expansion of the manufacturing sector. Due to the low domestic demand in Oman, the manufacturing sector would out of necessity rely heavily on exports. (Against this background of a small domestic market, industries with viable international competitiveness have already developed relatively early, and are expected to continue to grow in the future. Specially,

these are petroleum and natural gas related industries, and the cement industry.)

Major steel consuming industries in the manufacturing sector generally comprise the manufacturing of electro-mechanical equipment, general machinery and automobiles. Such manufacturing industries do not exist at present in Oman, and are excluded from future economic planning by the government due to substantial hurdles in terms of cost competitiveness with regard to raw materials and production technology.

It is thus assumed that steel consumption in the manufacturing sector in Oman will continue in the foreseeable future in line with the current situation. On this basis, no future change is anticipated in the product-wise composition ratios within the steel consumption market in Oman.

Table 4-3-6 Final Forecast of Steel Consumption by Product

(Unit : 1000 tons; %)

Product/Year	1985 a	1996 b	2000 c	2005	2010 d	b/a *	c/b *	d/c *
Bars and rods	-	300	350	470	640	-	-	-
Sections	-	15	20	25	30	-	-	-
Sheets and Plates	-	30	35	45	60	-	-	-
Pipes	-	170	195	270	360	-	-	-
Total	362	**515	600	810	1090	3.3	3.9	6.2

Note : * The average growth rate.

** Figure for Steel Demand B in Table 4-1-2,

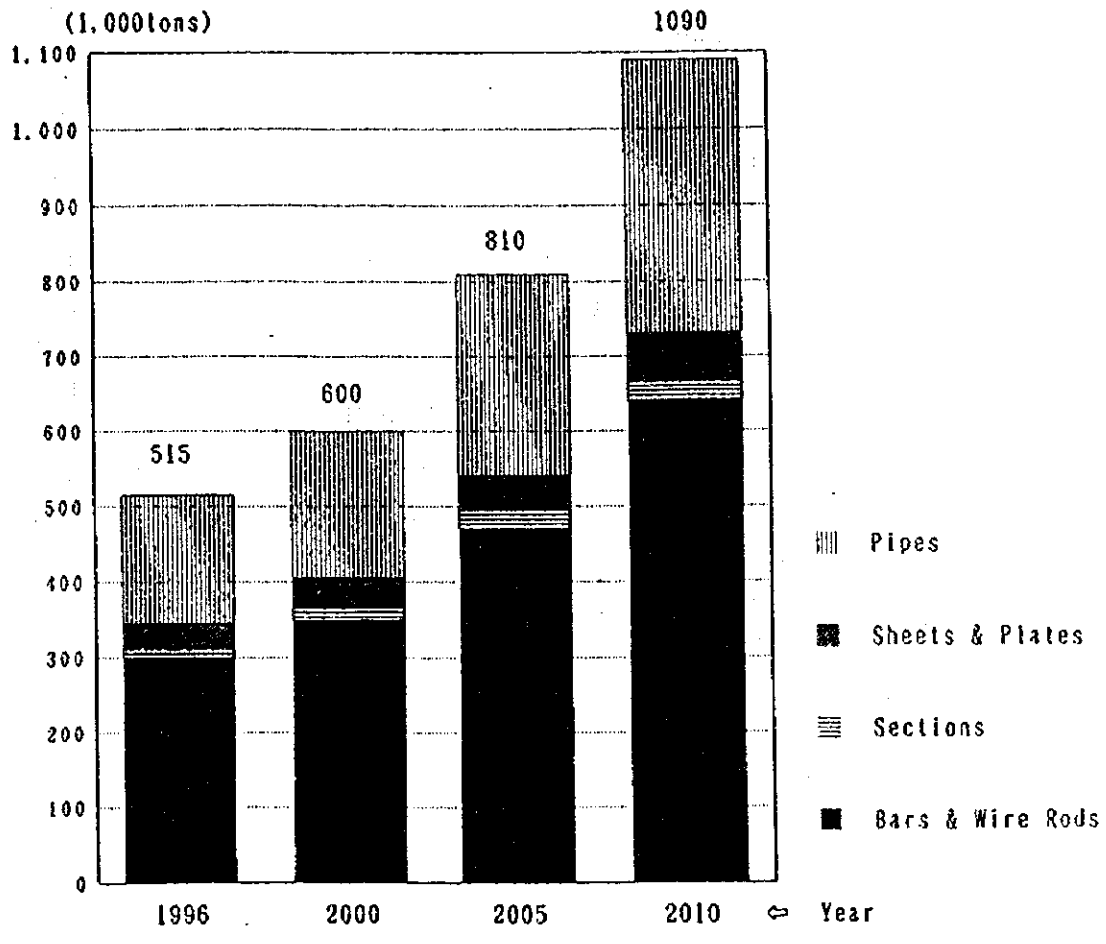


Figure 4-3-2 Final Forecast Steel Consumption by Product

4.3.3 Steel supply forecast

As discussed in the previous Section 4-2 (Present Status of Steel Production in Oman), present steel production in Oman is around 60,000 - 70,000 tons per year produced at a single re-roller mill. On the basis of interviews with concerned personnel of the Ministry of Commerce and Industry as well as numerous end users of steel products, there are no projects planned at present to further expand steel production. As a result, it is assumed under this Study that future steel supply volume in Oman will change little in the future.

4.3.4 Forecast of steel supply and demand balance

On the basis of Table 4-3-6 and the foregoing Section 4-3-3, the forecast of steel supply and demand balance is collated in Table 4-3-7. According to this tabulation, production shortages by product in 2005 and 2010 will be 400,000 and 570,000 tons for bars & wire rods, 25,000 and 30,000 tons for sections, 45,000 and 60,000 tons for sheets and plates, and 270,000 and 360,000 tons for pipes, respectively. Production shortage is particularly large in the case of bars & wire rods, and pipes.

Table 4-3-7 Forecast of Steel Balance by Product

(Unit : 1000 tons)

Product	Balance/Year	1996	2000	2005	2010
Bars and wire rods	Production A	60	70	70	70
	Consumption B	300	350	470	640
	Balance B - A	240	280	400	570
Sections	Production A	0	0	0	0
	Consumption B	15	20	25	30
	Balance B - A	15	20	25	30
Sheets and pates	Production A	0	0	0	0
	Consumption B	30	35	45	60
	Balance B - A	30	35	45	60
Pipes	Production A	0	0	0	0
	Consumption B	170	195	270	360
	Balance B - A	170	195	270	360
Total	Production A	60	70	70	70
	Consumption B	515	600	810	1090
	Balance B - A	455	530	740	1020

4.3.5 Product selection based on domestic market study

Bars are selected as the most suitable product for this Project. The principal reasons for this are (i) as indicated in Table 4-3-7 the market for steel bars (primarily for reinforcing bars) exhibits the largest volume, and (ii) the next largest market, i.e. pipes, comprises mostly seamless high quality pipes used for line pipes and drilling in the petroleum sector, and seamless pipes are considered extremely difficult to produce given levels of technology in developing countries.

4.4 Current Situation and Future Prospect of the International Steel Market

In this section, the present situation of the international steel market is discussed on the basis of past data, and the future prospect of the same are qualitatively examined.

4.4.1 Present situation of the international steel market

(1) World steel demand by region

World-wide steel demand over the 5 year period 1991 - 1996 has grown at an annual rate of 0.8% according to IISI statistics. Region-wise characteristics of this steel demand are as follows:

Table 4-4-1 Steel Demand in 1991 - 1996 in World by Region

(Unit : Million tons, %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1996*
Middle East	10.7	12.6	13.6	13.1	12.5	13.2	4.3	2.0
Asia	232.4	231.9	274.7	269.6	290.3	289.2	4.5	45.0
Africa	12.6	12.2	12.1	13.4	13.2	11.1	- 2.5	1.7
Western Europe	127.6	125.8	112.2	127.1	144.5	128.6	0.2	20.0
Eastern Europe	117.1	89.6	65.2	43.5	47.1	41.8	- 18.6	6.5
North America	96.0	102.8	109.9	127.2	119.6	129.7	6.2	20.2
South America	16.2	17.5	19.5	21.2	21.9	23.4	7.6	3.6
Oceania	5.2	5.1	5.9	6.4	6.4	6.3	3.9	1.0
World Total	617.8	597.5	613.1	621.5	655.5	643.3	0.8	100.0

Source : IISI

Note : Ranges of region are shown at Appendix A4-1-1. 96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.

- Demand in eastern Europe including Russia has greatly decreased under the impact of the disruption of the Soviet Union.
- Demand in North and South America has grown at a rate well above the world average.
- Demand in Asia and the Middle East, although not to the extent seen in North and South America, exhibits growth above the world average.
- Western Europe shows flat growth; while demand in Africa has decreased.

(2) World crude steel production by region

World-wide crude steel production exhibits the following characteristics by region during the 5 year period 1991 - 1996:

- Due to the impact of the collapse of the Soviet Union, production in Eastern Europe including Russia has dropped, however, this decrease is less than that for corresponding steel demand.
- Production in North and South America has increased, reflecting the growth in demand.
- Although production has greatly increased in the Middle East, production share compared to demand is still low vis à vis world-wide levels.
- Comparison of world production and demand shares for 1996 indicates that production significantly surpasses demand in the case of Eastern Europe (by 7.9 points). In the case of Western Europe and South America, production is greater than demand as well; however, this is only by 1.8 points and 1.2 points, respectively.
- Conversely, demand exceeds production in the case of Asia (by 6.6 points) and North America (by 3.6 points).
- Other regions show less than a 1 point plus/minus in this regard.

Table 4-4-2 Crude Steel Production in 1991 - 1996 in World by Region

(Unit : Million tons; %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1996*
Middle East	4.8	5.6	6.9	7.8	8.1	9.1	13.6	1.2
Asia	247.1	247.7	265.0	266.5	279.8	287.0	3.0	38.4
Africa	14.6	14.3	14.0	13.5	13.7	12.6	- 2.9	1.7
Western Europe	161.9	157.4	158.2	166.6	170.9	162.8	0.1	21.8
Eastern Europe	166.0	147.4	127.9	110.6	113.2	108.1	- 8.2	14.4
North America	101.4	107.5	113.0	116.2	122.7	123.6	4.0	16.5
South America	30.9	32.3	33.8	34.9	34.6	35.6	2.9	4.8
Oceania	6.9	7.5	8.7	9.2	9.3	9.2	5.9	1.2
World Total	733.6	719.7	727.5	725.3	752.3	748.0	0.4	100.0

Source : IISI
Note : 96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.

(3) World steel imports by region

World-wide steel imports exhibit the following characteristics by region during the 5 year period 1991 - 1996:

- Total volume of world-wide steel imports shows an annual 6.3% growth rate, increasing from 167.4 million tons in 1991 to 227.5 million tons in 1996.
- The Asian market has made the greatest contribution to this increase, exhibiting an annual growth rate in imports of 10%. The Asian market alone accounts for around 35% of total steel imports world-wide, and is on a par with Western Europe in this regard (approx. 36%).
- Western Europe remains the largest steel importing region, showing stable growth in imports of around 2% per annum and a 36% share of world-wide steel imports in 1996.
- The North American steel import market has grown at an annual rate of 11%, and is third in terms of world-wide import share.
- The Middle Eastern share of world steel imports is low at only 3.3%.
- Eastern Europe shows a high annual growth rate in steel importation at 13% over the subject period; however, 1991 imports were at a bottom level due to the collapse of the Soviet Union, and the 1996 level of imports is actually only a little over 50% of that prior to 1988.

Table 4-4-3 Imports of Steel Products in 1991 - 1996 in World by Region

(Unit : Million tons; %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1996*
Middle East	7.6	9.0	10.4	8.1	8.3	7.4	-0.5	3.3
Asia	50.0	54.6	92.3	86.1	85.1	80.4	10.0	35.3
Africa	5.4	5.8	5.4	6.7	7.2	5.5	0.4	2.4
Western Europe	73.5	75.3	66.3	78.1	89.4	82.2	2.3	36.1
Eastern Europe	6.0	7.4	9.7	11.1	11.0	11.6	12.9	5.1
North America	20.3	21.7	24.2	37.6	32.0	34.8	11.4	15.3
South America	3.1	4.0	3.6	4.3	5.2	4.1	5.8	1.8
Oceania	1.5	1.2	1.1	1.6	1.4	1.5	0.0	0.7
World Total	167.4	179.0	213.0	233.6	239.6	227.5	6.3	100.0

Source : IISI
Note : Steel products comprise semi-finished and finished products.
96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.

(4) Steel imports in the regions around Oman

Below, steel imports in the regions around Oman are discussed in terms of (i) total steel products, (ii) long products and (iii) bars & wire rods, and (iv) flat products. These regions comprise the Middle East, Africa and Asia.

1) Total steel products

Total imports of steel products for the Middle East, Africa and Asia regions are around 100 million tons. The majority of this occurs in the Asian market, with the Middle East and Africa conversely accounting for only a very small portion. Characteristics of total steel product import in the regions around Oman are as follows:

- Total imports of steel products in the Middle Eastern region are around 8 million tons, and shows little change over the subject 6 year period. Of this, the six GCC countries account for 3 - 4 million tons. Other parts of the Middle East account for 4 - 5 million tons of steel product import.
- East Africa, the region of Africa closest to Oman geographically, comprises an extremely small market with import volume less than 1 million tons.

Table 4-4-4 Imports of Steel Products in 1991 - 1996 in Regions around Oman

(Unit : Million tons, %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1996*
Middle East	7.6	9.0	10.4	8.1	8.3	7.4	-0.5	7.9
GCC 6	2.4	3.2	4.7	3.6	3.7	3.2	5.9	3.4
Others *	5.2	5.8	5.7	4.5	4.6	4.2	-4.2	4.5
Africa	5.4	5.8	5.4	6.7	7.2	5.5	0.4	5.9
East Africa *	0.5	0.5	0.5	0.6	0.7	0.7	7.0	0.8
Asia	50.0	54.6	92.3	86.1	85.1	80.4	10.0	86.2
South Asia *	2.0	2.5	2.7	3.3	3.3	3.0	8.4	3.2
ASEAN 5	15.3	17.2	19.6	23.2	27.7	27.3	12.3	29.3
China	3.6	8.1	36.6	25.5	14.6	16.2	35.1	17.4
Total *	63.0	69.4	108.1	100.9	100.6	93.3	8.2	100.0

Source: IISI.
Note : Steel products comprise semi-finished and finished products.
96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.
* Ranges of region are shown at A4-1-1.
Total * indicates the combined total for the Middle East, Africa and Asia.

As already discussed above, the Asian steel import market is the largest in the world. Supported by robust economic development, the annual growth rate in steel product imports over the subject 6 year period is 10%. Within the Asian region, the greatest share of steel imports is accounted for by China and the ASEAN-5. South Asia, closest geographically to Oman and including Pakistan and India, comprises a relatively small steel import market, accounting for only around 3 million tons of steel imports.

2) Long products

Long products comprise bars & wire rods and sections. In general, these steel products are utilized in the construction sector, and accordingly are heavily consumed in developing countries of the Middle East, Africa, and Asia. The combined total of long product import in these regions exceeds 20 million tons. Most of this occurs in the Asian market; however, the share of long product import accounted for by the Middle East market is relatively high vis à vis the figure for total steel products.

- Middle Eastern imports of long products has grown significantly in the subject 6 year period, increasing 2.1 fold since 1991 to 3.1 million tons in 1996. Of this, the six GCC countries account for 1 million tons, with other parts of the Middle East collectively accounting for 2.1 million tons.

Table 4-4-5 Imports of Long Products in 1991 - 1996 in Regions around Oman

(Unit : 1000 tons; %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1996*
Middle East	1,489	2,302	2,963	3,469	2,806	3,105	15.8	14.5
GCC 6	595	984	1,650	1,730	1,364	1,008	11.1	4.7
Others	894	1,318	1,313	1,739	1,442	2,097	18.6	9.8
Africa	1,572	1,981	1,937	2,346	1,792	1,529	0.6	7.2
East Africa *	228	281	300	227	328	249	1.8	1.2
Asia	9,733	10,623	27,422	19,378	17,559	16,732	11.4	78.3
South Asia *	195	187	288	444	318	306	9.4	1.4
ASEAN 5	3,410	3,872	4,319	4,941	5,927	6,068	12.2	28.4
China	221	705	14,760	6,201	4,640	4,848	85.5	22.7
Total *	12,794	14,906	32,322	25,193	22,157	21,366	10.8	100.0

Source : IISI.

Note : Long products comprise bars, wire rods, and sections.
96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.
* Ranges of region are shown at A4-1-1.
Total * indicates the combined total for the Middle East, Africa and Asia.

- East Africa, the region of Africa closest to Oman geographically, comprises an extremely small market with an import volume of 200,000 - 300,000 tons.
- Asia is a major import market world-wide, showing a high (as in the case of total steel products) annual growth rate for long product imports of 11%. In particular, the change in the Chinese market has been dramatic. In the case of the ASEAN-5, growth in imports has been less rapid but steady. South Asia, including India and Pakistan, is in contrast an extremely small market for long product imports.

3) Bars and wire rods

Bars & wire rod imports in the Middle East, Africa and Asia regions exceed 13 million tons. Most of this occurs in the Asian market; however, the share of imports accounted for by the Middle East market is relatively high compared to the same figure for long product imports. Due to the relative lack of IISI trade statistics on bars & wire rods compared to other steel products, regional statistical data from the GOIC Data Bank, etc. have been applied for import analysis.

Table 4-4-6 Imports of Bars and Wire Rods in 1991 - 1996 in Regions around Oman

(Unit : Million tons, %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1995*
Middle East	1,555	2,037	2,321	2,845	2,815	-	*16.0	21.5
GCC 6	1,036	1,313	1,640	1,878	1,772	2,377	18.1	13.6
Others	519	724	681	967	1,043	-	*19.1	8.0
East Africa *	44	51	51	104	91	-	*19.9	0.7
South Asia *	98	95	127	165	140	-	*9.3	1.1
ASEAN 5	2,069	2,581	2,547	2,940	3,515	3,603	11.7	26.9
China	202	1,510	10,588	10,152	4,734	4,495	86.0	36.2
Total *	3,968	6,274	15,634	16,206	13,067	-	*34.7	100.0

Source : IISI, GOIC Data Bank

Note : 96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.
* Ranges of region are shown at A4-1-1.
Total * indicates the combined total for the Middle East, East Africa, South Asia, ASEAN-5 and China.

- The imports of bars & wire rods in the Middle East have grown at a significant rate of 16% per annum during the five year period 1991 - 1995, with the total in 1995 reaching 2.8 million tons, or 1.8 fold that in 1991. Increases were particularly marked in the six GCC countries, reaching 2.4 million tons in 1966, which far exceeds the total of 1 million tons for other parts of the Middle East the same year.
- The East African market for imports of bars & wire rods is extremely small at

100,000 tons.

- Asia is a large market as well for imports of bars & wire rods. As in the case of total steel products, the Asian market shows a high growth rate of 12% per annum during the subject 6 year period. Change in the Chinese market has been particularly great. In 1993, China alone imported 10.6 million tons of bars & wire rods. In 1996, although lower, the scale of imports was 4.5 million tons. In the case of the ASEAN-5, the annual growth rate in imports of bars & wire rods has been a high 12% over the subject six year period, reaching 3.6 million tons in 1996. South Asia, including India and Pakistan, is a small market with imports of around 100,000 tons.

4) Flat products

Table 4-4-7 Imports of Flat Products in 1991~1996 in Regions around Oman

(Unit : thousand tons, %)

Region	1991	1992	1993	1994	1995	1996	96/91*	1995*
Middle East	3,286	3,460	3,336	2,171	2,744	2,845	-3.8	10.2
GCC 6	896	1,021	1,402	1,155	1,549	1,540	11.4	5.5
Others	2,389	2,439	1,934	1,016	1,195	1,305	-11.4	4.7
East Africa *	492	355	331	346	427	445	-2.0	1.6
South Asia *	1,383	1,775	1,736	2,061	2,434	2,248	10.2	8.0
ASEAN 5	8,168	8,698	9,895	9,686	13,114	12,050	8.1	37.2
China	1,740	3,148	14,160	8,840	7,433	10,437	43.1	37.2
Total *	15,069	17,436	29,458	23,104	26,152	28,025	13.2	100.0

Source: IISI, GOIC Data Bank

Note : 96/91* indicates annual growth rate (%); 1996* indicates share (%) by region.
* Ranges of region are shown at A4-1-1
East Africa * indicates Kenya, Tanzania and South African C.U.
Total * indicates the combined total for the Middle East, East Africa, South Asia, ASEAN-5 and China.

- During the five year period 1992 - 1996, imports of flat products in the Middle East overall declined to 2.85 million tons. A more detailed look, however, shows that imports in the GCC-6 actually increased to 1.54 million tons in 1996 at an annual rate of 11% during the said period, while imports to the rest of the Middle East region declined at an annual rate of -11% to a level less than the GCC-6 at 1.3 million tons in 1996. A major factor in this decrease in imports is increased self-sufficiency on the part of Iran in steel production.
- The East African market for flat product imports is small at around 400,000 tons per year.

- Asia is a major world market for flat product imports. In the case of the ASEAN-5, imports have grown at a high rate of 8% per annum during the subject 6 year period, reaching 12 million tons in 1996. Change in the Chinese market has been particularly great as in the case of bars & wire rod imports. In 1993, China alone imported 14.16 million tons of flat steel. In 1996, although lower, the scale of imports was 10.4 million tons. South Asia, including India and Pakistan, is a small market with imports of around 2.25 million tons in 1996.

4.4.2 Future outlook for the international steel market

Future outlook for the international steel market is examined below based on world-wide demand forecasts by region as released by IISI on October 1997, and future supply trends are qualitatively described.

(1) World-wide demand forecasts by region

1) Demand forecast by region

In October 1997, the IISI released its world-wide, steel demand forecast by region. Details are shown in Table 4-4-8. From this, the following can be concluded:

- World-wide demand is projected at 722.5 million in 2000 and 795.5 million in 2005, indicating a steady average increase of around 2% per year from the 652.2 million tons in 1995.
- In the case of industrialized countries, demand predictions overall indicate almost no growth. Specifically, steel demand in the EU (15) and Japan is forecast at minus growth and flat growth, respectively. An exception is the United States which is predicted to show a small increase in demand.
- Demand in the Middle East is predicted to increase from 9 million tons in 1995 to 12 million tons in 2000 at an average rate of 5.9%. Demand will continue to grow after 2000 at an average rate of 3.9%, reaching 14.5 million tons in 2005.
- In the case of Asia, major growth in demand will continue, particularly in the case of China which is predicted to show a high growth rate in steel demand of 6.5% per year from 1995, reaching 120 million tons in 2000. China's demand will continue to grow after 2000 at an average rate of 3.9%, reaching 145 million tons in 2005. The rest of Asia (excluding China and Japan) will show a major increase in demand at 137 million tons in 2000 and 165 million tons in 2005.

Table 4-4-8 Demand Forecast of Steel Products in 2000 and 2005 World-wide

(Unit: million tons, %)

Region, Country	1995	2000	2005	2000/1995	2005/2000
Japan	80.0	80.0	80.0	0.0	0.0
U.S.A.	99.5	101.5	102.5	0.4	0.1
Canada	12.8	14.0	14.0	1.9	0.0
EU(15)	125.6	124.0	124.0	-0.2	0.0
China	87.4	120.0	145.0	6.5	3.9
Former USSR	35.7	37.0	40.0	0.7	1.6
Middle East	9.0	12.0	14.5	5.9	3.9
Other Asia	121.1	137.0	165.0	2.5	3.8
Africa	14.1	15.5	17.5	1.9	2.5
Other Western Europe	14.5	16.0	17.0	2.0	1.2
Eastern Europe	17.3	18.0	21.0	0.8	3.1
South America	28.7	40.5	48.0	8.2	3.7
Oceania	6.5	7.0	7.5	1.5	1.4
World Total	652.2	722.5	795.5	2.1	1.9

Source: IISI, October 1997
Note: Steel products means semi-finished and finished products.

- The former Soviet Union, which for a long time has experienced depressed demand, is predicted to finally show moderate growth in demand at 37 million tons in 2000 and 40 million tons in 2005.
- In the case of the Middle East, overall share of world steel demand will increase; however, this will still remain low at 1.8% in 2005. Other Asian countries (excluding China and Japan) are predicted to experience high growth in steel demand, increasing 19% by 2000 and 20.7% by 2005. The entire Asian region including China and Japan will account for 49%, or nearly half, of all steel demand world-wide in 2005.

2) Supply forecast by region

In general, it is extremely difficult to quantitatively forecast steel production over the long term. Accordingly, the future production trend is discussed below in qualitative terms. The production of a particular region is in response to demand. As has been seen in the cases of Table 4-4-1 and 4-4-2, regions which evidence a shortage in steel production have the highest potential for future production growth. Specifically, these regions are Asia and North America as discussed in (2) "World Crude Steel

Production by Region" of Section 4-4-1 (Present Status of the International Steel Market).

Within the Asian region, the ASEAN-5 and South Korea have experienced up to this time a large production shortage, and as a result there have been numerous projects planned in these countries for steel production facilities. However, almost all of these have been abandoned due to the monetary crisis of 1997 and subsequent economic instability affecting these countries. Accordingly, an increase in production volume in the foregoing countries would not be expected until after the year 2000 when steel demand is anticipated to recover.

In the case of North America, there are at present numerous plans for facility investment, and it is expected that steel production will accordingly increase as these projects are implemented.

In contrast, the former Soviet Union is still experiencing a significant surplus in production at present, and this is accordingly expected to continue decreasing in the future, although not as drastically as up to this time.

(2) Supply and demand forecast in regions around Oman

Demand forecast is qualitatively discussed below for regions around Oman including the Middle East, East Africa, South Asia, and ASEAN-5.

1) Middle East

As indicated in Table 4-4-1 and Table 4-4-2, the Middle East overall experiences excess steel demand, in other words a shortage of supply. In the future, it is predicted as shown in Table 4-4-8 that demand will grow at an annual rate of 4-6%. Behind this high rate of increase is the fact that many of the countries in the region are petroleum producing countries aggressively pursuing development plans to expand domestic employment opportunities, establish industries outside the petroleum sector, etc. in light of high population growth rate and eventual depletion of oil resources. This trend is particularly evident in the case of the Gulf countries.

Excluding Oman, the present situation of steel demand in the other five GCC countries is indicated in Table 4-4-9. Major steel production projects planned for the future in the GCC countries are shown in Table 4-4-10. These reflect the present situation of high steel demand and steel imports, and predictions for future steel demand increase.

Table 4-4-9 Production, Demand and Imports of Steel in GCC 5

(Unit: 1000 tons)

Item	Steel Consumption			Steel Production			Steel Product Imports		
Year	1994	1995	1996	1994	1995	1996	1994	1995	1996
Saudi Arabia	3,435	3,596	3,519	2,082	2,283	2,278	1,459	1,835	1,985
UAE	1,732	1,857	1,653	96	96	90	1,641	1,764	1,580
Kuwait	514	533	721	2	2	24	513	532	702
Qatar	162	398	334	604	601	601	87	214	217
Bahrain	112	112	118	0	0	0	121	114	119
Total	5,955	6,496	6,345	2,688	2,886	2,903	3,821	4,464	4,603

Source : GOIC Data Bank

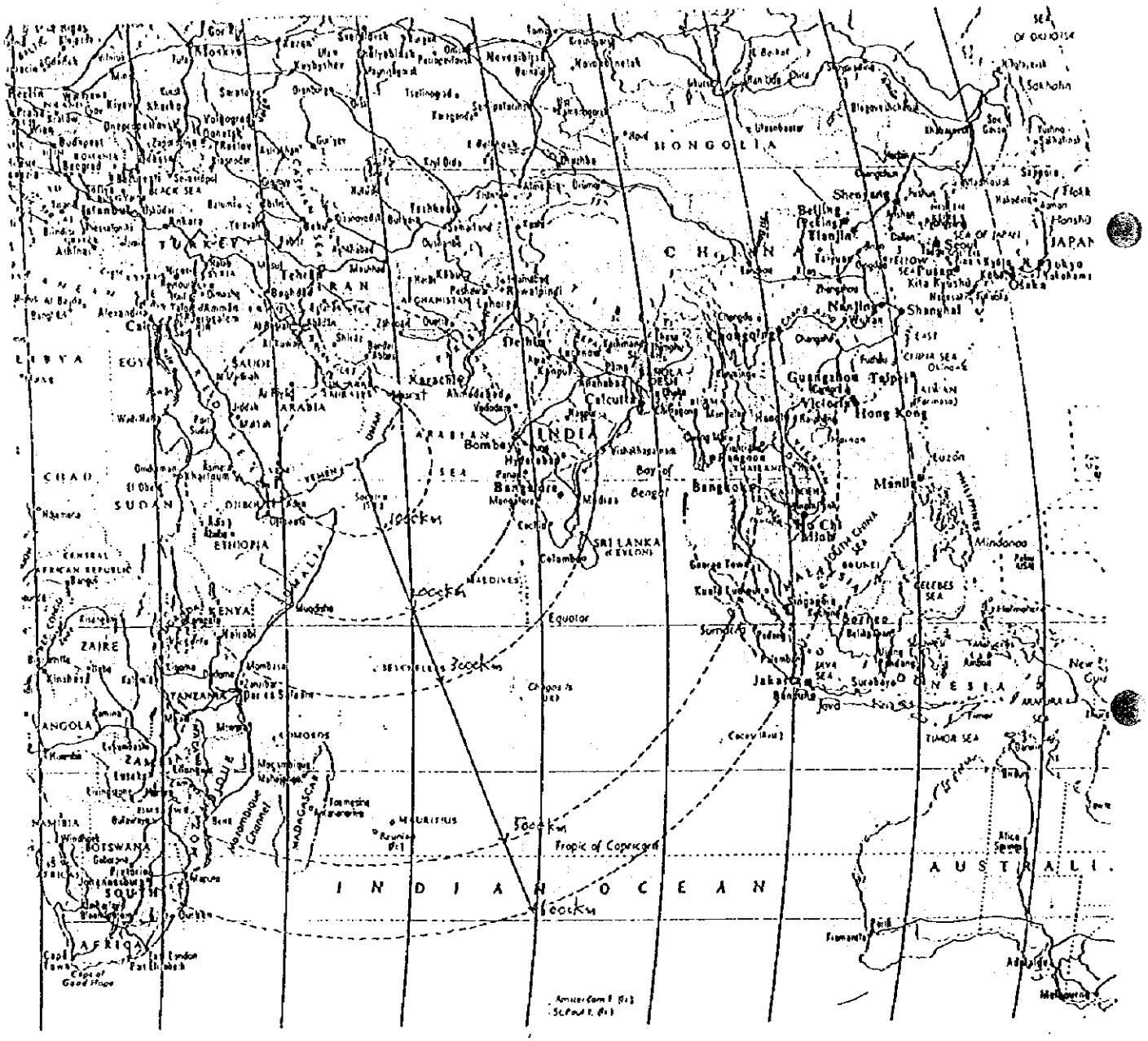


Figure 4-4-1 Map of Countries around Oman

Table 4-4-10 Future Planned Steel Projects in GCC Countries

(Unit : 1000 tons)

Country	Company	Product	Capacity	Start of operation
Saudi Arabia	Hadeed	Sheets	850	1999
	Universal Metal	Colored Sheets	120	1998
	Attich Steel	Colored Sheets	90	1998
UAE		Bars	500	2000

Source : Metal Bulletin, Japan Iron & Steel Exporters' Association

Of the above, the executing enterprise for the UAE bar project has yet to be determined, and whether or not it will be implemented remains in flux. Its realization will ultimately depend on factors of funding and profitability.

According to the Metal Bulletin and information from the Japan Iron & Steel Exporters' Association, steel projects in other parts of the Middle East include plans for expansion of facility production capacity by 1.6 million tons in Iran and 1.4 million tons in Egypt by 1999. Both cases concern production of flat steel products.

In terms of supply and demand, balance by products, bar & wire rod production is expected to exhibit significant shortage in the future. On the other hand, the prevailing view is that flat steel production in the Middle East after 2000 as a result of production capacity increase in Saudi Arabia, Iran and Egypt, although still insufficient, will move much closer to being able to meet the demands of the region.

Since oil price has been decelerating since early 1998, several of the development projects in many of the oil exporting countries including AGCC have been postponed or abandoned, the full impact of which will be known in early 1999. It is fearful that these will have some influences upon both supply and demand of steel in the Middle East in the future.

2) East Africa

The main countries in this region are Kenya, Tanzania and South Africa. The status of steel demand in these nations is shown in Table 4-4-11. On the basis of trends to date, little change in steel production and demand is anticipated in the future.

Table 4-4-11 Production, Demand and Imports of Steel in East Africa

(Unit: 1000 tons)

Item	Steel Consumption			Crude Steel Production			Steel Product Imports		
Year	1994	1995	1996	1994	1995	1996	1994	1995	1996
South Africa C.U.	4,191	4,360	4,010	8,525	8,741	7,973	333	295	361
Kenya	274	359	283	20	20	20	256	341	265
Tanzania	55	56	35	0	0	0	55	56	35
Total	4,520	4,775	4,328	8,545	8,761	7,993	644	692	661

Source : IISI

3) South Asia and the ASEAN-5

South Asia comprises India, Pakistan, Sri Lanka and Bangladesh. The ASEAN-5 includes Thailand, Malaysia, Singapore, Indonesia and the Philippines. The present status of steel production and demand in these countries / region is shown in Table 4-4-12.

Among the South Asian countries, production and demand behavior in the case of India (with relatively developed steel industry) will be a key factor in overall regional trend. Indian steel imports which shares 65-70 % of total of the South Asian countries are about 200,000 tons of long products and 1,500,000 tons of flat products. The volume of Indian long product imports is small.

In the case of the ASEAN-5 as discussed in Section 4-4-2, shortage of steel production is large and a number of steel production projects have been planned in the region. However, almost all of these have been abandoned due to the monetary crisis of 1997 and subsequent economic instability affecting these countries.

Table 4-4-12 Production, Demand and Imports of Steel in South Asia and ASEAN-5

(Unit: 1000 tons)

Item	Steel Consumption			Crude Steel Production			Steel Product Imports		
Year	1994	1995	1996	1994	1995	1996	1994	1995	1996
India	18,600	22,170	22,800	19,282	22,003	23,753	2,151	2,171	2,083
Pakistan	1,287	1,478	1,358	1,100	1,100	1,100	518	709	589
Sri Lanka	358	156	89	30	30	30	331	128	61
Bangladesh	413	396	386	34	35	35	335	317	307
Total	20,658	24,633	24,633	20,446	23,168	24,918	3,335	3,325	3,040
ASEAN 5	23,284	30,611	31,992	7,730	10,158	10,919	23,232	27,675	27,256

Source : IISI

4.4.3 Future priority products in the Oman export market

In terms of the potential steel export market for Oman, the following can be concluded specifically in the case of bar & wire rod and flat products as substantiated by data in Table 4-4-1 - Table 4-4-12 in the previous section:

- In the case of export markets relatively close to Oman including the other five GCC countries and nearby Middle East, bars & wire rods are more attractive products for the future than flat products as discussed in "1) Middle East" of (2) in the previous section.
- If consideration of export market is expanded to encompass the Asian region (including ASEAN-5 and China), flat products are the more attractive product. However, this would result in head-to-head competition with high quality steel produced by blast furnace manufacturers in Japan, Korea and Taiwan, as well as cheap flat products produced in the former Soviet Union.

In consideration of the above, bars & wire rods are deemed the most advantageous product in terms of export potential, for the new steel project in Oman.

Exports of semi-finished steel products can not be a target of this project because of a high hurdle to export them as shown at Appendix A4-4-1.