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COOPERATION AGENCY (JICA)

NO. 52

PORTS AND SHIPPING ORGANIZATION

THE ISLAMIC REPUBLIC OF IRAN

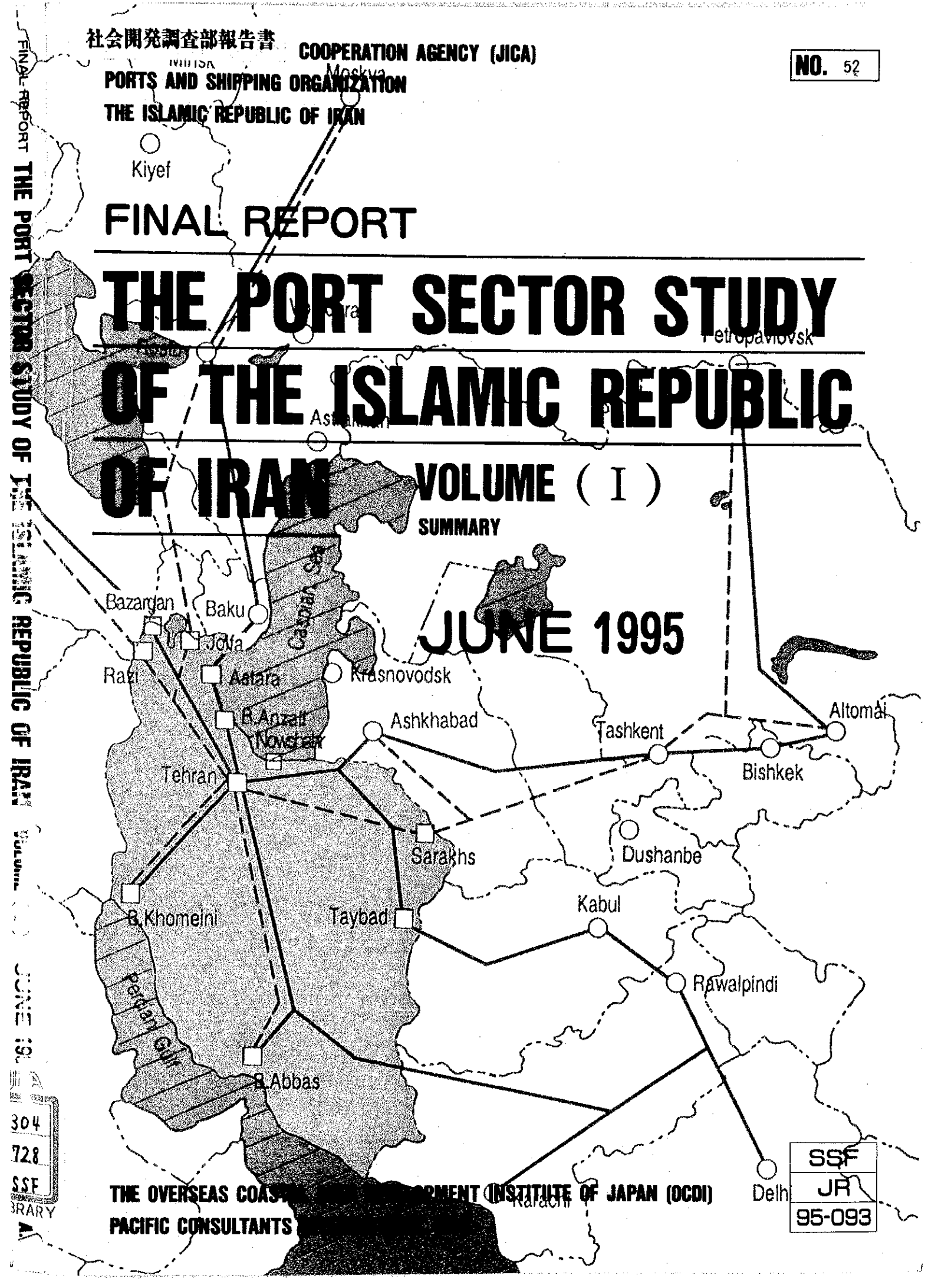
FINAL REPORT

THE PORT SECTOR STUDY OF THE ISLAMIC REPUBLIC OF IRAN

VOLUME (I)

SUMMARY

JUNE 1995



THE OVERSEAS COASTAL AREA DEVELOPMENT INSTITUTE OF JAPAN (OCDI)

PACIFIC CONSULTANTS

The following foreign exchange rate is applied in this study:
US$1.00 = 2,000 Iranian Rials (as January 1994)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
PORTS AND SHIPPING ORGANIZATION
THE ISLAMIC REPUBLIC OF IRAN

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PREFACE

In response to a request from the Government of The Islamic Republic of Iran, the Government of Japan decided to conduct a feasibility study on the Port Sector Study of the Islamic Republic of Iran and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Iran a study team four times between October 1993 and January 1995, which was headed by Mr. Yukio Nishida and was composed of members from the Overseas Coastal Area Development Institute of Japan (OCDI) and Pacific Consultants International Co., Ltd. (PCI).

The team held discussions with the officials concerned of the Government of the Iran and conducted field surveys in the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project 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 Islamic Republic of Iran for the close cooperation they extended to the team.

June, 1995

Kimio FUJITA
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

June 1995

Mr.Kimio FUJITA
President
Japan International Cooperation Agency

Dear Mr. Fujita,

It is my great pleasure to submit herewith the Report on the Port Sector Study of the Islamic Republic of Iran.

The Study Team which consists of the Overseas Coastal Area Development Institute of Japan (OCDI) and Pacific Consultants International (PCI) conducted surveys in Iran from October 1993 to January 1995 as per the contract with the Japan International Cooperation Agency.

Based on the finding of these surveys as well as the data and information collected and analyzed in Japan, the Study Team held discussions with the Iran officials of the Ministry of Road and Transportation and other authorities concerned, and has formulated the Long-Term Port Development Concept up to the year 2010 and the feasibility of the Short-term Plan for the period up to the year 2000.

On behalf of the study team, I would like to express my deepest appreciation to the Government of Iran, the Ministry of Road and Transportation and other authorities concerned for their brilliant cooporation and assistance and for the heartfelt hospitality which they extended to the study team during our stay in Iran.

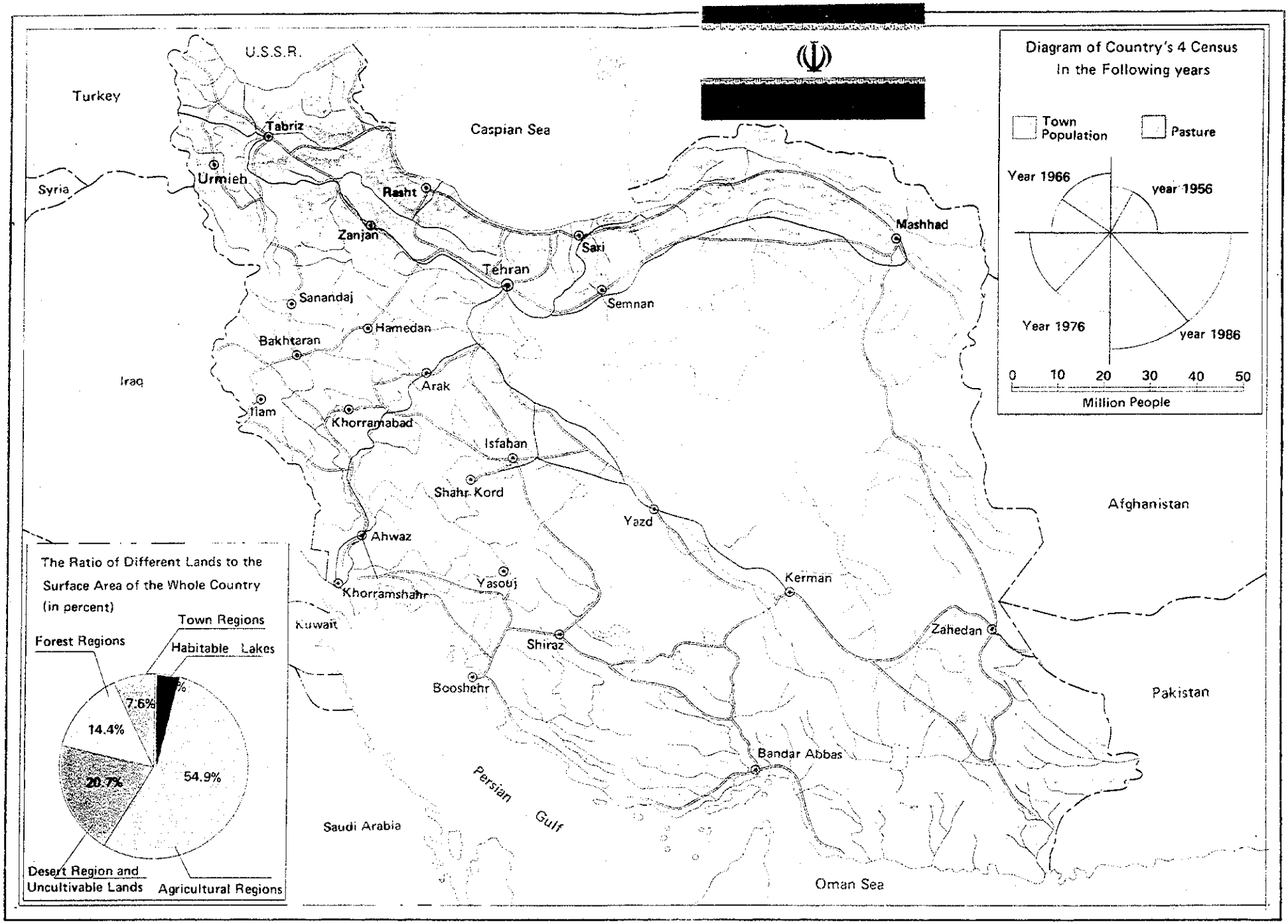
I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Embassy of Japan in Iran for giving us valuable suggestions and assistance during the preparation of this report.

Yours faithfully,

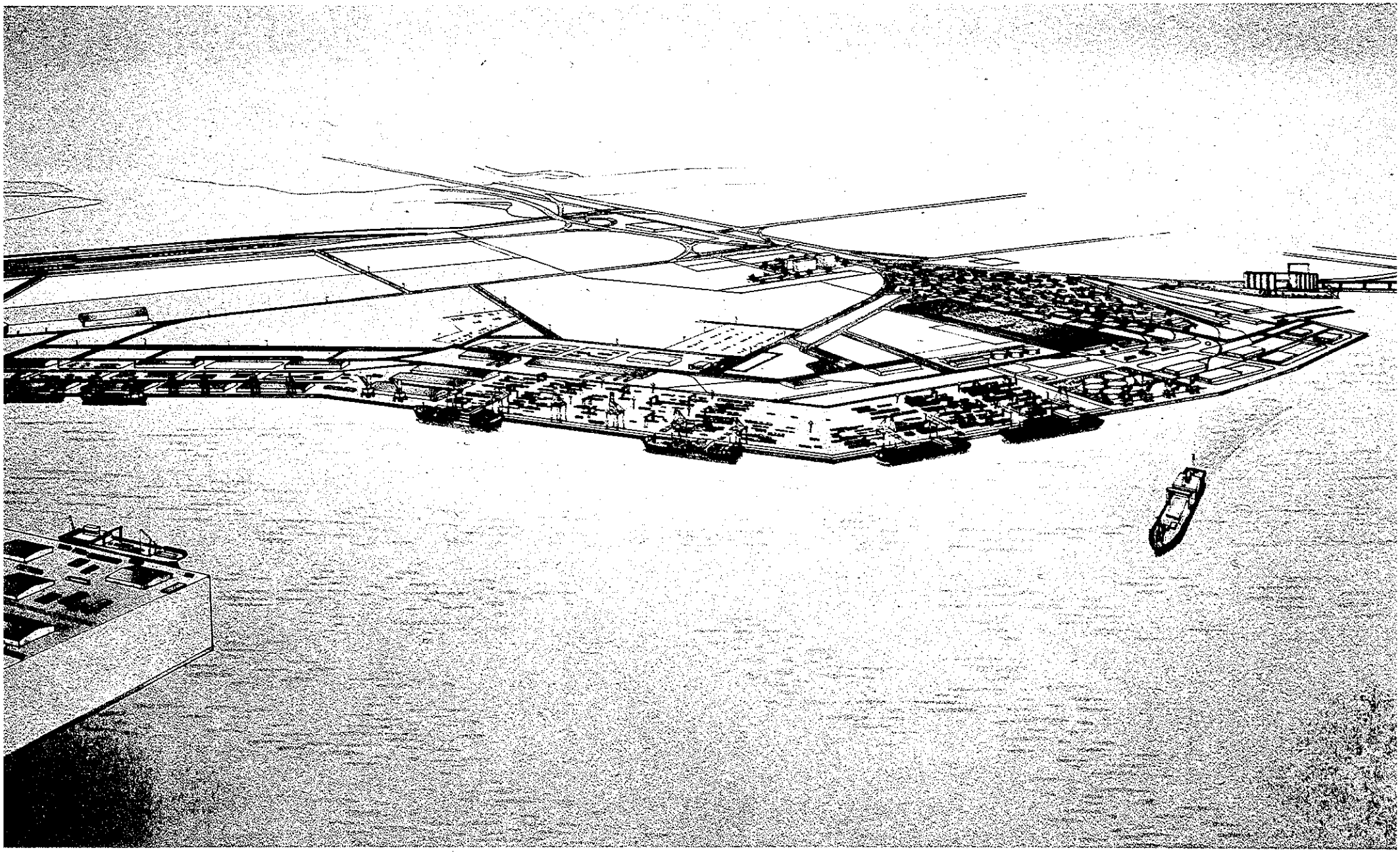
Yukio Nishida

Yukio Nishida
Leader of the Study Team for the Port Sector Study of the Islamic Republic of Iran

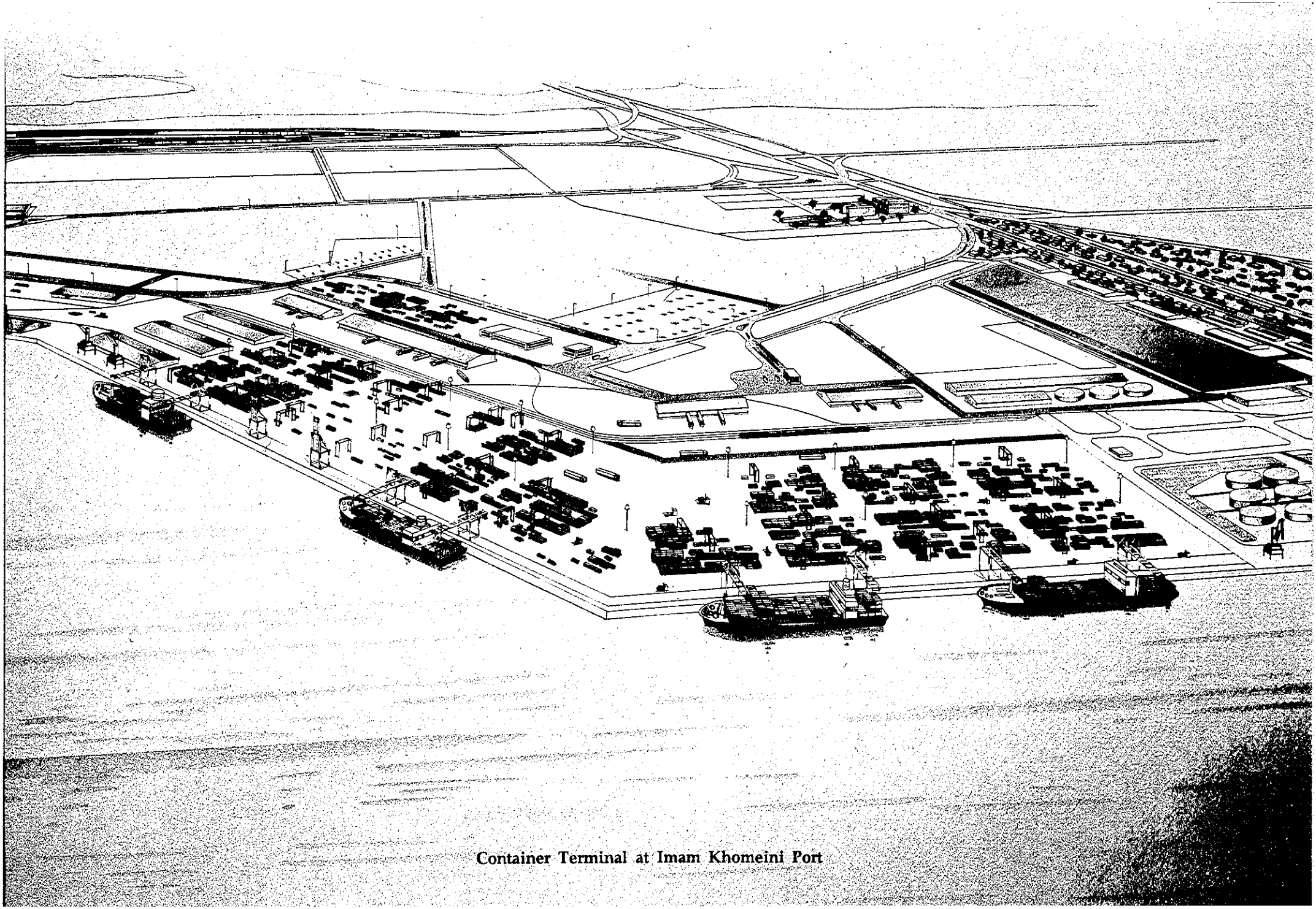
LOCATION MAP (1)



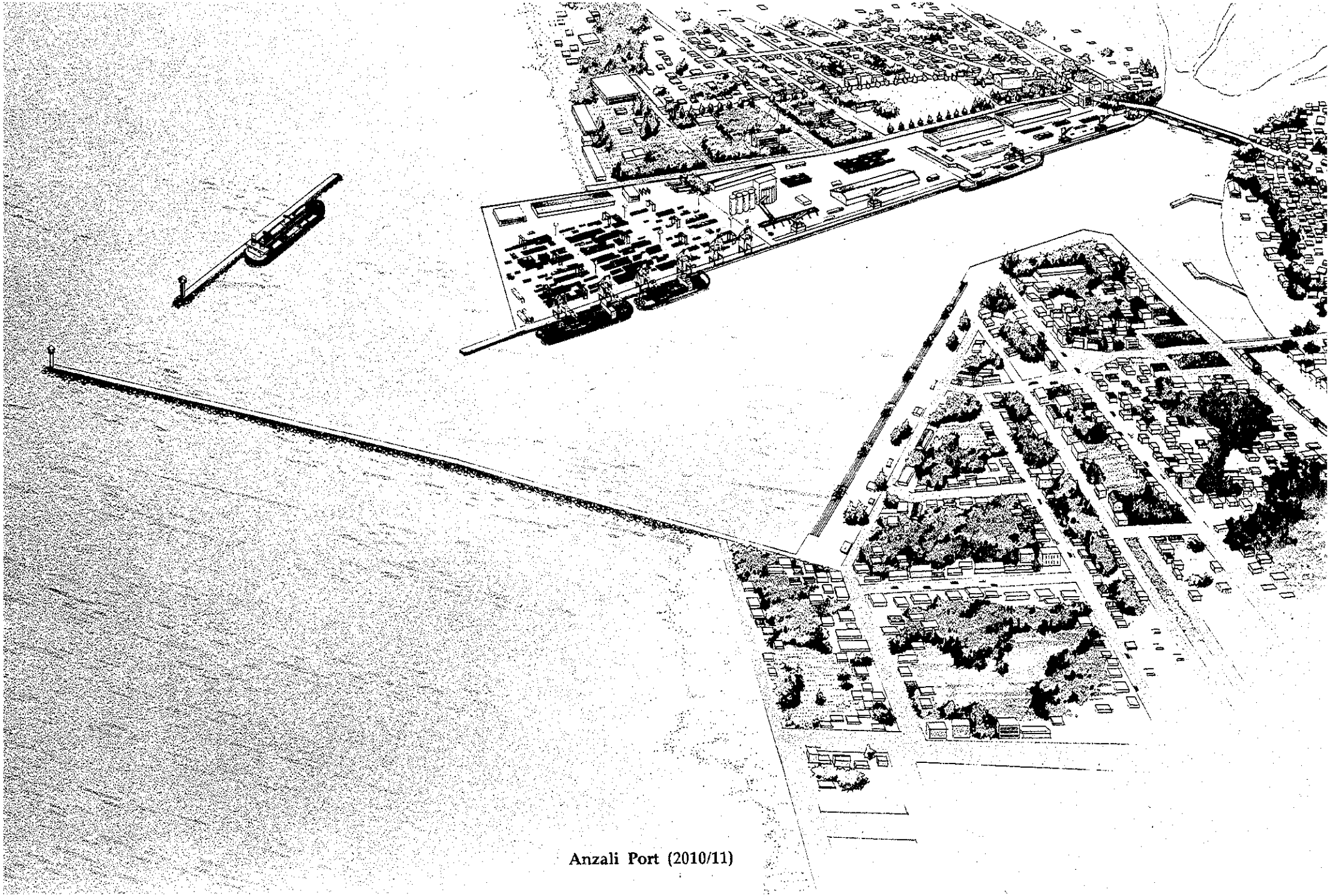
LOCATION MAP (2)



Imam Khomeini Port (2010/11)



Container Terminal at Imam Khomeini Port



Anzali Port (2010/11)

THE PORT SECTOR STUDY OF THE ISLAMIC REPUBLIC OF IRAN

SUMMARY

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List of Abbreviations

CIS	:	Commonwealth of Independent States
EIRR	:	Economic Internal Rate Return
EIA	:	Environmental Impact Assessment
PSO	:	Ports and Shipping Organization
IIRR	:	Islamic Iranian Republic Railways
DCDR	:	Deputy for Construction and Development of Railway Network
METRA	:	Railway Developing Consulting Engineers IRAN
DOE	:	Department of the Environment
STD	:	Short Term Development
LTD	:	Long Term Development
CIF	:	Cost, Insurance, and Freight
FOB	:	Free on Board
SCF	:	Standard Conversion Factor
CFC	:	Conversion Factor for Consumption
PES	:	Preliminary Environmental Survey
IEE	:	Initial Environmental Examination
FIRR	:	Financial Infernal Rate of Return
DWT	:	Dead Weight Tonnage
MRT	:	Ministry of Roads and Transportation
PBO	:	Planning and Budget Organization
G.T.	:	Gross Tons

SYMBOLS

Negligible fraction	-
Figures not available	?
Statistic data unavailable	***

I EXECUTIVE SUMMARY

The Port Sector Study of The Islamic Republic of Iran

October 1993- May 1995
Counter Part ; Ports and Shipping Organization

1. Background of Study

The major Iranian ports are Imam Khomeini port, Busher port, Abbas port and Chabahar port on the coast of the Persian Gulf, and Anzali port and Nowshahr port on the coast of the Caspian Sea. In 1974 PSO drafted the nationwide port development master plan. Since that time structural changes both globally and in Iran, in port and shipping activities have occurred.

At present, port activities are stagnant due to port management and low operation efficiency. Among the ports in the Persian Gulf and in the Caspian Sea, the functional allotment and priority of improvement among ports are unclearly. It is necessary to fix the master plan should be revised based on the new circumstances with nationwide viewpoint.

In light of the above, the Iranian government requested the government of Japan to formulate the nationwide port development and management strategy, to formulate the master plan for selected ports and to conduct the feasibility study for the short term plan in January 1992. The government of Japan set forth the Scope of Work for the study in February 1993, at which time both parties signed the agreement.

2. The Objectives of the Study

The objectives of the Study area:

(1) To formulate a nationwide port development and management strategy in Iran.

(2) To formulate master plans for selected ports for the period up to the year 2010/11.

(3) To conduct a feasibility study for short-term plans for the selected ports for the period up to the year 2000/01.

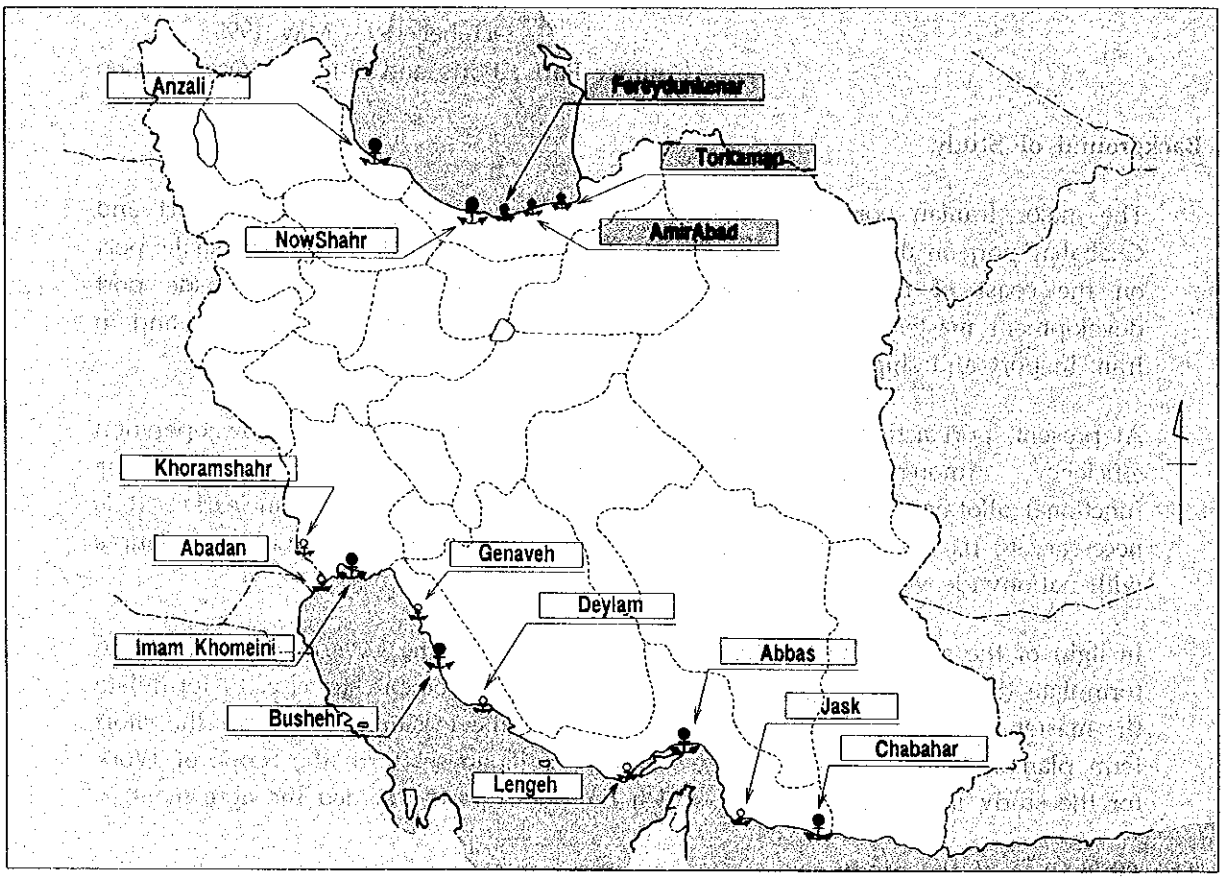
3. Objective ports

(1) For the nationwide port development and management strategy 16 ports, as shown in Figure-1.

(2) For the master plan and short-term plan Imam Khomeini port, Anzali port

4. Summary of the proposed port development plans

(1) Nationwide port development and management strategy Numerical targets and port development and management strategy are summarized in Figure-2.



	Major Port	7 Ports[1]
	Port	6 Ports
	Under Construction	3 Ports
	Total	16 Ports

Figure 1 Study Ports

(1); Abbas port has two harbors, Rajaee and Bahonar.

Figure 2 Nationwide Port Development and Management Strategy

The Core Roles Expected of the Port Sector and Basic requirements

Logistics Centers to Provide Necessities of Life	To Support Development of the National Economy	To Play the Central role in the International Transport Network	Encouragement of various port functions
Share of ship cargo is large Sea water level is rising Cargo storage days seem to be long Activity of domestic shipping line is substandard Railroads connecting between port and city is very few Many port require maintenace dredging	Non-oil export cargo volume is very small Import cargo value is limited by export income Production and consumption area incline to north-western part of Iran Government pushes to be independent from oil economy Pushes to boost non-oil exports	Share of ship cargo is large Iranian trade cargo is transhipped by other countrie's port Containerized cargo is small comparing with other countries Iranian port lack suitable plan for development Free trade zone are developing Trade should be active on the coast of the Caspian Sea	Incresing foreign passenger
Quality improvement and modernization of port Improvement of the port facilities for cargo traffic demand Provision of easy access to/from hinterland To cope with containerization	Promotion of regional development Provision of better environment for industries	Encouragement of international transit through Iran Supporting of the free trade zone activity To cope with containerization Tendency of larger ship size Provision of exchanging commodity style	Such as fishery, refuge and recreation Enhancement of environment protection Improvement of the port facilities for passenger demand

Numerical Targets

Population,GDP and GDP per-capita

	1991/92	2000/01	2010/11
Pop (1,000)	57,234	70,019	85,353
GDP (BN. Rls)	12,181	19,891	33,224
Per (1,000 Rls)	213	284	389

Note; 1982 Fixed Price

Sea Borne Cargo Traffic Demand

		2000/01	2010/11
Handling Cargo V(1,000 ton)	Import	32,455	53,315
	Export	8,936	23,768
	Total	41,391	77,083

Transit Cargo to/from CIS Countries

Unit; 1,000 ton

		2000/01	010/11
To	CIS Countries	620	1;540
From	CIS Countries	470	1,180
Total		1,090	2,720

Maximum Port Capacity

Number of Berth	Persian Gulf	Caspian Sea
Existing (1)	86	16
Capacity (1,000T)	50,574	4,139
Required (2)	19	14

Note; Excluding oil and oil products
(1); 180 m length / Berth
(2); 220 m length / Berth

Development Strategy

Quality improvement and modernization of ports and maritime transport to attract More ship calls
Improvement of the port facilities for cargo and passenger traffic demand
Encouragement of international transit through Iran
Promotion of regional development through provision of better business environment for port related industries
Provision of increasing cargo volume on the coast of the Caspian sea
Supporting of the free trade zone activity
Encouragement of other various port functions such as fishery, refuge and recreation
Enhancement of environment protection

Development Subjects

Development of container, bulky and steel cargo handling facilities
Provision of easy access to/from truck roads and rail
Provision of available areas or lots, utilities and services for various port related industries
Maintenance of navigation aides, navigation channel and basin for safety
Modification of standard berth length and depth to cope with large vessel
Push the construction on the coast of the Caspian Sea

Management Strategy

Application of strategic tariff policy for inviting more ship
Rationalization of custom clearance procedures and bonded transport/strage systems for international transit cargoes
Total improvement in variety of option and quality of required port services
Promoting privatization with regards to port operation and management
Reinforcement of personnel and training system
Establishment of technical standards and improvement of port statistics and recording system
Establishment of effective maintenance system

Allotments

NAME	1993/94 Import	1993/94 Export	1993/94 Total	2000/01 Import	2000/01 Export	2000/01 Total	2010/11 Import	2010/11 Export	2010/11 Total	Max Handling Capacity (1,000 tons)	Development Priority
Persian Gulf											
Imam Khomeini	7,259	2,788	10,047	11,052	5,181	16,233	19,663	11,513	31,176	24,970	1
Rajaee	8,410	931	9,341	11,901	2,721	14,622	19,158	10,088	29,246	17,210	1
Bahonar	3,330	553	3,883	3,552	867	4,419	3,896	1,651	5,547	5,900	
Busher	1,412	174	1,586	1,815	300	2,115	2,599	654	3,253	2,335	
Chabahar	816	2	818	1,158	9	1,167	2,008	226	2,234	2,044	
* Khoramshahr	-	-	-	732	268	1,000	671	329	1,000	2,035	1
* Abadan	-	-	-	146	54	200	134	66	200	480	1
Sub Total	21,227	4,448	25,675	30,356	9,400	39,756	48,129	24,527	72,656	54,974	
Caspian sea											
Anzali	1,036	42	1,078	1,593	218	1,811	4,241	841	5,082	2,340	1
Nowshahr	388	8	396	692	137	829	1,826	399	2,225	2,260	
** Amir Abad	-	-	-	485	175	660	956	444	1,400	1,415	1
** Fereydunkener	-	-	-	349	21	370	713	87	800	1,025	1
** Torkaman	-	-	-	70	75	145	170	190	360	100	
Sub Total	1,424	50	1,474	3,189	626	3,815	7,906	1,961	9,867	7,140	
TOTAL	22,651	4,498	27,149	33,545	10,026	43,571	56,035	26,488	82,523	62,114	

Note; Including oil and oil products. *; Reconstruction, ** ; Under Construction

Functions

Imam Khomeini	Main port of import/export. Container terminal. Large vessel.
Rajaee	Main port of import/export. Container terminal. Large vessel. Supporting free trade zone's activity
Bahonar	Sub port of Abbas (Rajaee)
Bushehr	Import/export sub port in region.
Behesti	Import/export sub port in regiRegional development core. Roles of national safety. Supporting free trade zone's activity
Khoramshahr	Sub port of Imam Khomeini port. Trading for Arabian countries.
Abadan	Sub port of Imam Khomeini port.
Genaveh	Coastal transportation. Fishery.
Deylam	Coastal transportation. Fishery.
Lengeh	Supporting free trade zone activity. Fishery.
Jask	Coastal transportation. Fishery.
Anzali	Foreign trade port in Caspian Sea. Transit cargo.
Nowshahr	Foreign trade port in Caspian Sea. Transit cargo.
Amir Abad	Foreign trade port in Caspian Sea. Transit cargo.
Fereydunkener	Foreign trade port in Caspian Fishery.
Torkaman	Transit cargo.

(2) Master plan for selected ports

Master plan for Imam Khomeini port includes the construction of an international container terminal and the development of new West harbor. Also, the plan includes an access route from the West harbor to express highway.

Master plan for Anzali port includes the development of a breakwater and new berths to handle the land-bridge cargo to/from CIS countries (CIS; Commonwealth of Independent States) and other general cargo.

(3) Short-term plan

Basic concept of the short-term plan for Imam Khomeini port is to handle the cargo more efficiently using the existing facilities. To cope with the increasing cargo volume, the plan includes the following.

1) Improvement of silo jetty by dolphin style, dredging of basin. (60 m length, -13 m)
2) Minimum investment to keep the berth length for the large calling vessel, dredging of basin. (200 m length, -9 m)
3) Improvement of the Western jetty, dredging of basin. (240 m length, -13 m)
4) Improvement of container terminal (No.11 - No. 15), dredging of basin. (260 m length, -12.5 m)
5) Setting the new standard berth length.
6) Maintenance dredging of the basin in the port.
7) Improvement of warehouse, yard and cargo handling equipment.

Basic concept of the master plan for Anzali port is to cope with the rising water level and ensure non-stop utilization of the wharves for cargo handling activities. The plan includes the improvement of wharves to meet the increasing cargo volume and expansion of the break water to maintain calmness in the port.

1) Improvement of wharves, dredging of basin. (690 m length, -6.5 m)
2) Expansion of the breakwater. (500 m)
3) Improvement of warehouse and cargo handling equipment.

5. Project cost

The total cost of Imam Khomeini port is 1,151.9 million dollars including short-term plan's cost, 124.3 million dollars. That of Anzali port is 338.6 million dollars including short-term plan's cost, 111.5 million dollars.

unit; Mn. US $

TERM	Imam Khomeini		Anzali	
1995-2000	124.3		111.5	
	Foreign currency	Local currency	Foreign currency	Local currency
	95.5	28.8	50.9	60.6
2001- 2010	1,027.7		227.1	
TOTAL	1,151.9		338.6	

Foreign currency exchange rate (Jan. 1994) US$ 1 = Rls 2,000

Average investment per year of the project is about 180 billion rials. Port sector's investment is about 90 billion rials per year (1994 price). Considering that growth rate of government investment for transport sector is more than ten percent, the investment is on an acceptable scale.

6. Evaluation

(1) Three kinds of economic benefits shown below are evaluated as benefits from the Short-term plan for the selected ports.

Saving in ships staying cost (Imam Khomeini)
Saving in interest of cargo cost (Imam Khomeini, Anzali)
Saving in land transportation cost (Anzali)

The Economic Internal Rate of Return (EIRR) of the Short-term Plan for Imam Khomeini port and Anzali port is calculated as 19.7% and 18.6% respectively. Comparing the EIRR with the social rate of discount (the opportunity cost of the domestic capital), the project is feasible from the viewpoint of the national income.

The Financial Internal Rate of Return (FIRR) of Imam Khomeini port and Anzali port is calculated as 22.5% and 7.0% respectively. At Anzali port, the FIRR is almost same as the long term interest rate of the World Bank loans (7%). Considering the importance of regional transportation and the need to counteract the rising sea level, the Short-term plan for Anzali port is both reasonable and financially viable.

(2) Environmental impact assessment

According to the results of the environmental impact assessment (EIA) of which items are selected by the initial environmental examination (IEE), the effect of the project proposed in the Short-term Plan on the surrounding environment is expected to be minimal, and thus there are no environmental problems arising from implementation of the project.

The Master Plan cal lead to a better-off in the environment by removing oil terminal at Anzali Port and unifying coal and ore terminals at Imam Khomeini port.

7. Recommendation

7.1 Overall Port Administration

(1) Financial Autonomy for the

The current practice of contribution system to the Government should be phased out.

(2) Decentralization of Port Administration

The appropriate part of competence fields need to be transferred from PSO central office to the port authority offices.

(3) Restructuring of PSO Organization

It is recommended to create, at PSO central office, the new organizations for timely response to the current requirements in port administration.

(4) Reinforcement of Personnel Policy and Training system

The well designed personnel policy and training system are essential to encourage or to educe the positive incentive and potential capability of PSO staff.

7.2 Port Planning

(1) The port plans need to be formulated by a systematic way.

(2) Port plans should be applicable and practicable

(3) In order to realize the proposed schemes of the plans, it is essential to secure active utilization of the plans by PSO.

7.3 Environmental Consideration in port operation

(1) Establishment of Environmental protection Policy in port operation

Overall policy to consider and conserve port environment need to be established.

(2) Environmental Consideration for Imam Khomeini port

Air pollution and water pollution are problems at Imam Khomeini port. Therefore, countermeasures of these problem should be studied.

(3) Environmental Consideration for Anzali port

In the Master Plan, there are reclamation works which will cause water pollution. Therefore, countermeasures should be studied. The Sea-bed quality test should need

again.

(4) Strengthening of PSO Organization for Environmental Administration

For maintaining the port environment, it is recommended to create at PSO central office a special department or section which is responsible in taking care of port environmental affairs.

7.4 Improvement of Port Engineering Aspects

(1) Overall Upgrading of PSO Engineering System

In order to carry out an appropriate future major port development, PSO's organization, with respect to engineering aspects, can be improved further.

(2) Establishment of Technical Standards for Port Facility Design

It is strongly recommended to PSO to continue its efforts to carry out necessary technical arrangement for PSO's technical standards.

(3) Improvement of Engineering Statistics and Recording System

The records should be given well-informed easy access to touch the records.

(4) Monitoring and Review for Flexible Project Implementation

PSO should enforce to monitor and to review the Plan.

(5) Establishment of Effective Maintenance System

According to past experience, if preventive maintenance is appropriately performed, the required cost for corrective maintenance works will be minimum.

7.5 Port Management and Operation

(1) Proper Application of Privatization Policy

Considering the nature of pubic port, partial and step-wise application of the policy is therefore desirable for the Iranian ports under deep understanding on the ultimate objective of privatization policy.

(2) Strategic Tariff Policy for Transit Cargoes

PSO should have a more aggressive tariff policy for further increase of cargo handling revenue through inviting transit cargoes to the ports along the Persian Gulf coast.

(3) Improvement of Port Statistics and Recording System

In order to support port planning and administration, it is essential to build up a well designed port statistic and recording system.

(4) Reinforcement of Port Promotion Activities

PSO should reinforce the port promotion activities.

7.6 Physical Implementation of Proposed Port Development Schemes

(1) Imam Khomeini Port

(1) PSO should study mitigation measures on the disturbance of port operation during the project implementation.
(2) Necessary arrangement should be conducted for the new access to the West Harbor.
(3) Periodical hydrographic survey and maintenance dredging should be carried out.

(2) Anzali Port

(1) Detailed plan of urgent mitigation measures against the water raise should be prepared.
(2) PSO should provide the residents with the explanation about importance of port activities.
(3) PSO should discuss with the municipality about the future port expansion eastward.
(4) PSO should make its best efforts to convince the military that the existing military area behind the port area should remove to other site.

7.7 Financial Issues for Successful Implementation of the Project

(1) Procurement of Necessary Funds For the Project

Considering the actual Iranian port development system, government bond and foreign currency loan are most practical at least for the basic port facilities. Private funds may also reasonably be introduced for some superstructures and cargo handling equipment in accordance with possible future privatization of port operation.

(2) Appropriate Policy Making on Reasonable Level of PSO Contribution To the National Revenue

It is recommended that PSO should seek possible way to set reasonable level of contribution through active appeal to the agencies concerned on significance of the port development and financial requirements for the project.

(3) Budgetary Arrangements For the Urgent Improvement Schemes

Immediate action for securing next year's budget for urgent improvement schemes is essential for timely completion of the project.

(4) Effective Utilization of Earnings from the Short Term Project of Imam Khomeini Port

Considering the current level of adequate port facilities and rather small investment requirements for the short term project at Imam Khomeini port, it is recommended that substantial earnings from the short term project should effectively be utilized;

1) for the Master Plan project of the port which will require a huge investment, by string them with in PSO accounts, and
2) for the development projects of other PSO ports, by re-allocating them through PSO contribution to the Government.

7.8 Other Relevant Issues to be Considered

(1) Promotion of regional development to be conducted together with the proposed port development schemes

(2) Organization, for port sector promotion, of wide-range of supporting groups composed of both public and private entities

(3) Constant dialogue between PSO and port users for effective improvement of port operation and services

(4) Early commencement of a detailed planning study on Abbas port for harmonized development with on-going Free Trade Zone project at Quesim Island.

(5) Consolidation of PSO position and its concern in participating in the development scheme of Free Zone.

(6) Promotion of active approaches to and coordination with the agencies concerned for timely construction of the roads and railways relevant to the proposed port development.

II SUMMARY

1. The Process of the Study

The process of the Study is drawn as in Figure 1-1. In all, the Study takes almost 21 months and will be completed by the end of June 1995 with the submission of the Final Report. The data and information are proposed by PSO. The field survey was subcontracted to a local company.

The Study had been carried out under the close cooperation between the PSO and the Study Team for the period of 21 months from October 1993 to June 1995 : (1) analysis of the present situations from October 1993 through January 1994; (2) formulation of basic strategies and preparation of Master Plan for the port of Imam Khomeini and Anzali from February to June 1994; (3) formulation of Short Term Development Plan and its feasibility study from July to October 1994; (4) finalization of the study from November 1994 through January 1995; (5) submission of final report of the Study in May 1995;
Study ports are 16 as shown in Figure 1.

The Final Report comprises five volumes:

VOLUME Ⅰ: SUMMARY
VOLUME Ⅱ: NATIONWIDE PORT DEVELOPMENT AND MANAGEMENT STRATEGY
VOLUME Ⅲ: MASTER PLAN AND FEASIBILITY STUDY FOR THE PORT OF IMAM KHOMEINI
VOLUME Ⅳ: MASTER PLAN AND FEASIBILITY STUDY FOR THE PORT OF ANZALI
VOLUME Ⅴ: APPENDIXES

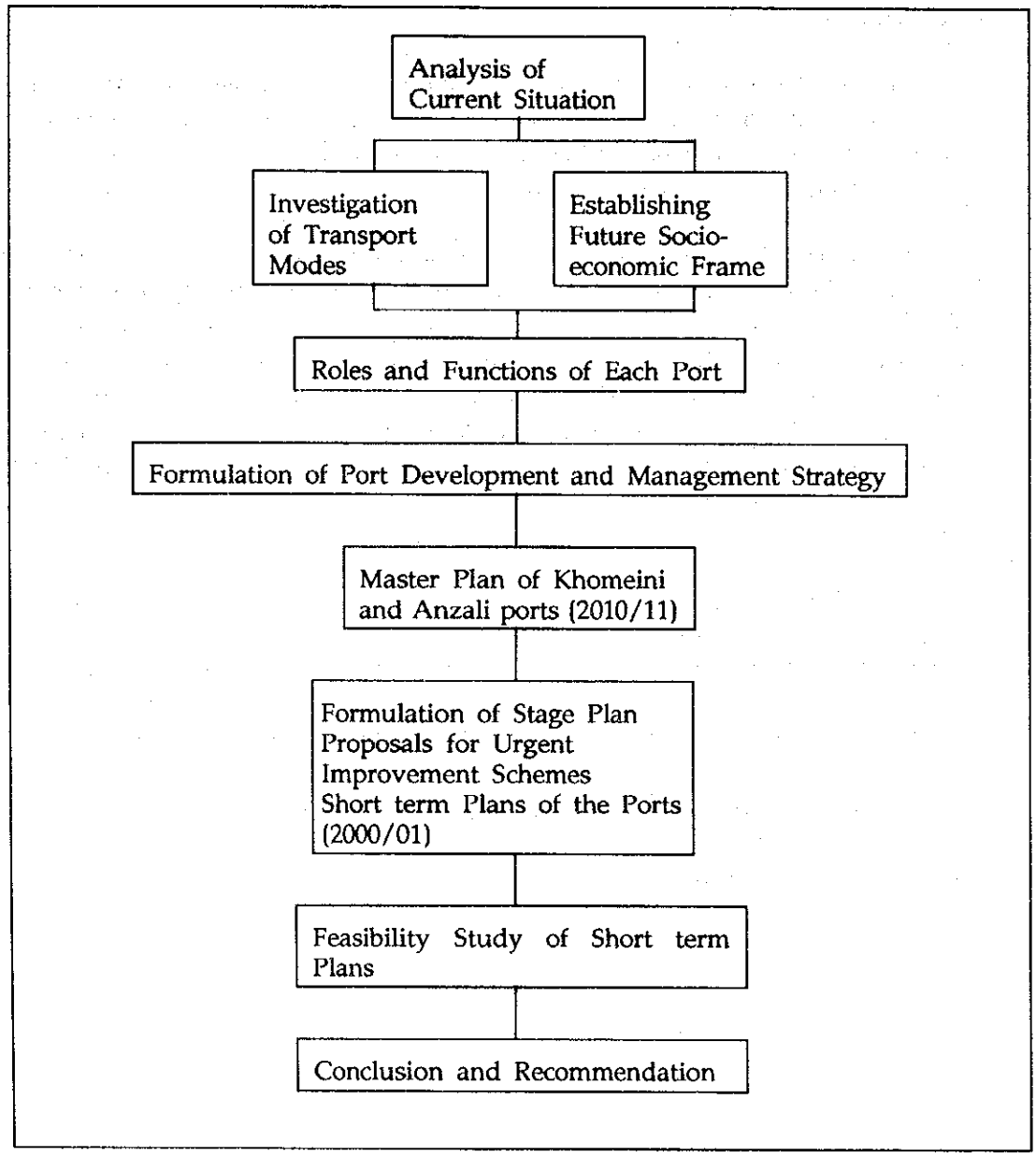


Figure 1.1 Process of the Study

2. Nationwide Port Development and Management Strategy

2.1 The Socio-Economic Situation of Iran

2.1.1 General Situation of Transport Sector of Iran

(1) Location of Iran and International Cargo Flow

Because of its favorable geographical situation, Iran has always been in the center of world trade. With the transformation of the former USSR, the roles of Iran has become more important as the economic central country in the Middle East and Central Asia. On the other side, CIS countries want to expand outer republic trade and seek the reliable cargo transport channels including through Iran. In this context, it is expected that cargo bound for the CIS countries from abroad will be transported through Iran at an increasing rate. The cargo flow to/from Iran is shown as Figure 2.1.1.1, the population of neighboring countries is shown as Figure 2.1.1.2.

Cargo Flow To/From Iran 1992/93

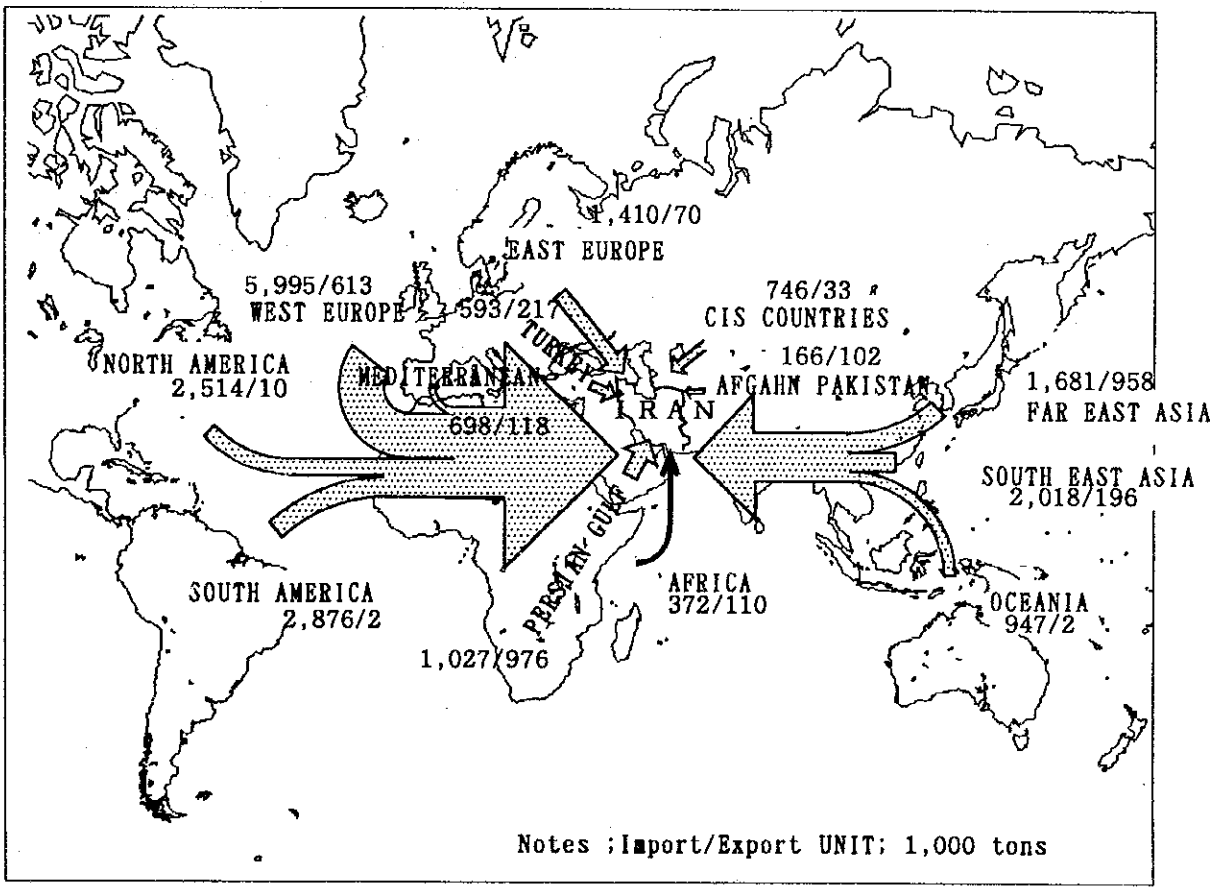


Figure 2.1.1.1 Location of Iran and Trading Volume

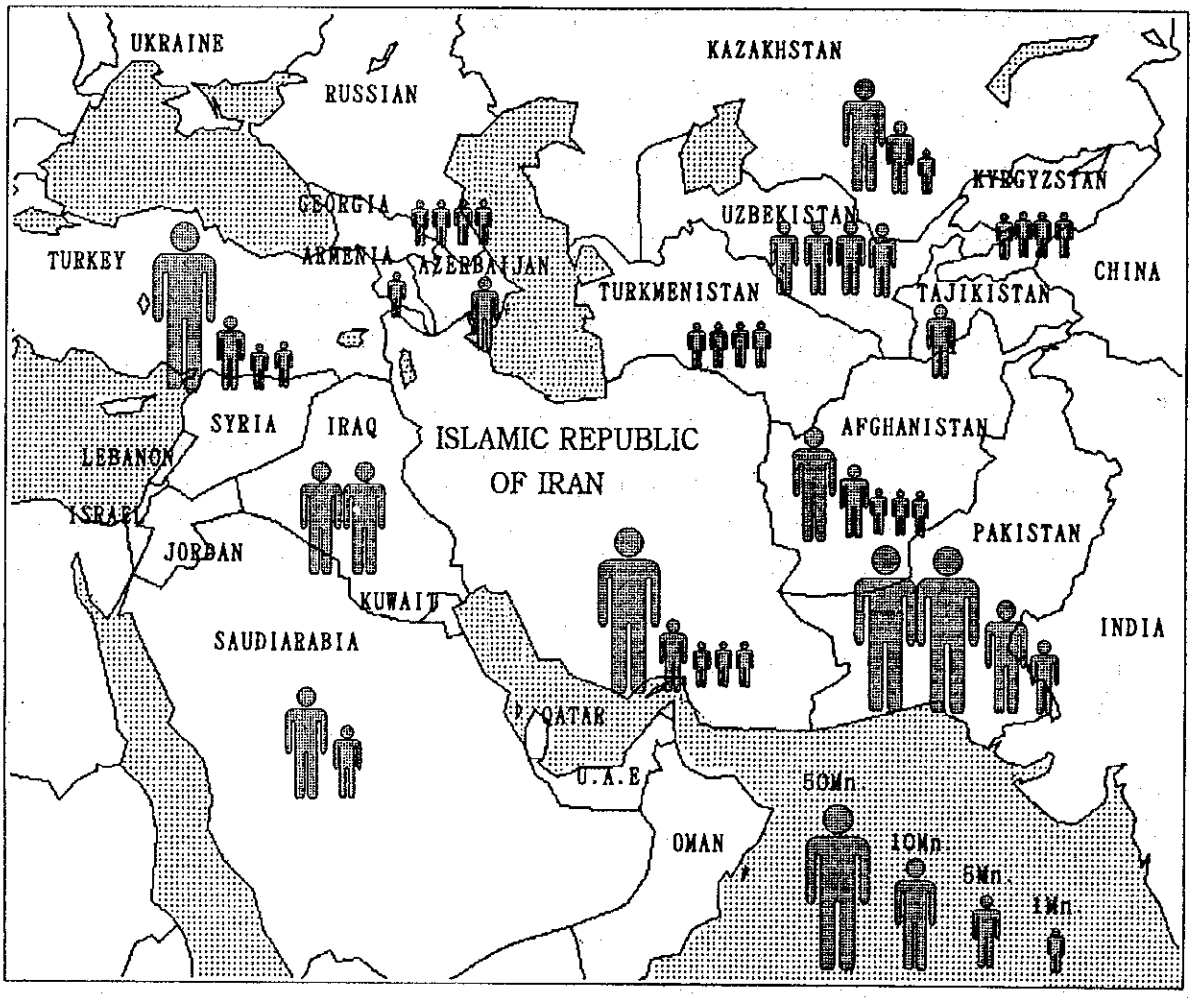


Figure 2.1.1.2 Population of Neighboring Countries

(2) National Budget and Investment

To meet the country's growing demand for transport, the Government has stepped up its investment in the transport sector. In 1992/93, government investment in the transport sector amounted 545.2 billion rials, of this, 70 billion rials is allocated for port works.

Table 2.1.1.1 National Budget

(unit: Bn. Rls.)

Year	1991/92	1992/93	1993/94*
Oil Income	3,550	5,141	15,597
Tax	2,765	3,776	5,410
Others	689	982	2,514
Total Income	**7,004**	**9,899**	**23,521**
Current	5,564	7,783	14,012
Development	2,527	3,193	9,684
Total Expenditure	**8,091**	**10,976**	**23,696**
Deficit	**1,087**	**1,077**	**175**

Source: P.B.O., 1982 price

** Preliminary*

(3) Transport Infrastructure Network

1) Road Network

Iranian road administration is under the Ministry of Roads and Transportation (MRT) in which there are Department of Maintenance and Coordination of Affairs of Provinces and Department of Technical Affairs and Road Construction, where the road construction and maintenance are conducted.

Total length of roads is 107,019 km. (1992/93)
The length of roads by road category is shown as follows.

Table 2.1.1.2 Lengths of Roads by Road Category (1992/93)

Road category	Length(km)
Free ways, Express ways	1,413
Main roads	18,533
Secondary roads	41,932
Other types	45,141
Total	107,019

Source : MRT

In inland transportation networks among cities, the road networks connecting Tehran, Mashhad, Esfahan, Tabriz are advanced. Freeways and expressways are arranged mainly around these cities.

The mountains of the Alborz Range forms a high and narrow barrier and separates the Caspian Sea from the interior region. Access roads for the major Caspian Sea ports (Anzali port and Nowshar port) through these mountains are therefore not in good conditions.

Route of Tehran-Khomeini port confronts the mountains of the Zagros Range, requiring many bridges and tunnels. Route of Tehran-Abbas port passes through the desert region where weather conditions are very severe.

Iran is connected to Europe and Central Asia by road through Turkey, Azerbaijan, Turkmeanistan, Afghanistan, and Pakistan. Present main transport routes to/from Turkey and Azerbaijan are through Bazargan and Astara respectively.

2) Railway Network

IIRR (Islamic Iranian Republic Railways) supervised by Ministry of Roads and Transport consists of a head office and 12 operational divisions.
Islamic Iranian Republic Railways (IIRR) has the Deputy for Construction and Development of Railway Network (DCDR) and Railway Developing Consulting Engineers IRAN (METRA)

Iran has 5,044 km of Public railways including 146 km of electric railtracks. The present network is a system of single track lines and standard gauge.

Table 2.1.1.3 Length of Railways (1992/93)

Existing main lines	5,044 km
Existing industrial lines	1,185 km
Under construction lines	1,000 km
Under study lines	5,500 km

Source : IIRR

Iran is linked by rail to three countries. The most active route at present is the one to Azerbaijan Republic through Julfa. Expansion of railway between Mashhad and Sarakhs straddles the Iran-Trukmenistan border.

3) Air Network

There are 26 domestic airports in Iran operating round-the-clock, 6 international airports, and 6 airfields for the National Iranian Oil Company
There are many air lines among Europe and Middle east.

4) Shipping Networks

a) Caspian Sea networks

On the Caspian Sea there are two important sailing routes. One is Baltic Sea--Volga River--Caspian Sea route(Volga-Baltic canal) and the other is Black Sea--Volga Don Canal--Volga River--Caspian Sea route(Volga-Don canal).

b) Persian Gulf networks

On the Persian Gulf, main transport routes are Abbas port, Khomeini port to/from Europe, Asia, America. Abbas port-Dubay route is used inside the Persian Gulf.

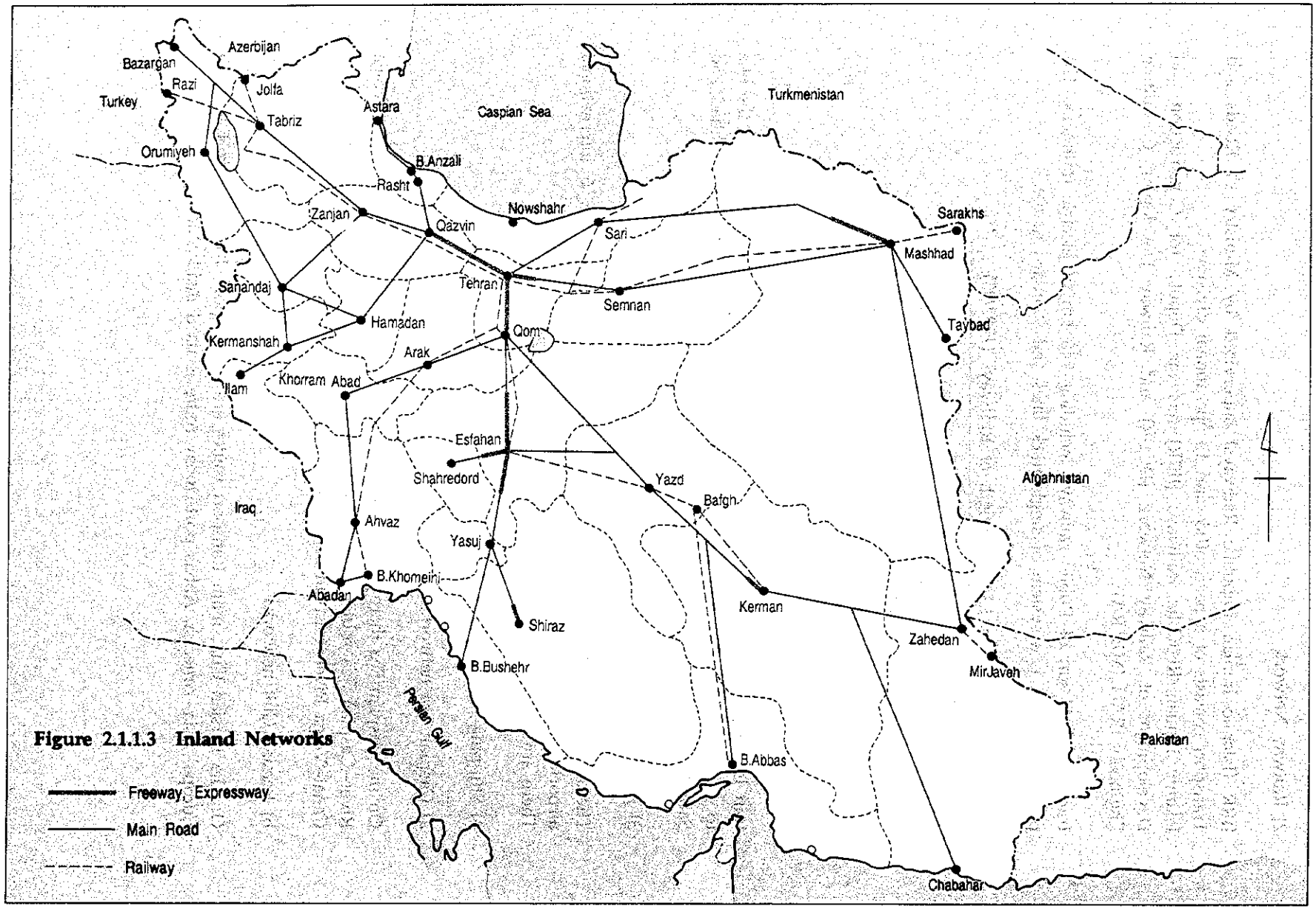


Figure 2.1.1.3 Inland Networks

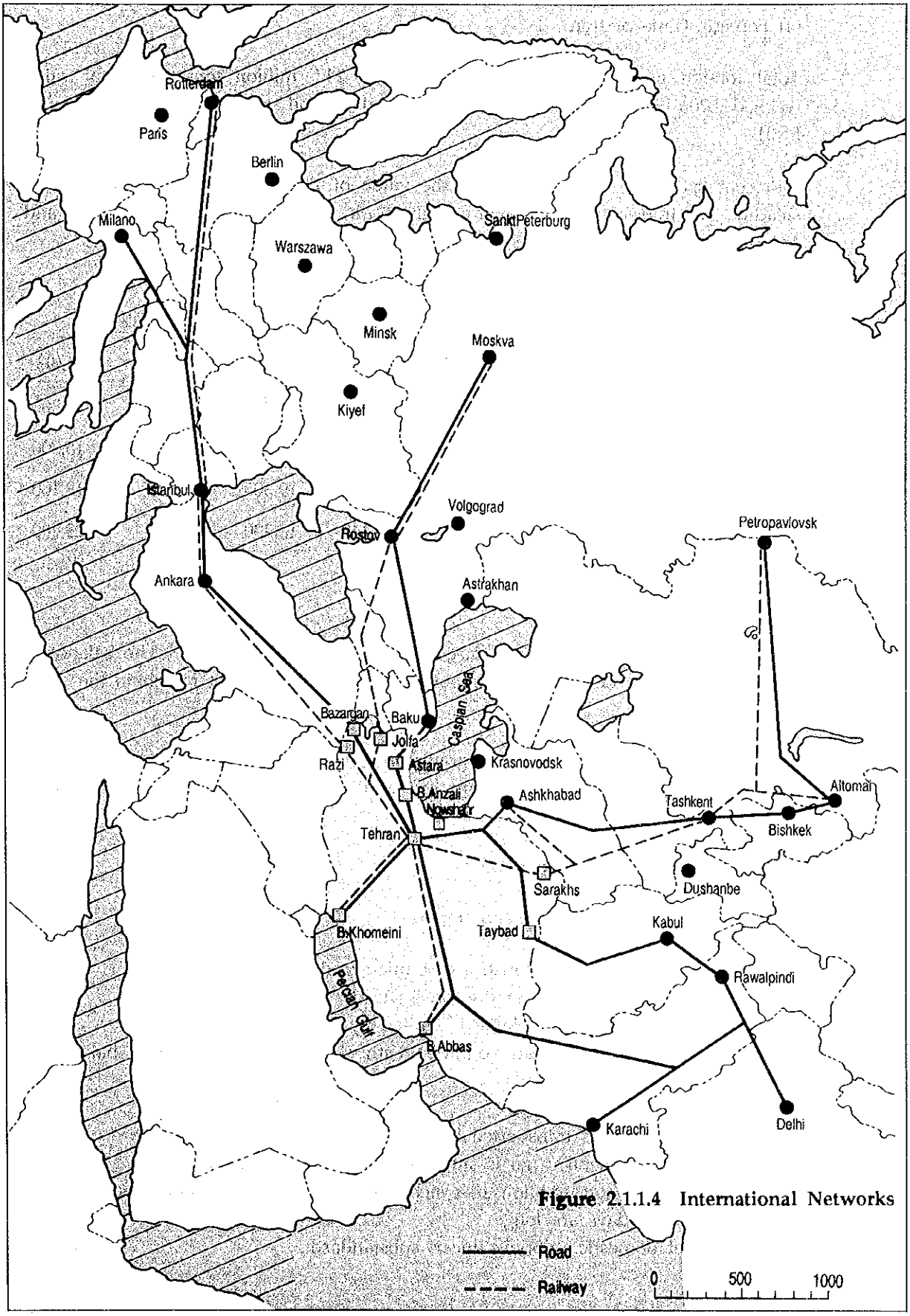


Figure 2.1.1.4 International Networks

(4) Foreign Trade of Iran

Total foreign trade goods in 1992/93 reached 24.5 million tons and total value reached 2,205 billion rials in Iran. (excluding oil and oil products, Custom Offices of I.R.I).

In recent six years, the volume and the value of the foreign trade are increasing steadily. The trade value per-capita and the trade volume per-capita are 0.4 ton and 434 dollars. Table 2.1.1.4 shows the balance of foreign trade in past six years.

Table 2.1.1.4 Balance of Trade

(unit: Us$ Mn.)

Year	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93*
Non Oil Export	1,161	1,036	1,044	1,312	2,613	2,800
Oil Export	10,755	9,673	12,037	17,993	15,802	15,300
Total Export	11,916	10,709	13,081	19,305	18,415	18,100
Total Import	13,236	10,608	13,448	18,330	24,975	23,200

*Source: Central Bank of I.R.I., *: Preliminary*

Import value is about eight times larger than non oil export value. The balance of trade in non oil products is over import. Europe is the largest region in the share of trade by region.

Main imported cargoes by ship are grains, iron-steel, chemical products and mineral fertilizer. Main exported cargoes are ore and dry fruits. On trade value, major exported cargoes are carpets and fruits.

(5) Characteristics of Foreign trade

1) General Situation of Export and Import

Followings are unique characteristics of Iranian trade.

i) The non-oil export goods of the foreign trade is very small
ii) Import good value and volume is limited by export income
iii) There are few counter-part countries with whom Iran can keep a balance of imports and exports
iv) Share of ship cargo is large
v) High value cargo is transported by air
vi) Containerized general cargo is small comparing with other countries
vii) Production and consumption area incline to western and northern part of Iran
viii) Cargo storage days are long
ix) Activity of domestic shipping line is substandard

In Iran, the volume of imports is determined by the amount of oil revenues in any particular year. The Iranian Government has pushed to boost non-oil exports and succeeded in raising their value in the past years. The Iranian Government's policies for improvement of foreign trade may be identified as follows.

i) to improve quality of non-oil goods, intensifying marketing efforts for them and raising their exports, increasing high value export goods rather than traditional products and primary materials
ii) increasing oil exports to major exporting countries
iii) reducing imports of goods and increasing products in sufficient quantities domestically

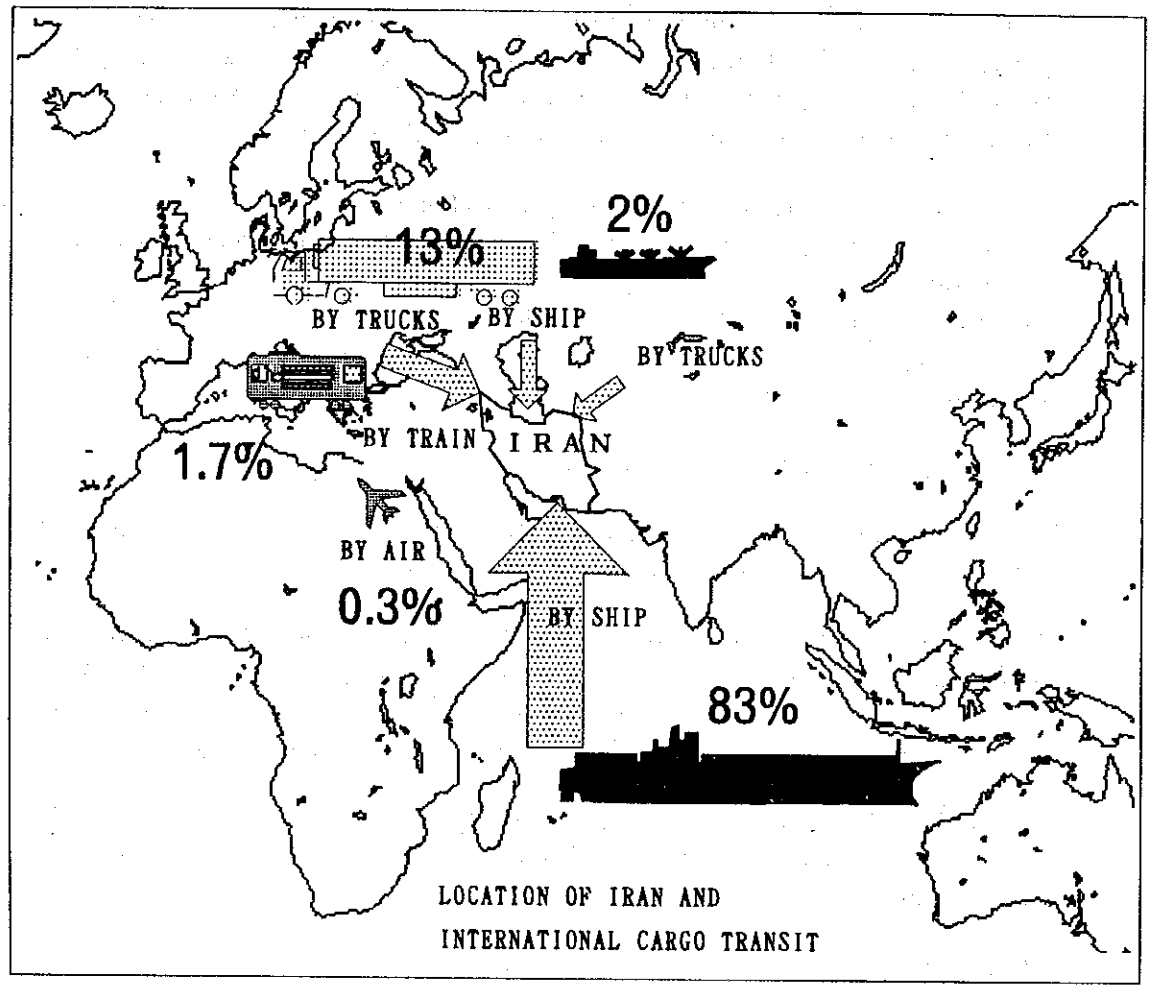
(6) Roles of Port Sector and Its Activities

The most significant aspect of Iranian ports is that the ports have intensified their activities mainly in regards with overseas cargo trade.

Total foreign trade goods in 1992/93 (excluding oil) reached 24.5 million tons, of which 20.9 million tons (85.1 % of total import/export cargo) were handled by ship and the rest by roads, railways and airplanes. The trade cargo by land is coming mainly from Turkey, Pakistan, Afghanistan, CIS Republics and European countries.

The trading share are of total trade volume by transport mode is shown in Figure 2.1.1.5. Most of trading goods are imported/exported to/from Iran, go through the Persian Gulf at the south and on land at the north.

Marine transport is the most important traffic mode for Iran and this trend is considered to be unchanged for a while.



Number ; Cargo Volume Share by Transport Mode, 1992/93
Source : Iran Customs Administration

Figure 2.1.1.5 Share of Trade Volume by Transport Mode

2.1.2 National Development Plan

In Iran, "The First Economic and Culture Development Five Year Plan" had been planned for the period 1989/90 - 1993/94. The Second Plan is under consideration in the Parliament. In this plan, the policy of the government is, with respect to its precious resources and capabilities, to be a powerful presence in the world markets and international economy and to reduce the country's dependence on oil-sales revenues.

In the document of The Second Five Year Plan, major indexes for economic condition and foreign trade are shown in Table 2.1.2.1. These indexes are referenced to The Study.

Table 2.1.2.1 Major Indexes of The Second Five Year Plan

Year	1993/94	1998/99	Annual Rate of Growth
GDP (Bn. Rls.)	13,258	17,647	5.89
GDP Per Capita (Rls. 1,000)	220.97	262.21	3.48
Population (1,000)	60,055	67,330	2.31
Development Ratio of GDP (%)	14.11	17.77	
Product of Manufacturing (Bn. Rls.)	2,182.0	3,025.6	6.76
Total Import Value (Mn. US$.)	16,018.6	21,710.5	6.27
Total Import Ratio of GDP (%)	12	12	
Non Oil Goods Ratio of Export (%)	16.75	26.89	
Oil Export Ratio of GDP (%)	12	19	
Non Oil Export (Mn. US$.)	3,280.2	5,891.5	12.43
Non Oil Export Ratio of GDP	2	3	

Source: Case-2 in Second Five Year Plan, P.B.O

2.1.3 Relevant Development Plan

(1) Major natural energy resource development projects of Iran

Major development projects under operation, construction and planning in Iran are listed here below.

1) Mining Projects
Chadoromloo, Gol-Gahar, Sangan

2) Metal projects
Steel complex : Khorasan, Kerman, Hormozgan, Qeshm
Aluminium : Jajoum Bauxite Plant, Al-Mehdi Aluminum Plant

3) Oil refinery
Arak refinery, B.Abbas refinery, B.Taheri refinery

4) Gas projects
Vali-Asr natural gas plant (Kangan)
Khorasan province 2 sites
Hormozgan province 1 site

5) Petrochemicals
Arak petro-chemical complex

6) Power stations

Neka power station	Sari	4x300 MW	Shahzand power station
	Arak	1100 MW	
Karun-3 dam	(water)	Khuzistan 2000 MW	Bushehr nuclear power station

(2) Location of industrial complex

Oilfields are mainly located in the south-west part of Iran. There are many oil related industries in this areas, such as oil refineries, natural liquid gas plant and petrochemical plant. There are two big industrial steel projects in this area. Ahvaz and Esfahan are important for their steel production industries.

There are four big industrial and commercial areas near Anzali port. Rasht area, Qazvin area, Tehran area and Tabriz area.
Main location of complex is shown in Figure 2.1.3.1.

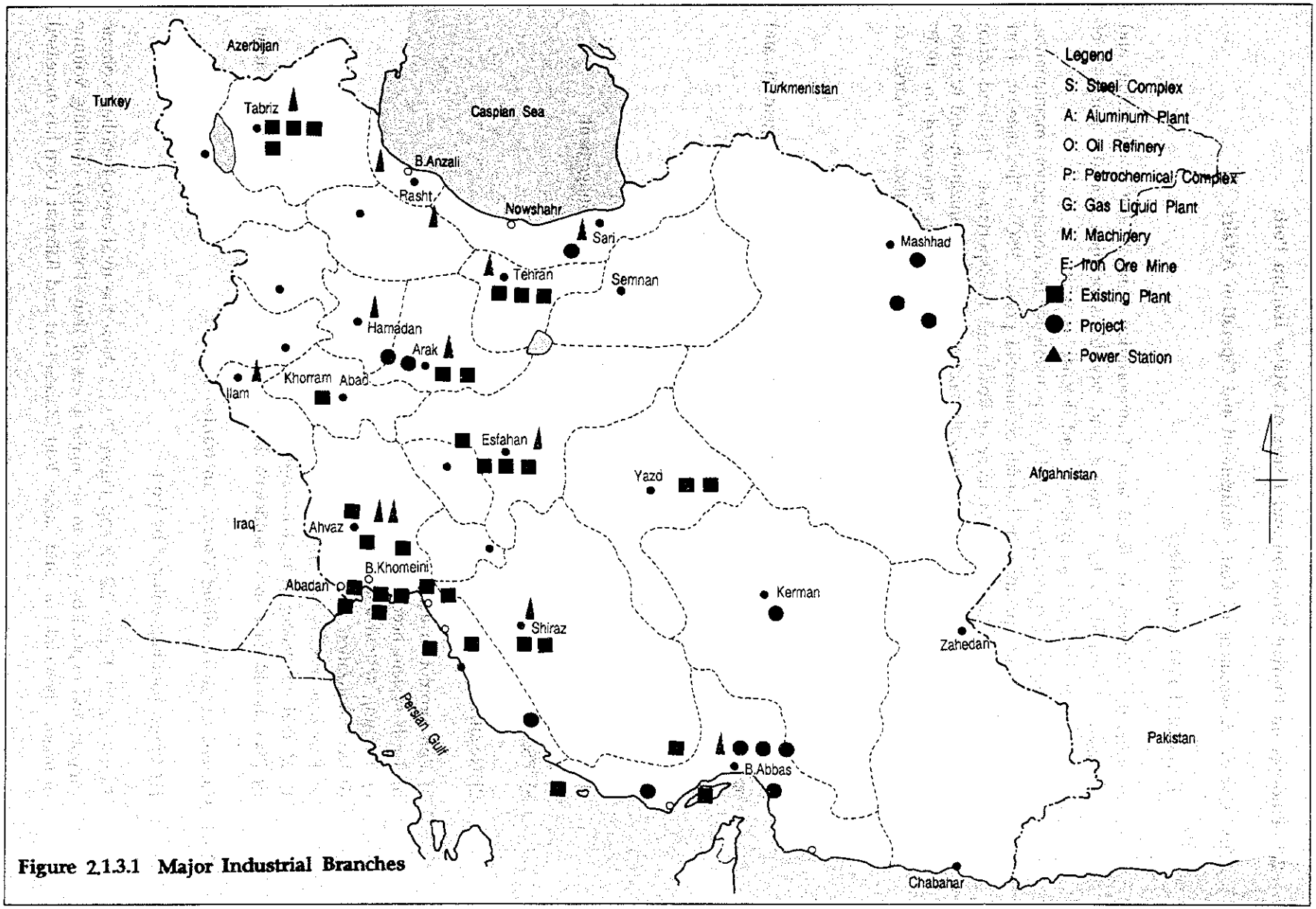


Figure 2.1.3.1 Major Industrial Branches

2.2 Findings on Current Situation and Issues on Major Iranian Ports

2.2.1 Overall Assessment of Port Management and Operation Affairs

(1) National Port Authorities

In Iran, the Ministry of Road and Transportation controls the construction and management related to land, marine and sky transportation, for the purpose of economic development and national land defence as well.
Port and Shipping Organization (PSO) is responsible for the construction, maintenance, management and operation of Iranian commercial ports. PSO is the state-run port management entity under the Ministry of Road and Transportation. Its head office is in Tehran, and it has port authorities at major ports. Its organization and function is based on "the Law of Ports and Shipping Organization approved in 1970" (hereinafter referred to as PSO law), Article III. PSO is also in charge of administration of all Iranian coastal and sea areas.

(2) Overall Assessment of Port Management and Operation Affairs

Positive and negative findings on the current situation of port management and operation affairs are observed by the study team as follows.

1) Positive Findings

a) PSO has enough power to control port area and infrastructure.
b) PSO aggressively promotes privatization of port activities.
c) PSO promotes introduction of information system to port management.
d) Accounting system is modernized.
e) PSO has a comparatively sufficient statistics database.

2) Negative Findings

a) Port promotion activity is insufficient.
b) Tariff system needs to be modernized
c) Training system and staff evaluation system need to be improved.
d) Decentralization is insufficient.
e) Port operation is not efficient
f) Moderized system of port management is necessary.
g) PSO should have more sufficient databases for port planning and administration.

2.2.2 Current Cargo Handling Volume in Iranian Ports

(1) Cargo handling volume by port

Figure 2.2.2.1, Figure 2.2.2.2 and Figure 2.2.2.3 show the total cargo handling volume (import and export) by port in six major ports of Iran. Total cargo handling volume of Imam Khomeini Port and Abbas Port (Rajaee Port and Bahonar Port) has increased

constantly every year since 1988/89, from a 70% share in 1988/89 to an 85% share in 1993/94.

The share of export cargo handling volume reached 95% in 1993/94. But cargo handling volume of the other four ports is stagnant. In particular, the stagnancy of import cargo volume after 1991/92 and the rapid increase of export cargo volume since 1990/91 at Imam Khomeini Port are especially worthy of note.

(2) Cargo handling volume by commodity

Figure 2.2.2.4, Figure 2.2.2.5 and Figure 2.2.2.6 show the total cargo handling volume (import and export) by commodity in the six major ports of Iran. The share of six major ports is about 100%. Import volume of liquid bulk cargo has steadily increased since 1989/90 and that of general cargo has slowly but steadily increased. On the other hand, steel product cargo volume showed a rapid increase from 1989/90 to 1991/92, fell sharply in 1992/93 and then maintained the same level in 1993/94.

Regarding the export cargo volume, exports of bagged cargo and steel product cargo which were hardly exported at all prior to 1991/92 suddenly increased at a rapid pace. The general cargo, which has always been the staple article of export cargo, and the above-mentioned cargoes accounted for 93% of the total export cargo.

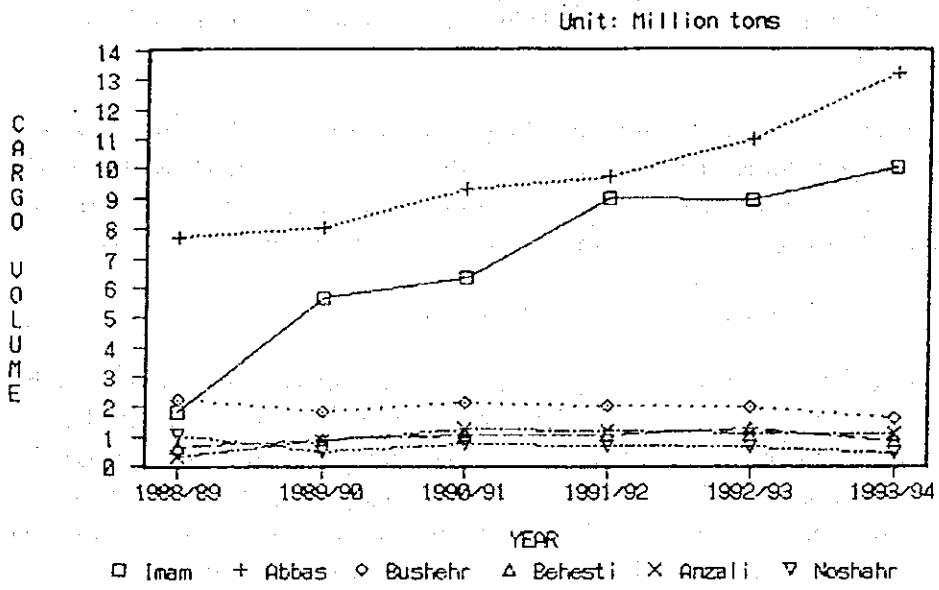


Figure 2.2.2.1 Total Cargo Volume

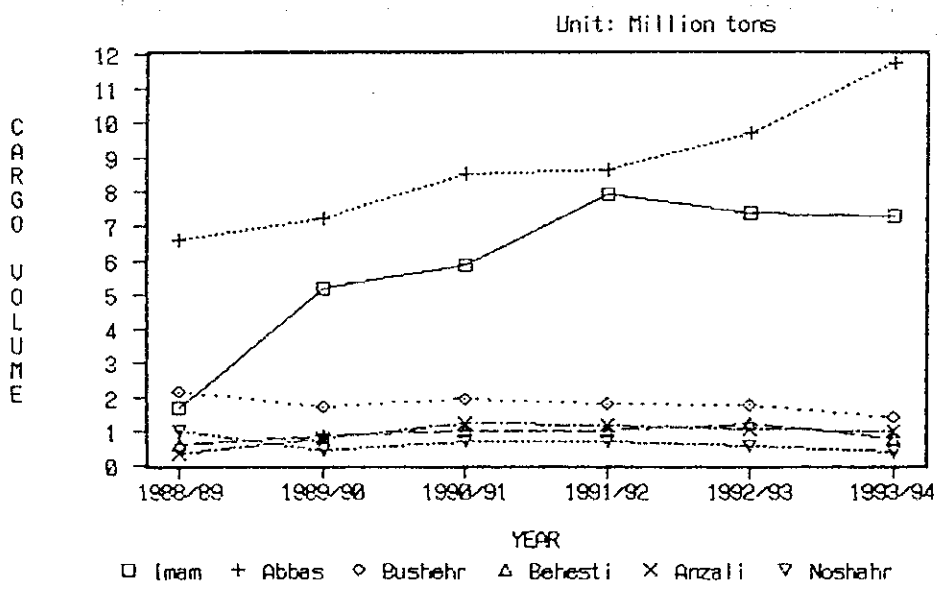


Figure 2.2.2.2 Import Cargo Volume

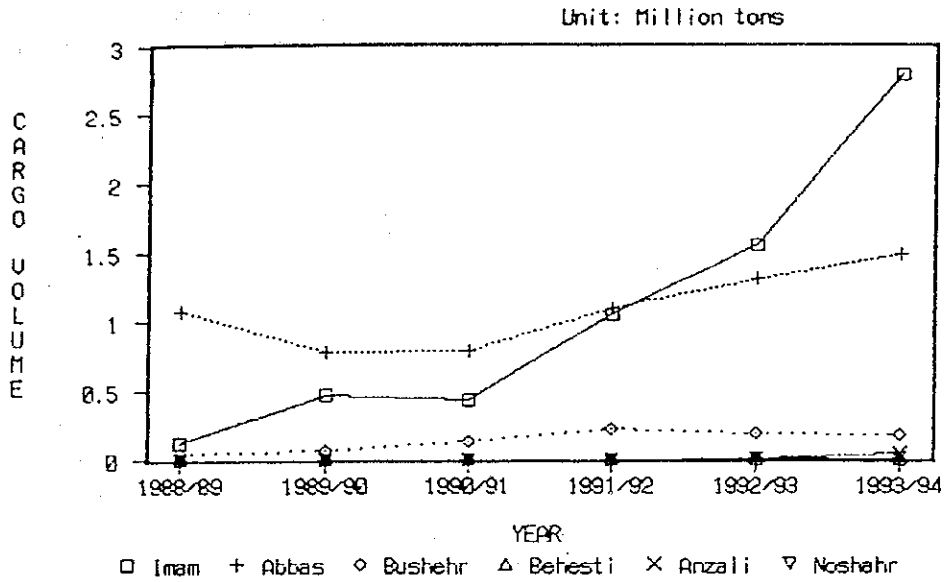


Figure 2.2.2.3 Export Cargo Volume

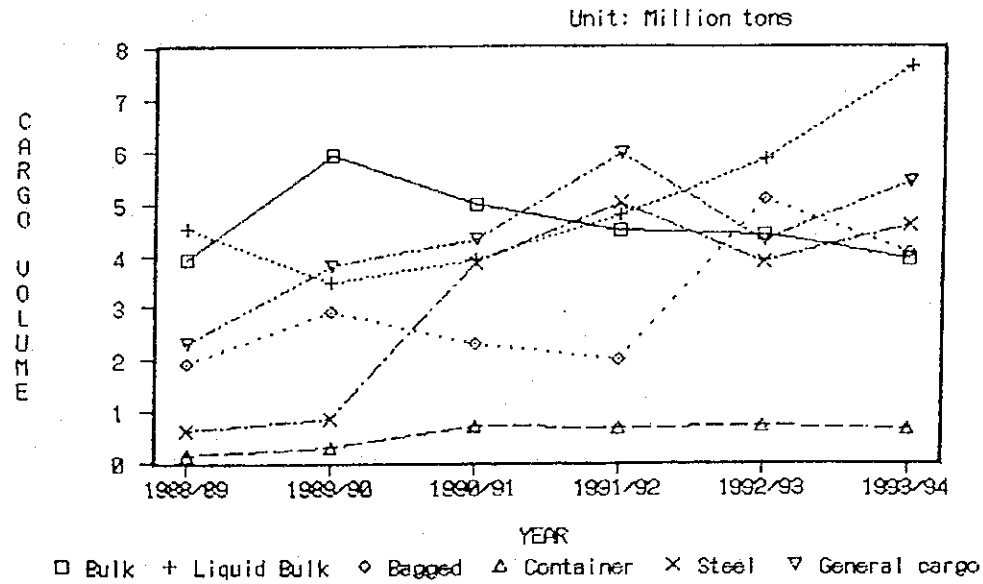


Figure 2.2.2.4 Total Cargo Volume

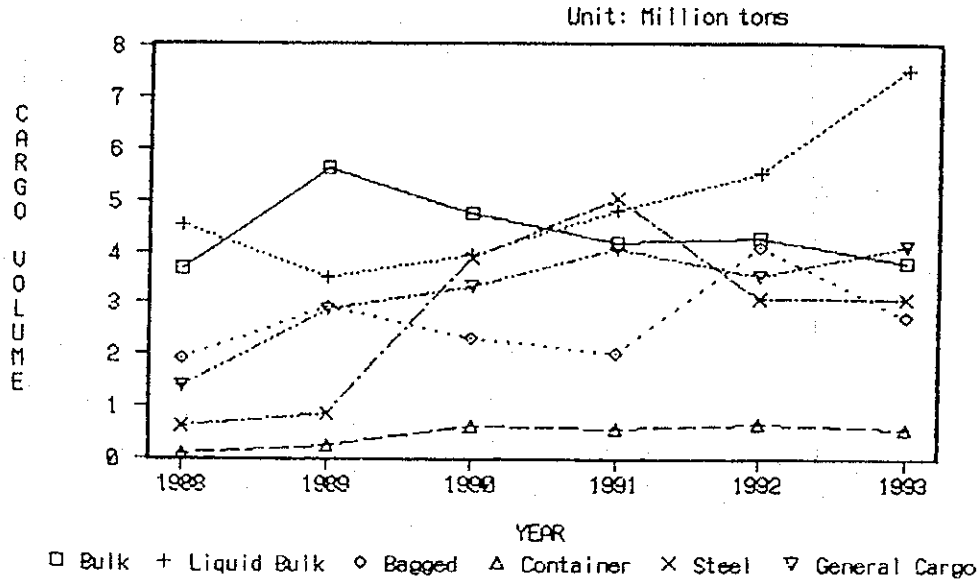


Figure 2.2.2.5 Import Cargo Volume

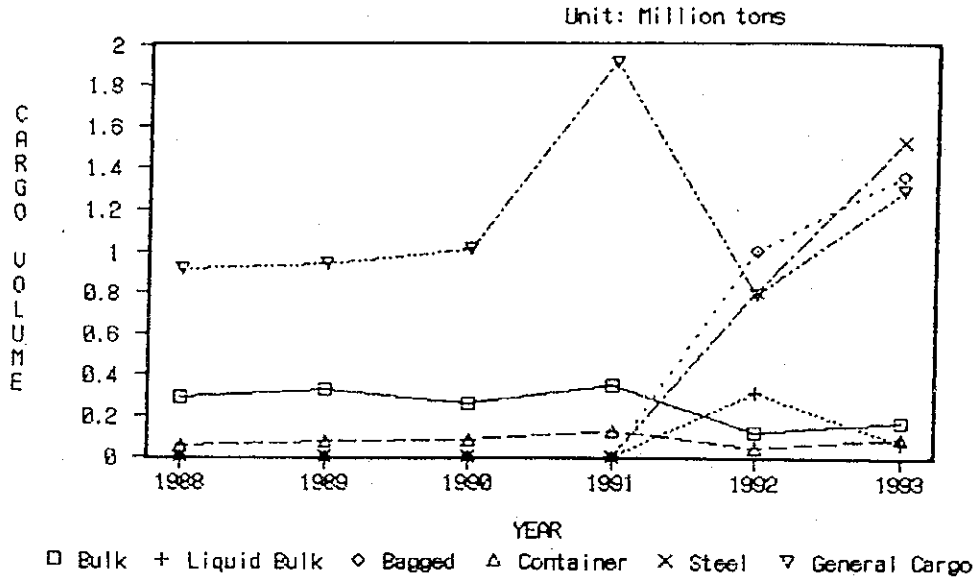


Figure 2.2.2.6 Export Cargo Volume

2.2.3 Situation of Port Facilities

(1) The major mooring facilities and cargo handling equipment at the Major Iranian Ports are as follows. As lack of maintenance during the last war, cargo handling equipment is low efficiency

Table 2.2.3.1 Major Port Facilities and Equipments at Major Iranian Ports

	Major mooring facilities			Major Cargo handling equipment	
Port	Kind of berth	Length (m)	Depth (m)	Kind of cargo handling equipment	Number of good condition crane
Khorramshah	Multi purpose berth	720	3.5	Unknown	-
Abadan	General cargo berth	490	4.5	Unknown	-
	Others	520	4.5		
I. Khomeini	Container cargo berth	1092	12.5	Container crane	2
Khomeini	Heavy cargo berth	912	11.5	Portal Jib crane	6
	General cargo berth	1094	10	Unloader	7
	Multi purpose berth	910	10	Grain loader	1
	Grain berth	230	9	Transfer crane	2
	Bagged cargo berth	386	10	Mobile crane	17
Busher	General cargo berth	419	9.0	Mobile crane	16
	Dolphin berth	-	9.0		
S. Rajaee	Container berth	1000	12.0	Container crane	2
	Multi purpose berth	400	12.0	Unloader	2
	Heavy cargo berth	719	12.0	Transfer crane	10
	General cargo berth	2200	12.0	Mobile crane	31
S. Bahonar	General cargo berth	1000	10.0		
S. Beheshti	Multi purpose berth	150	9.0	Unloader	4
	Multi purpose berth	450	10.0	Mobile crane	8
S. Kalantary	Pontoon berth	480	2.0-4.0		
	Multi purpose berth	Under construction			
Anzali	Multi purpose berth	646	5.5	Unloader	2
				Portal Jib crane	5
				Mobile crane	17
Now Shahr	General cargo berth	450	5.0	Unloader	2
				Mobile crane	22

Source:PSO

(2) Natural Condition

Because of its varing topograpng, Iran has a variety of climates but generally speaking, it is said to have a continental type of climate which is indeed true of a major part of its interior. Temperatures vary considerably from season to season and from one place to another. The interior deserts of Iran are amongst the hottest in the world but mountains play an all important part in lowering the temperature. Although the average temperature for the whole country is quoted as 18 degrees centigrade, it should be noted that the maximum of over 50° is observed in the summer of the interior and southern deserts, and minimum of -30° is common to the mountainous areas of the north and northwest.

Rainfall of Iran is rather scantly and this applies particularly to the plateau section of the country.

The Caspian sea littoral is the only exception to the rule. All over the plateau, rainfall is produced by the winter depressions that take their origin in the Mediterranean Sea.

Here rainfall is limited to the cold months of the year and its distribution is strongly dominated by topography. Higher level of ground and windward slopes facing the direction of western moisture bearing winds receive more rainfall than the low plains and deserts. The average for the country as a whole is around 35 centimeters per annum. The Caspian fringe receives its rain throughout the year. Here the annual precipitation ranges from above 1,500 millimeters in the west to about 50cm in the east.

For the country as a whole, it may be said that, the temperature decreases from south to north and from west to east, whereas rainfall assumes a similar pattern from north to south and from west to east. Briefly the Caspian area has a temperate climate with relatively plenty of rainfall and moderate temperature, the western and the northwestern mountainous areas enjoy a Mediterranean climate with cold rainy winters and dry hot summers. The Persian Gulf littoral suffers from hot and almost moist but few rain climate and the remaining central and eastern parts of Iran are the domains of various arid climates.

2.2.4 Navigation

Countermeasures to prevent sea accidents, e.g., navigational aids such as light buoys indicating center line of the fairway and lateral light buoys indicating boundary of the fairway, are arranged roughly. But the positioning of some of them is not reliable, nor are they sufficient in number at the berth approach and manoeuvering area. Maintenance dredging is not periodically executed. Compulsory pilotage for foreign vessels and more than 1500 GRT Iranian Vessels is being enforced, but the current number of manoeuvering vessels is so small that pilots are not gaining the necessary experience.

It has already been mentioned that calling vessels will increase both in size and number in line with the socioeconomic growth in Iran. Even if the current vessel traffic were to remain unchanged in future, it is an important issue for Iranian ports to plan a strategy for preventing loss of lives and property from sea accidents.

Furthermore, it is recommended that local traffic regulations, which are primarily the responsibility of the PSO, be revised.

It will be necessary to seek the cooperation of NIOC, fishery organization and users of the water area to improve the situation for the purpose of navigation safety.

They must endeavor to improve navigational safety so that the following remarks in the British charts No.1268, No.1269 (1993 edition) will be revised.

DEPTH-NAVIGATIONAL AIDS
Depth in the approach to Khowr-e Musa is liable to change and may be up to 5 meters less than charted. Navigational aids are reported to be unreliable and subject to change.
Mariners are advised to proceed with caution.

2.2.5 Cargo Handling System and Equipment

(1) Cargo Handling System

1) Cargo handling operation

In 1991/92, according to PSO statistics published in 1992, 56.1 % of total cargo volume through the ports were directly transported to and from outside the port area from and to vessels by trucks. Table 2.2.5.1 shows cargo movement in the ports in 1991/92. In some ports, this direct delivery system sometimes causes a long line of trucks due to long waiting time for loading of cargo.

Table 2.2.5.1 Cargo Movement in Major Ports

TABLE Cargo Movement in the Ports, 1991/92

Unit: 1,000 tons

PORT	CARGO IN WAREHOUSES BEGINNING OF YEAR	TRANSPORTATION OF CARGO				TOTAL	CARGO IN WAREHOUSES END OF YEAR
		DIRECT DELIVERLY	(%)	WAREHOUSE	(%)		
Imam Khomeini	274	3,860	50.1%	3,851	49.9%	7,711	435
Bushehr	9	705	65.5%	371	34.5%	1,076	8
Rajaee	623	2,704	47.0%	3,047	53.0%	5,751	318
Bahonar	19	1,323	96.5%	48	3.5%	1,371	18
Beheshti	2	739	96.9%	24	3.1%	763	1
Anzali	56	271	68.3%	126	31.7%	397	76
Now Shahr	22	67	38.7%	106	61.3%	173	22
Total South Port	927	9,331	56.0%	7,341	44.0%	16,672	780
Total North Port	78	338	59.3%	232	40.7%	570	98
TOTAL	1,005	9,669	56.1%	7,573	43.9%	17,242	878

Source: PSO

Among major ports, three ports of Imam Khomeini, Rajaee and Anzali ports have quay cranes for loading and unloading of cargo except container. Table 2.2.5.2 shows number of quay cranes in three ports. There is no quay crane in other ports.

Table 2.2.5.2 Quay Cranes

Port	Imam Khomeini	Abbas	Anzali
Crane	15 ton x 6 units	15 ton x 6 units	16 ton x 2 units 10 ton x 1 unit

Source : PSO

General cargo is unloaded and loaded by the above quay cranes, ship's gear, mobile crane or a combination of them.
For solid bulk (grain) cargo handling, there are pneumatic unloaders in the major ports.

2) Transit Shed and Warehouse

In some ports, no distinction is made between transit sheds and warehouses in the port area. Table 2.2.5.3 lists transit sheds, warehouses and open yards in major ports.

Table 2.2.5.3 Storage Facilities in the Major Ports (Unit: m^2)

Port	Transit Shed	Warehouse
Imam Khomeini	108,000	18,000
(Under Construction)	(27,000)	(54,000)
Rajaee	77,000	67,200
Bahonar	8,000	6,000
Busher	6,000	--
Chabahar	21,000	--
Anzali	20,289	--
Now Shahr	16,500	--

Source : PSO

(2) Cargo Handling Equipment

The existing major cargo handling equipment in the major ports is shown in Table 2.2.5.4.

Table 2.2.5.4 Existing Cargo Handling Equipment

Port	Imam Khomeini	Rejaee	Bushehr	Chabahar	Anzali	Now Shahr
Container Crane	1	2	0	0	0	0
Transfer Crane	2	10	0	0	0	0
Top Lifter	5	5	0	0	2	1
Portal Jib Crane	6	6	0	0	5	0
Pneumatic Unloader	2	2	0	4	2	2
Mobile Crane	17	36	0	8	17	22
Fork-lift Truck	39	51	1	7	12	14

Source : PSO

2.2.6 Issues and Problems of Each Major Port

According to the result of site survey and the interviews at Port Authority in Major Ports and PSO, the major problems at Iranian ports are as follows:

1) The volume of the export cargo is very small compared with the volume of the import cargo.
2) The hinterlands for Iranian ports are usually far from the port, but the major ports except Imam Khomeini Port have no railroads.
3) There are few express ways network between Major Ports and hinterlands.
4) All Iranian ports except for Chabahar Port require maintenance dredging. In particular, Busher Port has a large annual dredging volume as it is located on the

gradually shoring beach.

5) Since 1977, the Caspian Sea has being rising by about 13 cm every year on average, and many ports on the coast along the Caspian Sea require counter-measures against submerging.

2.3 Basic Policy for Port Development

2.3.1 Establishment of Socio-economic Frame

In the Study, a future economic frame is forecasted based on some conditions. There are four cases for economic condition and GDP percapita. There is one case for population estimates.

(1) Population

For the purpose of the population forecast, some conditions are stipulated by the Study Team as follows.

1) The base year is 1991/92.
2) The target years are 2000/01 and 2010/11.
3) Authorized future population level would be used for the purpose of the study.

After careful examination of the several sets of data, we have adopted 2.34% as the average population growth rate from 1991/92 to 1998/99 and 2.0% from 1999/00 to 2000/01 and 2010/11 for the population forecast.

Based on these assumptions, the forecasted population in 2000/01 and 2010/11 is given in Table 2.3.1.1.

Table 2.3.1.1 Population Forecast

	1991/92	1998/99	2000/01	2010/11
Population (1,000 persons)	57,234	67,300	70,019	85,353
Annual Growth Rate (percent)	2.44	2.34	2.00	2.00

Note: Average population growth rate from 2000/01 to 2010/11 refers to world bank data

(2) GDP

Four scenarios according to alternative levels of economic conditions varying with oil income and GDP per-capita in the target years in Iran are examined as shown in Table 2.3.1.2.

Table 2.3.1.2 Scenario for Economic Condition

Scenario	Economic Condition in Future	Year	Growth Rate of GDP per Capita (%)	Production of Oil (Thous. Bar/Day)	Oil Price (US$)
		1992-1993	4.28	3,430 - 3,540	16.6 - 17.5
Case-1	High	1994-2000	4.08	3,650 - 4,400	18.0 - 21.5
		2001-2010	4.08	4,540 - 6,000	22.2 - 22.9
		1992-1993	4.28	3,430 - 3,530	16.6 - 16.9
Case-2	Medium High	1994-2000	3.20	3,620 - 4,270	17.3 - 19.5
		2001-2010	3.20	4,380 - 5,600	19.9 - 20.3
		1992-1993	4.28	3,430 - 3,500	16.6 - 16.8
Case-3	Medium Low	1994-2000	2.10	3,570 - 4,020	16.9 - 18.0
		2001-2010	2.10	4,100 - 4,900	18.2 - 19.9
		1992-1993	4.28	3,430 - 3,470	16.6 - 16.8
Case-4	Low	1994-2000	0.00	3,510 - 3,750	16.9 - 18.0
		2001-2010	0.00	3,800 - 4,200	18.2 - 19.9

The average growth rate of GDP per capita, 4.08%, 3.20%, 2.10% and 0.00% in each case from 1994/95, will remain unchanged until the target years of 2000/01 and 2010/11.

Based on these assumption, GDP values and growth rates in 1998/99, 2000/01 and 2010/11 are given in Table 2.3.1.3.

Table 2.3.1.3 GDP Forecast, Constant Prices in 1982

	1991/92	1998/99	2000/01	2010/11
Gross Domestic Product				
Case-1	12,181	18,727	21,105	38,366
Case-2	12,181	17,951	19,891	33,224
Case-3	12,181	17,014	18,453	27,690
Case-4	12,181	15,335	15,955	19,449
Annual Growth Rate				
Case-1	11.45%	6.51%	6.16%	6.16%
Case-2	11.45%	5.62%	5.26%	5.26%
Case-3	11.45%	4.49%	4.14%	4.14%
Case-4	11.45%	2.34%	2.00%	2.00%

2.3.2 Future Trade Frame

(1) Future National Products Frame

Before estimating production shares and annual growth rate by sector, some conditions are assumed about the future economic frame considering the most influential aspects on the economic growth of a nation.

1) Four cases are proposed in estimating oil prices as mentioned above.
2) Since the functions of industrial, mining and energy sectors are very important, the growth rate of these sectors are set in higher level than others.
3) It is predicted that for exporting non-oil goods to the world, Iranian industrial sectors shall progress at the high rate. And for supplying raw materials, mining sector will move parallel to the industrial sector.
4) As mentioned above, the policy of the Iranian government is to become independent from oil income and thus must focus on the promotion of non-oil export which is a highly significant and strategic factor in economic growth and development.

Figure 2.3.2.2 and Figure 2.3.2.3 show the forecast share of each economic sector (Case-2). In the Figure it can be pointed out that as the growth rate of industry increases, the agriculture and oil sector's growth rate will decrease.

(2) Future Trade frame

Future trade frame is forecasted as shown in Figure 2.3.2.1.

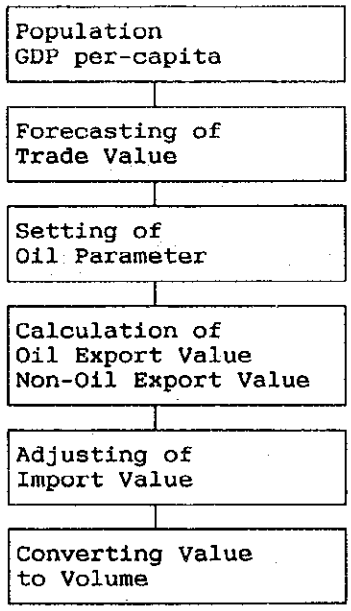


Figure 2.3.2.1 Forecast of the Future Trade Frame

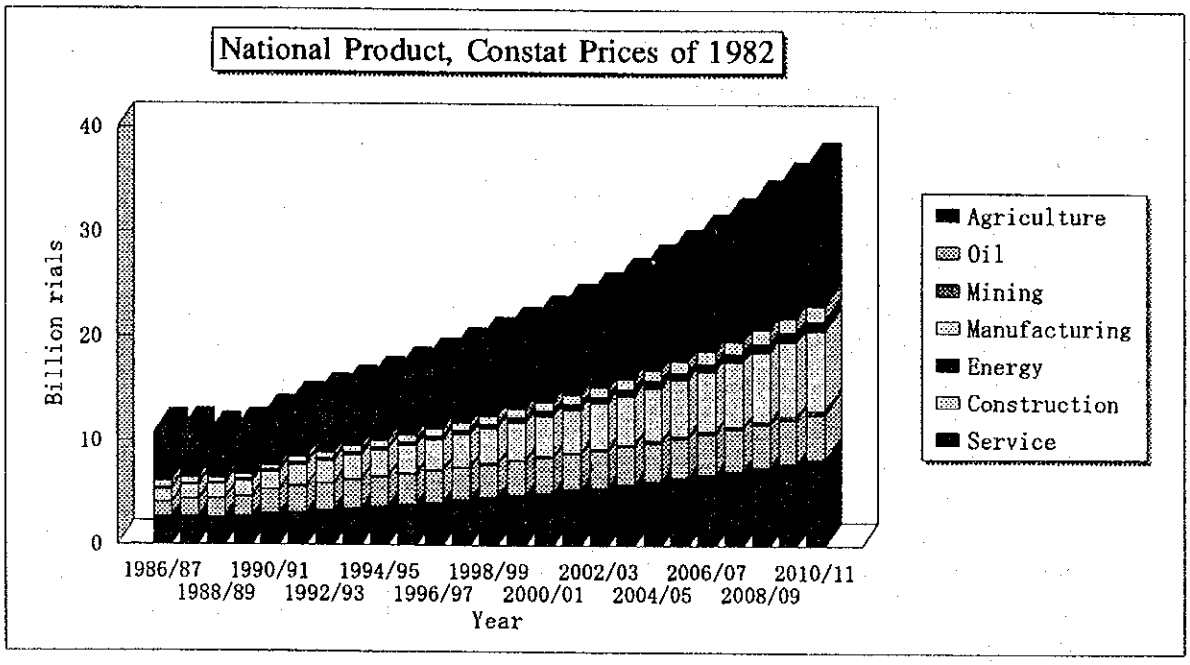


Figure 2.3.2.2 The Value of Economic Sector (Case 2)

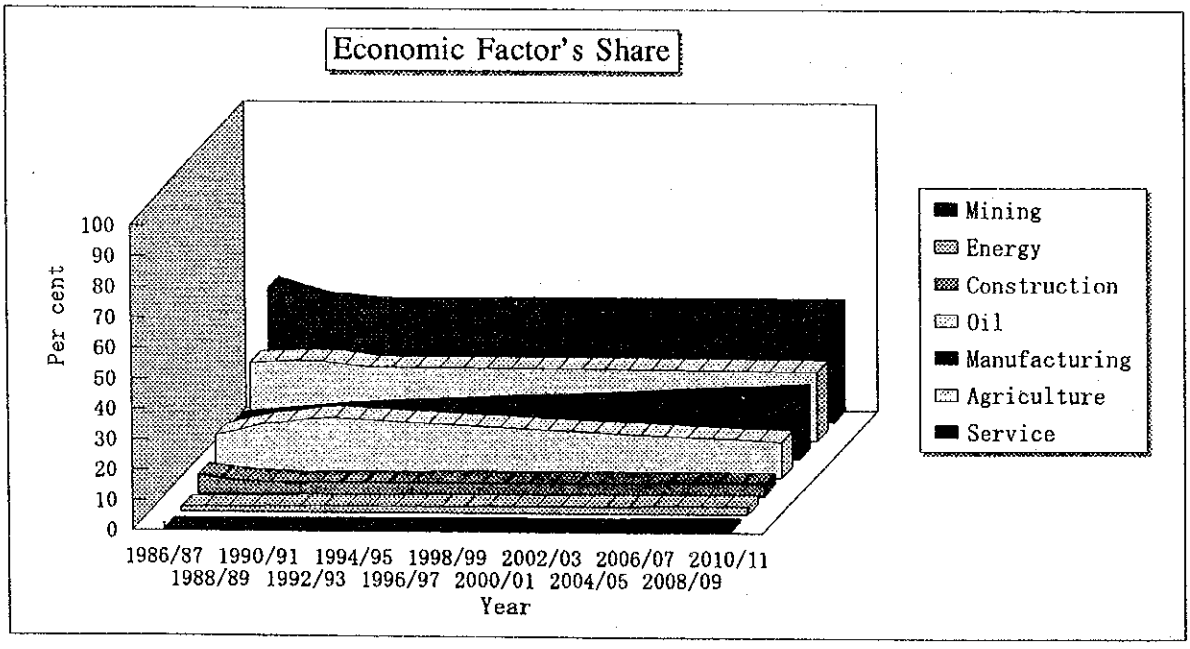


Figure 2.3.2.3 Economic Factor's Cost Share (Case 2)

(3) Parameters of Oil

In recent years 1.2 million barrel per day has been the consumption base and about 2.0-2.5 million barrels per day has been the exporting base in Iran.

In the low case scenario, the oil consumption increases with population growth mostly and in the high case, the oil consumption increases with GDP growth. The volume will be assumed at 1.7-2.9 million barrels per day.
(Annual growth rate is 2%-5% and consumption percapita is 1.0 ton-1.9 ton per year)

The future product volume is considered 4.2 - 6.0 million barrel per day (by past record), the export volume is estimated by subtracting consumption volume from product volume. The export volume is forecasted at 2.5-3.1 million barrel per day.

Table 2.3.2.1 Parameters of Oil (in 2010/11)

(unit; Mn.Barrel)

	Case-1	Case-2	Case-3	Case-4
Product Volume				
(Per year)	2,190	2,044	1,789	1,533
Consumption				
(Per day)	2.9	2.5	2.1	1.7
(Per year)	1,058	912	767	620
Export Volume				
(Per day)	3.1	3.1	2.8	2.5
(Per year)	1,132	1,132	1,022	913
Export ratio	52%	55%	57%	60%
Oil-Price (per Barrel)				
(US$)	22.9	20.3	19.9	19.9

Note: These petroleum prices are estimated by the Study Team based on data of World Bank and based on annual average growth rate of recent seven years between 1986-1992.

(4) Calculation of the trade value

Followings are the proposed assumptions for forecasting future trade frame.

i) Total trade value is related to the annual growth rate of GDP.
ii) The import-export balance is predicted to be equal in 2001/02.
iii) The oil export value is already predicted as mentioned above. Only the annual change ratio is used for estimating future export value because the actual oil value data are different by source with calculating method.

iv) There are and will be trade deficits from 1993/94 to 2000/01. The debt should be paid before 2010/11.

Based on these assumptions, average growth rate of non-oil goods value is 9.3 % per year in case-2. From the results shown in Figure 2.3.2.4 and Figure 2.3.2.5, import value for the year of 2010/11 is 43.38 billion dollars, and export value (non-oil) is 21.77 billion dollars. These values are used to check the micro forecast, modal split forecast, ports share and estimation.

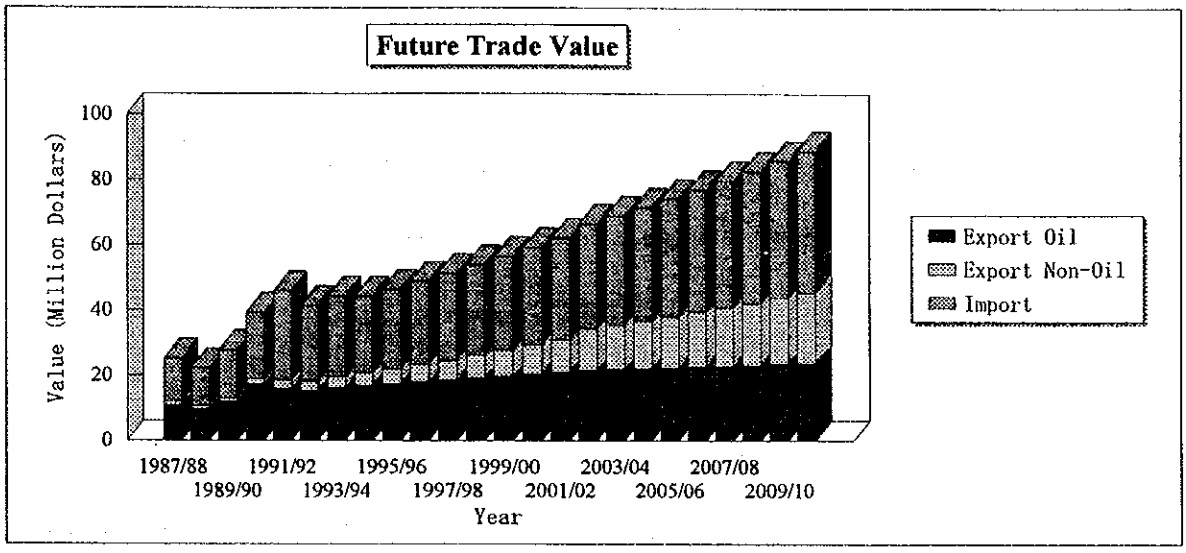


Figure 2.3.2.4 Future Trade Value (Unit: Mn. US$)

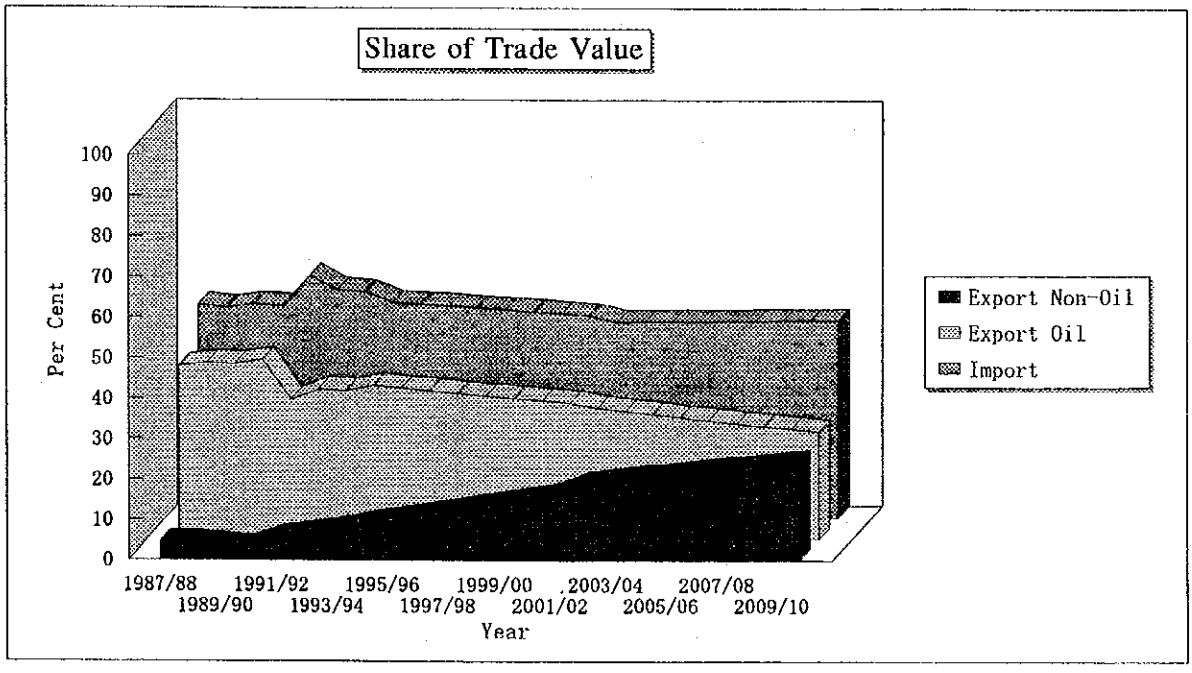


Figure 2.3.2.5 Future Trade Forecast

2.3.3 Future Status of Transportation System

(1) Future networks of road

1) Inland networks shown below will be constructed by four lanes road.

a) Khomeini port---Ahvaz---Esfahan---Qom---Tehran
b) Abbas port-----Yazd----------Qom---Tehran
c) Busher port---Shiraz---Esfahan---Qom---Tehran
d) Anzali port----------Qazvin---------Tehran
e) Bazargan--Tabriz---Tehran---Mashhad---Sarakhs

2) International Road Networks

Iran is connected to Europe and Central Asia by road through Turkey, Azerbijan, Turkmenistan, Afgahnistan, and Pakistan. Present main transport routes are Turkey through Bazargan and Azerbaijan through Astara. Transport networks between Iran and Central Asia will be constructed in future.

(2) Future networks of railways

1) Inland networks shown below will be constructed

a) Bafgh-----Bander Abbas railway
b) Sarakhs---Mashhad---Bafgh railway
c) Bad---------ChadoorMine
d) Tehran--------Mashhad railway
e) Khomeini port----Ahvaz railway

2) International railway networks

In the present network, borders from where the goods are transported by railways are Azerbaijan Julfa, Turkey Razi and Turkmenistan

(3) Air Transport

Expansion projects shown below is planned.
Imam Khomeini Airport
This is Tehran's second International airport, located
35 km southwest of Tehran.

(4) Hinterland

Future networks is shown in Figure 2.3.3.1.
Ports and their hinterlands are shown in Table 2.3.3.1 and Fig 2.3.3.2

Table 2.3.3.1 Ports and their Hinterlands

Hinterland (Province)	Core City	Port
Tehran, Zanjan, Semnan, Gilan Mazandaran, East Azarbayejan West Azarbayejan	Tehran	Khomeini port Rajaee port
Esfahan	Esfahan	Khomeini port Rajaee port
Khuzestan, Kohgiluye & Boyer-Ahmad, Chaharmahal & Bakhtiyari	Ahvaz	Khomeini port Rajaee port Bushehr port
Markazi, Bakhtaran, Kordestan Hamadan, Lorestan, Ilam	Arak	Khomeini port Rajaee port
Fars, Bushehr	Shiraz	Khomeini port Rajaee port Bushehr port
Yazd	Yazd	Khomeini port Rajaee port Bushehr port
Kerman, Sistan & Baluche tan Hormozgan	Kerman	Rajaee port Bushehr port Behesti port
Khorasan	Mashhad	Khomeini port Rajaee port Behesti port
Tehran	Tehran	Anzali port

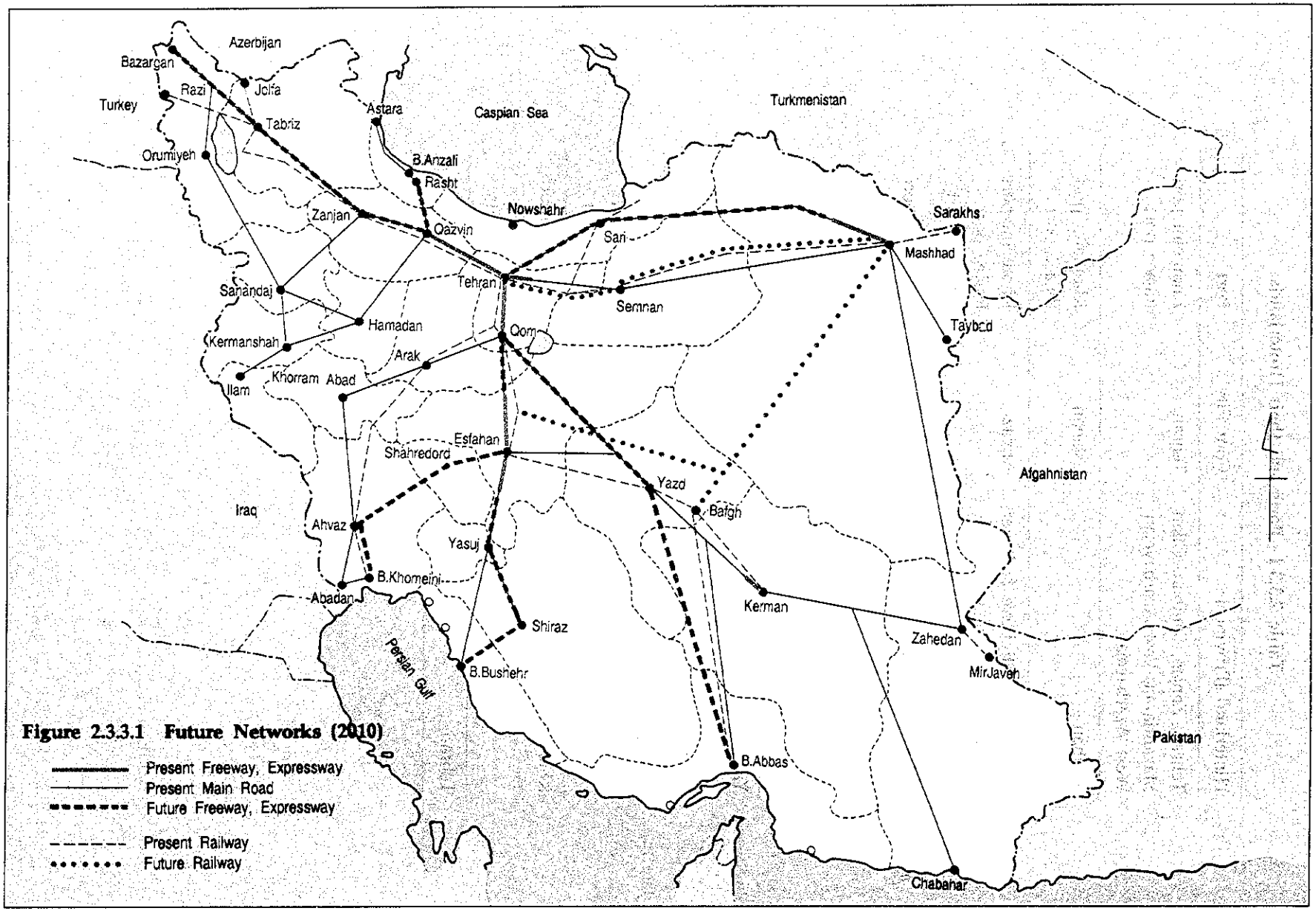


Figure 2.3.3.1 Future Networks (2010)

Present Freeway, Expressway
Present Main Road
Future Freeway, Expressway
Present Railway
Future Railway

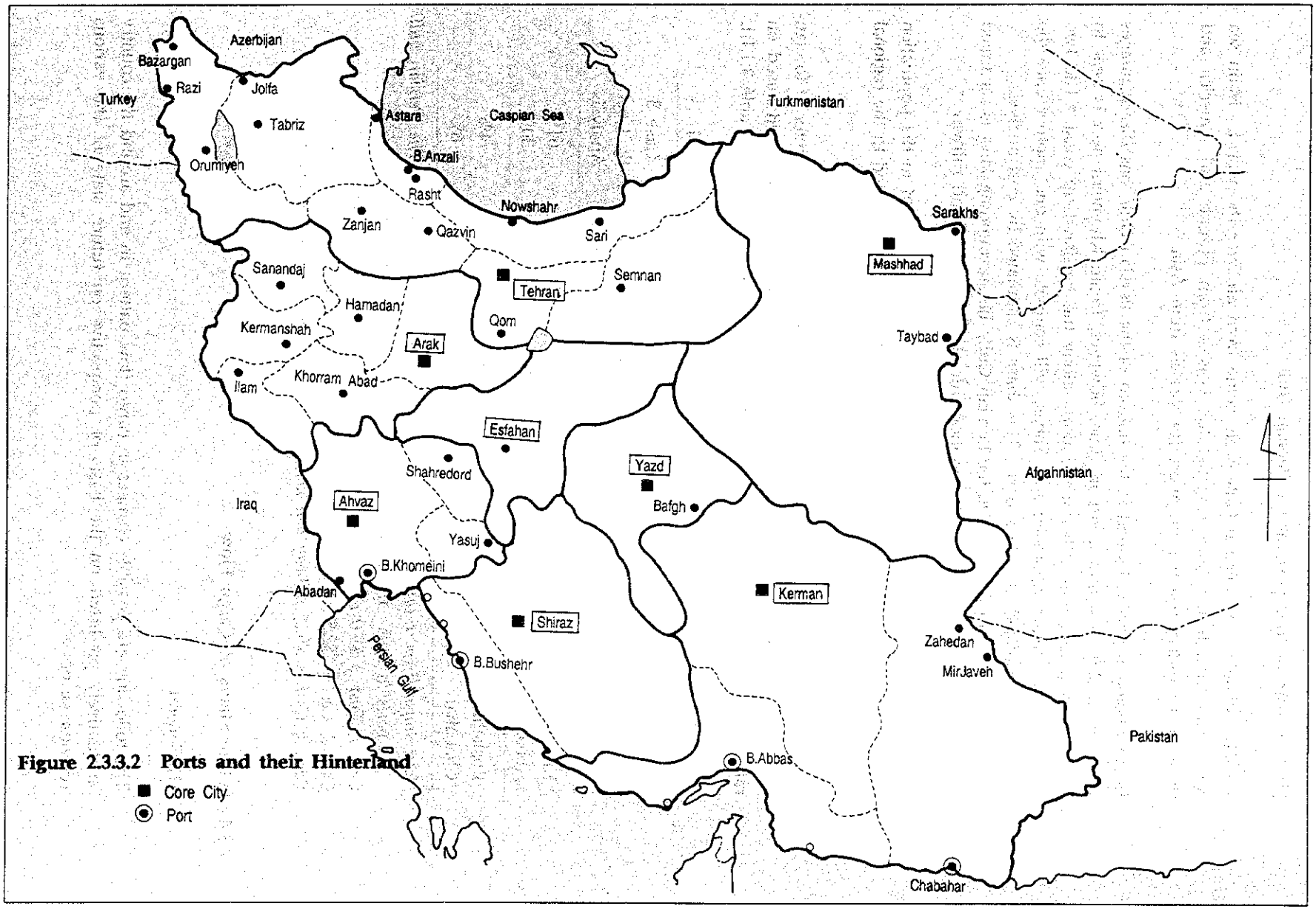


Figure 2.3.3.2 Ports and their Hinterland

■ Core City
◉ Port