4.1.5 Duqm Port

A consultant named Haskoning is carrying out the Master Plan and Feasibility Study for the development of the port. At the beginning of the study, Duqm Port had been planned to be fishery port, which was shown in Hydrographic Survey Report by MOAF in 1989 and site investigation report by Fugro in 1990. As GOS was setting the policy that Duqm Port would play a role in the development of middle area of Oman, the development plan of Duqm Port was enlarged to facilitate dry dock for repairing large vessels. Photo 4.1-3 shows the site situation around Duqm Port. The platform was on land, because it was taking refuge from severe waves during the SW monsoon.

Photo 4.1-3 Site Situation around Duqm Port

(1) Wave Condition

The wave hindcasting was carried out by Haskoning. Based on the result of estimated offshore waves, wave deformation at shallow water area was examined. The design wave at the breakwater with a return period of 100 years was determined as shown below. As the wave period at Dupm is shorter than that at Qaboos and Sohar, it had better to confirm by the site investigation.

Wave Direction;	E
Wave Height ($H_{1/3}$);	5.8 m (return period: 100 years)
Mean Wave Period ($T_{1/3}$);	10.0 s

(2) Tidal Levels

As the parameters of tidal levels by Royal Navy of Oman in 2003 are available, they have been applied for this study as shown below.

MHHW +2.36 m CD
MLHW +2.29 m CD
MHLW +1.48 m CD
MLLW +0.70 m CD
LAT ±0.00 m CD

(3) Tidal Current

According to the Draft Final Report of the Feasibility Study (Haskoning, 2002), the average velocity of tidal current was 0.25 m/s during the SW monsoon with its prevailing direction of NE, and 0.125 m/s during NE monsoon with its prevailing direction of SW.

(4) Geological Condition

There are some boring results around the cliff of the eastern side of the port planning area. It shows that the soils are represented by marine deposits (3-5m thick beneath the seabed), mudstone and siltstone (below marine deposits). In the site investigation, weak mudstone has been found in the eastern cliff, and sandstone has been in the western side. Soil investigations were conducted by Haskoning in 2004, which includes 48 offshore and 7 onland boreholes. Its results are in line with the existing results of soil investigations. Photo 4.1-3 shows the platform applied for offshore borings, which was onland to avoid the severe wave condition during the SW monsoon.

(5) Seismic Condition

The significant earthquake has never experienced in the area around Duqm. K_h, horizontal seismic coefficient, has been calculated at less than 0.01 G with using the earthquake data of National Earthquake Information Center. As this figure is quite small, it has been decided that the seismic condition is not taken into consideration in the structural design of this study for Duqm Port.

(6) Sedimentation

The effect of littoral drift at Duqm was simulated by Haskoning. The result shows that net volume toward the north was estimated at 500,000 m^3/ year approximately. The maximum difference between the original and dredged depths around the port entrance will be 2.0 m. However, soil materials, clay or silt, lying around the port are very sticky. The cliff in the eastern of the port can also provide such materials. Therefore, it is necessary for the discussion of sedimentation to grasp the characteristics of soil materials further at the detailed design stage.

4.1.6 Shinas Port

The available data on natural conditions for Shinas Port is quite few, and Geotechnical Investigation Report by Fugro 1993 is the only available information. As Shinas Port is, however, located to the north of 50 km from Sohar Port, natural conditions at Shinas Port except geological condition are expected to be similar to those at Sohar Port. The study in Shinas Port has been carried out based on such assumption.

(1) Geological Condition

According to the Geotechnical Investigation Report (Fugro, 1993), the soil condition of the port is represented by marine deposits (1-2 m thick beneath the seabed), loose sand layer (5-7 m thick below marine deposits) and stiff sand layer (below a loose sand layer).

4.2 Engineering Aspects of the On-going Infrastructure Development Projects

4.2.1 Sultan Qaboos Port

As mentioned above, Halcrow is preparing feasibility study for the port expansion which includes the construction of breakwater at a depth of -40 m outside the existing breakwater. With taking consideration of available rock materials with large quantity around the port and necessity of few dredging volume at turning basin and access channel as well, the anticipated project cost might be considerably small. If the compressive strength of rock at rocky hill behind the port is very high and difficult to explore and blast the rock located beside the port, it will be reasonable to transport rock materials from another quarry.

A significant wave height at a depth of -40 m has been calculated at 6.0 m based on the information provided in the Master Plan Study (JICA, 1990). Judging from the wave height of 6.0 m, a suitable weight of armour concrete block will be 15-20 tons if CORE-LOC is used as for armour concrete block.

Berth No.6 is suffering from the water surge from November to March, especially in February, because northeast wind is predominant. Therefore, the layout of breakwater should be examined carefully to ensure sufficient calmness inside the port in securing safe port operation. In order to keep the effect of breaking waves and relieve the surge problem, it is better to replace the existing armour concrete blocks protecting revetment to the eastern part of the existing breakwater.

As the access road to/from the port will be of great importance for the port activities, its route alignment should be carefully studied in consideration of future highway plan, environmental matters and so on.

4.2.2 Salalah Port

CES is preparing a detailed design for Berth No.5&6 and extended breakwater based on the Master Plan Study (JICA, 2000). At present, there are two problems encountered about wave characteristics. One is surge problem at Berth No.4 and 30, which disturb the port operation for three or four days in a year. It is presumed that the waves reflected by concrete wall at Berth No.30&31 are synchronized with incident long-period waves, and amplify vessel’s motion.

The calmness inside the port area was examined with using a numerical simulation by JICA Study Team in 2000. The results show the calmness after construction of Berth No.5&6 and extended breakwater will be better than that of present condition. The calmness inside the port area has been

checked again by diffraction diagrams based on the assumption that wave period is 7 seconds and S_{max}, which is a parameter that represents the degree of directional spreading of wave energy, is 25. The result of examination by diffraction diagrams is in line with that by the numerical simulation. Moreover, by increasing the depth of the access channel from -16.5 m to -18.5 m, fewer waves will intrude into the port area due to the wave refraction.

On the other hand, if the calmness inside the port area becomes worse after the construction of Berth No.5&6 and extended breakwater, as for remedial measures, it is considerable that the incident waves should be restricted to enter into the port area by the further extension of breakwater as a remedial plan, or the detached pier in front of Berth No.30&31 should be constructed, where more wave energy could be dissipated.

Another problem is the damage of the existing breakwater. According to the Project Definition Study (CES, 2004), there has been scouring of the seabed and inadequacy of the armour units, resulting in the sliding/dislodging of Dolos having a weight of 20 tons as a primary cover layer and that of 15 tons as a secondary cover layer. The present condition of the existing breakwater is shown in Photo 4.2-1.

Photo 4.2-1 Present Condition of Existing Breakwater

Shore Protection Manual allows to reduce weight of armour concrete blocks in primary cover layer below a depth equivalent to twice of wave height. The design documents of the existing breakwater reveal that armour concrete blocks, which are less than required weight, had been placed above a depth of twice of wave height. That is the reason why sliding of amour blocks was taken place. Thus, it is acceptable that MOTC has a plan to apply 30-ton CORE-LOC from top to toe of the breakwater. The severe stress of concrete may occur in a part of both Dolos and CORE-LOC due to its shape. If these blocks do not contain enough reinforcement bars to meet the stress, it is probable that concrete blocks will be broken by wave forces.

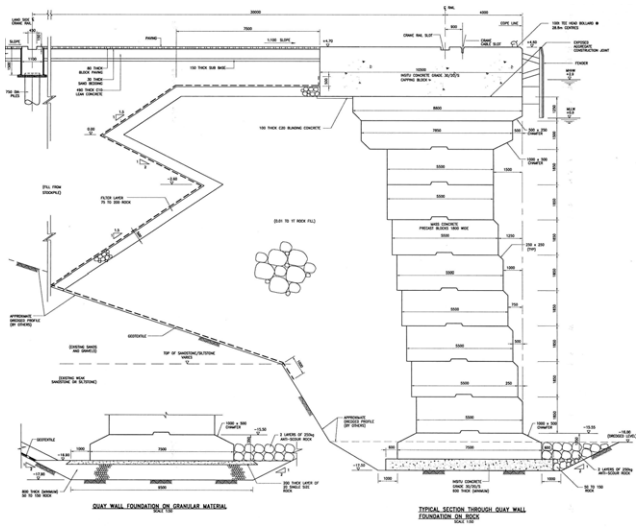
Regarding the beach erosion in the northern side of Salalah Port, it will be accelerated by the extension of breakwater because of the obstruction of the drift sand movement.

It is necessary for the dredging work to dredge the port area without disturbing the current port operation. A trailer suction dredger would be ideal to apply for dredging work. However, since most of dredged material is to be pumped into reclaimed area, a discharge pipe line system to dispose the dredged material is advisable. That is the reason why a cutter suction dredger is recommended for this port.

4.2.3 Sohar Port

Regarding berth structure, concrete-block type is usually chosen in Oman even it is deep berths. It is very important to keep level of in-situ base concrete in order to place pre-cast concrete blocks without larger deviation from the planned elevation. In-situ base concrete is planned to use mixed concrete with admixture of chemical materials to harden quickly and level smoothly by casting with tremie pipe from the top. Divers' assistance is required to level the surface of in-situ base concrete utilizing appropriate tools. According to the interview at the site visit, the average weight of a pre-cast concrete block is 60 tons with the maximum size of 90 tons. In casting concrete to manufacture the pre-cast concrete blocks, its temperature was kept below 32 degree C with some ice being mixed in order to control the quality of concrete. Typical cross section of berth structure is shown in Figure 4.2-1.

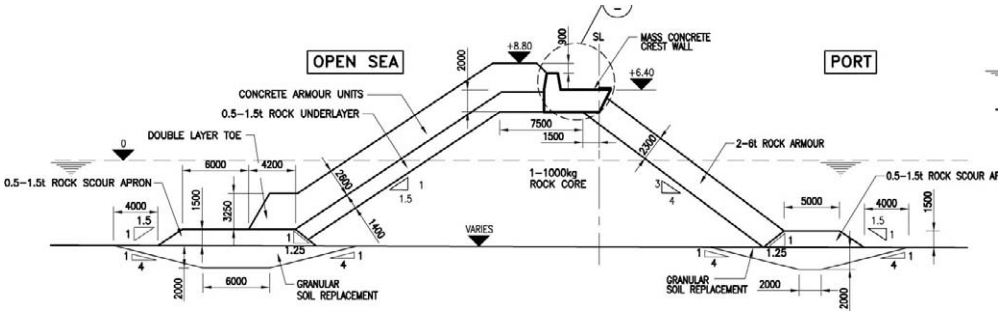
Figure 4.2-1 Typical Cross Section of Berth Structure



Source: MOTC

Main (southern) breakwater is located at a depth of -10 m with its length of 2400 m, and lee side of (northern) breakwater is at a depth of -8 m with its length of 3600 m. Berth length of 4000 m is sheltered by them. Typical cross section of breakwater is shown in Figure 4.2-2.

Figure 4.2-2 Typical Cross Section of Breakwater



Source: MOTC

There is a serious problem of beach erosion in the northern side of Sohar Port. It is likely that the breakwaters may prevent the drift sand transportation from the south to the north. Moreover, drift sand may be trapped in the access channel with its width of 500 m since dredging done for the access channel, though drift sand could be provided to the northern side of Sohar Port before dredging the access channel. The average difference between the original and dredged depths is 3.0 m. The dredging volume in the access channel is estimated to be approximate 1.2 million m^3. It is reported that the net volume of sediment transport is estimated at 50,000-100,000 m^3/year. Therefore, the erosion will be successive, even if no maintenance dredging is carried out.

4.2.4 Khasab Port

The phase 1 development of Khasab Port has been completed in 2004, which includes the construction of breakwaters, the dredging of turning basin, 75 ha land reclamation, 300 m commercial berth, 3 floating jetties for Iranian vessels, 2 floating jetties for government vessels, 2 floating jetties for fishing boats and 100 m quay for fishery harbour. The phase 2 development is on-going and will be completed within 2005, which includes the establishment of buildings for commercial berth. There was rubble mounded breakwater before. It has survived for 20 years without apparent significant damage. This was a reference for the design of new breakwater, though the size of armour rock was determined applying Hudson Formula, Van de Meer Formula and PIANC. Rubble mounded breakwaters have been constructed. Primary armour is composed of two layers of 5-7 tons rocks. Regarding Hudson Formula, BS recommends the use of $H_{1/10}$ to determine the rock armour size. On the other hand, the Shore Protection Manual and Technical Standards and Commentaries for Port ad Harbour in Japan recommend the use of $H_{1/3}$. It is depending on whether or not waves break before reaching the breakwater. The rock armour size was determined by applying $H_{1/3}$. The side slope of trunk portion is 1 to 1.5. The crest width and elevation of breakwater are 7.0 m and 7.5 m CD, respectively. Judging from the height of MHHW +2.27 m CD, they are enough high and wide to protect the port from waves.

Regarding berth structure, concrete block type was selected. The berth length is 300 m with depth of 10 m. This berth is multi-purpose berth, not for specific berth such as container cargo, bulk cargo and so on. The cargo handling equipment such as mobile crane and forklift will be hired until the cargo

volume will increase. The present situation at Khasab Port is shown in Photo 4.2-2. The dredging work was still on the way at the site visit. The port was crowded with a lot of small boats.

Photo 4.2-2 Present Situation at Khasab Port

4.2.5 Duqm Port

Haskoning proposed a draft Master Plan layout, which requires significant volume of dredging, but it has not been approved yet. As it is obvious that the soil to be dredged is fine materials, it will not be suitable for reclamation and will have to be dumped at offshore site. It will be difficult to deal with mudstone after dredged and mixed with sea water. In such respects, the site investigation is of great significance and prerequisite for the structural design and estimate of project cost as well. The applied interval distance of offshore borings is approximate 100 m with area of 2 km square. It is necessary to obtain the compressive strength of mudstone and siltstone in preparing construction plan of dredging works. If it is not stronger than 100 kg/cm^2, a cutter suction dredger could be applied.

Bathymetric survey was carried out with a single frequency of 200-210 kHz. As loose sediments, however, are predominant in the upper layer, another low frequency should have been used in order to grasp the thickness and elevation of loose sediments extended. Sediment sampling and chemical analysis were carried out. It is advisable that physical analysis such as sieve analysis be included as well in order to analyse the critical water depth of sediment movement.

In the Feasibility Study (Haskoning, 2004), structural types of breakwater and quay wall were examined respectively. As for breakwater, after discussion about berm type, caisson type and concrete block armour type, concrete block armour type was selected. As for quay wall, after discussion about concrete block type, cellular sheet pile type and sheet pile type, concrete block type was selected.

4.2.6 Shinas Port

There is a problem about the beach erosion in the northern side of Shinas Port. It is under observation how serious it is. However, there are no projects to develop port facilities so far.

CHAPTER 5

SOCIOECONOMIC FRAMEWORKS OF THE SULTANATE

5 SOCIOECONOMIC FRAMEWORKS OF THE SULTANATE

5.1 Oman Vision 2020

Oman Vision 2020 is a long term economic plan drawn under the direct command of the present Sultan in1995, and the current Omani economic policies are formulated targeting at the goals set by the Vision.

This study fully appreciates the spirit of Oman 2020 and the economic indices used in the ports development plan refer to and reinforce the targets of the long term plan so that they may contribute to uplifting of the Omani economy.

During the transition from the Fourth Five-Year Development Plan to the Fifth Five-Year Development Plan in 1995, "A Vision Conference: Oman 2020" was held in Muscat to establish the economic polices for the next 25 years.
Main objectives of the economic polices are as follows:

(1) Creation of Stable Macroeconomic Framework

- Establishing a balance between the public revenue and the expenditure
- Increasing the savings rate and accumulating the financial reserves
- Continuing adherence to the current monetary policies pertaining to the interest rate; preserving the value of Omani Rials, controlling inflation; and balancing the current account
- Enhancing relationships, systems and institutions that foster free competition

(2) Development of Government's Role in Providing Basic Services.

- Enhancing Government's role in the provision and improvement of the level and quality of basic services
- Enhancing Government's role as a strategic guide for achieving sustainable development
- Providing a stable macroeconomic framework
- Diminishing Government's involvement in the provision of public services, e.g. power

(3) Development of Human Resources

- Upgrading the levels of the education system
- Promoting educational and vocational training
- Establishing compatibility between the outputs of different educational and training systems and the inputs needed by the labor market
- Enhancing women's participation in the labor market
- Providing high quality health care for Omani citizens

- Developing the labor market mechanisms aiming at increasing the level of the Omani workforce's participation in the economy

(4) Enhancement of Economic Diversification

- Achieving an optimum utilization of available natural resources through its strategic location
- Promoting Oman's export industries and services
- Adopting high value-added strategies
- Utilizing advanced technologies.

(5) Development of the Private Sector

- Continuing adherence to the private sector development and the privatization policies of services enterprises according to clear and specific rules
- Eliminating procedural and administrative barriers obstructing the private capital entry to the various production and service sectors
- Developing trade investment laws
- Encouraging foreign investments
- Guaranteeing free competition in all economic activities
- Importing and developing technology

(6) Enhancement of Oman's Standard of Living

- Lessening differences in the living standards among different regions and groups
- Extending the scope of social securities
- Encouraging self-reliance and enhancing communities

(7) Enhancement of Integration of Omani Economy with Global Economy

- Strengthening Oman's economic relations with GCC countries
- Encouraging the free flow of goods and factors of production
- Upgrading advanced technology skills of the national workforce
- Assimilating modern technologies
- Joining the World Trade Organization
- Strengthening Oman's international economic relations with its friends and economic blocks in a way that serves the Sultanate's interests

In the Vision for Oman's Economy in 2020, various projections have been put forth in order to realize the above economic policies.

The major macro level projections of Oman's economy up to 2020 are described in Table 5.1-1.

For enhancing economic diversification, the Vision aims at substantial transformation in the structure of national economy by developing multiple income sources rather than depending on depletable sources like oil. This will achieve economic balance and sustainable growth.

Table 5.1-2 shows quantitative indicators of GDP in 2020 based on the above aims and prepared by the ministries concerned with development and services.

In the Vision, the economical structure changes for Transport and Telecommunications Sector, which are most affected by our study, are discussed as follows.

The major increases in the activities of this sector will be concentrated in telecommunications and port services. This will lead to an increase in the added values by an annual rate of about 5.9% on average, resulting from the following factors:

1) Aiming at making Oman an international commercial and financial center in order to benefit from its unique geographical location

2) Upgrading efficiency of the existing ports and developing a new port in order to meet the future needs of the Omani economy

3) Developing a national infrastructure for information

This means networking the sources and centers of information and also connecting them with the international information infrastructure

4) Benefiting from the telecommunication technology, expanding and upgrading the existing telecommunication network in order to provide a variety of high quality services

5) Providing the private sector with opportunities to participate in telecommunication activities

Table 5.1-1 Oman's Economy - Oman : 2020 % to GDP (1998=100)

	Item	1995	2000	2020
1	Total Revenue	38.8%	34.6%	16.0%
2	Total Expnditure	48.8%	34.6%	14.0%
3	Deficit/Surplus	10.0%	0.0%	2.0%
4	Total Final Consumption	78.8%	72.4%	68.0%
5	Domestic Saving	21.2%	27.6%	32.0%
6	Total Investment	14.5%	16.9%	34.0%
7	Public Investment	10.1%	8.3%	3.0%
8	Private Investment	4.4%	8.6%	31.0%
9	Total Imports	34.5%	29.9%	20.0%
10	Total Exports	41.1%	40.5%	23.0%
11	Non Oils Exports	9.4%	14.4%	13.0%
12	Oil Exports	31.7%	26.1%	10.0%
13	Current Account (Deficit/Surplus)	7.2%	8.0%	4.0%
14	Public External Debt.	20.9%	16.3%	9.0%
15	SGRF Balance	17.4%	2.9%	24.0%
	Annual Average Growth Rate (%)			
	plan	1995-91	2000-96	2020
16	Gross Domestic Product	5.8%	5.1%	7.4%
17	Non Oil GDP	6.8%	5.7%	8.8%
18	GDP per capita	0.02%	1.0%	3.8%

Source: The Fifth Five Year Development Plan, Ministry of Development

Table 5.1-2 Sectoral Relative Shares to GDP (%) 1993=100

Activitiy	1995	2000	2020
Oil	33.5	25.9	9.0
Gas	1.5	5.0	10.0
Agriculture	3.0	3.5	3.1
Fishing	1.1	1.0	2.0
Mining & Quarrying	0.6	0.6	2.0
Manufacture	5.4	6.8	15.0
Electricity & Water	1.7	4.3	2.0
Building, Construction & Real Estate	3.2	6.9	10.0
Trade & Tourism	14.1	17.8	18.0
Transportation & Communication	7.0	8.6	8.0
Banks, Insurance & Financial Services	7.9	4.3	8.0
Other Private Services*	8.3	3.2	5.0
Public Services	13.9	12.6	10.0
Other Services **	**-1.2**	**-5.0**	**-2.1**
Gross Domestic Product	**100.0**	**100.0**	**100.0**

Note * Educational Services, Medical Distribution & Presentation of Films, Repair of Vehicles, Washing and Cleaning Services, Hairdressing and Cosmetology
**Custom Duties and Imported Business Services
Source: The Fifth Five Year Development Plan, Ministry of Development

In the Development Policy for Human Resources, the growth rate of Omani population has been set at less than 3% in the year 2020. In addition, the following program has been established concerning the development of Omani labor market.

1) Increasing the Omani labor force from 17% of the total population in 1995 to about 50% in 2020
2) Increasing participation of women in the total labor force from about 6% in 1995 to about 12% in 2020
3) Increasing the Omanization ratio in the public sector from 68% in 1995 to 95% in 2020
4) Increasing the Omanization ratio in the private sector from 15% in 1995 to 75% by 2020

5.2 Socioeconomic Condition of the Sultanate in 2025

5.2.1 Population

(1) Present Situation

According to the census in 2003, the total population of Oman has exceeded 2.3million, and its annual growth rate from 1993, which is the previous census year, to 2003 is approximately 1.45%. The population of the Omani is 1,779,318 (76.3%) and that of the expatriates 552,073 (23.7%).

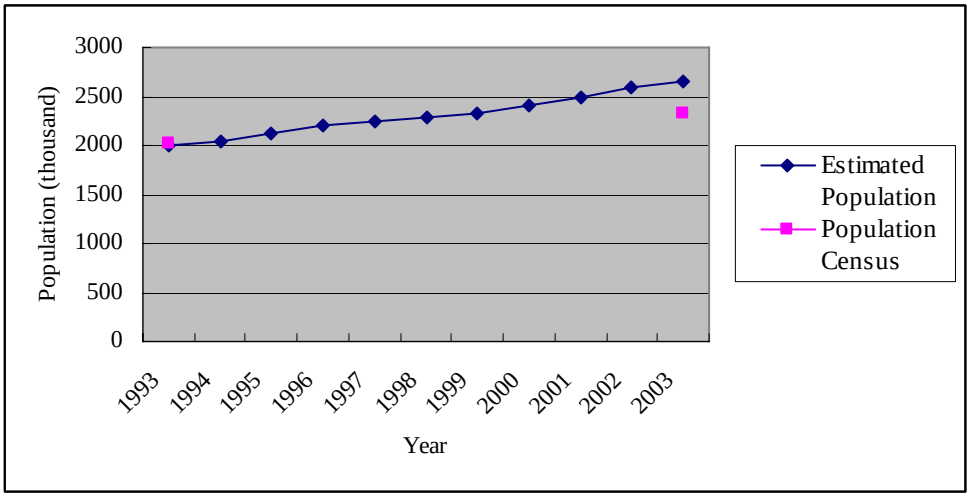
Table 5.2-1 shows the distribution of the Omani and the expatriate populations in the census, and Figure 5.2-1 shows the population movement from 1993 to 2003, which were published by the Ministry of National Economy.

Table 5.2-1 Distribution of Population-Omani-Expatriate

GOVERNORATE REGION	POPULATION					
	TOTAL		EXPATRIATE		OMANI	
	%	No.	%	No.	%	No.
Muscat	27.1	631,031	45.5	250,939	21.4	380,092
Al-Batinah	28.0	652,667	16.1	88,834	31.7	563,833
Musandam	1.2	28,263	1.4	7,883	1.1	20,380
A'Dhahirah	8.8	204,250	10.2	56,276	8.3	147,974
A'Dakhiliyah	11.4	265,083	5.4	29,896	13.2	235,187
A'Sharqiyah	13.4	312,708	8.8	48,618	14.8	264,090
Al-Wusta	1.0	23,058	1.1	6,090	1.0	16,968
Dhofar	9.2	214,331	11.5	63,537	8.5	150,794
Total	**100**	**2,331,391**	**100**	**552,073**	**100**	**1,779,318**

Source: the Ministry of National Economy

Figure 5.2-1 Population Movement from 1993 to 2003



Source: the Ministry of National Economy

(2) Future Population

Because the future socio-economic frameworks such as population and GDP at five year intervals in Oman from 2005 to 2030 were published in the interim report of the Study on Road Network Development in the Sultanate of Oman, which was implemented by the JICA Study Team (hereafter referred to as the JICA Road Team) at the same time as the start of our study, we should use the estimated population in their interim report. Therefore, we shall not estimate future populations in our target years.

According to the JICA Road Team Interim Report, the basic policy and methodology of estimation of the socio-economic frameworks in the future of Oman are as follows:

1) Target years

The target years of the socio-economic frame work (population and GDP) for the JICA Road Team Study are 2005, 2010, 2015, 2020, 2025 and 2030, which includes our team's target years, i.e. 2015 for the Short Term Development Plan and 2025 for the Master Plan. The JICA Road Team also adopted the year 2000 as the base year for their estimation of the socio-economic indices.

2) Basic policy for estimation of population

The basic policy of the JICA Road Team for estimation of the future population is as follows:

i. For estimation of the Omani population, its future sex-age structure should be projected in the first place based on the assumed future fertility rate.

ii. For estimation of the expatriate population, the number of employed persons shall be obtained first as the supplement labor force for the total labor force demand depending on the future economic growth. The total expatriate population will be obtained by assuming their activity rate.

iii. For estimation of the future economic framework, the petroleum activities (crude oil and natural gas) in future shall be projected in the first place. Then, the future non-petroleum activities shall be forecast based on the assumed sectoral growth rates.

iv. For estimation of the sectoral labor force demand, the future sectoral labor force demand shall be obtained by applying the sectoral labor productivity.

3) Economic development scenarios

JICA Road Team proposed three development scenarios to establish the socio-economic framework, namely Higher Omanization Development (Optimistic Case), New Oman Vision Development (Strategic Case) and Steady Economic Development (Pessimistic Case).

After studying the above three scenarios, New Oman Vision Development was selected as the future socio-economic framework for their study.

4) Future gross regional development products

Future Gross Regional Development Product is projected by breaking down the future projected GDP into the regional revel.

5) Future Omani population

After obtaining the census result in 2003, the JICA Road Team Interim Report was revised in respect of the published population data for the sex-age structure movement of Omanis from 1993 to 2000 by applying the component method with various trials and errors. Setting the year 2000 as the base year, Omani population with sex-age structure in their target years was projected using the component method and considering UN's population projection for Omanis. Table 5.2-2 shows the future total fertility rates of Oman and its neighboring countries published by UN.

Table 5.2-2 Future Total Fertility Rates by Countries in UN Population Projection

	2000–05	2005–10	2010–15	2015–20	2020–25	2025–30
Oman	5.46	5.06	4.67	4.27	3.88	3.48
Bahrain	2.28	2.10	2.10	2.10	2.10	2.10
Kuwait	2.66	2.44	2.21	2.10	2.10	2.10
Quatar	3.34	2.99	2.63	2.28	2.10	2.10
Saudi Arabia	5.54	5.01	4.51	4.04	3.61	3.20
UAE	2.86	2.56	2.25	2.10	2.10	2.10
Yemen	7.60	7.35	6.85	6.35	5.85	5.35

Source: World Population Prospects, the 2000 Revision (UN)

According to the JICA Road Team Interim Report, the projections of future Omani population in our target years are 2,237,000 in 2015 and 2,597,000 in 2025. Table 5.2-3 shows the future Omani population in the target years of the JICA Road Team and Tables 5.2-4 and 5.2-5 show the future Omani population by sex and age groups in 2015 and 2025.

Table 5.2-3 Estimated Future Omani Population (Unit: Persons)

Year	2000	2005	20010	2015	2020	2025	2030
Male	861,121	937,903	1,031,580	1,134,849	1,233,769	1,315,955	1,390,495
Female	831,882	908,362	1,000,901	1,102,478	1,199,660	1,280,736	1,355,083
Total	1,693,003	1,846,265	2,032,481	2,237,327	2,433,429	2,596,691	2,745,578

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

Table 5.2-4 Estimated Omani Population by Sex and Age Group in 2015

Age Group	**Male**	**Female**	**Total**
00 - 04	128,414	123,067	251,481
05 - 09	115,761	111,165	226,926
10 - 14	96,080	92,351	188,431
15 - 19	99,970	96,224	196,194
20 - 24	122,647	118,574	241,221
25 - 29	126,750	123,162	249,912
30 - 34	117,430	112,931	230,361
35 - 39	97,330	92,933	190,263
40 - 44	65,536	61,010	126,546
45 - 49	42,231	39,950	82,181
50 - 54	31,899	33,045	64,944
55 - 59	25,977	29,458	55,435
60 - 64	20,633	23,098	43,731
65+	44,191	45,510	89,701
Total	**1,134,849**	**1,102,478**	**2,237,327**
15+	**794,594**	**775,895**	**1,570,489**

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

Table 5.2-5 Estimated Omani Population by Sex and Age Group in 2025

Age Group	Male	Female	Total
00 - 04	113,629	108,769	222,398
05 - 09	126,151	120,986	247,137
10 - 14	126,950	121,841	248,791
15 - 19	114,379	109,904	224,283
20 - 24	94,795	91,234	186,029
25 - 29	98,506	94,979	193,485
30 - 34	120,678	116,914	237,592
35 - 39	124,440	121,215	245,655
40 - 44	114,704	110,839	225,543
45 - 49	94,177	90,755	184,932
50 - 54	62,499	58,931	121,430
55 - 59	39,293	37,855	77,148
60 - 64	28,349	30,404	58,753
65+	57,405	66,110	123,515
Total	**1,315,955**	**1,280,736**	**2,596,691**
15+	**949,225**	**929,140**	**1,878,365**

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

6) Future expatriate population

As described before, the number of expatriate population varies greatly depending on the labor force demand, which is affected by the economic growth. The employment status of expatriate labor is the supplement labor force for the total labor force demand. Accordingly, the future expatriate population is projected based on the Strategic Case of the socio-economic development scenarios in this study, which are mentioned in 5.2.3.

The number of employed expatriated persons was determined as the supplement labor force for the total labor force demand. The total expatriate population was obtained based on the ratio of employed to the total expatriate population of 0.84, which was used for the Sixth Five Year Development Plan. Table 5.2-6 shows the procedure and result of the forecast of future expatriate population.

Table 5.2-6 Estimated Future Expatriate Population (Unit: Persons)

Year	2000	2005	2010	2015	2020	2025	2030
Labour Force Demand	801,700	822,877	895,637	983,093	1,066,460	1,160,377	1,265,344
Omanis Aged 15+	991,500	1,212,367	1,417,265	1,570,489	1,709,265	1,878,365	2,062,409
LFPR (%)	36.4	36.4	40.0	45.0	50.0	52.5	52.5
Unemployment Rate (%)	22.9	22.9	20.0	15.0	10.0	10.0	5.0
No. of Employed Omani	278,300	340,058	453,525	600,712	769,169	887,527	1,028,626
Number of Employed Expatriates	523,400	482,819	442,112	382,381	297,291	272,850	236,718
Ratio of (Employed/Total expatriates population)	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Total expatriates population	623,600	574,783	526,324	455,215	353,918	324,821	281,807

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

7) Future total population

According to the results of 5) and 6), the future total populations in Oman in our target years are 2,693, 000 in 2015 and 2,922,000 in 2025.

Table 5.2-7 shows the future total populations in Oman in the target year of JICA Road Team.

Table 5.2-7 Future Population of Oman

	2000	2005	2010	2015	2020	2025	2030
Population							
Omanis	1693000	1846265	2032481	2237327	2433429	2596691	2745578
Expatriates	623600	574324	455215	353215	353918	324821	281807
Total	2316600	2421050	2558805	2692542	2787347	2921512	3027385
	2000-05	2005-10	2010-15	2015-20	2020-25	2025-30	2025-30
Annual Average Growth Rate (%)							
Omanis	1.75	1.94	1.94	1.69	1.31	1.12	1.62
Expatriates	-1.62	-1.75	-2.86	-4.91	-1.7	-2.8	-2.61
Total	0.89	1.11	1.02	0.69	0.94	0.71	0.9

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

5.2.2 Gross Domestic Product

According to the Statistical Year Book 2003, the Gross Domestic Product (GDP) in 2002 has exceeded 6,100 million Oman Rials. Its growth rate from 1993 to 2002 is approximately 2.7% per annum.

The per capita GDP in 2002 is approximately 2,430 RO/person. The annual growth rate from 1993 to 2002 is 1.1%.

Table 5.2-8 shows movement of GDP and per capita GDP from 1993 to 2002.

Table 5.2-8 GDP and Per Capita GDP from 1993 to 2002

Year	Unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GDP	(Mil.OR)	4,394.9	4,564.0	4,784.2	4,922.8	5,226.8	5,368.3	5,355.6	5,649.5	6,073.6	6,176.7
Population (MONE)	(Thousand)	2,000	2,050	2,131	2,214	2,255	2,287	2,325	2,402	2,478	2,538
Per Capita (MONE)	OR	2,197	2,226	2,245	2,223	2,318	2,347	2,303	2,352	2,451	2,434

Source: Statistical Year Books

This study did not estimate the future economic frameworks (GDP and per capita GDP) for the same reason as that for estimation of the future population in the target years.

According to the JICA Road Team Interim Report, the economic frameworks, namely GDP and GDP per capita of Oman in 2003 and 2005, were estimated first, and then the economic framework in the target years were estimated using the procedure which was used for the economic frameworks in 2003 and 2005.

(1) Estimation of Economic Frameworks in 2003 and 2005

In the JICA Road Team Interim Report, the economic frameworks in 2003 and 2005 were estimated by the following procedure.

i. Estimation of employment for 2000

ii. Estimation of employment and labor productivity for 2003

iii. Estimation of labor productivity rising rates

iv. Estimation of GDP by economic activities for 2005

v. Estimation of labor productivity and employment for 2005

1) Estimation of employment for 2000

The number of employed Omani persons in 2000 was estimated based on the result of the 2000 Labor Force Survey and the estimated Omani population by sex and age group, which was estimated in 5.2.2. For expatriates, the number of employed persons in 2000 was obtained from the Statistical Year Book.

The economic activity distributions for the Omani and expatriates in 2000 were obtained respectively from the 2000 Labor Force Survey and the Statistical Year Book.

The number of the total employed persons in 2000 was obtained from the above results. Table 5.2-9 shows the number of employed persons by economic activities in 2000.

Table 5.2-9 Number of Employed Persons by Economic Activities in 2000 (Unit: persons)

Economic Activity	No. of Employed Persons
Agriculture & Fisheries	76,120
Mining	13,470
Manufacturing	82,780
LNG & Related	400
Others	82,380
Electricity, Water & Construction	127,000
Services	502,350
Total	801,720

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

2) Estimation of employment and labor productivity for 2003

Assuming that the ratio of the labor force participation for the Omani in 2003 is the same as that of 2000, the employed Omani population is estimated using the number of Omani population aged 15 or older by sex, which is obtained by interpolating estimated populations for 2000 and 2005 by the sex-age structure. The estimated number of employed Omani population in 2003 is 313,000.

As described previously, the number of employed expatriate population is assumed to be 84% of the total expatriate population. The number of employed expatriate population in 2003 was obtained from the total number of expatriates in the census population in 2003, which were 552,073. Therefore, the estimated employed expatriate population in 2003 is 463,700. Accordingly, the total number of employed persons in 2003 is 776,700.

If it is assumed that the economic sector distribution in 2003 is the same as that of 2000, the number of employed persons and the labor productivity by economic activities are obtained by applying respectively the sector distribution in 2000 and the added values of each sector of GDP. Table 5.2-10 shows the estimated number of employed persons and the labor productivity by economic activities in 2003.

Table 5.2-10 Estimated Number of Employed Persons and Labor Productivity by Economic Activities in 2000

(Unit: Persons)

Economic Activity	No. of Employed Persons	Labor Productivity (RO/person)
Agriculture & Fisheries	71,610	2,304
Mining	14,020	248,531
Manufacturing	76,822	8,921
LNG & Related	500	724,800
Others	76,300	4,229
Electricity, Water & Construction	114,680	2,568
Services	499,590	7,353
Total	776,700	10,689

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

3) Estimation of labor productivity rising rate

The labor productivity by economic activities in real term in 1993 and 2003 were calculated applying the added values of each sector of GDP and the number of employed persons in both years. Table 5.2-11 shows the annual rising rates of estimated labor productivity from 1993 to 2003.

Table 5.2-11 Estimated Labor Productivity Annual Rising Rates from 1993 to 2003

Economic Activity	No. of Employed Persons		GVA (Const.)(RO m)		Productivity (RO/person)		Rising Rates %
	1993	2003	1993	2003	1993	2003	1993-2003
Agriculture & Fisheries	62373	71610	131.6	187.2	2110	2614	2.17
Mining	14021	71610	1600.3	1808.6	2110	129001	1.23
Manufacturing (excl. LNG)	60099	14020	203.5	285	114136	3735	0.99
Electricity, Water & Construction	112121	114680	210.7	339.4	1879	2960	4.65
Services	421661	499590	2248.8	3507.6	5333	7021	2.79

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

4) Estimated GDP by economic activities for 2005

GDP by economic activities of 2005 was estimated by mainly using the same average growth rate

from 2000 to 2003. Table 5.2-12 shows the estimated annual average growth rate (AAGR) from 2003 to 2005 and the estimated gross added values by economic activities.

Table 5.2-12 Estimated AAGR and GDP by Economic Activities in 2005

Economic Activity	GDP (RO m)	Assumed AAGR from 2003
1. Industry	4,613.4	
1.1 Petroleum Activities	3,495.9	
- Crude Oil	32,230.7	
- Extraction of Crude Oil	3,102.7	See Section 6.3.1
- Incidental Service to Oil & Gas	121.0	13.83%(2000-03)
- Natural Gas	272.2	13.15% (1993-2003)
1.2 Non-petroleum Activities	1,117.5	
- Mining & Quarrying	15.1	3.06% (1993-2003)
- Manufacturing	747.4	
Refined Oil Production	39.9	2.38% (2000-2003)
LNG Production	395.9	4.53% (2001-2003)
Other Manufacturing	311.5	4.63% (2000-2003)
Electricity & Construction	355.0	9.80% (2000-2003)
2. Agriculture & Fisheries	176.3	3.37% (2000-2003)
3. Service	4,098.6	5.63% (2000-2003)
GDP at Market Prices	8,888.3	
GDP per Capita (RO)	3,671.2	
GDP per Capita (US$)RO)	9,548.1	

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

5) Estimation of labor productivity and employment for 2005

The number of employment in 2005 was estimated by applying the gross added values and the labor productivity by economic activities except LNG and related industries. The labor productivity by economic activities in 2005 was calculated by applying the long term rising ratio (1993-2003) by economic activities to the labor productivity by economic activities in 2003.

The number of employed persons by economic activities in 2005 was obtained by dividing the estimated gross added value by labor productivity.

The number of employed persons for LNG and related industries in 2005 is 500, which was same as that of 2003.

Table 5.2-13 shows the calculation procedure of employment by economic activities in 2005.

Table 5.2-13 Estimation of Labor Productivity and Number of Employed Persons in 2005

Economic Activity	2003-2005 Productivity Rising Rate (%)	2005 Labor Productivity (RO/Person)	2005 No. of Employed Persons
Agriculture & Fisheries	2.17	2405	73296
Mining	1.23	254682	13786
Manufacturing			81982
LNG & Related*	4.52	791803	500
Others	0.99	4314	81482
Electricity, Water & Construction	4.65	2812	126235
Services	2.79	7769	527578
Total			822877

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

6) Economic frameworks for 2005

Economic frameworks in 2005 are projected based on the recent trend of sectors and the labor force demands, which are calculated based on the long term trend of labor productivity and by keeping the present Omani employment status such as the labor force participation and the unemployed rate until 2005.

Table 5.2-14 shows the economic indicators for 2000, 2003 and 2005.

Table 5.2-14 Estimated Economic Indicators in 2000, 2003 and 2005

	2000	2003	2005
GDP at Market Price (million RO)	7639.2	8302.4	8888.3
GDP per Capita (RO)	3297.6	3561.6	3671.2
GDP annual growh rate (%)		2.81	3.47
GDP per Capita annual growth rate (%)		2.60	1.53

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

(2) Future Long Term Economic Frameworks

According to the JICA Road Team Interim Report, the future long-term economic frameworks are estimated using the same procedure as the economic frameworks in 2003 and 2005 considering the future Omani population, future oil production as well as the large-scale studies for industry and tourism projects and the various government development policies.

Variable assumptions in this estimation are as follows:

1) Future growth rate of each economic activity

2) Future rising rate of labor productivity of each economic activity

3) Future employment status (labor force participation and unemployment rate) of Omanis

As described before, the following three scenarios were established for comparison of the future

socio-economic conditions:

1) Higher Omanization Development (Case 1)

2) New Oman vision Development (Case 2)

3) Steady economic Development (Case 3)

After studying the above three cases, assumptions about improvement in unemployment of Omanis in Case 1 seem to be too optimistic and these of Case 3 too pessimistic. Economic growth assumptions of Case 3 are steady but hopeless. Assumptions about rising of labor productivity for construction and service sectors in Case 1 seem to be too high.

Finally Case 2 is selected. Economic growth assumptions of this case are challenging but to the quantitative targets of Oman vision 2020.

Future assumptions of the three scenarios are shown in Tables 5.2-15 to 5.2-17.

Table 5.2-15 Future Growth Assumptions for Higher Omanization Development

	2005-10	20210-15	2015-20	2020-25	2025-30
AAGR of GVA by Sector (%)					
Extration of Crude Oil	3102.7	3046.3	2121.3	1477.2	1028.6
Incidental Services to Oil & Gas	3.59% of GVA of Oil and Gas				
Natural Gas	11.1	11.1	11.1	9.5	7
Mining & Qurrying	10.8	10.8	10.8	10.8	10.8
Manufacturing					
Refined Oil & Related					
LNG & Related	2 times	2.5 times	5.0	5.0	5.0
Other Manufacturing	2 times	2.5 times	8.0	6.5	5.0
Electricity, Water & Construction	6.0	6.5	7.0	7.0	7.0
Agriculture & Fisheries	3.7	3.7	3.7	3.7	3.7
Services	4.5	4.5	4.5	4.5	4.5
AAGR of labor Productivity (%)	4.0	4.0	4.0	4.0	4.0
Agriculture & Fisheries	2.20	2.20	2.20	2.20	2.20
Mining & Qurrying	3.00	3.00	3.00	3.00	3.00
LNG & Related	4.50	5.00	3.00	3.00	3.00
Other Manufacturing	2.00	3.00	3.00	3.00	3.00
Electricity, Water & Construction	3.00	3.00	3.00	3.00	3.00
Services	2.80	3.00	3.00	3.00	3.00
Employment Status of Omanis LFPR (%)	2010	2015	2020	2025	2030
LFPR (%)	40	45	50	52.5	53
Unemployment Rate (%)	15	10	7.5	5	5

Note: AAGR: Annual average growth rate

GVA: Gross value added

LFPR: Labor force participation rate

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

Table 5.2-16 Future Growth Assumptions for New Oman Vision Development

	2005-10	20210-15	2015-20	2020-25	2025-30
AAGR of GVA by Sector (%)					
Extration of Crude Oil	3102.7	3046.3	2121.3	1477.2	1028.6
Incidental Services to Oil & Gas	3.59% of GVA of Oil and Gas				
Natural Gas	11.1	11.1	11.1	9.5	7.0
Mining & Qurrying	10.8	10.8	10.8	10.8	10.8
Manufacturing					
Refined Oil & Related					
LNG & Related	2 times	2.5 times	5.0	5.0	5.0
Other Manufacturing	2 times	2.5 times	8.0	6.5	5.0
Electricity, Water & Construction	6.0	6.5	7.0	7.0	7.0
Agriculture & Fisheries	3.7	3.7	3.7	3.7	3.7
Services	4.5	4.5	4.5	4.5	4.5
AAGR of labor Productivity (%)	4.0	4.0	4.0	4.0	4.0
Agriculture & Fisheries	2.20	2.20	2.20	2.20	2.20
Mining & Qurrying	3.00	3.00	3.00	3.00	3.00
LNG & Related	4.50	5.00	3.00	3.00	3.00
Other Manufacturing	2.00	3.00	3.00	3.00	3.00
Electricity, Water & Construction	2.00	2.00	2.00	2.00	2.00
Services	2.80	2.80	2.80	2.80	2.80
Employment Status of Omanis LFPR (%)	2010	2015	2020	2025	2030
LFPR (%)	40	45	50	52.5	52.5
Unemployment Rate (%)	20	15	10	10	5

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

Table 5.2-17 Future Growth Assumptions for Steady Economic Development

	2005-10	20210-15	2015-20	2020-25	2025-30
AAGR of GVA by Sector (%)					
Extration of Crude Oil	3102.7	3046.3	2121.3	1477.2	1028.6
Incidental Services to Oil & Gas	3.59% of GVA of Oil and Gas				
Natural Gas	8.0	8.0	8.0	6.0	4.0
Mining & Qurrying	5.0	5.0	5.0	5.0	5.0
Manufacturing					
Refined Oil & Related					
LNG & Related	1.5 times	2 times	3.0	3.0	3.0
Other Manufacturing	1.5 times	2 times	5.0	4.5	4.0
Electricity, Water & Construction	5.0	5	5.0	4.5	4.0
Agriculture & Fisheries	3.0	3.0	3.0	3.0	3.0
Services	3.5	3.5	3.5	3.5	3.5
AAGR of labor Productivity (%)	4.0	4.0	4.0	3.5	3.5
Agriculture & Fisheries	2.20	2.20	2.20	2.20	2.20
Mining & Qurrying	3.00	3.00	3.00	3.00	3.00
LNG & Related	4.50	5.00	3.00	3.00	3.00
Other Manufacturing	2.00	3.00	3.00	3.00	3.00
Electricity, Water & Construction	2.00	2.00	2.00	2.00	2.00
Services	2.80	2.80	2.80	2.80	2.80
Employment Status of Omanis LFPR (%)	2010	2015	2020	2025	2030
LFPR (%)	40	45	50	52.5	52.5
Unemployment Rate (%)	20	20	20	20	20

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

The result of estimation and future economic indicators for the above scenarios are shown in Tables 5.2-18.

Table 5.2-18 Future Economic Indicators in 2005, 2010, 2015, 2020, 2025

	2005	2010	2015	2020	2025	2030
Higher Omanization Development						
GDP at Market Price (million RO)	8,888.3	10,578.7	12,649.2	15,267.4	18,909.6	23,371.0
GDP per Capita (RO)	3,671.2	4,202.4	4,814.7	5,610.3	6,746.3	7,932.6
GDP annual growth rate (%)	3.47	3.54	3.64	3.83	4.37	4.33
GDP per Capita annual growth rate (%)	1.53	2.74	2.76	3.11	3.76	3.29
Total population (Persons)	2,421,050	2,517,289	2,627,175	2,721,308	2,802,973	2,946,208
New Oman Vision Development						
GDP at Market Price (million RO)	8,888.3	10,578.7	12,649.2	15,267.4	18,909.6	23,371.0
GDP per Capita (RO)	3,671.2	4,134.2	4,697.8	5,477.4	6,472.5	7,719.1
GDP annual growth rate (%)	3.47	3.54	3.64	3.83	4.37	4.3
GDP per Capita annual growth rate (%)	1.53	2.40	2.59	3.12	3.40	3.59
Total population (Persons)	2,421,050	2,558,805	2,692,542	2,787,347	2,921,512	3,027,385
Steady Economic Development						
GDP at Market Price (million RO)	8,888.3	10,248.1	11,438.5	12,988.3	14,918.5	17,288.5
GDP per Capita (RO)	3,671.2	4,037.1	4,267.2	4,636.5	5,164.9	5,774.4
GDP annual growth rate (%)	3.47	2.89	2.22	2.57	2.81	2.99
GDP per Capita annual growth rate (%)	1.53	1.92	1.11	1.67	2.18	2.76
Total population (Persons)	2,421,050	2,538,458	2,680,537	2,801,335	2,888,441	2,993,993

Source: Interim Report of the Study on Road Network Development in the Sultanate of Oman, JICA

CHAPTER 6

FUTURE PROSPECTS OF INDUSTRIES AND REGIONS

6. FUTURE PROSPECTS OF INDUSTRIES AND REGIONS

6.1 Nationwide Development Policy on Industries and Regions

The current sixth five-year plan states development policy for industries as follows: Diversification of the national economy's production base represents the main dimensions of the vision for Oman's Economy: Oman 2020, because it is considered a basic pillar for the sustainability of development. In accordance with this the Sixth Plan aims at working toward raising growth rates of the economic diversification activities and thereby increasing their contribution to the GDP. The plan aims at achieving an average annual growth rate of (5.4%) for the activities, and increase its contribution to GDP at current prices in 2005 to about (65.3%) compared to (51.2%) in 2000.
The plan seeks achieving its economic diversification related objectives through the following:

- Development of non-oil exports and natural gas based industries
- Tourism developments
- Raising productivity through benefiting from modern technologies, utilization of existing production capacity.
- Paying attention to marketing and promotion
- Encouragement of scientific research and development
- Increasing the banking finance for the economic diversification activities
- Promoting domestic and foreign investment through updating the legal and regulatory framework of the private sector
- A dilation of the privatization processes
- Provision of Infrastructure

The Plan aims at developing the goods and services of Omani origin at an average /annual growth rate of about (16.3%). The plan also seeks introducing positive changes in exports structure. This involves focusing on export of high value added industrial goods, such as the products of the Natural Gas based industries.

- Increasing the export activities productivity to levels that are comparable to worldwide free competition, by encouraging the merger of establishments, use of modern technologies and giving more attention to research and development.
- The study of the Development strategy of Exports of Omani-origin, prepared by Oman center for investment promotion and export development, is to be approved.
- To seek entering into bilateral free trade agreements during the period (2000-2003) with some countries that name distinguished relationships with the Sultanate.
- To encourage the measures concerning export process and e-commerce.

Among various targets adopted in the plan, promotion of natural gas based industries is included. At present, there many natural gas based projects are under construction, and one can observe the plan and policy in Oman 2020 and Five Years Plan is materializing.

6.2 Future Prospects by Sector

6.2.1 Industrial (Manufacturing) Sector

(1) Oman's Policy for Industrial Development

The manufacturing sector assumes a distinct and axial role in sustaining development, due to its interlacing relations with other sectors of Oil, Gas, Agriculture, Fisheries, Trade, Minerals and others. Development in the sector will reflect a positive effect on the improvement of these Sectors, and hence on the national economy. This will lead to provide more new chances of work to assimilate the increasing educational graduates, and the improvement of the status of the balance of payment, through increased exports and substitution of import, and strengthening the connection of the national economy with the International Economy to benefit from the comparative advantages of the Sultanate through the optimal exploitation of all the wealth and natural resources in the Sultanate and for assimilation and upgrading of technology.

The vision for the Industry Sector is related to Oman 2020 in the sense that it provides the basis for diversification of the economic base, and development of the national income sources, and finding new and alternative sources for the Oil revenues through increasing the investment in income generating projects, specially in manufacturing industry activities and encouraging private sector industrial investments in the different regions of the Sultanate, paying attention to qualifying the national human resources to take their role in the development and improvement of the industrial sector. Also, encouraging Scientific Researches and researches of development and transfer of new technology and meeting the finances of the infrastructure to satisfy sector requirements.

The vision for the Sector aims to increase the value added in an accelerated manner to top the average annual growth rate targeted for the national economy for the period 1995-2020, to raise its contribution to the GDP from 5% in 1995 to 15% by the end of the year 2020. The vision for the Sector relies on the following major dimensions:

- Adoption of high value added strategy.
- To pursue export-oriented manufacturing strategy.
- Development of the industries that depend on local resources, giving priority to the industries that depend on Gas as a primary input.
- Manufacturing should be dominated by medium and small scale establishments.
- Furthering the manufacturing operation through collaboration with the foreign capital and status creation for the Omani industry in the international markets.
- Adoption of technology transfer and settlement strategy.
- State commitment to encourage the industrial development.

Many hopes are centered on the Sector during the Sixth Plan to overcome the challenges which affected its advancement and achieving the targeted growth rates through increasing governmental and private, both local and foreign, investments in the sector and its infrastructure, and following the policies and mechanism.

Objectives of the Industry Sector in the Sixth Plan:
Within the framework of Oman 2020, and the realization of the importance of the role undertaken by the Industry Sector in the diversification of the economic base for the national economy, the major objectives of the Sector during the Sixth Plan (2001-2005) were as follows:

- Achieving an average output growth rate of the Sector, including the Petrochemicals and Oil refining activities, of 11.7%.
- Supporting the balance of payments through increase of exports to achieve an average growth rate in Industrial exports of 16.3% and the lowering of imports.
- Achieving an annual average growth rate of 7% for the Omani workforce in the Sector and provision of high rank jobs for Omani graduates from universities and institutes.
- Achieving regional balance in the industrial development.

To fulfill its objectives, the Plan depends on, first, development of the industries depending on Natural gas, and knowledge based industries such as information technology and communications, and also the industries related to the Oil, fisheries and minerals.

To achieve the Sector objectives in an appropriate manner, the Plan adopted the following policies and mechanisms:

- Participation of the government in the capital investment of the companies jointly with the foreign capital and floating part of the capital of these Companies to the public subscription after two years from establishing the project, as an example.
- Expansion in the funding resources and by way of long-term loans from Commercial Banks to fund the industrial sector investments.
- Provision of the infrastructure.
- Preparation of a detailed program of development of Natural Gas based industries so that the program include coherent and effective policies and mechanisms and the steps for implementation and the responsible locales with the time schedule for allocation of suitable quantities of the proven Gas for the approved gas dependent industrial projects.
- PDO shall carry out preliminary studies for oil related projects.
- Dedicated efforts to attract the foreign investment to cover the large investments necessary to achieve the targeted growth rates and the revision of the investment law.
- Approval of the industrial strategy and amendment of the law for regulation and encouragement of industry.
- Suggestion of appropriate solutions for encouraging the private sector to contribute to the industry and its inclination for training the national cadre and raising its efficiency.

- Early completion of the system of One-Stop-Shop to facilitate the procedures for foreign and domestic industrial investment.
- Raising the production in the Sector to the international level with free competition through encouraging and merging industrial establishments and the exemption of inputs used by domestic industries from Custom duties, in case the similar competing imported goods are exempted from custom duties.
- Evaluation of Youth-Projects Development Fund to reinforce and activate it.
- Government participation in the primary projects capital and securing the long term funding for the Sector and its projects.
- Encouragement of information technology and the support of the activities of research & development within the Omani Establishments.
- Encouragement to set up industries in the different regions of the Sultanate.
- Concentration on the industries that support Omanization policies, and its follow up by one specialized unit.
- To formulate regulations and measures to resist commercial dumping.

The natural gas based industries are one of the basic pillars of the strategy for diversification of the national economy's economic base and increasing its development. In accordance with this strategy and its requirements the Sixth Plan seeks development of such industries. The plan includes several major projects that are related to those industries. Examples of those projects include the Methanol project, Oman-India Fertilizer Project, Ferro Chrome project, Sohar Fertilizer Project. The Investments targeted for these projects in the Plan constitute about (12.3%) of total targeted investments in the plan.

The plan adopts the following in order to achieve the objectives related to the development of such activities:

- Formulation of a detailed program for the development of natural gas related industries. The program should include policies and accurate and effective policies, executive steps, responsible authorities, time schedule for implementation of the program projects, as well as allocation of appropriate quantities of confirmed gas reserves for the natural gas based projects.
- Exerting efforts in order to attract foreign investment to cover the potential major investments for these industries in the Plan, and to review the Investment Law.
- Providing the infrastructure and particularly enhance the implementation of the Industrial area in Sohar Port.

As stated in the overall vision and plan, the vision and plan for industrial (manufacturing) sector also stresses the importance of the development of natural gas based industry, and the related development in Sohar port and its vicinity.

(2) Development Strategy Studies

There are two JICA studies regarding the development of industry; one was done in 1994 on industrial development master plan, another done in 2000 in connection with the expansion of Salalah port for industrial development of the hinterland of Salalah port.

1) The Industrial Development Master Plan by JICA study team (Study on Master Plan for Industrial Development in the Sultanate of Oman, December 1994)

The study team proposed following potential projects in view of geographical advantage, resource advantage, and other factors:

Projects in bold were already realized or are under construction stage. In Sohar Industrial Port area, a number of large projects based on natural gas and other resources of Oman are starting. Unstable condition in Iraq may have enhanced the geographical advantage of Oman.

Table 6.2-1 Potential Projects Proposed in 1994 JICA Study

Identified Project	Criteria for identifying projects	Factors to be considered
Group 0		
Pet Food	Utilization of fishery resources	Further study for availability of resource required
Group 1		
Gypsum	Development of export market for potential non-metallic resources	
Marble		
Aggregates		
Group 2		
Gypsum Board	Development of new application of available resources	Should be export-oriented
Rock Wool		Should be export-oriented
Group 3		
Ammonia & Urea	Development of new application of available resources	
Methanol		
C2 & downstream		
Group 4		
Glass Bottle	Import substitution	
Group 5		
Snack Food	Location Advantage	
Printing		
Pharmaceutical Formulation / Repacking		
Group 6		
Knitwear	Advantage of production condition	

Source: JICA - Master Plan for Industrial Development in the Sultanate of Oman, December 1994

The third group in the table 6.3.1. (2) is natural gas or petroleum based. These large-scale gas based industry may have a large impact on Oman's economy and the development of Sohar area as well.

2) The Master Plan Study of Salalah Port and Its Hinterland in the Sultanate of Oman, by JICA Team in 2000

The study proposes following industry fields for Salalah Hinterland and FTZ:

At that stage (in 2000), large size project planned in the Sultanate were listed as follows:

- LNG project
- Gas pipeline construction projects
- Steel mill construction project
- Oil refinery construction project
- Petrochemical complex construction project
- Ship repair yard

Prospective Markets envisaged for projects in Salalah area and Oman were enumerated as follows:

- Yemen plus East African countries.
- The U.S.A. and European markets.
- Southeastern Asian markets and Far East Countries' markets.
- GCC markets may be regarded as a part of domestic market for Oman. Iran, Iraq and Central Asian Republics markets will be the same as GCC markets in terms of Salalah's advantage.
- India is a big market particularly for Oman as a whole.

Industry groups and specific fields proposed for Hinterland of Salalah Port were as follows:

- Agricultural resources based Industry
- Fishery resources based Industry
- Mineral resources based Industry
- Redistribution Business
- Logistics Industry
- Tourism Industry
- High-technology Related Industry
- Electronic/ Electrical Products Industry, and Automotive Industry
- Development of Food Industries based on Imported Grain and Oil Crops
- Development of Quick Response and High Quality Garment Industry targeting EU Markets
- Promotion of Industries to meet the Import Demand in the Markets in Southeastern Asia
- Development of Fish Processing Industry Targeting European Markets

The industrial fields to be developed are proposed to utilize following resources and advantages:

The policy measures to be taken were proposed as follows:

- Establishment of Port Salalah Free Zone
- Preferential treatment for re-export business (or transit trade)
- Facilities and systems convenient for Dhow ship trade
- Formulation of the master plan for promotion of fishery industry on the basis of a comprehensive marine fishery resource study
- Permission of fish import maintaining strict quality control
- Promotion of fish processing industry with provision of supporting system and facilities
- Formulation of tourism master plan, and promotion of the plan, together with development of facilities attractive for the tourists
- Construction of port silo for storing of raw material grins and oil seeds, together with various food processing plants including flour mill, an oil mill, and a feed processing plant, etc., adjacent to the silo, as well as loading and unloading facilities, which required for an integrated grain and vegetable oil processing complex
- Promotion of industrial estate (as a part of the expansion of the existing industrial estate) specialized in food processing in conjunction with the above food processing complex
- Promotion of industrial estates (as a part of the expansion of the existing industrial estate) specialized in garment fabrication
- Assistance for feasibility study on use of mineral resources available around the Hinterland
- Establishment of supporting functions for the garment industry to upgrade their products to be able to penetrate into the medium-high grade markets in European countries
- Promotion measures for local assembly of electric and electronic parts, and automotive

Salalah Free Trade Zone was proposed in the study in 2000, but it took a long time for realization. As Sohar port is being started, and Salalah port being expanded for transshipment of containers, it is important to take advantage of the location of Salalah, and to establish Free Trade Zone for proposed plans to materialize.

6.2.2 Mining & Quarrying Industry Sector

The Minerals sector is considered one of the sectors expected to contribute to achieving the economic diversification, as the Sultanate produces many of the minerals ores such as Copper, Gold, Silver, Chromite, Manganese, Marble, Gypsum and Limestone. The sector has many capabilities that qualify it to take an effective role in the diversification of the production base, as its products are used as raw materials and inputs for many of the domestic industries. The importance of the sector arises from its interlacing relations with many of the other economic sectors such as manufacturing agriculture, construction, buildings and construction of roads and ports.

In accordance with Oman 2020, it is expected that the sector will meet fully the needs of the Omani market from the minerals raw materials, which will save the foreign currency. To achieve the objective of national income diversification, it is expected that the sector will process and export the surplus of the needs of the local markets to abroad, which will contribute to the amelioration of the trade balance.

The Minerals sector vision include increasing its contribution to the GDP from about 0.6% in 1995 to about 2% in 2000, through raising the annual growth rate of the sector by about 10.8% on the average. The sector vision depends on the following dimensions:

- Completion of the geological infrastructure, where the Sultanate had taken steps in improving the basic documents such as the geological, geophysical and geochemical maps.
- Large proven reserves for many of the minerals ores.
- Increasing the interlacing relation between mining sector and the manufacturing sector to obtain the highest value added.
- To assign the leading role in managing and investments in the Minerals sector to the private sector.

Challenges and Obstacles facing the Minerals sector during the Sixth Plan (2001-2005) were analyzed as follows:

The Minerals sector faces a number of problems continued from the Fifth Five-Year Development Plan, which constitute challenges that require formation of appropriate policies and mechanisms to deal with them. Based on the evaluation of the Minerals sector in the Fifth Five-Year Development Plan, the most important of what will face the sector during the Sixth Plan could be summarized in the followings:

- The long time taken to complete the studies and the geological, exploration, geophysical, engineering and environmental surveys which precede the minerals extraction operations. This leads to lengthening of the time of extraction.
- High risk element in investment, and the instability of the international prices for minerals bullions and the long period for capital recovery and the high interest rates on loans.
- Large capital requirements and the complexity of recovery of minerals.
- Lack of infrastructures in some of the mineral ores locations.
- Problems of attracting the private sector investments, due to the high cost of the prospecting operations.
- The regulations related to environment protection, pollution prevention, the nature reserves, procedural delays for obtaining mining licenses, hinder the implementation of many of the minerals prospecting and its utilization.
- Delay of establishing the project of the Geographical Information System (GIS).
- Shortage in the qualified cadre and technical experts needed for exploration and extraction of minerals.

The objectives of the Minerals Sector in the Sixth Plan as follows:
In accordance with Oman 2020 and its long-term objectives, the sector's objectives are defined in the Sixth Plan as follows:

- Achieving an average annual growth rate of about 4.5%.
- Achieving an average annual growth rate of 10% in the Omani workforce in the sector.
- Activation of the private sector to take a major role in the sector investments and encouragement of international companies to invest in the sector.
- The optimal utilization of the minerals wealth and increasing the value added.
- Concentration on exploitation of industrial rocks and minerals for industrial development and increased inter-sector linkages.
- Achieving regional balance between development of the sector and environment conservation.

Policies and mechanisms to achieve the sector objectives in the Sixth Plan are as follows:
To address the challenges and obstacles facing the sector, and achieve the planned objectives, the following polices and mechanisms have been identified for the sector in the Plan:

- Promotion of investment in Mineral sector.
- Offering soft loans, special to industries using the local raw materials for exports.
- Formulation of a technical committee with the Ministry of Regional Municipalities, Environment and Water Resources, Ministry of Interior, Ministry of Housing, Electricity and Water and Ministry of Commerce and Industry and The Office of the Ministry of State and Governor of Dhofar to formulate strategy to demark the mining locations, so that, this committee, later on assumes the role of issuing and approval of licenses.
- Working towards endorsement of the new Mining Law.

6.2.3 Fisheries Industry Sector

The Fisheries Sector is considered one of the important productive Sectors in the Sultanates economy due to its economic potentials involving the fisheries resources whereas the Sultanate's coasts are endowed with abundance and diversity of these resources.
In order to achieve its role, efforts should be exerted toward the optimal utilization for all available resources to achieve the economic objectives of the Sultanate. On top of these efforts is the diversification of national economic resources and achieving food security for the Sultanate and self-sufficiency of this major nutrition commodity.

The Sector is distinguished by important characteristics in the framework of its relation to a number of other economic sectors, through establishment of industries for both foodstuffs and forages to contribute; to the availability of the food materials to the animal wealth. The export activity for fish is honored by a large attention due to its effective return to the national economy, due to its high chances for development & growth through formulation of standards for quality control and observance of the

international measures and specifications followed by new systems for sea-foods and required by fisheries importing countries. Since the fisheries resources are exhaustible, but limited resources liable for depletion, it is necessary to seek better utilization and protection from depletion and exhaustive fishing and amelioration of management system and improving to ensure the continuity of its utilization with the required economic efficiency.

The sector is considered as a source of living for a large number of Omani citizens specially those living in the coastal areas extending from Musandam in the North to Dhofar in the South, in addition to the other professions and activities related to fishing such as marketing, transport, preparation and other services. The sector has a significant economic potential, which enable it to accommodate a large ratio of the investment of the Government and private sector for a long period. The most important of which is, the availability of fishery stock estimated for surface and bottom fishes at about 817,000 tons, of which, 278.8,000 ton available for exploitation if the stock is rehabilitated and the fishing seasons have been organized and introducing the operation of handling and processing for same varieties and development of utilization techniques. The fish stock of Fanar fish is estimated at about 4490,000 ton, about 4000,000 tons are ready for exploitation, although the quantities actually exploited are considered very meager.

Oman's fisheries industry is categorized into two; Traditional fishery and Industrial. Traditional fishery is the one performed by individual fisherman on small boats, and mainly supplies local demands. Companies collect some of the catches or traders to be further processed and exported. Industrial fishery is the one by companies with large ship.

In 2003, 31,587 fishermen were active in traditional fishery. It is estimated that more than 4,000 Omanis are working in associated industries such as transportation and trading. Fisheries industry's contribution to GDP is about 0.6% in 2001. In the vision 2020 for Oman's Economy, it is expected that the growth of the fisheries sector will accelerate to 5.6% per year raising its share in the GDP from 1.1% in 1995 to about 2% in 2020.

The sixth five-year plan (2000-2005) analyses the status of Oman's fisheries industry and states various problems. The poor available database about fishery sector and fishing grounds, and weakness of research institutes and scientific cadre qualified to lead the research programs and analysis of data drawn from it, are thought to be major weakness of Oman's fisheries industry as a whole.

The traditional fishing sector is said to have following problems:

- Low level of efficiency of traditional fishing boats: It is characterized by its large number, lack of storing facilities, absence of safety measures and weakness of its structure and sailing power. This leads to low production and higher rate of damage.
- Lower grade of landed fishes due to improper handling and refrigeration directly after fishing and lack of landing facilities and cold storages in the areas of landing.
- Transport methods and the conditions during the transport, play a major role in loss of freshness and enhancing the fish's damage. The fish face the worst kinds of handling and marketing in the markets.

- The traditional fisherman lack knowledge about ways and techniques of modern fishing and its preservation and the ways of handling and storing and the quality and characteristics of fishes.

The Commercial Fishing sector's problems are as follows:

- The Commercial Fishing is monopolized by a small number of companies, through offering fishing licenses to only five Companies. The five Companies' activities are on brokerage for large pelagic fishes (Tuna) and bartering for demersal fishes, where the five Companies sell the granted licenses for fishing of large pelagic fish (50,000s ton) to foreign fishing ships in exchange of fixed sum and selling the granted licenses for the demersal fish (28,000s ton) in return for 20% of the actual total amount of the fish. The total gain by the Omani Companies (Oman Economy) is about R.O. 3.7 million.
- The foreign fishing ships transport its entire product from pelagic fish and 80% of the demersal fish, abroad as raw materials, which means lack of interlacing economic relations between this sector and the other national economy sectors, and the limit the value added of this sector in the GDP.
- The workforce in these foreign fishing ships is a 100% foreigner workforce, which means the deprivation of the Omani society from employment opportunities.
- The foreign fishing ships throw between 40% to 70% of the actual fish product, which means a loss to the economic resources, and pollution to the sea environment and the natural wealth.

In accordance with the Vision 2020 for the fisheries sector, the objectives of the sector in the Sixth Plan are summarized as follows:

- Achieving an average annual growth rate of 3.9%.
- Maintenance and development of the marine resources and fisheries.
- Accomplishing a sound administration for fisheries and costal areas.
- Organization of marine fishery surveillance.
- Improvement of post fishing activities and trading and achieving an average growth rate in the exports estimated at about 11.5%.
- Completion of the infrastructure.
- Securing productive employment opportunities in the fishing villages and raising the level of fishermen income.
- Raising the average consumption of fish and its products.
- Furthering the role of the private sector in the Sector development and broadening its activities.

Sixth Plan sets out the policies and mechanisms to achieve the objectives of the sector in the Development Plan period, aiming to overcome the obstacles and challenges facing the sector, and securing the appropriate environment to activate its role in diversification of income resources, and achieving its objectives, adopted a bunch of polices and mechanisms represented by:

- Encouraging youth ships program and sector investment in large fishing ships aiming at Omanization of the commercial fishing fleet by the end of 2005.
- Upgrading the efficiency of the traditional fishing, reducing the losses and raising the quality of exported fishes.
- Development of the fishing resource, through aquaculture.
- Promotion and improvement of surveillance of fisheries.
- Encouraging the private sector to complete the infrastructure related to the Fisheries Sector and the industrial projects related to inputs and outputs of the sector.
- Determination of the fishing potential appropriate to the production capacity for the fisheries resources.
- Breaking the monopoly of marine fishing licenses and broadening its base.
- Special attention should be paid to the research and development related to the sector and establishment of a Fish Training Centre.

CHAPTER 7

FORECAST OF PORT TRAFFIC

7 FORECAST OF PORT TRAFFIC

The future port traffic was forecasted based upon past traffic trend in relation with GDP of countries and regions and extrapolated for the future according to the estimated GDP. At the time of this traffic projection, available officially announced port statistics were up to 2002 and reliable GDP projection was World Bank Baseline Forecast (published July 2003), which covers country-wise projection of 2003 to 2015.

During the Study period, particularly at the latter half of 2003 and 2004, sharp rise of growth rate on the port traffic in the world was observed. However, due to no availability of official statistics for 2004 and necessity to propose priority projects by the end of 2004, the port traffic projection was fixed without reflecting 2003 and 2004 figure resulting rather conservative particularly for the coming five year period. However, as stated in 7.2.3 (6) of this chapter, recent sharp increase of traffic may be the result of the war at Iraq and subsequent oil price rise. This effect may continue for several years but may subdue at later years.

7.1 Large Projects-Related Cargo

7.1.1 Categorization and Methodology of Forecasting

Forecast of the Industrial Cargo is made assuming two categories for industrial cargoes. One is the cargo from the existing industry and its future development. Forecast for this cargo category was made basically through extrapolation of the past data, with necessary adjustments taking into consideration government plans, foreseeable structural change, resources limitation, market change, labor productivity improvement etc. This category is dealt with in the Chapter 7.4.Indigenous Cargo.

Another category is the cargo from the New Large Projects, the field of which does not exist so far in Oman. This category of the new projects is mainly the natural gas based heavy industry, mainly in Sohar area as targeted in Oman’s industrial development plan. For this category, extrapolation based on the past data is not adequate. This category of projects is not directly connected with the existing industry. It is based on the investment decision to develop, rather than the extension of the existing industry. For the period of 2006-2015, forecasting was made through interviews to the on-going projects, and studies and policy papers for the possible projects.

In Oman in particular, the existence of export-import traffic through border points with U.A.E. is the major factor affecting the forecast of cargo traffic through Omani ports. As of 2003, over 70% of export and about half of import traffic go through border posts, and considerable portion is considered to go through ports in U.A.E.

As to the new projects, most of which is in large scale and located close to the new port of Sohar, it was assumed that all of the export-import traffic use Sohar port. Containerization is assumed to proceed in the future. Based on the above-mentioned assumptions, the forecast of the cargo traffic was worked out.

7.1.2 Large Projects and Sohar/Salalah Industry Areas

Contacts were made as much as possible with the relevant parties promoting the project for cargo traffic forecast. For the long range after 2015, forecast was made based on the hearing as to future expansion plans, likely new projects, and general forecast using land utilization ratio. Tables7.1.2-1, 2, 3 and 4 show the result of survey and exercise, showing cargo traffic tonnage, mode of cargo (container, general cargo, dry bulk and liquid bulk). After 2015, Sohar Industrial Port area (immediate behind the port) is expected to be fully utilized, and no expansion of capacity is taken into account. If any expansion of industry is required, the location is supposed to be at the area behind the highway near the Sohar port.

To assess the long-term future cargo traffic from industrial zones, where there is no industry yet in operation, we went through a method utilizing acreage allocated. Taking into consideration were the number of establishments in the existing industrial estates versus total industrial establishments included in the industrial census statistics, utilized (rented) acreage, unpublished production/export and raw materials/import statistics which was provided by MOCI industrial statistics directorate, value-tonnage conversion through ROP export-import statistics. Latest statistics figures available were used for calculation.

The figures reached are:

Export	908 tons/ha
Import	566 tons/ha
Total	1,474 tons/ha

Future industrial areas (Sohar and Salalah FTZ) are adjacent to port, and all cargo traffic is supposed to go through adjacent port, although considerable parts of Oman's Export-Import cargo traffic go through border posts by inland transportation.

Industrial area behind Sohar port is planned to be around 6,828 ha, and occupancy was estimated start after 2010 and reach 5% by 2015, 12.5% by 2020 and 25% by 2025. Before this period, areas in Sohar Industrial Port will be filled in gradually. The utilization of hinterland is assumed to start after 2010 for downstream, supporting, service industries mainly for Sohar Industrial Port area.

Cargo traffic estimated with the method for the industrial zone behind Sohar port is shown below:

	Utilization	Base Case	High Case	Low Case
			Base Case x 1.5	Base Case x 0.5
By 2015	5.0 %	503,231 tons/year	754,847	251,616
By 2020	12.5	1,258,076	1,887,114	629,038
By 2025	25.0	2,516,153	3,774,230	1,258,077

Free Trade Zone (FTZ) of Salalah has the planned area of around 2400 ha, and through the same method, following traffic forecast figures are obtained:

	Utilization	Base Case	High Case	Low Case
			Base Case x 1.5	Base Case x 0.5
By 2010	12.5%	442,200 tons/year	63,300	21,100
By 2015	25.0	884,400	1,326,600	442,200
By 2020	50.0	1,768,800	2,653,200	884,400
By 2025	100.0	3,537,600	3,537,600	1,768,800

It should be noted that High Case of 2025 is same as Base Case of 2025 as 100% is already utilized.

Table 7.1.2.-5 shows the summary of port cargo traffic forecast of New Large Projects and Industrial Zones of Sohar and FTZ of Salalah.

Table 7.1-1 Oman Large New Projects Cargo Traffic Estimation Worksheet, Shipment/Receiving plan by Projects

Unit: Ton

Project or Company Name	Location	Area ha	Cargo	Direction	Cargo Mode		**2010**	One time shipt 2011-2015	**2015**	**2025**
1st Phase 2006-2010										
Sohar Intl Urea	Sohar	90	Plant Equipmen	Import	container			6,000		
Sohar Intl Urea	Sohar		Plant Equipmen	Import	g.cargo		10,000	18,000		
Sohar Intl Urea	Sohar		Urea Bulk	Export	dry bulk		1,225,000		2,450,000	2,450,000
Sohar Intl Urea	Sohar		Spare Parts etc.	Import	container		2,000		4,000	4,000
Oman Methanol	Sohar	70	Plant Equipmen	Import	container/g.cargo			25,000		
Oman Methanol	Sohar		Liq Bulk MeOH	Export	liq bulk		1,600,000		3,200,000	3,200,000
Oman Methanol	Sohar		Parts etc.	Import	container/g.cargo		2,000		4,000	4,000
Sohar Oil Refinery	Sohar	240	Plant Equipmen	Import	container/g.cargo					
Sohar Oil Refinery	Sohar		Liq Bulk	Export	liq bulk		5,400,000		5,400,000	5,400,000
Sohar Oil Refinery	Sohar		Parts etc.	Import	container/g.cargo		5,000		5,000	5,000
Sohar Polypropylene	Sohar	25	Plant Equipmen	Import	container/g.cargo					
Sohar Polypropylene	Sohar		PP Container	Export	container		340,000		340,000	340,000
Sohar Polypropylene	Sohar		Parts etc.	Import	container/g.cargo		3,000		3,000	3,000
Aluminum	Sohar	325	Plant Equipmen	Import	container/g.cargo			60,000		
Aluminum	Sohar		Aluminum Ingo	Export	container/g.cargo		330,000		660,000	660,000
Aluminum	Sohar		Alumina	Import	dry bulk		635,000		1,270,000	1,270,000
Aluminum	Sohar		Petrocoke	Import	dry bulk		115,000		230,000	230,000
Aluminum	Sohar		Pitch	Import	liq bulk (heated)		29,000		58,000	58,000
Aluminum	Sohar		Others	Import	container		10,000		20,000	20,000
Polyethylene/Dow	Sohar	200	Plant Equipmen	Import	container/g.cargo					
Polyethylene/Dow	Sohar		PE Container	Export	container		850,000		850,000	850,000
Polyethylene/Dow	Sohar		Others	Import	container/g.cargo		5,000		5,000	5,000
Polyethylene/Dow	Sohar		Comonomers	Import	liq bulk		150,000		150,000	150,000
EDC	Sohar	50	Plant Equipmen	Import	container/g.cargo					
EDC	Sohar		EDC Liq Bulk	Export	liq bulk		500,000		500,000	500,000
EDC	Sohar		Salt	Import	dry bulk		550,000		550000	550000
DRI	Sohar		DRI	Export	container/g.cargo		1,164,000		1,164,000	1,164,000
DRI	Sohar		Iron Ore	Import	dry bulk		1,885,000		1,885,000	1,885,000
DRI	Sohar		Scrap	Import	container/g.cargo		98,900		98,900	98,900
DRI	Sohar		Other Materials	Import	container/g.cargo		80,000		80,000	80,000
DRI	Sohar	1200	Plant Equipmen	Import	container/g.cargo					
Total		2200					14,988,900	109,000	18,926,900	18,926,900
2nd Phase 2011-2015										
Ferrochrome	Sohar	100	Plant Equipmen	Import	container/g.cargo			25,000		
Ferrochrome	Sohar		Ferrochrome	Export	container				100,000	100,000
Magnesium	Sohar	100	Plant Equipmen	Import	container/g.cargo			10,000		
Magnesium	Sohar		Magnesium	Export	container				25,000	25,000
Silicon Metal	Sohar	100	Plant Equipmen	Import	container/g.cargo			20,000		
Silicon Metal	Sohar		Silicon Metal	Export	container				30,000	30,000
Plate Glass	Sohar	500	Plant Equipmen	Import	container/g.cargo			100,000		
Plate Glass	Sohar		Plate Glass	Export	container				350,000	350,000
Total		800						155,000	505,000	505,000
Total from New Projects							14,988,900	419,000	19,431,900	19,431,900

Source: JICA Study Team

Table 7.1-2 Oman Large New Projects Cargo Traffic Estimation Worksheet, Sorting by Cargo Mode

Unit: Ton

								1st phase 2200ha		2nd phase 800ha	
1st Phase 2006-2010								auxiliary, downstream, supporting industrie 340ha =5% of 6800ha			
Sohar Intl Urea	Sohar	90	Plant Equipmen	Import	container				6,000		
Sohar Intl Urea	Sohar			Import	container			2,000		4,000	4,000
Sohar Polypropylene	Sohar		PP Container	Export	container			340,000		340,000	340,000
Aluminum	Sohar		Others	Import	container			10,000		20,000	20,000
Polyethylene/Dow	Sohar		PE Container	Export	container			850,000		850,000	850,000
Total								1,202,000	6,000	1,214,000	1,214,000
Oman Methanol	Sohar	70	Plant Equipmen	Import	container/g.cargo				25,000		
Oman Methanol	Sohar		Parts etc.	Import	container/g.cargo			2,000		4,000	4,000
Sohar Oil Refinery	Sohar	240	Plant Equipmen	Import	container/g.cargo						
Sohar Oil Refinery	Sohar		Parts etc.	Import	container/g.cargo			5,000		5,000	5,000
Sohar Polypropylene	Sohar	25	Plant Equipmen	Import	container/g.cargo						
Sohar Polypropylene	Sohar		Parts etc.	Import	container/g.cargo			3,000		3,000	3,000
Aluminum	Sohar	325	Plant Equipmen	Import	container/g.cargo				60,000		
Aluminum	Sohar		Aluminum Ingo	Export	container/g.cargo			330,000		660,000	660,000
Polyethylene/Dow	Sohar	200	Plant Equipmen	Import	container/g.cargo						
Polyethylene/Dow	Sohar		Others	Import	container/g.cargo			5,000		5,000	5,000
EDC	Sohar	50	Plant Equipmen	Import	container/g.cargo						
DRI	Sohar	1200	Plant Equipmen	Import	container/g.cargo						
DRI	Sohar		DRI	Export	container/g.cargo			1,164,000		1,164,000	1,164,000
DRI	Sohar		Scrap	Import	container/g.cargo			98,900		98,900	98,900
DRI	Sohar		Other Materials	Import	container/g.cargo			80,000		80,000	80,000
Total								1,687,900	85,000	2,019,900	2,019,900
Sohar Intl Urea	Sohar			Import	g.cargo			10,000	18,000		
Sohar Intl Urea	Sohar		Urea Bulk	Export	dry bulk			1,225,000		2,450,000	2,450,000
Aluminum	Sohar		Alumina	Import	dry bulk			635,000		1,270,000	1,270,000
Aluminum	Sohar		Petrocoke	Import	dry bulk			115,000		230,000	230,000
EDC	Sohar		Salt	Import	dry bulk			550000		550000	550000
DRI	Sohar		Iron Ore	Import	dry bulk			1,885,000		1,885,000	1,885,000
Total								4,410,000		6,385,000	6,385,000
Oman Methanol	Sohar		Liq Bulk MeOH	Export	liq bulk			1,600,000		3,200,000	3,200,000
Sohar Oil Refinery	Sohar		Liq Bulk	Export	liq bulk			5,400,000		5,400,000	5,400,000
Aluminum	Sohar		Pitch	Import	liq bulk (heated)			29,000		58,000	58,000
Polyethylene/Dow	Sohar		Liq Bulk	Import	liq bulk			150,000		150,000	150,000
EDC	Sohar		EDC Liq Bulk	Export	liq bulk			500,000		500,000	500,000
Total								7,679,000		9,308,000	9,308,000

total by cargo mode

container	container	1,202,000	6,000	1,214,000	1,214,000
container/g.cargo	container/g.cargo	1,687,900	85,000	2,019,900	2,019,900
g.cargo	g.cargo	10,000	18,000		
dry bulk	dry bulk	4,410,000		6,385,000	6,385,000
liq bulk	liq bulk	7,679,000		9,308,000	9,308,000
cargo total	cargo total	14,988,900	109,000	18,926,900	18,926,900

Source: JICA Study Team

Table 7.1-3 Oman Large New Projects Cargo Traffic Estimation Worksheet, Sorting by on Time and Continuous

Unit: Ton

One time traffic (plant etc)

Sohar Intl Urea	Sohar	90	Plant Equipmen	Import	container			6,000		
Sohar Intl Urea	Sohar			Import	g.cargo		10,000	18,000		
Oman Methanol	Sohar	70	Plant Equipmen	Import	container/g.cargo			25,000		
Sohar Oil Refinery	Sohar	240	Plant Equipmen	Import	container/g.cargo					
Sohar Polypropylene	Sohar	25	Plant Equipmen	Import	container/g.cargo					
Aluminum	Sohar	325	Plant Equipmen	Import	container/g.cargo			60,000		
Polyethylene/Dow	Sohar	200	Plant Equipmen	Import	container/g.cargo					
EDC	Sohar	50	Plant Equipmen	Import	container/g.cargo					
DRI	Sohar	1200	Plant Equipmen	Import	container/g.cargo					
Total							10,000	109,000		

Continuous traffic

Sohar Intl Urea	Sohar		Urea Bulk	Export	dry bulk		1,225,000		2,450,000	2,450,000
Sohar Intl Urea	Sohar			Import	container		2,000		4,000	4,000
Oman Methanol	Sohar		Liq Bulk MeOH	Export	liq bulk		1,600,000		3,200,000	3,200,000
Oman Methanol	Sohar		Parts etc.	Import	container/g.cargo		2,000		4,000	4,000
Sohar Oil Refinery	Sohar		Liq Bulk	Export	liq bulk		5,400,000		5,400,000	5,400,000
Sohar Oil Refinery	Sohar		Parts etc.	Import	container/g.cargo		5,000		5,000	5,000
Sohar Polypropylene	Sohar		PP Container	Export	container		340,000		340,000	340,000
Sohar Polypropylene	Sohar		Parts etc.	Import	container/g.cargo		3,000		3,000	3,000
Aluminum	Sohar		Aluminum Ingo	Export	container/g.cargo		330,000		660,000	660,000
Aluminum	Sohar		Alumina	Import	dry bulk		635,000		1,270,000	1,270,000
Aluminum	Sohar		Petrocoke	Import	dry bulk		115,000		230,000	230,000
Aluminum	Sohar		Pitch	Import	liq bulk (heated)		29,000		58,000	58,000
Aluminum	Sohar		Others	Import	container		10,000		20,000	20,000
Polyethylene/Dow	Sohar		PE Container	Export	container		850,000		850,000	850,000
Polyethylene/Dow	Sohar		Others	Import	container/g.cargo		5,000		5,000	5,000
Polyethylene/Dow	Sohar		Liq Bulk	Import	liq bulk		150,000		150,000	150,000
EDC	Sohar		EDC Liq Bulk	Export	liq bulk		500,000		500,000	500,000
EDC	Sohar		Salt	Import	dry bulk		550000		550000	550000
DRI	Sohar		DRI	Export	container/g.cargo		1,164,000		1,164,000	1,164,000
DRI	Sohar		Scrap	Import	container/g.cargo		98,900		98,900	98,900
DRI	Sohar		Other Materials	Import	container/g.cargo		80,000		80,000	80,000
DRI	Sohar		Iron Ore	Import	dry bulk		1,885,000		1,885,000	1,885,000
Total							14,978,900		18,926,900	18,926,900

one time traffic	10,000	109,000	
continuous cargo traffic	14,978,900	18,926,900	18,926,900
	14,988,900	109,000 18,926,900	18,926,900

2nd Phase 2011-2015

Ferrochrome	Sohar		Ferrochrome	Export	container				100,000	100,000
Magnesium	Sohar		Magnesium	Export	container				25,000	25,000
Silicon Metal	Sohar		Silicon Metal	Export	container				30,000	30,000
Plate Glass	Sohar		Plate Glass	Export	container				350,000	350,000
Total									505,000	505,000

Ferrochrome	Sohar	100	Plant Equipmen	Import	container/g.cargo			25,000		
Magnesium	Sohar	100	Plant Equipmen	Import	container/g.cargo			10,000		
Silicon Metal	Sohar	100	Plant Equipmen	Import	container/g.cargo			20,000		
Plate Glass	Sohar	500	Plant Equipmen	Import	container/g.cargo			100,000		
Total								155,000	0	0

container		505000	505000
container/g.cargo	155000	0	0
cargo total	155000	505000	505000

Source: JICA Study Team

Table 7.1-4 Oman Large New Projects Cargo Traffic Estimation Worksheet, Summary

Unit: Ton

1st Phase 2006-2010				
container	1,202,000	6,000	1,214,000	1,214,000
container/g.cargo	1,687,900	85,000	2,019,900	2,019,900
g.cargo	10,000	18,000		
dry bulk	4,410,000		6,385,000	6,385,000
liq bulk	7,679,000		9,308,000	9,308,000
cargo total	14,988,900	109,000	18,926,900	18,926,900
2nd Phase 2011-2015				
container			505000	505000
container/g.cargo		155000	0	0
cargo total		155000	505000	505000
1st Phase plus 2nd Phase				
container	1,202,000	6,000	1,719,000	1,719,000
container/g.cargo	1,687,900	290,000	2,019,900	2,019,900
g.cargo	10,000	18,000		
	2,899,900	314,000	3,738,900	**3,738,900**
dry bulk	4,410,000		6,385,000	**6,385,000**
liq bulk	7,679,000		9,308,000	**9,308,000**
cargo total	14,988,900	314,000	19,431,900	19,431,900

Source: JICA Study Team

Table 7.1-5 Cargo Traffic through Sohar and Salalah Port

- New Large Projects and Industrial Zones -

Unit: Ton

Year				2006	2007	2008	2009	2010	-2015 Plants	2015	2020	2025
Sohar	New Projects		Container	3,000	352,000	1,202,000	1,202,000	1,202,000	6,000	1,719,000	1,719,000	1,719,000
			Cont/G.Cargo	0	48,000	230,000	1,026,450	1,687,900	290,000	2,019,900	2,019,900	2,019,900
			G.Cargo	13,000	5,000			10,000	18,000			
				16,000	405,000	1,432,000	2,228,450	2,899,900	314,000	3,738,900	3,738,900	3,738,900
			Dry Bulk		1,225,000	1,680,000	3,467,500	4,410,000		6,385,000	6,385,000	6,385,000
			Subtotal	16,000	1,630,000	3,112,000	5,695,950	7,309,900	314,000	10,123,900	10,123,900	10,123,900
			Liquid Bulk		7,000,000	7,168,000	7,679,000	7,679,000		9,308,000	9,308,000	9,308,000
		Total		16,000	8,630,000	10,280,000	13,374,950	14,988,900	314,000	19,431,900	19,431,900	19,431,900
	Industrial Zones	Export	Container	0	0	0	0	0		309845	774,613	1,549,227
		Import	Container	0	0	0	0	0		193385	483,463	966,926
		Total	Container	0	0	0	0	0		503,230	1,258,076	2,516,153
	Sohar Port		**Grand Total**	**16,000**	**8,630,000**	**10,280,000**	**13,374,950**	**14,988,900**	**314,000**	**19,935,130**	**20,689,976**	**21,948,053**
Salalah	FTZ	Export	Container	0	0	0	0	272,395		544,749	1,089,581	2,179,162
		Import	Container					169,805		339,610	679,219	1,358,438
		Total	Container					442,200		884,359	1,768,800	3,537,600
	Salalah Port		**Grand Total**	**0**	**0**	**0**	**0**	**442,200**		**884,359**	**1,768,800**	**3,537,600**

Source: JICA Study Team

7.1.3 Mining & Quarrying Industry

Minerals for export are generally in solid bulk, and the handling facilities are not readily available in Sultan Qaboos Port. In Salalah Port, solid bulk handling facility exists. The non-existence of solid bulk handling facility in northern Oman made it difficult for mining industry project to be seriously considered.

Ministry of Commerce and Industry, Directorate General of Minerals provided the JICA Team with the data for export possibilities of minerals sorted by location of major ports under the current JICA study. With subsequent discussions, the JICA Team came up with the traffic forecast for 2006-2010, 2015, 2020 and 2025, as shown in the Table 7.1-6.

It is worth pointing out that the lack of shipping infrastructure discouraged the projects to explore minerals of Oman. The only bulk handling facilities for minerals is currently available in Salalah port, and the jetty used for copper export near Sohar disused for some time. There is a plan to build a jetty for aggregate export near Shinas toward the border with UAE. The project to exploit and export aggregates in Musandam is to have its own jetty. There were studies to export gypsum of Shwaimiah area by Japanese companies, the result being unfeasible due to a large cost of construction of jetty for export. If the jetty is to be used by multiple minerals available in the area, feasibility of the projects may increase.

The Team was told of the possibility of Limestone export to India for steel making, and if it realizes, the requirements for mineral handling in Salalah may have to be increased to 5 million tons per year, and eventually to 10 million tons. It would be necessary to build an independent jetty especially for this purpose when the project realizes.

For Salalah port, 1 million tons of minerals export is included for the purpose of the present master plan study.

Table 7.1-6 Mineral Export Possibilities

Port Area				2006	2007	2008	2009	2010	2015	2020	2025
Year											
Khasab	Minerals	Export	Dry Bulk	1,000,000	1,000,000	1,100,000	3,000,000	4,000,000	4,000,000	5,000,000	7,000,000
	Through quarry's own jetty										
Shinas	Minerals	Export	Dry Bulk	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
	Separate jetty plan near the border exists										
Sohar	Minerals	Export	Dry Bulk	1,000,000	1,500,000	2,000,000	2,500,000	3,000,000	3,000,000	3,000,000	3,000,000
	MOCI information: Salt 500,000 tons included in EDC Project cargo. Other possibilities include copper concentrate 200,000 tons/year, Gabbro and Marble.										
(Sultan Qaboos)											
	No specific porribility of mineral export mentioned.										
Sur	Minerals	Export	Dry Bulk								
	Possibilities of Cement, Coal, Aggregate, Marble etc. informed by MOCI										
Duqm	Minerals	Export	Dry Bulk	1000000	1500000	2000000	3000000	4000000	4000000	4000000	4000000
	Possibilities include Aggregate, Limestone and Silica Sand/Quartzite.										
Shwaimiah	Minerals	Export	Dry Bulk								
	Possibilities include Cement, Gypsum, Attapugite, Limestone, Calcium Carbonate, Aggregate.										
Salalah	Minerals	Export	Dry Bulk	2,500,000	2,875,000	3,300,000	3,800,000	4,400,000	7,000,000	10,000,000	10,000,000
	Possibilities include Aggregate, Gabbro, Limestone, Marble, Silica Sand, Clay, Dolomite.										
	The discussion with Tata on Limestone export upto 10 million tons/year is said to be proceeding.										

Source: MOCI

7.1.4 Fisheries Industry

In the early 1990s, a study was made for Fisheries DG for fisheries ports development. In the study, it was stated that the maximum fish catch for sustainable fisheries in Oman is 419,000 tons per year. When this maximum quantity is reached is uncertain. At present, commercial fishery companies are subcontracting to foreign fishing ship, and the efficiency is considered to be low, and the utilization of Omani workforce is not sufficient. The plan, however, for providing infrastructure for fisheries is proceeding gradually.

Aquaculture may provide a frontier for Oman's fisheries industry. The sixth five year plan states that the fish stock of Fanar fish in Oman's sea is estimated at about 4490,000 ton, about 4000,000 tons are ready for exploitation, although the quantities actually exploited are considered very meager.

In the current exercise, this possibility is not dealt with, but in the long term, there will be a breakthrough and the landing and export cargo traffic may be larger than forecasted. For the purpose of commercial port master plan, the target of 419,000 tons was increased to 500,000 tons per year in view of the possibility of the development of aquaculture and possible finding of reserves, which increases the maximum quantity of fish catch to keep sustainable fishing. This target is supposed to be attained in 2025. A gradual slope of production/export growth was estimated from 2003 to 2025. A ratio of 50% of total catch is supposed to be exported, same as current situation.

Currently, landed fish, after processing, is brought to Muscat and exported. Small quantities are exported from Salalah. Large portion is exported to UAE through border posts. Considering these situations, export is considered to be utilizing Salalah for catch in Dhofar, Duqm for Al Wusta plus half of Sharqiah, Muscat for Muscat plus half of Sharqiah, Sohar/Shinas for Batinah (50% each for cargo traffic forecast purpose), and Khasab for Musandam. However, catch in Musandam will continue to be shipped via truck to UAE, and usage of Khasab port for export is estimated to be minimal, hence zero for port cargo traffic forecast purpose.

Total landing of Oman was extrapolated toward 500,000 tons in 2025, and regional ratio was taken from 1999-2003 figures from fisheries statistics. Industrial fishery catch is included in Oman's total. The result of the exercise is shown in the Table 7.1.4.

The above exercise was made in the absence of data from the MOAF. After the authentic data is obtained with regard to the landing, export quantities and location, the data will be revised accordingly.

Table 7.1-7 Estimation of Fish Export based on Certain Assumption Unit: Ton

	Year	Total Landing	Khasab	Shinas/Soha	Qaboos	Duqm	Salalah	Oman Total
		Share of Tonnage	0.0470	0.1979	0.3521	0.2682	0.1348	1.0000
Actual	1999	45299	2,102	10,341	16,075	14,119	5,697	48,334
Actual	2000	46160	2,690	11,875	18,573	11,503	9,369	54,010
Actual	2001	52464	2,934	13,351	22,034	16,100	8,219	62,638
Actual	2002	62250	2,562	10,316	21,217	16,859	6,710	57,664
Actual	2003	69009	2,965	9,941	21,447	17,065	8,021	59,439
Forecast	2004	73,167	3,439	14,480	25,762	19,624	9,863	73,167
Forecast	2005	77,577	3,646	15,352	27,315	20,806	10,457	77,577
Forecast	2006	82,251	**3,866**	**16,278**	**28,961**	**22,060**	**11,087**	**82,251**
Forecast	2007	87,208	**4,099**	**17,258**	**30,706**	**23,389**	**11,756**	**87,208**
Forecast	2008	92,463	**4,346**	**18,298**	**32,556**	**24,799**	**12,464**	**92,463**
Forecast	2009	98,035	**4,608**	**19,401**	**34,518**	**26,293**	**13,215**	**98,035**
Forecast	2010	103,942	**4,885**	**20,570**	**36,598**	**27,877**	**14,011**	**103,942**
Forecast	2011	110,206	5,180	21,810	38,803	29,557	14,856	110,206
Forecast	2012	116,847	5,492	23,124	41,142	31,338	15,751	116,847
Forecast	2013	123,888	5,823	24,517	43,621	33,227	16,700	123,888
Forecast	2014	131,354	6,174	25,995	46,250	35,229	17,706	131,354
Forecast	2015	139,269	**6,546**	**27,561**	**49,037**	**37,352**	**18,773**	**139,269**
Forecast	2016	147,661	6,940	29,222	51,992	39,603	19,905	147,661
Forecast	2017	156,559	7,358	30,983	55,125	41,989	21,104	156,559
Forecast	2018	165,994	7,802	32,850	58,446	44,519	22,376	165,994
Forecast	2019	175,996	8,272	34,830	61,968	47,202	23,724	175,996
Forecast	2020	186,602	**8,770**	**36,929**	**65,703**	**50,047**	**25,154**	**186,602**
Forecast	2021	197,847	9,299	39,154	69,662	53,062	26,670	197,847
Forecast	2022	209,769	9,859	41,513	73,860	56,260	28,277	209,769
Forecast	2023	222,409	10,453	44,015	78,310	59,650	29,981	222,409
Forecast	2024	235,812	11,083	46,667	83,029	63,245	31,787	235,812
Forecast	2025	250,000	**11,750**	**49,475**	**88,025**	**67,050**	**33,700**	**250,000**

Assumptions
Total maximum catch in 2025 will be 250,000 Tons
From 2003 to 2025, 6% growth is realized every year
50% of catch will be exported
All export of region will be through nearest port. Sharqiah catch to be diverted 50:50 to Muscat and Al Wusta

Source: MOAF Fisheries Statistics and JICA Study Team

7.2 International Transshipment Container

7.2.1 Evolution of International Shipping

(1) Sharp Rise of Container Movement

Container terminals in Sultanate of Oman both at Salalah and Sultan Qaboos Ports are all working at more than their full capacity in 2004. During the visit of the Study team, more than three container vessels have been waiting for the berth at the anchorage at both ports.

At the end of last year (2003) global container port volume growth was 14.5% compared with previous year. The world wide container business has shifted to fewer hub ports. While ports of over one million TEUs registered 14.8% annual growth rate, less than one million TEUs ports growth was 10.4%. This tendency seems to continue for few more years as more over 6000TEUs capacity vessels coming to the market.

The Middle East region container grew by 20.8% during the year 2003. Most of the regional ports are faced with congestion and a growth of 6.9% and 8.2% is forecast for the years 2004 and 2005 respectively.

Container volume handled at Salalah increased by 59% against previous year partly because sudden surge of cargo movement related Iraqi and Afghan rehabilitation and partly its relative security versus to inside Gulf ports and Yemeni ports.

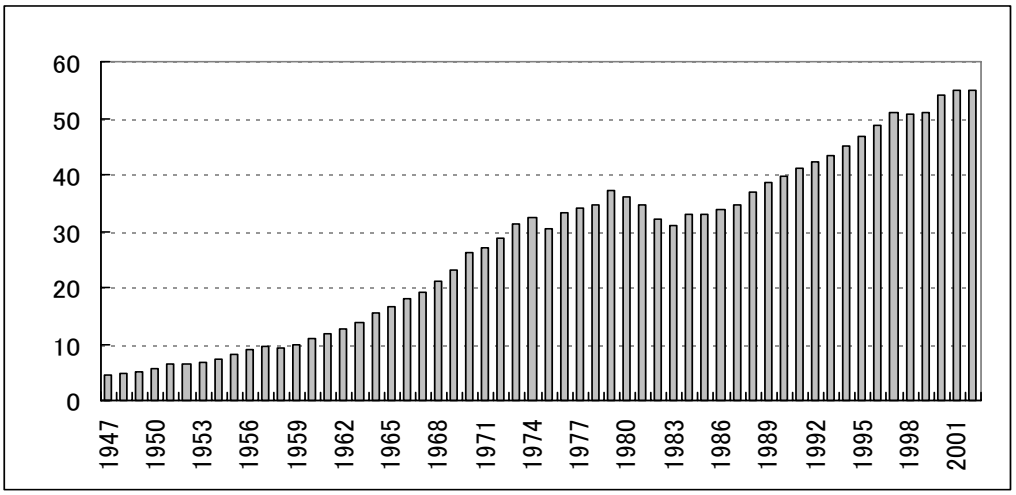
Sultan Qaboos Port also registered 260,000 TEUs in 2003 which is remarkable growth of 25% from previous year. Reasons of this growth are mainly due to start of a new transshipment service by Mediterranean Shipping Company (MSC).

In order to evaluate future prospect of container volume particularly of transshipment, further analysis on the shipping trend as well as regional economy and competitive positions are made.

(2) Movement of Cargoes Transported by Sea

The volume of sea-transported cargoes including containers has historically increased as shown on Figure 7.2-1. World cargo volume decreased only during an energy conservation campaign to cope with rapid price increase of oil, which accounted for 40 percent of cargoes transported by sea in the world. Increase of population and GDP has strongly supported this trend. Cargo growth seems oblivious to serious trouble or large accidents.

Figure 7.2-1 Movement of Cargoes Unit: hundred millions tons



Source: Research-Co-operation Office, Mitsui O.S.K. Lines "Current status of Liner Shipping 2002/2003"

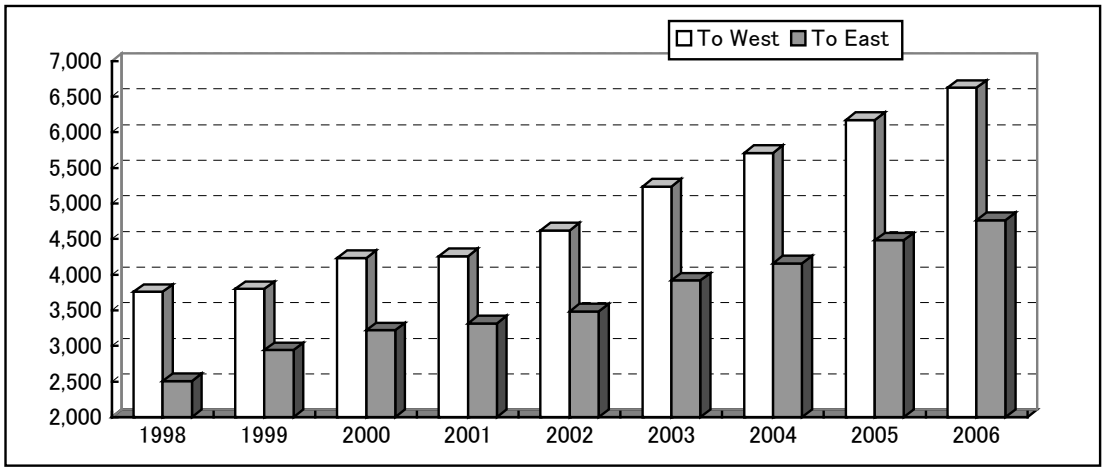
(3) Rapid Increase of Container Cargoes

Container traffic has rapidly increased as a result of globalization. Since the 1980's, foreign capital has flowed into Asian nations and China where political stability has been maintained and technical skills improved. As a result, production infrastructure in this region has been continuously developed. The Asian currency crisis in 1997 presented Asian countries with a good opportunity to increase exports, and this eventually started the trend of outsourcing to Asian nations. In addition, China joined the WTO in 2001. The East Asian region has become one of the world's largest factories. Development of production and trade without regard for borders has accelerated growth of container traffic. This trend will continue in future.

(4) Enlargement of Container Vessels

Supported by such lively trend, larger and larger container vessels are being launched everywhere to cope with cargo rush and to take advantage of the scale of merit. Also in Asia-Europe container trade which produces a powerful effect on the future of Salalah Port in Oman, the forecast is very vivid thanks to strong Chinese trade and increased buying power in Europe due to the strong Euro.

Figure 7.2-2 Cargo Forecast in Asia-Europe Trade Unit: 1,000 TEU



Source: Research-Co-operation Office, Mitsui O.S.K. Lines "Current status of Liner Shipping 2002/2003 "

Strong annual cargo growth ratio is expected as follows.

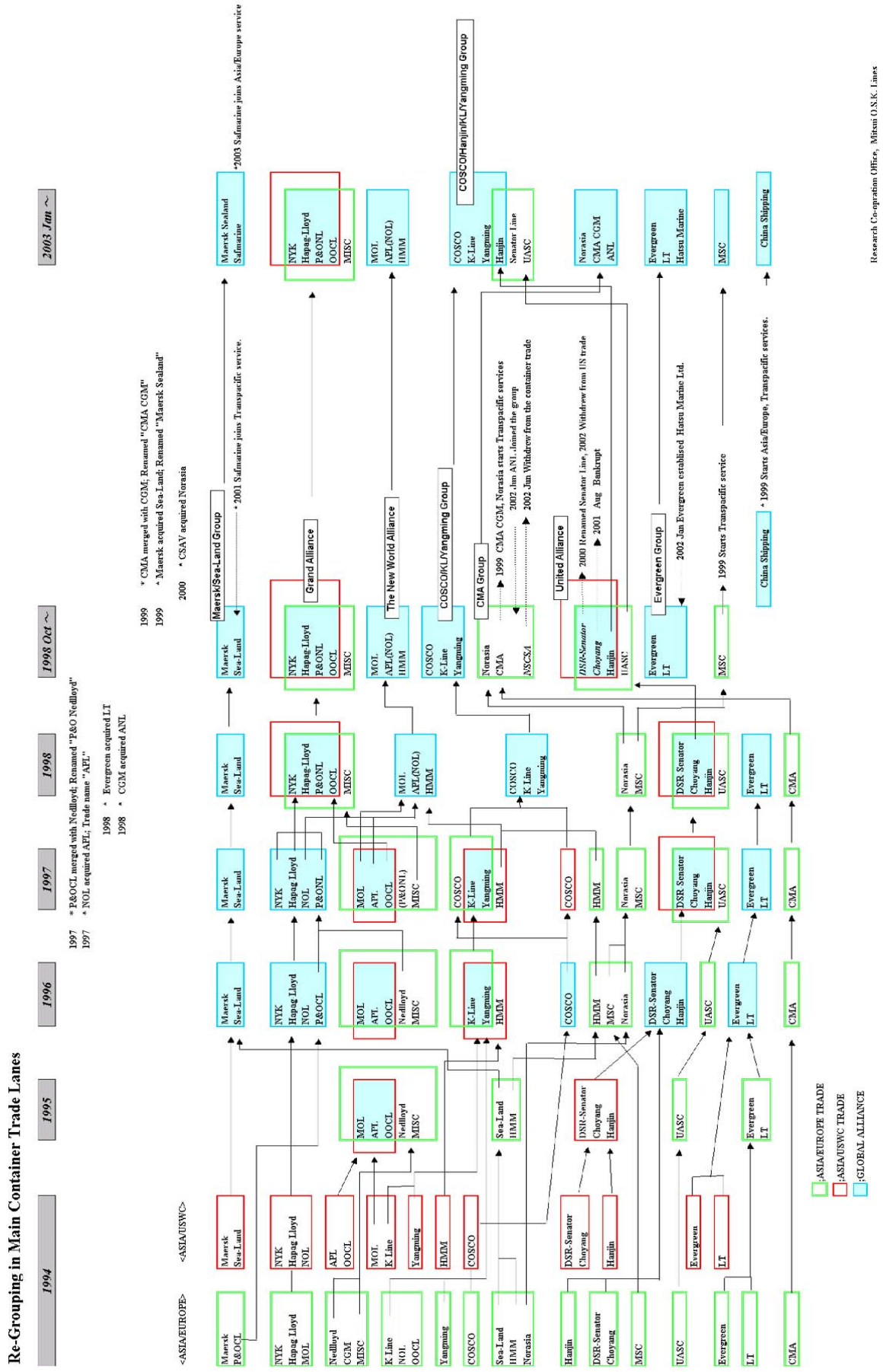
- From Asia to Europe (West bound) 7.5~9.5 percent
- From Europe to Asia (East bound) 6.2~7.8 percent
  (By Research-Co-operation Office, Mitsui O.S.K. Lines)
- From Asia to Europe (West bound) 5.2~14.7 percent
- From Europe to Asia (East bound) 5.1~6.9 percent
  (By Drewry Container Consultants)

Table 7.2-1 Outline of Main Alliance and Shipping Lines in Asia-Europe Trade

	Aug. 2002			Aug. 2003		
	Loop	Vessels	Average	Loop	Vessels	Average
TNWA	3(0)	24	5,520TEU	3(0)	24	5,715TEU
Grand Alliance	7(2)	63	5,216TEU	8(2)	71	5,103TEU
(KL/COSCO/YangMing)	4(1)	35	4,937TEU	-	-	-
(United Alliance)	5(1)	55	4,157TEU	-	-	-
CHKY Group	*9(2)*	*90*	4,574TEU	9(3)	82	4,485TEU
Maersk Sealand	3(0)	30	6,221TEU	4(1)	39	6,019TEU
Evergreen/LT	3(1)	29	4,527TEU	3(1)	29	4,746TEU
CMA Group	3(1)	27	4,692TEU	4(1)	31	4,400TEU
MSC	1(0)	10	6,675TEU	2(1)	18	5,861TEU
China Shipping	1(0)	8	3,779TEU	1(0)	9	4,191TEU

Source: Research-Co-operation Office, Mitsui O.S.K. Lines " Current status of Liner Shipping 2002/2003 "

Table 7.2-2 Re-Grouping in Main Container Trade Lanes



Source: JICA Study Team

Although cost saving by the merit of mother vessel's size is becoming almost minimal area, due to the limitation of maximum engine power for a single screw, requirement of higher cost for twin screw, as well as additional investment required for port facilities, the maximum limit of container vessels have been stepped up from 6000 TEUs types to 8000 TEUs types. Some of these 8000 TEUs types can manage to carry up to 9000 TEUs by squeezing the space of containers.

Table 7.2-3 Container Vessels of Over 7,000 TEUs Capacity under Construction

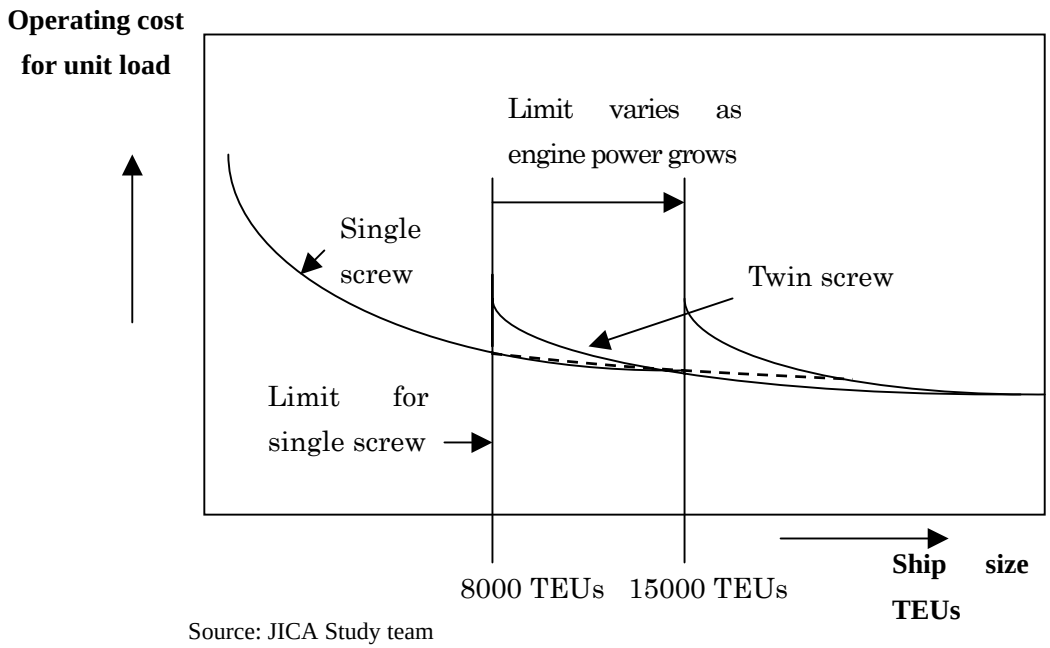
Owner	Operator	Shipyard	TEUs Vessels	Completion
Seaspan（Canada）	China Shipping	Samsung	9,500 x 4	2006
MSC	MSC	Daewoo	8,400 x 4	2006-2007
Nordeeutsche Vermogen（Germany）	Hapag-Lloyd	Daewoo	8,300 x 2	2005
Nordeeutsche Vermogen（Germany）	－	Daewoo	8,300 x 3	2006
E.R.Schiffahrt（Germany）	－	Hyundai	8,200 x 4	2006
Costamare（Greece）	COSCO	Hyundai	8,200 x 5	2006
CMA CGM	CMA CGM	Hyundai	8,200 x 8	2006
CMA CGM	CMA CGM	Hyundai	8,200 x 1	2004
MSC	MSC	Hyundai	8,200 x 2	2004
ContiReederei（Germany）	CMA CGM	Hyundai	8,200 x 2	2004
Blue Star（Germany）	P&O Nedlloyd	IHIMU	8,150 x 8	2004-2007
K Line	K line	IHIMU	8,120 x 4	2006
Seaspan（Canada）	China Shipping	Samsung	8,100 x 3	2005
Danaos（Canada）	China Shipping	Samsung	8,100 x 2	2004-2005
ContiReederei（Germany）	Evergreen	Samsung	8,100 x 8	2005-2006
Reederei C.P.Offe（Germany）	MSC	Samsung	8,074 x 4	2005-2006
Reederei C.P.Offen（Germany）	－	Samsung	8,074 x 5	2006-2007
OOCL	OOCL	Samsung	8,063 x 10	2004-2006
Reederei C.P.Offen（Germany）	MSC	Hanjin	8,034 x 2	2005
Reederei C.P.Offen（Germany）	－	Hanjin	8,034 x 4	2006-2007
MSC	MSC	Hanjin	8,034 x 3	2005
YangMing	YangMing	Hyundai	8,000 x 4	2006-2007
Hapag-Lloyd	Hapag-Lloyd	Hyundai	8,000 x 3	2005-2006
NYK	NYK	IHIMU	8,000 x 4	2007
NYK	NYK	Hyundai	8,000 x 4	2007
MISC	MISC	Daewoo	8,000 x 2	2006-2007
Maersk Sealand	Maersk Sealand	Odense	7,900 x 5	2004-2006
HCI Holding（Germany）	－	Hyundai	7,700 x 7	2006-2007
E.R.Schiffahrt（Germany）	COSCO	Hyundai	7,500 x 5	2004
ContiReederei（Germany）	Hanjin	Hyundai	7,455 x 5	2005

Source: Research-Co-operation Office, Mitsui O.S.K. Lines "Current status of Liner Shipping 2002/2003 "

Until 2002, shipping market was exposed to severe competitive condition. However, business environment on the container shipping has been much improving since 2003. Accordingly many shipping operators are more aggressive to invest in the larger vessels in the main route. The list of over 7000TEUs vessels in order is shown in the Table 7.2-3.

Consequently, secondary route and tertiary route receive second handed main route mother vessels for feeder service, which necessitates improvement or selection of feeder ports. Relationship between a ship size and its operating cost per unit load is indicated in the Figure 7.2-3. The operating cost becomes less as the ship size grow. However, as the size become larger, the less reduction rate of cost becomes. At the size of approximately at 8,000 TEUs, the curve become near level stage because the limitation of available engine power for single screw. A larger vessel requires, therefore, twin screw driven by two engines which costs considerably higher than single engine vessel. If more powerful diesel engine becomes available, the limit for the single screw ship will become larger.

Figure 7.2-3 Relation with Operation Cost for a Unit Load and Ship Size



Source: JICA Study team

The trunk route of Asia-Europe container trade has longer distance and more concentrated volume of trade than that of Asia-USA trade. Vessels launched into the Asia-USA trade can hold 3,976 TEUs containers on average and one launched into the Asia-Europe trade can hold 4,191 TEUs. Accordingly, the largest-sized container vessels have been introduced to Asia-Europe trade since the start of the container shipping business. This trend will continue in future. The larger a vessel becomes, the greater the number of containers it can handle. However, a larger ship requires more staying time at each port for loading/discharging. Each shipping line will thus limit the number of calling ports to strategic hub ports in order to maintain transit time as before.

7.2.2 Competition with Surrounding Ports

(1) Overview

As each port in the region will strive to acquire hub port status, competition is expected to be severe. Ports in Sultanate of Oman exist amid of many regional hub ports. The port of Sultan Qaboos has its

captive cargo mainly for Muscat area and also some transshipment cargo for Gulf ports. The port of Salalah, on the other hand, handles mostly transshipment cargo for Gulf ports, Indian ports and Indian Ocean ports, as well as ports of East coast of Africa.

While Sultan Qaboos Port is placed at the rear rank of regional hub ports due to its limitation in capacity, Salalah port has emerged as one of the top positions of hub ports in the Indian Ocean.

Competitors in the region are not only limited among the ports in the Arabian Peninsula but also include ports in the Indian Subcontinent ports including Jawaharlal Nehru (India), Colombo (Sri Lanka) and Singapore/Tanjung Pelepas.

(2) Competition with Dubai

Middle East Port development has been dominated by the success of the DPA (Dubai Ports Authority). Despite having a very small regional and domestic population the twin ports of Jebel Ali and Port Rashid under a combined management structure of DPA has been extremely successful in attracting a significant share of the dominant trade method (being transshipment).

The Government of Dubai through DPA was quick to recognize that investment in infrastructure would directly relate to the success and ability to attract the major carriers. Dubai Governments Policy of 'Infrastructure Development' has paid dividends despite the fact that both of Dubai's ports are within the Gulf and requires a sailing diversion from the main trade routes and navigation through the Straits of Hormuz. Additional benefits of the Jebel Ali Free Zone attracted its own growth freight factor reducing the percentage of transshipment business in DPA from an initial 75% to an almost equal balance of local traffic and transshipment traffic 50/50% split.

Dubai Port has 17 container berths (-14 to -16m) and general and bulk terminals. Its free trade zone has a 100 sq. km land area immediately behind the port. Container throughput was 4,194,300 TEUs (No.13 in the world) in 2002 and 5,151,955TEUs (No.11 in the world) in 2003. Half of the total is transshipment cargo and the other half is cargo originating in or destined to the port's hinterland or processed and re-packed for re-export including dhow trade to Iran and CIS countries through Iranian ports.

Table 7.2-4 Container Throughput in Dubai Unit: 1,000 TEU

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Inbound	515.6	600.3	685.7	768.5	788.6	881.1	1,001.7	1,196.1	1,440.4
Outbound	515.6	457.0	514.3	596.3	613.1	706.9	769.7	904.2	1,096.3
Transshipment	1,041.8	1,189.8	1,400.0	1,439.3	1,443.0	1,470.9	1,730.4	2,093.9	2,615.2
Total	2,073.0	2,247.1	2,600.0	2,804.1	2,844.7	3,058.9	3,501.8	4,194.2	5,151.9
Transshipment	50.3%	52.9%	53.8%	51.3%	50.7%	48.1%	49.4%	49.9%	50.8%

Source: Dubai Ports Authority

A part of the cargo handled at Dubai as its local cargo, is destined/originated to/from Oman through land route due to insufficient capacity and/or lower service at Omani ports particularly at the Northern

coastal area including Musandam province. iv

In case a shipping line shifts from Dubai to some other port, it can not but transship Dubai cargoes i.e. half of loading containers. Dubai has not only value-added function in logistics service but also its original cargoes. This is a strong point of Dubai. The Dubai Port Authority is forecasting high volume growth over the next 20 years, as reflected in its ambitious expansion plan including Dubai Marine City. GAC, the major liner agency and logistic services provider, has also announced a US$ 5 million plan to expand its distribution center in the Jebel Ali Free Zone.

Dubai Port Authority is 100 % government owned agency and custom function is also included within DPA. EDI network is connected between Port Rashid and Jebel Ali port as well as Free Trade Zone. Custom clearance is made within 24 hours. The port, Customs and Immigration opens 24 hours. The shipping agent and other users can clear their document through internet without paper.

Because of large volume of traffic, number of shipping lines and size of calling vessels are largest in the region. Consequently, freight rate from Dubai is significantly less than smaller ports. Port charges are also lower than neighboring ports.

In summary Dubai have advantages/disadvantages to Omani ports as follows.

1) Advantages

- As an early starter, established the top position in the Gulf ports with a convenient feeder network
- Half of loading containers originate Dubai fully utilizing its FTZ, large and growing local market
- Competitive level of container freight rate and handling charge
- Excellent business environment i.e. comprehensive IT environment, internationally connected financial system, quick response of Authority and minimal regulatory requirement.

2) Disadvantages

- approximately 3.5 days deviation from the main Europe-Asia trunk route
- extra insurance premium required inside Hormuz straight in recent years (By the result of DPA's effort the premium is reduced for those ships passing within the Dubai to Omani coast through the designated channel in the Hormuz Strait).

(3) Other Ports in the Gulf Area

Major container ports inside of the Gulf, beside Dubai are Sharjah – Khalid, Ajman and Jeddah. And at the out side of Hormuz Strait, there are Khorfakkan and Fujairah. They are generally less competitive than Dubai but still have influence to Omani ports particularly for Qaboos and Sohar.

1) Inside Hormuz Strait:

General advantages are their proximity to the center of oil-thriving Gulf economy. However, longer sailing distance from the East-West trunk line route is the major common disadvantage for the group. More over, some shipping lines reduced or ceased their service by the higher insurance rate applied at the time of Gulf war for inside Hormuz strait ports. Although the insurance surcharge has been removed today, the effect still remains to some extents.

- Abu Dhabi (UAE) handles approximately one million TEUs of mainly local cargo generated through own industrial output and local market. Facilities have limitation - four 12.5 meter container berths - compared with Dubai.
- Sharjah (Mina Khalid) (UAE) has limited infrastructure investment (maximum -8m berths)
- Ajman (UAE) has limited infrastructure investment
- Mina Salman (Bahrain) new port has been under development and international tender for terminal operator has been announced. It contains two RO/RO/LO-LO berths and an industrial zone. However, this port will not become a container transshipment hub port.

2) Outside Hormuz Straight: -

- Khorfakkan (UAE) is located outside of Hormuz straight and privately owned port. Although it has container berths including one -15m and three -12m berths, large domestic cargo as Dubai is not expected due to limited hinterland. Nevertheless the port handled 1.16million TEUs in 2002.
- Fujairah (UAE) is also located outside of Hormuz adjacent to Khorfakkan. It has two -12.5m container berths. It has lost hub port status for Sealand and APL to Salalah. The volume of containers handled in 2002 was estimated to be 300,000TEUs. However, because of its location, close to the Northern provinces of Oman, the port handles some traffic from those provinces as well as other breakbulk cargo for those areas.

(4) Competition with Aden

Because of its proximity to the major shipping trunk route, many had great expectations for Aden.

Table 7.2-5 Container Throughput in Aden Unit: 1,000TEU

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Aden	11.0	9.7	10.0	8.1	8.9	12.1	13.5	57.5	121.7	248.2	377.7	398.4	155.7
Hodeidah						37.0	38.2	43.5	35.0	15.0	15.0		
Yemen	11.0	9.7	10.0	8.1	8.9	49.1	51.7	101.0	156.7	263.2	392.7	388.9	155.7

Source: World Container Port Markets to 2012; After 1997 Port of Aden home page.

However, due to the tremendous increase in war-risk insurance caused by the terrorist attack in Oct. 2002 on the French tanker Limburg, American President Line, the port's main user, has shifted to Salalah in Oman. Furthermore the port operator and 60% shareholder PSA (Port of Singapore

Authority) withdrew from ACT (Aden Container Terminal) and sold all its stocks to the Yemeni Government. Consequently containers handled at Aden sharply reduced in 2003 as shown in the Table 7.2-5. The Yemeni Government is looking for a new terminal operator. Details of vessels currently calling Aden are as follows.

- Main Line

  Far East – Colombo – Red Sea service operated by PIL (Pacific International Lines)

- Feeder service-

Only some feeder vessels from Salalah, Jeddah and Dubai operated by P&O Nedlloyd, Maersk Sealand and American President Line.

Some of disadvantages pointed out in the previous studies have considerably overcome by the opening of the new container terminal ACT on 17th Mar. 1999 and hard training by PSA.

Shipping lines suffer from high war-risk insurance. The highest insurance policy was 0.25 percent. About $125,000 was required for a standard type container vessel per one calling (staying within 7 days), rendering it virtually impossible to call Aden. Though the insurance premium has since been decreased to 0.025 percent i.e. about $12,500, it is still prohibitively high.

It is hard to forecast when the abovementioned problems are solved; it will likely take a good deal of time.

(5) Jedda (Saudi) at Red Sea

Jeddah (Saudi) has good infrastructure with efficiency. Containers handled in 2003 are 10,755,162 tons or approximate equivalent of one million TEUs. The container terminal is now operated by DPI (Dubai Port International) which is a subsidiary terminal of DPA (Dubai Port Authority). DPI applies same system as Jebel Ali and will become more efficient port. However, it is located far from the Indian Ocean and longer distance required to serve ports in the Gulf, Indian Sub-Continent. A part of East African trade will be affected. Therefore, the port is not regarded as an important competitor to Salalah.

(6) Djibouti

Djibouti is also located at Red sea and recently DPI has moved in as the operator. The port will serve for ports of Somalia, Ethiopia and Sudan as well as other East African ports. The volume of container handled at Djibouti in 2002 was only163,000 TEUs. Considering present capacity and stability of the area, the port may not be a competitor to Salalah.

(7) Competition with India

Table 7.2-6 Container Throughput in India Unit: 1,000 TEU

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Mumbai	315.4	427.6	487.0	517.5	583.4	601.3	509.3	429.4	321.4	254.0	272.7	
Calcutta	80.9	102.0	117.8	125.2	141.5	169.1	160.2	175.6	188.7	191.0	206.8	
Cochin	58.0	66.8	86.9	96.0	112.1	121.6	128.9	130.1	133.2	151.8	163	
Jawaharlal Nehru	142.7	173.1	244.1	339.4	423.1	504.1	*669.1	*890.0	*1,189.8	*1,573.7	*1,929.5	*2,269
Kandla	35.0	28.5	51.0	65.0	77.0	84.0	86.0	90.0	92.0	125.0	134.2	
Madras	126.4	162.1	200.5	227.5	256.5	292.6	283.8	322.0	352.3	344.5	373	
Tuticorin	35.0	48.1	57.0	68.6	88.8	102.5	99.5	136.6	157.0	213.5	242	
Visakhapatnam	8.6	8.7	11.1	8.5	13.1	12.6	14.3	20.1	20.2	21.5	23.3	
India Total	802.0	1,016.9	1,255.4	1,447.7	1,695.5	1,887.8	1,951.1	2,193.8	2,454.6	2,875.0	3,265.0	

Source: Until 1994 Ocean Shipping Consultants and JICA Study Team: After 1995 WORLD CONTAINERPORT OUTLOOK TO 2015 by Ocean Shipping Consultants, For Jawaharlal Nehru: JNP.

Note: * Figures of Jawaharlal Nehru include JNP CT and NSICT after 1998.

Major ports of India are located far from the Asia-Europe route. Nevertheless, India's large population generates a significant volume of traffic. As local economy is now reaching to the take-off stage, greater growth rate of trade is expected. Accordingly, shipping lines prefer direct service to transshipment one unless the water depth restriction. Jawaharlal Nehru (JNP), the largest port in India, dose not have much function of a hub port serving for other Indian ports because of its water limitation. Number of containers transshipped at JNP is 25,000 TEUs, which is only 2% of all containers.

General disadvantages of Indian ports are limitation of water depth at the ports, due to siltation by prevailing littoral current along the coast line and extensive continental shelves. Up till today, productivities problems still remain at the Indian ports.

Jawaharlal Nehru (JN) port has a channel length of 7.2 KM with maintained depth of -10.7m to -11m. Dredging to further depth is necessary to receive over 4000 TEUs size vessels, which is now serving for secondary feeder routes. Huge costs required for capital and maintenance dredging will be the impediment for the port for the time being. Therefore, most of the traffic to and from areas further than South and West Asian has to rely on transshipment service rather than direct shipping.

(8) Competition with Colombo

Located almost right along the East-West trunk route, and good access to both sides of the Indian coast, a large number of shipping lines use Colombo as a transshipment port of cargoes from/to Indian Sub-continent, including Pakistan, and Bangladesh of Upper Gulf Bengal. Transshipment ratio is about 70%. Shipping lines can use various feeder services including Sea Consortium Lanka (Private) ltd., Bengal Tiger Line, Orient Express Line, Sri Lanka Shipping, HRC, ACL, Samudra Shipping and Sea Services.

Table 7.2-7 Container Throughput in Colombo Unit : 1,000 TEU

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Colombo	972.6	1,049.0	1,356.3	1,687.2	1,714.1	1,704.4	1,732.9	1,726.6	1.760	1,950
Transshipment	666.0	789.9	1,021.2	1,270.4	1,235.4	1,192.8	1,180.9	1,195.0	n.a.	n.a.
	68.5%	75.3%	75.3%	75.3%	72.1%	70.0%	68.1%	69.2%	n.a.	n.a.

Source : Until 1994 Drewry After 1995 WORLD CONTAINERPORT OUTLOOK TO 2015 by Ocean Shipping Consultants. For 2002 and 2003: www.slpa.lk/News/Colombo-Port

Disadvantages identified in the 13-22 of JICA study report (2000) stated that, "1. The port has limited draft and is continually affected by the south-west monsoon and rains, which necessitates more work-stops than in Salalah."

Colombo Port is increasing its harbor basin to 15m and approach channel to 16m. Accordingly, a large container vessel will be able to directly call Colombo and compete with Salalah.

Even though the main channel is dredged to 17m and opening of the North Channel is planned, number of berths in the existing basin can not be increased due to limitation of the area. Some of the breakbulk berths are going to be converted into feeder container berths by shifting bulk and break-bulk cargo handling to a Southern port(s). Additional capacity gained with this improvement may add not more than half million TEUs per year.

JICA study (2000) also mentioned "2. Political and civil strife caused by Tamil Tigers. Because of increase in war-risk insurance caused by Tamil Tiger's (LTTE) terrorist attack on the International Airport in Jul. 2001, some container shipping lines dropped Colombo Port."

This situation has been eased by temporary halt of confrontation. Although the formal agreement with Tigers is not yet materialized, container volume handled at Colombo recovered its growth from 2002 and 2003 as indicated in the Table 7.2-7. In 2004, the volume is expected to be above 2 million TEUs's which is close match to the volume handled at Salalah.

At the outside of the existing harbor basin, additional berths (South Harbor) have been proposed, but will not be materialized before 2008 or even after because of the magnitude of investment cost and limitation of workable period for construction due to interruption of works during monsoon.

As the alternative site for the South Harbor there is a possibility to develop immediate north side of the Colombo harbor. This area may be developed gradually with fewer disturbances by the monsoon waves. At any rate, major development may require several years at Colombo and in the mean time, expansion of number 5 and 6 berth at Salalah will take place within two years.

Therefore, Salalah may have advantageous position by gaining two new berths before Colombo develops South Harbor or North Harbor. For the longer spun, however, Colombo may become larger hub port in the Indian Ocean with better access to both coasts of India. Nevertheless, Salalah still has better access to East Africa and Gulf ports than Colombo.

Therefore close watch for Colombo will be necessary as a potential contender in the future.

(9) Competition with Singapore/Tanjung Pelepas

Singapore is the world second largest container hub port after Hong Kong and a strong rival of Salalah Port. Transshipment ratio is about 80%.

A lot of shipping lines have various routes from Singapore to Middle East via India (See International Transportation Handbook 2004 by Ocean Commerce). Most of them are directly connecting between China and Middle East. Containers from/to Japan, USA, Australia and other areas have been transshipped at Singapore. Assuming that vessel size continues to increase and that carriers will reduce the number of calling ports, some of this cargo may be diverted to Salalah in future.

Table7.2-8 Container Throughput in Singapore Unit : 1,000 TEU

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Singapore	6,354	7,560	9,046	10,399	11,846	12,944	14,135	15,136	15,945	17,087	15,571	16,800

Source : Until 1994 Containerization International Yearbook. After 1995 Intra-Asia Container Trades Dynamism Beyond Bounds January 2003 by Drewry

Currently, Singapore enjoys its status as the best transshipment port in this region thanks to good location and continuous investment. Although, Tanjung Pelepas in Malaysia is threatening the position of Singapore by offering lower charges, Singapore and Tanjung Pelepas together maintain one of the largest transshipment centers in the world.

With regard to its influence to Gulf ports, Africa, Indian Ocean islands and West Coast of Indian ports, Salalah has advantage in respect of shorter distance.

7.2.3 Prospects of International Container Shipping and Ports of the Sultanate of Oman

(1) Positions of Omani Ports in the International Container Terminals

1) Salalah

In 2003, Salalah marked its highest container volume of 2,001,000 TEUs, which is 59% higher than the previous year of 1,259,000 TEUs. Salalah has good reputation for its efficient operation, good access from the main container route, sufficient water (-16m) and world largest gantry cranes serviceable to 9,000TEUs class vessel.

Currently SPS has an annual capacity of 1.8 Million TEUss. First quarter of year 2002 witnessed a general drop in volumes mainly on account of events related to ‘September 11’. During the second and fourth quarter of year 2002, two new customers, Safmarine and APL, started calling the Port.

SPS has reached an agreement with China Shipping to use Salalah as their transshipment hub for the Indian Ocean Rim countries starting July 2003 with an expected annualized volume of 300,000 TEUsS. However, China Shipping stopped calling Salalah from beginning of 2004 due to

congestion at Salalah.

This sharp increase in traffic volume is mainly due to the impact of the war at Iraq as well as its advantageous location in the Indian Ocean and good accessibility to both Gulf and East African ports. At the same time, as joining of APL demonstrated, recent hike of insurance rates to the War Risk area pushed relative advantageous position of Salalah.

This rapid growth will soon come to a halt unless its limitations of capacity both berth and land spaces are eased by expansion. In fact, Mediterranean Shipping Company, which used to call Salalah moved its transshipment activities to Sultan Qaboos since 2003 due to the congestion. Ironically, Salalah has become a victim of its own success by attracting many customers and now is paying the price for not developing the infrastructure ahead of the DPA. Salalah will be unable to attract further business until much needed berth development is completed (some 18 months away). In shipping terms this is very serious as the carriers will deploy elsewhere to enable an improved Hub/Spoke Operation. Long term infrastructure vision is therefore essential for ports such as Salalah which will again suffer even after this current extension is completed.

Salalah handles approximately 98% of total containers as transshipment. Of which, approximately 35% intra lines (exchange of cargo among lines including other regions) 30% relates with India sub-continent ports, 18% with African ports and 18% with Gulf ports. Maersk/Sealand lines has share of 77 % of the total container vessels calling to Salalah, APL has 20 % and others has only 3 %. (Source: Analysis on "Vessel Movement record in Times of Oman" during August ~ September 2004 by JICA Study Team)

Due to shortage of the container berths and the yard, some feeder vessels are berthing at general cargo berths. Containers are also placed at a part of general cargo terminals. Subsequently, general cargo handling is affected with container traffic.

2) Sultan Qaboos

Similar to Salalah, the port experienced significant increase of cargo volume in 2003 compared to the previous year. Besides approximately 25% increase of container volume, other cargo also increased, such as vehicle (+26.4%) and import of dry bulk (+15%). Transshipment of containers also increased 101% mainly due to shift of MSC from Salalah. As the result, its transshipment ratio became 56%.

Table7.2-9 Containers at Sultan Qaboos Port, their O/D and Transshipment Ratio

REGION	Discharged TOTAL TEUs	(Inclusive in total) TRANS-SHIPMENT	TR Ratio %	Loaded TOTAL TEUs	(Inclusive in total) TRANS-SHIPMENT	TR Ratio %
Arabian Gulf Ports	51259	46034	90	7732	3135	41
Northern Europe	18139	1265	7	24401	14748	60
Red Sea Ports	2424	1230	51	8917	3335	37
Australia & NZ	2143	0	0	391	0	0
Indian Sub-continent	16706	4623	28	7245	2542	35
Mediterranean	9610	158	2	14299	12972	91
South east Asia	19801	0	0	5861	0	0
US East Coast	4881	4	0	1592	1	0
US West Coast	804	0	0	3630	3251	90
South America	2845	0	0	7	0	0
Canada	307	0	0	173	0	0
East Africa	752	636	85	7628	5455	34
Other Africa	2830	1886	67	2574	2166	84
Russia	7	0	0	130	0	0
Others	1565	647	41	16	0	0
TOTAL	134073	56483	42	84596	47605	56

Source: PSC Statistics 2003

Origin and destination of containers handled at Sultan Qaboos Port is shown in the Table 7.2-9. Among transshipment cargo, Arabian Gulf ports occupies highest share for inbound cargo and North Europe and Mediterranean region have significant share for out going cargo.

(2) Growth Rate of GDP in the Major Regions

Because of existence of a strong relationship between growth of GDP and that of container throughput, the future projection of a region can be utilizing GDP as the base case.

Table 7.2-10 GDP Growth in Middle East Region Unit: US Billion dollars

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
Bahrain	5.199	5.566	5.848	6.101	6.348	6.183	6.619	7.969	7.933	8.554	6.1
Iran	85.877	67.094	90.838	110.623	106.345	97.855	104.636	96.341	113.137	108.134	-0.06
Kuwait	23.995	24.873	26.555	31.069	29.865	25.123	29.184	35.824	32.803	33.099	5.2
Oman	12.494	12.919	13.803	15.277	15.839	14.085	15.711	19.868	19.944	20.295	5.0
Qatar	7.157	7.374	8.138	9.059	11.298	10.255	12.388	17.76	17.127	17.466	8.6
Saudi Arabia	118.516	120.167	127.811	157.743	167.866	151.704	162.758	188.772	183.257	188.471	4.4
UAE	35.745	38.268	42.807	47.993	51.209	48.52	55.193	70.522	69.861	71.243	7.2
Yemen	19.905	25.862	12.757	6.425	6.797	6.213	7.438	9.457	9.541	9.985	-24
TOTAL	308.888	302.123	328.557	384.29	395.567	359.938	393.927	446.513	453.603	457.247	3.2

Source: IMF Home Page (Gross domestic product, current prices)

Table 7.2-11 GDP Growth in East Africa Unit: US Billion dollars

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
Djibouti	0.466	0.492	0.498	0.494	0.503	0.514	0.536	0.553	0.573	0.592	3.5
Eritrea	0.468	0.532	0.587	0.694	0.686	0.745	0.728	0.641	0.708	0.644	-2.0
Ethiopia	6.25	5.56	5.763	5.993	6.383	6.535	6.434	6.363	6.233	6.059	-5.0
Kenya	5.752	7.149	9.047	9.257	10.745	11.18	10.542	10.438	11.396	12.333	4.1
Madagascar	3.371	2.979	3.16	3.995	3.546	3.739	3.721	3.866	4.527	4.56	4.3
Mauritius	3.26	3.265	3.756	4.103	4.386	4.168	4.273	4.401	4.535	4.563	4.4
Seychelles	0.474	0.486	0.508	0.503	0.563	0.608	0.623	0.62	0.618	0.698	4.9
Tanzania	5.073	4.814	5.631	6.463	7.607	8.365	8.635	9.079	9.342	9.414	5.6
TOTAL	25.114	25.277	28.95	31.502	34.419	35.854	35.492	35.961	37.932	38.863	2.2

Source: IMF Home Page (Gross domestic product, current prices)

Demand forecast of transshipment containers can also be based on the preliminary development scenario which assumes GDP growth in the surrounding regions for the period of 2005-2025. GDP growth rates in the same region in the passed ten years are summarized as follows (Table 7.2-10 ~Table 7.2-12). GDP forecast for 2004 and 2005 of some countries and regions are shown in Table 7.2-13.

Table 7.2-12 GDP Growth in Indian Sub-continent Unit: US Billion dollars

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
India	272.685	310.573	352.854	373.424	406.858	409.422	436.798	460.792	476.119	494.821	5.8
Pakistan	51.728	56.324	63.284	63.334	62.393	59.952	59.625	61.131	57.195	63.649	2.3
Sri Lanka	10.354	11.718	13.03	13.898	15.092	15.761	15.712	16.597	15.75	16.423	5.4
TOTAL	334.767	378.615	429.168	450.656	484.343	485.135	512.135	538.52	549.064	574.893	5.4

Source: IMF Home Page (Gross domestic product, current prices)

(3) Container Throughput in Three Regions

Table 7.2-13 Container Throughput in Middle East Region Unit: 1,000 TEU

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
Aden	10.0	8.1	8.9	12.1	13.5	57.5	121.7	248.2	377.7	388.9	*46
Hodeidah				37.0	38.2	43.5	35.0	15.0	15.0		n.a.
S. Qaboos	91.1	88.2	96.0	100.9	109.2	122.3	124.8	128.9	143.9	203.9	8.4
Salalah			0.7	0.2	0.0	17.5	649.0	1,032.7	1,152.7	1,211.6	*23.40
UAE	2,853.3	3,202.5	3,511.5	3,747.8	4,112.4	4,450.5	4,850.3	5,031.6	5,247.9	6,166.3	8.00
Qatar	38.2	37.4	45.4	57.3	79.1	83.4	82.3	93.0	103.4	108.0	11
Bahrain	102.1	103.2	105.2	104.3	111.7	117.7	121.9	132.3	140.1	146.4	3.7
S.Arabia	1,256.7	1,183.1	1,221.9	1,148.1	1,280.1	1,387.3	1,441.7	1,514.7	1,703.6	1,938.8	4.40
Kuwait	201.8	214.5	224.0	235.4	240.5	245.0	255.0	260.0	270.0	280.0	3.3
Iran	91.2	110.9	205.8	267.9	316.4	320.2	379.8	439.2	533.4	730.8	23.1
TOTAL	4,644.4	4,947.9	5,419.4	5,711.0	6,301.1	6,844.9	8,061.5	8,895.6	9,687.7	11,174.7	9.2

Note: *applicable for last 5y ears,

Source: Until 1994 World Containerport Markets to 2012 by Ocean Shipping Consultants. After 1995 WORLD CONTAINERPORT OUTLOOK TO 2015 by Ocean Shipping Consultants. Salalah after 1999, Slalah Port Services Co

The sum total of container throughput from 1991 to 2002 in three regions is as follows (Table 7.2-13~7.2-15). Total throughput in 2002 is 18,244,100 TEUs. The growth rate of container traffic is generally greater then respective countries GDP. Those growth rates of late starters are calculated at the later years.

Table 7.2-14 Container Throughput in East Africa Unit: 1,000 TEU

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
Djibouti	74	75	84	110	149	138	162	158	148	163	8.2
Ethiop./Eritoria	3	11	15	33	45	28	13	16	25	29	25.4
Kenya			201	2170	231	249	232	237	291	315	*5.8
Mauritius			93	106	117	136	144	157	162	188	*9.2
			113	125	124	145	146	156	159	166	*4.9
Tanzania			99	99	104	110	108	112	145	155	*5.8
			39	42	52	62	67	68	81	85	*10
Seychelles			10.0	11.9	16.1	21.2	19.4	19.4	17.9	18.7	*8.1
(East Africa)	486	507									n.a.
TOTAL	563	593	654	742	837	888	892	923	1,028	1,119	7.1

Note: * Applicable only last 8 yeas

Source : Same as Table 7.2-14

Table 7.2-15 Container Throughput in Indian Sub-Continent Unit: 1,000 TEU

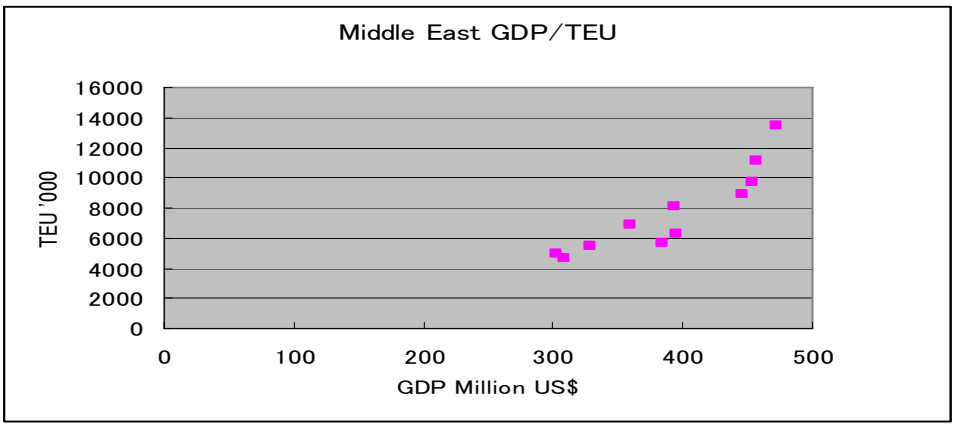
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	AV. Growth rate %
Mumbai	428	487	517	583	601	509	429	321	254	273	-4.4
Calcutta	102	117	125	142	169	160	176	189	191	207	7.3
Cochin	67	87	96	112	122	129	130	133	152	163	9.3
Jawaharlal Nehru	173	244	339	423	504	669	890	1,189	1,574	1,850	26.7
Kandla	29	51	65	77	84	86	90	92	125	134	16.8
Madras	162	201	228	257	293	284	322	352	345	373	8.7
Tuticorin	48	57	69	89	103	100	137	157	214	242	17.55
Visakhapatnam	9	11	9	13	13	14	20	20	22	23	10.36
India Total	1,017	1,255	1,448	1,696	1,888	1,951	2,194	2,455	2,875	3,265	12.36
Pakistan	510	513	551	555	558	660	599	610	815	926	6.15
Sri-lanka	859	973	1,049	1,356	1,687	1,714	1,704	1,733	1,727	1,760	7.44
TOTAL	2,386	2,741	3,047	3,607	4,133	4,325	4,497	4,797	5,416	5,950	7

Source: Same as Table 7.2-13

Figures 7.2-4 to 7.2-6 demonstrate correlation with GDP and container volume Gulf and Middle East Region, Indian Sub-Continent Region, and East African Region.

Figure 7.2-4 Correlation of GDP/TEU Middle East

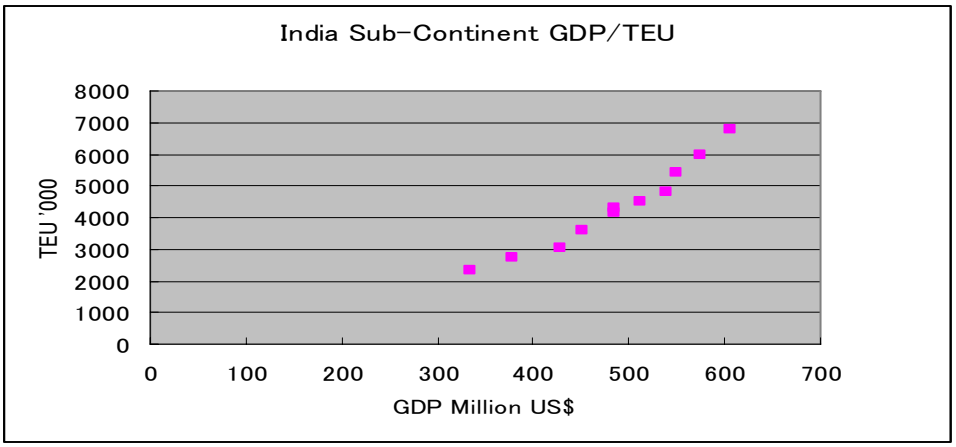
Y=41.64X-8544.88



Source: JICA Study Team

Figure 7.2-5 Correlation of GDP/TEU Indian Sub-Continent

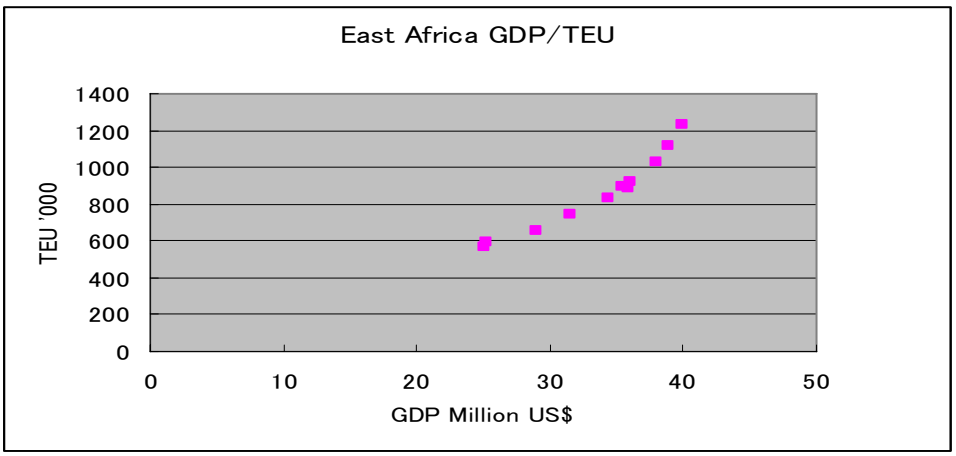
Y=16.16X-3516.79



Source: JICA Study Team

Figure 7.2-6 Correlation of GDP/TEU East Africa

Y=39.55X-466.98



Source: JICA Study Team

Correlation Formula

Utilizing the sum total of container throughput and GDP of each region each year, the study team has made 3 correlation formulas, of which X=GDP Index and Y=Container Throughput per year.

The correlation coefficient resulted in as follows.

- Middle East Region: 0.903
- Indian Sub-continent: 0.975
- East Africa: 0.975

They are closely correlated.

Figures 7.2-4 to 7.2-6 demonstrate correlation with GDP and container volume Gulf and Middle East Region, Indian Sub-Continent Region, and East African Region

(4) Input of Future GDP Index

In order to obtain future traffic volume in each region, GDP growth rate has to be determined. Following table shows GDP forecast, for the period of 2003 to 2015, compiled by IBRD in July 2003. According to this table, East Africa is included in Sub-Saharan Africa which also covers West Coast of Africa. Nevertheless, GDP and container traffic volume in the East Africa is small compared to the other regions, application of Sub-Saharan growth rate will not affect to the projected results.

Table 7.2-16 GDP Growth Rate Forecast (from 2003 to 2015)

Real GDP Growth rates %	'91~'00	2001	2002	2003	2004	2005	'06~'15	'16~'25
Middle East & North Africa	3.4	3.2	3.1	3.3	3.9	3.5	4.3	3.8
South Asia	5.2	4.9	4.2	5.4	5.4	5.4	5.4	4.4
Sub-Saharan Africa	2.3	3.2	2.8	2.8	3.5	3.8	1.2	1.2

Source: World Bank baseline forecast July 2003; after 2016, JICA Study Team

Using these GDP growth rates, GDP values at 2010 and 2015 are calculated as follows. For GDP growth rates after 2015, the JICA Study Team estimates one percent lower than the period of '06~'15 for Middle East and India Sub-Continent because of reaching to relatively high per capita GDP level at these regions. For Sub-Saharan region, there is little reason to reduce growth rate considering the relative low level of per capita GDP. Using correlation formula, obtained from the previous section, container volume at each region is calculated in the Table 7.2-17.

Table 7.2-17 Forecast of GDP and Container Traffic

Real GDP MILLION US$ Container TEUs '000	2002 Actual	2003	2004	2005	2010	2015	2025
Middle East GDP	457	472	490	508	627	774	932
Middle East TEUs	11,175	13,499	11,772	12,565	17,311	23,369	38,016
Indian Sub-Continent	575	606	639	673	748	973	1260
Indian Sub-Continent TEUs	5,950	6,796	6,804	7,361	10,633	14,889	25,060
East Africa	39	40	41	43	46	49	51
East Africa TEUs	1,119	1,231	1,157	1,214	1,363	1,476	1,722

Source: JICA Study Team

(5) Calculation of Transshipment Containers at Omani Ports

Once the transshipment TEU in 2002 is set, volume for the following years will be tabulated as the Table 7.2-19 and 7.2-20 using growth ration of total TEUs in the respective regions in the target years displayed in the Table 7.2-17.

1) Salalah

For the future projected container volume at Salalah, three cases have been calculated. As indicated in the table, share of transshipment containers at Salalah to the total three regions traffic in 2002 was 6.8% and 2003 increased 2.5% reached to 9.3%. This indicates the share at Salalah has expanded as SPC has attracted more customers from other competitive ports. Therefore, three alternative cases are considered.

- Case (1) medium case: Share of Salalah increases to 10.14% in 2004 and remains 10% after that. With this case, volume in 2004 remains unchanged from previous year while the total volume of three regions is expected to be less than 2003 if GDP growth rates are estimated by IBRD. The transshipment volume will increase again after 2005.
- Case (2) high case: Share of Salalah increases to 11.8% in 2004 to maintain the momentum to expand its share in 2003. Share expansion rate will slow down but reach to 13% in 2015 and 14% in 2025. This scenario assumes Salalah invests in infrastructures sufficiently ahead of growth of demand.
- Case (3): Share of Salalah maintains the level in 2003. This is based on the worst scenario, which Salalah lose some customers due to delay in expansion and/or recovery of competitive ports such as Aden by easing war risk insurance premium.

Results of the forecast are displayed in the Table 7.2-18.

Table 7.2-18 Results of Transshipment Forecast for Salalah

Container TEU '000	2002 Actual	2003	2004	2005	2010	2015	2025
Middle East TEUs	11,175	13,499	11,772	12,565	17,311	23,369	38,016
Indian Sub-Continent TEUs	5,950	6,796	6,804	7,361	10,633	14,889	25,066
East Africa TEUs	1,119	1,231	1,157	1,214	1,363	1,476	1,722
Total three regions throughput	18,244	21,526	19,733	21,140	29,307	39,734	64,804
Total transshipment Salalah(1)	1,234	2,001	2,001	2,144	2,972	4,029	6,571
Transshipment share Salalah(1)	6.80%	9.30%	10.14%	10.14%	10.14%	10.14%	10.14%
Transshipment volume Salalah(2)		2001	2328	2600	3663	5165	9073
Transshipment share Salalah(2)		9.30%	11.80%	12.30%	12.50%	13%	14%
Transshipment volume Salalah(3)		20.01	1835	1966	2726	3695	6027
Transshipment share Salalah(3)		9.30%	9.30%	9.30%	9.30%	9.30%	9.30%

Source: JICA Study Team

According to the results of Table 7.2-18, the base case (1) will require additional one berth before 2010 without considering local containers, which would be generated from EPZ. In the case (2), situation will become critical even before 2005 if no expansion of the port is made. In the case (3), the total transshipment volume remains unchanged until 2005. However, transshipment volume in 2010 will reach to over 2.7million TEUs which would need expansion of the terminal.

2) Sultan Qaboos

Similarly transshipment container volume at Sultan Qaboos Port is estimated. Unlike Salalah, which is 99%, transshipment rate at Sultan Qaboos is 43%. Consequently, the share of transshipment volume at Sultan Qaboos Port is very small to the total container throughput in the three regions.

As indicated in the Table 7.2-19, share of transshipment containers at Qaboos to the total three regions traffic in 2002 was only 0.31% and 0.53% in 2003. This increase of share at Sultan Qaboos is mainly attributed by the shift of MSC from Salalah in 2003.

Table 7.2-19 Results of Transshipment Forecast for Sultan Qaboos Port

Container TEUs '000	2002 Actual	2003*	2004	2005	2010	2015	2025
Middle East TEUs	11,175	13,499	11,772	12,565	17,311	23,369	38,016
Indian Sub-Continent TEUs	5,950	6,796	6,804	7,361	10,633	14,889	25,066
East Africa TEUs	1,119	1,231	1,157	1,214	1,363	1,476	1,722
Total three regions throughput	18,244	21,526	19,733	21,140	29,307	39,734	64,804
Total Containers handled Qaboos	203	265	265	285	395	536	874
Total transshipment Qaboos(1)	56	114	114	123	170	230	376
Transshipment share Qaboos(1)	0.31%	0.53%	0.58%	0.58%	0.58%	0.58%	0.58%
Total Containers handled Qaboos	203	265	265	295	443	647	1130
Transshipment volume Qaboos(2)		114.0	114.5	127	190	278	486
Transshipment share Qaboos(2)		0.53%	0.58%	0.60%	0.65%	0.70%	0.75%
Total Containers handled Qaboos	203	265	265	261	361	490	799
Transshipment volume Qaboos(3)		114	105	112	155	211	343
Transshipment share Qaboos(3)		0.53%	0.53%	0.53%	0.53%	0.53%	0.53%

*Values in 2003 for three regions are estimated by IBRD's GDP growth ratio and 2003 cargo statistics at some major ports.

Source: JICA Study Team

- Case (1) medium case: Share of Sultan Qaboos increases to 0.58%% in 2004 and remains 0.58% after that. With this case, volume in 2004 remains unchanged from previous year while the total volume of three regions is expected to be less than 2003 if GDP growth rates are estimated by IBRD. The transshipment volume will increase again after 2005. Container handling capacity at Sultan Qaboos Port will be saturated by 2010 without considering any other cargo increase.

- Case (2) high case: Share of Sultan Qaboos increases to 0.58% in 2004 to maintain the momentum to expand its share in 2003. Share expansion rate will slow down but reach to 0.70% in 2015 and 0.75% in 2025. This scenario assumes Sultan Qaboos Port invests in infrastructures sufficiently ahead of growth of demand including other commodities.

- Case (3): Share of Sultan Qaboos maintains the level in 2003. This is based on the worst scenario, which Sultan Qaboos Port loses some customers due to delay in expansion and/or recovery of competitive ports such as Gulf port by easing war risk. Major expansion for container handling volume at Sultan Qaboos Port would not become necessary until 2015.

(6) Evaluation of Future Transshipment Containers

1) General observation

Since there is no reliable forecast for future GDP after 2015, forecasts for 2025 should be considered to have greater range of highs and lows.

2) Effects of Iraq war

Higher growth rate experienced in 2003 at Middle East ports are considered to be influenced by the war at Iraq. The impact of war and subsequent supplies for rehabilitation materials to Iraq and Afghanistan will continue for several years. Although direct supply relating to the conflict area will diminish gradually, impact on surrounding countries will generate further traffic demand by stimulated economies.

Duration of this influence will continue at least 5 years as experienced after the Korean War in Japan and Vietnamese War in Thailand.

Therefore, the transshipment volume of at least 3 million TEUs at Salalah will be achieved sometime before 2010. However, after 2010, the situation varies according to the stabilization of entire Middle East region as well as East Africa and Indian sub-continent including Afghanistan and the fate of other countries where internal unrest are continuing.

In case, all the present conflicts are settled, GDP will continue to grow to a certain level and come to a peak as experienced in the East Asia and South East Asia during latter half of 1990's.

Economic and traffic projection of 20 years future involves many uncertain factors besides points mentioned above including uncertainty of oil reserve after 20 years. Many oil producing countries including Oman are therefore shifting economic structures to non-oil sectors.

Logistic infrastructures are one of the key elements to support non-oil economy. In order to survive from the severe competition, quick decision and bold implementation without missing an opportunity will be the most important factors.

SPS or Salalah port needs to expand after proposed expansion of berth No. 5 and 6 without delay. Otherwise, the port will not only lose its transshipment market share but also miss a chance to develop export oriented industries in the region.

At Sultan Qaboos Port, if PSC determines to expand its capacity within a year with immediate support by GSO for the infrastructure development, there remains still a chance to catch up container transshipment market share as well as export and import containers volume. If the decision delays, however, the lost opportunity of market share will be enormous, which will be not only limited to the transshipment volume but also be fail to attract direct export/import cargo; and the loss to the economy will be much greater than the amount saved by not invested to the "expensive breakwater cost".

7.3 Indigenous Cargo

7.3.1 Present Situation of Foreign Trade Cargo Volumes

(1) Overview

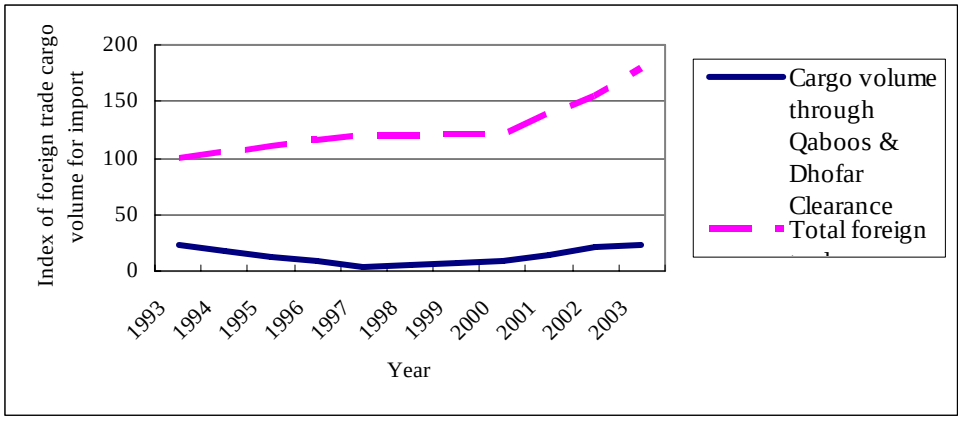
According to the Foreign Trade Statistics, which is the customs statistics published by Royal Oman Police, the volume of foreign trade cargoes of Oman in 2003 have reached approximately 5,640 ,000 tons for import and 2,280,000 for export.

The major customs clearance points for foreign trade cargoes are Mina Qaboos, Seeb Airport, Dhofar (Salalah), Wajaja and other border points, and the respective ratios of cargo volumes in 2003 are 27.1%, 0.3%, 12.7%, 27.0% 32.9% for import and 58.0%, 27.2%, 8.5%, 6.1% and 0.2% for export respectively.

Major origins and destinations of the foreign trade cargoes in Oman are in and around Muscat and Salalah, which are the major consumption areas for imported general cargoes and bulk cargoes of materials for industrial foodstuffs. Major industrial estates located in Rusail, Sohar, Buraimi, Nizwa and Raysut in Salalah are also the major origin and destination points for imported row material cargoes and exported manufacturing goods. Muscat, Salalah, Sohar and Rusail are located near the coast line.

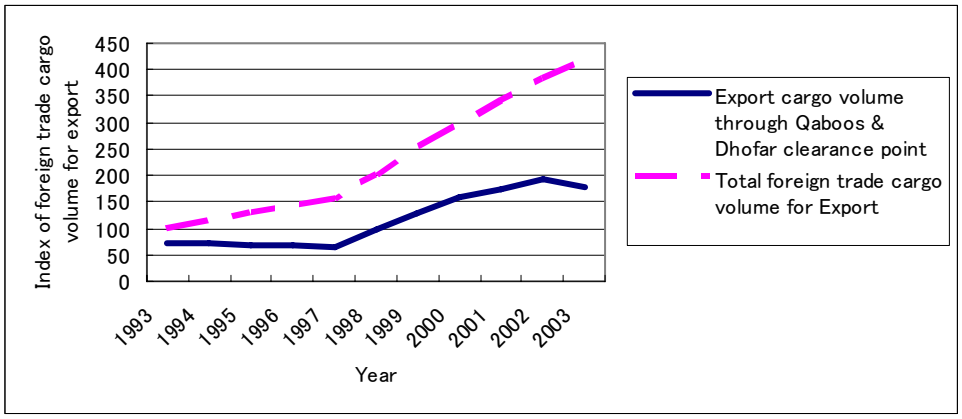
Figures 7.3-1 and 7.3-2 show the trends of import and export volumes in the total volume and the volume passing through the customs clearance points at Sultan Qaboos Port and in Dhofar District. It is assumed that almost all of the cargoes passing through Qaboos and Dhofar clearance points pass through Qaboos and Salalah Ports.

Figure 7.3-1 Trend of Import Cargo Volume



Source: Foreign Trade Statistics, ROP

Figure 7.3-2 Trend of Export Cargo Volume



Source: Foreign Trade Statistics, ROP

According to Figures 7.3-1 and 7.3-2 the total import cargo volume has steadily increased but the cargo volumes through the clearance points at Sultan Qaboos Port or in Dhofar District have not increased since 1993. For export cargo volumes, the growth rate of the cargo volumes through clearance points at Sultan Qaboos Port or in Dhofar District is much smaller than that of the total export cargo volumes.

(2) Cargo Handling Volume at Omani Ports

Major ports in Oman are Sultan Qaboos Port and Salalah Port of which total cargo handling volume is approximately 98% of the total cargo handling volume at Omani sea ports in 2002 according to the foreign statistics published by ROP. Therefore, the total cargo handling volume at Sultan Qaboos Port and Salalah Port is deemed as the total volume for all of the Omani ports.

According to the ports statistics of Sultan Qaboos Port and Salalah Ports, the cargo handling volume at Omani ports has reached approximately 3,800,000 tons (2,600,000 tons for import and 1,200,000 tons for export).

Commodities for import are grain (including rice), sugar, other foodstuffs, cement, steel, timber and other construction materials, vehicles, spare parts of vehicles, other dry bulk cargo, other liquid bulk cargo, livestock, miscellaneous cargo, and those for export are flour including wheat, other foodstuffs, cement, mineral products, vehicles and others.

Items of containerizable cargoes are rice, part of other foodstuffs, part of steel, part of timber, part of other construction materials, spare parts of vehicles and parts of miscellaneous cargoes for import while those for export are part of other foodstuffs, and others which are assumed from interviews and experiences.

Tables 7.3-1 and 7.3-2 show the cargo volumes at Omani Port excluding trans-shipment cargoes from 1993 to 2003.

Table 7.3-1 Cargo Volume at Omani Ports for Unloading (excluding transshipment cargoes) from 1993 to 2003 Unit: Thousand tons

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Foodstuffs											
Grains (including rice)	273.0	330.5	340.0	292.2	489.9	454.3	503.3	529.7	547.9	561.6	475.1
Sugar	18.6	18.2	10.1	16.9	15.2	8.7	6.7	10.9	5.4	9.9	4.3
Other food	176.2	189.3	195.6	186.6	188.3	232.1	236.7	255.8	298.9	352.4	327.1
Construction matrials											
Timber and other construction materials	59.3	55.9	83.7	55.4	72.0	88.7	66.6	104.2	94.3	97.5	183.2
Cement	2.5	0.2	0.0	0.0	16.8	4.6	0.1	52.1	0.0	132.9	304.7
Steel	141.6	105.4	65.1	130.2	257.8	235.9	92.2	83.3	325.8	216.0	132.8
Vehicles											
Vehicles (thousand vehicles)	49.2	41.8	34.3	40.0	46.6	50.9	36.6	47.0	55.0	48.8	61.0
Spareparts	10.5	10.4	12.6	13.2	14.7	20.8	20.2	17.5	18.9	20.1	20.2
Other cargoes											
Miscelleneous cargoes	476.4	491.9	624.7	818.8	711.7	674.6	691.1	606.9	697.2	757.2	661.2
Other dry bulk	130.8	98.1	61.0	79.4	67.4	58.1	49.7	28.0	26.2	45.0	50.0
Other liqued bulk	293.3	293.6	309.5	323.8	346.8	375.1	398.2	395.0	495.1	649.2	310.7
Livestock	26.7	32.7	31.7	40.7	30.4	28.0	29.0	27.4	27.2	24.5	21.7
Total (except vehicles)	1,608.9	1,626.2	1,734.0	1,957.0	2,211.0	2,180.9	2,093.8	2,110.8	2,536.8	2,866.3	2,491.0

Source: SPC and the DPS for National Port Development Strategy Study in Sultanate of Oman

Table 7.3-2 Cargo Volume at Omani Ports for Loading (excluding trans-shipment cargoes) from 1993 to 2003 Unit: Thousand tons

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Flour	-	-	-	-	-	-	36.2	53.2	50.8	91.6	79.9
Other foodstuffs	22.2	35.8	53.4	51.0	51.9	56.0	64.0	96.6	90.0	74.2	80.3
Cement	15.0	69.0	78.0	72.4	49.7	85.1	430.0	485.8	548.8	644.7	687.9
Mineral products	21.5	21.2	20.0	26.5	29.3	21.6	22.2	31.1	32.6	22.7	144.3
Vehicles	11.6	17.3	6.8	6.5	4.8	2.9	2.2	3.0	3.8	7.3	7.7
Others	39.8	38.5	55.9	57.3	73.1	224.9	142.1	94.5	157.8	343.1	229.2
Total	110.1	181.8	214.1	213.7	208.8	390.5	696.7	761.3	883.8	1,151.4	1,206.3

Source: SPC and the DPS for National Port Development Strategy Study in Sultanate of Oman

(3) Cargo Handling Volume at Sultan Qaboos Port (excluding trans-shipment cargoes)

The cargo handling volume for foreign trade at Sultan Qaboos Port in 2003 has reached 2,470,000 tons, 2,010,000 tons for unloading and 462,000 for loading. Major commodities are grain, other foodstuff, cement, vehicles and miscellaneous cargoes for unloading, and cement and miscellaneous cargoes for loading. Wheat accounts for 60% of all the grains which are unloaded. The grains except rice will most likely be loaded as bulk cargo and almost of all rice will be packed in bags and carried by containers in future. Other foodstuffs include dry cargoes such as sugar, chilled and frozen stuffs, animal ghee, dry and canned foods, and liquid cargoes such as vegetable oils, fruit juices and water.

Cement is transported as bulk cargo mainly from Salalah by domestic sea transportation. Other construction materials are steel, timber, miscellaneous building materials, bitumen and clinkers. Vehicles are mostly sedans, almost of all of them being unloaded currently at Sultan Qaboos Port.

The cement loaded at Sultan Qaboos Port accounts for about 25% of all the cargoes loaded, which is the second largest volume next to others. The mineral products, mainly lime stone rocks, are another large volume cargo being loaded.

The annual growth rates of cargo volumes for loading and unloading from 1993 to 2003 are 18.2% and 5.8% respectively.

Table 7.3-3 shows the cargo handling volume at Sultan Qaboos Port (excluding trans-shipment cargoes) from 1993 to 2003.

Table 7.3-3 Cargo Handling Volume at Sultan Qaboos Port (excluding trans-shipment cargoes)

(Unloading) Unit: Thousand tons

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Food Stuff	450.9	523.8	536.6	480.1	669.1	644.4	652.7	663.2	710.3	763.7	640.9
Grains	269.7	328.5	339.5	290.7	476.9	454.3	417.1	401.7	429.0	437.8	333.8
Sugar	15.5	18.2	10.1	16.9	15.2	8.7	6.7	10.9	5.4	9.9	4.3
Frozen stuffs	36.0	39.1	45.7	46.3	46.3	50.7	67.2	86.3	97.9	104.2	115.1
Other foodstuffs	129.7	138.0	141.3	126.2	130.7	130.7	161.7	164.3	178.0	211.8	187.7
Construction Materials	191.1	141.0	111.6	153.1	312.1	287.8	140.3	175.2	285.1	331.8	569.9
Timber	37.5	28.9	30.7	23.3	22.1	31.5	31.8	27.1	35.0	46.6	55.6
Cement	2.5	0.2	0.0	0.0	16.8	4.6	0.1	52.1	0.0	132.9	304.5
Steel	129.3	92.2	56.7	106.4	237.8	211.2	74.3	62.8	215.5	112.9	108.1
Others	21.8	19.7	24.2	23.5	35.4	40.5	34.1	33.2	34.6	39.4	101.7
Vehicles (No.)	48810	41598	33024	39711	46291	50399	35742	46977	55045	48099	60148
Spareparts	10.5	10.4	12.6	13.2	14.7	20.8	20.2	17.5	18.9	20.1	20.2
Others	493.3	517.2	648.1	851.2	726.4	685.6	710.0	632.2	721.0	768.2	675.3
Miscellaneous cargo	466.6	484.8	617.4	811.6	698.8	662.3	684.7	606.7	695.0	748.2	659.4
Livestock	26.7	32.4	30.7	39.6	27.6	23.3	25.3	25.5	26.0	20.0	15.9
Total (Except vehicles)	1,145.8	1,192.4	1,308.9	1,497.6	1,722.3	1,638.6	1,523.2	1,488.1	1,735.3	1,883.8	1,906.3
(Loading)											
Flour	0	0	0	0	0	0	0	0	0	32.2	23
Other foodstuffs	22.2	35.8	53.4	51	51.9	56	64	87.1	90	71.4	77.9
Cement	0	0	0	0.4	0.7	0.4	0	12.4	71	143.6	115
Mineral products	21.5	21.2	20	26.5	29.3	21.6	22.2	31.1	32.6	22.7	24.1
Vehicles	11.6	17.3	6.8	6.5	4.8	2.9	2.2	2.9	3.8	5.2	6.4
Others	31.8	33.5	48.9	50.3	59.1	62.6	77.2	91	122.6	163.4	222.1
Total	87.1	107.8	129.1	134.7	145.8	143.5	165.6	221.6	316.2	433.3	462.1

Source: SPC and DPS for National Port Development Strategy Study in Sultanate of Oman

(4) Cargo Handling Volume at Salalah Port (excluding trans-shipment cargoes)

In 2003, the cargo handling volume at Salalah Port was approximately 1,346,000 tons (585,000 tons for unloading and 761,000 tons for loading), showing a decrease of 412,000 tons from 2002. The annual growth rate of cargo volumes from 1993 to 2003 was approximately 8.1% (4% per annum for unloading and 42% per annum for loading).

Major commodities for unloading are grains and liquid bulk for import, which constitute 80% of the total unloading cargo volume, and those for loading are wheat and cement, which constitute 80% of the total loading cargo volume.

In addition to grains which is mostly wheat and fuel which is in liquid bulk, unloading cargoes include construction materials (steel pipes), mineral products (bintonite and bazalani rocks) and other cargo (cattle feed). Although more than 1,000 vehicles passed through Salalah Port in 1900s, there are hardly any vehicles today that pass through the Port.

Table 7.3-4 shows the cargo handling volume at Salalah Port (excluding trans-shipment cargoes) from 1993 to 2003.

Table 7.3-4 Cargo Handling Volume at Salalah Port (excluding trans-shipment cargoes)

(Unloading) Unit: Thousand tons

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Foodstuffs	16.9	14.2	9.1	15.6	24.3	50.7	94.0	133.2	141.8	160.2	165.6
Grain	3.3	2.0	0.5	1.5	13.0	-	86.2	128.0	118.9	123.8	141.3
Suger	3.1	-	-	-	-	-	-	-	-	-	-
Frozen food	1.1	1.5	1.0	0.7	1.5	0.7	0.1	0.1	4.2	4.0	7.3
Other foodstuffs	9.4	10.7	7.6	13.4	9.8	50.0	7.7	5.1	18.8	32.4	17.0
Construction materials	12.3	20.5	37.2	32.4	34.5	41.4	18.6	64.4	135.0	114.6	50.8
Timber	-	-	-	-	-	-	-	-	-	1.9	1.4
Cement	-	-	-	-	-	-	-	-	-	-	0.2
Steel	12.3	13.2	8.4	23.8	20.0	24.7	17.9	20.5	110.3	103.1	24.7
Others	-	7.3	28.8	8.6	14.5	16.7	0.7	43.9	24.7	9.6	24.5
Vehicles (Number)	375	223	1,226	315	349	497	863	64	-	684	895
Others	433.9	399.1	378.8	411.5	429.9	450.2	458.1	425.1	524.7	707.7	368.3
Dry bulk	130.8	98.1	61.0	79.4	67.4	58.1	49.7	28.0	26.2	45.0	50.0
Other liqued bulk	293.3	293.6	309.5	323.8	346.8	375.1	398.2	395.0	495.1	649.2	310.7
Live stock	-	0.3	1.0	1.1	2.8	4.7	3.7	1.9	1.2	4.5	5.8
Miscelleneous cargoes	9.8	7.1	7.3	7.2	12.9	12.3	6.4	0.2	2.2	9.0	1.8
Total (Except vehicles)	463.1	433.8	425.1	459.4	488.7	542.3	570.6	622.7	801.5	982.5	584.7
(Loading)											
Flour & wheat	-	-	-	-	-	-	36.2	53.2	50.8	59.4	56.9
Other foodstuffs	-	-	-	-	-	-	-	9.5	0.0	2.8	2.4
Cement	15.0	69.0	78.0	72.0	49.0	84.7	430.0	473.4	477.8	501.1	572.9
Mineral products	-	-	-	-	-	-	-	-	-	-	120.2
Vehicles	-	-	-	-	-	-	-	0.1	-	2.1	1.3
Others	8.0	5.0	7.0	7.0	14.0	162.3	64.9	3.5	35.2	179.7	7.1
Total	23.0	74.0	85.0	79.0	63.0	247.0	531.1	539.7	563.8	745.1	760.8

Source: SPC and DPS for National Port Development Strategy Study in Sultanate of Oman

7.3.2 Cargo Demand Forecast of Indigenous Cargo

(1) General

The demand forecast except transshipment containers by this study is implemented in two parts; that of the cargo handling volume generated by implementation of new projects including construction of an industrial complex and that of the other cargo handling volume.

The forecast will (1) estimate the entire cargo volumes at Omani Ports, and then (2) distribute the forecast volumes to Sultan Qaboos and Salalah Ports.

The target years for this forecast are 2010, 2015 and 2025.

(2) Indigenous Cargo Totaled for the Two Principal Ports

The cargo demand forecast will address three cases, namely the High Case, the Base Case and the Low Case for items listed in Tables 7.3-5.

The cargo handling volumes for almost all the items at Omani Ports are affected by the foreign trade cargoes passing through the clearing points along the border on land. Since the yearly cargo volumes handled at ports fluctuate so much, it is extremely difficult to estimate the import or the export volume based on the production and the consumption volumes. Thus, the present itemized estimation for cargo

handling volumes at Omani ports used the time trend and the correlation of socio-economic indices and the cargo volumes at ports.

The Base Case was forecast based on the average trends in the past cargo volumes taking care that break-bulk cargo volume will not drastically decrease by the trend of containerization in the future.

The High Case was forecast by eliminating the portion of cargo volume which is smaller, and the Low Case by eliminating the cargo volume which is larger.

Methods for estimation for major items are described below:

[Unloading]

- Commodities using the correlation between the population and the import cargo volumes at Omani ports.
  Base and Low Cases for grain, and Base Case for Other foods
- Commodities using the correlation between GDP and the import cargo volumes at Omani ports
  Base Case for timber and other construction materials, Base Case for vehicles, and Base and Low Cases for miscellaneous cargoes
- Commodities estimated by multiplying the average per capita import volume by population
  Base Case for vegetable oil, Base and Low Cases for steel
- Commodities estimated by using the average annual import volume
  Base Case for other dry bulks and High Case for sugar, Base Case for other dry bulk and Base Case for livestock
- Commodities estimated by using the ratio of imported raw material to the production volume (Clinkers are imported to make up short supply of domestic clinkers used for cement production)
  High, Base and Low Cases for cement
- Commodities estimated by using the time trends of annual unloading volumes
  Base Case for other dry bulk cargoes

Table 7.3-5 shows the estimation results for the cargo handling volume at Omani ports in the target years except trans-shipment cargoes.

Table 7.3-5 Cargo Handling Volume at Major Omani Ports (except trans-shipment cargoes) In the Target Years

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
1. Food Stuff									
Grains	629	710	848	722	833	1,022	779	908	1,167
Sugar	13	13	13	13	13	13	13	13	13
Other foods	280	321	393	385	396	419	465	591	807
Vegetable oil	66	70	76	66	70	76	66	70	76
2. Construction Materials									
Timber and Other construction material	135	173	295	169	218	368	259	352	633
Cement	560	560	560	560	560	560	560	560	560
Steel	141	148	161	189	199	216	279	294	318
3. Vehicles									
Vehicles (Number)	55,413	59,388	67,339	67,303	80,576	122,347	76,386	93,738	148,345
Spare parts	16	18	24	19	25	44	27	34	53
4. Others	0	0	0	0	0	0		0	0
Miscellaneous	909	1,084	1,613	1,210	1,533	2,510	1,506	1,968	3,365
Other dry bulk	63	63	63	72	72	72	79	79	79
Other liqued bulk	576	662	836	606	751	1,189	659	833	1,361
Livestock	31	31	31	31	31	31	31	31	31
Container (TEU)	101,200	128,800	211,900	133,700	178,300	300,400	170,400	236,000	437,400
Total (Import) Except vehicle	3,419	3,853	4,913	4,042	4,761	6,520	4,723	5,733	8,463

(Ioading)

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
Flour & Wheat	83	86	92	83	86	92	83	86	92
Other foodstuffs	104	123	161	122	147	196	127	174	334
Cement	1,240	1,930	1,930	1,240	1,930	1,930	1,240	1,930	1,930
Mineral products	49	56	75	57	77	141	174	229	341
Vehicles	4,202	4,202	4,202	4,202	4,202	4,202	4,202	4,202	4,202
Others	312	399	572	345	441	634	418	536	774
Total (Export)	1,788	2,594	2,830	1,847	2,681	2,993	2,042	2,955	3,471
Container (TEU)	26,900	34,800	51,900	30,300	39,400	59,100	34,900	47,600	81,100

Source: JICA Study Team

(3) Sultan Qaboos Port and Salalah Port

As discussed before, Oman's major ports are Qaboos and Salalah Ports, which handle 98% of the cargo volume handled by all ports in Oman. Salalah Port is located at about 1,020 km south of Muscat, and these two ports have separate hinterlands. According to JICA's Master Plan Study of Salalah Port and Its Hinterland 2000, the Governorate of Dhofar is located behind the Salalah Port and its principal area is Wilayat Salalah. Based on the foregoing, we chose the Governorate of Dhofar as the hinterland of Salalah Port and the remaining area as the hinterland of Muscat. Thus, we distributed the total cargo handling volume of Oman estimated in Table 7.3-5 to the ports of Qaboos and Salalah by the following methods based on the review of past statistics and the interviews with those concerned.

[Unloading Cargo]

Foodstuff: The volume of foodstuff handled as cargo at Salalah Port was obtained from the ratio of Dhofar population to the entire population of Omar.

Construction materials: The volume of construction materials handled as cargo (excluding cement) at Salalah Port was obtained from the ratio of Dhofar GRDP to GDP. Since there are only two cement plants in Oman, the volume of cement handled at Qaboos and Salalah Ports was obtained by estimating the ratio of production volumes at these plants to the volume loaded, and the ratio of clinker import and production based on the interviews and past data and giving consideration to the plants' expansion plans.

Vehicles: The number of vehicles passing through Salalah Port was obtained from the ratio of Dhofar population to the total population of Oman in the manner similar to that for foodstuff.

Others: The volume of miscellaneous items and livestock handled as cargoes at Salalah Port was obtained from the ratio of Dhofar population to the total population of Oman, and those of other dry bulk and liquid bulk were obtained from the ratio of Dhofar GRDP to GDP.

Table 7.3-6 Cargo Handling Volume at Sultan Qaboos Port for Unloading in the Target Years (Except transshipment cargoes and Large Size New Projects cargoes)

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
1. Food Stuff									
Grains	571	645	770	656	756	928	779	824	1,060
Sugar	12	12	12	12	12	12	13	12	12
Other foods	255	292	357	350	360	380	465	536	733
Vegetable oil	60	64	69	60	64	69	66	64	69
2. Construction Materials									
Timber and Other construction materials	88	114	194	111	143	241	259	231	415
Cement	560	560	560	560	560	560	560	560	560
Steel	92	97	106	124	131	142	279	193	209
3. Vehicles									
Vehicles (Number)	50,315	53,924	61,144	61,111	73,163	111,091	76,386	85,114	134,697
Spare parts	15	17	22	17	23	40	27	31	48
4. Others									
Miscellaneous	825	984	1,465	1,099	1,392	2,279	1,506	1,787	3,055
Other dry bulk	41	41	41	47	47	47	79	52	52
Other liqued bulk	378	434	548	398	493	780	659	546	893
Livestock	28	28	28	28	28	28	31	28	28
Container (TEU)	88,000	112,000	183,700	116,400	155,600	261,600	170,400	207,300	383,000
Total (Import) Except vehicle	2,925	3,288	4,172	3,462	4,063	5,506	4,723	4,864	7,134

Source: JICA Study Team

[Loading Cargo]

The ratio of cargo volumes loaded at Muscat and Salalah excluding cement was obtained based on the past data and interviews with those concerned. Estimation for cement was conducted similarly to that for unloading cargoes. From Tables 7.3-6 to 7.3-9 show the estimation results.

Table 7.3-7 Cargo Handling Volume at Sultan Qaboos Port for Loading in the Target Years (except transshipment cargoes and Large Size New Projects cargoes)

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
Flour & Wheat	13	14	15	13	14	15	13	14	15
Other foodstuffs	101	119	155	118	142	188	122	167	321
Cement	280	386	386	280	386	386	280	386	386
Mineral products	39	44	59	45	61	111	137	181	269
Vehicles (Number)	4,202	4,202	4,202	4,202	4,202	4,202	4,202	4,202	4,202
Others	246	315	452	273	348	501	330	423	611
Total (Excpt vehicls)	679	878	1,067	729	951	1,201	882	1,171	1,602
Container (TEU)	22,800	29,400	43,600	25,800	33,400	49,800	29,300	40,100	69,500

Source: JICA Study Team

Table 7.3-8 Cargo Handling Volume at Salalah Port for Unloading in the Target Years (except transshipment cargoes and Large Size New Projects cargoes)

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
1. Food Stuff									
Grains	58	65	78	66	77	94	72	84	107
Sugar	1	1	1	1	1	1	1	1	1
Other foods	25	29	36	35	36	39	43	55	74
Vegetable oil	6	6	7	6	6	7	6	6	7
2. Construction Materials									
Timber and Other construction mate	47	59	101	58	75	127	90	121	218
Cement	0	0	0	0	0	0	0	0	0
Steel	49	51	55	65	68	74	96	101	109
3. Vehicles									
Vehicles (Number)	5,098	5,464	6,195	6,192	7,413	11,256	7,028	8,624	13,648
Spare parts	1	1	2	2	2	4	2	3	5
4. Others									
Miscellaneous	84	100	148	111	141	231	139	181	310
Other dry bulk	22	22	22	25	25	25	27	27	27
Other liqued bulk	198	228	288	208	258	409	227	287	468
Livestock	3	3	3	3	3	3	3	3	3
Container (TEU)	13,200	16,800	28,200	17,300	22,700	38,800	20,700	28,700	54,400
Total (Import) Except vehicle	494	565	741	580	698	1,014	706	869	1,329

Source: JICA Study Team

Table 7.3-9 Cargo Handling Volume at Salalah Port for Loading in the Target Years (except transshipment cargoes and Large Size New Projects cargoes)

Commodities	Low Case			Base Case			High Case		
	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)	2010 (1000 tons)	2015 (1000 tons)	2025 (1000 tons)
Flour & Wheat	70	72	77	70	72	77	70	72	77
Other foodstuffs	3	4	6	4	5	8	5	7	13
Cement	960	1,544	1,544	960	1,544	1,544	960	1,544	1,544
Mineral products	10	12	16	12	16	30	37	48	72
Vehicles (Number)	0	0	0	0	0	0	0	0	0
Others	66	84	120	72	93	133	88	113	163
Total (Excpt vehicls)	1,109	1,716	1,763	1,118	1,730	1,792	1,160	1,784	1,869
Container (TEU)	4,100	5,400	8,300	4,500	6,000	9,300	5,600	7,500	11,600

Source: JICA Study Team

(4) Sohar Port

Sohar Port is an industrial port under construction. Some of the industrial plants are scheduled to start operation in 2006. All of the industrial related cargoes such as raw materials、manufactured goods, parts and plant equipment are expected to be unloaded/loaded through Sohar Port.

Some of the industrial related cargoes which are suited for container transport will move by boxes and pass through the closest port, Sohar Port, rather than destine to UAE ports or other Omani ports. However, it is assumed in this study that Sohar Port will solely function as a part of logistic system to support industrial activities in the Sohar Industrial Area and that the port will not aim to be one of the international container hub ports.

It is also assumed that Sohar Port will not handle overflow cargoes from Sultan Qaboos Port because space for building new berths is quite limited within the protected area by the breakwaters. In other words, Sohar port is assumed in this study to be a purely industrial port. All of the forecast cargoes which will be handled at Sohar Port have been explained in section 7.2.

(5) Khasab Port

Khasab Port has been observing two types of cargo traffic: Dhows and speed boats. Number of speed boats for trade with Iran registered 78,466 in 2003, and that of Dhows was 47 in the same year.

According to Annual Reports, each speed boat is loaded with about 1ton to 1.5 ton. Therefore, it can be estimated that about 80,000 tons to 120,000 tons of cargo were traded annually between Khasab Port and Iranian ports in recent years.

Khasab Port Annual Report for 2002 reveals the number of Dhow's call and volume of cargoes for 2002 as shown in Table 7.3-10. A total of 33 Dhows called Khasab Port and total cargo tonnage were 6,321 tons, implying about 200 tons per ship.

Table 7.3-10 Dhow Traffic and Cargo at Khasab Port in 2002

	Nr of Wooden Vessels	Discharged tons	Type of Goods
January	2	38	scrap, cigars
February	3	1,032	fuel, cigar, household items
March	2	4,330	scrap, cigars
April	4	159	building materials, cigar
May	1	18	cigar, household items
June	5	101	scrap, cigars
July	3	70	cigar, household items
August	4	175	scrap, household items
September	2	46	scrap, cigars
October	2	92	beverage, cigar
November	2	78	cigars, scrap,
December	3	182	scrap, cigars
Total	33	6,321	

Source: DGPMA Annual Report for 2002

The first phase development project, which is nearly completed, includes a 300m long quay of -10m water depth with a R0/Ro ramp, and this quay can accommodate more than 300,000 tons to 500,000 tons cargo annually.

Therefore, even if traffic type changes from existing type of small ships to RO/RO vessel type, the newly built berth can cope with cargo traffic up to about half million tons. Further, as future development space is provided at the northern part of the reclamation area, required berthing facilities can be provided when time comes. Difficulty of traffic forecast does not cause significant planning problems in this master plan study.

(6) Duqm Port

According to Feasibility Study Report on Duqm Port Development, August 2004, about 100,000 tons of general cargo import and 30,000 tons of fish export as well as about 40,000 tons of petroleum products are forecast as potential cargo at Duqm in 2020.

As Duqm Port is expected to play as a nucleus for regional development, minimum infrastructure is required at the port. Basic infrastructure such as an airport, power generation plant, desalination plant, and buildings for social services will be built near the port area. Project related cargoes such as steel and iron, pipes and cement will be transported by sea. Therefore a general/bulk cargo berth is a minimum requirement to commence the project.

Vessel size will vary depend on type of cargoes transported. A berth for accommodating 10, 000 DWT class cargo vessel is minimum requirement, and required length and water depth of berth for this class are 160m and 9.0m respectively. Commercial berth proposed by Posford Haskoning has 380m in length and 10.0m of alongside water depth, and is well above the minimum requirements. The proposed berth has cargo handling capacity of more than 400,000 tons annually.

It is said that limestone and other minerals have export quality while competitiveness in the market yet to be confirmed.

(7) Shinas Port

Port statistics for Shinas Port is not available. Following traffic information for 2001 was given by DGPMA/MOTC. Port traffic was minimal and it has not significantly changed so far.

- Vessels which arrived at the port since its establishment: 138 vessels.
- Number of goats: 19,077
- Vegetables: 158 tons
- Domestic utensils: 203 tons
- Prawns: 250 tons
- Shark: 1 ton
- Birds: 152

According to port traffic records at Sultan Qaboos Port, livestock is mainly imported from Australia. Sheep and goats are landed at the port from large vessels, some of which reach nearly 40,000 GRT. However, sometimes small vessels come to Sultan Qaboos Port loaded with livestock, size of which is around 2,000 GRT.

At Shinas Port, livestock trade with Iran by wooden vessels has been recorded. It is anticipated that after berthing and supporting facilities are developed, larger vessels loaded with livestock will come to Shinas Port and they will be consumed in the domestic market.

If a berth with minimum depth of 6.5m is constructed, 3,000 DWT type cargo vessels can be accommodated. The berth will have 110m in length, and more about 100,000 tons of cargo can be handled annually.

Considering the fact that present live stock tonnage at Sultan Qaboos Port is 16,000 tons and forecast tonnage for 2025 is about 30,000 tons, and that population of the Batinah Region is about 30 % of the national total, the 110m berth at Shinas port will easily handle up to about 100,000 tons of general/bulk cargoes including livestock.

7.4 Cruising Passenger

7.4.1 Evolution of International Cruise Shipping

(1) General Situation

Over 12 million people throughout the world enjoyed cruising in 2002 and this figure is likely to increase in future. A cruise is not only a means of travel but also a vacation in itself. It offers us a chance to relax and enjoy friendly service, good food and comfortable surroundings. Furthermore it is a hassle-free and crime-free vacation, in which passengers need not carry their suitcases, need not wait for passport control, and need not flag a taxi to reach a hotel. There are various diversions on board. Upon waking, a passenger can look through his or her cabin window and experience a new and enchanted world. Some of the world's most beautiful landscapes can be seen only from a ship. At the same time, passengers enjoy the comforts of home. This mixture of comfort and wonder is one of the enduring charms of a cruise.

As shown in Table 7.4-1, the total number of cruise passengers almost doubled from 1990 (4.48 millions) to 1998(8.40 millions), and almost tripled from 1990 to 2002 (12.20 millions). The growth rates of UK and Asia (not including Japan) are very large. The United States occupies the far biggest share (about 70%) every year.

Table 7.4-1 Number of Cruise Passengers in 1990, 1998, 2001 and 2002

Nationality	1990	1998	2001	2002
United States	3,500,000	5,500,000	6,900,000	8,650,000
Canada	150,000	250,000	300,000	300,000
United Kingdom	180,000	635,000	800,000	823,000
France	75,000	165,000	225,000	225,000
Germany	190,000	283,000	392,000	428,000
Rest of Europe	180,000	370,000	250,000	250,000
Asia (not including Japan)	75,000	800,000	800,000	800,000
Japan	25,000	200,000	200,000	200,000
Italy			250,000	250,000
Australia	100,000	200,000	200,000	200,000
Cyprus (Local markets only)			75,000	75,000
Freighter Passengers			3,000	3,000
Total	4,475,000	8,403,000	10,395,000	12,204,000

Source: 1990 & 1998 Complete Guide to Cruising & Cruise Ships 2000 by Berlitz

2002 & 2002 Ocean Cruising & Cruise Ships 2003 and 2004 by Berlitz

(1) Cruise Shipping Trends

Larger and larger cruise ships are being constructed to take advantage of the scale of merit. This allows cruise shipping lines to reduce the cost per passenger. Three companies (Carnival Cruise Lines, Princess Cruise Lines and Royal Caribbean International) have ships measuring over 100,000 GWT and accommodating over 3,000 passengers, which are mainly put on service in the Caribbean Sea. A variety of seven-day cruises appealing to both the traveler on a budget and the person in search of luxury is available. Since cruise vessels are generally too large to transit the Panama Canal, the main business ground for cruise shipping lines is the Caribbean Sea. However, luxurious smaller ships have also come into vogue.

(2) Around the World Cruise

Around the World Cruise is one of the most important cruises calling the Sultanate of Oman. Table 7.4-2 shows the list of Around the World Cruises in 2003/2004. Most of the ships in this Table sail the Indian Ocean, i.e. near the shore of the Arabian Peninsula.

Table 7.4-2 List of Around the World Cruises in 2003/2004

Name of Ship	Days	Start Date	From	To
Europa	239	2002/11/25	Malta	Hamburg
Delphin	136	2002/12/12	Genoa	Nice
Deutschland	136	2002/12/18	Las Palmas	Venice
Maxim Gorkiy	139	2002/12/21	Bremerhaven	Bremerhaven
Albatros	130	2002/12/21	Genoa	Genoa
Astor	153	2002/12/22	Nice	Bremerhaven
Amsterdam	108	2003/1/4	Fort Lauderdale	Fort Lauderdale
Queen Elizabeth 2	107	2003/1/5	Southampton	New York
Saga Rose	104	2003/1/5	Southampton	Southampton
Aurora	91	2003/1/6	Southampton	Southampton
Oriana	92	2003/1/8	Southampton	Southampton
Crystal Symphony	104	2003/1/19	Fort Lauderdale	Los Angeles
Seven Seas Mariner	108	2003/1/21	Los Angeles	Fort Lauderdale
Asuka	103	2003/3/11	Yokohama	Kobe
Pacific Venus	100	2003/3/21	Yokohama	Kobe
Nippon Maru	103	2003/4/4	Tokyo	Kobe
Europa	154	2003/11/15	Malaga	Monte Carlo
Astor	118	2003/12/19	Nice	Nice
Maxim Gorkiy	138	2003/12/20	Bremerhaven	Bremerhaven
Albatros	126	2003/12/21	Monte Carlo	Monte Carlo
Black Watch	106	2004/1/5	Southampton	Southampton
Queen Elizabeth 2	110	2004/1/5	New York	New York
Saga Rose	107	2004/1/5	Southampton	Southampton
Aurora	80	2004/1/11	Southampton	Southampton
Crystal Serenity	106	2004/1/19	Los Angeles	Fort Lauderdale
Prinsendam	107	2004/1/20	Los Angeles	Fort Lauderdale
Pacific Venus	100	2004/4/1	Yokohama	Kobe

Source: Ocean Cruising & Cruise Ships 2003 and 2004 by Berlitz

7.4.2 Cruise Ships Calling Omani Ports

Based on the data given in 'Ocean Cruising & Cruise Ships' by Berlitz, the average annual growth rate of the number of cruise passengers from 1990 to 2002 is about 8.7%. This growth mainly depended on less than seven-day duration categories which were promoted by introducing low price cruises and Fly-Cruise packages.

The duration of cruises calling the Sultanate of Oman is, in general, longer than 7 days at present, and this trend is assumed to continue in future because the embarking and disembarking ports in this area are limited to Safaga, Aqaba, Muscat, Dubai and Mumbai. Considering the above-mentioned facts, the growth rate of cruise ship calling ports in the Sultanate of Oman may be expected to range from 3% to 5% per annum. A breakdown of calling vessels in recent years is given as follows (Table 7.4-3)

Table 7.4-3 Number of Cruise Ships Calling Middle East & Indian Sub-continent

Port	2002	2003
Muscat	8	9
Salalah	9	6
Dubai (UAE)	5	7
Mumbai (India)	11	12
Colombo (Sri Lanka)	13	17

Source: PSC, Salalah Port Services Co., Mumbai International Terminal, JICA Study Team

In order to avoid high temperature at long summer and rough sea during monsoon, seasons for cruise ships calling Oman are limited during October to December and March to May. For coming season of 2004 to 2005 is expected to increase more than previous season.

The typical routs for those calling cruise ships are (1) Safaga – Salalah – (Sur) - Muscat – Khasab – Muscat – Mumbai; (2) Safaga – Salalah – Mumbai; (3) Safaga – Salalah – Dubai/Fujailah – Muscat – Sur – Mumbai.

Some passengers will change at Muscat and arrive/leave by air route.

Size of the ships calling Oman is relatively small and number of passengers per vessel is 180 to 400. Though these ships are small in sizes, accommodations are generally high classes and passengers are more oriented to exotic world and/or eco-tourism. As general trend of growing ship size, average number of passengers per vessel will also increase to 500; thus the total numbers of passengers are estimated as in the table.

Considering the small number of Around the World Cruise, the number of Cruise Ships Calling Oman is forecast as follows (Table 7.4-4).

Table 7.4-4 Provisional Forecast Number of Cruise Ships Calling Oman

Port	2005	2010	2020	2025
High case	10	12	19	25
Low case	9	10	14	16
Number of Passengers	5,000	6,000	10,000	13,000

Source: JICA Study Team

7.5 Forecast of Calling Vessels

The size and number of cargo vessels calling Oman's major ports as well as at a new large industrial port in the target years of 2010, 2015 and 2025 are forecast based on analysis of passed trend and future prospect of the port development.

At Sultan Qaboos Port, one of the major ports, receives more than 1,800 ships annually. Most of them are container ships, RO/RO ships, general cargo ships, cement ships, vegetable oil tankers and bunker oil tankers.

Another major port, Salalah Port, as the container transshipment port, serves the Middle East, Indian Sub-continent and the east coast of Africa as well as some conventional cargo and bulk cargo vessels for neighboring country ports.

Although, information on calling ships is available at Sultan Qaboos Port to some extent, ship's data at Salalah Port is not disclosed to the public.

In 2004, the first calling vessel entered Sohar Port, a new large industrial port with large industrial area just behind the quay wall. Major ship types of the vessels calling at Sohar Port in the future are container vessels, conventional general cargo vessels, dry and liquid bulk vessels according to the demand forecast in this study.

7.5.1 Size of Calling Vessels

The global trend for increase in ship sizes is not observable recently except for container ships. Therefore, the maximum size of vessels excepting container ships, chemical tankers, mineral products vessels and liquid bulk vessels (except oil tankers) calling at Oman's major ports and the new large industrial port in the target years will be deemed the same trend.

The size of full container ships has increased world-wide as indicated by the fact that the size of those built between 1993 and 2004 is about 1.8 times greater in terms of capacity of TEUs or by the increase from 4600 TEUs to 8500 TEUs.

However, the speed of size increase for full container ships has recently slowed down (1.7% per annum growth from 1997 to 2004 in the maximum capacity for newly built vessels), and it is therefore very difficult to estimate the future increase. Container vessels over 7,000 TEUs capacity under construction is shown in the Table 7.2-3.

Frequency of calling for trans-shipment at Sultan Qaboos Port by mother container ships serving the Middle East/Europe will increase if a new container wharf is built.

Mother container vessels serving the Middle East/Europe regularly call at Salalah Port.

Considering these facts, the maximum capacity of TEUs of full container ships calling at Qaboos and Salalah Ports in the project target years of this project will be set at 8,500 TEUs, the largest size ever

built before 2004.

The maximum size of container vessels calling at Sohar Port in the target years is estimated as 5,500 DWT class.

Because of paucity of the data regarding chemical tankers calling at Sultan Qaboos Port and the new large industrial port, we adopted 43,500 GRT as the maximum size of chemical & oil carriers in the world (source: Lloyd's Register.).

Major types of vessels calling at Sultan Qaboos Port in the target years are chemical tankers, cement vessels, grain vessels, RO/RO vessels, other dry bulk vessels, container vessels, conventional general cargo vessels and vessels for livestock. As for Salalah Port, oil tankers, cement vessels, grain vessels, other dry bulk vessels, RO/RO vessels, container vessels, conventional general cargo vessels and vessels for livestock.

As for the average size of vessels except container vessels and chemical tankers calling at Sultan Qaboos Port, the average load capacity of each calling vessel is more than sufficient for the current cargo volume. Therefore, we used the current average size of vessels for each type of vessels at Sultan Qaboos Port except container vessels and chemical tankers as the average size of vessels up to 2025.

It was assumed that the average size of container ships calling at major Omani ports will increase at a rate similar to that of the global trend of size increases for container ships in recent years.

Because sufficient data of chemical tankers at major Omani ports was not available, the worldwide average of chemical tankers (oil/chemical tankers) was adopted for that of major Omani ports (source: Lloyd's Register).

Most container ships calling at Sultan Qaboos Port are feeder vessels plying to Sharjah, J.Ali, Port Rashid, Dammam, Salalah and Jeddha, and they usually call at two to three ports. Thus, the share of capacity for Sultan Qaboos Port is estimated to be 30 to 50%.

According to Port Service Corporation (PSC), the mode of operation for bulk vessels calling at Qaboos is diverse and varied. While cement carriers usually operate between two points, other bulk dry bulk vessels serve three or more ports and their routes are varied.

As for liquid bulk vessels, about 50% operate between two points and the remaining 50% serve three or more ports. Their routes are also varied as in the case of dry bulk vessels.

As the data of vessels calling at Salalah Port was not available, the average ship type at Salalah Port (except container ships and chemical tankers) was estimated by referring to the data of Sultan Qaboos Port, the newspaper data for three weeks describing vessel movements at Salalah Port, and Lloyd's Register.

As for container vessels calling at Salalah Port, the length of each vessel which called during

approximately three months was obtained from newspaper. Therefore, the vessel data such as the capacity (teu per vessel), DWT, GRT, etc. were roughly estimated.

Accordingly, the average size of feeders and mother container vessels calling at Salalah Port in 2004 would be 27,000 GRT (capacity 2300 TEUs) and 58,000 GRT (capacity 4800 TEUs) respectively. Also the average size of feeder containers calling at Salalah after 2004 would increase at 1.7% annually.

Since the average size of oil/chemical tankers at Sultan Qaboos Port and the newspaper data are substantially equal, the average size of oil/chemical tankers at Sultan Qaboos Port is adopted as that of oil tankers at Salalah Port. According to Qaboos data, the average size is 30,000 GRT and the maximum size is 60,000 GRT.

The grain cargo volume in 2003 at Salalah Port is about 30% of that at Sultan Qaboos Port. Consequently, the average size for grain vessels calling at Salalah Port is assumed to be 20,000 GRT.

As for conventional general cargo vessels, the newspaper data describes only small sized refrigerator vessels. Although the volume of conventional general cargoes in 2003 is less than 10% of that of Sultan Qaboos Port, the volume is expected to increase radically in target years since the FTZ at Salalah Port would start operation in full scale. By considering these factors, the average size of general cargo vessels calling at Salalah Port in the project target years is set to be the same as that at Sultan Qaboos Port.

RO/RO vessels (for vehicles) which used to call at Salalah Port up to 2003 no longer stop there. This must be mainly due to lack of facilities or berths for large sized vessels due to increased number of container vessels. Once the facilities proposed by this project are completed, some of RO/RO vessels (for vehicles), which call at Sultan Qaboos Port, will also stop at Salalah Port. Thus, the average size of RO/RO vessels (for vehicles) to call at Salalah Port in the target years is considered to be same as that at Sultan Qaboos Port.

The average size of vessels for livestock that call at Salalah Port is deemed also the same as that at Sultan Qaboos Port as some of livestock vessels calling at Sultan Qaboos Port will also stop at Salalah Port.

The volumes of dry bulk cargo in the target years at Salalah Port are estimated by assuming that they are larger than Sultan Qaboos Port by 120,000 tons to 600,000 tons for cement and 900,000 tons to 1,000,000 tons for mineral products.

As for cement vessels, most of those calling at Sultan Qaboos Port are expected to also call at Salalah according to the data at Qaboos.

The average ship size for mineral products at Salalah Port in the target years is assumed to be 12,000 GRT based on the global average of limestone carriers.

Major types of vessels calling at Sohar Port in the target years are oil tankers, chemical tankers, container vessels and conventional general cargo vessels.

Since it is assumed that feeders and large sized container vessels serving routes between Europe and the Middle East or the Middle East and the Far East will call at Sohar Port similarly as Sultan Qaboos Port, the average container ship size of those calling at Sultan Qaboos Port is adopted as that for Sohar Port.

Average size of vessels excluding container vessels calling at Sohar Port, is assumed to be similar to the average size for conventional general cargo vessels and dry bulk vessels at Sultan Qaboos Port. Average size of chemical tankers and non-chemical liquid bulk vessels are also assumed to be same as the global average size of chemical tankers and non-chemical liquid bulk vessels.

Tables 7.5-1, 7.5-2 and 7.5-3, show the average and maximum sizes by ship types in the target years at Qaboos, Salalah and Sohar Ports.

Table 7.5-1 Average and Maximum Sizes by Ship Types in Target Years at Sultan Qaboos Port

(Unit: ton)

Type of Vessels	Items	2003	2010	2015	2025
General Cargo Vessels	Average GRT	10,900	11,000	11,000	11,000
	Max. GRT	32,600	33,000	33,000	33,000
Container Vessels	Average capacity per vessel (TEU/Vessel)	1,300	1,400	1,500	1,800
	Max. capacity per vessel (TEU/Vessel)	4,000	8,500	8,500	8,500
Ro-ro (for Vehicles)	Average GRT per vessel	41,700	41,700	41,700	41,700
	Max. GRT	58,700	58,700	58,700	58,700
Dry bulk (for grain)	Average GRT	26,700	26,700	26,700	26,700
	Max. GRT	58,684	60,000	60,000	60,000
Sugar Vesels	Average GRT	8,600	8,600	8,600	8,600
	Max. GRT	32,600	32,600	32,600	32,600
Vegetable Oil Tankers	Average GRT	12,700	12,700	12,700	12,700
	Max. GRT	29,300	29,300	29,300	29,300
Chemical Tankers	Average GRT	-	16,700	16,700	16,700
	Max. GRT	-	43,500	43,500	43,500
Live Stocks	Average GRT	25,200	25,200	25,200	25,200
	Max. GRT	39,000	39,000	39,000	39,000
Oil Tankers	Average GRT	7,000	7,000	7,000	7,000
	Max. GRT	45,000	45,000	45,000	45,000
Cement Carriers	Average GRT	4,431	4,500	4,500	4,500
	Max. GRT	30,000	30,000	30,000	30,000

Source: PSC data for 2003

JICA Study Team data 2010, 2015 and 2025

Table 7.5-2 Average and Maximum Ship Type in Target Years at Salalah Port (Unit: ton)

Type of Vessel	Items	2004	2010	2015	2025
General Cargo Vessels	Average GRT	-	11,000	11,000	11,000
	Max. GRT	-	33,000	33,000	33,000
Container Vessels (Feeder Vessls)	Average capacity per vessel (TEU/Vessel)	2,300	2,600	2,600	3,300
(Mother Vessls)	Average capacity per vessel (TEU/Vessel)	4,800	5,330	5,810	6,860
	Max. capacity of container vessel (TEU/Vessel)	8,500	8,500	8,500	8,500
Ro-ro (for Vehicles) Vessels	Average GRT	-	41,700	41,700	41,700
	Max. GRT	-	58,700	58,700	58,700
Grain Vessels	Average GRT	-	26,700	26,700	26,700
	Max. GRT		60,000	60,000	60,000
Cement Carriers	Average GRT	-	4,500	4,500	4,500
	Max. GRT	-	30,000	30,000	30,000
Mineral Products Vessels	Average GRT	-	12,000	12,000	12,000
	Max. GRT	-	23,000	23,000	23,000
Oil Tankers	Average GRT	-	7,000	7,000	7,000
	Max. GRT	-	45,000	45,000	45,000
Live Stocks	Average GRT	-	25,200	25,200	25,200
	Max. GRT	-	39,000	39,000	39,000

Source: JICA Study Team

Table 7.5-3 Average and Maximum Sizes by Ship Type in Target Years at Sohar Port

(Unit: ton)

Type of Vessels	Items	2010	2015	2025
General Cargo Vessels	Average GRT	11,000	11,000	11,000
	Max. GRT	33,000	33,000	33,000
Container Vessels	Average capacity per vessel (TEU/Vessel)	1,400	1,500	1,800
	Max. capacity per vessel (TEU/Vessel)	4,000	4,000	4,000
Chemical Tankers	Average GRT	16,700	16,700	16,700
	Max. GRT	43,500	43,500	43,500
Dry Bulk	Average GRT	26,700	26,700	26,700
	Max. GRT	60,000	60,000	60,000
Liquid Bulk (Products carriers)	Average GRT	26,300	26,300	26,300
	Max. GRT	67,500	67,500	67,500

Source: JICA Study Team

7.5.2 Number of Calling Vessel

Number of calling vessels at each major port and the new large industrial port in the target years of 2010, 2015 and 2025 are estimated by the result of the cargo forecast (Refer to Section 7.4.2.). Tables 7.6-1, 7.6-2 and 7.6-3 show the number of calling vessels at major ports and the new large industrial port in 2010, 2015 and 2025.

Table 7.5-4 Number of Vessels Calling at Sultan Qaboos Port in 2010, 2015 and 2025

(Unit: Vessels)

Type of Vessels	2010	2015	2025
General Cargo Vessels	135	135	81
Container Vessels	794	858	911
Ro-ro (for Vehicles)	229	251	412
Dry bulk (for grain)	20	22	28
Sugar Vesels	2	2	2
Vegetable Oil Tankers	26	28	30
Oil/chemical Tankers	36	43	68
Live Stocks	47	47	47
Cement Carriers	46	46	46

Source: JICA Study Team

Table 7.5-5 Number of Vessels Calling at Salalah Port in 2010, 2015 and 2025

(Unit: Vessels)

Type of Vessels	2010	2015	2025
General Cargo Vessels	34	34	26
Container Vessels	2,142	2,830	3,767
Ro-ro (for Vehicles) Vessels	24	25	33
Grain Vessels	6	7	8
Cement Carriers	147	235	235
Mineral Products Vessels	63	63	64
Oil Tankers	17	18	19
Live Stocks	12	12	12

Source: JICA Study Team

Table 7.5-6 Number of Major Calling Cargo Vessels at Sohar Port in 2010, 2015 and 2025

(Unit: Vessels)

Type of Vessels	2010	2015	2025
General Cargo Vessels	50	62	62
Container Vessels	139	176	233
Chemical Tankers	89	152	152
Dry Bulk	71	110	110
Liquid Bulk (Products carriers	217	219	219

Source: JICA Study Team

7.6 Summary of Demand Forecast by Study Port

As the results of these exercises, the summary of cargo forecast prepared by the Study Team is shown in the following tables.

Table 7.6-1 Summary of Cargo in 2003

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)				7		
Dry Bulk Cargo	(1,000 ton)	2,472	1,347				
Liquid Bulk Cargo	(1,000 ton)						
Ex / Im Container	(1,000 teu)	151					
Transshipment Container	(1,000 teu)	114	2,001				

Source: JICA Study Team

Table 7.6-2 Summary of Cargo Forecast in 2010

(Base Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	766	131	854	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,498	2,123	3,775			
Liquid Bulk Cargo	(1,000 ton)	458	214	7,679			
Ex / Im Container	(1,000 teu)	232	64	312			
Transshipment Container	(1,000 teu)	170	2,972	0			

(High Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	982	130	854	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,629	2,153	3,775			
Liquid Bulk Cargo	(1,000 ton)	492	233	7,679			
Ex / Im Container	(1,000 teu)	300	90	312			
Transshipment Container	(1,000 teu)	190	3,663	0			

(Low Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	607	106	854	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,423	2,111	3,775			
Liquid Bulk Cargo	(1,000 ton)	438	204	7,679			
Ex / Im Container	(1,000 teu)	176	42	312			
Transshipment Container	(1,000 teu)	155	2,726	0			

Source: JICA Study Team

Table 7.6-3 Summary of Cargo Forecast for 2015

(Base Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	782	136	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,706	2,722	6,385			
Liquid Bulk Cargo	(1,000 ton)	557	264	9,308			
Ex / Im Container	(1,000 teu)	312	114	422			
Transshipment Container	(1,000 teu)	230	4,029	0			

(High Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	1,027	139	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,871	2,760	6,385			
Liquid Bulk Cargo	(1,000 ton)	610	293	9,308			
Ex / Im Container	(1,000 teu)	414	170	496			
Transshipment Container	(1,000 teu)	278	5,165	0			

(Low Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	600	105	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,597	2,706	6,385			
Liquid Bulk Cargo	(1,000 ton)	498	234	9,308			
Ex / Im Container	(1,000 teu)	224	64	438			
Transshipment Container	(1,000 teu)	211	3,695	0			

Source: JICA Study Team

Table 7.6-4 Summary of Cargo Forecast for 2025

(Base Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	688	120	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,901	2,755	6,385			
Liquid Bulk Cargo	(1,000 ton)	849	416	9,308			
Ex / Im Container	(1,000 teu)	524	430	672			
Transshipment Container	(1,000 teu)	376	6,571	0			

(High Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	904	125	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	2,146	2,807	6,385			
Liquid Bulk Cargo	(1,000 ton)	962	475	9,308			
Ex / Im Container	(1,000 teu)	766	436	796			
Transshipment Container	(1,000 teu)	486	9,073	0			

(Low Case)

Package Type	Unit	Qaboos	Salalah	Sohar	Khasab	Duqm	Shinas
Break-bulk Cargo	(1,000 ton)	482	90	1,010	400	400	100
Dry Bulk Cargo	(1,000 ton)	1,721	2,726	6,385			
Liquid Bulk Cargo	(1,000 ton)	617	295	9,308			
Ex / Im Container	(1,000 teu)	368	222	546			
Transshipment Container	(1,000 teu)	343	6,027	0			

Source: JICA Study Team

CHAPTER 8

BASIC POLICY ON PORT SECTOR DEVELOPMENT

8 BASIC POLICY ON PORT SECTOR DEVELOPMENT

8.1 Basic Direction of Port Reform

8.1.1 Objectives

Basic objectives to develop port sector in the Sultanate of Oman are to enhance the national development strategy as stipulated in the basic national policy of promotion of economy in the sultanate of Oman. The basic national policy emphasizes promotion of economy in the sultanate of Oman by activating non-oil sectors and activating private resources.

8.1.2 Strategy

(1) Activating Non-Oil Sector with Port Development

In order to activate non-oil sector, development of the port sector is one of the most effective means to achieve the objectives.

- The port provides industrial areas at the waterfront which facilitates most efficient sea and land transport node.
- The port provides access to the foreign market where products produced in Oman can be exported with reasonable cost. The port is also the most important gateway to the import goods such as industry supplies, food staff and other consumer goods.
- In connection with the tourist promotion in Oman, importance of the port is increasing according to the expansion of world wide cruise business.

(2) Promotion of Port Utilization

Foreign trade traffic in Oman, except for gas and oil, relies partly on land routes connecting to UAE ports and partly on ports in Oman. Reasons for use of land routes rather than Omani ports are partly due to business advantages by UAE routes including overall transport cost, handling cost, accessibility to the international market and partly due to insufficient and inadequate port facilities and/or inefficiency of cargo handling as well as relatively poor business environment at the Omani ports.

In order to promote use of Omani ports by the cargo owners, basic policy applicable to the port sector should include but not limited to:-

- Enhance efficient port service,
  - ✧ by improvement of business environment
  - ✧ by simplifying and expediting administrative procedure and
  - ✧ by coordination among related Ministries & Agencies
- Provide ample capacity of the ports so that the ships do not have to wait for the berths

- ✧ by improvement of port operation efficiency including improvement of managerial systems and skills of workers
- ✧ by increasing facilities both infrastructures and superstructures.

➢ Together with well prepared long term port development planning

- ✧ by coordinating all port users' requirement
- ✧ by aiming to attain minimum transport cost to the business activities
- ✧ by mobilizing private sector resources for port development

All the policies listed above will effectively promote port activities as a whole, thus they will enhance port industries and job opportunities.

(3) Development of Adequate Port Facilities

In order to induce customers to use Omani ports, the most important factor is the availability of sufficient capacity. The port capacity can be increased either by additional facilities or by better efficiency in operation.

Presently, two major ports in Oman namely Sultan Qaboos port and Salalah port are suffering with shortage of capacity due to insufficient facilities or because of sharp increase of traffic in recent years. This is basically caused by rapid growth of economy in the Middle East and Indian Sub-continent regions. Particularly, ports traffic at UAE is approaching to their capacity and some overflowed cargo is affecting the Omani ports.

A part of the problems at Sultan Qaboos port can be solved by improvement of cargo handling efficiency by means of introduction of IT system, replacement of equipment, re-alignment of yard layout and enhancement of workers' skills. Nevertheless, absolute shortage of facilities at both major ports has to be solved by capital investment for infrastructures as well as superstructures.

The Government of Sultanate of Oman has to prepare sufficient port development scheme to cope with such traffic demand in the future. For that purpose, the GSO is now preparing the seventh Five Year Plan in which port development plans are going to be incorporated. At the same time, the GSO must prepare long term development plans to ensure sustainable development of economy.

(4) Activation of Private Resources

In order to provide enough port facilities, the amount of capital investment required in the future will be considerably large compared with the passed five year plans. In the previous five year plans, the port sector had limited approbation. Even a project was listed in the five year plan, its implementation often delayed or unused during the planned period.

The reasons of limited budget allocation to the port sector and delayed implementation may be due to tight financial position of GSO as well as due to ignorance of the policy makers on importance of ports in relation with national development.

Recent trend of favorable economy together with high oil price will ease financial position of GSO. Considering the port is the key element for the non-oil sector promotion, and existence of potential port users for the Omani ports, it is the chance to develop port facilities at sufficient scale to attract traffic not only for the natural growth by the economy but by inducing other traffic which was handled by other than Omani ports by utilizing Oman's advantageous geopolitical position (outside of Hormuz Strait) and by improvement of business environment.

All the same, the capital necessary for such large scale investment may exceed the financial capacity of GSO. Therefore, introduction of private capital for port sector is expected more than before.

Considering competitive environment of the ports in the region where most of port infrastructures are invested by the government, introduction of private investment to the port development may have certain limitation. Nevertheless, at the results of recent favorable results of major ports performance, introduction of private capital to some part of the port infrastructures may become possible.

(5) Need for Appropriate System to Introduce Private Resources

Introduction of private finance to the port infrastructures may be attractive to the government because it will relieve financial burden to the government. However, at the results of port privatization, government does not always receive financial advantages. In many ports in the world, the government rather lost its port revenue in the long run compared with under the public run port system.

Therefore, at the introduction of private resources for port infrastructures, it is necessary to prepare sufficient system and skills for management of such cases in the public sector including in the MOTC and the port authorities.

8.2 Basic Direction of Port Infrastructure Development

Port infrastructures of the Sultanate shall be developed to fulfill the following requirements of the national targets.

8.2.1 Economic Diversification

One of the key roles of ports in the Sultanate is to help realize sustainable economic growth in the nation. A long term development strategy has been adopted for the period (1996-2020), and the vision for Oman's Economy: Oman 2020 has been ratified in January 1996 as per royal Decree No. 1/96.

The long term development strategy up to 2020 primarily aims at maintaining the current level of per capita income, as a minimum, and strives to double it, in real terms, for the year 2020. To achieve this economic goal, the government has set a policy to shift from oil-led economy to diversified sources of national income. The basic objective of Oman's economic diversification strategy is to fully exploit the naturally available resources and country's excellent location. Ports have to play important roles to promote the diversification policy by providing necessary infrastructure for prospective industries.

Trade with other nations plays a vital role for a country both to expand its markets and to improve technological level for production. Oman signed WTO membership treaty on 10 October 2000 aiming at intensifying the Omani economy's connection with the international economy. Ports should not become obstacles for the enhancement of trade but promote trade by providing necessary space and information for the users.

Ports in Oman have to meet the maritime transportation requirement in the target year. Cargo throughput at port has high correlation with economic activities, and could become three or four times larger than the present level. Ports have to provide sufficient facilities and services for the future needs.

Photo 8.2-1 Oil Refinery

Photo 8.2-2 Cruise Vessel at Berth

8.2.2 Reduction of Transportation Cost

(1) Reduction of Maritime Transportation Cost

Omani ports should be planned and designed as well to accommodate large bulk cargo carriers such as minerals and cement in order to reduce maritime transportation cost. Raw materials for industrial activities are likely transported by bulk carriers, and providing berthing facilities for larger vessels can be help promote diversification of economies. Provision of better port facilities such as spacious cargo handling area and well protected basin will increase chances to attract new shipping lines. Competition among shipping lines is likely to function to lower freight rates.

(2) Reduction of Land Transportation Cost

There are only six major ports in the Sultanate, and its coastline extends 3,165 km from the Strait of Hormuz in the North to Dhofar in the South. On the other hand, not necessarily good example, Japan has 1,084 ports and total length of the coastline is 34,822 km. Dividing the coastline by number of port gives 528 km/port for Oman and 32 km/port for Japan. Assuming that natural resources such as minerals are evenly distributed along the coast, 16-times longer distance is required to transport the resources from a quarry to a nearby port to export. To reduce the land transportation cost, more ports should be developed in the Sultanate.

(3) Reduction of Terminal Cost and Increase of Value Added

Efficient operation and management is a must to reduce the terminal cost at port. Some of the existing ports have been suffering from insufficient cargo handling and storage space, thus creating additional terminal cost. Ports in the coming stage should hold ample cargo handling space where value is added and distributed to customers. Multifunctional logistic centers should be created in or near the port area in Oman.

Photo 8.2-3 Bulk Cement Carrier

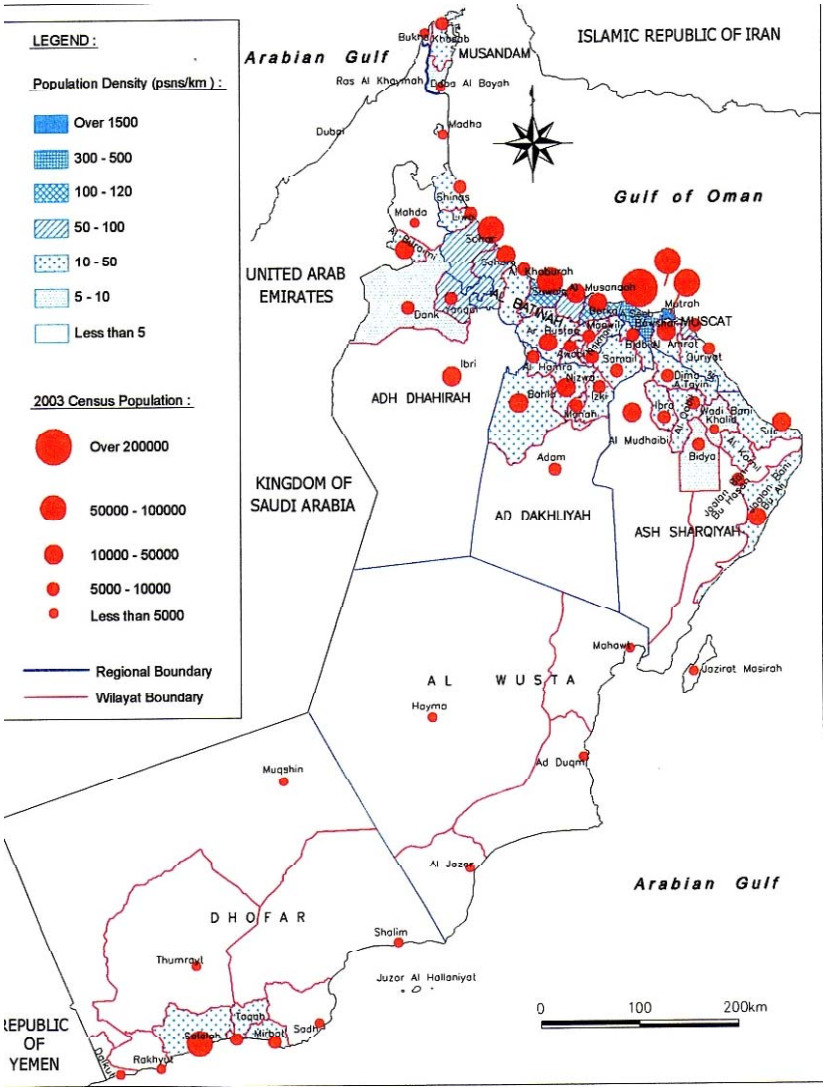
Photo 8.2-4 Multi-function Port

8.2.3 Balanced Development of the Nation

Population of the Sultanate is heavily concentrated along the coastal area facing Gulf of Oman, especially from the capital Muscat to the Northwest forward. Rest of the national land area is scarcely populated and deserted. Port should function as development center by providing competitive maritime transportation and gateway function for the hinterland region.

Figure 8.2-1 clearly shows the direction which futuristic port development should follow from the view point of balanced development of the nation: Development axis should extend to the Southeast and to the South. It is worth noting that there is no commercial port at Sur in spite of the existing of urbanized population and industrial estate with land area of more than 4,000 ha. Al Wusta Region is centrally located in the Sultanate and awaits development and exploitation.

Figure 8.2-1 Population Distribution in Oman, 2003



Source: JICA Road Study Team 2004

8.2.4 Type of Port Development

(1) Develop Waterfront Industrial Zone

Industrialization is a typical and urgent need for the Sultanate. More than 70% of government income relies on oil revenue, and this natural resource may last for coming 20 years. Diversification of national economies has been targeting for the long term policy. Port development should be in line with the national economic development policy and provide efficient transition point between land and maritime transportation as well as industrial land in the waterfront zone.

(2) Extract Locational Advantage of Omani Ports

One of the basic strategies for Oman's economic diversification is to fully exploit the country's excellent location. Oman is located outside of the Gulf where conflict tends to take place, and close proximity to the East-West major sea lane, and centrally located among East Africa, Gulf and India-Sub Continent. Ports in Oman should take into consideration this unique and precious situation, and best make use of the characteristics.

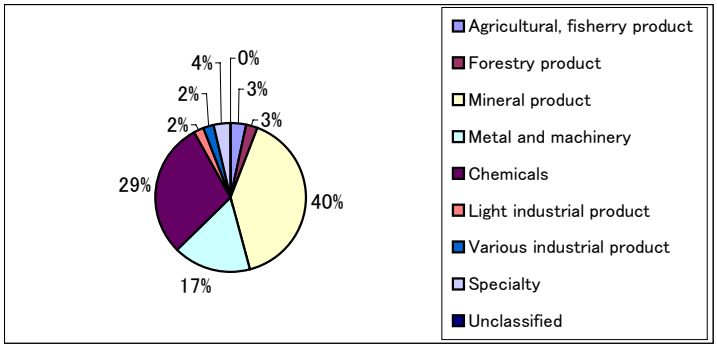
(3) Exploitation of National Resources

Figure 8.2-2 shows composition of cargo category of Japanese ports. Mineral product occupies 40% of the total throughput and chemicals take the 2nd place of 29%. Bulky cargos such as mineral are main cargo in the Japanese ports. These characteristics of port cargo can be seen in future at ports in Oman as well. It is said that Oman has several mineral deposits of good economic quality as well as quantities, which could be used as raw materials in various manufacturing sectors such as chromites, gold, copper, coal, and silica. Ports should provide loading facilities for these cargos when public interest meets.

(4) Promote Tourism Development in Port

Tourism is one of the prosperous fields for the economic diversification. It is expected that some of the tourist will move through posts. Planning of urban port is required to be in line with tourism development, which is one of the key factors for the sustainable economic development of the Sultanate.

Figure 8.2-2 Composition of Cargo Category of Japanese Ports, 2001



Source: Ports and Harbour Pocket Book 2003, Japan Ports and Harbour Association

8.2.5 Allocation of Roles and Functions of Ports

Ports and harbours can fulfill a variety of roles and functions, major components of which are categorized in the following manners:

Transportation

- Gateway function for the nation
- International transshipment container hub
- Maritime transport center for passengers

Industry

- Waterfront production base
- Energy supply and storage base
- Construction materials supply base

Daily life

- Basic infrastructure for daily life
- Recreation and amenity
- Environment preservation and improvement

Gateway function for the nation has been resided at Sultan Qaboos Port since the commissioning of this port. Although some portion of the foreign trade goods has been transported over land to/from the UAE ports, all the rest have been passing through Sultan Qaboos Port and distributed to final destinations and markets. The national gateway function will remain at Sultan Qaboos Port for foreseeable future.

Salalah Port has enjoyed an international container transshipment hub function since its inception in 1998. Sultan Qaboos Port also enjoys regional container transshipment port status at a moderate scale. Omani economy has been energized by international transshipment business as well as job opportunities have been provided. As Salalah Port is geographically closest located to the international major sea lane in the Sultanate, Salalah Port will hold the international transshipment hub status.

Waterfront production base requires a good harbour function, sufficient areas for industrial use, sufficient supply of energy and natural resources. Sohar Port meets such requirements and sufficient human resources as well can be expected in the region. Salalah, Sur and Duqm also cover considerable portions of the requirements if not all.

Basic infrastructure for daily life should be arranged throughout the nation. Port facilities for the use of maritime traffic consist of the basic infrastructure. Khasab Port, Shinas Port and Duqm Port are located at dispersed areas, and require port function as basic infrastructure for daily life.

8.2.6 Other Tactics for Port Development

(1) Provision of the Sufficient Capacity

To pursue the sustainable economic growth, it is essential for the nation to hold sufficient capacity for cargo movement, internationally or domestically. It is sometimes very difficult to foresee future volume of cargo movement, and even if it can be forecast, it takes long time to effectively provide facilities needed. On the other hand, shortage of capacity causes tremendous damage to the economy, resulting in surcharge of freight rate premium and will lost trust in the international circles. Considering this situation, ample port capacity is not necessarily too expensive, and can be said that excess capacity is better than shortage capacity. Dubai Port Authority, a leading port in the Middle East, publicly states that excess capacity is their policy.

(2) Coordinated Development with Urbanization

Port planning should be well coordinated with city planning, especially in the urbanized areas. Port surrounding area is likely to become focal point where commercial, recreational and industrial activities are taken place. Port itself is a node in the transportation chain, but it usually has multi functions suggested above. Functions of specific port are also moving as time pasts. Therefore port's roles and functions should be viewed and evaluated in dynamic manners.

(3) Lost Cargoes should be Regained

According to DPS Report of this study, a significant volume of cargoes has been passing through land borders, particularly ones with UAE. The JICA Study Team was informed that minerals produced in Oman crossed the border and exported through UAE ports. Daily necessities and provisions are imported through Dubai. The portion in which export/import goods are transported through UAE ports, not through ports in Oman, has been increasing recently. Trade, in general, provides revenue and job opportunities. Therefore, the present situation that trade is implemented through foreign ports implies losing revenue and employment opportunity. Omani ports should pursue the port development in which majority of export/import activities are carried out in the Omani ports.

CHAPTER 9

LONG-TERM INFRASTRUCTURE DEVELOPMENT PLANS OF THE STUDY PORTS

9 LONG-TERM INFRASTRUCTURE DEVELOPMENT PLANS OF THE STUDY PORTS

9.1 Socioeconomic Characteristics of the Regions of the Study Ports

- Governorate of Muscat

Governorate of Muscat, where Sultan Qaboos Port resides, is situated on the Gulf of Oman at the south part of Al Batinah coast. It is confined between Gulf of Oman and the mountains of Al Hajr Al Sharqi. The total population of the Governorate amounts to 549 ,000 inhabitants according to the 1993 Census. The Governorate is the most populous area of the Sultanate. The average density exceeds 24 times the average population density in the Sultanate.

The Governorate consists of six wilayats. Muscat is the capital of the Sultanate and the headquarters and the administrative apparatus of the state. It is an old city that played an important role as a commercial station since the early ages of Islam. It is also one of the most important trade centers.
The census results (December 1993) showed that 68% of Omani labour force in Governorate of Muscat work in public sector, while 32% are engaged in private sector. Most of those employed by the private sector work in commerce amounting to 22% followed by 16% in the mining sector and 14% in banks.

- Governorate of Dhofar

Governorate of Dhofar, where Salalah Port resides, is situated in the far south of the sultanate. It joins Al Wusta Region from the east and the borders of the Sultanate with the Republic of Yemen from the south west. At the south is the Arabian Sea. At the north and north west the Empty Quarter. The total population of the Governorate is about 189 ,000 inhabitants according to the 1993 census. Governorate of Dhofar consists of nine wilayats.

Slalah town is the regional center located some 1023 kilometers from the capital Muscat. The Governorate formed the joining point between Oman and East Africa. It was a great Omani gate on the Indian Ocean and a crossing to the convoy's old road in the south Arabian Peninsula.

According to the 1993 Census results 83% of the Omani labor force work in the public sector and the rest 17% in the private sector. The private sector workers are distributed among all activities, 22% are in agriculture, 22% in mining, 15% and 14% work in commerce and fishing activities respectively.

- Al Batinah Region

Al Batinah Region, where Sohar Port and Shinas Port are located, is known as Al Batinah coast, as it occupies a vital geographical location on the coast of the Gulf of Oman. It runs from Khatmat Malahah in the north to Ras Al Hamra in the south. It is confined between the foot of Al Hajr Al

Gharbi Mountains, in the west and the Gulf of Oman in the east. The width of the coastal plain is about 25 km.

Al Batinah Region is one of the most highly populated regions of Oman as its population approximates to 565 ,000 inhabitants according to the 1993 Census. The Region contains 12 wilayats.

Sohar town is one of the regional centers of the region located some 230 kilometers from the capital Muscat. It was also the capital of Oman before Islam. Sohar is the most important wilayat of Al Batinah Region. It is famous for production and export of copper since long time ago. A percentage of 76% of the Omani labour force work in public sector while 24% work in private sector, of these 32% work in agriculture, 17% in fishing and 16% in commerce.

- Governorate of Musandam

Governorate of Musandam, where Khasab Port resides, lies in the extreme north of the Sultanate. It is separated from the rest of the Sultanate by a strip of UAE land. Its rough mountains rise to 1800 meters above sea level. The total population is about 28 ,000 inhabitants according to 1993 Census.

Governorate of Musandam is distinguished for its strategic location, with part of it-known as Ras Musandam-overlooks the international water passage called the Strait of Hormuz.

Governorate of Musandam consists of four wilayats. Khasab town is the regional center of the Governorate located 481 kilometers from the capital Muscat. Wilayat Khasab is situated in the north corner of the governorate. It has taken its name from the fertility of its soil.

A percentage of 76% of the Omani labour force of the Governorate work in the public sector and 24% work in the various activities of private sector according to the 1993 Census results. These results also showed that 67% of those working in the private sector work in fishing.

- Al Wusta Region

Al Wusta Region, where Duqm Port is planned, is situated to the south of both Ad Dakhliyah and Adh Dhahairah Regions, at the east side it is linked to the Arabian Sea, at the west to the Empty Quarter and at the south to Governorate of Dhofar. It includes a large area of the central parts of the Sultanate. It is distinguished for having a great number of oil wells. Its population is approximately 17 ,000 inhabitants according to the 1993 Census. It consists of four wilayats.

Wilayat Hayma is situated in the center of the region, situated on the Muscat-Salalah road which links the Northern parts of the Sultanate with the Southern parts, it is a desert area, therefore its people are migrating Bedouins. The government constructed roads to join the interior areas to the coastal areas as well as the others parts of the Sultanate, paramount among which are Nizwa-Hayma-Thumarayt.

19% of Omanis in this Region work in the public sector and 81% in private sector in different economic activities, as 58% of those in private sector work in fishing, and 14% in agriculture and grazing, the rest work in others activities.

Table 9.1-1 Estimated GRDP by Region in 2000 (at Current Prices, R.O. million)

Economic Activity		Muscat	Batinah	Musandam	Dhahirah	Dakhliyah	Sharqiyah	Wusta	Dhofar	Total
1	Total Petroleum Activities	3,718								
2	Total Non Petroleum Activities	2,153	676	35	219	223	416	16	343	4,079
2.1	Agriculture & Fishing	14	70	5	13	7	20	7	14	149
2.2	Industry Activities	302	68	3	41	28	161	2	49	655
	C. Mining & Quarrying	7	1	-	6	1	2	-	1	18
	D. Manufacturing	206	36	0	14	10	136	-	13	415
	E.Electricity & Water Supply	26	20	3	6	6	6	1	10	78
	F. Building & Contruction	64	11	0	15	11	18	0	25	145
2.3	Services Activities	1,836	538	27	165	188	234	7	280	3,275
GRDP at Market Prices		5,713	676	35	219	223	416	16	343	7,639
	Total Population	549,000	645,800	28,600	199,100	260,600	296,700	20,000	217,600	2,316,570
	GRDP per Capita (RO)	8,813	1,046	1,224	1,099	856	1,400	790	1,575	3,298
Area (km2)		3,900	12,500	1,800	44,000	31,900	36,400	79,700	99,300	309,500

Source: JICA Road Study Team Estimates