6. Administration and Management of Port Salalah

6.1 Port Administration in Oman

6.1.1 Ports in Oman

(1)General

Directorate General of Ports & Maritime Affairs ("DGPMA"), which is under MOTH, is responsible for port development, port management and maritime affairs. DGPMA has 32 employees and 3 Directors under the Director General. It consists of a head office, two administration offices at Port Salalah and Port Khasab, and three offices of registry and ship monitoring at Port Qaboos, Port Salalah, and Port Sur.

MOTH administrates four common-user ports, Port Sultan Qaboos, Port Salalah, Port Khasab, and Port Sohar. There are two industry-specific ports, Sur(Qalhat) and Al Fahal. Port Qalhat is a LNG terminal and Port Al Fahal is an oil terminal. These ports are under the administration of the Ministry of Oil and Gas ("MOOG"). Fishery ports are under the Ministry of Agriculture & Fisheries ("MOAF"). Two private marinas are administrated by municipal governments.

(2)Port Management Policy

In order to develop and manage the ports efficiently, DGPMA is promoting private sector involvement in the port sector. To lessen the financial burden of the government and to use the substantial expertise and experience of the private sector are the main objectives of privatization. In 1976 Port Service Corporation ("PSC") was established as a management and operation entity of Port Sultan Qaboos. In 1997 Salalah Port Services ("SPS") was established for the development of a container transshipment terminal and it now manages all of Port Salalah including the conventional terminal.

6.1.2 Management of Port Sultan Qaboos

At the establishment of PSC, non-fixed properties in the port area were transferred from GSO to PSC, but GSO retains the fixed properties. PSC is responsible for the management, procurement of terminal facilities and maintenance. PSC provides all port services including navigation aids and vessel control. Collecting port dues is PSC's competency. Infrastructure development is conducted by the government with its funds.

When PSC was established, the government held 60% of the shares. The government portion has been reduced to 35%. As a result the number of government officials among the 12 Board of Directors decreased from 7 to 5. The present tariff was fixed in 1981 and subsequently amended

in 1992 by MOTH. As per Ministerial Resolution of 1997 by MOTH, PSC is authorized to grant concessions in individual cases in the interest of PSC up to a maximum limit of 40% of the fixed tariff. This is in line with the government policy to advance privatization.

PSC is obliged to pay rental fees of port facilities and franchise fees to the government. Rental fee is a basic yearly fee. Franchise fee is a profit share for the government in return for the use of the utilities and facilities provided by the government and for the exclusive right given to the PSC to act as the operator of the Sultan Qaboos Port. In 1999 PSC paid R.O.100,000 in rental fees. No franchise fee is payable for the year 1999 due to PSC's reduced profits during 1999.

6.2 Administration of Port Salalah

6.2.1 Agreement between GSO and SPS

(1) Container Terminal

To take advantage of locating close to the shipping routes linking Europe and the Far East, GSO planned to construct and develop a world class container terminal facility at Port Salalah to be operated and managed by a joint venture with substantial expertise and experience in container terminal operations. According to a 30-year Concession Agreement, SPS was established as a joint venture company between GSO and the private sectors. At the expiration of the term all equipment possessed by SPS should be transferred to GSO.

Based on this Agreement, GSO developed the infrastructure for a container terminal with an investment of 130 million US dollars, which was subsequently leased to SPS, and granted to SPS an exclusive license to operate and manage the container terminal facility. SPS executed procurement, installation and commissioning of the equipment and started to operate and maintain the facilities as a world-class container transshipment terminal at its sole cost and expense.

The Concession Agreement also set out certain obligations on SPS. The first one is guaranty of minimum main line vessel calls and total annual volume by the partner shipping lines. The second one is to ensure that an open and competitive commercial environment exists and not to discourage competition. The third one is to undertake marketing and related activities in order to encourage usage of the facilities by any shipping company. In addition, SPS is required to conduct training and promote employment of Omani nationals.

The revenues of GSO from SPS consist of land lease fee, royalty fee for granting the concession, share of profit and dividend.

(2) Conventional Terminal

In October of 1998, GSO and SPS signed a Memorandum of Understanding ("MOU") and SPS started its management and operation of the conventional terminal. At the same time SPS takes over tugs, pilot vessels, vessel tracking systems, harbour master functions and navigation aids. This means that SPS manages and operates all facilities in Port Salalah.

6.2.2 Organization of SPS

SPS was established in 1997 as a joint venture company. The government's share is 31% and that of Maersk Sea-Land is 30%.

SPS provides all port services. SPS employs a total of 866 workers and its organization is basically divided into two sections; the container terminal and the conventional terminal. The container terminal employs 75 % of all employees.

Omanization, or employment of the maximum number of Omanis in the organization, is a basic policy of SPS. Of the total 866 employees, Omani workers represent 54%. The target is to increase the Omanization ratio to 60%, indicating the need for foreign experts to manage and operate transshipment container terminal and for low salary Non-Omani workers to compete with other ports.

Training for workers is conducted by National Training Institute together with the management of SPS. Sending trainees abroad for on-the-job training at modernized container terminals and inviting experts to train workers at home are common practices.

6.2.3. Management of SPS

SPS is the sole management and operation body of Port Salalah and covers not only the land area but also the inner harbour area. Navigation control is a duty of the harbour master of SPS. As a joint venture company, SPS puts priority on profit to provide shareholders with a reasonable return. In this sense potentially profitable container terminals are the main concern of SPS.

At the container terminal operators allocate many quay cranes to minimize ship cost and maximum 6 quay cranes are allocated to a mother vessel. Ninety nine percent of cargo throughput is transshipment. There are only 3 gate lanes (in, out, alternative) while the handling capacity of this terminal is 2 million TEUs per year. Container loading/unloading, marshaling/stacking container and stuffing/destuffing is conducted 24 hours a day in 3 shifts. Basic service hours of delivering/receiving cargoes is 8:00-16:00, Saturday-Thursday.

Container terminal operations are conducted through a computer system. SPS's computer system, IT system, totally covers vessel planning, yard management, container terminal administration, and EDI.

Conventional terminal used to be operated by the government but management and operation was transferred to SPS in September 1998. After the takeover, SPS reduced employees to improve the financial situation of the conventional terminal. Before the transfer, about 250 employees worked for MOTH in Port Salalah. Out of those 250, about 170 personnel belonged to the operation and engineering departments. At present about 130 personnel belong to these departments although the volume of cargo throughput in 1999 increased 40% compared with that in 1998. Berth allocation of conventional terminal is on a 'First come, First service' basis.

Stevedore services are basically provided by SPS's employees and equipment 24 hours a day in a 3 shift system.

6.2.4 Organization of MOTH in Port Salalah

A total of 251 people were employed by MOTH port office in July 1998. Since SPS began management and operation of the conventional terminal, ship registration is the only remaining main function of the MOTH office at Port Salalah. Therefore the number of employees is only 10 at present and that figure may be further reduced. 45% of former MOTH employees have been employed by SPS.

6.3 Financial Status of SPS

6.3.1Financial Situation

Commercial operations of the new container terminal commenced in November 1998 with two quay cranes. The port handled 44 vessels and 25,000 TEUs during the 2 months in 1998. From this operation SPS earned revenues of R.O. 253,757 but posted a net loss of R.O. 586,784 from September 16,1997 to December 31,1998.

From May in 1999, operation of 6 quay cranes started and the port handled about 649 thousand TEUs in 1999. Though the increased cargo handling raised revenues to R.O. 7,140,716, a net loss of R.O. 3,750,117 was posted. There are two main reasons. One is the increase of depreciation and the other is write off of startup expenditure.

Table 6.3.1 Income and expenditure of SPS

(Unit:R.O.)

	From 1/1/1999 To 31/12/1999	From 16/9/1997 To 31/12/1998
Revenue	7,140,716	253,757
Operating Costs	(5,751,931)	(408,949)
GROSS PROFIT(LOSS)	1,388,785	(155,192)
Administration expenses	(958,040)	(205,312)
Other operating expenses	(831,892)	(203,467)
Marketing expenses	(183,105)	(19,622)
LOSS FROM OPERATIONS PRIOR TO WRITE OFF OF STARTUP EXPENDITURE	(584,252)	(583,593)
Write off of startup expenditure	(2,157,519)	—
LOSS FROM OPERATIONS	(2,741,771)	(583,593)
Finance costs	(1,261,801)	(58,605)
Interest income	198,332	55,414
Miscellaneous income	55,123	—
NET LOSS FOR THE YEAR/PERIOD	(3,750,117)	(586,784)

Source: SPS ,"Annual Report 1999"

6.3.2 Revenues of Conventional Terminal

Up to the end of September 1998, Port Salalah was operated by MOTH. SPS started its service from October 1998. In 1999, thanks to greater cargo throughput and the revision of marine charges, total revenues increased by 20 % to R.O. 986,341.

6.4 Tariffs

Tariffs are decided by the Board of Directors of SPS except minimum tariff structure and charges which are decided by the government. The Board of Directors has a sub-committee to discuss tariff matters. The sub-committee recommends guidelines for negotiating tariffs rates with customers for Port Salalah.

Tariffs of Port Salalah comprise marine charges, container terminal charges, and conventional terminal charges. Tariff book is published by SPS.

(1) Marine Charges

Marine charges consist of port dues, berthing/unberthing charges, and marine service charges. Port dues are charged to all vessels entering Port Salalah except exempted vessels. Berthing/unberthing charges are charged on all vessels including exempted vessels for berthing at Port Salalah. Marine service charges cover pilotage, tugs, and water supply. When SPS started to manage and operate the conventional terminal, marine charges were revised (raised) to their current levels.

(2)Container Terminal Charges

The tariffs of Port Salalah are a little bit higher than those of Dubai Ports.

Table 6.4.3 Charges Loading and Discharging of Container

(Unit: US$)

	Port Salalah	Sultan Qaboos Port	Dubai Ports
Transshipment			
20' Laden	140.00	38.96	138.04
20' Empty	98.00	38.96	93.48
40' Laden	200.00	64.94	192.39
40' Empty	140.00	64.94	134.24
Import / Export			
20' Laden	109.00	85.71	107.33
20' Empty	63.00	44.16	59.78
40' Laden	165.00	111.68	158.97
40' Empty	85.00	57.14	81.52

Note : 1 US dollar is equivalent to R.O. 0.385 ,1 Dhs. is equivalent to 3.68 US dollars

Source : Tariff of Port Salalah 1999, Tariff of Port Sultan Qaboos 1999, Tariff of Dubai Ports 1999

(3)Conventional Terminal Charges

Stevedoring charges, quay handling and storage charges in the conventional terminal were not changed as SPS assumed its operation.

Table 6.4.4 Charges Stevedoring and Quay Handling

(Unit: R.O./freight ton)

		Port Salalah	Port Sultan Qaboos
General Cargo	Stevedoring		
	Discharging without crane	1.350	1.750
	Discharging with crane	1.700	1.750+Crane charge
	Loading for Export	5.250	3.500
	Quay Handling		
	Discharging	1.125	1.500

Note : Crane charge depends on the equipment.

Source : Port Raysut Tariff, Port Sultan Qaboos Port Tariff

6.5 Port Services

(1) Navigation Aid

SPS provides all port services including navigation aids and vessel control. As a part of this duty SPS maintains buoys, lighthouse, radar system and VHF.

(2) Pilotage

Pilotage is compulsory for vessels larger than 200 GRT by Port Rules & Regulations. ETA, LOA, and draft must be advised as early as possible but not less than 24 hours before arrival. The service is 24 hours with 3 pilots. It is pointed out by the pilot that due to the curb of the channel at the entrance of the inner harbour, large container vessels cannot reduce their speed under 6 knots to pass the entrance. Entering vessels are therefore required to conduct careful maneuvering. It is also pointed out that ships moored at berth Nos. 3 and 4 experienced excessive vessel motion during the last monsoon season.

(3) Tug Boat

One tug boat is compulsory for vessels larger than 200 GRT. Vessels larger than 10,000 GRT ,except vessels with bow and stern thruster, require 2 tug boats. Two tug boats built in 1998 with 5,000 H.P. are in service.

(4) Fire Fighting

Tug boats are equipped for fire fighting. In addition, fire fighting service from the local fire brigade is available around the clock.

(5) Customs and Immigration

Royal Oman Police Customs Department is responsible for customs. Its office in Port Salalah is located near the conventional terminal. The office provides services for documentation procedures and custom duties with 52 employees from 7:30 to 14:00. Port customs office for cargo inspection is at the container terminal. One group consists of 1 officer and 7staff members working in a 3 shift system (24 hour service). Inspection of imported container cargo is conducted at an inspection yard and is finished within 1 or 2 minutes. Inspection of export cargoes is done outside the port. Custom duties for imported cargo is 5%. In case of re-export, 5% custom duties need to be deposited of which 4% is refunded when re-exported. The container terminal also has an immigration office under the Royal Oman Police. This office provides 24 hour service with 2 officials under a 3-shift system.

6.6 Scenario Setting

Taking account of successful examples of port management around the world, the Study Team will propose the following alternative port management scenarios.

The difference between Case-1 and Case-2 lies in the number of terminal operators. In Case-1, existing scheme is extended to the future development area. SPS develops and operates the entire port area(Single terminal operator scenario modeled after Singapore). In Case-2, a third party will be given concession to develop and operate additional berths. In other words, Port Salalah will have two or more terminal operators competing amongst themselves (Multiple terminal operator scenario modeled after Hong Kong). Both of the cases assume SPS as the only agency responsible for port management. Conceptual distribution of roles among the parties concerned is summarized in Table 6.6.1 and Table 6.6.2.

Next point is the importance of coordination between port development and hinterland development. Many port authorities in the world are actively involved in coordination between port and hinterland development. The Study Team will further examine what kind of coordination mechanism is desirable for Salalah.

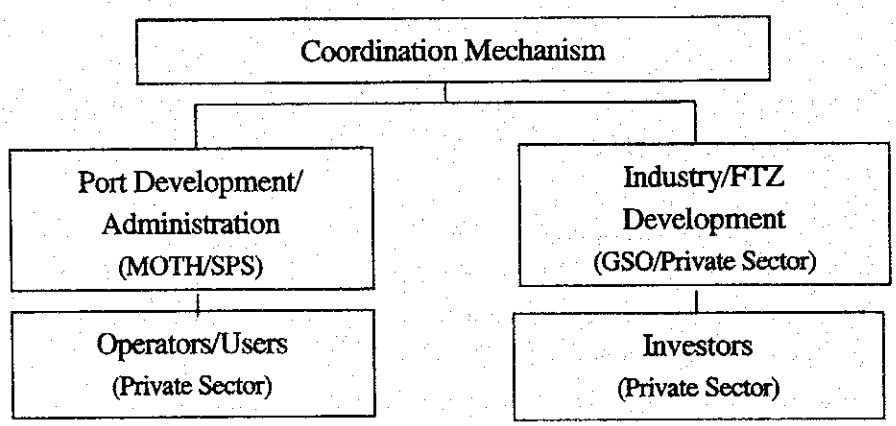

Fig. 6.6.1 Concept of a Coordination Mechanism

Table 6.6.1 Case-1(Single Terminal Operator)

Facilities	Decision Making/ Planning	Port Management	Development and Operation		Marketing
			Concessionaire	Operator	
Existing Container Terminal	MOTH/SPS	SPS	SPS	SPS/SFS	MOTH/SPS
Existing Conventional Terminal				SPS	
Additional Container Berths				SPS/SFS	
Additional Conventional Berths				SPS	
Hinterland Development	GSO	Private Sector	Private Sector	Private Sector	Private Sector/GSO

Note: SFS(Sea-land Freight Services)

Table 6.6.2 Case-2(Multiple Terminal Operators)

Facilities	Decision Making/ Planning	Port Management	Development and Operation		Marketing
			Concessionaire	Operator	
Existing Container Terminal	MOTH/SPS	SPS	SPS	SPS/SFS	MOTH/SPS/ 3rd Party
Existing Conventional Terminal				SPS	
Additional Container Berths	MOTH/SPS/ 3rd Party		3rd Party	3rd Party	
Additional Conventional Berths					
Hinterland Development	GSO	Private Sector	Private Sector	Private Sector	Private Sector/GSO

Note: SFS(Sea-land Freight Services)

7. Socioeconomic Conditions of the Surrounding Countries

7.1 Socioeconomic Background

Oman is surrounded by the Arabian Gulf and the Indian-subcontinent (to the West), Saudi Arabia (to the North), Yemen and the Red Sea (to the South), and the Indian Ocean and East Africa (to the South). The Study Team classified those surrounding areas into three groups, the Middle East, the Indian sub-continent, and East Africa and reviewed their socioeconomic conditions.

(1) Middle East Countries

There are 11 major countries (UAE, Yemen, Iraq, Iran, Qatar, Kuwait, Saudi Arabia, Jordan, Syria, Bahrain, and Lebanon) in this region. Among them, UAE, Qatar, Kuwait, and Bahrain will continue to have a major impact on the future outlook for the Omani economy and Port Salalah. Iran and Iraq may have a great impact on Salalah depending on the developments of international politics. Port Aden in Yemen is of particular relevance to Salalah in terms of the regional container shipping business.

(2) Indian Sub-Continent Countries

India, Sri Lanka, Pakistan and Afghanistan are the major countries in this region. Among them, India and Pakistan have strong economic ties with Oman and also provide many workers. Colombo Port in Sri Lanka is one of Salalah's keenest competitors thus the political situation of that country requires close attention. Afghanistan will need some time to achieve political and social stability.

(3) East / South Africa

There are nine major countries (Sudan, Eritrea, Djibouti, Somalia, Kenya, Tanzania, Mozambique, South Africa, and Madagascar) in this region. Among them, economic growth can be expected only in South Africa. The economies of the other eight countries are in shambles. UN and G7 countries are considering a debt relief package of 17 trillion yens for those countries. The economic situation in this region will pick up if this debt relief is approved, which is expected to happen in fiscal 2000.

7.2 Port Development Projects

(1) Regional Overview

Potential container transshipment market of Port Salalah comprises the areas surrounding the Indian Ocean including the Indian sub-continent, the Middle East, and Eastern Africa. Container throughput in the region has recorded a rapid annual growth of over 11 % in this decade. That figure well surpasses that of the world total, indicating the very strong demand for port development in the region.

(2) Dubai

Dubai is a twin port consisting of Port Rashid and Jebel Ali, both of which are managed by the Dubai Port Authority (DPA). Dubai has achieved a remarkable growth in container traffic taking advantage of its strategic location as a crossroads of the East and the West. In addition to the strategic location, sophisticated equipment and technology in cargo handling as well as efficient port services have contributed to the rapid growth of Dubai.

Table 7.2.1 Cargo Throughput of Dubai

		1980	1985	1990	1995	1997	1998
Container throughput (1000 TEUs)	Import	92	160	252	516	686	768
	Export	90	154	214	516	514	596
	Transshipment	91	202	450	1,042	1,400	1,439
	Total	273	516	916	2,073	2,600	2,804
Container throughput rank in the world		38	24	23	14	11	10
Container cargo (1000 t)		1,449	3,771	7,658	10,106	21,880	21,997
General cargo (1000 t)		2,981	2,520	2,562	4,529	5,560	6,138
Petroleum (1000 t)		551	4,876	7,518	5,924	8,548	8,290
Total cargo (1000 t)		4,981	11,167	17,738	28,337	35,988	36,424

Source: Dubai Port Authority

Container cargo is handled in both of the terminals but with different systems. Transtainer cranes are used in the Jebel Ali Terminal, while a straddle carrier system is adopted in the Port Rashid Terminal. Main container handling facilities are listed below.

- quay depth: 13-14 m
- number of berths: 10
- gantries: 23
- RTGs: 34
- straddle carrier: 27
- container yard: 122 ha (with a storage capacity of 98 thousand TEUs)

- CFS: 19 ha

The Jebel Ali Free Zone (JAFZ), the largest free zone in the Middle East, has played a significant role in Dubai's rapid growth since its opening in 1985. Jebel Ali Free Zone Authority manages the free zone. The authority and DPA share a chairman and their operation is closely linked. In 1998, export containers account for nearly a quarter of the total container throughput, a substantial part of which is re-exported from the free zone. More than 1500 companies from more than 80 countries have established their business bases in the free zone. Dubai serves as a cargo distribution center with destination for the Arabian Gulf, Iran, CIS, and the Indian sub-continent.

Though transshipment has continued to account for about a half of the container throughput, DPA is now aiming to reduce its share to around one third. On the other hand, DPA has no major expansion project except introduction of four super post-panamax gantry cranes to meet the growing demand. Latest figures compiled by DPA clearly show the high growth of export-import cargo and stagnation of transshipment. DPA indicates that it achieved an annual growth of 2 % in total container throughput in 1999 despite the loss of transshipment business to Salalah.

Since Dubai is located well off the main shipping route, prospects of Dubai as a transshipment hub are not very bright. Better-located ports such as Khor Fakkan, Salalah, and Aden are expected to gain ground in the competition.

(3) Aden

Aden is only four nautical miles off the main shipping route, thus providing an ideal location for transshipment business. The status of Aden has dramatically changed since Aden Container Terminal (ACT) was opened in March 1999 by a joint venture between PSA Corporation Limited and Yemen Holdings Limited. PSA, the Port of Singapore Authority, will manage and operate ACT for 20 years based on a terminal management contract signed in 1997. PSA has been in a privatization process for the last few years and is now aiming to invest in overseas port development projects. Aden is one of its early efforts in overseas investments.

Main container handling facilities of Aden are shown below:

- quay depth: 16m (with future provision for 18m)
- number of berths: 2
- gantries: 4 (another 2 in 2000)
- RTGs: 8 (another 5 in 2000)
- Container yard: 35 ha (with a storage capacity of 98 thousand TEUs)

Aden Free Zone is developed right behind the container terminal. 70 ha of area was reclaimed

as the Phase 1 and is now ready for sell. The total area of the Free Zone will be 1550 ha.

ACT has a conceptual plan to more than double the quay length from the present 700 m to 1650 m, in which case its capacity will reach two million TEUs per year, comparable to that of Dubai at present. Since Aden's location and well-sheltered harbor basin are superb, ACT has a great potential to be a competitive port in the region. The sheltered basin can easily provide ample room for further expansion of the terminal. PSA's operational expertise and its clout in the shipping business give it a strong advantage as well..

(4) Khor Fakkan

Khor Fakkan is a container transshipment hub located on the east coast of the Emirate of Sharjah, just outside of the sensitive Straits of Hormuz. Its strategic location is a clear advantage over Dubai and container throughput has grown rapidly during this decade. Roughly 80 % of the throughput is made up of transshipment containers. UASC and CMA make up 75 % of the total cargo.

Main container handling facilities of Khor Fakkan are shown below:

- quay depth: 12-15 m (with future provision for 18m)
- number of berths: 4
- gantries: 8 (another 2 in 2000)
- Container yard: storage capacity of 17 thousand TEUs

Hamriyah Free Zone was established 15 km to the north of Sharjah in 1995. Sea, land, and air links to various parts of the world support it. Sharjah International Airport is located 13 km from Sharjah and is chosen as the Middle East freight hub of Lufthansa, recording a steady growth in sea-air freight.

It is also noteworthy that further extension of the existing container terminal is very difficult due to the port's geometry.

(5) Fujairah

Fujairah is the first container transshipment hub developed in UAE and started its operation in 1984. The transshipment business grew rapidly from 87000 TEUs in 1984 to 694000 TEUs in 1994 recording an annual increase of 18.6%. Business environment changed in 1995 when APL, the port's only customer, shifted some of its operation to Dubai. The throughput in 1999 was roughly a half million TEUs.

Main container handling facilities of Khor Fakkan are shown below:

- quay depth: 12.5 m

- number of berths: 4
- gantries: 6
- container yard: storage capacity of 15 thousand TEUs

600m quays with alongside depth of 15m will be commissioned in 2002 at the cost of 50 million US dollars. But its future outlook is rather bleak under fierce competition with Dubai and Khor Fakkan, both of which are located within a few hours' drive from the port. Further expansion will require large-scale civil works including breakwaters and channel dredging. Based on the above observations, the Study Team concludes that Fujairah's role in the transshipment business in the region will remain limited.

7.3 Industrial Development Projects

The industrial development projects, which might affect influences most on the development of Salalah port and its hinterland, may be those of free zone/ free trade zone projects. There are many free zone/ free trade zone projects in the surrounding countries. These include free zone projects in UAE, and Yemen. The free trade zone in Aden will be the most competing projects with that of Salalah, particularly in terms of target markets to serve. The strength and weakness of these free trade zones will be analyzed comparatively with that of Salalah in 12.1, and 17.2, to define the development potentials of Salalah.

7.4 International Shipping Trends

7.4.1 Latest Trend

When it was finally announced on July 22 1999, A P Moller-Maersk's acquisition of Sea-Land's International operations from parent CSX Corp.was not a surprise to many people in the maritime world, as it had been anticipated for so long, but it was a big surprise to many people outside of maritime circles. The union of Maersk with Sea-Land to form Maersk-SeaLand creates a truly mega-carrier in every sense of the word with 167 large container vessels including 21 vessels under construction. The new company operates a fleet of 500 thousand TEUs, which is equivalent to 23 % of the world total. Consequently, five major groups consisting of top ten companies are considered to be the competitors in international shipping business.

7.4.2 Trends as viewed by Japanese Shipping World

representatives of major Japanese shipping companies generally agree that the following three factors have fundamental importance in international shipping trends:

Imbalance of Containers

Ever-enlarging vessels

Merger and acquisition in the international shipping business

Table 7.4.1 Carrying Capacity of International Alliances at the End of 1999

Alliances	Asia/N.Am.	Asia/Eu.Med.	N.Am./Eu.Med	Total TEU/Year	Vessel Used VSL	TEU
Grand	947,765	1,395,593	147,071	2,490429	93	376,500
New World	1,730,653	832,982	264,348	2,827,983	95	356,650
United	1,235,716	943,697	291,997	2,471,410	94	327,350
Maersk/SL	913,920	1,001,003	664,695	2,579,618	79	321,650
Cosco/K/Y	1,004,143	570,490	229,482	1,804,115	65	214,450
Evergreen	1,049,140	785,426	424,847	2,259,413	70	280,700

Source: JICA Study Team

Remarks:

Grand Alliance	Hapag-Lloyd, NYK, OOCL, P&ON
New World Alliance	APL, Hyundai, NOL, MOL
United Alliance	Hanjin, Cho Yang, DSR-Senetor, UASC
COSCO/K/Y	COSCO, K-Line, Yangming

7.4.3 OECD Maritime Transport Report 1997

The total volume of containerized cargoes traded worldwide rose by approximately 11 percent in 1995, to around 35.5 million TEU, compared to some 32 million TEU in 1994. In other words, container carryings reached an estimated 55 percent of the total liner trades, compared to 31 percent ten years earlier. Trades involving Africa and Latin America accounted for most of the remaining break bulk carryings, although continued containerization is also apparent in these trades. The coming 21st century will see the most active movement of containers in the regions to and from these continents.

7.4.4 Journal of Commerce/ Kaiji Press Data

The total number of containers in service in the world doubled between the end of 1985 (4,800,000 TEU) and the end of 1995 (9,600,000 TEU). Containers increased by approximately 800,000 TEU in 1995 and slightly less in 1996. 1,200,000 new containers were brought into service and 450,000 were withdrawn in 1995, which was a record high. Imbalance of container moves has been aggravated by the Asian Economic Crisis.

7.4.5 Scenario Setting

To carry out a demand forecast of " Transshipment Containers at Port of Salalah ", due attention must be paid to all the factors which may affect the future demand and transportation pattern of the transshipment boxes in the region surrounding Port Salalah. The factors to be considered are:

(1) Future Outlook of the World Shipping Business
-1. Alliances---How will this tendency develop?
-2. Vessel Size---Is 10,000 TEU the maximum vessel size?
-3. Imbalance of Boxes---Can it be improved?

(2) Socioeconomic Framework of Surrounding Countries
-1. Oil-producing Gulf Countries
-2. India and Sri-Lanka
-3. East and South Africa

(3) Regional Competition
-1. Competition with Aden
-2. Competition with Gulf Ports
-3. Competition with Indian/Sri-Lankan Ports
-4. Competition with Singapore

(4) Factors proper to Port Salalah
-1. Feeder Service Network Development
-2. Port Development Plan
-3. Port Sales Activity

From the viewpoint of international shipping trends, the Study Team will incorporate those factors into three cases shown below as a basis of the demand forecast.

Case I: Salalah's competitiveness will be further strengthened
Case II: Salalah's competitiveness will remain unchanged
Case III Salalah's competitiveness will be weakened

8. Natural Conditions around Port Salalah

8.1 Meteorology

There are three seasons in a year at Salalah, namely NE monsoon during November through February, SW monsoon during May through September and intermediate between NE to SW monsoons. During NE monsoon, a fine weather is mostly prevailed without rain and dry northerly cooler wind. During SW monsoon, a humid cloudy weather with light rain is prevailed.

(1) Rain

The mean annual precipitation at Salalah is 112 mm, and main rainfall period brought by the SW monsoon with 25 to 30 mm of rain per month.

(2) Wind

During the NE monsoon, wind strengths of between 7 and 17 knots are typical with maximum strength of about 28 knots.
During the SW monsoon, wind strengths are typically 17 to 34 knots with a maximum normally less than 48 knots.

(3) Temperature

The annual temperature of Salalah is maximum about 42° C in April and minimum about 15° C in December. The mean temperature through the year is about 25° C.

(4) Cyclones

The sixteen (16) cyclones had been recorded from 1902 to 1999 in the vicinity of Salalah.

8.2 Oceanography

During the months of June to September, a strong upwelling of cold water moves towards the coast, and this causes water temperatures to drop significantly approximate 5° C in the vicinity of Salalah.

The average temperatures at Salalah will be about 25° C in summer season due to above situation.

(1) Sea Water Temperature

The variation of sea water temperature for surface water at Salalah is as follows.

- Maximum April 27° C
- Minimum August 20° C

(2) Tide

The semi-diurnal tide with average daily tide range is 1．0 m.
The full moon tide range is about 1．6 m.

(3) Wave

The wave measurement of Salalah port has taken place on and off since 1977 by wave rider buoy. The wave rider buoy measures the up and down motion of the water at particular point, however no information for the direction of waves can be derived.

The study team applied the international weather data base ECMWF (European Center for Medium-Range Weather Forecast) for proper wave hindcasting.

The wave characteristics at the entrance of Salalah port is investigated by means of the improved WAM model called the JWA-3G model with 15years database. The result of calculated designed wave height and period is shown below.

- 50 years designed wave height and period
- Wave Direction : S, Wave Height : Hs (m) 7.00, Wave Period : 8.4 sec.

The wave characteristics at the entrance of Salalah port is as follows.

- November – February ; Relatively calm sea conditions less than 1.0m high of wave in SE.
- May – September; Wave becomes higher and worse in July and August experiencing 2.5m in S, SSE with large swell.

(4) Current

A fifteen (15) days statistics of current observation and 25 hours spot current observation were conducted in proposed project area. The surface current was dominated both on and offshore direction (SSW, NNE) with 0.2 m/sec and the bottom current was dominated to offshore direction (S) with 0.1 m/sec. The maximum current was recorded 0.38 m/sec.

8.3 Topography

The Dhofar region is naturally divided into three main areas, namely The Coastal Plain, The Mountains and The Desert. Salalah is situated on The Coastal Plain. The elevation is gradually changes from MSL 0m coast to 15m airport and the distance of 9 km north to west, 20 km north to east from the port is almost flat area. The mountain range is located about 11 km from the coast with about 500 m top elevation.

8.4 Bathymetry

The bathymetric survey of Salalah port was conducted by the WGS 84 system by satelite fixing from 1992 and 1996 by international survey companies. The study team conducted bathymetric survey for proposed project area in this year and compiled the bathymetric map with scale 1 : 10,000.

The northern part of existing port, the seabed slopes down from the beach and across the entire site between gradients of 1 : 50 and 1 : 300 in an easterly direction of 110 degrees.
The area of approach channel, the seabed slopes at a gradient of 1 : 100 in a south easterly direction of 150° and 1 : 400 in a southerly direction of 170° . The gradient of seabed condition are generally mild for entire survey area.

8.5 Siltation and Shoreline

In accordance with the result of soil investigation by the study team, sand, gravel,cobble layer has been confirmed as surface layer. The maintenance dredging record does not exist since 1973, therefore the Salalah port has experienced almost no accumulation of sediment during long time.

The shoreline of Salalah city is about 20 km from the existing container terminal to Holiday Inn Hotel and the study team confirmed the movement of shoreline about 50 m towards landward by seasonal SW monsoon waves. Along the coastline,some part of beach road was dameged by SW monsoon waves forces and the temporary shore protection works is now ongoing.

The coastal erosion surveys was conducted by the study team for measurement of existing shoreline and analysis of beach material particle in laboratory. The average size and density of beach material is as follows.

- Average diameter of particles is 0.25 mm and density of particle is 2.70mg/cm3 respectively.

8.6 Geophysical Surveys

The study team conducted the bathymetric and sub bottom profiling survey simultaneously for northern part of Salalah port (600 Hectare) and approach channel expansion area (250 Hectare). The result of sub bottom profiling survey was compiled in isopach chart with scale 1 : 10,000.

The pinger data shows the thickness of uncemented sediments comprising sands and gravels with cobbles and boulders. Over most of the survey area, the sediments are cemented calcarenties、which are not penetrated by the pinger. Some of the area was found to be sandy sediments of 1-3 m at surface layer. Weak and soft soil materials could not be find out in entire survey area..

8.7 Geotechnical Surveys

A total of 10 points offshore boring field work was carried out in northeast part of Salalah port including channel and breakwater area covering approximately 600 hectares.

The subsurface condition can be judged hard materials of rocks predominant by this study and previous soil investigation study of existing port. The borehole logs reveal varying near-surface conditions, across the site, which can be generally categorised into following three zones.

(1) On the southern side of the port channel, in the deepest section of the site、boreholes MBH 1 and MBH 2 reveals coarse, alluvial, wadi gravel deposits from seabed to the depths investigated (-25m). The gravel particles are predominantly coarse (to cobble and boulder size) ,well rounded and strong to very strong.

(2) At borehole locations MBH 3 to MBH 5, in water depth about 10 to 15m, on the northern side of the channel, moderately weak carbonate sandstone was encountered beneath relatively thin wadi gravel deposits and seabed sediments. The calcarenite layer generally extends from about –16m to the depth of investigation (-25m) .

(3) Further to the northwest, in the vicinity of boreholes MBH 6 to MBH 10, where seabed elevations range from about –5 to –11m, a chalky limestone formation was encountered from near-seabed to the depth of investigation (-25m) .

According to the result of laboratory test, the rock strength is from 10 kg/cm2 to 100 kg/cm2 which can be dredged by cutter suction dredgers.

9. Socioeconomic Framework of Oman

9.1 Population

The Fifth Five-year Development Plan estimates that the total population will grow by 3.7% per year. If this trend continues, the total population is expected to reach 3.955 million in 2020. On the other hand, the Fifth Five-year Development plan recommends that the population growth rate should be reduced to less than 3%. However, no concrete measures are mentioned to achieve this target in the development plan. The Study Team adopted the latest Omani population growth rate from 1989 to 1998, which is 3.8%. for the population forecast.

Since the growth rate of the non-Omani population is unstable, the growth rate of the non-Omani population can not be estimated by past trends. The Fifth five-year Development plan pursues the Omanisation policy. The Study Team therefore assumes that the non-Omani population will remain constant at the average between 1989 to 1998.

Taking 3.2% as the annual population growth rate, the total population of Oman in the target years is estimated as follows (See Table 9.1.1).

Table 9.1.1 Total Population in the Target Years

('000 persons)

Year	Population	
	Omani	Total
2003	1,975	2,466
2010	2,468	2,959
2020	3,392	3,883

The population of Dhofar in the target years is estimated based on the same value as the average national population growth rate between 1993 and 1998. (See Table 9.1.2) The non-Omani population in the target years is estimated using the same premise in the estimation of national population, namely, the non-Omani population will remain constant at the average between 1989 and 1998.

Table 9.1.2 Population in Dhofar Region

('000 persons)

Year	Population	
	Omani	Total
2003	162	232
2010	194	264
2020	250	321

9.2 Gross Domestic Product (GDP)

The Study Team examined the following three GDP growth scenarios in the target years of this study:

a. High case: the growth rate of GDP gradually increases from the current level to 7.4% in 2020 as targeted in the Fifth Five-year Development Plan.

b. Middle case: the growth rate of GDP is determined by adding the annual growth rate of population and per capita GDP between 1988 and 1998. The growth rate remains constant throughout the period.

c. Low case: the average per capita GDP between 1988 and 1998 is adopted as the growth rate of per capita GDP. The growth rate remains constant throughout the period.

(Figure9.2.1 shows estimated GDP for each case.)

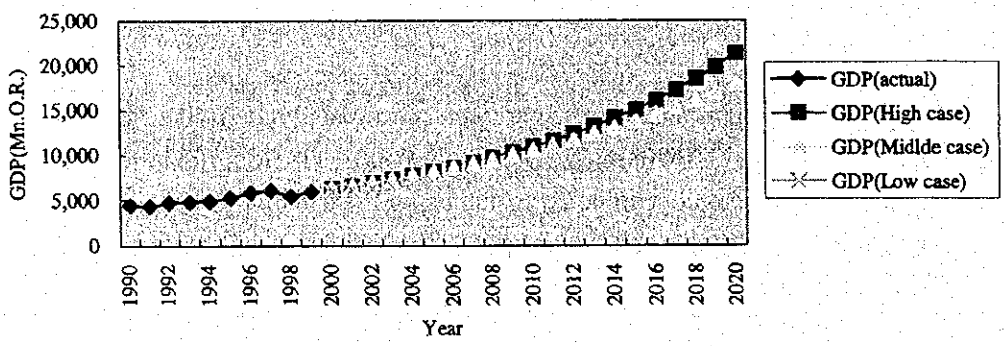

Fig 9.2.1 GDP Estimates at Current Prices

9.3 Scenario Setting

After discussions with officials of MONE, the Study Team prepared the following sets of parameters for the demand forecast of domestic cargo.

(1) GDP estimates in the target years

GDP values in the target years are the same as those estimated in Section 9.2.

Table 9.3.1 GDP Assumptions

Case	Year	GDP (million R.O.)
High case	2003	7,169
	2010	10,712
	2020	20,842
Middle case	2003	6,930
	2010	9,875
	2020	16,379
Low case	2003	5,843
	2010	7,300
	2020	10,033

(2) Regional GDP (GRDP)

Since there is not reliable data to divide GDP to GRDP, the study team uses per capita Omani GDP rates as a basis of the analysis in a later stage of the Study. Per Omani capita GRDP in the Governorate of Dhofar is assumed to be the same value as per Omani capita GDP

(3) GRDP estimates in the target years

Case	Year	GRDP (million R.O.)
High case	2003	588
	2010	842
	2020	1,536
Middle case	2003	568
	2010	776
	2020	1,072
Low case	2003	479
	2010	574
	2020	740

10. Socioeconomic Framework of the Surrounding Countries

10.1 Regional Economic Prospects

(1) Middle East and North Africa

This region was also affected by the Asian Economic Crisis to some extent. Historical plunge in oil prices hit the oil producing countries hard. The World Bank estimates that the economy in this region will pick up again in 2000 and will grow 3.4 % a year during the decade to come. OPEC's decision in 1999 to cut production brought a sharp price increase, and thus supported the oil exporters' economy.

(2) South Asia

Economic growth in this region picked up significantly between 1992-96 following trade and investment liberalization and significant depreciation of real exchange rates. The Asian Economic Crisis impacted on South Asia as well resulting in a slowed growth. This region's economy started to pick up again in 1998 with 5.1% growth. The World Bank predicts moderate growth of 5.2 % a year over the next decade.

(3) Sub-Saharan Africa

The Asian Economic Crisis hit Africa in such areas as private capital flows, terms of trade, and exports market growth. The World Bank estimates that the growth rate hit bottom in 1999 at 2.3 % before rebounding to 3.1 % in 2000. According to the World Bank, people will see their incomes rise by a modest 1 % a year, thanks to annual growth rates of 3.4 % for 1999-2008, well over the 2.4 % in the past 10 years (1989-98).

10.2 The World and the Region in 2020

OECD prepared the future outlook for the world economy toward 2020 in 1997. Here are some extractions from its analytical report.

If governments make only slow progress in liberalization of international trade and finance, annual economic growth could fall to around 2 %, compared with almost 3 % over the last 25 years. Progress would be far more dramatic in the non-OECD world, given its generally lower level of development. Real GDP per capita would be around 270 % above 1995 levels by 2020.

In the HG (High Growth) scenario, world GDP would increase by 2.5 times from 1995 to 2020, with the non-OECD countries accounting for a little under half that increase. In the low growth case, world GDP would less than double. In LG, most of the increase in the non-OECD share of world GDP would reflect growth in Asia.

10.3 Scenario Setting

The Study Team set two economic frameworks for the demand forecast of container cargo. Since GDP growth can satisfactorily explain container cargo growth in most cases, the Study Team will use GDP as a basis of the demand forecast. In setting "High case" and "Low case", the Study Team consulted the economic forecasts conducted by OECD and the World Bank and took into account the latest economic performance after the Asian Economic Crisis.

Table 10.3.1 GDP Growth Forecast and Latest Performance in the Surrounding Region

Region	GDP Growth Forecast		Latest Performance		
	OECD	World Bank	1996-1997	1997-1998	1998-1999
Middle East and North Africa	High growth 7.1%(2001-2010) 6.9%(2011-2020) Low growth 2.2%(2001-2020)	3.4%(1999-2008)	3.7%	3.2%	2.0%
India/South Asia	High growth 7.2%(2001-2010) 6.6%(2011-2020) Low growth 4.3%(2001-2010) 4.2%(2011-2020)	5.2%(1999-2008)	4.7%	5.1%	5.4%
Sub-Saharan Africa	High growth 5.0%(2001-2010) 5.8%(2011-2020) Low growth 2.8%(2001-2010) 2.6%(2011-2020)	3.4%(1999-2008)	3.7%	2.4%	2.3%

Source: The World In 2020 by OECD, 1997, Global Economic Prospects for Developing Countries 2000 by the World Bank, 1999, Asian Development Outlook 1999 by Asian Development Bank

The Study Team set the High and Low growth case cargo after considering the above forecast as well as economic events which took place after OECD estimates were prepared (see Table 10.3.2).

Table 10.3.2 GDP Growth, 2001-2020 (Basis of Demand Forecast)

Region	High Growth	Low Growth
Middle East and North Africa	4%	2%
Indian Sub-Continent	6%	4%
Sub-Saharan Africa	4%	2%

Part 3 Master Plan

11. Port Development Scenario

11.1 Development Target

(1) Process of Scenario Setting

The Study Team concludes that the targets of Salalah port development will basically remain unchanged from the present policy, that is, to handle increasing import/export cargo, to act as an impetus for the development of new industries, and to develop a container transshipment hub.

While the above mentioned targets are instruments of development, the success of the development of Port Salalah depends on whether it will answer the urgent need for Oman to decrease dependence on oil exports through diversifying its economy. It is also important to determine an appropriate demarcation of the roles among the ports in Oman.

Consequently, development scenarios will be formulated placing emphasis on the following parameters: development target of a container transshipment hub, harmonized use of the port area by a variety of port-related activities, and an appropriate phasing plan.

(2) Primary Targets in Port Development

Container terminals

Salalah was selected by Maersk / Sea Land due to its strategic location, admittedly, but diversified port users and increased volume of export/import cargo are needed to ensure economic development of the Hinterland.

With additional terminals, Port Salalah can become a leading container port in the Indian Ocean Rim. And this is a justifiable target given the port's strategic location. However, Salalah will need very deep draft container quays to acquire a dominant status in the region. Considering the ever-enlarging vessel sizes, Port Salalah needs to have container quays to cater for the largest conceivable container vessels toward the target year. Considering the evolution of the shipping business, the Study Team sets an 8,000 TEU vessel as the design ship for the master plan.

Conventional terminals

Conventional terminals should be developed to cater for the needs of the region. In a way, conventional terminals are more closely related to the regional economy than container terminals. The existing conventional wharves handled roughly 1.1 million tons of cargo in 1999, 80% of which was bulk cargo. The main cargo items are fuel, cement, wheat, flour, and cattle feed in descending order.

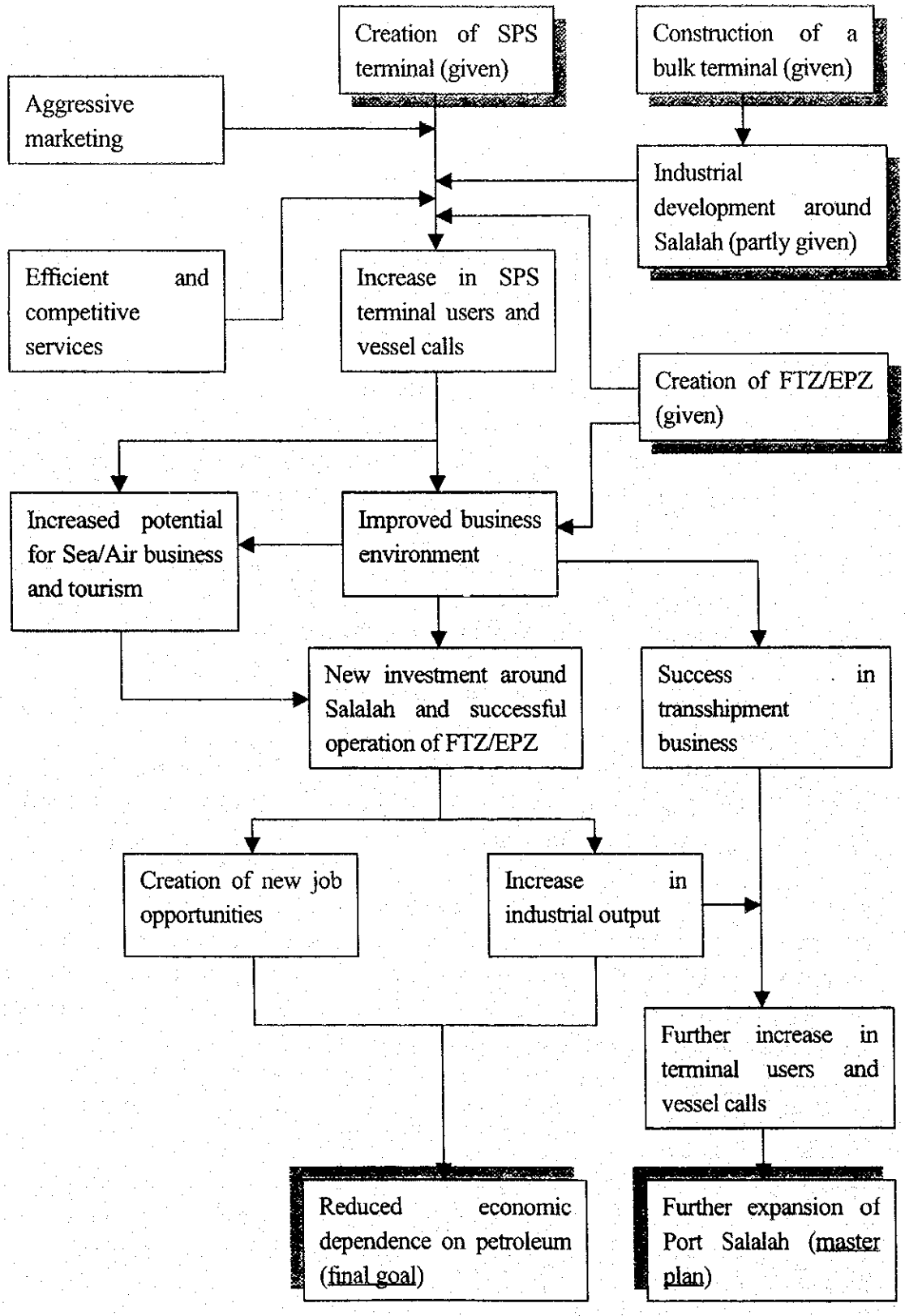

Fig. 11.1.1 Expected Sequence of Events in a Successful Port Development Scenario

Since a new bulk terminal is near completion, Port Salalah will be able to handle a sizable growth of dry bulk cargo and general cargo without further expansion. Taking into account the relatively small population in the catchment area, the scale and pace of the industrial development in the hinterland determines the need for additional conventional terminals. The expansion needs will be further examined in accordance with the demand forecast in a later section.

11.2 Pace of Development

(1) Container Terminal

In order to minimize the risk entailed in the transshipment business, it is desirable for a developer to reach at least a preliminary agreement with a prospective user before embarking on the creation of a new terminal. On the other hand, a transshipment port can not invite a new customer without a certain spare capacity, as the creation of a new terminal takes time.

Although the demand forecast of transshipment cargo will provide a gradually growing cargo projection, the actual demand will grow suddenly when the port succeeds in attracting a new customer. The master plan is required to enable the port to respond to these requirements.

(2) Conventional Terminal

The dimensions and specifications of the conventional terminal widely differ depending on the industry it supports. Prospective industries therefore need to be identified before the planning of conventional terminals.

The new bulk terminal will provide a considerable capacity when it becomes operational. Consequently, the timing of further expansion of the conventional terminal needs to be carefully examined so that it can keep pace with the needs of the industrial development projects without creating an excessive capacity.

11.3 Demarcation of Responsibilities

11.3.1 Port Development and Privatization

In Oman privatization is being promoted as a basic policy of the government in many sectors including the port sector. Privatized ports generally have the following positive points;

1)Efficient management

2)Reduced services cost and increased productivity

3)Decrease of national government expenditure

But they also have some negative points as follows;

1)More emphasis on pursuit of profit than providing public service

2)Restriction of competition within a port

3)Abuse of regulatory function (navigation control, use of port facilities) within a port

Therefore, the national government is expected to undertake appropriate functions in order to take full advantage of the merits of privatization while avoiding the demerits.

11.3.2 Port Management System in Major Ports in the World

In the United Kingdom, Associated British Ports ("ABP") was entirely privatized in 1983 and now manages 23 ports including the port of Southampton. The port of Felixstowe, the largest container port in the country, is also privately owned. In the United Kingdom the central government has no subsidy or financial support system for port development in principle. As private companies, above mentioned management bodies put the first priority on the profit of the company. They are not particularly focussed on regional development.

Port management entities of the port of Singapore consist of MPA(Maritime & Port Authority of Singapore) and PSA(Port of Singapore Authority). MPA was established to undertake legal matters including navigation safety, environmental matters and ship registration. PSA is a port authority and the sole operator of the port. It makes efficient usage of port facilities and equipment. It provides all port services including stevedoring, tug service and pilot service. When it was established, the government held all shares, but it is now in the process of privatization.

In Japan all common user ports are owned and governed by a public port management body, most of which are run by the regional government. The central government is responsible for the overall development and administration policy of Japanese ports. Usually the management body gives priority to regional development rather than its own financial condition, because financial assistance is available through government subsidy.

11.3.3 Port Operation System

Researchers classify various port operation systems in the world into three types ("Operating port", "Tool port" & "Land-lord port" type). In addition, "Private initiative port (BOT)" and "Privately owned port" are also classified as forms of private participation. Each system has its own advantage and disadvantage.

11.3.4 Port Development Framework of Port Salalah

In order to develop and manage the ports efficiently, MOTH is promoting private sector participation in the port sector. To lessen the financial burden of the government and to use the substantial expertise and experience of the private sector are the main objectives of privatization in Oman.

The existing container terminal development of Port Salalah was undertaken under the BOT scheme. Under this scheme, the government invests in infrastructure and leases it to the joint venture (SPS) which procures superstructure and manages, operates, and maintains the terminal. Since the government maintains land ownership and is a board member of SPS as a representative of share holders, the government has some means to control SPS. To balance a private company's profit with public benefit is an important duty of the government.

Taking the view that ports are public assets, the government should play the following fundamental roles in the nationwide port development and its follow-up.

1)To formulate national port development policies, and establish necessary laws and regulations for port administration and development
2)To give advice to port management bodies on port development
3)To establish and coordinate port development plans
4)To allocate public funds for port construction projects

(1)Container Terminal Development

Development bodies are assumed to be GSO, SPS, and a third company. There are some alternatives based on the development bodies of infrastructure and superstructure. The sole management body is assumed to be SPS because it is generally agreed that a single body can manage port activities more efficiently.

(2)Conventional Terminal Development

Conventional terminals cater for the needs of the region. Since the income from conventional terminals is limited, it is difficult to recover the investment including infrastructure only from the port revenue. Therefore, to support regional development GSO should develop necessary conventional terminal infrastructure and set reasonable concession conditions which will allow SPS to set low port charges.

11.4 Interaction between the Port and the Region

11.4.1 Objectives of the Development of Port Salalah

Through the development of Port Salalah, the government hopes to realize two objectives. One is to create job opportunities and increase revenue of the government through the establishment of a transshipment hub port. The other is to promote various industries in the area surrounding the port and the hinterland which will in turn bring many kinds of benefits including job creation and increased incomes.

The development of the hinterland depends on the port activities and incentives in the Free Trade Zone ("FTZ") which GSO is promoting in order to spread the benefits of Port Salalah to all regional areas. In order to encourage the investment of private companies, Port Salalah should provide efficient service and offer low port tariffs and dues to the various customers of the port.

11.4.2 Coordination between the Port Development and FTZ Project

Dubai offers a successful example of coordination between the port and the free trade zone. Jebel Ali Freeport Zone Authority and the Dubai Port Authority are different organizations but both authorities have the same executives and are actually managed as one organization. That is one of the key points in the success of Dubai's Free Zone. In the United States and Europe, many port authorities have free trade zones and manage them directly for port and regional development. It is necessary that port and free trade zone development be well coordinated.

At Salalah, a new joint company, whose shareholders are SPS, GSO, and private sectors, will be established in order to develop, operate, and maintain the FTZ. FTZ Authority, which is a governmental authority, also will be established for the promulgation of rules, regulations, licenses and permits concerning the FTZ.

SPS will be appointed as a project manager of phase I of FTZ under an agreement with the government. Therefore SPS can play a main role in coordinating Port and FTZ planning and development.

For the success of the FTZ, the legal framework in the FTZ area which includes Omanisation, corporate taxes, foreign ownership, repatriation of funds and capital, custom duties, localization norms and other incentives, is very important. It is essential that GSO offers more attractive incentives than competing FTZs in order to attract private investment. Also the compulsory ratio of Omanisation in this area must be set at low level at least during the initial stage of FTZ.

Until the establishment of the FTZ Authority, PEIE is responsible for all legal matters.

Therefore, coordination between SPS and PEIE is a key factor in developing the FTZ. To ensure the success of the FTZ, it will also be necessary to coordinate with government organizations concerned including MOTH, MOCI, MONE, OCIPED, and ROP.

To coordinate port development among SPS, GSO and port users (private sector), GSO already has a plan to establish a Port Planning and Regulatory Committee ("PPRC"). To avoid duplication of the committees and bureaucracy, the functions of PPRC should be expanded to deal with the FTZ issues.

12. Industrial Development Scenario

12.1 Analysis of Industrial Development Potentials and Constraints in Salalah

(1) General

Natural resources available in the region are not so attractive to use them as a major sales point for industrial promotion. There is no sufficient accumulation of industries, which attracts new investments. The primary advantage in promoting industries in Salalah will be its strategic location together with a call of international container trunk line.

(2) Large Scale Industrial Projects in the Sultanate

The large-scale industrial projects prospective in the Sultanate are mostly planned to locate in Sohar and Sur, instead of Salalah. Sohar, in general, is characterized by its industrial port development together with petrochemical related industrial projects, whereas Sur by natural gas based projects due to the existence of LNG plant. Further, Sohar is in an advantageous position compared to Salalah in view of proximity to the GCC markets.

(3) Prospective Markets

The extent of prospectiveness of markets from the standpoint of Salalah will be significantly affected with the comparative position of freight cost to that of Dubai. The current freight rates from Salalah to various markets are more expensive than those from Dubai.

However, assuming that the freight rate from Salalah to each destination will be reduced to 70% of the current freight rate, due to increase in the cargo volume, the prospective position of Salalah to each market will be as follows:

Prospective position of Salalah to Dubai	Markets
Advantageous	E. African Countries, Yemen
Equivalent	Pakistan, Europe, USA, SE Asia
Poor	Iran, CIS, GCC, India

Following three markets can be regarded as the prospective markets:

1) The promotion of industry targeting those markets in the countries on the Indian Ocean Rim, particularly, Yemen, and East African countries, making most of the advantageous position of Salalah in import and export by container. Yemen and East African markets are the focal markets for Salalah, because not only of geological position but also of the historical relationship between Oman and these countries. These markets have potential in terms of population, but the size of the market is rather limited due to the low-income level in these countries. Further, no bank can open the L/C in some of these countries. Nevertheless, if Salalah can take care of these markets with providing facilities and systems convenient for this type of trade, it will enable Salalah to establish a good relationship with these markets. Further, the function of Salalah as the access point of these countries for the international markets should be strengthened. The trade and distribution linkages with Iran and Central Asian Countries will become prospective, if the feeder line networks are developed in the future.
2) Industrial promotion targeting US and European markets, which will become prospective with the call of major international container line. The access to the US and European markets became easier due to the call of major container lines to Port Salalah. Deduction of access time to these markets will improve competitiveness of industries in Salalah, together with reduction of time required for transportation of imported raw materials. In addition, the freight costs to these markets and from the raw material procured points, will be reduced compared to the case where the cargos are transshipped at Dubai. However, it should be kept in mind that the time to be reduced with the container lines will not be so significant for the increased advantage, in that there are many other countries, which are located more conveniently to the target markets (like European markets, and US markets). Thus, there is a need for the industry in Salalah to have some more competitive edge including that of quality and sales prices. One of the potential examples is the garment industry. They produce low-price products for the US markets at present. With production of higher-grade products, they should target the European markets, instead of insisting on price competition with other suppliers.
3) Promotion of industry targeting Southeastern Asian markets and Far East Countries' markets, making most of the freight rate advantage to these markets caused by imbalanced empty container returned to this direction. Processed food, if the proposed integrated food processing industry is established, can find out good markets in these countries. Construction materials using local mineral resources will be another possibility with reasonable prices and quality.

The access to GCC markets may be regarded as a part of domestic market for Oman. However, in view of distance, particularly compared to Dubai, Salalah will not be competitive.

India is a big market particularly for Oman as a whole, because of the following factors:

1. High costs of oil and natural gas
2. High costs of energies
3. Low productivity of manufacturing industry in general
4. Huge population
5. Various types of constraints posed on imports, aiming at preferential conditions for the local industries

However, in view of industry in Salalah, it will not be applicable, in that the industries based on oil and natural gas are mostly located in the North.

(4) Development potential and constraining factors by type of resource

Agricultural resources

The agricultural sector will not provide any major resources for industrial development. The major and critical constraint for development of agriculture in Salalah is insufficient supply capacity of water.

Fishery resources

Fish processing industry may be regarded as one of the most potential industries suitable for promotion in Salalah area, because of variety of fish available, easy access to European markets by container, good reputation on Oman's quality control performance. However, there is a need to confirm the availability of fish resources based on a comprehensive resource study, and a need to improve the fishery system.

Mineral resources

The gypsum resource in the region has high potential for large-scale development. However, there is a problem of shipping facilities at the site. The construction of jetty at the quarrying site for shipment was found difficult due to the weather condition in the monsoon season. The limestone resource is prospective because of its high purity. However, distance to Australia, which is the major international user of limestone, is far.

Redistribution Business

Redistribution would be one of the major potential businesses in Salalah, taking advantage of its convenient location, particularly to the countries on the Indian Ocean Rim. For the successful redistribution business in Salalah, establishment of free zone will play a key role. At the same time, facilities and services catering for small-scale operation of cargo handling at the port will be essential. These redistribution businesses will be the potential seeds for future local production.

Logistics Industry

In addition to the potentials of logistics industries to be promoted by development of redistribution businesses, there are other potentials of logistics industries. These are development of logistics industry related to Internet businesses, and the sea-air link cargo movement.

Tourism Industry

Not only Salalah but also the Sultanate as a whole is rich in potential tourism resources, though they are not developed yet. However, these resources will not be enough to keep tourists stay longer. At the same time, the tourism development has a risk to damage environment and local culture. In order to avoid the above-mentioned risk, and develop the resources sufficient to attract tourists, the country is recommended develop tourism only within the limitation of risk-free level; for example, formulating the tourism attraction in link with Dubai's tourism.

High-technology Related Industry

The market size is still small for electronic/electrical products industry, and automotive industry to establish manufacturing points in the Middle East region. The operation of this industry in Salalah is better to start with trading.

As for the development of IT related industries, Salalah may have the advantage in developing software with various languages for the Middle Eastern and North African countries. However, there are many countries, which are watching the possibility to start with this type of development. There will not be enough time to wait for future potentiality of nurturing the capacity.

12.2 Development Scenario, and Prospective Industries

(1) Development Scenario

The most prospective industry, in view of Salalah's geographically advantageous location combined with the call of international major container lines, will be redistribution businesses. The development of redistribution businesses will lead to increase in local production of these goods, if appropriate encouraging measures are taken. The currently proposed development scenario is making most of this potential as the key for development in Salalah. Namely,

1) Put the primary focus on development of redistribution industry.
2) Establish Free Zone as the major and most effective promotion measure for the redistribution businesses, and under the free zone, provide the promotional conditions and supporting measures for the potential investors, for their investment and operation.

3) Formulate linkages among the related zones in and adjacent to Oman, to strengthen the position of Salalah not only as the regional redistribution center, but also as the access point to the international market from the region.
4) Encourage local production, taking advantage of business experiences accumulated through the redistribution businesses.

(2) Prospective Industries

Following industries are recommended as the prospective industries in Salalah.

1) Redistribution businesses with wholesaler's function, targeting Yemen and East African countries

There will be two types of industries. Both of them play a role of distributors, namely, collection of goods, and distribution to the customers, together with the functions of simple processing, packaging, and sub-packaging.

1. Import of goods to meet the demand in Yemen, East African countries, and other markets prospective to Salalah by container in an economic lot size, store, sub-packaging if necessary, and export (distribute) to the customers at their demand in a size they require. The products, which might be categorized under this, include, for example, food, pharmaceuticals, clothes, construction materials, plastics products, electrical products and parts, and automotive parts, etc.
2. Import (collect) of materials in a small lot size from Yemen, East African countries, and other countries, which regard Salalah as their access point to international market, store, and export to the markets in Europe, US, and Southeastern Asia with container. Salalah should not only play a role of distribution point, but also function to refine, process, repack and improve the quality to meet the demand in the markets. These include, for example, spices, tea, etc. The fish or marine products from Yemen are also categorized under this, though it requires establishment of a system of strict quality control.

2) Development of food industries as the integrated food processing base, using imported grain and oil crops, which bases flour milling, oil refining, animal feed processing, while having an outlook of downstream processing of noodles and confections, etc.

- Salalah has the base of this kind of development with existing operations.
- The scale of economy plays an important role in its competitiveness, particularly in importing raw material grains. Salalah is a good location, which can provide sufficient space to develop such integrated project.
- The import of wheat flour by Yemen and East African countries alone will be big enough to justify this kind of operation.

- Downstream processing of processed food has potentials, targeting Southeast Asian markets.

3) Development of quick response and high quality garment industry targeting EU markets

- The existing garment industry in Muscat area has a base of competitive edge with reputable quality control and reliable delivery, meeting the client's demand.
- Garment industry is the labor-intensive industry, and has high potential of absorbing surplus labor.
- In the initial stage of operation, in order to maintain the quality level of production, it is essential to use skilled labors, which can be obtained from such countries as Sri Lanka.
- Oman has excellent communication system, which will be one of the advantages to establish this kind of operation, since one of the key factor for successful operation is quick response to the orders from buyers.

4) Promotion of industries to meet the import demand in the markets in Southeastern Asia

- Construction material manufacturing industry.
- Various kinds of industrial and consumer products. At present there is a flood of import from China particularly for price-conscious consumers. If Oman can export the products with quality at competitive prices, they can find out the niche markets in these countries. These include, for example, quality paper products, printed materials, etc.

5) Tourism development with link to that of Dubai

6) Development of fish processing industry targeting European markets, with improvement of accessibility due to the call of container lines

The prospective industries discussed in the above sections are the industries, which have high potential of local production because of certain factors, except for the case of redistribution businesses. In terms of potentiality of local production, there will be various products apart from the above, which are handled by the redistribution businesses, and expected to be viable for local production. These include various kinds of chemicals and chemical products, plastics products, paper products, metal products, etc., which are mostly related to construction and building materials, daily necessities, and foods. These products, or industries to produce these products, are not discussed here. Rather, the growth of these industries is already assumed as a natural tendency.

13.1Evolution of International Shipping

(1) Alliances

Globalization of the economy and the low profit ratio of the shipping business will inevitably result in the further merger of alliances. In the quite near future, say within three to five years, the scale of an alliance will be as shown below:

i.	Total TEU/Year	5,000,000
ii.	Number of Vessel Deployed	200
iii.	TEU onboard Vessel	500,000 to 700,000

(2) Vessel Size

As the players in the field decrease, competition among the alliances is getting fiercer. The alliances seek economies of scale to reduce the transport cost. The container industry has therefore witnessed a seemingly never-ending increase in the size of vessels in recent years. Table 13.1.1 shows how the size of the fleet of Maersk Line has developed in these ten years.

Table 13.1.1 Maersk Fleet Development in Last 10 Years

Type of Ship	A	L	M	K	S	?
LOA	239.26m	270.00m	294.12m	318.00m	346.98m	390.00m
BREADTH	30.50m	32.20m	32.20m	42.80m	42.80m	47.70m
DWT	37,872	53,690	60,640	90,456	104,696	115,000
BHP	35,000	43,000	49,000	75,640	82,792	91,100
TEUs	2,362	3,466	4,297	6,000	6,600	8,000
REEFERS	120	300	500	700	800	960
DRAFT	12.20m	13.00m	13.50m	14.00m	14.50m	16.00m

Source: Maersk Line, JICA Study Team

(3) Imbalance of Boxes

Imbalance of boxes exists in all the container trunk lines in the world. This issue has a vital importance for a shipping company to find a way to survive. Economies of scale in global liner networks point to increasing use of hubs to sustain long and thin liner trades.

13.2 Capacity of the Existing Port

13.2.1 Container Terminal

Container terminals dedicated to transshipment show very high productivity, nearly 2,000 TEUs/m/year. Taking Singapore, where transshipment accounts for more than 90 % of the cargo, as an example, its container terminals handle 1,726 TEUs/m/year. If we apply this figure to a typical 350m quay with alongside depth of 15m, it yields roughly 600,000 TEUs/berth/year. On the other hand, the per-crane productivity in Singapore is roughly 150,000 TEUs/year. Since Singapore achieves this high productivity with the quay depth ranging from 9.8m to 15m, SPS's target of 500,000 TEUs/berth/year with 16m quay will be attainable if the terminal is properly operated.

Latest productivity records indicate that the SPS terminal achieved the gross productivity of 25 - 26 moves/hour/crane, or 41 – 42 TEUs/hour/crane. The quay crane productivity showed a remarkable increase in 2000, which well surpasses that of Singapore.

Rough capacity estimates indicate that the quay-side capacity and yard-side capacity are almost balanced even for export-import containers. Since transshipment accounts for most of the cargo, the yard-side capacity is much larger than the quay-side capacity in this terminal. It is concluded that the existing four berths can handle up to two million TEUs/year even if local cargo increases notably. When that target is achieved, the berth occupancy ratio of the present terminal will be 53% if we assume the same per-crane productivity (22 gross moves/hour).

(Quay-side capacity) = 2,280,000 TEU/year
(Yard-side capacity with no transshipment) = 2,050,000 TEU/year
(Yard-side capacity with 80% of transshipment) = 3,410,000 TEU/year

13.2.2 Conventional Terminal

Conventional cargoes are handled at berths 1-4. The berth occupancy ratio of berths 1-4 based on the vessel arrival records in 1999 was as shown below:

Berth	Occupancy Ratio (%)
No.1	61
No.2	16
No.3	52
No.4	29
Average	40

If the number of vessels handling miscellaneous goods and non-cargo handling vessels remains constant, berths 1-4 can additionally handle slightly less than the present volume of the four

main items, or roughly 500,000t/year, with the berth occupancy of 60%.

Productivity of a bulk terminal widely varies depending on the characteristics of the vessel and the cargo. Capacity of the new bulk terminal is therefore examined taking into account the demand forecast in a later section.

13.3Demand Forecast of Transshipment Cargo

13.3.1 Regional Competition

(1) Competition with Aden

Port of Aden benefits from a huge, sheltered, deep-water harbor, and a convenient location relative to the trunk line. This port boasts minimum deviation from the trunk line. The container terminal has a draft of 16m. Consequently, Aden has the potential to become Salalah's strongest competitor. However, political instability and poor economic performance will continue to hamper the development of Aden.

(2) Competition with Gulf Ports

Among the Gulf ports, Dubai is by far the largest, and thus will continue to be the main competitor against Salalah. Dubai's success was made possible by the government through an appropriate policy mix. The biggest advantage of Dubai is a large hinterland which the Jebel Ali Free Zone serves. No other port in the Middle East has a comparable hinterland at present.

However, a call to Dubai requires an approximately 3.5 day deviation from the main East-West trunk route. Consequently, it will gradually become a feeder port as vessels become larger.

(3) Competition with Indian/Sri-Lankan Ports

JN, Mumbai, and Colombo are potential competitors with Salalah if properly developed. This is because they are located close to the main east-west trunk line. However, these ports are still either underdeveloped or face security issues. For these reasons, they will be not competitive with Salalah for the time being.

(4) Competition with Singapore

Singapore is the leading container port in the world and thus should be considered as a competitor for every port. All the prospective customers for Salalah call at Singapore. Therefore service levels of Salalah need to be competitive in every aspect including tariff and feeder network.

13.3.2 Salalah Port Proper Elements

(1) Feeder Service Network

Port Salalah is currently served by 15 feeder services on a weekly basis. It is still not comparable with Singapore, which is served by 70-80 feeder vessels weekly. To become a successful transshipment hub port, Salalah must have a sufficient feeder service network.

(2) Port Development Plan

Competition in the region will become fierce as the various port development projects either planned or in progress result in increased port capacity.

(3) Transshipment Cost Comparison

The Study Team carried out a basic cost comparison study to clarify how competitive Salalah can be. The marginal transportation cost per TEU was estimated to be US$144 for Salalah and US$160 for Dubai. However, it should be pointed out that there are limits to the simple model cost comparison since many factors such as evolutionary change in managerial philosophy and sudden development of marine technology can not be quantified.

13.3.3Previous Study

KPMG's demand projection was made available to the Study Team. The forecast method was as follows:

Step 1: Grasp the size of world container trade and regional container trade.
Step 2: Estimate the current regional transshipment market.
Step 3 Estimate the current Salalah transshipment market.
Step 4 Forecast the future figure of Salalah transshipment containers.

It should be noted that the consultant relied on interviews with officials of shipping companies in Dubai and the demand projection of SPS. The results are shown below.

	Regional market (TEUs)	Salalah's demand (TEUs)
2005	6,512,532	2,973,000
2010	9,569,046	2,973,000
2020	20,658,854	2,973,000

Salalah's demand remains constant after 2005 as this study focused on an expansion of two berths.

13.3.4 Demand Forecast

(1) Methodology

Demand forecast of transshipment containers is conducted based on the development scenario

set up in section 10.3.

Step 1: To review the total container throughput in the region including transshipment and local cargo.

Step 2: To estimate the economic growth rate in the region

Step 3: To find a co-relation between the container throughput and economic growth. Then, to estimate the total throughput.

Step 4: To estimate the transshipment incidence and calculate the volume of transshipment container.

Step 5: To estimate Salalah's demand according to the three levels of Salalah's competitiveness

Summary of Step 1-3

High Economic Growth Case and Low Economic Growth Case for the three Regions are summarized in Table 13.3.1 and 2.

Table 13.3.1 Container Throughput Outlook for High/Low Cases of the Three Regions

(Short Term: 2005, 1000 TEU)

Region	High Growth	Low Growth
Middle East	15,185 (59.2%)	11,482 (57.8%)
Indian Subcontinent	5,277 (20.6%)	4,559 (22.9%)
East/South Africa	5,177 (20.2%)	3,826 (19.3%)
Total	25,639 (100.0%)	19,867 (100.0%)

Table 13.3.2 Container Throughput Outlook for High/Low Cases of the Three Regions

(Long Term: 2020, 1000 TEU)

Region	High Growth	Low Growth
Middle East	35,775 (57.9%)	19,088 (56.4%)
Indian Subcontinent	12,369 (20.0%)	7,750 (22.9%)
East/South Africa	13,689 (22.1%)	7,027 (20.7%)
Total	61,833 (100.0%)	33,865 (100.0%)

Step 4

The following assumptions are set for the transshipment container throughput at Salalah.

1. Panama Canal will not be widened and remains as it is at the time of 2020.
2. As a result, major East/West shipping routes are : Asia/North America, Asia/Europe and Europe/North America.
3. Imbalance of containers in the above major routes still exists.
4. The largest ship size is 8,000 TEU, with a length of 390m, a beam of 58m (22 boxes across), and a maximum loaded draft of 16m.
5. The overall transshipment containers' ratio in the three region market is assumed to be 25 %, thus the gross container throughput is a half of the total throughput.

Transshipment container throughput in the region is shown below:

Short Term: 2005	High Growth Case	12,820 thousand TEU
	Low Growth Case	9,934 thousand TEU
Long Term:2020	High Growth Case	30,917 thousand TEU
	Low Growth Case	16,933 thousand TEU

Step 5

Salalah's competitiveness and its share in the regional market are closely related. Salalah's market share was assumed as follows:

Salala's competitiveness	Salalah's market share
Strengthened	increases to 30 percent
Status quo	remains at 20 percent
Weakened	decreases to 15 percent

The above shares are combined with the previous figures of High and Low cases in Table 13.3.3.

Table 13.3.3 Demand Forecast of Transshipment Containers at Salalah

Term	Economic Growth	Transshipment Market in the Region (thousand TEU)	Salalah's Strategic Position	Salalah's Share in the Market	Throughput of Salalaah (thousand TEU)
Short Term (2005)	High	12,820	Strengthened	30 %	3,846
		12,820	Status quo	20 %	2,564
		12,820	Weakened	15 %	1,923
	Low	9,934	Strengthened	30 %	2,980
		9,934	Status quo	20 %	1,987
		9,934	Weakened	15 %	1,490
Long Term (2020)	High	30,917	Strengthened	30 %	9,275
		30,917	Status quo	20 %	6,183
		30,917	Weakened	15%	4,638
	Low	16,933	Strengthened	30 %	5,080
		16,933	Status quo	20 %	3,387
		16,933	Weakened	15 %	2,540

13.4 Demand Forecast of Domestic Cargo

13.4.1 Methodology

There are two different methods of forecasting demand for port traffic in general. One is the so-called macro forecast method on the basis of socioeconomic frameworks in the catchment area of the port, and the other is the so-called micro forecast method on the basis of the characteristics of cargo flow by each commodity group of cargo.
The former method forecasts the total cargo volume as a whole by statistical correlation between the cargo volume and socioeconomic indices such as GDP of the catchment area of the port and/or population, and past time trend. The latter one is a cumulative method forecasting the cargo volume based on analyses of the patterns of major commodities individually (related indices, the forecast demand, supply situation and so on).

13.4.2 Catchment Area for Domestic Cargo

Many factors are considered in determining the catchment area of domestic cargo handled in a port. The catchment area depends on such factors as geographical condition around the port, the level of commercial activities in the related area, transportation networks, total transport cost and the level of service in other ports located around the port. Theoretically, the catchment area of a port varies according to the kind of cargo and sometimes may shift in the course of regional development. The catchment areas of adjacent ports, especially at their outskirts, sometimes overlap each other. In this study, the geographical profile, transportation network, the level of commercial activities in the related area and land transport cost are reviewed and then the catchment area of Salalah port is evaluated considering total transport cost.

The catchment area of Salalah port for bulk and break bulk cargo is assumed to be the Governorate of Dhofar, mainly the Wilayat of Salalah. The catchment area for container cargo is assumed to be the Governorate of Dhofar and Al Wusta Region.

13.4.3 Traffic Demand Forecast

(1) Macro Forecast

1) Import and Export Cargo of All Oman

The correlation between import cargo (excluding cement) and export cargo and GDP is given in the following equation.
- Import Cargo Excluding Cement of All Oman

$$Y = 0.69458 \times X - 783.673$$

(R^2=0.981, Dummy1 on in 1993 and Dummy2 on in 1996&1997)

Where, Y : Import volume of all Oman (1,000 ton)
X : GDP of Oman (Million R.O)

- Export Cargo of All Oman

$Y = 0.33086 \times X - 839.063$ (R^2=0.981, Dummy1 on in 1998)

Where, Y : Import volume of all Oman (1,000 ton)
X : GDP of Oman (Million R.O)

Table 13.4.1 Summary of Import and Export Cargo Volume of All Oman (Macro Forecast)

(Unit : 1,000 ton)

Year	Import (Excluding Cement)			Export		
	Low Case	Middle Case	High Case	Low Case	Middle Case	High Case
2003	3,745	4,499	4,666	1,094	1,454	1,533
2010	4,757	6,545	7,127	1,576	2,428	2,705
2020	6,655	11,063	14,163	2,481	4,580	6,057

3) Import and Export Cargo Volume in Salalah Port

Import and export cargo volume handled in Salalah port is simply estimated based on the following assumption.

a) All cargo to/from the Governorate of Dhofar utilizes the port of Salalah
b) The share of cargo volume from the Governorate of Dhofar is the same as that of GDP to all Oman

Table 13.4.2 Summary of Import and Export Cargo Volume of Salalah (Macro Forecast)

(Unit : 1,000 ton)

Year	Import (Excluding cement)			Export		
	Low Case	Middle Case	High Case	Low Case	Middle Case	High Case
2003	307	369	383	90	119	126
2010	374	515	560	124	191	213
2020	491	815	1,044	183	338	446

(2) Micro Forecast

1) Premise

In Chapter 12, future industrial activities in the hinterland are evaluated by HS (Harmonized System) Code, and recommended production volumes and the level of realization are given individually. According to this evaluation, the following industries would generate a large volume of sea cargo.

a) Cement	b) Cereals	c) Animal Feed
d) Vegetable Oil	e) Fish Processing	f) Calcined Gypsum
g) High Purity Lime Stone	h) Textile and its Articles	i) Re-export

Table 13.4.3 shows the cargo volume handled in Salalah port in 1999 including imported/ exported cargo to/from the factories of a)cement, b)wheat and flour, c)animal feed, and d)vegetable oil. The share of these cargoes was more than 80 % of total import/export cargo (607,000ton/741,000ton). The cargo from/to these eight industries and re-export are, therefore, forecasted individually and the other cargo volume is forecasted as other general cargo in total, including the cargo to/from the recommended industrial activities in the hinterland which is not shown in above a)-i) industries.

Table 13.4.3 Cargo Volume Handled in Salalah Port in1999 with Origin/Destination

(Unit : 1,000 ton)

Origin/Destination	Export		Import	
Dhofar Cattle Feed	Cattle Feed(Break)	1	Cattle Feed(Bulk) Cattle Feed(Break)	16 19
Raysut Cement	Cement(Bulk) Cement(Break)	344 86	Bozalani	7
Salalah Mills	Flour(Break) Wheat(Bulk)	36 3	Wheat(Bulk)	85
Vegetable Oil			Palm Oil	10
Oman Drilling			Fly Ash / Bentonite	8
Dhofar Marble & Granite	Build Material	42		
PDO and Others	Pipe	2	Pipe	18
Other General Cargo		17		21
Sub Total		**531**		**184**
Container (TEU)		706		1,927
Container (1,000 ton)*		7		19
Total		**538**		**203**
Domestic Cargo	Loading		Unloading	
Fuel		Nil		398
Grand Total		**538**		**601**

Note : The weight of container per TEU is approx. 10ton based on the statistical data of container handled in Sultan Qaboos port.

Source : SPS (Salalah Port Service)

2) Forecast Cases

According to the industrial development scenarios in the hinterland given in Chapter 12, the cargo volume is forecasted and summarized for the following three cases.

Case 1 : Without case,
Case 2 : Scenario(1), and
Case 3 : Scenario(2)

3) Summary of Micro Forecast

The results of the micro forecast are summarized in Table 13.4.4.

Table 13.4.4 Summary of Micro Forecast Cargo Volume

(Unit : 1,000 ton)

Case	year / Style	2003		2010		2020	
		Import	Export	Import	Export	Import	Export
Case 1	Container	50	83	86	183	145	316
	General	52	183	48	222	44	247
	Bulk	178	296	237	360	310	480
	Total	**280**	**562**	**371**	**765**	**499**	**1,043**
Case 2	Container	585	618	783	863	1,005	1,161
	General	56	187	60	233	64	269
	Bulk	178	296	666	772	830	980
	Total	**819**	**1,101**	**1,509**	**1,868**	**1,899**	**2,410**
Case 3	Container	1,118	1,151	1,458	1,544	2,022	2,188
	General	60	191	60	236	72	277
	Bulk	178	296	666	772	830	980
	Total	**1,356**	**1,638**	**2,184**	**2,552**	**2,924**	**3,445**

(3) Cross Check of the Result

For import cargo, there is only a slight difference between Case1 of the micro forecast and the Low Case of the macro forecast, but the cargo volumes of Case 2 and Case 3 in the micro forecast are quite larger than that of the High Case in the macro forecast. For export cargo, the difference between the micro forecast and macro forecast is quite large. The scenarios of industrial development in the hinterland given in Chapter 12 include a kind of evolution of economy in the catchment area due to the new container pub port. In this case, the regression analysis method adopted in the macro forecast, in general, does not give an appropriate result. The result of the micro forecast is, therefore, more reasonable for further study.

(4) Container Volume

The projected container cargo volumes are converted into loaded container volume in TEU based on average cargo weight per TEU at Sultan Qaboos port. The average cargo weight per TEU from 1995 to 1999 is 10.1 tons/TEU and it is assumed that this figure is the same for import and export container in Salalah port until target year. According to the container volume handled in Dubai port in 1997, the empty container (empty/loaded) ratio of landed and shipped were 21.5% and 50.5% respectively, and the total volume of landed and shipped was almost balanced. The forecasted exported container cargo volume is larger than imported in Salalah port and the empty

container ratio of exported container volume is assumed to be 21.5%. It is also assumed that an equal numbers of import and export containers in TEUs will be handled at the port.

Table 13.4.5 Container Volumes Handled in Salalah Port

		2003		2010		2020	
		Import	Export	Import	Export	Import	Export
Case 1	Container Cargo Volume (1,000 ton)	50	83	86	183	145	316
	Loaded Container Volume (1,000 TEUs)	5	8	9	18	14	31
	Empty Container Volume (1,000 TEUs)	5	2	13	4	24	7
	Total (1,000 TEUs)	10	10	22	22	38	38
	Grand Total (1,000 TEUs)		20		44		76
Case 2	Container Cargo Volume (1,000 ton)	585	618	783	863	1,005	1,161
	Loaded Container Volume (1,000 TEUs)	58	61	78	85	100	115
	Empty Container Volume (1,000 TEUs)	16	13	26	18	40	25
	Total (1,000 TEUs)	74	74	104	104	140	140
	Grand Total (1,000 TEUs)		149		208		279
Case 3	Container Cargo Volume (1,000 ton)	1,118	1,151	1,458	1,544	2,022	2,188
	Loaded Container Volume (1,000 TEUs)	111	114	144	153	200	217
	Empty Container Volume (1,000 TEUs)	28	25	41	33	63	47
	Total (1,000 TEUs)	138	138	186	186	263	263
	Grand Total (1,000 TEUs)		277		371		526

(5) Fuel

1) Domestic Consumption

The port handled about 400,000 tons in total in 1999, and the average annual growth rate for the past 7 years is about 6%. All fuels are shipped from the Muscat refinery for local consumption of aircraft, vehicle and electric power station in the Governorate of Dhofar. The average shares of Jet (A1), Gasoline, Gas Oil and Light Fuel are about 10%, 20%, 60%, 10%, respectively in 1999. The major users of Gas Oil are electric power stations and private factories in Dhofar Region at present. Natural gas will be supplied by pipeline by the year 2003 and the Ministry of Electricity and Water already has a plan to build electric power stations fueled by natural gas. After natural gas is supplied by pipeline, all private factories in Salalah area, which are now using gas oil for operation, will also switch to natural gas.

It will be assumed that the recent growth rate of 6 % will continue for all products except Gas Oil. After the switch to natural gas, the need for Gas Oil will be eliminated and thereby the total consumption of fuel in Salalah area will be reduced by 40%.

2) Bunkering

Salalah port is located near the east-west trunk line and there is a large container transshipment terminal, and therefore there is some possibility to become a principal bunkering port in the Middle East area. The cost competitiveness to Singapore and the size of demand, although, should be evaluated thoroughly. It could be optimistically forecasted that the volume of bunkering would be between 3% - 5% of total cargo throughput.

Table 13.4.6 Summary of Fuel Demand Forecast Volume

(Unit : 1,000 ton)

Year	2003	2010	2020
Domestic Consumption	200	300	540
Bunker	0.3 – 0.5 × Volume of Container (TEUs) / 1,000		

(6) Cruise Ship

Based on the data given in "Complete Guide to Cruising & Cruise Ships", the average annual growth rate of the number of cruise passengers from 1990 to 1998 is more than 8 percent. This growth mainly depended on less than 7 night duration categories which were promoted by introducing low price cruise and Fly-Cruise packages. The duration of cruises calling Salalah port is, in general, longer than 7 nights 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 in Salalah port is assumed to be between 4% and 6 % per annum.

Twenty-three cruise ships called Salalah port in 1999, but this number has varied from year to year because several numbers of Roaming Ships were included. For example Sultan Qaboos port was called by 13 ships in 1995, 8 ships in 1996, 23 ships in 1997, 16 ships in 1998 and 21 ships in 1999. In the forecast for Salalah port, it is assumed that the number of calling cruise ships is 20 in 2000.

Table 13.4.7 Number of Calling Cruise Ships

(Unit : Ships)

Year	2000	2003	2010	2020
Cruise Ships	20	22-24	30-36	44-64

13.4.4 Vessel Size Forecast

(1) Vessel Size Forecast

Considering the enlargement trend of the vessel size, the new largest container vessel employed on the Europe/Asia route and the draft of the new bulk terminal, the average sizes of vessel in target years and loading ratio are forecasted.

Table 13.4.8 Average Sizes of Calling Vessels and Loading Ratio by Type

Vessel Type	Loading Ratio (%)	Average Size (DWT)		
		2003	2010	2020
Bulk	70	15,000	30,000	30,000
General	60	3,000	3,500	4,200
Container				
Mother	40*	5,000(TEU)	5,700(TEU)	7,000(TEU)
Feeder	140*	1,000(TEU)	1,200(TEU)	1,400(TEU)
Fuel	80	10,000	10,000	10,000

Note : * Unloading + Loading
Source : Estimated by JICA Study Team

(2) Number of Calling Ship

Based on the result of demand forecast Case 2, the number of calling vessels by type in target years are calculated. About one hundred non-trading vessels called for the purpose of bunkering, sheltering and others. In addition, about two hundred fifty launches called in 1999. The same number of non-trading vessels and launches is assumed to call up to the target year.

Table 13.4.9 Summary of Number of Calling Vessels

Year / Type of Vessel	2003 (2005)*			2010			2020		
	Cargo Volume (1,000ton)	Average Size (DWT)	Number of ship call	Cargo Volume (1,000ton)	Average Size (DWT)	Number of ship call	Cargo Volume (1,000ton)	Average Size (DWT)	Number of ship call
Bulk									
Cement	303	10,000	43	369	15,000	35	492	15,000	47
Other Bulk	171	15,000	16	1,069	30,000	51	1,318	30,000	63
General									
Ships	192	3,000	110	243	3,500	116	283	4,200	112
Launches	50	-	250	50	-	250	50	-	250
Container	(1,000TEU)	(TEU)					(1,000TEU)	(TEU)	
Mother	1,580	5,000	790				3,140	7,000	1,121
Feeder	1,580	1,000	1,128				3,140	1,400	1,602
Fuel**									
Domestic	200	10,000	25	300	10,000	38	540	10,000	68
Bunkering	500	50,000	12	-	-	-	1,880	100,000	23
Cruise Ship***			22-24			30-36			44-64
Non-trading vessels			100			100			100

Note : * The figures for container is in the year 2005. ** See Table 13.4.6 *** See Table 13.4.7